PRELIMINARY DRAINAGE REPORT

TT. 16397

CITY OF VICTORVILLE

June 11, 2018

Prepared for:

R.Y. PROPERTIES

REGISTERED PROFESSIONAL ENGINEER
JIMMY J. FRY
NO. C040692
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

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DISCUSSION AND SUMMARY – Offsite Drainage – TRACT 16397

INTRODUCTION:

Tract No. 16397 is an 80 acre, 10 phase subdivision located in the western portion of Victorville, owned by R.Y. Properties. It is bounded by Dos Palmas Road on the north, Mesa View Drive on the east, Bellflower Street on the west and vacant property on the south. This study analyzes the offsite drainage that flows along a seasoned drainage course (blue stream) that is located approximately 1,000 feet east pf Bellflower Street. This 341 lot subdivision is designed to handle this drainage course within a 180 foot wide drainage lot. A 110ft wide dirt bottom, reinforced concrete side sloped trapezoidal channel will direct the runoff through the tract with a double-cell, 36 foot span x 8.17 foot rise con / span pre-cast concrete bridge arch at Dos Palmas Road.

OFFSITE HYDROLOGY:

The upstream drainage area starts along the north side of the Cajon Summit. These upper drainage areas drain to some railroad tracks that are shown on our Drainage Map. Field investigation shows that the tracks will act as a detention basin with various pipes and culverts that outlet the runoff to the north. No evidence of overtopping was seen in the field. We have taken the conservative approach and shown the flow that goes under the railroad tracks by using the maximum ponding height behind the drainage pipes/culverts.

The middle drainage area starts at the railroad tracks and ends at the California Aqueduct. Various concrete overchutes allow the runoff to go across to the north.

The lower drainage area starts at the California Aqueduct and ends at the south tract boundary where the calculated runoff will be directed in an improved dirt bottom, concrete side sloped trapezoidal channel. This drainage study will show that approximately 7,953 cfs will be conveyed through the tract.

ON-SITE DRAINAGE

The onsite flows from the proposed subdivision located west side tributary area of the proposed trapezoidal channel drain to the northeast corner of the site to Detention Basin 2 located at the intersection of Dos Palmas Road and Trapezoidal Channel with a Catch basins inlet at the adjacent streets, and an outlet of 18in Dia. R.C.P. outflow towards trapezoidal channel. Basin 2 will retained the 2-yr, 24-hours Volume as per W.Q.M.P. required volume capture. The maximum outflow from this basin will be equivalent to the existing pre-developed condition runoff.
The other onsite flows from the proposed subdivision located at the east side tributary areas of the proposed trapezoidal channel drain into 2 separate directions towards Basin 2 & Basin 3 relative to existing pre-developed condition flowline, each basin have an inlet on to adjacent street catch basins. The street capacities were evaluated for the proposed design. A six inch curb on most interior streets of the subdivision is sufficient to convey

the 10-year flows below the top of the curb, and within the right of way for the 100-year storm. An 8 inch curb will be required along Dos Palmas Road, Bell Flower Street and Mesa View Road to meet these same requirements. The street capacity calculations for the proposed subdivision are contained in pages xxx - xxx.

HYDROLOGY METHODOLOGY

The calculated run-off flows are depicted on the enclosed Drainage Maps. All run-off values are calculated using the rational method and the Unit Hydrograph Analysis as outlined in the August 1986, San Bernardino County Hydrology Manual, assuming:

a) 100 year storm frequency.
b) Onsite 1-hour rainfall intensity = 1.10 in/hr., 24-hour rainfall intensity = 4.96 in/hr. Per Station Victorville Ca. of the NOAA Atlas 14, Volume 6, version 2 SAN BERNARDINO COUNTY FLO.
c) Antecedent Moisture Content value (AMC) of III for Rational Method and (AMC) of III for the Unit Hydrograph per ADD -1 (AMC) 5day Rainfall of the S. B. County Hydrology Manual.
d) Slope on the intensity /duration curve = 0.7 desert, Per Figure D-3 of the S. B. County Hydrology Manual.
e) Soils group "A" Per Soil Map of the USDA Natural Resources Conservation Service.
f) Residential cover ranges from 1 du/2.5ac (developed condition) at the upper area to 4.0-5.0 du/ac (developed condition) at the lower area.

All flows were calculated using "RSBC.EXE" & UNSBC.EXE, a San Bernardino County Rational Hydrology Program by Civilcadd/Civildesign engineering software, version 7.1, 1989-2005.

HYDRAULIC METHODOLOGY

All computed depths of flow were based on the manning's equation.
Using VANGO Alpha Operating System, Version 7.2-1 software for street section flow capacity.

Manning calculations for typical cross section capacities are based on the following:

1. City of Victorville standard concrete curb and gutter:
2. A manning's roughness coefficient of 0.015 for roadway and 0.017 for parkway.
3. Curb opening inlet capacity, per Bureau of Public Roads Division Two Wash., D.C. formulas and nomographs.
4. Hydraulic Toolbox 4.1, July 2013 by the Federal Highways Administration.

CONCLUSIONS:

The upstream drainage areas contributing to the blue stream drainage course has been analyzed by the Synthetic Unit Hydrograph Method to determine the approximate storm flows go through Tract 16397. We conclude that approximately 7,953 cfs in a 100 year, 24 hour storm event could come from the south in the blue stream. Tract No. 16397 plans will show adequate channel improvements to carry this flow through this subdivision. Some upstream and downstream grading is needed and shown on the plans

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JOB RY-0324

CALCULATED BY DATE 12/15/2017
CHECKED BY DATE

DESCRIPTION TR. 16397
City of Victorville

TIME OF CONCENTRATION

	Existing (Pre) Tc (min) Rational Method				Proposed (POST) Tc Rational Method			
	DA1	DA2	DA3		DA1 DMA-A	DA1 DMA-B	DA2 DMA-A	DA3 DMA-A
Storm Event	AA5 to AA6	AA3 to AA4	AA1 to AA2		A8a - A11b	A12a-a12b	A5a-A7	A1a-A4
2-Year	26.46	46.18	30.32		13.82	15.00	13.85	12.48
10-Year	24.50	40.06	28.01		13.49	14.68	13.13	11.98
100-Year	24.29	27.21	27.12		13.49	16.27	12.66	17.83

RATIONAL METHOD

	Existing (Pre) RATIONAL METHOD Q Flow Rate				Proposed (POST) Q Rational Method			
	DA1	DA2	DA3		DA1 DMA-A	DA1 DMA-B	DA2 DMA-A	DA3 DMA-A
Storm Event	AA5 to AA6	AA3 to AA4	AA1 to AA2		A8a - A11b	A12a-a12b	A5a-A7	A1a-A4
2-Year	3.70	1.80	2.03		11.20	2.90	8.40	12.20
10-Year	18.50	6.50	14.00		27.20	6.10	20.50	28.00
100-Year	40.10	21.80	31.20		52.60	11.84	39.20	52.90

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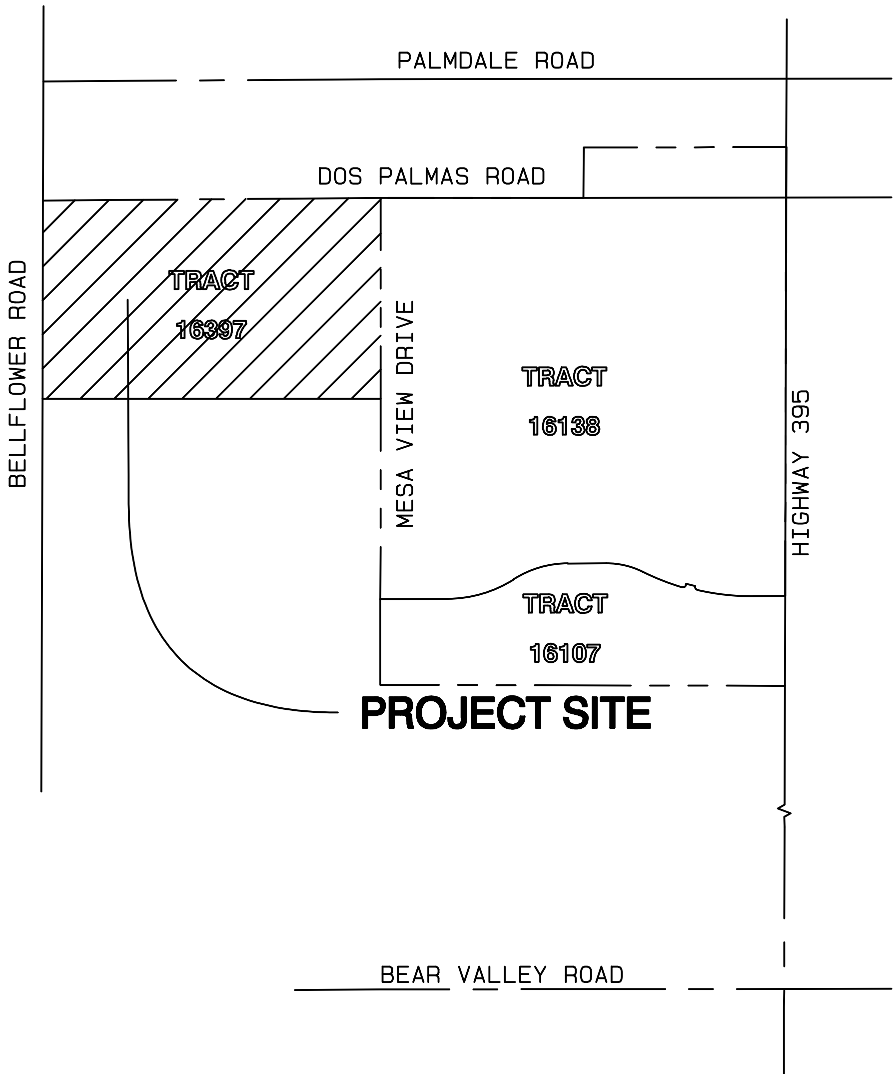
UNIT HYDROGRAPH

BASIN 1 Post BMP's OUTFlow Rate (with *BMP's)100-YR,24-HR UNIT HYD*			BASIN 2 - Post BMP's OUTFlow Rate (with *BMP's)100-YR,24-HR UNIT HYD*		
DA1 DMA-A	CAPTURE VOL.(AC.FT.)	OUTFLOW (CFS)	DA1 DMA-B	CAPTURE VOL.(AC.FT.)	OUTFLOW (CFS)
64.80	1.63(2yr) + 0.215= 1.84	38.80	10.60	0.23(2yr) + 0.0364= 0.27	6.20

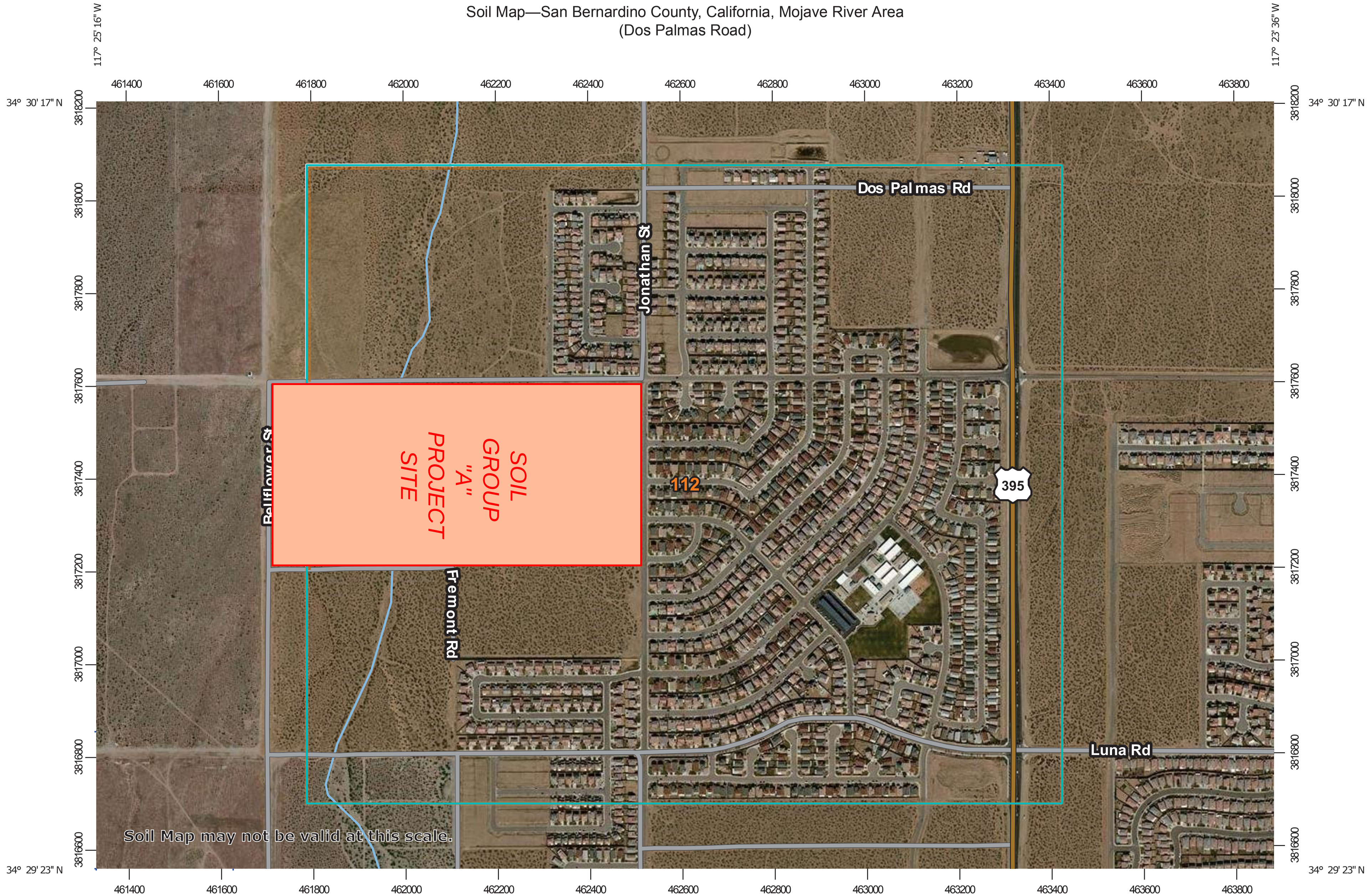
UNIT HYDROGRAPH

BASIN 2 Post BMP's OUTFlow Rate (with *BMP's)100-YR,24-HR UNIT HYD*			BASIN 1 - Post BMP's OUTFlow Rate (with *BMP's)100-YR,24-HR UNIT HYD*		
DA2 DMA-A	CAPTURE VOL.(AC.FT.)	OUTFLOW (CFS)	DA3 DMA-A	CAPTURE VOL.(AC.FT.)	OUTFLOW (CFS)
41.20	1.03(2yr) + 0.129= 1.16	25.60	56.90	1.51(2yr) + 0.168= 1.68	36.55



VICINITY MAP
SCALE: 1"=800'

Soil Map—San Bernardino County, California, Mojave River Area
(Dos Palmas Road)



Map Scale: 1:11,700 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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, California, Mojave River Area
Survey Area Data: Version 8, Sep 12, 2016

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

Date(s) aerial images were photographed: May 5, 2010—Feb 4, 2015

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.

Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Cajon

Setting

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

Typical profile

H1 - 0 to 7 inches: sand
H2 - 7 to 25 inches: sand
H3 - 25 to 45 inches: gravelly sand
H4 - 45 to 60 inches: stratified sand to loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Sandy (R030XF012CA)
Hydric soil rating: No

Minor Components

Manet

Percent of map unit: 5 percent
Landform: Playas
Hydric soil rating: Yes

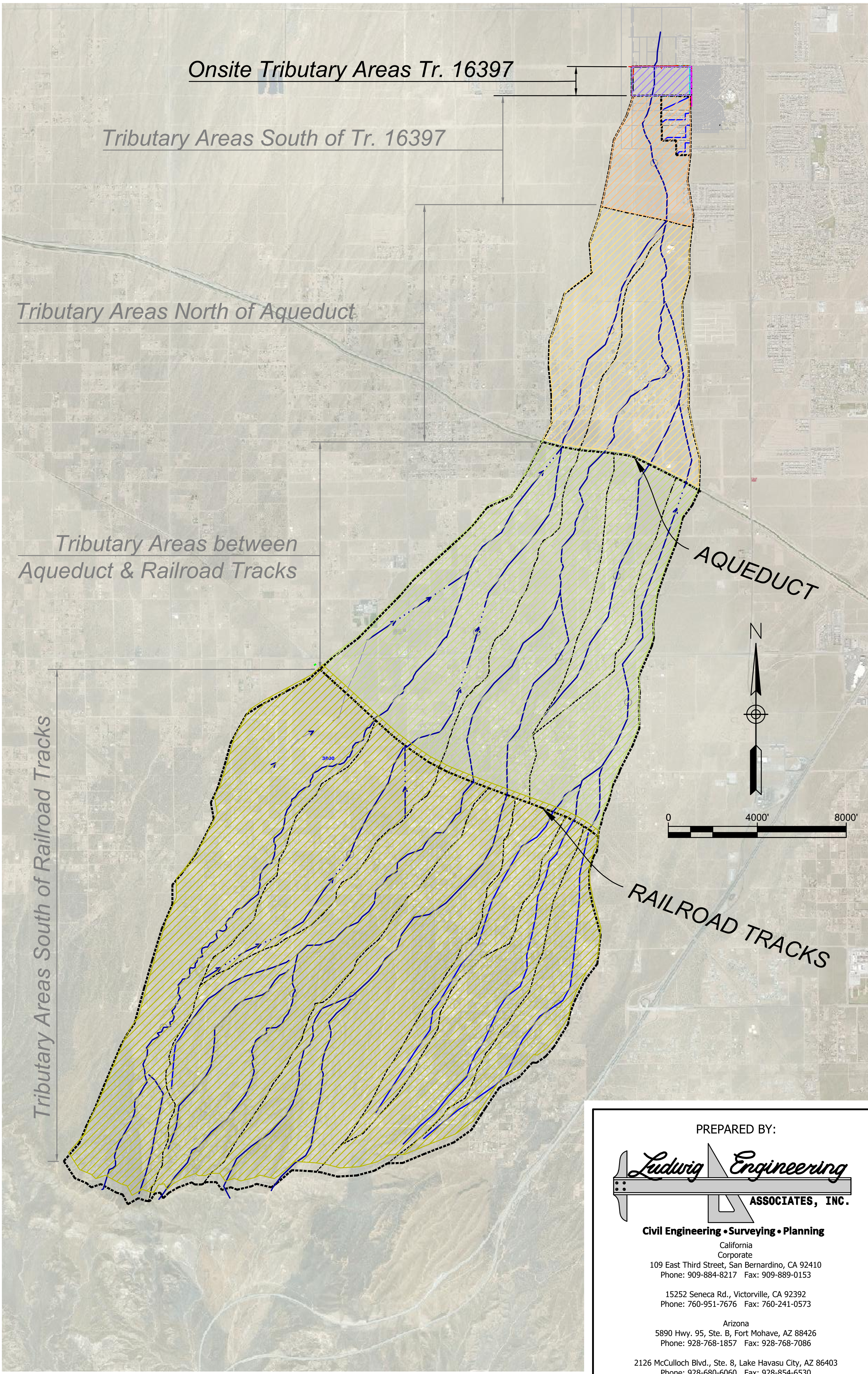
Kimberlina

Percent of map unit: 5 percent

Map Unit Legend

San Bernardino County, California, Mojave River Area (CA671)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	558.9	100.0%
Totals for Area of Interest		**558.9**	**100.0%**

POINT PRECIPITATION FREQUENCY ESTIMATES MAPS



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NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.4991°, Longitude: -117.4096°
Elevation: 3188.14 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	0.078 (0.065-0.096)	0.112 (0.093-0.138)	0.158 (0.130-0.193)	0.195 (0.159-0.241)	0.246 (0.194-0.314)	0.285 (0.221-0.372)	0.326 (0.246-0.436)	0.368 (0.270-0.506)	0.425 (0.299-0.609)	0.469 (0.319-0.697)
10-min	0.112 (0.093-0.137)	0.161 (0.133-0.197)	0.226 (0.186-0.277)	0.279 (0.228-0.345)	0.352 (0.278-0.450)	0.409 (0.316-0.534)	0.467 (0.352-0.625)	0.527 (0.387-0.725)	0.609 (0.429-0.874)	0.673 (0.458-0.999)
15-min	0.136 (0.112-0.166)	0.195 (0.161-0.239)	0.273 (0.225-0.335)	0.337 (0.276-0.418)	0.426 (0.336-0.545)	0.494 (0.382-0.646)	0.565 (0.426-0.755)	0.637 (0.468-0.877)	0.737 (0.519-1.06)	0.814 (0.554-1.21)
30-min	0.202 (0.167-0.247)	0.289 (0.239-0.354)	0.406 (0.334-0.498)	0.501 (0.409-0.620)	0.632 (0.499-0.808)	0.734 (0.567-0.958)	0.838 (0.633-1.12)	0.946 (0.694-1.30)	1.09 (0.770-1.57)	1.21 (0.822-1.79)
60-min	0.267 (0.221-0.327)	0.384 (0.317-0.469)	0.537 (0.442-0.659)	0.664 (0.542-0.821)	0.837 (0.661-1.07)	0.972 (0.752-1.27)	1.11 (0.838-1.49)	1.25 (0.920-1.73)	1.45 (1.02-2.08)	1.60 (1.09-2.38)
2-hr	0.375 (0.310-0.458)	0.509 (0.420-0.623)	0.692 (0.570-0.849)	0.846 (0.691-1.05)	1.06 (0.841-1.36)	1.24 (0.958-1.62)	1.42 (1.07-1.90)	1.61 (1.19-2.22)	1.88 (1.33-2.70)	2.10 (1.43-3.12)
3-hr	0.468 (0.387-0.572)	0.625 (0.516-0.765)	0.842 (0.693-1.03)	1.03 (0.838-1.27)	1.29 (1.02-1.65)	1.51 (1.17-1.97)	1.73 (1.31-2.32)	1.98 (1.45-2.72)	2.32 (1.64-3.33)	2.60 (1.77-3.86)
6-hr	0.639 (0.528-0.781)	0.846 (0.698-1.04)	1.14 (0.935-1.39)	1.39 (1.13-1.72)	1.75 (1.39-2.24)	2.06 (1.59-2.69)	2.38 (1.80-3.18)	2.73 (2.01-3.76)	3.24 (2.28-4.65)	3.66 (2.49-5.44)
12-hr	0.797 (0.659-0.974)	1.09 (0.903-1.34)	1.51 (1.24-1.86)	1.87 (1.53-2.32)	2.40 (1.89-3.07)	2.83 (2.19-3.70)	3.30 (2.49-4.41)	3.80 (2.79-5.23)	4.54 (3.19-6.50)	5.14 (3.50-7.63)
24-hr	1.08 (0.961-1.25)	1.55 (1.37-1.79)	2.20 (1.94-2.54)	2.76 (2.42-3.22)	3.58 (3.03-4.31)	4.25 (3.53-5.22)	4.96 (4.02-6.25)	5.74 (4.52-7.44)	6.87 (5.19-9.28)	7.80 (5.70-10.9)
2-day	1.17 (1.04-1.34)	1.67 (1.48-1.92)	2.37 (2.09-2.74)	2.98 (2.61-3.47)	3.87 (3.28-4.65)	4.60 (3.82-5.65)	5.39 (4.36-6.79)	6.25 (4.93-8.10)	7.51 (5.68-10.1)	8.55 (6.25-12.0)
3-day	1.25 (1.11-1.43)	1.77 (1.57-2.04)	2.51 (2.22-2.90)	3.15 (2.76-3.67)	4.09 (3.47-4.93)	4.87 (4.04-5.99)	5.71 (4.62-7.19)	6.63 (5.22-8.59)	7.97 (6.03-10.8)	9.10 (6.65-12.7)
4-day	1.34 (1.19-1.54)	1.89 (1.68-2.18)	2.68 (2.37-3.10)	3.37 (2.95-3.92)	4.37 (3.70-5.26)	5.19 (4.31-6.38)	6.08 (4.93-7.66)	7.06 (5.56-9.15)	8.49 (6.42-11.5)	9.68 (7.07-13.5)
7-day	1.44 (1.28-1.66)	2.03 (1.80-2.34)	2.86 (2.52-3.30)	3.58 (3.13-4.17)	4.62 (3.91-5.56)	5.47 (4.54-6.73)	6.39 (5.17-8.05)	7.38 (5.82-9.56)	8.83 (6.67-11.9)	10.0 (7.31-14.0)
10-day	1.54 (1.36-1.77)	2.15 (1.91-2.48)	3.02 (2.67-3.49)	3.78 (3.31-4.40)	4.87 (4.13-5.86)	5.76 (4.78-7.08)	6.71 (5.44-8.45)	7.74 (6.10-10.0)	9.23 (6.98-12.5)	10.4 (7.63-14.6)
20-day	1.84 (1.63-2.12)	2.57 (2.28-2.96)	3.61 (3.19-4.17)	4.50 (3.95-5.25)	5.81 (4.92-6.99)	6.87 (5.70-8.45)	8.01 (6.49-10.1)	9.23 (7.27-12.0)	11.0 (8.29-14.8)	12.4 (9.05-17.3)
30-day	2.14 (1.90-2.46)	2.97 (2.63-3.42)	4.16 (3.67-4.80)	5.19 (4.55-6.05)	6.70 (5.68-8.07)	7.93 (6.58-9.75)	9.24 (7.48-11.6)	10.6 (8.39-13.8)	12.6 (9.56-17.1)	14.3 (10.4-19.9)
45-day	2.50 (2.22-2.88)	3.44 (3.05-3.97)	4.79 (4.23-5.54)	5.97 (5.23-6.96)	7.71 (6.54-9.29)	9.14 (7.59-11.2)	10.7 (8.63-13.4)	12.3 (9.68-15.9)	14.6 (11.0-19.7)	16.5 (12.0-23.0)
60-day	2.81 (2.49-3.23)	3.82 (3.38-4.40)	5.28 (4.66-6.10)	6.56 (5.75-7.65)	8.46 (7.17-10.2)	10.0 (8.32-12.3)	11.7 (9.48-14.7)	13.5 (10.6-17.5)	16.0 (12.1-21.7)	18.1 (13.2-25.3)

[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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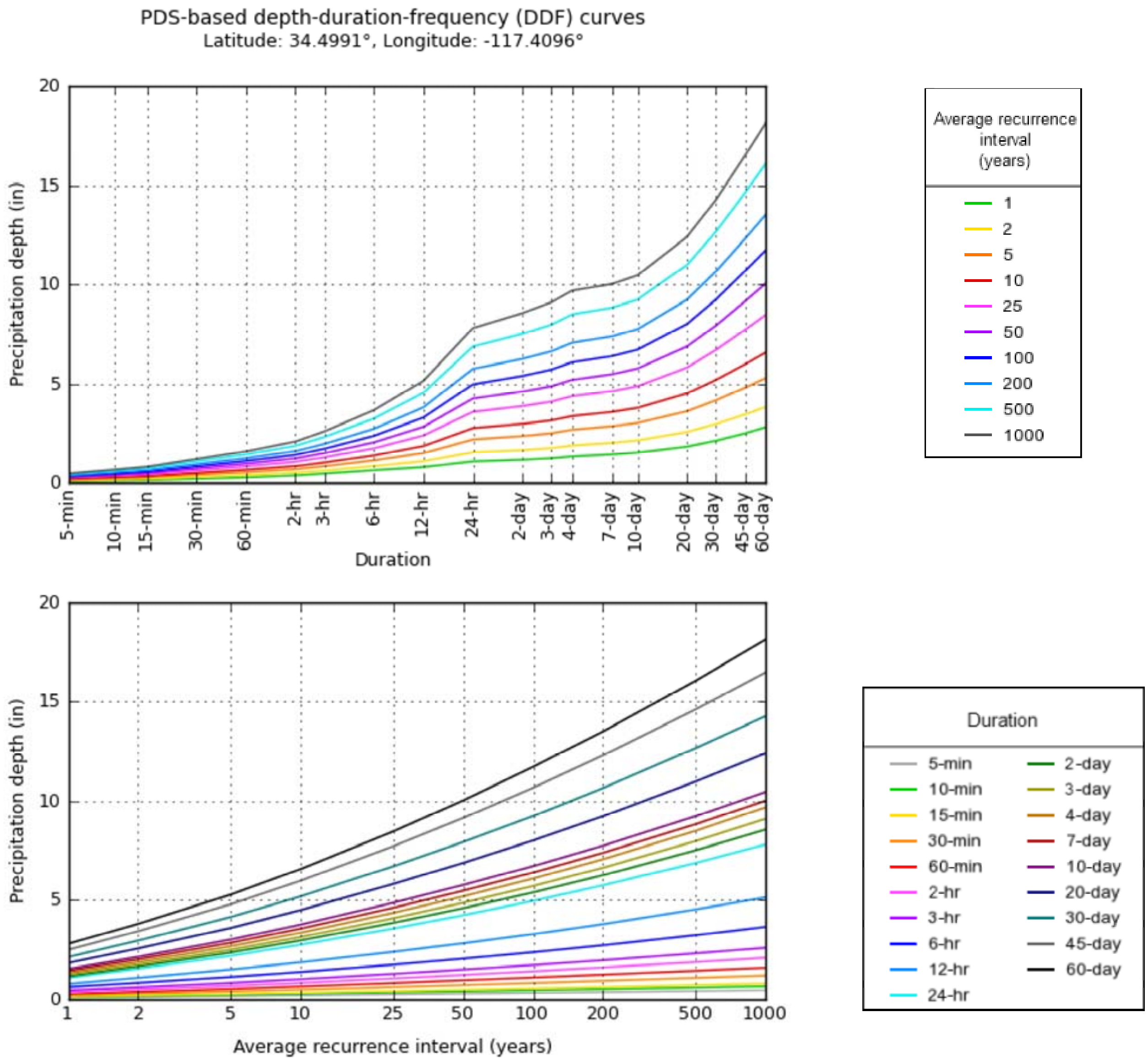
No.1 - Onsite Tributary Areas of Tr. 16397

see page 9

PF graphical



NOAA Atlas 14, Volume 6, Version 2 Created (GMT): Fri Feb 24 17:49:08 2017

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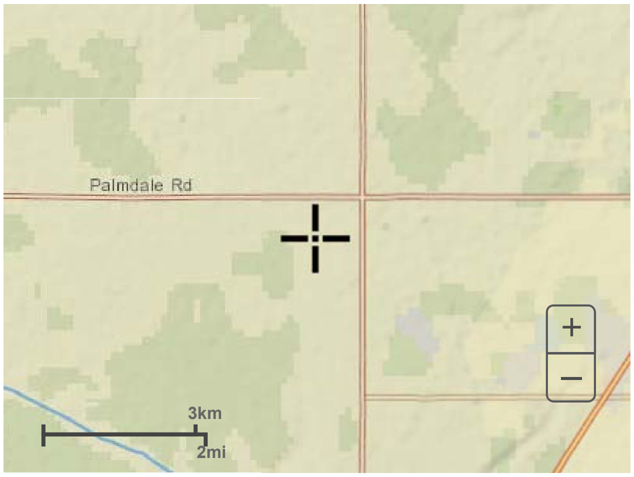
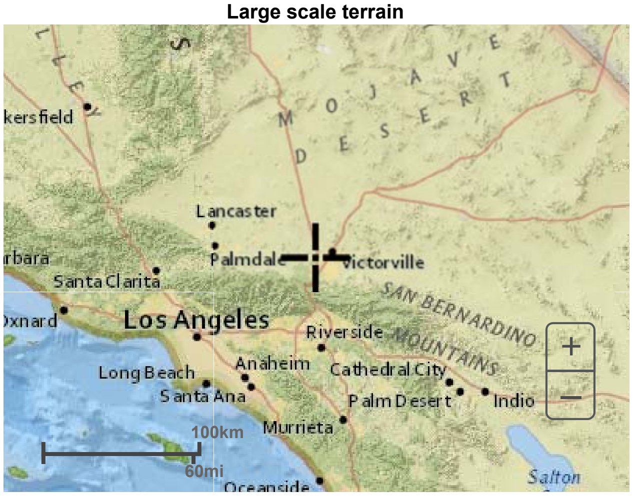
Maps & aerials

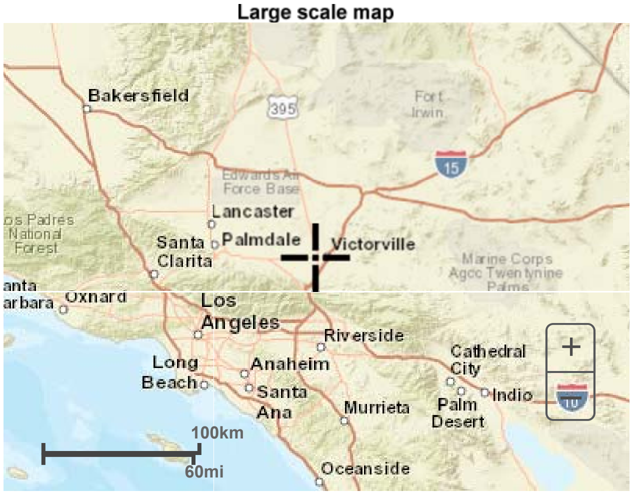
Small scale terrain



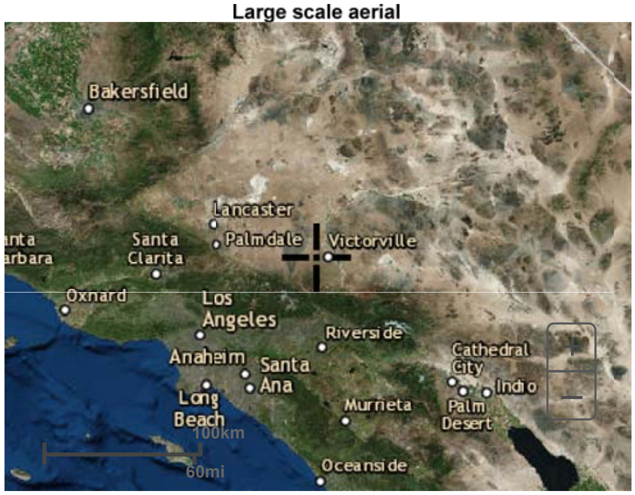
Large scale terrain



Large scale map



Large scale aerial



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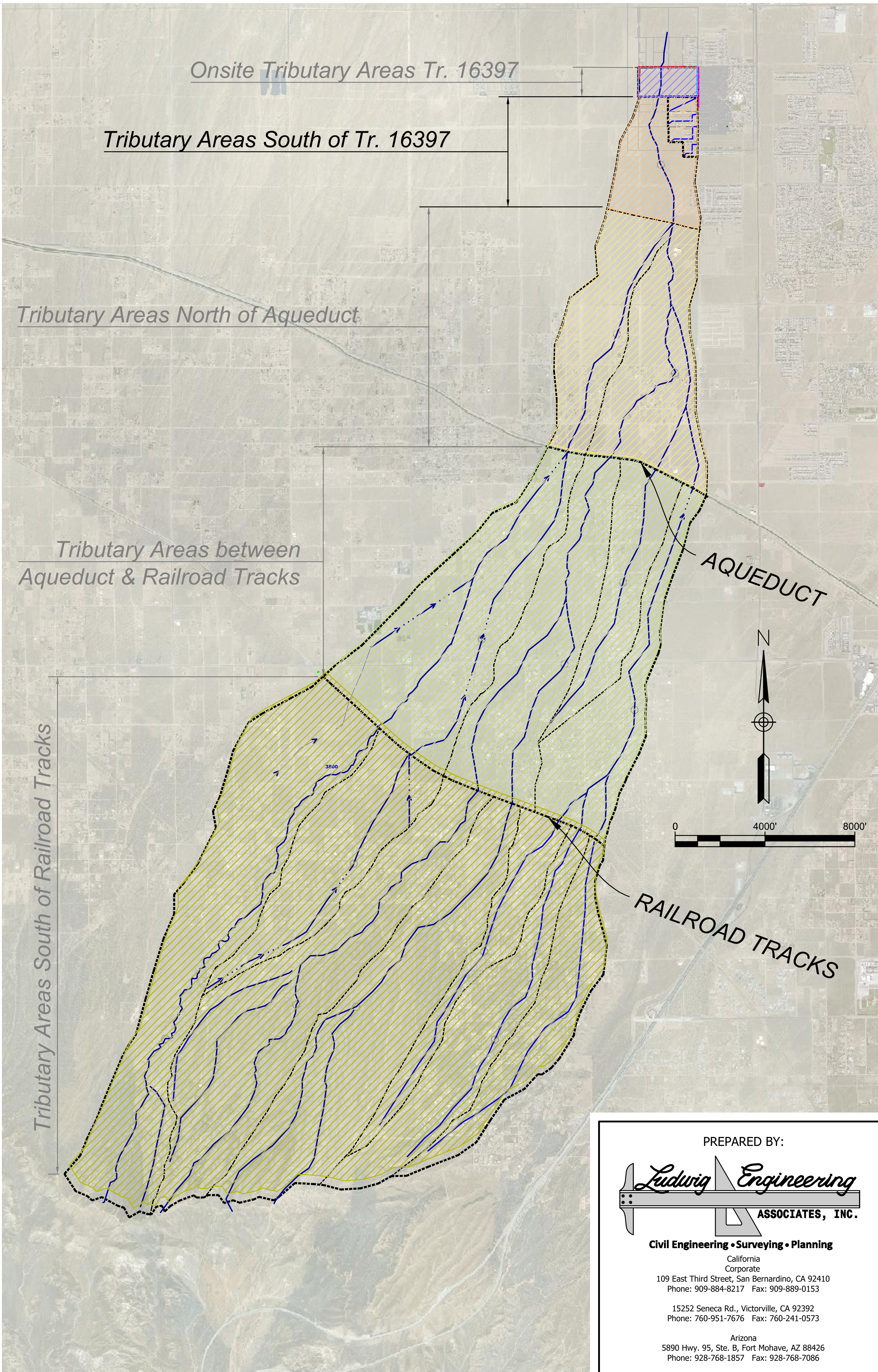
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

POINT PRECIPITATION FREQUENCY ESTIMATES MAPS



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2126 McCulloch Blvd., Ste. 8, Lake Havasu City, AZ 86403
Phone: 928-680-6060 Fax: 928-854-6530

NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.4827°, Longitude: -117.4159°
Elevation: 3279.99 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	0.078 (0.064-0.095)	0.112 (0.093-0.138)	0.158 (0.130-0.194)	0.195 (0.159-0.241)	0.245 (0.194-0.314)	0.285 (0.220-0.371)	0.324 (0.245-0.434)	0.365 (0.268-0.503)	0.421 (0.297-0.604)	0.465 (0.316-0.690)
10-min	0.112 (0.092-0.137)	0.161 (0.133-0.197)	0.226 (0.186-0.277)	0.279 (0.228-0.345)	0.352 (0.278-0.450)	0.408 (0.316-0.532)	0.465 (0.351-0.622)	0.524 (0.385-0.721)	0.604 (0.425-0.866)	0.666 (0.453-0.989)
15-min	0.135 (0.112-0.165)	0.195 (0.161-0.238)	0.274 (0.225-0.336)	0.338 (0.276-0.418)	0.426 (0.336-0.544)	0.493 (0.382-0.644)	0.562 (0.424-0.752)	0.634 (0.465-0.872)	0.730 (0.514-1.05)	0.806 (0.548-1.20)
30-min	0.204 (0.169-0.249)	0.294 (0.243-0.360)	0.413 (0.340-0.507)	0.510 (0.416-0.631)	0.642 (0.507-0.821)	0.744 (0.576-0.972)	0.849 (0.641-1.14)	0.956 (0.702-1.32)	1.10 (0.776-1.58)	1.22 (0.828-1.81)
60-min	0.277 (0.229-0.339)	0.400 (0.330-0.489)	0.561 (0.462-0.689)	0.693 (0.566-0.857)	0.873 (0.690-1.12)	1.01 (0.783-1.32)	1.15 (0.871-1.54)	1.30 (0.955-1.79)	1.50 (1.06-2.15)	1.65 (1.13-2.46)
2-hr	0.390 (0.323-0.477)	0.531 (0.439-0.650)	0.722 (0.595-0.886)	0.884 (0.722-1.09)	1.11 (0.877-1.42)	1.29 (0.999-1.69)	1.48 (1.12-1.98)	1.68 (1.24-2.31)	1.96 (1.38-2.82)	2.19 (1.49-3.25)
3-hr	0.491 (0.406-0.600)	0.656 (0.542-0.802)	0.884 (0.728-1.08)	1.08 (0.881-1.33)	1.36 (1.07-1.74)	1.58 (1.23-2.07)	1.82 (1.38-2.44)	2.08 (1.53-2.86)	2.45 (1.72-3.51)	2.74 (1.87-4.07)
6-hr	0.674 (0.558-0.824)	0.893 (0.738-1.09)	1.20 (0.989-1.47)	1.47 (1.20-1.82)	1.86 (1.47-2.38)	2.18 (1.69-2.85)	2.53 (1.91-3.38)	2.91 (2.13-4.00)	3.46 (2.44-4.96)	3.92 (2.66-5.81)
12-hr	0.845 (0.699-1.03)	1.16 (0.960-1.42)	1.61 (1.33-1.97)	2.00 (1.63-2.47)	2.57 (2.03-3.28)	3.04 (2.35-3.96)	3.54 (2.67-4.74)	4.10 (3.01-5.64)	4.90 (3.45-7.03)	5.57 (3.79-8.27)
24-hr	1.16 (1.03-1.33)	1.66 (1.47-1.91)	2.37 (2.09-2.73)	2.98 (2.61-3.47)	3.87 (3.28-4.66)	4.61 (3.82-5.66)	5.40 (4.37-6.80)	6.27 (4.94-8.12)	7.52 (5.69-10.2)	8.57 (6.26-12.0)
2-day	1.25 (1.11-1.44)	1.78 (1.58-2.06)	2.54 (2.24-2.94)	3.20 (2.80-3.73)	4.17 (3.53-5.02)	4.97 (4.13-6.12)	5.85 (4.74-7.37)	6.81 (5.36-8.82)	8.22 (6.21-11.1)	9.40 (6.86-13.1)
3-day	1.33 (1.18-1.54)	1.89 (1.67-2.18)	2.68 (2.37-3.10)	3.37 (2.96-3.93)	4.39 (3.72-5.29)	5.25 (4.35-6.45)	6.17 (5.00-7.77)	7.19 (5.67-9.32)	8.69 (6.57-11.7)	9.96 (7.27-13.9)
4-day	1.44 (1.27-1.65)	2.03 (1.80-2.34)	2.87 (2.53-3.31)	3.60 (3.16-4.20)	4.69 (3.97-5.65)	5.59 (4.64-6.88)	6.58 (5.33-8.28)	7.66 (6.03-9.92)	9.26 (7.00-12.5)	10.6 (7.74-14.8)
7-day	1.57 (1.39-1.80)	2.19 (1.94-2.52)	3.07 (2.71-3.55)	3.84 (3.36-4.47)	4.97 (4.21-5.98)	5.90 (4.90-7.26)	6.91 (5.60-8.71)	8.02 (6.32-10.4)	9.63 (7.28-13.0)	11.0 (8.02-15.3)
10-day	1.67 (1.49-1.93)	2.33 (2.06-2.68)	3.25 (2.87-3.76)	4.06 (3.55-4.73)	5.23 (4.43-6.30)	6.20 (5.14-7.62)	7.24 (5.86-9.12)	8.38 (6.60-10.9)	10.0 (7.59-13.5)	11.4 (8.33-15.9)
20-day	2.03 (1.80-2.34)	2.80 (2.48-3.23)	3.89 (3.44-4.50)	4.84 (4.24-5.64)	6.22 (5.27-7.49)	7.35 (6.10-9.04)	8.57 (6.94-10.8)	9.89 (7.79-12.8)	11.8 (8.91-15.9)	13.4 (9.76-18.7)
30-day	2.38 (2.11-2.74)	3.26 (2.88-3.75)	4.50 (3.97-5.20)	5.58 (4.89-6.50)	7.15 (6.06-8.62)	8.45 (7.01-10.4)	9.83 (7.96-12.4)	11.3 (8.93-14.7)	13.5 (10.2-18.2)	15.3 (11.1-21.3)
45-day	2.80 (2.48-3.22)	3.78 (3.35-4.36)	5.18 (4.57-5.98)	6.39 (5.60-7.45)	8.17 (6.92-9.84)	9.63 (7.99-11.8)	11.2 (9.07-14.1)	12.9 (10.2-16.7)	15.3 (11.6-20.7)	17.3 (12.6-24.2)
60-day	3.15 (2.79-3.63)	4.20 (3.72-4.84)	5.70 (5.03-6.59)	7.01 (6.14-8.16)	8.92 (7.56-10.7)	10.5 (8.71-12.9)	12.2 (9.87-15.3)	14.0 (11.0-18.1)	16.6 (12.6-22.5)	18.8 (13.7-26.2)

[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.

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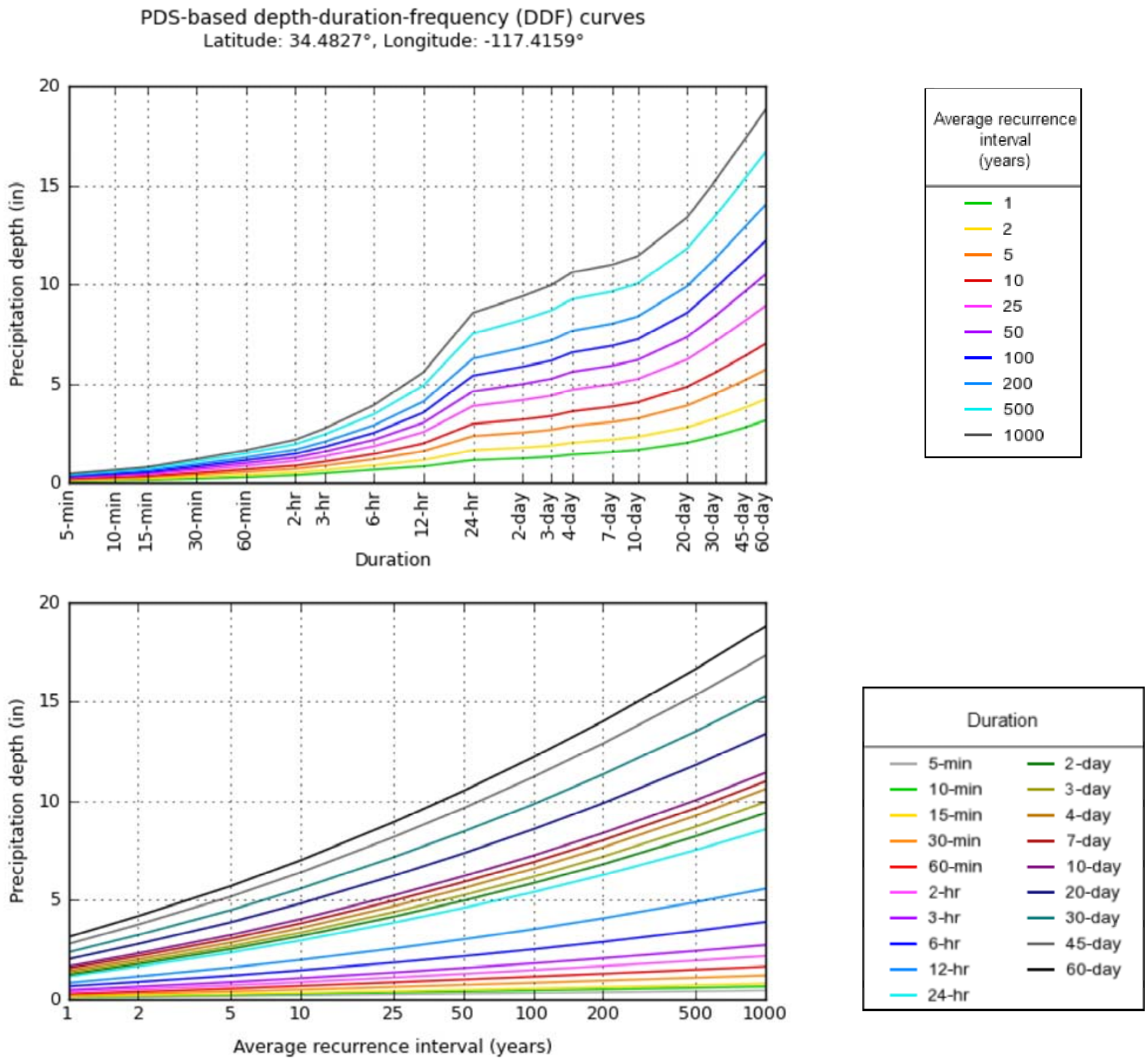
No.2 - Tributary Areas South of Tr. 16397

see page 9

PF graphical



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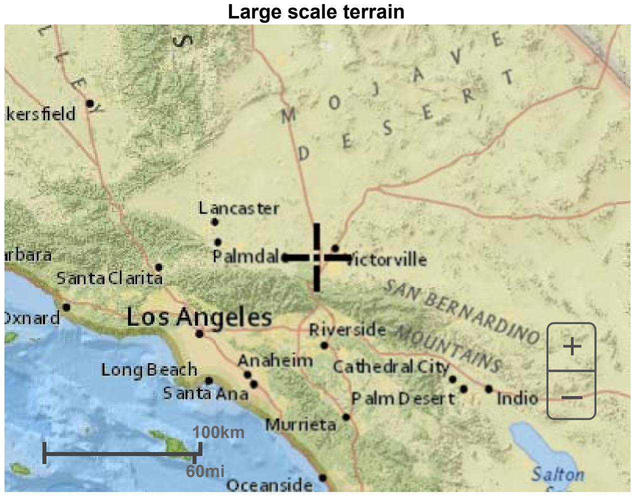
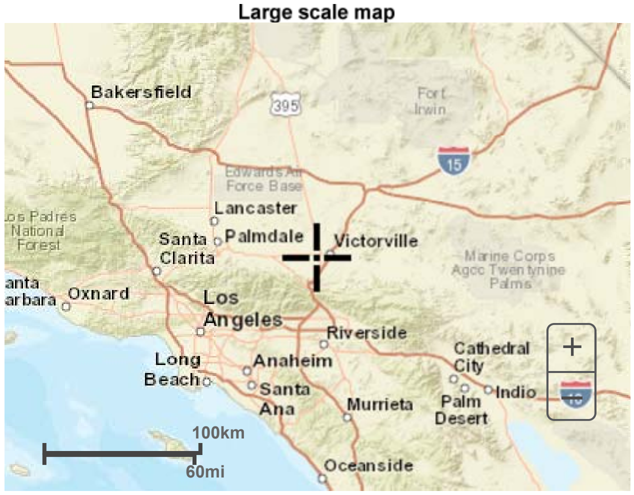
Maps & aerials

Small scale terrain

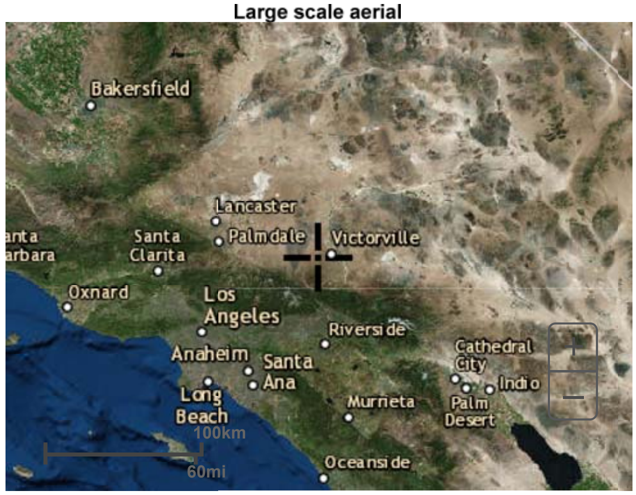
Large scale terrain



Large scale map



Large scale aerial



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National Weather Service
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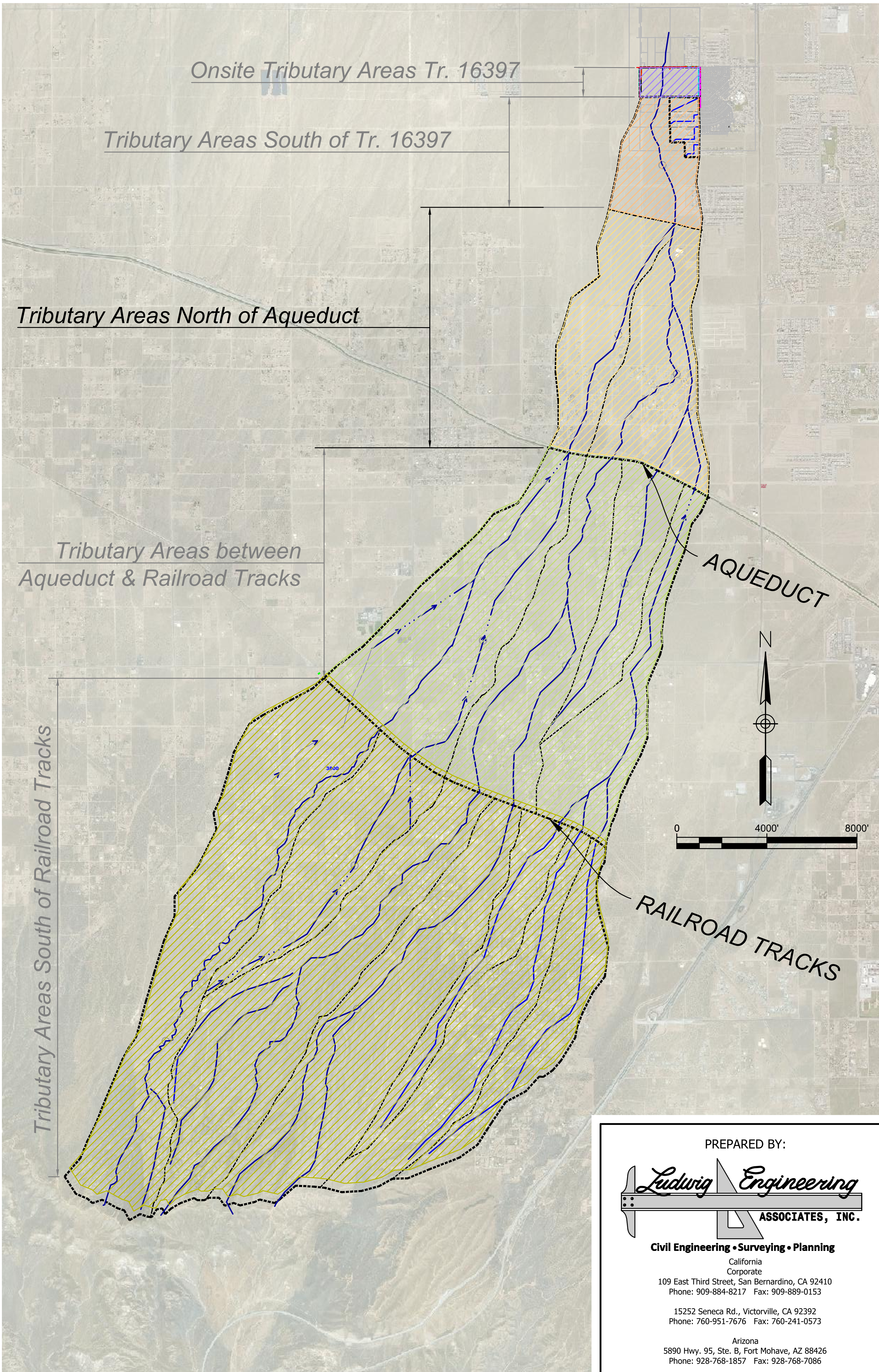
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

POINT PRECIPITATION FREQUENCY ESTIMATES MAPS



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NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.4569°, Longitude: -117.4218°
Elevation: 3446.78 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	0.081 (0.067-0.099)	0.116 (0.096-0.142)	0.163 (0.134-0.200)	0.201 (0.165-0.249)	0.254 (0.200-0.324)	0.294 (0.228-0.384)	0.336 (0.254-0.449)	0.379 (0.278-0.521)	0.438 (0.309-0.628)	0.485 (0.330-0.720)
10-min	0.116 (0.096-0.142)	0.167 (0.138-0.204)	0.234 (0.193-0.287)	0.289 (0.236-0.357)	0.364 (0.287-0.465)	0.422 (0.326-0.551)	0.481 (0.364-0.644)	0.543 (0.399-0.747)	0.628 (0.442-0.901)	0.695 (0.473-1.03)
15-min	0.140 (0.116-0.171)	0.202 (0.167-0.247)	0.283 (0.233-0.347)	0.349 (0.285-0.431)	0.440 (0.348-0.562)	0.510 (0.395-0.666)	0.582 (0.440-0.779)	0.657 (0.482-0.904)	0.760 (0.535-1.09)	0.840 (0.572-1.25)
30-min	0.213 (0.176-0.260)	0.306 (0.253-0.374)	0.429 (0.354-0.526)	0.530 (0.433-0.655)	0.668 (0.528-0.853)	0.774 (0.599-1.01)	0.884 (0.668-1.18)	0.998 (0.733-1.37)	1.15 (0.812-1.65)	1.28 (0.868-1.89)
60-min	0.296 (0.245-0.361)	0.426 (0.352-0.520)	0.596 (0.491-0.731)	0.736 (0.601-0.910)	0.927 (0.733-1.19)	1.08 (0.833-1.40)	1.23 (0.927-1.64)	1.39 (1.02-1.91)	1.60 (1.13-2.30)	1.77 (1.21-2.63)
2-hr	0.423 (0.350-0.517)	0.576 (0.476-0.704)	0.783 (0.645-0.960)	0.958 (0.783-1.18)	1.20 (0.952-1.54)	1.40 (1.08-1.83)	1.61 (1.21-2.15)	1.83 (1.34-2.51)	2.13 (1.50-3.06)	2.38 (1.62-3.53)
3-hr	0.534 (0.442-0.652)	0.715 (0.590-0.874)	0.963 (0.794-1.18)	1.18 (0.960-1.45)	1.48 (1.17-1.89)	1.72 (1.33-2.25)	1.98 (1.50-2.65)	2.26 (1.66-3.11)	2.66 (1.87-3.81)	2.99 (2.03-4.43)
6-hr	0.744 (0.615-0.908)	0.987 (0.815-1.21)	1.33 (1.09-1.63)	1.62 (1.33-2.00)	2.05 (1.62-2.62)	2.40 (1.86-3.13)	2.78 (2.10-3.72)	3.19 (2.34-4.39)	3.79 (2.67-5.44)	4.29 (2.92-6.37)
12-hr	0.948 (0.784-1.16)	1.30 (1.08-1.59)	1.80 (1.48-2.20)	2.22 (1.82-2.75)	2.85 (2.25-3.64)	3.36 (2.60-4.39)	3.91 (2.96-5.23)	4.52 (3.32-6.21)	5.40 (3.80-7.74)	6.13 (4.17-9.10)
24-hr	1.30 (1.15-1.49)	1.85 (1.64-2.13)	2.62 (2.32-3.03)	3.29 (2.88-3.84)	4.26 (3.61-5.13)	5.06 (4.20-6.22)	5.92 (4.79-7.45)	6.85 (5.40-8.87)	8.21 (6.20-11.1)	9.33 (6.82-13.0)
2-day	1.44 (1.28-1.66)	2.05 (1.81-2.36)	2.90 (2.56-3.35)	3.64 (3.19-4.24)	4.73 (4.01-5.69)	5.63 (4.67-6.92)	6.61 (5.36-8.33)	7.69 (6.06-9.96)	9.27 (7.01-12.5)	10.6 (7.74-14.8)
3-day	1.55 (1.37-1.78)	2.18 (1.93-2.51)	3.07 (2.71-3.55)	3.86 (3.38-4.49)	5.02 (4.25-6.04)	5.98 (4.97-7.36)	7.04 (5.70-8.86)	8.20 (6.46-10.6)	9.91 (7.49-13.4)	11.4 (8.29-15.9)
4-day	1.67 (1.48-1.92)	2.34 (2.07-2.70)	3.30 (2.91-3.81)	4.13 (3.62-4.81)	5.37 (4.55-6.46)	6.40 (5.31-7.87)	7.52 (6.09-9.48)	8.77 (6.91-11.4)	10.6 (8.01-14.3)	12.1 (8.87-17.0)
7-day	1.85 (1.64-2.13)	2.57 (2.27-2.96)	3.58 (3.16-4.14)	4.46 (3.91-5.20)	5.76 (4.88-6.94)	6.84 (5.68-8.41)	8.02 (6.49-10.1)	9.31 (7.34-12.1)	11.2 (8.47-15.1)	12.8 (9.35-17.9)
10-day	1.98 (1.76-2.28)	2.74 (2.42-3.15)	3.79 (3.35-4.38)	4.71 (4.13-5.49)	6.06 (5.13-7.30)	7.18 (5.95-8.82)	8.38 (6.79-10.6)	9.71 (7.65-12.6)	11.7 (8.81-15.7)	13.3 (9.71-18.6)
20-day	2.41 (2.14-2.77)	3.30 (2.92-3.80)	4.53 (4.00-5.24)	5.60 (4.91-6.53)	7.16 (6.06-8.62)	8.44 (7.00-10.4)	9.82 (7.96-12.4)	11.3 (8.93-14.7)	13.6 (10.2-18.3)	15.4 (11.3-21.5)
30-day	2.84 (2.52-3.27)	3.86 (3.42-4.45)	5.26 (4.65-6.08)	6.48 (5.68-7.55)	8.24 (6.98-9.92)	9.69 (8.04-11.9)	11.3 (9.12-14.2)	13.0 (10.2-16.8)	15.5 (11.7-20.9)	17.6 (12.8-24.6)
45-day	3.37 (2.99-3.88)	4.51 (3.99-5.19)	6.08 (5.37-7.03)	7.44 (6.52-8.67)	9.41 (7.97-11.3)	11.0 (9.15-13.6)	12.8 (10.3-16.1)	14.7 (11.6-19.0)	17.5 (13.2-23.6)	19.8 (14.5-27.7)
60-day	3.82 (3.39-4.40)	5.04 (4.46-5.81)	6.72 (5.93-7.76)	8.16 (7.15-9.51)	10.3 (8.69-12.4)	12.0 (9.94-14.7)	13.8 (11.2-17.4)	15.9 (12.5-20.6)	18.9 (14.3-25.5)	21.4 (15.6-29.9)

[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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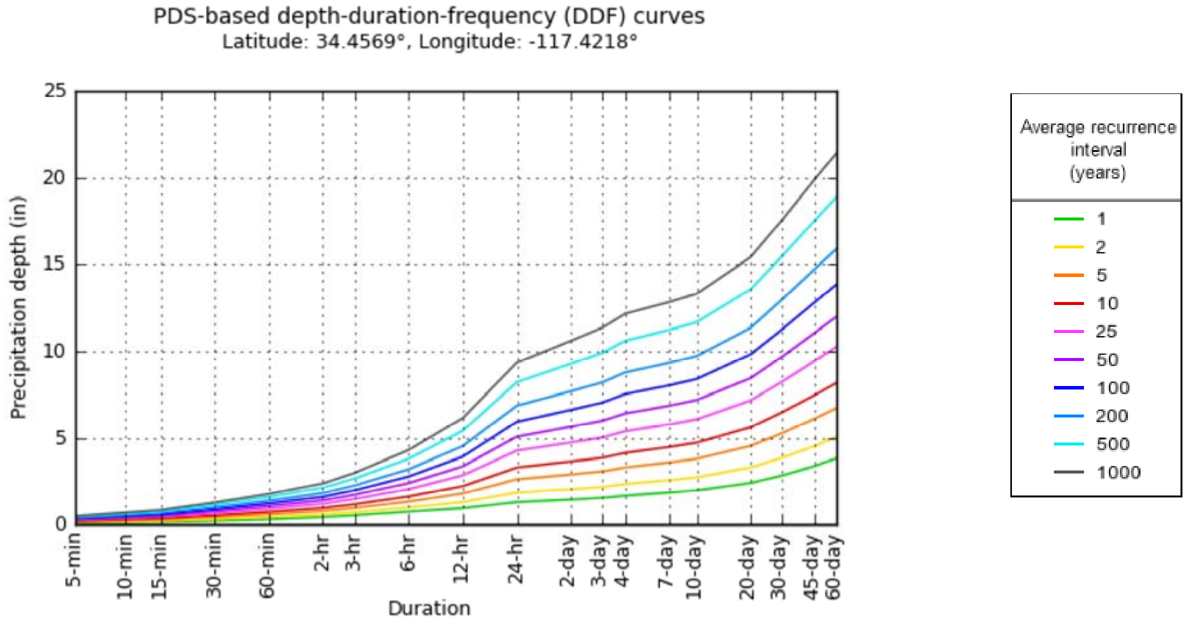
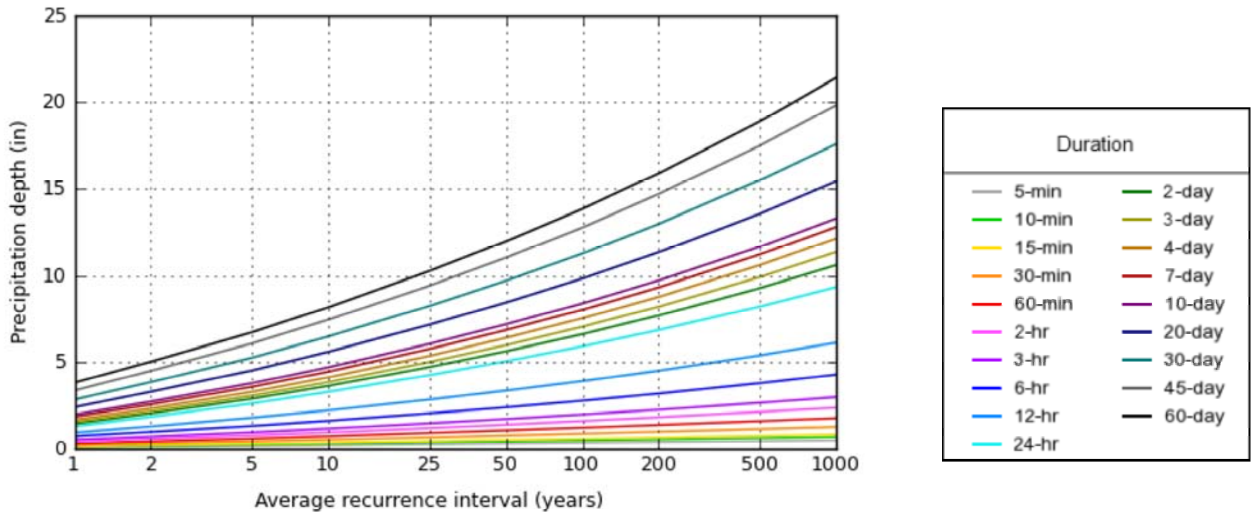
No.3 - Tributary Areas North of Aqueduct

see page 9

PF graphical





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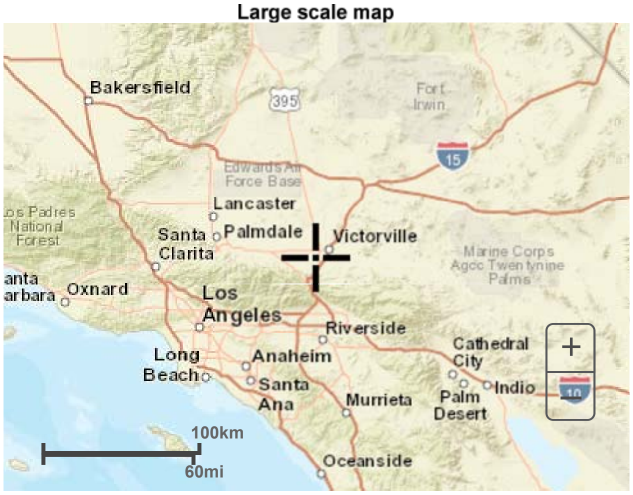
Maps & aerials

Small scale terrain

Large scale terrain

Large scale map



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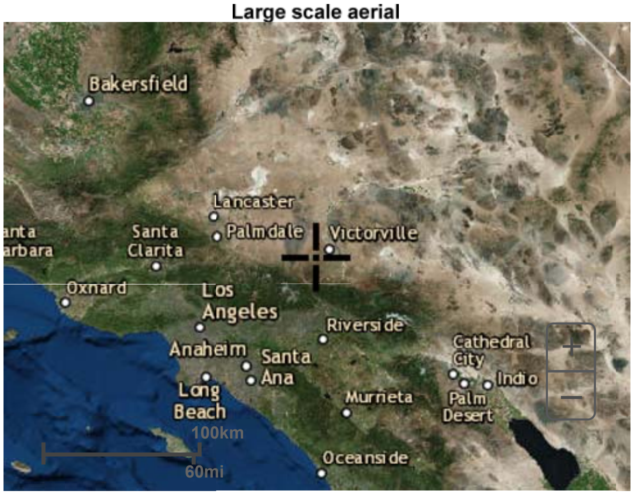

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National Weather Service
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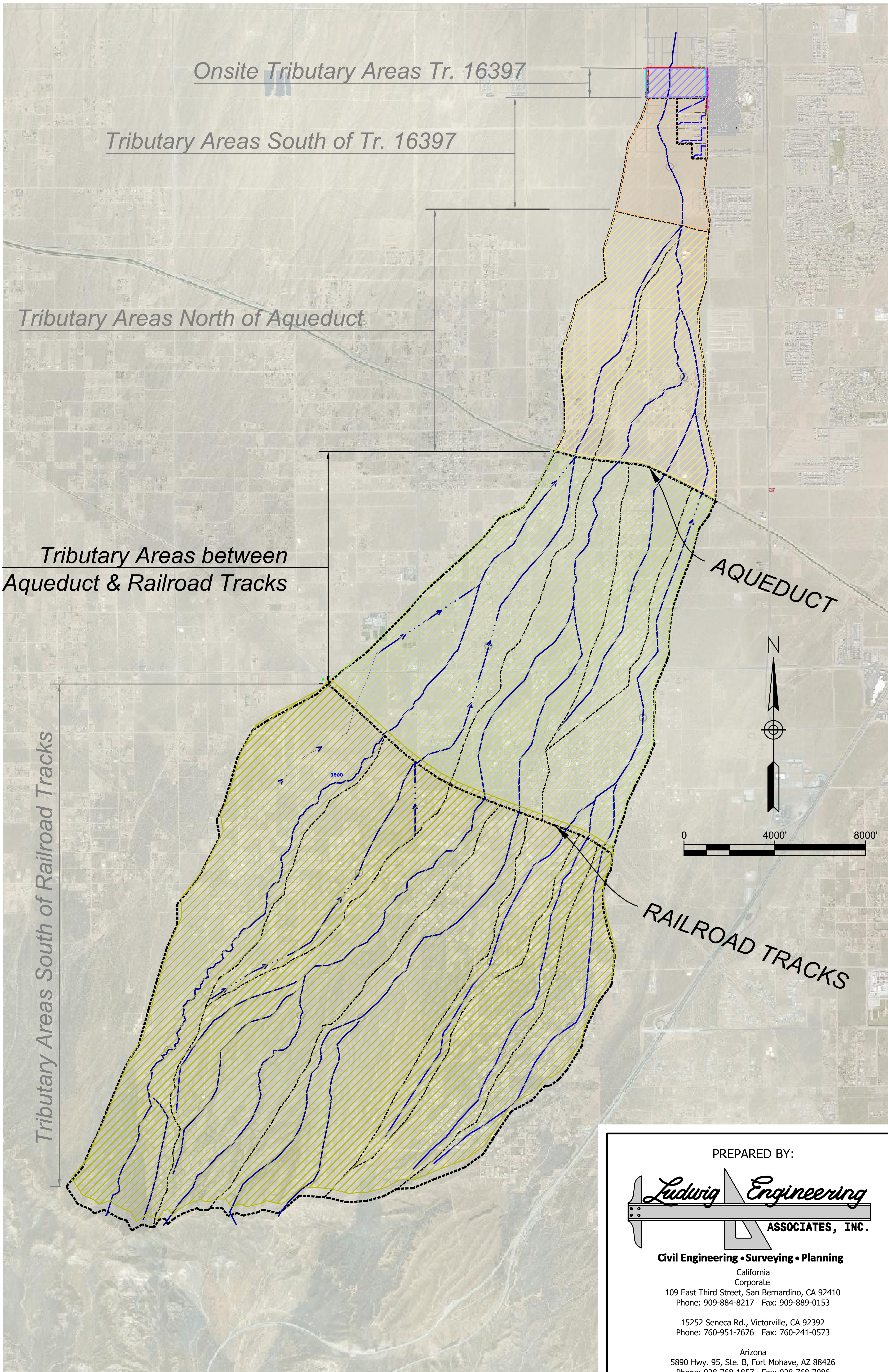
POINT PRECIPITATION FREQUENCY ESTIMATES MAPS



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Phone: 928-680-6060 Fax: 928-854-6530

NOAA Atlas 14, Volume 6, Version 2
Location name: Hesperia, California, USA*
Latitude: 34.432°, Longitude: -117.4297°
Elevation: 3559.8 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

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Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.087 (0.072-0.106)	0.123 (0.102-0.151)	0.172 (0.142-0.211)	0.212 (0.173-0.262)	0.267 (0.211-0.342)	0.311 (0.240-0.405)	0.355 (0.268-0.475)	0.402 (0.295-0.552)	0.466 (0.328-0.668)	0.516 (0.351-0.767)
10-min	0.124 (0.103-0.152)	0.177 (0.146-0.216)	0.247 (0.203-0.302)	0.304 (0.248-0.376)	0.383 (0.303-0.490)	0.445 (0.345-0.581)	0.509 (0.384-0.680)	0.576 (0.423-0.792)	0.668 (0.470-0.957)	0.740 (0.504-1.10)
15-min	0.150 (0.124-0.183)	0.214 (0.177-0.261)	0.298 (0.246-0.365)	0.368 (0.300-0.454)	0.463 (0.366-0.592)	0.538 (0.417-0.702)	0.615 (0.465-0.823)	0.696 (0.511-0.957)	0.807 (0.569-1.16)	0.895 (0.609-1.33)
30-min	0.226 (0.187-0.276)	0.322 (0.266-0.393)	0.449 (0.370-0.550)	0.553 (0.452-0.684)	0.698 (0.552-0.891)	0.811 (0.627-1.06)	0.927 (0.700-1.24)	1.05 (0.770-1.44)	1.22 (0.856-1.74)	1.35 (0.917-2.00)
60-min	0.320 (0.265-0.390)	0.455 (0.376-0.556)	0.634 (0.523-0.777)	0.782 (0.639-0.966)	0.986 (0.780-1.26)	1.15 (0.887-1.49)	1.31 (0.989-1.75)	1.48 (1.09-2.04)	1.72 (1.21-2.46)	1.90 (1.30-2.83)
2-hr	0.469 (0.388-0.572)	0.637 (0.526-0.778)	0.864 (0.713-1.06)	1.06 (0.863-1.30)	1.32 (1.05-1.69)	1.54 (1.19-2.01)	1.76 (1.33-2.35)	2.00 (1.47-2.75)	2.33 (1.64-3.34)	2.60 (1.77-3.86)
3-hr	0.592 (0.490-0.722)	0.792 (0.655-0.968)	1.07 (0.878-1.30)	1.30 (1.06-1.60)	1.62 (1.28-2.07)	1.89 (1.46-2.46)	2.16 (1.63-2.89)	2.46 (1.81-3.38)	2.88 (2.03-4.13)	3.22 (2.19-4.78)
6-hr	0.843 (0.697-1.03)	1.12 (0.923-1.37)	1.50 (1.23-1.83)	1.82 (1.49-2.25)	2.28 (1.80-2.91)	2.66 (2.06-3.46)	3.06 (2.31-4.09)	3.49 (2.56-4.80)	4.11 (2.90-5.89)	4.62 (3.15-6.86)
12-hr	1.10 (0.912-1.35)	1.50 (1.24-1.83)	2.05 (1.69-2.51)	2.51 (2.06-3.11)	3.18 (2.52-4.07)	3.72 (2.88-4.86)	4.30 (3.25-5.75)	4.93 (3.62-6.78)	5.82 (4.10-8.35)	6.56 (4.47-9.74)
24-hr	1.50 (1.33-1.72)	2.10 (1.86-2.42)	2.94 (2.59-3.39)	3.65 (3.20-4.25)	4.66 (3.95-5.62)	5.48 (4.55-6.74)	6.36 (5.15-8.01)	7.30 (5.75-9.46)	8.65 (6.54-11.7)	9.76 (7.13-13.6)
2-day	1.72 (1.53-1.99)	2.43 (2.15-2.80)	3.40 (3.00-3.93)	4.24 (3.71-4.94)	5.45 (4.62-6.57)	6.45 (5.35-7.93)	7.51 (6.08-9.46)	8.67 (6.83-11.2)	10.4 (7.83-14.0)	11.8 (8.58-16.4)
3-day	1.85 (1.64-2.13)	2.60 (2.30-3.00)	3.65 (3.22-4.22)	4.56 (3.99-5.31)	5.88 (4.98-7.08)	6.97 (5.79-8.57)	8.15 (6.60-10.3)	9.44 (7.44-12.2)	11.3 (8.55-15.3)	12.9 (9.41-18.0)
4-day	2.00 (1.77-2.30)	2.81 (2.48-3.23)	3.93 (3.47-4.55)	4.92 (4.31-5.73)	6.35 (5.38-7.64)	7.53 (6.25-9.26)	8.81 (7.14-11.1)	10.2 (8.04-13.2)	12.3 (9.26-16.5)	14.0 (10.2-19.5)
7-day	2.23 (1.98-2.57)	3.12 (2.76-3.60)	4.36 (3.85-5.03)	5.43 (4.75-6.32)	6.99 (5.92-8.42)	8.28 (6.87-10.2)	9.67 (7.83-12.2)	11.2 (8.82-14.5)	13.4 (10.1-18.1)	15.3 (11.2-21.3)
10-day	2.39 (2.11-2.75)	3.32 (2.94-3.83)	4.62 (4.08-5.34)	5.75 (5.03-6.70)	7.38 (6.26-8.89)	8.73 (7.25-10.7)	10.2 (8.25-12.8)	11.8 (9.28-15.3)	14.1 (10.7-19.0)	16.0 (11.7-22.4)
20-day	2.86 (2.53-3.29)	3.96 (3.51-4.57)	5.49 (4.85-6.35)	6.82 (5.97-7.95)	8.74 (7.41-10.5)	10.3 (8.57-12.7)	12.0 (9.75-15.2)	13.9 (11.0-18.0)	16.6 (12.6-22.5)	18.9 (13.8-26.4)
30-day	3.37 (2.99-3.88)	4.64 (4.11-5.35)	6.41 (5.66-7.41)	7.94 (6.95-9.25)	10.1 (8.60-12.2)	12.0 (9.94-14.7)	14.0 (11.3-17.6)	16.1 (12.7-20.9)	19.3 (14.6-26.0)	22.0 (16.0-30.7)
45-day	4.01 (3.56-4.62)	5.46 (4.83-6.29)	7.46 (6.59-8.63)	9.20 (8.05-10.7)	11.7 (9.92-14.1)	13.8 (11.4-16.9)	16.0 (13.0-20.2)	18.5 (14.6-24.0)	22.2 (16.8-29.9)	25.3 (18.4-35.3)
60-day	4.57 (4.05-5.26)	6.12 (5.42-7.05)	8.27 (7.30-9.55)	10.1 (8.86-11.8)	12.8 (10.9-15.4)	15.1 (12.5-18.5)	17.5 (14.2-22.0)	20.2 (15.9-26.1)	24.2 (18.3-32.6)	27.5 (20.1-38.5)

[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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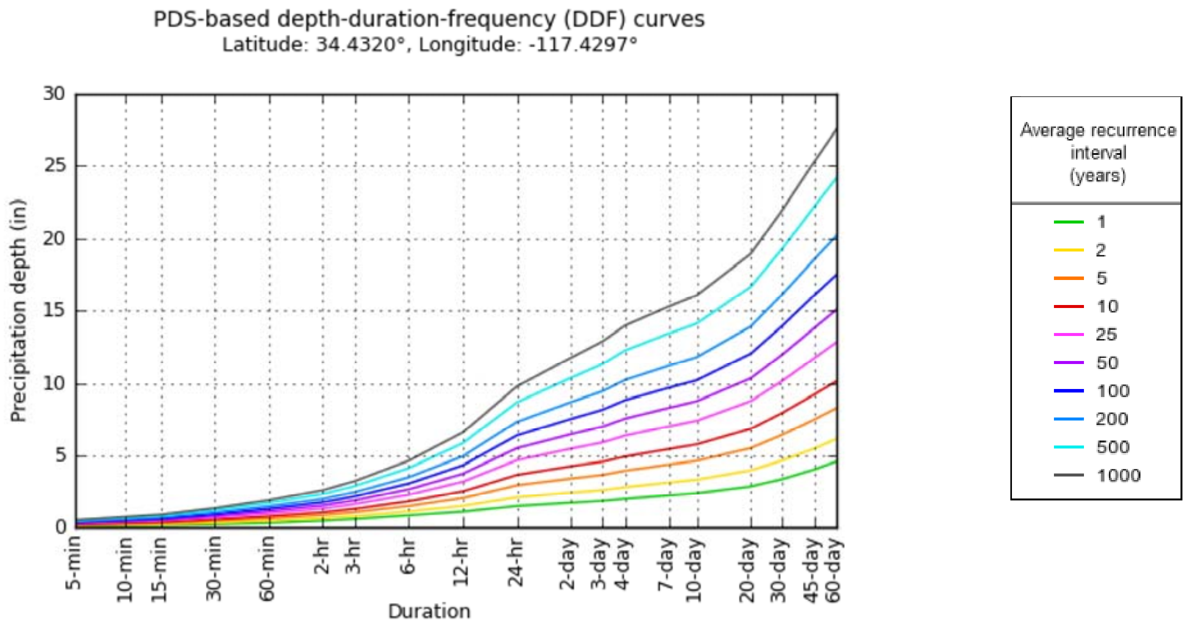
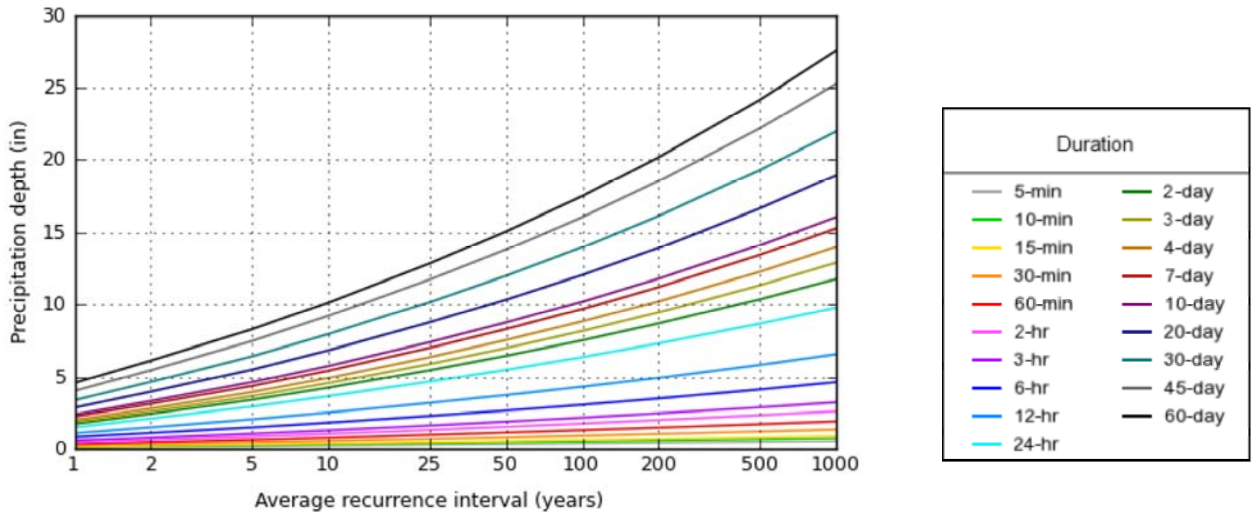
No.4 - Tributary Areas between Aqueduct and Rail Road Tracks
see page 9

PF graphical





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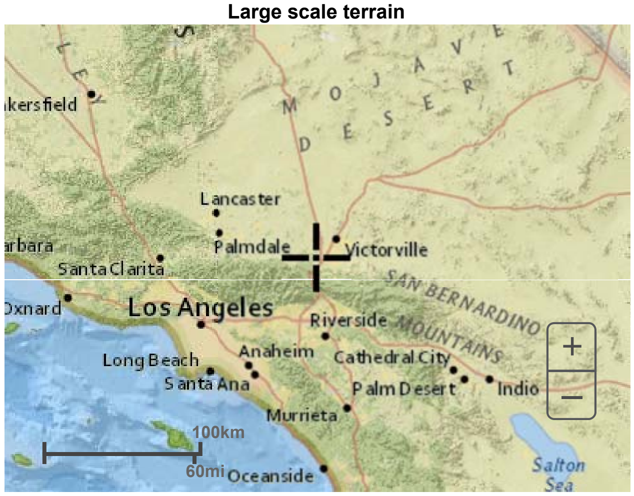
Maps & aerials

Small scale terrain

Large scale terrain



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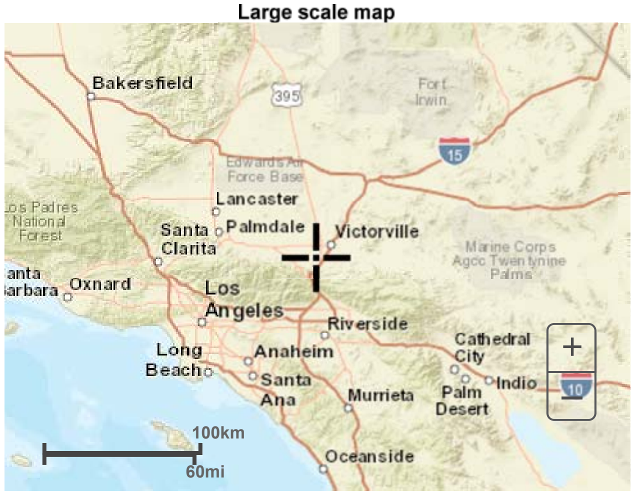
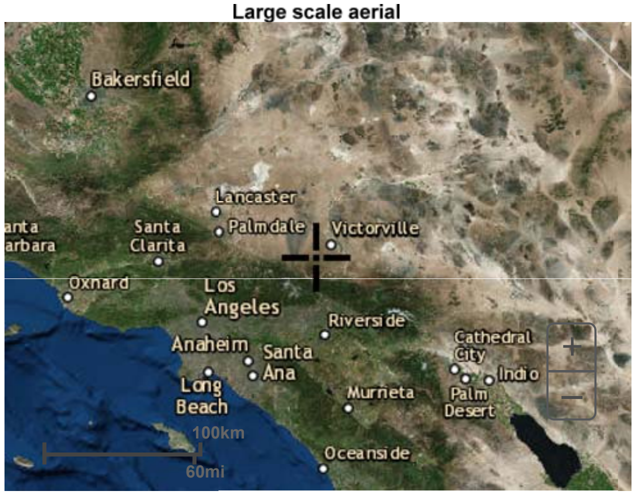


Large scale aerial



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National Weather Service
National Water Center
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Silver Spring, MD 20910
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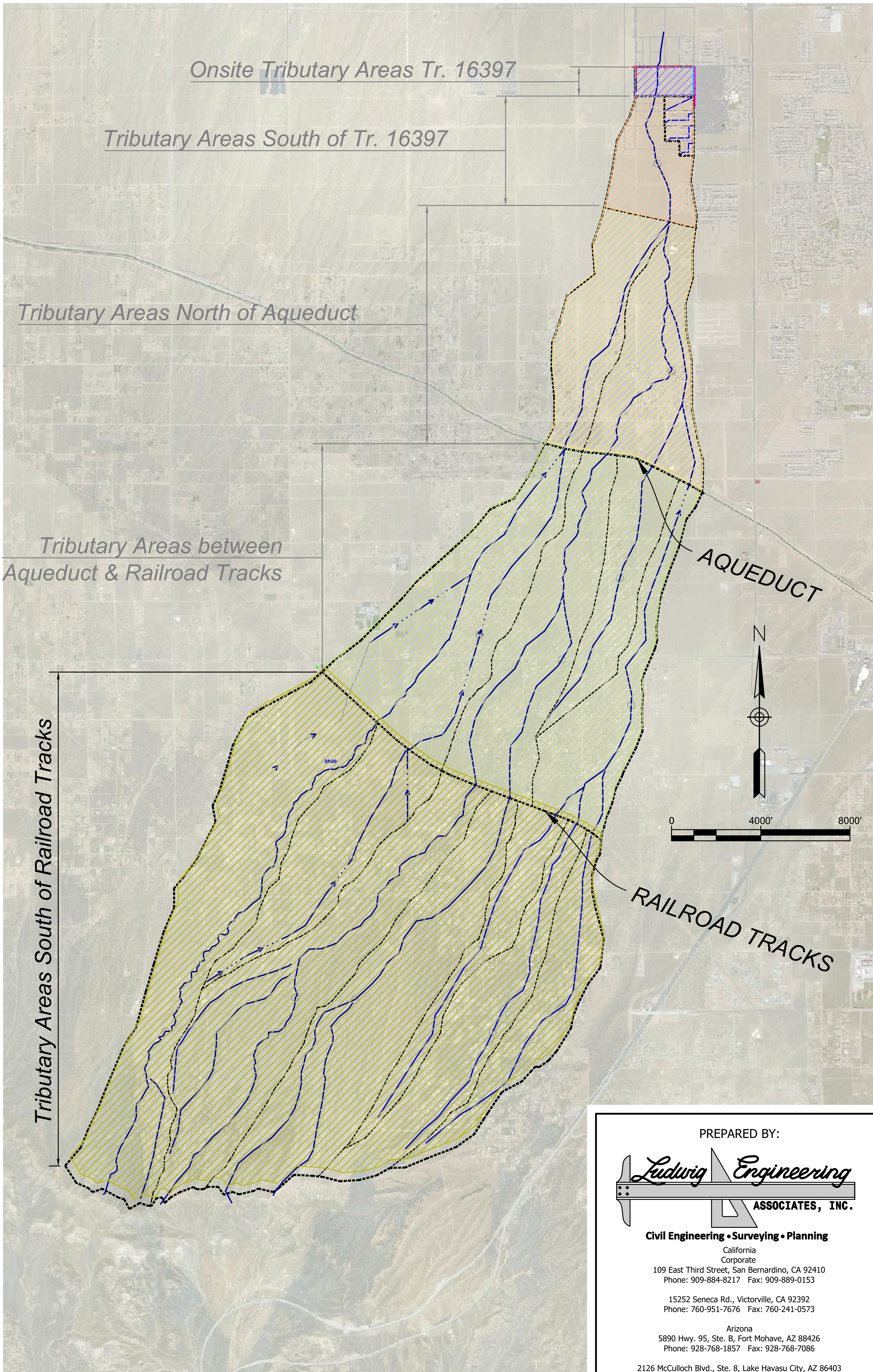
POINT PRECIPITATION FREQUENCY ESTIMATES MAPS



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NOAA Atlas 14, Volume 6, Version 2
Location name: Hesperia, California, USA*
Latitude: 34.3844°, Longitude: -117.4437°
Elevation: 4028.95 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	0.102 (0.084-0.124)	0.140 (0.116-0.171)	0.191 (0.157-0.234)	0.233 (0.190-0.287)	0.291 (0.230-0.371)	0.336 (0.260-0.438)	0.383 (0.289-0.511)	0.431 (0.317-0.593)	0.498 (0.351-0.714)	0.551 (0.375-0.817)
10-min	0.146 (0.121-0.178)	0.201 (0.166-0.245)	0.273 (0.226-0.335)	0.334 (0.273-0.412)	0.417 (0.330-0.532)	0.481 (0.373-0.628)	0.548 (0.414-0.733)	0.618 (0.454-0.850)	0.714 (0.503-1.02)	0.789 (0.537-1.17)
15-min	0.176 (0.146-0.215)	0.243 (0.201-0.296)	0.331 (0.273-0.405)	0.403 (0.330-0.498)	0.504 (0.399-0.643)	0.582 (0.451-0.759)	0.663 (0.501-0.886)	0.747 (0.549-1.03)	0.863 (0.608-1.24)	0.955 (0.650-1.42)
30-min	0.266 (0.221-0.325)	0.367 (0.303-0.447)	0.500 (0.412-0.612)	0.609 (0.499-0.752)	0.761 (0.602-0.972)	0.880 (0.681-1.15)	1.00 (0.757-1.34)	1.13 (0.830-1.55)	1.31 (0.919-1.87)	1.44 (0.981-2.14)
60-min	0.396 (0.328-0.482)	0.544 (0.450-0.664)	0.742 (0.612-0.908)	0.905 (0.741-1.12)	1.13 (0.894-1.44)	1.31 (1.01-1.70)	1.49 (1.13-1.99)	1.68 (1.23-2.31)	1.94 (1.37-2.78)	2.14 (1.46-3.18)
2-hr	0.603 (0.500-0.735)	0.811 (0.671-0.990)	1.09 (0.898-1.33)	1.32 (1.08-1.63)	1.63 (1.29-2.09)	1.88 (1.46-2.45)	2.14 (1.62-2.86)	2.41 (1.77-3.31)	2.78 (1.96-3.98)	3.07 (2.09-4.56)
3-hr	0.766 (0.634-0.933)	1.02 (0.844-1.25)	1.36 (1.12-1.66)	1.64 (1.34-2.02)	2.03 (1.60-2.59)	2.33 (1.81-3.04)	2.65 (2.00-3.54)	2.98 (2.19-4.10)	3.44 (2.43-4.93)	3.81 (2.59-5.65)
6-hr	1.13 (0.938-1.38)	1.50 (1.24-1.83)	1.98 (1.64-2.43)	2.38 (1.95-2.94)	2.94 (2.33-3.76)	3.38 (2.62-4.41)	3.84 (2.90-5.13)	4.32 (3.18-5.94)	4.99 (3.52-7.16)	5.53 (3.76-8.21)
12-hr	1.53 (1.27-1.87)	2.06 (1.70-2.51)	2.75 (2.27-3.37)	3.33 (2.72-4.10)	4.12 (3.26-5.26)	4.74 (3.67-6.18)	5.39 (4.07-7.20)	6.06 (4.45-8.33)	7.00 (4.93-10.0)	7.75 (5.28-11.5)
24-hr	2.08 (1.84-2.39)	2.85 (2.52-3.28)	3.88 (3.42-4.48)	4.73 (4.14-5.51)	5.90 (5.00-7.10)	6.82 (5.66-8.38)	7.77 (6.29-9.79)	8.77 (6.91-11.4)	10.2 (7.68-13.7)	11.3 (8.23-15.7)
2-day	2.50 (2.21-2.87)	3.47 (3.07-4.00)	4.79 (4.23-5.53)	5.90 (5.16-6.87)	7.46 (6.32-8.99)	8.71 (7.23-10.7)	10.0 (8.12-12.6)	11.4 (9.00-14.8)	13.4 (10.1-18.1)	15.0 (11.0-21.0)
3-day	2.67 (2.37-3.07)	3.74 (3.31-4.31)	5.21 (4.60-6.03)	6.47 (5.66-7.54)	8.26 (7.00-9.95)	9.72 (8.06-11.9)	11.3 (9.12-14.2)	12.9 (10.2-16.7)	15.3 (11.6-20.7)	17.3 (12.6-24.1)
4-day	2.87 (2.54-3.30)	4.04 (3.57-4.65)	5.66 (5.00-6.54)	7.05 (6.18-8.22)	9.06 (7.67-10.9)	10.7 (8.87-13.1)	12.4 (10.1-15.7)	14.3 (11.3-18.5)	17.0 (12.9-23.0)	19.3 (14.1-26.9)
7-day	3.24 (2.87-3.73)	4.58 (4.05-5.28)	6.45 (5.69-7.45)	8.06 (7.06-9.39)	10.4 (8.80-12.5)	12.3 (10.2-15.1)	14.3 (11.6-18.0)	16.5 (13.0-21.4)	19.7 (14.9-26.6)	22.4 (16.3-31.2)
10-day	3.44 (3.05-3.96)	4.88 (4.32-5.63)	6.89 (6.08-7.96)	8.62 (7.55-10.0)	11.1 (9.43-13.4)	13.2 (10.9-16.2)	15.4 (12.5-19.4)	17.8 (14.0-23.1)	21.3 (16.1-28.7)	24.1 (17.6-33.7)
20-day	4.05 (3.59-4.66)	5.79 (5.13-6.68)	8.24 (7.27-9.52)	10.4 (9.07-12.1)	13.5 (11.4-16.2)	16.0 (13.3-19.7)	18.8 (15.2-23.6)	21.8 (17.1-28.2)	26.1 (19.8-35.3)	29.8 (21.8-41.6)
30-day	4.75 (4.21-5.47)	6.80 (6.02-7.84)	9.68 (8.54-11.2)	12.2 (10.7-14.2)	15.9 (13.4-19.1)	18.9 (15.7-23.2)	22.2 (18.0-27.9)	25.8 (20.3-33.4)	31.1 (23.5-42.0)	35.5 (25.9-49.6)
45-day	5.69 (5.04-6.55)	8.06 (7.13-9.29)	11.4 (10.1-13.2)	14.3 (12.6-16.7)	18.6 (15.8-22.5)	22.2 (18.5-27.3)	26.1 (21.2-32.9)	30.4 (24.0-39.4)	36.8 (27.8-49.6)	42.1 (30.8-58.8)
60-day	6.53 (5.78-7.51)	9.11 (8.06-10.5)	12.8 (11.3-14.8)	16.0 (14.0-18.6)	20.7 (17.6-25.0)	24.7 (20.5-30.4)	29.0 (23.5-36.5)	33.8 (26.6-43.8)	40.9 (30.9-55.2)	46.9 (34.2-65.5)

[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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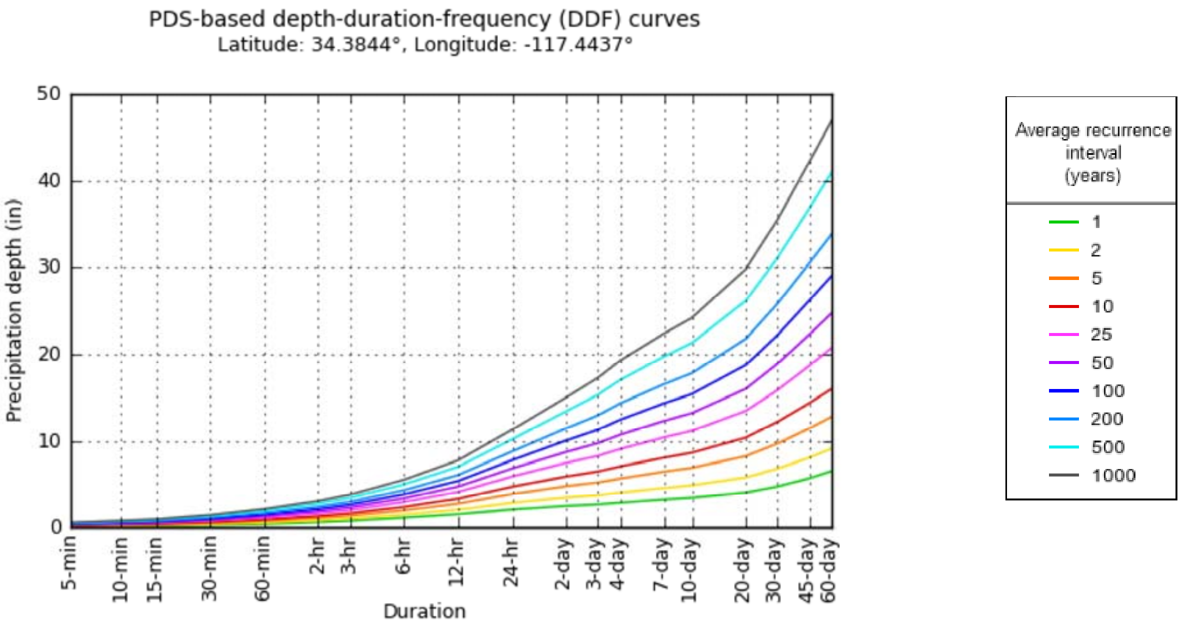
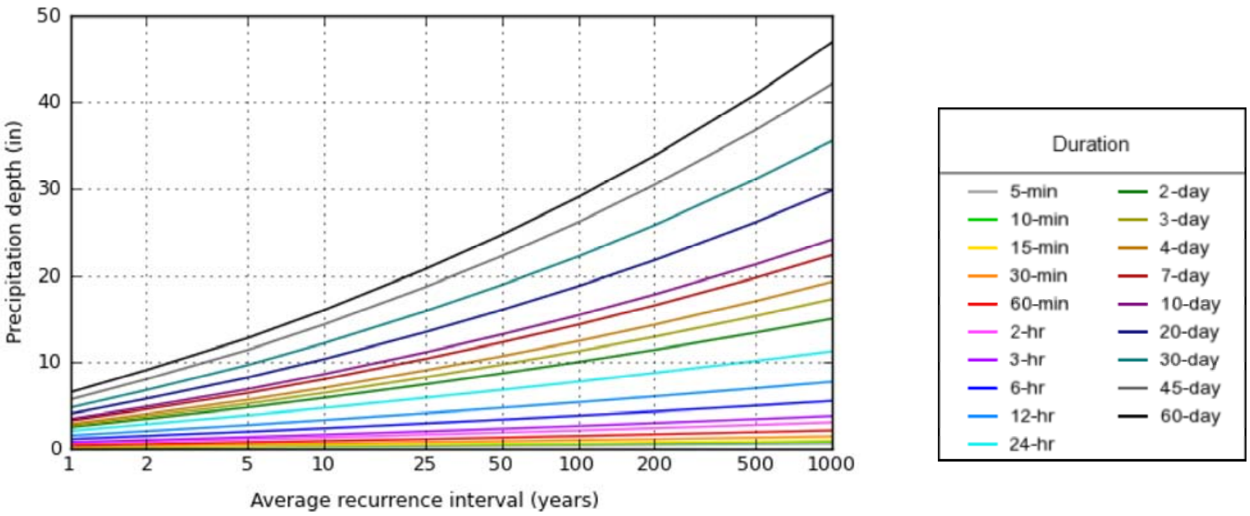
No.5 - Tributary Areas south of Rail road Tracts

see page 9

PF graphical





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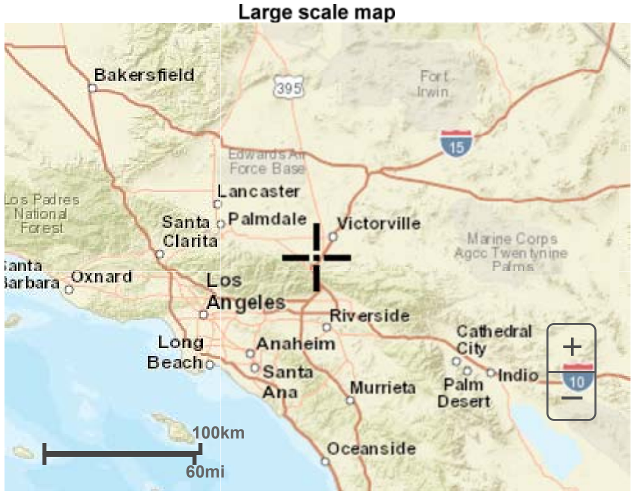
Maps & aerials

Small scale terrain

Large scale terrain

Large scale map



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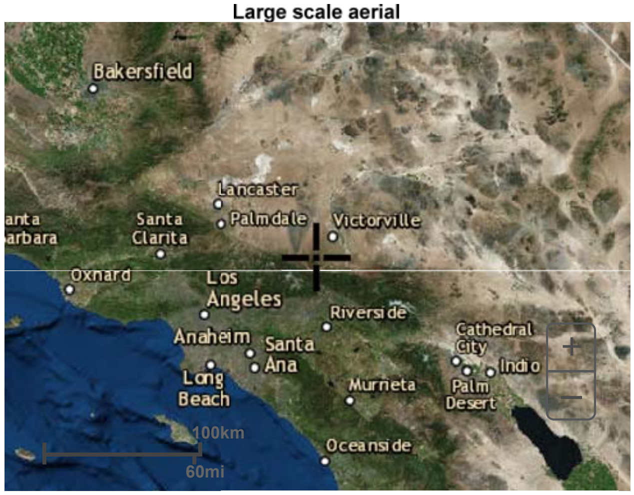

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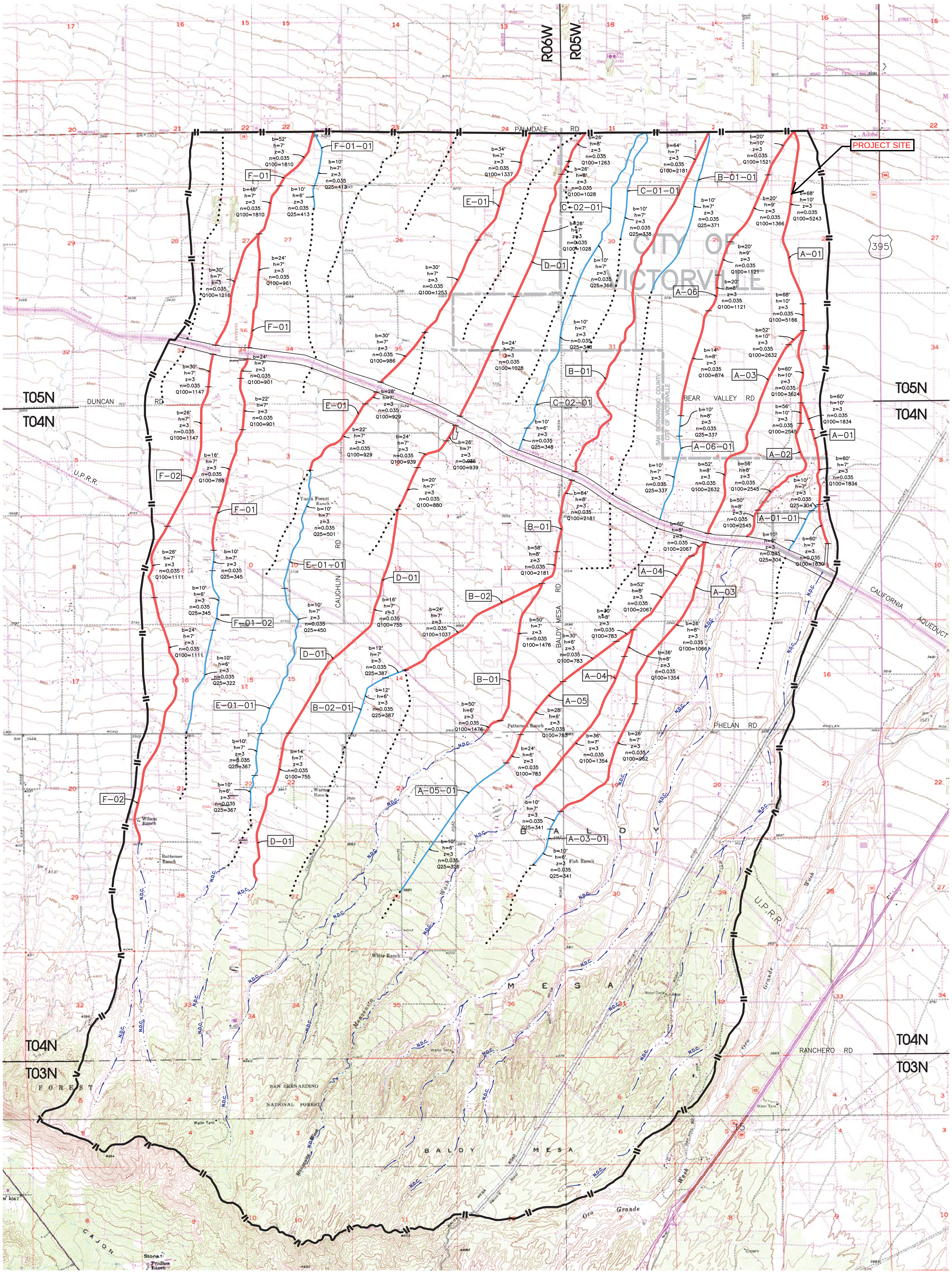

WATERSHED BOUNDARY

CITY BOUNDARY

PROPOSED REGIONAL FACILITY

A-01 FACILITY DESIGNATION

PROPOSED SECONDARY FACILITY

PROPOSED LOCAL FACILITY

NATURAL DRAINAGE COURSE (N.D.C.)

N

SCALE: 1" = 5000'

BALDY MESA

MASTER PLAN OF DRAINAGE

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT 1939 CALIFORNIA

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

FACILITY INDEX MAP

DATE
F.B. REF.
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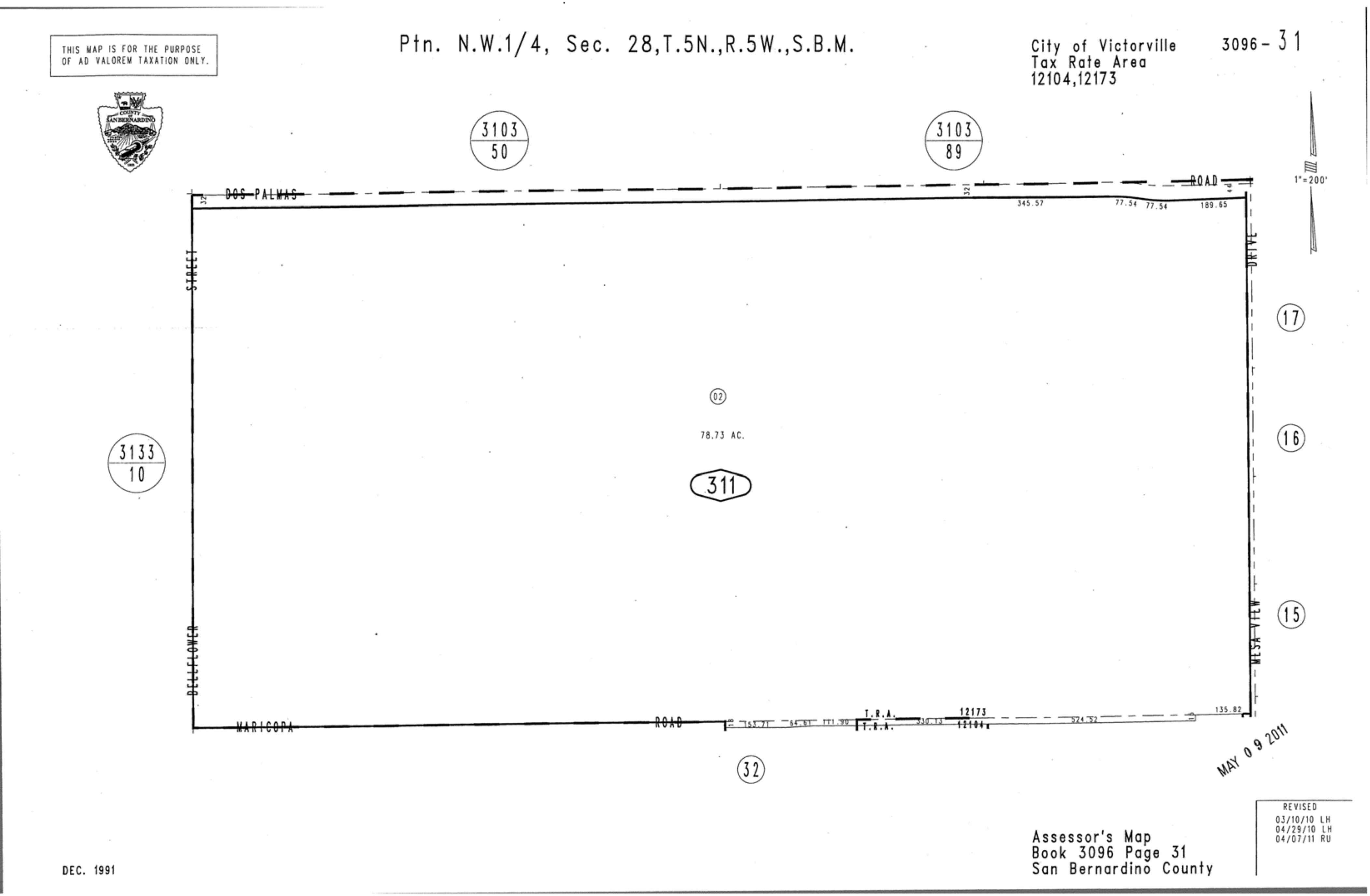
DRWG. NO.


THIS MAP IS FOR THE PURPOSE OF AD VALOREM TAXATION ONLY.
Ptn. N.W.1/4, Sec. 28,T.5N.,R.5W.,S.B.M.
City of Victorville
Tax Rate Area
12104,12173
3096-31
3103 50
3103 89
3133 10
1"=200'
DOS PALMAS ROAD
BELLFLOWER STREET
MESA VIEW DRIVE
MARICOPA ROAD
345.57
77.54
77.54
189.65
02
78.73 AC.
311
17
16
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32
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111.90
T.R.A.
12173
12104
330.13
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135.82
MAY 09 2011
REVISED
03/10/10 LH
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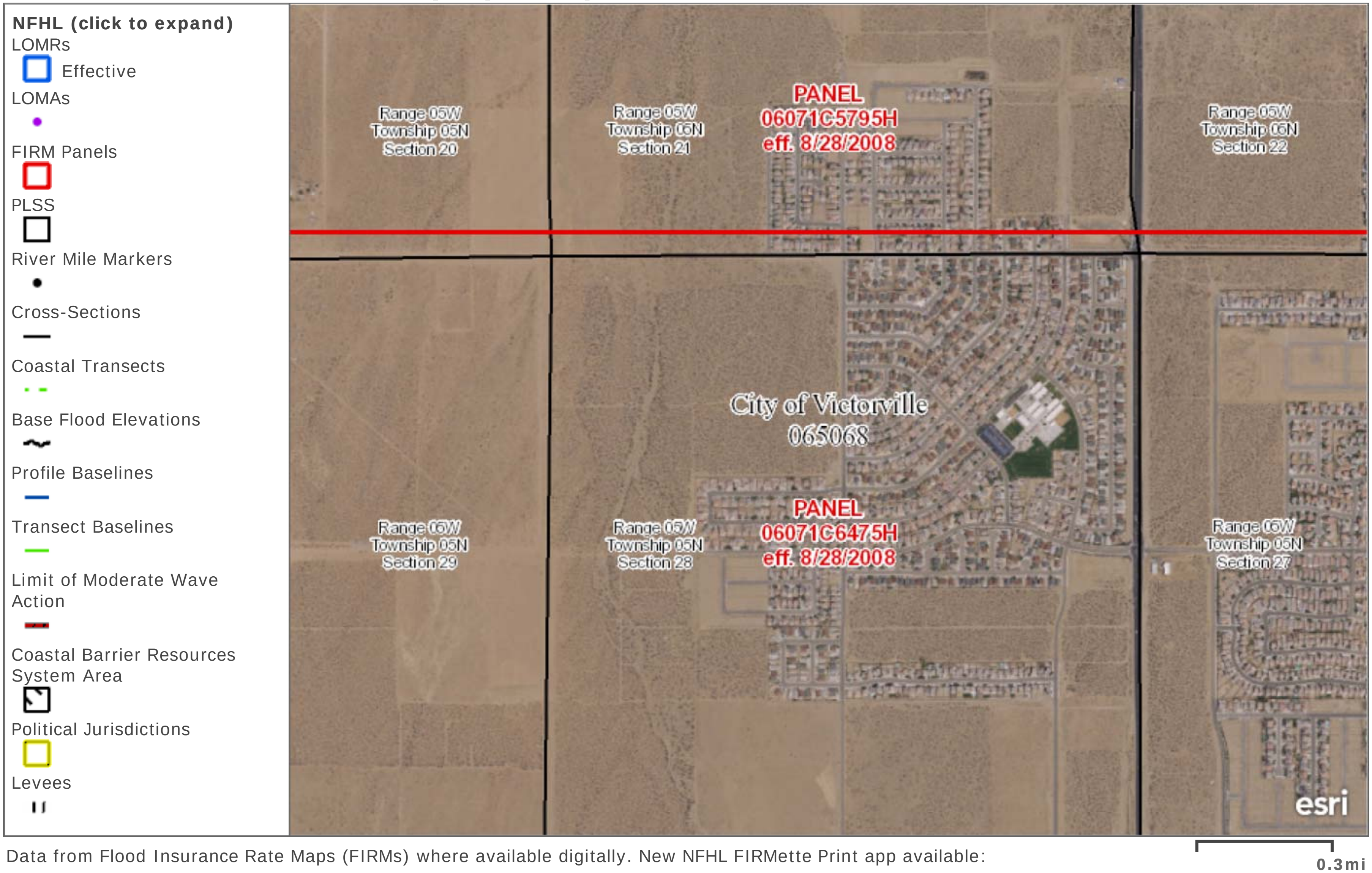
04/07/11 RU
Assessor's Map
Book 3096 Page 31
San Bernardino County
DEC. 1991

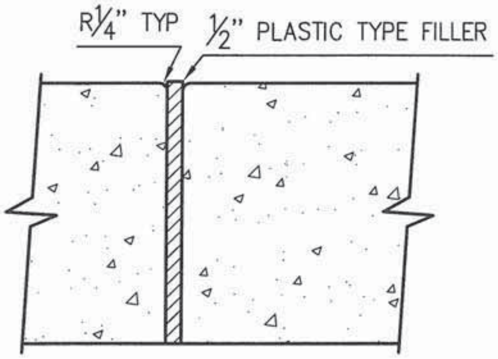
FEMA's National Flood Hazard Layer (Official)



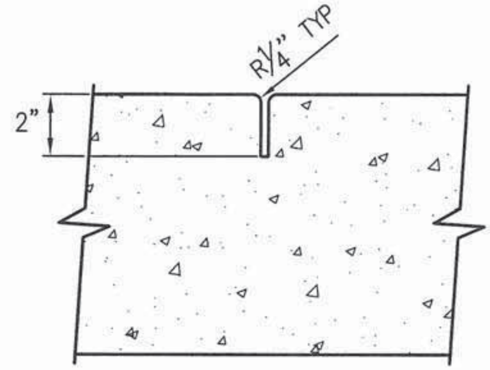
Data from Flood Insurance Rate Maps (FIRMs) where available digitally. New NFHL FIRMette Print app available: http://tinyurl.com/j4xwp5e

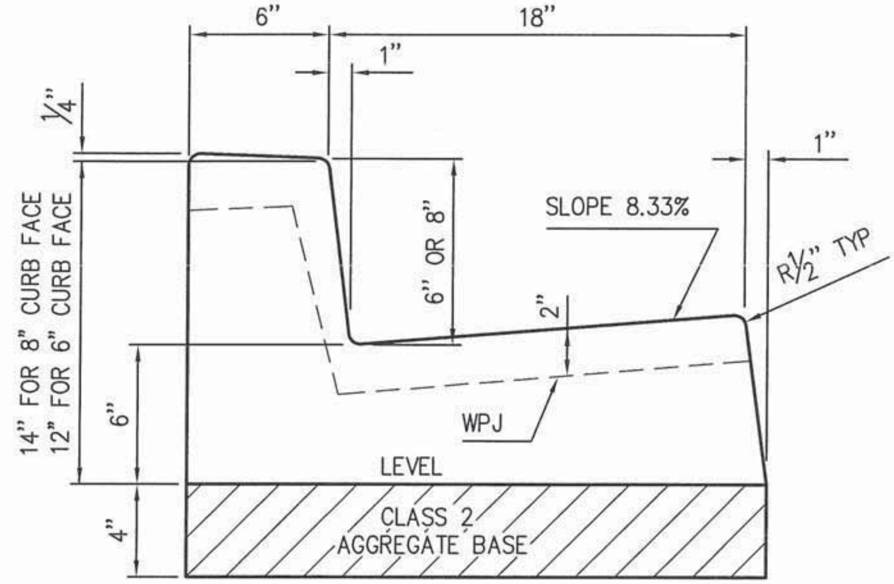
USGS The National Map: Orthoimagery | National Geospatial-Intelligence Agency (NGA); Delta State University; Esri | Print here instead: http://tinyurl.com/j4xwp5e Support: FEMAMapSpecialist@riskmapcds.com | USGS The National Map: Orthoimagery

EXPANSION JOINT



WEAKENED PLANE JOINT





STANDARD CURB & GUTTER

NOT TO SCALE

NOTES:

1. CURB AND GUTTER SHALL BE CONSTRUCTED FROM PORTLAND CEMENT CONCRETE CONTAINING NOT LESS THAN 550 POUNDS OF TYPE II PORTLAND CEMENT PER CUBIC YARD WITH 4% AIR ENTRAINMENT AND 1" MAXIMUM AGGREGATE GRADING.
2. CONCRETE SHALL BE CURED WITH WHITE PIGMENTED CURING COMPOUND.
3. CURB AND GUTTER SHALL BE CONSTRUCTED ON MINIMUM 4" CLASS 2 AGGREGATE BASE COMPACTED TO 95% RELATIVE COMPACTION.
4. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED AT 10' INTERVALS.
5. WEAKENED PLANE JOINTS SHALL BE AT LEAST 2" DEEP.
6. EXPANSION JOINTS SHALL BE CONSTRUCTED AT ALL CURB RETURNS, DRIVEWAY APPROACHES AND AT 60' INTERVALS.
7. EXPANSION JOINTS SHALL BE 1/2" WIDE AND FILLED WITH PLASTIC TYPE FILLERS.

(NOTES CONTINUE ON SHEET 2)

APPROVED BY CITY ENGINEER		CITY OF VICTORVILLE - ENGINEERING DEPARTMENT	
DATE	SIGNATURE	STANDARD CURB & GUTTER	S-01
02/03/09	J. McGlade	JOHN A. McGLADE, CITY ENGINEER	SHEET 1 OF 2

<u>POOR:</u> Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

<u>FAIR:</u> Moderate cover with 50 percent to 75 percent of the ground surface protected by vegetation.

<u>GOOD:</u> Heavy or dense cover with more than 75 percent of the ground surface protected by vegetation.

In most cases, watershed existing conditions cover type and quality can be readily determined by a field review of a watershed. In ultimate planned open spaces, the soil cover condition shall be considered as "good." Figure C-3 provides the CN values for various types and quality of ground cover. Impervious areas shall be assigned a CN of 98. It is noted that for ultimately developed conditions, the CN for urban landscaping (turf) is provided in Figure C-3.

C.4. WATERSHED DEVELOPMENT CONDITIONS

Ultimate development of the watershed should normally be assumed since watershed urbanization is reasonably likely within the expected life of most hydraulic facilities. Long range master plans for the County and incorporated cities should be reviewed to insure that reasonable land use assumptions are made for the ultimate development of the watershed. A field review shall also be made to confirm existing use and drainage patterns. Particular attention shall be paid to existing and proposed landscape practices, as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. Appropriate actual impervious percentages can then be selected from Figure C-4. It should be noted that the recommended values from these figures are for average conditions and, therefore, some adjustment for particular applications may be required.

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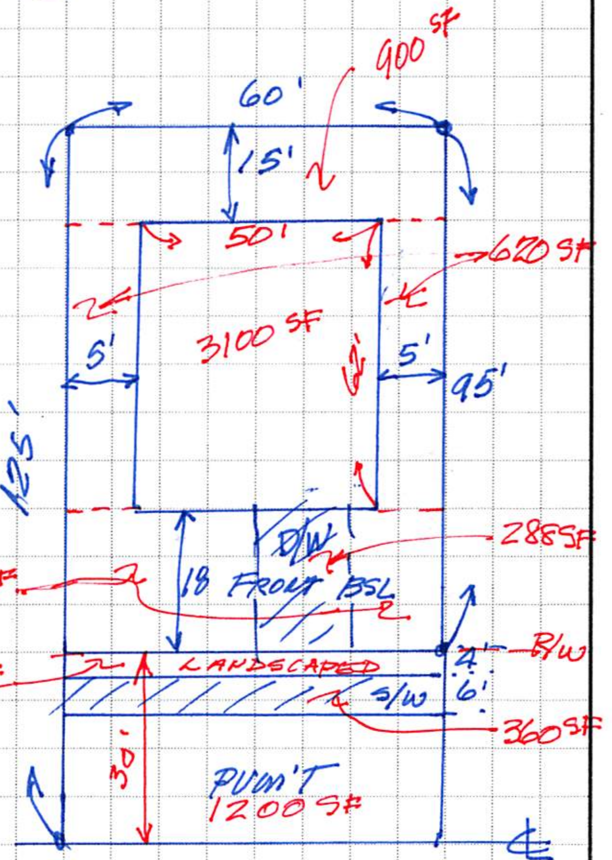
JOB RY-0257 R.Y. Properties
SHEET NO. ______ OF ______
CALCULATED BY ______ DATE ______
CHECKED BY ______ DATE ______
SCALE ______

TR. NO. 16397
CURVE NUMBER DETERMINATION (CN)

CN = 98 (ROOF, D/W, S/W, PVM'T)
CN = 32 (LANDSCAPE)
CN = 78 (GRADED BARREN LAND)



(CN) CONSIDERING REAR/SIDE YARD (BARREN GRADED LAND)

$$CN = \frac{\left[(78 \times 1{,}520) + (32 \times 1{,}032) + (98 \times 4{,}948)\right]}{7{,}500}$$

CN = 84.9

CN = 85

(CN) CONSIDERED FULLY LANDSCAPED (ULTIMATE CONDITION)

$$CN = \frac{\left[(32 \times 2552) + (98 \times 4{,}948)\right]}{7{,}500}$$

CN = 75.5

CN = 76

RUNOFF INDEX 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
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, 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	72	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	28	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)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.

2. Quality of cover definitions:
   Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.

3. See Plate C-2 for a detailed description of cover types.

4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.

5. Reference Bibliography item 17.

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

IMPERVIOUS COVER FOR DEVELOPED AREAS

HYDROLOGY INPUT TABLES ONSITE/OFFSITE

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JOB RY-0324

CALCULATED BY ________ **DATE** 11/21/2017
CHECKED BY ________ **DATE** ________

DESCRIPTION *ONSITE RATIONAL* **100-YR, 1HR** **1.11IN**
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q100 (CFS)	REMARKS
FILE: 16397ONSITEA8POST100YR.OUT				*POST-DEVELOPED CONDITION*					***DA 1 - DMAA***
11 >12	**DA1-A8a**	3205.00	3197.17	1000.00	5.85	A	4-5 DU/AC	21.10	INITIAL SUBAREA
12 >13	**DA1-A8b**	3197.17	3195.97	116.00	0.42	A	4-5 DU/AC	21.50	STREET FLOW + SUBAREA
12 >13						A	4-5 DU/AC	21.50	**CONFLUENCE 1 OF 2**
14 >13	**DA1-A8c**	3201.90	3195.97	846.00	2.46	A	4-5 DU/AC	6.00	INITIAL SUBAREA
14 >13						A	4-5 DU/AC	27.20	**CONFLUENCE 2 OF 2**
13 >15	**DA1-A9**	3195.97	3187.60	966.00	6.36	A	4-5 DU/AC	35.10	STREET FLOW + SUBAREA
13 >15						A	4-5 DU/AC	35.10	**MAIN STREAM CONFLUENCE 1 OF 2**
16 >17	**DA1-A10a**	3201.90	3193.60	841.00	2.31	A	4-5 DU/AC	5.97	INITIAL SUBAREA
16 >17						A	4-5 DU/AC	5.97	**CONFLUENCE 1 OF 2**
18 >17	**DA1-A10b**	3198.30	3193.60	615.00	2.90	A	4-5 DU/AC	7.90	INITIAL SUBAREA
18 >17						A	4-5 DU/AC	13.80	**CONFLUENCE 2 OF 2**
17 >19	**DA1-A11a**	3193.60	3190.40	252.00	0.90	A	4-5 DU/AC	15.20	STREET FLOW + SUBAREA
17 >19						A	4-5 DU/AC	15.20	**CONFLUENCE 1 OF 2**
20 >19	**DA1-A11b**	3195.50	3190.40	598.00	1.65	A	4-5 DU/AC	4.60	INITIAL SUBAREA
20 >19						A	4-5 DU/AC	19.40	**CONFLUENCE 2 OF 2**
19 >15	**DA1-A11c**	3190.40	3187.60	235.00	0.80	A	4-5 DU/AC	20.30	STREET FLOW + SUBAREA
19 >15						A	4-5 DU/AC	**52.60**	**MAIN STREAM CONFLUENCE 2 OF 2**
	TC=16.27MIN				***A=26.65AC***	A	4-5DU/AC		***AP=0.5; SCS=76***
FILE: 16397ONSITEA12POST100YR.OUT				*POST-DEVELOPED CONDITION*					***DA 1 - DMAB***
23 > 22	**DA1-A12a**	3192.70	3186.80	615.00	4.00	A	4-5 DU/AC	11.10	INITIAL SUBAREA
23 > 22						A	4-5 DU/AC	11.10	**CONFLUENCE 1 OF 2**
21 > 22	**DA1-A12b**	3195.00	3186.80	536.00	1.00	A	4-5 DU/AC	1.00	INITIAL SUBAREA

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CHECKED BY ______ **DATE** ______

DESCRIPTION *ONSITE RATIONAL* **100-YR, 1HR** **1.11IN**
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q100 (CFS)	REMARKS
21 > 22						A	4-5 DU/AC	**11.84**	**CONFLUENCE 2 OF 2**
	TC=13.49MIN				*A=4.28AC*	A	4-5DU/AC		*AP=0.5; SCS=72*
FILE: 16397ONSITEA5POST100YR.OUT				*POST-DEVELOPED CONDITION*					***DA 2 - DMAA***
26 > 25	**DA2-A5a**	3202.70	3194.40	512.00	2.83	A	4-5 DU/AC	13.10	INITIAL SUBAREA
26 > 25						A	4-5 DU/AC	13.10	**MAIN STREAM CONFLUENCE 1 OF 2**
28 > 27	**DA2-A5c**	3202.30	3197.30	303.00	1.22	A	4-5 DU/AC	4.00	INITIAL SUBAREA
27 > 25	**DA2-A5d**	3197.30	3194.40	268.00	0.88	A	4-5 DU/AC	8.30	STREET FLOW + SUBAREA
27 > 25						A	4-5 DU/AC	20.40	**MAIN STREAM CONFLUENCE 2 OF 2**
25 > 28	**DA2-A5e**	3194.40	3190.80	475.00	2.43	A	4-5 DU/AC	24.00	STREET FLOW + SUBAREA
25 > 28						A	4-5 DU/AC	24.00	**MAIN STREAM CONFLUENCE 1 OF 2**
29 > 30	**DA2-A6a**	3198.50	3192.10	536.00	2.31	A	4-5 DU/AC	7.00	INITIAL SUBAREA
29 > 30						A	4-5 DU/AC	7.00	**CONFLUENCE 1 OF 2**
31 > 30	**DA2-A6b**	3195.30	3192.10	300.00	1.10	A	4-5 DU/AC	3.90	INITIAL SUBAREA
31 > 30						A	4-5 DU/AC	10.40	**CONFLUENCE 2 OF 2**
30 > 28	**DA2-A6c**	3192.10	3190.80	246.00	0.80	A	4-5 DU/AC	11.60	STREET FLOW + SUBAREA
30 > 28						A	4-5 DU/AC	34.60	**MAIN STREAM CONFLUENCE 2 OF 2**
28 > 32	**DA2-A7**	3190.80	3189.70	186.00	2.35	A	4-5 DU/AC	**39.20**	STREET FLOW + SUBAREA
	TC=12.66MIN				*A=16.75AC*				*AP=0.5; SCS=72.8*
FILE: 16397ONSITEA1POST100YR.OUT				*POST-DEVELOPED CONDITION*					***DA 3 - DMAA***
1 > 2	**DA3-A1a**	3204.60	3197.10	976.00	5.39	A	4-5 DU/AC	12.90	INITIAL SUBAREA
1 > 2						A	4-5 DU/AC	12.90	**CONFLUENCE 1 OF 2**

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JOB RY-0324

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CHECKED BY ______ DATE ______

DESCRIPTION *ONSITE RATIONAL* 100-YR, 1HR 1.11IN
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q100 (CFS)	REMARKS
3 > 2	**DA3-A1b**	3203.50	3197.10	720.00	3.22	A	4-5 DU/AC	8.60	INITIAL SUBAREA
3 > 2						A	4-5 DU/AC	20.90	**CONFLUENCE 2 OF 2**
2 > 4	**DA3-A2a**	3197.10	3193.70	312.00	1.22	A	4-5 DU/AC	22.40	STREET FLOW + SUBAREA
2 > 4						A	4-5 DU/AC	22.40	**CONFLUENCE 1 OF 2**
5 > 4	**DA3-A2b**	3199.30	3193.70	488.00	2.81	A	4-5 DU/AC	8.70	INITIAL SUBAREA
5 > 4						A	4-5 DU/AC	29.30	**CONFLUENCE 2 OF 2**
4 > 6	**DA3-A2c**	3193.70	3189.30	432.00	2.30	A	4-5 DU/AC	32.10	STREET FLOW + SUBAREA
4 > 6						A	4-5 DU/AC	32.10	**MAIN STREAM CONFLUENCE 1 OF 2**
7 > 8	**DA3-A3a**	3202.60	3192.70	891.00	4.94	A	4-5 DU/AC	12.80	INITIAL SUBAREA
8 > 9	**DA3-A3b**	3192.70	3190.80	289.00	1.26	A	4-5 DU/AC	14.60	STREET FLOW + SUBAREA
8 > 9						A	4-5 DU/AC	14.60	**CONFLUENCE 1 OF 2**
10 > 9	**DA3-A3c**	3194.80	3190.80	325.00	1.78	A	4-5 DU/AC	6.20	INITIAL SUBAREA
10 > 9						A	4-5 DU/AC	18.90	**CONFLUENCE 2 OF 2**
9 > 6	**DA3-A3b**	3190.80	3189.30	289.00	1.70	A	4-5 DU/AC	21.10	STREET FLOW + SUBAREA
9 > 6						A	4-5 DU/AC	**52.90**	**MAIN STREAM CONFLUENCE 2 OF 2**
	TC=17.83MIN				***A=24.62AC***				***AP=0.5; SCS=76***
FILE: 16397ONSITEA14POST100YR.OUT					***POST-DEVELOPED CONDITION***				
37 > 38	A14a	3188.90	3183.50	957.00	0.87	A	Dos Palmas	2.00	INITIAL SUBAREA
37 > 38						A	Dos Palmas	2.00	**CONFLUENCE 1 OF 2**
39 > 38	A14b	3184.80	3183.50	232.00	0.21	A	Dos Palmas	0.72	INITIAL SUBAREA
39 > 38						A	Dos Palmas	**2.50**	**CONFLUENCE 2 OF 2**
	TC=18.45min				***A=1.08AC***	A	Dos Palmas		***AP=0.5; SCS=76***
FILE: 16397ONSITEA13POST100YR.OUT					***POST-DEVELOPED CONDITION***				

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DESCRIPTION *ONSITE RATIONAL* 100-YR, 1HR 1.11IN
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q100 (CFS)	REMARKS
34 > 35	A13a	3203.60	3190.70	1000.00	1.27	A	Bellflower	3.25	INITIAL SUBAREA
35 > 36	A13b	3190.70	3186.30	303.00	0.40	A	Bellflower	3.94	STREET FLOW + SUBAREA
35 > 36						A	Bellflower	3.94	**CONFLUENCE 1 OF 2**
37 > 36	A13c	3188.90	3186.30	985.00	0.82	A	Bellflower	1.67	INITIAL SUBAREA
37 > 36						A	Bellflower	**5.50**	**CONFLUENCE 2 OF 2**
	TC=16.85min				***A=2.49AC***				***AP=0.5; SCS=76***
FILE: 16397ONSITEA14CPOST100YR.OUT					***POST-DEVELOPED CONDITION***				
15 > 15	***TC=16.27min***		***AP=0.5; SCS=76***		***A=19.66AC***	A	Bellflower	**38.80**	USER DEFINE/ ONSITE FLOWBY/FREDERICK CT
39 > 40	A14c	3184.80	3182.40	447.00	0.47	A	Dos Palmas	44.40	INITIAL SUBAREA
39 > 40						A	Dos Palmas	44.40	**CONFLUENCE 1 OF 2**
41 > 42	A14d	3202.90	3188.50	1000.00	0.47	A	Mesa View Rd	1.22	INITIAL SUBAREA
42 > 40	A14e	3188.50	3182.40	303.00	0.27	A	Mesa View Rd	1.70	STREET FLOW + SUBAREA
41 > 40						A	Mesa View Rd	**46.00**	**CONFLUENCE 2 OF 2**
	TC=18.46min				***A=20.87AC***	A			***AP=0.5; SCS=76***

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DESCRIPTION ONSITE/OFFSITE RATIONAL 10-YR, 1HR 0.664IN
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q10 (CFS)	REMARKS
FILE: 16397ONSITEA8POST10YR.OUT				*POST-DEVELOPED CONDITION*					***DA 1 - DMAA***
11 >12	**DA1-A8a**	3205.00	3197.17	1000.00	5.85	A	4-5 DU/AC	11.20	INITIAL SUBAREA
12 >13	**DA1-A8b**	3197.17	3195.97	116.00	0.42	A	4-5 DU/AC	11.40	STREET FLOW + SUBAREA
12 >13						A	4-5 DU/AC	11.40	**CONFLUENCE 1 OF 2**
14 >13	**DA1-A8c**	3201.90	3195.97	846.00	2.46	A	4-5 DU/AC	3.20	INITIAL SUBAREA
14 >13						A	4-5 DU/AC	14.40	**CONFLUENCE 2 OF 2**
13 >15	**DA1-A9**	3195.97	3187.60	966.00	6.36	A	4-5 DU/AC	17.70	STREET FLOW + SUBAREA
13 >15						A	4-5 DU/AC	17.70	**MAIN STREAM CONFLUENCE 1 OF 2**
16 >17	**DA1-A10a**	3201.90	3193.60	841.00	2.31	A	4-5 DU/AC	3.20	INITIAL SUBAREA
16 >17						A	4-5 DU/AC	3.20	**CONFLUENCE 1 OF 2**
18 >17	**DA1-A10b**	3198.30	3193.60	615.00	2.90	A	4-5 DU/AC	4.30	INITIAL SUBAREA
18 >17						A	4-5 DU/AC	7.50	**CONFLUENCE 2 OF 2**
17 >19	**DA1-A11a**	3193.60	3190.40	252.00	0.90	A	4-5 DU/AC	8.10	STREET FLOW + SUBAREA
17 >19						A	4-5 DU/AC	8.10	**CONFLUENCE 1 OF 2**
20 >19	**DA1-A11b**	3195.50	3190.40	598.00	1.65	A	4-5 DU/AC	2.50	INITIAL SUBAREA
20 >19						A	4-5 DU/AC	10.30	**CONFLUENCE 2 OF 2**
19 >15	**DA1-A11c**	3190.40	3187.60	235.00	0.80	A	4-5 DU/AC	10.70	STREET FLOW + SUBAREA
19 >15						A	4-5 DU/AC	**27.20**	**MAIN STREAM CONFLUENCE 2 OF 2**
	TC=14.68MIN				***A=26.65AC***	A	4-5DU/AC		***AP=0.5; SCS=76***
FILE: 16397ONSITEA12POST10YR.OUT				*POST-DEVELOPED CONDITION*					***DA 1 - DMAB***
23 > 22	**DA1-A12a**	3192.70	3186.80	615.00	4.00	A	4-5 DU/AC	6.00	INITIAL SUBAREA
23 > 22						A	4-5 DU/AC	6.00	**CONFLUENCE 1 OF 2**
21 > 22	**DA1-A12b**	3195.00	3186.80	536.00	1.00	A	4-5 DU/AC	0.60	INITIAL SUBAREA

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JOB RY-0324

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DESCRIPTION ONSITE/OFFSITE RATIONAL 10-YR, 1HR 0.664IN
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q10 (CFS)	REMARKS
21 > 22						A	4-5 DU/AC	**6.40**	**CONFLUENCE 2 OF 2**
	TC=13.49MIN				*A=4.28AC*	A	4-5DU/AC		***AP=0.5; SCS=72***
FILE: 16397ONSITEA5POST10YR.OUT				***POST-DEVELOPED CONDITION***					***DA 2 - DMAA***
26 > 25	**DA2-A5a**	3202.70	3194.40	512.00	2.83	A	4-5 DU/AC	7.10	INITIAL SUBAREA
26 > 25						A	4-5 DU/AC	7.10	**MAIN STREAM CONFLUENCE 1 OF 2**
28 > 27	**DA2-A5c**	3202.30	3197.30	303.00	1.22	A	4-5 DU/AC	2.10	INITIAL SUBAREA
27 > 25	**DA2-A5d**	3197.30	3194.40	268.00	0.88	A	4-5 DU/AC	4.30	STREET FLOW + SUBAREA
27 > 25						A	4-5 DU/AC	11.00	**MAIN STREAM CONFLUENCE 2 OF 2**
25 > 28	**DA2-A5e**	3194.40	3190.80	475.00	2.43	A	4-5 DU/AC	12.50	STREET FLOW + SUBAREA
25 > 28						A	4-5 DU/AC	12.50	**MAIN STREAM CONFLUENCE 1 OF 2**
29 > 30	**DA2-A6a**	3198.50	3192.10	536.00	2.31	A	4-5 DU/AC	3.80	INITIAL SUBAREA
29 > 30						A	4-5 DU/AC	3.80	**CONFLUENCE 1 OF 2**
31 > 30	**DA2-A6b**	3195.30	3192.10	300.00	1.10	A	4-5 DU/AC	2.10	INITIAL SUBAREA
31 > 30						A	4-5 DU/AC	5.80	**CONFLUENCE 2 OF 2**
30 > 28	**DA2-A6c**	3192.10	3190.80	246.00	0.80	A	4-5 DU/AC	6.20	STREET FLOW + SUBAREA
30 > 28						A	4-5 DU/AC	18.20	**MAIN STREAM CONFLUENCE 2 OF 2**
28 > 32	**DA2-A7**	3190.80	3189.70	186.00	2.35	A	4-5 DU/AC	**20.50**	STREET FLOW + SUBAREA
	TC=13.13MIN				*A=16.75AC*				***AP=0.5; SCS=72.8***
FILE: 16397ONSITEA1POST10YR.OUT				***POST-DEVELOPED CONDITION***					***DA 3 - DMAA***
1 > 2	**DA3-A1a**	3204.60	3197.10	976.00	5.39	A	4-5 DU/AC	6.90	INITIAL SUBAREA
1 > 2						A	4-5 DU/AC	6.90	**CONFLUENCE 1 OF 2**

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DESCRIPTION ONSITE/OFFSITE RATIONAL 10-YR, 1HR 0.664IN
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q10 (CFS)	REMARKS
3 > 2	**DA3-A1b**	3203.50	3197.10	720.00	3.22	A	4-5 DU/AC	4.60	INITIAL SUBAREA
3 > 2						A	4-5 DU/AC	11.30	**CONFLUENCE 2 OF 2**
2 > 4	**DA3-A2a**	3197.10	3193.70	312.00	1.22	A	4-5 DU/AC	11.90	STREET FLOW + SUBAREA
2 > 4						A	4-5 DU/AC	11.90	**CONFLUENCE 1 OF 2**
5 > 4	**DA3-A2b**	3199.30	3193.70	488.00	2.81	A	4-5 DU/AC	4.80	INITIAL SUBAREA
5 > 4						A	4-5 DU/AC	15.80	**CONFLUENCE 2 OF 2**
4 > 6	**DA3-A2c**	3193.70	3189.30	432.00	2.30	A	4-5 DU/AC	17.00	STREET FLOW + SUBAREA
4 > 6						A	4-5 DU/AC	17.00	**MAIN STREAM CONFLUENCE 1 OF 2**
7 > 8	**DA3-A3a**	3202.60	3192.70	891.00	4.94	A	4-5 DU/AC	6.90	INITIAL SUBAREA
8 > 9	**DA3-A3b**	3192.70	3190.80	289.00	1.26	A	4-5 DU/AC	7.70	STREET FLOW + SUBAREA
8 > 9						A	4-5 DU/AC	7.70	**CONFLUENCE 1 OF 2**
10 > 9	**DA3-A3c**	3194.80	3190.80	325.00	1.78	A	4-5 DU/AC	3.50	INITIAL SUBAREA
10 > 9						A	4-5 DU/AC	10.30	**CONFLUENCE 2 OF 2**
9 > 6	**DA3-A3b**	3190.80	3189.30	289.00	1.70	A	4-5 DU/AC	11.50	STREET FLOW + SUBAREA
9 > 6						A	4-5 DU/AC	**28.00**	**MAIN STREAM CONFLUENCE 2 OF 2**
	TC=11.98MIN				***A=24.62AC***				***AP=0.5; SCS=76***
FILE: 16397ONSITEA14POST10YR.OUT					***POST-DEVELOPED CONDITION***				
37 > 40	A14a	3188.90	3183.50	957.00	0.87	A	Dos Palmas	1.10	INITIAL SUBAREA
37 > 40						A	Dos Palmas	1.10	**CONFLUENCE 1 OF 2**
39 > 38	A14b	3184.80	3183.50	232.00	0.21	A	Dos Palmas	0.40	INITIAL SUBAREA
39 > 38						A	Dos Palmas	**1.30**	**CONFLUENCE 2 OF 2**
	TC=9.91min				***A=1.08AC***	A	Dos Palmas		***AP=0.5; SCS=76***

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DESCRIPTION ONSITE/OFFSITE RATIONAL 10-YR, 1HR 0.664IN
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q10 (CFS)	REMARKS
FILE: 16397ONSITEA13POST10YR.OUT				***POST-DEVELOPED CONDITION***					
34 > 35	A13a	3203.60	3190.70	1000.00	1.27	A	Bellflower	1.75	INITIAL SUBAREA
35 > 36	A13b	3190.70	3186.30	303.00	0.40	A	Bellflower	2.07	STREET FLOW + SUBAREA
35 > 36						A	Bellflower	2.07	**CONFLUENCE 1 OF 2**
37 > 36	A13c	3188.90	3186.30	985.00	0.82	A	Bellflower	0.88	INITIAL SUBAREA
37 > 36						A	Bellflower	**2.92**	**CONFLUENCE 2 OF 2**
	TC=17.14min				***A=1.84AC***				***AP=0.5; SCS=76***
FILE: 16397ONSITEA14CPOST10YR.OUT				***POST-DEVELOPED CONDITION***					
15 > 15	***TC=16.27min***		***AP=0.5; SCS=76***		***A=19.66AC***	A	Bellflower	**13.40**	USER DEFINE/ ONSITE FLOWBY/FREDERICK CT
39 > 40	A14c	3184.80	3182.40	447.00	0.47	A	Dos Palmas	13.40	INITIAL SUBAREA
39 > 40						A	Dos Palmas	13.40	**CONFLUENCE 1 OF 2**
41 > 42	A14d	3202.90	3188.50	1000.00	0.47	A	Mesa View Rd	0.70	INITIAL SUBAREA
42 > 40	A14e	3188.50	3182.40	303.00	0.27	A	Mesa View Rd	0.90	STREET FLOW + SUBAREA
41 > 40						A	Mesa View Rd	**14.20**	**CONFLUENCE 2 OF 2**
	TC=19.08min				***A=8.01AC***	A			***AP=0.5; SCS=76***

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DESCRIPTION *ONSITE RATIONAL* 2-YR, 1HR 0.384in

CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q2 (CFS)	REMARKS
FILE: 16397ONSITEA8POST2YR.OUT				*POST-DEVELOPED CONDITION*					*DA 1 - DMAA*
11 >12	DA1-A8a	3205.00	3197.17	1000.00	5.85	A	4-5 DU/AC	4.70	INITIAL SUBAREA
12 >13	DA1-A8b	3197.17	3195.97	116.00	0.42	A	4-5 DU/AC	4.70	STREET FLOW + SUBAREA
12 >13						A	4-5 DU/AC	4.70	**CONFLUENCE 1 OF 2**
14 >13	DA1-A8c	3201.90	3195.97	846.00	2.46	A	4-5 DU/AC	1.40	INITIAL SUBAREA
14 >13						A	4-5 DU/AC	6.10	**CONFLUENCE 2 OF 2**
13 >15	DA1-A9	3195.97	3187.60	966.00	6.36	A	4-5 DU/AC	6.10	STREET FLOW + SUBAREA
13 >15						A	4-5 DU/AC	6.10	**MAIN STREAM CONFLUENCE 1 OF 2**
16 >17	DA1-A10a	3201.90	3193.60	841.00	2.31	A	4-5 DU/AC	1.40	INITIAL SUBAREA
16 >17						A	4-5 DU/AC	1.40	**CONFLUENCE 1 OF 2**
18 >17	DA1-A10b	3198.30	3193.60	615.00	2.90	A	4-5 DU/AC	1.90	INITIAL SUBAREA
18 >17						A	4-5 DU/AC	3.30	**CONFLUENCE 2 OF 2**
17 >19	DA1-A11a	3193.60	3190.40	252.00	0.90	A	4-5 DU/AC	3.40	STREET FLOW + SUBAREA
17 >19						A	4-5 DU/AC	3.40	**CONFLUENCE 1 OF 2**
20 >19	DA1-A11b	3195.50	3190.40	598.00	1.65	A	4-5 DU/AC	1.10	INITIAL SUBAREA
20 >19						A	4-5 DU/AC	4.50	**CONFLUENCE 2 OF 2**
19 >15	DA1-A11c	3190.40	3187.60	235.00	0.80	A	4-5 DU/AC	4.50	STREET FLOW + SUBAREA
19 >15						A	4-5 DU/AC	**11.20**	**MAIN STREAM CONFLUENCE 2 OF 2**
		TC=15MIN			*A=26.65AC*	A	4-5DU/AC		*AP=0.5; SCS=76*
FILE: 16397ONSITEA12POST2YR.OUT				*POST-DEVELOPED CONDITION*					*DA 1 - DMAB*
23 > 22	DA1-A12a	3192.70	3186.80	615.00	4.00	A	4-5 DU/AC	2.70	INITIAL SUBAREA
23 > 22						A	4-5 DU/AC	2.70	**CONFLUENCE 1 OF 2**
21 > 22	DA1-A12b	3195.00	3186.80	536.00	1.00	A	4-5 DU/AC	0.30	INITIAL SUBAREA

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DESCRIPTION *ONSITE RATIONAL* **2-YR, 1HR** **0.384in**
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q2 (CFS)	REMARKS
21 > 22						A	4-5 DU/AC	**2.90**	**CONFLUENCE 2 OF 2**
	TC=9.45MIN				*A=4.28AC*	A	4-5DU/AC		*AP=0.5; SCS=76*
FILE: 16397ONSITEA5POST2YR.OUT				*POST-DEVELOPED CONDITION*					***DA 2 - DMAA***
26 > 25	**DA2-A5a**	3202.70	3194.40	512.00	2.83	A	4-5 DU/AC	3.10	INITIAL SUBAREA
26 > 25						A	4-5 DU/AC	3.10	**MAIN STREAM CONFLUENCE 1 OF 2**
28 > 27	**DA2-A5c**	3202.30	3197.30	303.00	1.22	A	4-5 DU/AC	0.90	INITIAL SUBAREA
27 > 25	**DA2-A5d**	3197.30	3194.40	268.00	0.88	A	4-5 DU/AC	1.80	STREET FLOW + SUBAREA
27 > 25						A	4-5 DU/AC	4.90	**MAIN STREAM CONFLUENCE 2 OF 2**
25 > 28	**DA2-A5e**	3194.40	3190.80	475.00	2.43	A	4-5 DU/AC	5.00	STREET FLOW + SUBAREA
25 > 28						A	4-5 DU/AC	5.00	**MAIN STREAM CONFLUENCE 1 OF 2**
29 > 30	**DA2-A6a**	3198.50	3192.10	536.00	2.31	A	4-5 DU/AC	7.00	INITIAL SUBAREA
29 > 30						A	4-5 DU/AC	7.00	**CONFLUENCE 1 OF 2**
31 > 30	**DA2-A6b**	3195.30	3192.10	300.00	1.10	A	4-5 DU/AC	3.90	INITIAL SUBAREA
31 > 30						A	4-5 DU/AC	10.40	**CONFLUENCE 2 OF 2**
30 > 28	**DA2-A6c**	3192.10	3190.80	246.00	0.80	A	4-5 DU/AC	11.60	STREET FLOW + SUBAREA
30 > 28						A	4-5 DU/AC	7.80	**MAIN STREAM CONFLUENCE 2 OF 2**
28 > 32	**DA2-A7**	3190.80	3189.70	186.00	2.35	A	4-5 DU/AC	**8.40**	STREET FLOW + SUBAREA
	TC=13.85MIN				*A=16.75AC*				*AP=0.5; SCS=72.8*
FILE: 16397ONSITEA1POST2YR.OUT				*POST-DEVELOPED CONDITION*					***DA 3 - DMAA***
1 > 2	**DA3-A1a**	3204.60	3197.10	976.00	5.39	A	4-5 DU/AC	2.90	INITIAL SUBAREA
1 > 2						A	4-5 DU/AC	2.90	**CONFLUENCE 1 OF 2**

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DESCRIPTION *ONSITE RATIONAL* **2-YR, 1HR** 0.384in
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q2 (CFS)	REMARKS
3 > 2	**DA3-A1b**	3203.50	3197.10	720.00	3.22	A	4-5 DU/AC	2.00	INITIAL SUBAREA
3 > 2						A	4-5 DU/AC	4.90	**CONFLUENCE 2 OF 2**
2 > 4	**DA3-A2a**	3197.10	3193.70	312.00	1.22	A	4-5 DU/AC	4.90	STREET FLOW + SUBAREA
2 > 4						A	4-5 DU/AC	4.90	**CONFLUENCE 1 OF 2**
5 > 4	**DA3-A2b**	3199.30	3193.70	488.00	2.81	A	4-5 DU/AC	2.20	INITIAL SUBAREA
5 > 4						A	4-5 DU/AC	7.20	**CONFLUENCE 2 OF 2**
4 > 6	**DA3-A2c**	3193.70	3189.30	432.00	2.30	A	4-5 DU/AC	7.20	STREET FLOW + SUBAREA
4 > 6						A	4-5 DU/AC	7.20	**MAIN STREAM CONFLUENCE 1 OF 2**
7 > 8	**DA3-A3a**	3202.60	3192.70	891.00	4.94	A	4-5 DU/AC	3.00	INITIAL SUBAREA
8 > 9	**DA3-A3b**	3192.70	3190.80	289.00	1.26	A	4-5 DU/AC	3.10	STREET FLOW + SUBAREA
8 > 9						A	4-5 DU/AC	3.10	**CONFLUENCE 1 OF 2**
10 > 9	**DA3-A3c**	3194.80	3190.80	325.00	1.78	A	4-5 DU/AC	1.60	INITIAL SUBAREA
10 > 9						A	4-5 DU/AC	4.80	**CONFLUENCE 2 OF 2**
9 > 6	**DA3-A3b**	3190.80	3189.30	289.00	1.70	A	4-5 DU/AC	5.00	STREET FLOW + SUBAREA
9 > 6						A	4-5 DU/AC	**12.20**	**MAIN STREAM CONFLUENCE 2 OF 2**
	TC=12.48MIN				***A=24.62AC***				***AP=0.5; SCS=76***
	FILE: 16397ONSITEA14POST2YR.OUT				***POST-DEVELOPED CONDITION***				
37 > 40	A14a	3188.90	3183.50	957.00	0.87	A	Dos Palmas	0.40	INITIAL SUBAREA
37 > 40						A	Dos Palmas	0.40	**CONFLUENCE 1 OF 2**
39 > 38	A14b	3184.80	3185.50	232.00	0.21	A	Dos Palmas	0.20	INITIAL SUBAREA
39 > 38						A	Dos Palmas	**0.54**	**CONFLUENCE 2 OF 2**
	TC=9.91min				***A=1.08AC***	A	Dos Palmas		***AP=0.5; SCS=76***

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DESCRIPTION *ONSITE RATIONAL* 2-YR, 1HR 0.384in
CITY OF VICTORVILLE TR. 16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q2 (CFS)	REMARKS
FILE: 16397ONSITEA13POST2YR.OUT					***POST-DEVELOPED CONDITION***				
34 > 35	A13a	3203.60	3190.70	1000.00	1.27	A	Bellflower	0.75	INITIAL SUBAREA
35 > 36	A13b	3190.70	3186.30	303.00	0.40	A	Bellflower	0.83	STREET FLOW + SUBAREA
35 > 36						A	Bellflower	0.83	**CONFLUENCE 1 OF 2**
37 > 36	A13c	3187.80	3186.30	208.00	0.17	A	Bellflower	0.34	INITIAL SUBAREA
37 > 36						A	Bellflower	**1.18**	**CONFLUENCE 2 OF 2**
	TC=17.56min				***A=2.49AC***				***AP=0.5; SCS=76***
FILE: 16397ONSITEA14CPOST2YR.OUT					***POST-DEVELOPED CONDITION***				
15 > 15						A	Bellflower	**0.00**	USER DEFINE/ ONSITE FLOWBY/FREDERICK CT
39 > 40	A14c	3184.80	3182.40	447.00	0.47	A	Dos Palmas	0.32	INITIAL SUBAREA
39 > 40						A	Dos Palmas	0.32	**CONFLUENCE 1 OF 2**
41 > 42	A14d	3202.90	3188.50	1000.00	0.47	A	Mesa View Rd	0.28	INITIAL SUBAREA
42 > 40	A14e	3188.50	3182.40	303.00	0.27	A	Mesa View Rd	0.38	STREET FLOW + SUBAREA
41 > 40						A	Mesa View Rd	**0.80**	**CONFLUENCE 2 OF 2**
	TC=17.32min				***A=1.68AC***	A			***AP=0.5; SCS=76***

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DESCRIPTION ONSITE RATIONAL 100-YR, 1HR 1.11IN

CITY OF VICTORVILLE

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q100 (CFS)	REMARKS
FILE: 16397ONSITEAA1PRE100YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 3***
1 > 2	AA1	3201.08	3193.18	684.00	10.00	A	UNDEV.	14.50	INITIAL SUBAREA
2 > 3	AA2	3193.18	3182.90	749.00	14.70	A	UNDEV.	**31.20**	IRREGULAR CHANNEL + SUBAREA
	TC=27.12MIN				***24.70***				***AP=1; SCS=50***
FILE: 16397ONSITEAA3PRE100YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 2***
4 > 5	AA3	3202.99	3192.28	788.00	10.00	A	UNDEV.	14.20	INITIAL SUBAREA
5 > 6	AA4	3192.28	3184.00	611.00	7.35	A	UNDEV.	21.80	IRREGULAR CHANNEL + SUBAREA
6 > 6	***TC=27.21MIN***				***A=17.35AC***			**21.80**	***NODE 6 AP=1; SCS=50***
FILE: 16397ONSITEAA5PRE100YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 1***
7 > 8	AA5	3202.61	3195.66	521.00	10.00	A	UNDEV.	16.40	INITIAL SUBAREA
8 > 9	AA6	3195.66	3183.00	854.00	18.60	A	UNDEV.	**40.10**	IRREGULAR CHANNEL + SUBAREA
9 > 9	***TC=24.29MIN***				***28.60***				***NODE 9 AP=1; SCS=50***

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DESCRIPTION ONSITE RATIONAL 10-YR, 1HR 0.664IN

CITY OF VICTORVILLE TR.16397

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q10 (CFS)	REMARKS
FILE: 16397ONSITEAA1PRE10YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 3***
1 > 2	AA1	3201.08	3193.99	662.00	10.00	A	UNDEV.	4.20	INITIAL SUBAREA
2 > 3	AA2	3193.99	3182.90	771.00	16.03	A	UNDEV.	**7.10**	IRREGULAR CHANNEL + SUBAREA
	TC=28.75MIN				***26.03***				***AP=1; SCS=50***
FILE: 16397ONSITEAA3PRE10YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 2***
4 > 5	AA3	3202.99	3192.28	789.00	10.00	A	UNDEV.	4.00	INITIAL SUBAREA
5 > 6	AA4	3192.28	3184.00	1647.00	7.70	A	UNDEV.	**4.10**	IRREGULAR CHANNEL + SUBAREA
	TC=42.08MIN				***A=17.7AC***				***AP=1; SCS=50***
FILE: 16397ONSITEAA5PRE10YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 1***
7 > 8	AA5	3202.61	3195.66	494.00	10.00	A	UNDEV.	5.40	INITIAL SUBAREA
8 > 9	AA6	3195.66	3183.00	863.00	18.90	A	UNDEV.	**10.10**	IRREGULAR CHANNEL + SUBAREA
	TC=25.75MIN				***46.60***				***AP=1; SCS=50***

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JOB RY-0324

CALCULATED BY ______ DATE 11/30/2017

CHECKED BY ______ DATE ______

DESCRIPTION ONSITE/OFFSITE RATIONAL 2-YR, 1HR 0.384IN

CITY OF VICTORVILLE

NODE NO.	AREA NO.	HIGH EL. (FT)	ELEVATION (FT)	LENGTH (FT)	AREA (AC)	SOIL TYPE	COVER TYPE	Q2 (CFS)	REMARKS
FILE: 16397ONSITEAA1PRE2YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 3***
1 > 2	AA1	3201.08	3193.99	662.00	10.00	A	UNDEV.	0.00	INITIAL SUBAREA
2 > 3	AA2	3193.99	3182.90	771.00	16.03	A	UNDEV.	**0.00**	IRREGULAR CHANNEL + SUBAREA
									AP=1; SCS=50
FILE: 16397ONSITEAA3PRE2YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 2***
4 > 5	AA3	3202.99	3192.28	789.00	10.00	A	UNDEV.	0.00	INITIAL SUBAREA
5 > 6	AA4	3192.28	3184.00	1647.00	7.70	A	UNDEV.	**0.00**	IRREGULAR CHANNEL + SUBAREA
									AP=1; SCS=50
FILE: 16397ONSITEAA5PRE2YR.OUT					*PRE-DEVELOPED CONDITION*				***DA 1***
7 > 8	AA5	3202.61	3195.66	494.00	10.00	A	UNDEV.	0.00	INITIAL SUBAREA
8 > 9	AA6	3195.66	3183.00	863.00	18.90	A	UNDEV.	**0.00**	IRREGULAR CHANNEL + SUBAREA
									AP=1; SCS=50

Ludwig Engineering
109 E. Third Street
San Bernardino, California 92410
(909)884-8217
Fax (909) 889-0153

JOB RY-0324

CALCULATED BY DATE 12/15/2017
CHECKED BY DATE

DESCRIPTION TR. 16397
City of Victorville

TIME OF CONCENTRATION

	Existing (Pre) Tc (min) Rational Method				Proposed (POST) Tc Rational Method			
	DA1	DA2	DA3		DA1 DMA-A	DA1 DMA-B	DA2 DMA-A	DA3 DMA-A
Storm Event	AA5 to AA6	AA3 to AA4	AA1 to AA2		A8a - A11b	A12a-a12b	A5a-A7	A1a-A4
2-Year	26.46	46.18	30.32		13.82	15.00	13.82	12.48
10-Year	24.50	40.06	28.01		13.49	14.68	13.12	11.98
100-Year	24.29	27.21	27.12		13.49	16.27	12.64	17.83

RATIONAL METHOD

	Existing (Pre) RATIONAL METHOD Q Flow Rate				Proposed (POST) Q Rational Method			
	DA1	DA2	DA3		DA1 DMA-A	DA1 DMA-B	DA2 DMA-A	DA3 DMA-A
Storm Event	AA5 to AA6	AA3 to AA4	AA1 to AA2		A8a - A11b	A12a-a12b	A5a-A7	A1a-A4
2-Year	3.70	1.80	2.03		11.20	2.90	9.10	12.20
10-Year	18.50	6.50	14.00		27.20	6.10	21.90	28.00
100-Year	40.10	21.80	31.20		52.60	11.84	41.80	52.90

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DESCRIPTION TR. 16397
City of Victorville

UNIT HYDROGRAPH

BASIN 1 Post BMP's OUTFlow Rate (*with BMP's)100-YR,24-HR UNIT HYD*			BASIN 2 - Post BMP's OUTFlow Rate (*with BMP's)100-YR,24-HR UNIT HYD*		
DA1 DMA-A	CAPTURE VOL.(AC.FT.)	OUTFLOW (CFS)	DA1 DMA-B	CAPTURE VOL.(AC.FT.)	OUTFLOW (CFS)
64.80	1.63(2yr) + 0.215= 1.84	38.80	10.60	0.23(2yr) + 0.0364= 0.27	6.20

UNIT HYDROGRAPH

BASIN 2 Post BMP's OUTFlow Rate (*with BMP's)100-YR,24-HR UNIT HYD*			BASIN 1 - Post BMP's OUTFlow Rate (*with BMP's)100-YR,24-HR UNIT HYD*		
DA2 DMA-A	CAPTURE VOL.(AC.FT.)	OUTFLOW (CFS)	DA3 DMA-A	CAPTURE VOL.(AC.FT.)	OUTFLOW (CFS)
41.20	1.03(2yr) + 0.129= 1.16	25.60	56.90	1.51(2yr) + 0.168= 1.68	36.55

CIVIL CADD/CIVIL DESIGN PROGRAM OUTPUT

DA 1

RATIONAL METHOD

ONSITE PRE-DEVELOPED

100-YEAR, 10-YEAR & 2-YEAR

1-HOUR STORM EVENTS

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          San Bernardino County Rational Hydrology Program

               (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/28/17
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```
100-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA5-AA6 ***DA 1***
FILE: 16397ONSITEAA5PRE100YR.OUT
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------------------------------------------------------------------------


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.110 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station       8.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Initial subarea data:
Initial area flow distance =   521.000(Ft.)
Top (of initial area) elevation =  3202.610(Ft.)
Bottom (of initial area) elevation =  3195.660(Ft.)
Difference in elevation =     6.950(Ft.)
Slope =    0.01334  s(%)=       1.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   20.441 min.
Rainfall intensity =      2.359(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.697
Subarea runoff =     16.436(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.532(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.236(Ft.), Average velocity =   3.703(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00               2.00
      2             10.00               0.00
      3             20.00               2.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     28.304(CFS)
  '     '    flow top width =     12.364(Ft.)
  '     '     velocity=    3.703(Ft/s)
  '     '    area =      7.644(Sq.Ft)
  '     '    Froude number =     0.830

Upstream point elevation =  3195.660(Ft.)
Downstream point elevation =  3183.000(Ft.)
Flow length =   854.000(Ft.)
Travel time  =    3.84 min.
Time of concentration =   24.29 min.
Depth of flow =   1.236(Ft.)
Average velocity =   3.703(Ft/s)
Total irregular channel flow =    28.304(CFS)
Irregular channel normal depth above invert elev. =   1.236(Ft.)
Average velocity of channel(s) =   3.703(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Rainfall intensity =      2.091(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.671
Subarea runoff =     23.672(CFS) for   18.600(Ac.)
```

Total runoff =   40.108(CFS)
Effective area this stream =   28.60(Ac.)
Total Study Area (Main Stream No. 1) =   28.60(Ac.)
Area averaged Fm value =   0.532(In/Hr)
Depth of flow =   1.409(Ft.), Average velocity =   4.040(Ft/s)
End of computations, Total Study Area =   28.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

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                San Bernardino County Rational Hydrology Program

                    (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/28/17
------------------------------------------------------------------------
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10-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA5-AA6 ***DA 1***
FILE: 16397ONSITEAA5PRE10YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.664 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 2
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station       8.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   521.000(Ft.)
Top (of initial area) elevation =  3202.610(Ft.)
Bottom (of initial area) elevation =  3195.660(Ft.)
Difference in elevation =     6.950(Ft.)
Slope =    0.01334  s(%)=       1.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   20.441 min.
Rainfall intensity =      1.411(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.384
Subarea runoff =      5.413(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.761(Ft.), Average velocity =   2.680(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2             10.00              0.00
      3             20.00              2.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      7.767(CFS)
  '     '    flow top width =      7.614(Ft.)
  '     '     velocity=    2.680(Ft/s)
  '     '    area =      2.898(Sq.Ft)
  '     '    Froude number =     0.765

Upstream point elevation =  3195.660(Ft.)
Downstream point elevation =  3183.000(Ft.)
Flow length =   854.000(Ft.)
Travel time  =    5.31 min.
Time of concentration =   25.75 min.
Depth of flow =   0.761(Ft.)
Average velocity =   2.680(Ft/s)
Total irregular channel flow =     7.767(CFS)
Irregular channel normal depth above invert elev. =   0.761(Ft.)
Average velocity of channel(s) =   2.680(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Rainfall intensity =      1.200(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.293
Subarea runoff =      4.646(CFS) for   18.600(Ac.)
Total runoff =     10.059(CFS)
Effective area this stream =       28.60(Ac.)
Total Study Area (Main Stream No. 1) =       28.60(Ac.)
Area averaged Fm value =    0.810(In/Hr)
Depth of flow =   0.839(Ft.), Average velocity =   2.859(Ft/s)
End of computations, Total Study Area =           28.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
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effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

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              San Bernardino County Rational Hydrology Program

                 (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/28/17
------------------------------------------------------------------------
```
2-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA5-AA6 ***DA 1***
FILE: 16397ONSITEAA5PRE2YR.OUT
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Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is     2.0
Computed rainfall intensity:
Storm year =     2.00   1 hour rainfall =     0.384 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 1
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station       8.000
**** INITIAL AREA EVALUATION ****
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```
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 1 = 31.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.983(In/Hr)
Initial subarea data:
Initial area flow distance =   521.000(Ft.)
Top (of initial area) elevation =  3202.610(Ft.)
Bottom (of initial area) elevation =  3195.660(Ft.)
Difference in elevation =     6.950(Ft.)
Slope =    0.01334  s(%)=       1.33
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   20.441 min.
Rainfall intensity =      0.816(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.000
```

Subarea runoff =   0.000(CFS)
Total initial stream area =   10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =   0.983(In/Hr)

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
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Q2 = 0.0 (CFS)

DA1 DMA A

RATIONAL METHOD

ONSITE POST-DEVELOPED

100-YEAR, 10-YEAR & 2-YEAR

1-HOUR STORM EVENTS

```
          San Bernardino County Rational Hydrology Program

              (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/27/17
------------------------------------------------------------------------
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100-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A8 TO A12 FOR BASIN 1(EAST OF TRAPEZOIDAL CHANNEL)
FILE: 16397ONSITEA8POST100YR.OUT
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------------------------------------------------------------------------


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.110 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 3
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3205.000(Ft.)
Bottom (of initial area) elevation =  3197.170(Ft.)
Difference in elevation =     7.830(Ft.)
Slope =    0.00783  s(%)=       0.78
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.631 min.
Rainfall intensity =      2.725(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.873
Subarea runoff =     21.058(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.170(Ft.)
End of street segment elevation =  3195.970(Ft.)
Length of street segment  =   115.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     21.351(CFS)
Depth of flow =   0.449(Ft.), Average velocity =   3.219(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.029(Ft.)
Flow velocity =   3.22(Ft/s)
Travel time =    0.60 min.     TC =   17.23  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.659(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.872
Subarea runoff =      0.446(CFS) for    0.420(Ac.)
Total runoff =     21.505(CFS)
Effective area this stream =        9.27(Ac.)
Total Study Area (Main Stream No. 1) =        9.27(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     21.505(CFS)
Half street flow at end of street =     10.752(CFS)
Depth of flow =   0.450(Ft.), Average velocity =   3.225(Ft/s)
Flow width (from curb towards crown)=  18.078(Ft.)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      13.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.270(Ac.)
Runoff from this stream =     21.505(CFS)
Time of concentration =   17.23 min.
Rainfall intensity =     2.659(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station      13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   846.000(Ft.)
Top (of initial area) elevation =  3201.900(Ft.)
Bottom (of initial area) elevation =  3195.970(Ft.)
Difference in elevation =     5.930(Ft.)
Slope =    0.00701  s(%)=       0.70
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.903 min.
Rainfall intensity =      2.812(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.874
Subarea runoff =      6.045(CFS)
Total initial stream area =        2.460(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station      13.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.460(Ac.)
Runoff from this stream =      6.045(CFS)
Time of concentration =   15.90 min.
Rainfall intensity =     2.812(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     21.50     9.270     17.23    0.081      2.659
2      6.05     2.460     15.90    0.081      2.812
Qmax(1) =
         1.000 *    1.000 *    21.505) +
         0.944 *    1.000 *     6.045) + =      27.211
Qmax(2) =
         1.059 *    0.923 *    21.505) +
         1.000 *    1.000 *     6.045) + =      27.077

Total of 2 streams to confluence:
Flow rates before confluence point:
      21.505       6.045
Maximum flow rates at confluence using above data:
       27.211       27.077
Area of streams before confluence:
        9.270        2.460
Effective area values after confluence:
       11.730       11.018
Results of confluence:
Total flow rate =     27.211(CFS)
Time of concentration =    17.226 min.
Effective stream area after confluence =     11.730(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.081(In/Hr)
Study area total (this main stream) =      11.73(Ac.)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      15.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3195.970(Ft.)
End of street segment elevation =  3187.600(Ft.)
Length of street segment  =   966.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     31.217(CFS)
Depth of flow =   0.518(Ft.), Average velocity =   3.343(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.89(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   3.34(Ft/s)
Travel time =    4.82 min.     TC =   22.04  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.237(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.867
Subarea runoff =      7.892(CFS) for    6.360(Ac.)
Total runoff =     35.103(CFS)
Effective area this stream =       18.09(Ac.)
Total Study Area (Main Stream No. 1) =       18.09(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     35.103(CFS)
Half street flow at end of street =     17.552(CFS)
Depth of flow =   0.538(Ft.), Average velocity =   3.439(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    1.90(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      15.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     18.090(Ac.)
Runoff from this stream =     35.103(CFS)
Time of concentration =   22.04 min.
Rainfall intensity =     2.237(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      17.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   841.000(Ft.)
Top (of initial area) elevation =  3201.900(Ft.)
Bottom (of initial area) elevation =  3193.600(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00987  s(%)=       0.99
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.816 min.
Rainfall intensity =      2.955(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =      5.974(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station      17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.310(Ac.)
Runoff from this stream =      5.974(CFS)
Time of concentration =   14.82 min.
Rainfall intensity =     2.955(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station      17.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   615.000(Ft.)
Top (of initial area) elevation =  3198.300(Ft.)
Bottom (of initial area) elevation =  3193.600(Ft.)
Difference in elevation =     4.700(Ft.)
Slope =    0.00764  s(%)=       0.76
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.758 min.
Rainfall intensity =      3.112(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.876
Subarea runoff =      7.910(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.900(Ac.)
Runoff from this stream =      7.910(CFS)
Time of concentration =   13.76 min.
Rainfall intensity =     3.112(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      5.97     2.310     14.82    0.081      2.955
2      7.91     2.900     13.76    0.081      3.112
Qmax(1) =
         1.000 *    1.000 *     5.974) +
         0.948 *    1.000 *     7.910) + =      13.474
Qmax(2) =
         1.055 *    0.929 *     5.974) +
         1.000 *    1.000 *     7.910) + =      13.761

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.974       7.910
Maximum flow rates at confluence using above data:
       13.474       13.761
Area of streams before confluence:
        2.310        2.900
Effective area values after confluence:
        5.210        5.045
Results of confluence:
Total flow rate =     13.761(CFS)
Time of concentration =    13.758 min.
Effective stream area after confluence =      5.045(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.081(In/Hr)
Study area total (this main stream) =      5.21(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station      19.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3193.600(Ft.)
End of street segment elevation =  3190.400(Ft.)
Length of street segment  =   252.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     14.533(CFS)
Depth of flow =   0.387(Ft.), Average velocity =   3.153(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.963(Ft.)
Flow velocity =   3.15(Ft/s)
Travel time =    1.33 min.     TC =   15.09  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.917(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.875
Subarea runoff =      1.412(CFS) for    0.900(Ac.)
Total runoff =     15.173(CFS)
Effective area this stream =        5.95(Ac.)
Total Study Area (Main Stream No. 2) =       24.20(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     15.173(CFS)
Half street flow at end of street =      7.586(CFS)
Depth of flow =   0.392(Ft.), Average velocity =   3.186(Ft/s)
Flow width (from curb towards crown)=  15.215(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station      19.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.945(Ac.)
Runoff from this stream =     15.173(CFS)
Time of concentration =   15.09 min.
Rainfall intensity =     2.917(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      19.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   598.000(Ft.)
Top (of initial area) elevation =  3195.500(Ft.)
Bottom (of initial area) elevation =  3190.400(Ft.)
Difference in elevation =     5.100(Ft.)
Slope =    0.00853  s(%)=      0.85
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.310 min.
Rainfall intensity =      3.185(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.877
Subarea runoff =      4.609(CFS)
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       19.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.650(Ac.)
Runoff from this stream =      4.609(CFS)
Time of concentration =   13.31 min.
Rainfall intensity =     3.185(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     15.17     5.945     15.09    0.081      2.917
2      4.61     1.650     13.31    0.081      3.185
Qmax(1) =
         1.000 *    1.000 *    15.173) +
         0.914 *    1.000 *     4.609) + =      19.384
Qmax(2) =
         1.095 *    0.882 *    15.173) +
         1.000 *    1.000 *     4.609) + =      19.256

Total of 2 streams to confluence:
Flow rates before confluence point:
      15.173       4.609
Maximum flow rates at confluence using above data:
       19.384       19.256
Area of streams before confluence:
        5.945        1.650
Effective area values after confluence:
        7.595        6.894
Results of confluence:
Total flow rate =     19.384(CFS)
Time of concentration =    15.091 min.
Effective stream area after confluence =      7.595(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.081(In/Hr)
Study area total (this main stream) =      7.60(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       15.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.400(Ft.)
End of street segment elevation =  3187.600(Ft.)
Length of street segment  =   235.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     19.911(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   3.326(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.109(Ft.)
Flow velocity =   3.33(Ft/s)
Travel time =    1.18 min.     TC =   16.27  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.768(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.874
Subarea runoff =      0.912(CFS) for    0.800(Ac.)
Total runoff =     20.296(CFS)
Effective area this stream =        8.40(Ac.)
Total Study Area (Main Stream No. 2) =       26.65(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     20.296(CFS)
Half street flow at end of street =     10.148(CFS)
Depth of flow =   0.433(Ft.), Average velocity =   3.342(Ft/s)
Flow width (from curb towards crown)=  17.236(Ft.)
```

++
Process from Point/Station 19.000 to Point/Station 15.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 8.395(Ac.)
Runoff from this stream = 20.296(CFS)
Time of concentration = 16.27 min.
Rainfall intensity = 2.768(In/Hr)
Area averaged loss rate (Fm) = 0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	35.10	18.090	22.04	0.081	2.237
2	20.30	8.395	16.27	0.081	2.768

```
Qmax(1) =
        1.000 *    1.000 *    35.103) +
        0.803 *    1.000 *    20.296) + =      51.394
Qmax(2) =
        1.246 *    0.738 *    35.103) +
        1.000 *    1.000 *    20.296) + =      52.573
```

Total of 2 main streams to confluence:
Flow rates before confluence point:
36.103 21.296
Maximum flow rates at confluence using above data:
51.394 52.573
Area of streams before confluence:
18.090 8.395
Effective area values after confluence:
26.485 21.746

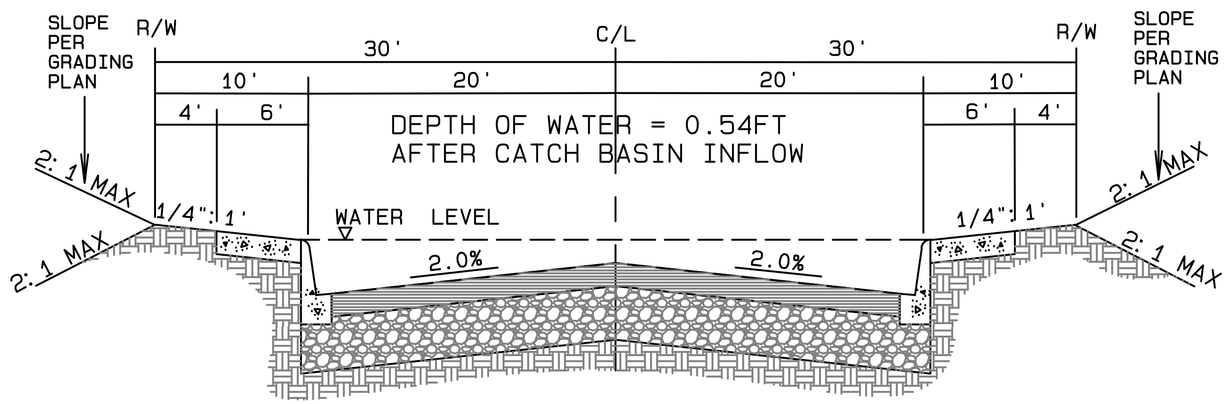
Results of confluence:
Total flow rate = 52.573(CFS)
Time of concentration = 16.268 min.
Effective stream area after confluence = 21.746(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.081(In/Hr)
Study area total = 26.49(Ac.)
End of computations, Total Study Area = 26.65 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500

Area averaged SCS curve number = 76.0

DA-1 , DMA-a
Q100= 52.57 CFS
CONFLUENCE @ NODE 15

CATCH BASIN 1 & 2
INFLOW TO BASIN 1
Q=13.8 CFS (CAPTURED)
@ LOW POINT



@ CATCH BASIN 1 & 2 FREDERICK COURT/EMMA PL

TYPICAL SECTION (60'R/W)
N.T.S.

AFTER INLET FLOW TO CATCH BASIN,
DEPTH OF WATER REMAINS = 0.54 FT
ABOVE FL

PREPARED BY:
Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning
California
Corporate
109 East Third Street, San Bernardino, CA 92410
Phone: 909-884-8217 Fax: 909-889-0153

Pkwy Slope = .02 Cross Slope = .02 Half Street Width = 20
Half R/W Width = 30 Gutter Width = 1.5 Curb Hike = .118
Curb Batter = .083 Curb Depth = .5 N (Road) = .015 N (Parkway) = .017

Slope of Curb Face = .166 Slope of Gutter = .786667E-01
HT. of Crown above Gutter F.L = .48634

INTERIOR STREET 60'R/W; 6"CF.

Depth	Area	Road Flooding	Pkway Flooding (one side)	Q/S**.5
.1	.643893E-01	1.28779	0	.830369
.11	.779111E-01	1.41657	0	1.07066
.12	.927952E-01	1.61992	0	1.31289
.13	.111503	2.12158	0	1.50033
.14	.135227	2.62324	0	1.80434
.15	.163968	3.1249	0	2.22064
.16	.197725	3.62656	0	2.75326
.17	.236499	4.12822	0	3.40945
.18	.280289	4.62988	0	4.19778
.19	.329096	5.13154	0	5.12737
.2	.38292	5.6332	0	6.20747
.21	.44176	6.13486	0	7.44732
.22	.505617	6.63652	0	8.85607
.23	.574491	7.13818	0	10.4427
.24	.648381	7.63984	0	12.216
.25	.727288	8.1415	0	14.1848
.26	.811211	8.64316	0	16.3574
.27	.900151	9.14482	0	18.7423
.28	.994107	9.64648	0	21.3477
.29	1.09308	10.1481	0	24.1815
.3	1.19707	10.6498	0	27.2519
.31	1.30608	11.1515	0	30.5664
.32	1.4201	11.6531	0	34.133
.33	1.53914	12.1548	0	37.959
.34	1.66319	12.6564	0	42.052
.35	1.79227	13.1581	0	46.4193
.36	1.92636	13.6598	0	51.0682
.37	2.06546	14.1614	0	56.0059
.38	2.20959	14.6631	0	61.2394
.39	2.35872	15.1647	0	66.7758
.4	2.51288	15.6664	0	72.6219
.41	2.67205	16.1681	0	78.7846
.42	2.83624	16.6697	0	85.2706
.43	3.00545	17.1714	0	92.0867
.44	3.17967	17.673	0	99.2395
.45	3.35891	18.1747	0	106.736
.46	3.54316	18.6764	0	114.581
.47	3.73243	19.178	0	122.783
.48	3.92672	19.6797	0	131.348
T O P	O F	C R O W N	E X C E E D E D	
.49	8.25139	39.9967	0	282.198
.5	8.62137	40	0	303.5
F L O W	E X C E E D S	T O P	O F C U R B	
.51	8.98971	40	.5	325.431
.52	9.35805	40	1	348.024
.53	9.72639	40	1.5	371.306

DEPTH = 0.54 FT

.54	10.0947	40	2	395.298
.55	10.4631	40	2.5	420.017
.56	10.8314	40	3	445.48
.57	11.1998	40	3.5	471.701
.58	11.5681	40	4	498.694
.59	11.9364	40	4.5	526.473
.6	12.3048	40	5	555.051
.61	12.6731	40	5.5	584.44
.62	13.0415	40	6	614.652
.63	13.4098	40	6.5	645.698
.64	13.7781	40	7	677.591
.65	14.1465	40	7.5	710.341
.66	14.5148	40	8	743.959
.67	14.8832	40	8.5	778.456
.68	15.2515	40	9	813.842
.69	15.6198	40	9.5	850.129
.7	15.9882	40	10	887.326

$Q/(S)^{1/2}$

$38.89\ \text{CFS}/(0.9\%)^{1/2}$

$=409$

=409

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/27/17

10-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A8a TO A11C FOR BASIN 1(EAST OF TRAPEZOIDAL CHANNEL) DA 1 DMA-A
FILE: 16397ONSITEA8POST10YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.664 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3205.000(Ft.)
Bottom (of initial area) elevation =  3197.170(Ft.)
Difference in elevation =     7.830(Ft.)
Slope =    0.00783  s(%)=       0.78
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.631 min.
Rainfall intensity =      1.630(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.779
Subarea runoff =     11.245(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.170(Ft.)
End of street segment elevation =  3195.970(Ft.)
Length of street segment  =   115.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.416(CFS)
Depth of flow =   0.371(Ft.), Average velocity =   2.759(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.152(Ft.)
Flow velocity =   2.76(Ft/s)
Travel time =    0.69 min.     TC =   17.33  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.584(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.776
Subarea runoff =      0.150(CFS) for    0.420(Ac.)
Total runoff =     11.395(CFS)
Effective area this stream =        9.27(Ac.)
Total Study Area (Main Stream No. 1) =        9.27(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =     11.395(CFS)
Half street flow at end of street =      5.698(CFS)
Depth of flow =   0.371(Ft.), Average velocity =   2.758(Ft/s)
Flow width (from curb towards crown)=  14.141(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      13.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.270(Ac.)
Runoff from this stream =     11.395(CFS)
Time of concentration =   17.33 min.
Rainfall intensity =     1.584(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station      13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   846.000(Ft.)
Top (of initial area) elevation =  3201.900(Ft.)
Bottom (of initial area) elevation =  3195.970(Ft.)
Difference in elevation =     5.930(Ft.)
Slope =    0.00701  s(%)=       0.70
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.903 min.
Rainfall intensity =      1.682(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.783
Subarea runoff =      3.241(CFS)
Total initial stream area =        2.460(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      13.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.460(Ac.)
Runoff from this stream =      3.241(CFS)
Time of concentration =   15.90 min.
Rainfall intensity =     1.682(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     11.40     9.270     17.33    0.218      1.584
2      3.24     2.460     15.90    0.218      1.682
Qmax(1) =
         1.000 *    1.000 *    11.395) +
         0.933 *    1.000 *     3.241) + =      14.419
Qmax(2) =
         1.072 *    0.918 *    11.395) +
         1.000 *    1.000 *     3.241) + =      14.450

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.395       3.241
Maximum flow rates at confluence using above data:
       14.419       14.450
Area of streams before confluence:
        9.270        2.460
Effective area values after confluence:
       11.730       10.969
Results of confluence:
Total flow rate =     14.450(CFS)
Time of concentration =    15.903 min.
Effective stream area after confluence =     10.969(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.218(In/Hr)
Study area total (this main stream) =      11.73(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      15.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3195.970(Ft.)
End of street segment elevation =  3187.600(Ft.)
Length of street segment  =   966.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     16.182(CFS)
Depth of flow =   0.424(Ft.), Average velocity =   2.803(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.795(Ft.)
Flow velocity =   2.80(Ft/s)
Travel time =    5.74 min.     TC =   21.65  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.355(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.755
Subarea runoff =      3.285(CFS) for    6.360(Ac.)
Total runoff =     17.735(CFS)
Effective area this stream =       17.33(Ac.)
Total Study Area (Main Stream No. 1) =       18.09(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =     17.735(CFS)
Half street flow at end of street =      8.868(CFS)
Depth of flow =   0.436(Ft.), Average velocity =   2.867(Ft/s)
Flow width (from curb towards crown)=  17.398(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       15.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     17.329(Ac.)
Runoff from this stream =     17.735(CFS)
Time of concentration =   21.65 min.
Rainfall intensity =     1.355(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station      17.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   841.000(Ft.)
Top (of initial area) elevation =  3201.900(Ft.)
Bottom (of initial area) elevation =  3193.600(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00987  s(%)=       0.99
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.816 min.
Rainfall intensity =      1.768(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.789
Subarea runoff =      3.221(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station      17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.310(Ac.)
Runoff from this stream =      3.221(CFS)
Time of concentration =   14.82 min.
Rainfall intensity =     1.768(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station      17.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   615.000(Ft.)
Top (of initial area) elevation =  3198.300(Ft.)
Bottom (of initial area) elevation =  3193.600(Ft.)
Difference in elevation =     4.700(Ft.)
Slope =    0.00764  s(%)=       0.76
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.758 min.
Rainfall intensity =      1.862(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.794
Subarea runoff =      4.289(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

++
Process from Point/Station 18.000 to Point/Station 17.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
Stream flow area = 2.900(Ac.)
Runoff from this stream = 4.289(CFS)
Time of concentration = 13.76 min.
Rainfall intensity = 1.862(In/Hr)
Area averaged loss rate (Fm) = 0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	3.22	2.310	14.82	0.218	1.768
2	4.29	2.900	13.76	0.218	1.862

```
Qmax(1) =
         1.000 *    1.000 *     3.221) +
         0.943 *    1.000 *     4.289) + =       7.264
Qmax(2) =
         1.061 *    0.929 *     3.221) +
         1.000 *    1.000 *     4.289) + =       7.461
```

Total of 2 streams to confluence:
Flow rates before confluence point:
3.221 4.289
Maximum flow rates at confluence using above data:
7.264 7.461
Area of streams before confluence:
2.310 2.900
Effective area values after confluence:
5.210 5.045
Results of confluence:
Total flow rate = 7.461(CFS)
Time of concentration = 13.758 min.
Effective stream area after confluence = 5.045(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.218(In/Hr)
Study area total (this main stream) = 5.21(Ac.)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       19.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3193.600(Ft.)
End of street segment elevation =  3190.400(Ft.)
Length of street segment  =   252.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      7.859(CFS)
Depth of flow =   0.323(Ft.), Average velocity =   2.713(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.757(Ft.)
Flow velocity =   2.71(Ft/s)
Travel time =    1.55 min.     TC =   15.31  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.728(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.786
Subarea runoff =      0.615(CFS) for    0.900(Ac.)
Total runoff =      8.076(CFS)
Effective area this stream =        5.95(Ac.)
Total Study Area (Main Stream No. 2) =       24.20(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =      8.076(CFS)
Half street flow at end of street =      4.038(CFS)
Depth of flow =   0.326(Ft.), Average velocity =   2.731(Ft/s)
Flow width (from curb towards crown)=  11.885(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       19.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.945(Ac.)
Runoff from this stream =      8.076(CFS)
Time of concentration =   15.31 min.
Rainfall intensity =     1.728(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       19.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   598.000(Ft.)
Top (of initial area) elevation =  3195.500(Ft.)
Bottom (of initial area) elevation =  3190.400(Ft.)
Difference in elevation =     5.100(Ft.)
Slope =    0.00853  s(%)=       0.85
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.310 min.
Rainfall intensity =      1.905(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.797
Subarea runoff =      2.505(CFS)
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station      19.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.650(Ac.)
Runoff from this stream =      2.505(CFS)
Time of concentration =   13.31 min.
Rainfall intensity =     1.905(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      8.08     5.945     15.31    0.218      1.728
2      2.51     1.650     13.31    0.218      1.905
Qmax(1) =
         1.000 *    1.000 *     8.076) +
         0.895 *    1.000 *     2.505) + =      10.317
Qmax(2) =
         1.118 *    0.870 *     8.076) +
         1.000 *    1.000 *     2.505) + =      10.354

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.076       2.505
Maximum flow rates at confluence using above data:
       10.317       10.354
Area of streams before confluence:
        5.945        1.650
Effective area values after confluence:
        7.595        6.820
Results of confluence:
Total flow rate =     10.354(CFS)
Time of concentration =    13.310 min.
Effective stream area after confluence =      6.820(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.218(In/Hr)
Study area total (this main stream) =       7.60(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station      15.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.400(Ft.)
End of street segment elevation =  3187.600(Ft.)
Length of street segment  =   235.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     10.582(CFS)
Depth of flow =   0.356(Ft.), Average velocity =   2.848(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.387(Ft.)
Flow velocity =   2.85(Ft/s)
Travel time =    1.38 min.     TC =   14.69  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.779(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.790
Subarea runoff =      0.345(CFS) for    0.800(Ac.)
Total runoff =     10.699(CFS)
Effective area this stream =        7.62(Ac.)
Total Study Area (Main Stream No. 2) =       26.65(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =     10.699(CFS)
Half street flow at end of street =      5.350(CFS)
Depth of flow =   0.357(Ft.), Average velocity =   2.855(Ft/s)
Flow width (from curb towards crown)=  13.445(Ft.)
```

++
Process from Point/Station 19.000 to Point/Station 15.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 7.620(Ac.)
Runoff from this stream = 10.699(CFS)
Time of concentration = 14.69 min.
Rainfall intensity = 1.779(In/Hr)
Area averaged loss rate (Fm) = 0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	17.74	17.329	21.65	0.218	1.355
2	10.70	7.620	14.69	0.218	1.779

```
Qmax(1) =
        1.000 *    1.000 *    17.735) +
        0.729 *    1.000 *    10.699) + =      25.533
Qmax(2) =
        1.372 *    0.678 *    17.735) +
        1.000 *    1.000 *    10.699) + =      27.206
```

Total of 2 main streams to confluence:
Flow rates before confluence point:
18.735 11.699
Maximum flow rates at confluence using above data:
25.533 27.206
Area of streams before confluence:
17.329 7.620
Effective area values after confluence:
24.949 19.375

Results of confluence:
Total flow rate = 27.206(CFS)
Time of concentration = 14.685 min.
Effective stream area after confluence = 19.375(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.218(In/Hr)
Study area total = 24.95(Ac.)
End of computations, Total Study Area = 26.65 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500

Area averaged SCS curve number = 76.0

```
           San Bernardino County Rational Hydrology Program

                (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/27/17
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2-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A8a TO A11C FOR BASIN 1(EAST OF TRAPEZOIDAL CHANNEL) **DA 1 DMA-A**
FILE: 16397ONSITEA8POST2YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is     2.0
Computed rainfall intensity:
Storm year =     2.00   1 hour rainfall =     0.384 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 1
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3205.000(Ft.)
Bottom (of initial area) elevation =  3197.170(Ft.)
Difference in elevation =     7.830(Ft.)
Slope =    0.00783  s(%)=       0.78
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.631 min.
Rainfall intensity =      0.943(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.564
Subarea runoff =      4.703(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      13.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.170(Ft.)
End of street segment elevation =  3195.970(Ft.)
Length of street segment  =   115.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.759(CFS)
Depth of flow =   0.288(Ft.), Average velocity =   2.232(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.001(Ft.)
Flow velocity =   2.23(Ft/s)
Travel time =    0.86 min.     TC =   17.49  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      4.654(CFS)
therefore the upstream flow rate of Q =      4.703(CFS) is being used
Rainfall intensity =      0.910(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.552
Subarea runoff =      0.000(CFS) for    0.420(Ac.)
Total runoff =      4.703(CFS)
Effective area this stream =        9.27(Ac.)
Total Study Area (Main Stream No. 1) =        9.27(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      4.703(CFS)
Half street flow at end of street =      2.352(CFS)
Depth of flow =   0.287(Ft.), Average velocity =   2.225(Ft/s)
Flow width (from curb towards crown)=   9.954(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.270(Ac.)
Runoff from this stream =      4.703(CFS)
Time of concentration =   17.49 min.
Rainfall intensity =     0.910(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station      13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   846.000(Ft.)
Top (of initial area) elevation =  3201.900(Ft.)
Bottom (of initial area) elevation =  3195.970(Ft.)
Difference in elevation =     5.930(Ft.)
Slope =    0.00701  s(%)=       0.70
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.903 min.
Rainfall intensity =      0.973(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.574
Subarea runoff =      1.374(CFS)
Total initial stream area =        2.460(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.460(Ac.)
Runoff from this stream =      1.374(CFS)
Time of concentration =   15.90 min.
Rainfall intensity =     0.973(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      4.70     9.270     17.49    0.352      0.910
2      1.37     2.460     15.90    0.352      0.973
Qmax(1) =
         1.000 *    1.000 *     4.703) +
         0.899 *    1.000 *     1.374) + =       5.939
Qmax(2) =
         1.112 *    0.909 *     4.703) +
         1.000 *    1.000 *     1.374) + =       6.131

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.703       1.374
Maximum flow rates at confluence using above data:
        5.939        6.131
Area of streams before confluence:
        9.270        2.460
Effective area values after confluence:
       11.730       10.889
Results of confluence:
Total flow rate =      6.131(CFS)
Time of concentration =    15.903 min.
Effective stream area after confluence =     10.889(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.352(In/Hr)
Study area total (this main stream) =      11.73(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      15.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3195.970(Ft.)
End of street segment elevation =  3187.600(Ft.)
Length of street segment  =   966.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.201(CFS)
Depth of flow =   0.319(Ft.), Average velocity =   2.216(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.545(Ft.)
Flow velocity =   2.22(Ft/s)
Travel time =    7.26 min.     TC =   23.17  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      0.748(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.476
Subarea runoff =      0.006(CFS) for    6.360(Ac.)
Total runoff =      6.137(CFS)
Effective area this stream =       17.25(Ac.)
Total Study Area (Main Stream No. 1) =       18.09(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      6.137(CFS)
Half street flow at end of street =      3.068(CFS)
Depth of flow =   0.318(Ft.), Average velocity =   2.211(Ft/s)
Flow width (from curb towards crown)=  11.497(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       15.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     17.249(Ac.)
Runoff from this stream =      6.137(CFS)
Time of concentration =   23.17 min.
Rainfall intensity =     0.748(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station      17.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   841.000(Ft.)
Top (of initial area) elevation =  3201.900(Ft.)
Bottom (of initial area) elevation =  3193.600(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00987  s(%)=       0.99
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.816 min.
Rainfall intensity =      1.022(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.590
Subarea runoff =      1.393(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station      17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.310(Ac.)
Runoff from this stream =      1.393(CFS)
Time of concentration =   14.82 min.
Rainfall intensity =     1.022(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       17.000
**** INITIAL AREA EVALUATION ****
```

```
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   615.000(Ft.)
Top (of initial area) elevation =  3198.300(Ft.)
Bottom (of initial area) elevation =  3193.600(Ft.)
Difference in elevation =     4.700(Ft.)
Slope =    0.00764  s(%)=       0.76
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.758 min.
Rainfall intensity =      1.077(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.606
Subarea runoff =      1.890(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station      17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.900(Ac.)
Runoff from this stream =      1.890(CFS)
Time of concentration =   13.76 min.
Rainfall intensity =     1.077(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      1.39     2.310     14.82    0.352      1.022
2      1.89     2.900     13.76    0.352      1.077
Qmax(1) =
         1.000 *    1.000 *     1.393) +
         0.925 *    1.000 *     1.890) + =       3.141
Qmax(2) =
         1.081 *    0.929 *     1.393) +
         1.000 *    1.000 *     1.890) + =       3.289

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.393       1.890
Maximum flow rates at confluence using above data:
        3.141        3.289
Area of streams before confluence:
        2.310        2.900
Effective area values after confluence:
        5.210        5.045
Results of confluence:
Total flow rate =      3.289(CFS)
Time of concentration =    13.758 min.
Effective stream area after confluence =      5.045(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.352(In/Hr)
Study area total (this main stream) =       5.21(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station      19.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3193.600(Ft.)
End of street segment elevation =  3190.400(Ft.)
Length of street segment  =   252.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.397(CFS)
Depth of flow =   0.255(Ft.), Average velocity =   2.221(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.360(Ft.)
Flow velocity =   2.22(Ft/s)
Travel time =    1.89 min.     TC =   15.65  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      0.984(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.578
Subarea runoff =      0.090(CFS) for    0.900(Ac.)
Total runoff =      3.379(CFS)
Effective area this stream =        5.95(Ac.)
Total Study Area (Main Stream No. 2) =       24.20(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      3.379(CFS)
Half street flow at end of street =      1.689(CFS)
Depth of flow =   0.255(Ft.), Average velocity =   2.218(Ft/s)
Flow width (from curb towards crown)=   8.341(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station      19.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.945(Ac.)
Runoff from this stream =      3.379(CFS)
Time of concentration =   15.65 min.
Rainfall intensity =     0.984(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station      19.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   598.000(Ft.)
Top (of initial area) elevation =  3195.500(Ft.)
Bottom (of initial area) elevation =  3190.400(Ft.)
Difference in elevation =     5.100(Ft.)
Slope =    0.00853  s(%)=       0.85
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.310 min.
Rainfall intensity =      1.102(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.612
Subarea runoff =      1.113(CFS)
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       19.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.650(Ac.)
Runoff from this stream =      1.113(CFS)
Time of concentration =   13.31 min.
Rainfall intensity =     1.102(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.38     5.945     15.65    0.352      0.984
2      1.11     1.650     13.31    0.352      1.102
Qmax(1) =
         1.000 *    1.000 *     3.379) +
         0.842 *    1.000 *     1.113) + =       4.317
Qmax(2) =
         1.187 *    0.850 *     3.379) +
         1.000 *    1.000 *     1.113) + =       4.524

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.379       1.113
Maximum flow rates at confluence using above data:
        4.317        4.524
Area of streams before confluence:
        5.945        1.650
Effective area values after confluence:
        7.595        6.706
Results of confluence:
Total flow rate =      4.524(CFS)
Time of concentration =    13.310 min.
Effective stream area after confluence =      6.706(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.352(In/Hr)
Study area total (this main stream) =       7.60(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station      15.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.400(Ft.)
End of street segment elevation =  3187.600(Ft.)
Length of street segment  =   235.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.592(CFS)
Depth of flow =   0.280(Ft.), Average velocity =   2.327(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.594(Ft.)
Flow velocity =   2.33(Ft/s)
Travel time =    1.68 min.     TC =   14.99  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      4.469(CFS)
therefore the upstream flow rate of Q =      4.524(CFS) is being used
Rainfall intensity =      1.014(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.587
Subarea runoff =      0.000(CFS) for    0.800(Ac.)
Total runoff =      4.524(CFS)
Effective area this stream =        7.51(Ac.)
Total Study Area (Main Stream No. 2) =       26.65(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      4.524(CFS)
Half street flow at end of street =      2.262(CFS)
Depth of flow =   0.279(Ft.), Average velocity =   2.319(Ft/s)
Flow width (from curb towards crown)=   9.536(Ft.)
```

++
Process from Point/Station 19.000 to Point/Station 15.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 7.506(Ac.)
Runoff from this stream = 4.524(CFS)
Time of concentration = 14.99 min.
Rainfall intensity = 1.014(In/Hr)
Area averaged loss rate (Fm) = 0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	6.14	17.249	23.17	0.352	0.748
2	4.52	7.506	14.99	0.352	1.014

```
Qmax(1) =
         1.000 *    1.000 *     6.137) +
         0.598 *    1.000 *     4.524) + =       8.840
Qmax(2) =
         1.673 *    0.647 *     6.137) +
         1.000 *    1.000 *     4.524) + =      11.170
```

Total of 2 main streams to confluence:
Flow rates before confluence point:
7.137 5.524
Maximum flow rates at confluence using above data:
8.840 11.170
Area of streams before confluence:
17.249 7.506
Effective area values after confluence:
24.755 18.669

Results of confluence:
Total flow rate = 11.170(CFS)
Time of concentration = 14.993 min.
Effective stream area after confluence = 18.669(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.352(In/Hr)
Study area total = 24.76(Ac.)
End of computations, Total Study Area = 26.65 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500

```
Area averaged SCS curve number =  76.0
```

DA 1 DMA B

RATIONAL METHOD

ONSITE POST-DEVELOPED

100-YEAR, 10-YEAR & 2-YEAR

1-HOUR STORM EVENTS

```
              San Bernardino County Rational Hydrology Program

                  (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/27/17
------------------------------------------------------------------------
```
100-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A12a & A12b DA 1 DMA-B
FILE: 16397ONSITEA12POST100YR.OUT
```
------------------------------------------------------------------------


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.110 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   469.000(Ft.)
Top (of initial area) elevation =  3187.800(Ft.)
Bottom (of initial area) elevation =  3185.500(Ft.)
Difference in elevation =     2.300(Ft.)
Slope =    0.00490  s(%)=       0.49
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.490 min.
Rainfall intensity =      3.155(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.877
Subarea runoff =     11.066(CFS)
Total initial stream area =        4.000(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station      22.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.000(Ac.)
Runoff from this stream =     11.066(CFS)
Time of concentration =   13.49 min.
Rainfall intensity =     3.155(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station      38.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   295.000(Ft.)
Top (of initial area) elevation =  3188.900(Ft.)
Bottom (of initial area) elevation =  3185.500(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.01153  s(%)=       1.15
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.446 min.
Rainfall intensity =      4.049(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff =      1.000(CFS)
Total initial stream area =        0.280(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       38.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.280(Ac.)
Runoff from this stream =      1.000(CFS)
Time of concentration =    9.45 min.
Rainfall intensity =     4.049(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     11.07     4.000     13.49    0.081      3.155
2      1.00     0.280      9.45    0.081      4.049
Qmax(1) =
         1.000 *    1.000 *    11.066) +
         0.775 *    1.000 *     1.000) + =      11.840
Qmax(2) =
         1.291 *    0.700 *    11.066) +
         1.000 *    1.000 *     1.000) + =      11.002

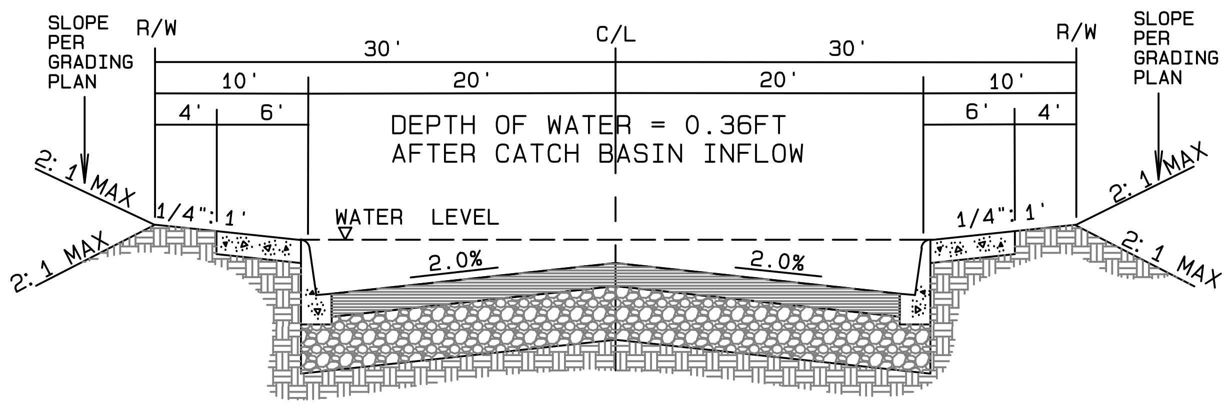
Total of 2 streams to confluence:
Flow rates before confluence point:
      11.066       1.000
Maximum flow rates at confluence using above data:
       11.840       11.002
Area of streams before confluence:
        4.000        0.280
Effective area values after confluence:
        4.280        3.081
Results of confluence:
```

Total flow rate =   11.840(CFS)
Time of concentration =   13.490 min.
Effective stream area after confluence =   4.280(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) =   0.081(In/Hr)
Study area total (this main stream) =   4.28(Ac.)
End of computations, Total Study Area =   4.28 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

DA-1 , DMA-B
Q100= 11.8 CFS
CONFLUENCE @ NODE 22

CATCH BASIN 3 & 4
INFLOW TO BASIN 1
Q=5.6 CFS (CAPTURED)
@ LOW POINT



@ CATCH BASIN 3 & 4 FREDERICK COURT/EMMA PL

TYPICAL SECTION (60'R/W)
N.T.S.

AFTER INLET FLOW TO CATCH BASIN,
DEPTH OF WATER REMAINS = 0.36 FT
ABOVE FL

PREPARED BY:
Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning
California
Corporate
109 East Third Street, San Bernardino, CA 92410
Phone: 909-884-8217 Fax: 909-889-0153

Pkwy Slope = .02   Cross Slope = .02   Half Street Width = 20
Half R/W Width = 30   Gutter Width = 1.5   Curb Hike = .118
Curb Batter = .083   Curb Depth = .5   N (Road) = .015   N (Parkway) = .017

Slope of Curb Face = .166   Slope of Gutter = .786667E-01
HT. of Crown above Gutter F.L = .48634

INTERIOR STREET 60'R/W; 6"CF.

Depth	Area	Road Flooding	Pkway Flooding (one side)	Q/S**.5
.1	.643893E-01	1.28779	0	.830369
.11	.779111E-01	1.41657	0	1.07066
.12	.927952E-01	1.61992	0	1.31289
.13	.111503	2.12158	0	1.50033
.14	.135227	2.62324	0	1.80434
.15	.163968	3.1249	0	2.22064
.16	.197725	3.62656	0	2.75326
.17	.236499	4.12822	0	3.40945
.18	.280289	4.62988	0	4.19778
.19	.329096	5.13154	0	5.12737
.2	.38292	5.6332	0	6.20747
.21	.44176	6.13486	0	7.44732
.22	.505617	6.63652	0	8.85607
.23	.574491	7.13818	0	10.4427
.24	.648381	7.63984	0	12.216
.25	.727288	8.1415	0	14.1848
.26	.811211	8.64316	0	16.3574
.27	.900151	9.14482	0	18.7423
.28	.994107	9.64648	0	21.3477
.29	[illegible]	10.1481	0	24.1815
.3	1.19707	10.6498	0	27.2519
.31	1.30608	11.1515	0	30.5664
.32	1.4201	11.6531	0	34.133
.33	1.53914	12.1548	0	37.959
.34	1.66319	12.6564	0	42.052
.35	1.79227	13.1581	0	46.4193
.36	1.92636	13.6598	0	51.0682
.37	2.06546	14.1614	0	56.0059
.38	2.20959	14.6631	0	61.2394
.39	2.35872	15.1647	0	66.7758
.4	2.51288	15.6664	0	72.6219
.41	2.67205	16.1681	0	78.7846
.42	2.83624	16.6697	0	85.2706
.43	3.00545	17.1714	0	92.0867
.44	3.17967	17.673	0	99.2395
.45	3.35891	18.1747	0	106.736
.46	3.54316	18.6764	0	114.581
.47	3.73243	19.178	0	122.783
.48	3.92672	19.6797	0	131.348
T O P O F C R O W N E X C E E D E D				
.49	8.25139	39.9967	0	282.198
.5	8.62137	40	0	303.5
F L O W E X C E E D S T O P O F C U R B				
.51	8.98971	40	.5	325.431
.52	9.35805	40	1	348.024
.53	9.72639	40	1.5	371.306

DEPTH = 0.36 FT

=53

$Q/(S)^{1/2}$

$6.2\ \text{CFS}/\ (1.35\%)^{1/2}$

=53

.54	10.0947	40	2	395.298
.55	10.4631	40	2.5	420.017
.56	10.8314	40	3	445.48
.57	11.1998	40	3.5	471.701
.58	11.5681	40	4	498.694
.59	11.9364	40	4.5	526.473
.6	12.3048	40	5	555.051
.61	12.6731	40	5.5	584.44
.62	13.0415	40	6	614.652
.63	13.4098	40	6.5	645.698
.64	13.7781	40	7	677.591
.65	14.1465	40	7.5	710.341
.66	14.5148	40	8	743.959
.67	14.8832	40	8.5	778.456
.68	15.2515	40	9	813.842
.69	15.6198	40	9.5	850.129
.7	15.9882	40	10	887.326

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/27/17

10-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A12a & A12b DA 1 DMA-B
FILE: 16397ONSITEA12POST10YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.664 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   469.000(Ft.)
Top (of initial area) elevation =  3187.800(Ft.)
Bottom (of initial area) elevation =  3185.500(Ft.)
Difference in elevation =     2.300(Ft.)
Slope =    0.00490  s(%)=       0.49
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.490 min.
Rainfall intensity =      1.887(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.796
Subarea runoff =      6.009(CFS)
Total initial stream area =        4.000(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station      22.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.000(Ac.)
Runoff from this stream =      6.009(CFS)
Time of concentration =   13.49 min.
Rainfall intensity =     1.887(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station      38.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   295.000(Ft.)
Top (of initial area) elevation =  3188.900(Ft.)
Bottom (of initial area) elevation =  3185.500(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.01153  s(%)=       1.15
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.446 min.
Rainfall intensity =      2.422(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.819
Subarea runoff =      0.555(CFS)
Total initial stream area =        0.280(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       38.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.280(Ac.)
Runoff from this stream =      0.555(CFS)
Time of concentration =    9.45 min.
Rainfall intensity =     2.422(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      6.01     4.000     13.49    0.218      1.887
2      0.56     0.280      9.45    0.218      2.422
Qmax(1) =
         1.000 *    1.000 *     6.009) +
         0.757 *    1.000 *     0.555) + =       6.429
Qmax(2) =
         1.320 *    0.700 *     6.009) +
         1.000 *    1.000 *     0.555) + =       6.111

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.009       0.555
Maximum flow rates at confluence using above data:
        6.429        6.111
Area of streams before confluence:
        4.000        0.280
Effective area values after confluence:
        4.280        3.081
```

Results of confluence:
Total flow rate =   6.429(CFS)
Time of concentration =   13.490 min.
Effective stream area after confluence =   4.280(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) =   0.218(In/Hr)
Study area total (this main stream) =   4.28(Ac.)
End of computations, Total Study Area =   4.28 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/27/17

2-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A12a & A12b DA 1 DMA-B
FILE: 16397ONSITEA12POST2YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.384 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 1

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   469.000(Ft.)
Top (of initial area) elevation =  3187.800(Ft.)
Bottom (of initial area) elevation =  3185.500(Ft.)
Difference in elevation =     2.300(Ft.)
Slope =    0.00490  s(%)=       0.49
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.490 min.
Rainfall intensity =      1.091(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.610
Subarea runoff =      2.661(CFS)
Total initial stream area =        4.000(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station      22.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.000(Ac.)
Runoff from this stream =      2.661(CFS)
Time of concentration =   13.49 min.
Rainfall intensity =     1.091(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station      38.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   295.000(Ft.)
Top (of initial area) elevation =  3188.900(Ft.)
Bottom (of initial area) elevation =  3185.500(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.01153  s(%)=       1.15
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.446 min.
Rainfall intensity =      1.401(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.674
Subarea runoff =      0.264(CFS)
Total initial stream area =        0.280(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       38.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.280(Ac.)
Runoff from this stream =      0.264(CFS)
Time of concentration =    9.45 min.
Rainfall intensity =     1.401(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      2.66     4.000     13.49    0.352      1.091
2      0.26     0.280      9.45    0.352      1.401
Qmax(1) =
         1.000 *    1.000 *     2.661) +
         0.705 *    1.000 *     0.264) + =       2.848
Qmax(2) =
         1.418 *    0.700 *     2.661) +
         1.000 *    1.000 *     0.264) + =       2.907

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.661       0.264
Maximum flow rates at confluence using above data:
        2.848        2.907
Area of streams before confluence:
        4.000        0.280
Effective area values after confluence:
        4.280        3.081
```

Results of confluence:
Total flow rate =   2.907(CFS)
Time of concentration =   9.446 min.
Effective stream area after confluence =   3.081(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) =   0.352(In/Hr)
Study area total (this main stream) =   4.28(Ac.)
End of computations, Total Study Area =   4.28 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

DA 2

RATIONAL METHOD

ONSITE PRE-DEVELOPED

100-YEAR, 10-YEAR & 2-YEAR

1-HOUR STORM EVENTS

```
               San Bernardino County Rational Hydrology Program

                   (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/28/17
------------------------------------------------------------------------
```
100-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA3-AA4 *DA 2*
FILE: 16397ONSITEAA3PRE100YR.OUT
```
------------------------------------------------------------------------


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.110 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Initial subarea data:
Initial area flow distance =   788.000(Ft.)
Top (of initial area) elevation =  3202.990(Ft.)
Bottom (of initial area) elevation =  3192.280(Ft.)
Difference in elevation =    10.710(Ft.)
Slope =    0.01359  s(%)=       1.36
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   24.030 min.
Rainfall intensity =      2.106(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.672
Subarea runoff =     14.163(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.532(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       6.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.062(Ft.), Average velocity =   3.199(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
     1              0.00              2.00
     2             10.00              0.00
     3             20.00              2.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     18.043(CFS)
  '     '    flow top width =     10.621(Ft.)
  '     '    velocity=    3.199(Ft/s)
  '     '    area =      5.640(Sq.Ft)
  '     '    Froude number =     0.774

Upstream point elevation =  3192.280(Ft.)
Downstream point elevation =  3184.000(Ft.)
Flow length =   611.000(Ft.)
Travel time  =    3.18 min.
Time of concentration =   27.21 min.
Depth of flow =   1.062(Ft.)
Average velocity =   3.199(Ft/s)
Total irregular channel flow =    18.043(CFS)
Irregular channel normal depth above invert elev. =   1.062(Ft.)
Average velocity of channel(s) =   3.199(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Rainfall intensity =      1.931(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.652
Subarea runoff =      7.667(CFS) for    7.350(Ac.)
Total runoff =     21.831(CFS)
Effective area this stream =       17.35(Ac.)
Total Study Area (Main Stream No. 1) =       17.35(Ac.)
Area averaged Fm value =    0.532(In/Hr)
Depth of flow =   1.141(Ft.), Average velocity =   3.355(Ft/s)
End of computations, Total Study Area =           17.35 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

```
              San Bernardino County Rational Hydrology Program

                  (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/28/17
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10-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA3-AA4 *DA 2*
FILE: 16397ONSITEAA3PRE10YR.OUT

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Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.664 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 2
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       5.000
**** INITIAL AREA EVALUATION ****
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```
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   789.000(Ft.)
Top (of initial area) elevation =  3202.990(Ft.)
Bottom (of initial area) elevation =  3192.280(Ft.)
Difference in elevation =    10.710(Ft.)
Slope =    0.01357  s(%)=       1.36
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   24.049 min.
Rainfall intensity =      1.259(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.321
Subarea runoff =      4.047(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.734(Ft.), Average velocity =   1.522(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2             10.00              0.00
      3             20.00              2.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      4.096(CFS)
  '     '    flow top width =      7.336(Ft.)
  '     '     velocity=    1.522(Ft/s)
  '     '    area =      2.691(Sq.Ft)
  '     '    Froude number =     0.443

Upstream point elevation =  3192.280(Ft.)
Downstream point elevation =  3184.000(Ft.)
Flow length =  1647.000(Ft.)
Travel time  =   18.03 min.
Time of concentration =   42.08 min.
Depth of flow =   0.734(Ft.)
Average velocity =   1.522(Ft/s)
Total irregular channel flow =     4.096(CFS)
Irregular channel normal depth above invert elev. =   0.734(Ft.)
Average velocity of channel(s) =   1.522(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      0.664(CFS)
therefore the upstream flow rate of Q =      4.047(CFS) is being used
Rainfall intensity =      0.851(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.044
Subarea runoff =      0.000(CFS) for    7.700(Ac.)
Total runoff =      4.047(CFS)
Effective area this stream =       17.70(Ac.)
Total Study Area (Main Stream No. 1) =       17.70(Ac.)
Area averaged Fm value =    0.810(In/Hr)
Depth of flow =   0.730(Ft.), Average velocity =   1.518(Ft/s)
End of computations, Total Study Area =          17.70 (Ac.)
```

**The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.**

**Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0**

```
            San Bernardino County Rational Hydrology Program

                (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/28/17
------------------------------------------------------------------------
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2-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA3-AA4 ***DA 2***
FILE: 16397ONSITEAA3PRE2YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is     2.0
Computed rainfall intensity:
Storm year =     2.00   1 hour rainfall =     0.384 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 1
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 1 = 31.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.983(In/Hr)
Initial subarea data:
Initial area flow distance =   789.000(Ft.)
Top (of initial area) elevation =  3202.990(Ft.)
Bottom (of initial area) elevation =  3192.280(Ft.)
Difference in elevation =    10.710(Ft.)
Slope =    0.01357  s(%)=       1.36
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   24.049 min.
Rainfall intensity =      0.728(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.000
Subarea runoff =      0.000(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.983(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        6.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
```

```
Q2 = 0.0 (CFS)
```

DA 2 DMA A

RATIONAL METHOD

ONSITE POST-DEVELOPED

100-YEAR, 10-YEAR & 2-YEAR

1-HOUR STORM EVENTS

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 06/11/18

100-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA A5 TO A7
FILE: 16397ONSITEA5POST100YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.110 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station      25.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  3205.600(Ft.)
Bottom (of initial area) elevation =  3194.400(Ft.)
Difference in elevation =    11.200(Ft.)
Slope =    0.01231  s(%)=       1.23
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.630 min.
Rainfall intensity =      2.981(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =     13.101(CFS)
Total initial stream area =        5.020(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       5.020(Ac.)
Runoff from this stream =     13.101(CFS)
Time of concentration =   14.63 min.
Rainfall intensity =     2.981(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station       27.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.471(In/Hr)
Initial subarea data:
Initial area flow distance =   303.000(Ft.)
Top (of initial area) elevation =  3202.300(Ft.)
Bottom (of initial area) elevation =  3197.300(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.01650  s(%)=       1.65
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.204 min.
Rainfall intensity =      4.123(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.797
Subarea runoff =      4.010(CFS)
Total initial stream area =        1.220(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.471(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station      25.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.300(Ft.)
End of street segment elevation =  3194.400(Ft.)
Length of street segment  =   268.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.252(CFS)
Depth of flow =   0.310(Ft.), Average velocity =   2.416(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.081(Ft.)
Flow velocity =   2.42(Ft/s)
Travel time =    1.85 min.     TC =   11.05  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      3.627(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.837
Subarea runoff =      4.307(CFS) for    1.520(Ac.)
Total runoff =      8.317(CFS)
Effective area this stream =        2.74(Ac.)
Total Study Area (Main Stream No. 2) =        7.76(Ac.)
Area averaged Fm value =    0.255(In/Hr)
Street flow at end of street =      8.317(CFS)
Half street flow at end of street =      4.158(CFS)
Depth of flow =   0.336(Ft.), Average velocity =   2.589(Ft/s)
Flow width (from curb towards crown)=  12.410(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.740(Ac.)
Runoff from this stream =      8.317(CFS)
Time of concentration =   11.05 min.
Rainfall intensity =     3.627(In/Hr)
Area averaged loss rate (Fm) =    0.2549(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5445
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     13.10     5.020     14.63    0.081      2.981
2      8.32     2.740     11.05    0.255      3.627
Qmax(1) =
         1.000 *    1.000 *    13.101) +
         0.808 *    1.000 *     8.317) + =      19.823
Qmax(2) =
         1.223 *    0.755 *    13.101) +
         1.000 *    1.000 *     8.317) + =      20.421

Total of 2 main streams to confluence:
Flow rates before confluence point:
      14.101       9.317
Maximum flow rates at confluence using above data:
       19.823       20.421
Area of streams before confluence:
        5.020        2.740
Effective area values after confluence:
        7.760        6.532


Results of confluence:
Total flow rate =     20.421(CFS)
Time of concentration =    11.053 min.
Effective stream area after confluence  =      6.532(Ac.)
Study area average Pervious fraction(Ap) =  0.516
Study area average soil loss rate(Fm) =    0.143(In/Hr)
Study area total =       7.76(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      25.000 to Point/Station      28.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3194.400(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   475.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     22.296(CFS)
Depth of flow =   0.478(Ft.), Average velocity =   2.885(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  19.489(Ft.)
Flow velocity =   2.88(Ft/s)
Travel time =    2.74 min.     TC =   13.80  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      3.106(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.863
Subarea runoff =      3.616(CFS) for    2.430(Ac.)
Total runoff =     24.037(CFS)
Effective area this stream =        8.96(Ac.)
Total Study Area (Main Stream No. 1) =       10.19(Ac.)
Area averaged Fm value =    0.126(In/Hr)
Street flow at end of street =     24.037(CFS)
Half street flow at end of street =     12.018(CFS)
Depth of flow =   0.489(Ft.), Average velocity =   2.942(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  20.000(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       28.000
**** CONFLUENCE OF MAIN STREAMS ****
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```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.962(Ac.)
Runoff from this stream =     24.037(CFS)
Time of concentration =   13.80 min.
Rainfall intensity =     3.106(In/Hr)
Area averaged loss rate (Fm) =    0.1260(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5115
Program is now starting with Main Stream No. 2
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      29.000 to Point/Station      30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   536.000(Ft.)
Top (of initial area) elevation =  3198.500(Ft.)
Bottom (of initial area) elevation =  3192.100(Ft.)
Difference in elevation =     6.400(Ft.)
Slope =    0.01194  s(%)=      1.19
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.910 min.
Rainfall intensity =      3.443(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.879
Subarea runoff =      6.988(CFS)
Total initial stream area =       2.310(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station      30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.310(Ac.)
Runoff from this stream =      6.988(CFS)
Time of concentration =   11.91 min.
Rainfall intensity =     3.443(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      31.000 to Point/Station      30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  3195.300(Ft.)
Bottom (of initial area) elevation =  3192.100(Ft.)
Difference in elevation =     3.200(Ft.)
Slope =    0.01067  s(%)=       1.07
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.658 min.
Rainfall intensity =      3.987(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff =      3.866(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      31.000 to Point/Station      30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      3.866(CFS)
Time of concentration =    9.66 min.
Rainfall intensity =     3.987(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      6.99     2.310     11.91    0.081      3.443
2      3.87     1.100      9.66    0.081      3.987
Qmax(1) =
         1.000 *    1.000 *     6.988) +
         0.861 *    1.000 *     3.866) + =      10.316
Qmax(2) =
         1.162 *    0.811 *     6.988) +
         1.000 *    1.000 *     3.866) + =      10.450

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.988       3.866
Maximum flow rates at confluence using above data:
       10.316       10.450
Area of streams before confluence:
        2.310        1.100
Effective area values after confluence:
        3.410        2.973
Results of confluence:
Total flow rate =     10.450(CFS)
Time of concentration =     9.658 min.
Effective stream area after confluence =      2.973(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.081(In/Hr)
Study area total (this main stream) =       3.41(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station      28.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3192.100(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   246.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.097(CFS)
Depth of flow =   0.407(Ft.), Average velocity =   2.120(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.973(Ft.)
Flow velocity =   2.12(Ft/s)
Travel time =    1.93 min.     TC =   11.59  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      3.508(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.879
Subarea runoff =      1.188(CFS) for    0.800(Ac.)
Total runoff =     11.638(CFS)
Effective area this stream =        3.77(Ac.)
Total Study Area (Main Stream No. 2) =       14.40(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     11.638(CFS)
Half street flow at end of street =      5.819(CFS)
Depth of flow =   0.413(Ft.), Average velocity =   2.145(Ft/s)
Flow width (from curb towards crown)=  16.269(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       28.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.773(Ac.)
Runoff from this stream =     11.638(CFS)
Time of concentration =   11.59 min.
Rainfall intensity =     3.508(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     24.04     8.962     13.80    0.126      3.106
2     11.64     3.773     11.59    0.081      3.508
Qmax(1) =
         1.000 *    1.000 *    24.037) +
         0.883 *    1.000 *    11.638) + =      34.308
Qmax(2) =
         1.135 *    0.840 *    24.037) +
         1.000 *    1.000 *    11.638) + =      34.562

Total of 2 main streams to confluence:
Flow rates before confluence point:
      25.037      12.638
Maximum flow rates at confluence using above data:
       34.308       34.562
Area of streams before confluence:
        8.962        3.773
Effective area values after confluence:
       12.736       11.304


Results of confluence:
Total flow rate =     34.562(CFS)
Time of concentration =    11.592 min.
Effective stream area after confluence  =     11.304(Ac.)
Study area average Pervious fraction(Ap) =  0.508
Study area average soil loss rate(Fm) =    0.113(In/Hr)
Study area total =      12.74(Ac.)
```

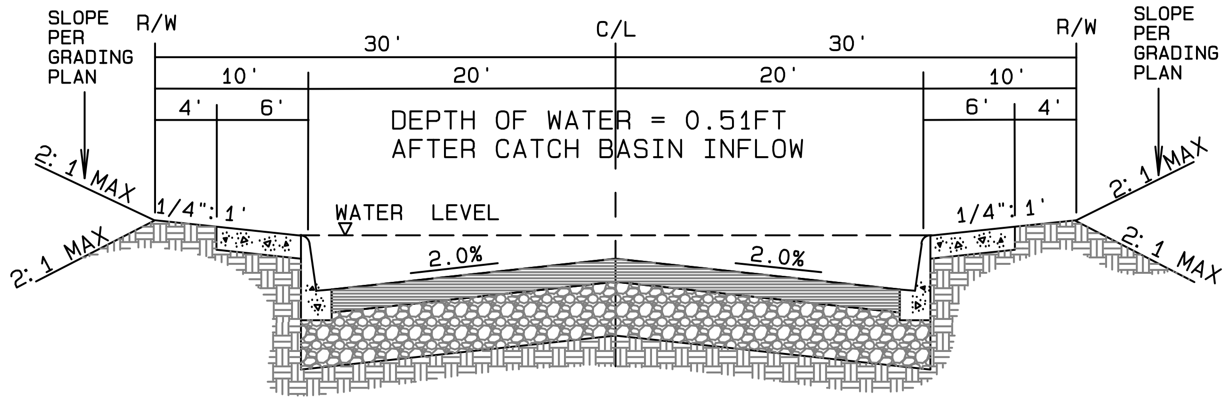
```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station      32.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.800(Ft.)
End of street segment elevation =  3189.700(Ft.)
Length of street segment  =   186.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      36.967(CFS)
Depth of flow =   0.618(Ft.), Average velocity =   2.895(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.73(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.000(Ft.)
Flow velocity =   2.90(Ft/s)
Travel time =    1.07 min.     TC =   12.66  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      3.298(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.871
Subarea runoff =      4.646(CFS) for    2.350(Ac.)
Total runoff =     39.208(CFS)
Effective area this stream =       13.65(Ac.)
Total Study Area (Main Stream No. 1) =       16.75(Ac.)
Area averaged Fm value =    0.107(In/Hr)
Street flow at end of street =     39.208(CFS)
Half street flow at end of street =     19.604(CFS)
Depth of flow =   0.628(Ft.), Average velocity =   2.947(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.13(Ft.)
Flow width (from curb towards crown)=  22.000(Ft.)
End of computations, Total Study Area =           16.75 (Ac.)
The following figures may
```

be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.507
Area averaged SCS curve number = 72.8

DA-2 , DMA-a
Q100= 41.8 CFS
CONFLUENCE @ NODE 32

CATCH BASIN 5 & 6
INFLOW TO BASIN 2
Q=15.6 CFS (CAPTURED)
@ LOW POINT



@ CATCH BASIN 5 & 6 HARVEST PLACE/BELARDO ST

TYPICAL SECTION (60'R/W)
N.T.S.

AFTER INLET FLOW TO CATCH BASIN,
DEPTH OF WATER REMAINS = 0.51 FT
ABOVE FL

PREPARED BY:
Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning
California
Corporate
109 East Third Street, San Bernardino, CA 92410
Phone: 909-884-8217 Fax: 909-889-0153

Pkwy Slope = .02 Cross Slope = .02 Half Street Width = 20
Half R/W Width = 30 Gutter Width = 1.5 Curb Hike = .118
Curb Batter = .083 Curb Depth = .5 N (Road) = .015 N (Parkway) = .017

Slope of Curb Face = .166 Slope of Gutter = .786667E-01
HT. of Crown above Gutter F.L = .48634

INTERIOR STREET 60'R/W; 6"CF.

Depth	Area	Road Flooding	Pkway Flooding (one side)	Q/S**.5
.1	.643893E-01	1.28779	0	.830369
.11	.779111E-01	1.41657	0	1.07066
.12	.927952E-01	1.61992	0	1.31289
.13	.111503	2.12158	0	1.50033
.14	.135227	2.62324	0	1.80434
.15	.163968	3.1249	0	2.22064
.16	.197725	3.62656	0	2.75326
.17	.236499	4.12822	0	3.40945
.18	.280289	4.62988	0	4.19778
.19	.329096	5.13154	0	5.12737
.2	.38292	5.6332	0	6.20747
.21	.44176	6.13486	0	7.44732
.22	.505617	6.63652	0	8.85607
.23	.574491	7.13818	0	10.4427
.24	.648381	7.63984	0	12.216
.25	.727288	8.1415	0	14.1848
.26	.811211	8.64316	0	16.3574
.27	.900151	9.14482	0	18.7423
.28	.994107	9.64648	0	21.3477
.29	1.09308	10.1481	0	24.1815
.3	1.19707	10.6498	0	27.2519
.31	1.30608	11.1515	0	30.5664
.32	1.4201	11.6531	0	34.133
.33	1.53914	12.1548	0	37.959
.34	1.66319	12.6564	0	42.052
.35	1.79227	13.1581	0	46.4193
.36	1.92636	13.6598	0	51.0682
.37	2.06546	14.1614	0	56.0059
.38	2.20959	14.6631	0	61.2394
.39	2.35872	15.1647	0	66.7758
.4	2.51288	15.6664	0	72.6219
.41	2.67205	16.1681	0	78.7846
.42	2.83624	16.6697	0	85.2706
.43	3.00545	17.1714	0	92.0867
.44	3.17967	17.673	0	99.2395
.45	3.35881	18.1747	0	106.736
.46	[illegible]	18.6764	0	114.581
.47	3.73243	19.178	0	122.783
.48	3.92672	19.6797	0	131.348
T O P O F C R O W N E X C E E D E D				
.49	8.25139	39.9967	0	282.198
.5	8.62137	40	0	303.5
F L O W E X C E E D S T O P O F C U R B				
.51	8.98971	40	.5	325.431
.52	9.35805	40	1	348.024
.53	9.72639	40	1.5	371.306

DEPTH = 0.5 FT

=325

$Q/(S)^{1/2}$

$26.2\ \text{CFS}/(0.65\%)^{1/2}$

=325

.54	10.0947	40	2	395.298
.55	10.4631	40	2.5	420.017
.56	10.8314	40	3	445.48
.57	11.1998	40	3.5	471.701
.58	11.5681	40	4	498.694
.59	11.9364	40	4.5	526.473
.6	12.3048	40	5	555.051
.61	12.6731	40	5.5	584.44
.62	13.0415	40	6	614.652
.63	13.4098	40	6.5	645.698
.64	13.7781	40	7	677.591
.65	14.1465	40	7.5	710.341
.66	14.5148	40	8	743.959
.67	14.8832	40	8.5	778.456
.68	15.2515	40	9	813.842
.69	15.6198	40	9.5	850.129
.7	15.9882	40	10	887.326

```
               San Bernardino County Rational Hydrology Program

                   (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 06/11/18
------------------------------------------------------------------------
```
10-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA A5 TO A7
FILE: 16397ONSITEA5POST10YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.664 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station      25.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  3205.600(Ft.)
Bottom (of initial area) elevation =  3194.400(Ft.)
Difference in elevation =    11.200(Ft.)
Slope =    0.01231  s(%)=       1.23
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.630 min.
Rainfall intensity =      1.783(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.790
Subarea runoff =      7.070(CFS)
Total initial stream area =        5.020(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station      25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.020(Ac.)
Runoff from this stream =      7.070(CFS)
Time of concentration =   14.63 min.
Rainfall intensity =     1.783(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station      27.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Initial subarea data:
Initial area flow distance =   303.000(Ft.)
Top (of initial area) elevation =  3202.300(Ft.)
Bottom (of initial area) elevation =  3197.300(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.01650  s(%)=       1.65
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.204 min.
Rainfall intensity =      2.467(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.686
Subarea runoff =      2.064(CFS)
Total initial stream area =        1.220(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.587(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       25.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.300(Ft.)
End of street segment elevation =  3194.400(Ft.)
Length of street segment  =   268.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.269(CFS)
Depth of flow =   0.258(Ft.), Average velocity =   2.070(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.506(Ft.)
Flow velocity =   2.07(Ft/s)
Travel time =    2.16 min.     TC =   11.36  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      2.128(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.738
Subarea runoff =      2.242(CFS) for    1.520(Ac.)
Total runoff =      4.306(CFS)
Effective area this stream =        2.74(Ac.)
Total Study Area (Main Stream No. 2) =        7.76(Ac.)
Area averaged Fm value =    0.382(In/Hr)
Street flow at end of street =      4.306(CFS)
Half street flow at end of street =      2.153(CFS)
Depth of flow =   0.279(Ft.), Average velocity =   2.209(Ft/s)
Flow width (from curb towards crown)=   9.531(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.740(Ac.)
Runoff from this stream =      4.306(CFS)
Time of concentration =   11.36 min.
Rainfall intensity =     2.128(In/Hr)
Area averaged loss rate (Fm) =    0.3823(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5445
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      7.07     5.020     14.63    0.218      1.783
2      4.31     2.740     11.36    0.382      2.128
Qmax(1) =
         1.000 *    1.000 *     7.070) +
         0.802 *    1.000 *     4.306) + =      10.525
Qmax(2) =
         1.221 *    0.777 *     7.070) +
         1.000 *    1.000 *     4.306) + =      11.008

Total of 2 main streams to confluence:
Flow rates before confluence point:
       8.070       5.306
Maximum flow rates at confluence using above data:
       10.525       11.008
Area of streams before confluence:
        5.020        2.740
Effective area values after confluence:
        7.760        6.639


Results of confluence:
Total flow rate =     11.008(CFS)
Time of concentration =    11.362 min.
Effective stream area after confluence  =      6.639(Ac.)
Study area average Pervious fraction(Ap) =  0.516
Study area average soil loss rate(Fm) =    0.276(In/Hr)
Study area total =       7.76(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station      28.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3194.400(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   475.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.824(CFS)
Depth of flow =   0.393(Ft.), Average velocity =   2.467(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.266(Ft.)
Flow velocity =   2.47(Ft/s)
Travel time =    3.21 min.     TC =   14.57  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.788(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.769
Subarea runoff =      1.459(CFS) for    2.430(Ac.)
Total runoff =     12.467(CFS)
Effective area this stream =        9.07(Ac.)
Total Study Area (Main Stream No. 1) =       10.19(Ac.)
Area averaged Fm value =    0.261(In/Hr)
Street flow at end of street =     12.467(CFS)
Half street flow at end of street =      6.234(CFS)
Depth of flow =   0.400(Ft.), Average velocity =   2.499(Ft/s)
Flow width (from curb towards crown)=  15.583(Ft.)
```

++
Process from Point/Station 25.000 to Point/Station 28.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 9.069(Ac.)
Runoff from this stream = 12.467(CFS)
Time of concentration = 14.57 min.
Rainfall intensity = 1.788(In/Hr)
Area averaged loss rate (Fm) = 0.2607(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5115
Program is now starting with Main Stream No. 2

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station      30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   536.000(Ft.)
Top (of initial area) elevation =  3198.500(Ft.)
Bottom (of initial area) elevation =  3192.100(Ft.)
Difference in elevation =     6.400(Ft.)
Slope =    0.01194  s(%)=       1.19
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.910 min.
Rainfall intensity =      2.059(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.805
Subarea runoff =      3.827(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.310(Ac.)
Runoff from this stream =      3.827(CFS)
Time of concentration =   11.91 min.
Rainfall intensity =     2.059(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      31.000 to Point/Station      30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  3195.300(Ft.)
Bottom (of initial area) elevation =  3192.100(Ft.)
Difference in elevation =     3.200(Ft.)
Slope =    0.01067  s(%)=       1.07
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.658 min.
Rainfall intensity =      2.385(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.818
Subarea runoff =      2.145(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

++
Process from Point/Station   31.000 to Point/Station   30.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
Stream flow area =   1.100(Ac.)
Runoff from this stream =   2.145(CFS)
Time of concentration =   9.66 min.
Rainfall intensity =   2.385(In/Hr)
Area averaged loss rate (Fm) =   0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	3.83	2.310	11.91	0.218	2.059
2	2.14	1.100	9.66	0.218	2.385

```
Qmax(1) =
         1.000 *    1.000 *     3.827) +
         0.850 *    1.000 *     2.145) + =       5.650
Qmax(2) =
         1.177 *    0.811 *     3.827) +
         1.000 *    1.000 *     2.145) + =       5.797
```

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.827   2.145
Maximum flow rates at confluence using above data:
        5.650   5.797
Area of streams before confluence:
        2.310   1.100
Effective area values after confluence:
        3.410   2.973
Results of confluence:
Total flow rate =   5.797(CFS)
Time of concentration =   9.658 min.
Effective stream area after confluence =   2.973(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) =   0.218(In/Hr)
Study area total (this main stream) =   3.41(Ac.)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       28.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3192.100(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   246.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.098(CFS)
Depth of flow =   0.341(Ft.), Average velocity =   1.831(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.648(Ft.)
Flow velocity =   1.83(Ft/s)
Travel time =    2.24 min.     TC =   11.90  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      2.061(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.805
Subarea runoff =      0.460(CFS) for    0.800(Ac.)
Total runoff =      6.257(CFS)
Effective area this stream =        3.77(Ac.)
Total Study Area (Main Stream No. 2) =       14.40(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =      6.257(CFS)
Half street flow at end of street =      3.128(CFS)
Depth of flow =   0.344(Ft.), Average velocity =   1.842(Ft/s)
Flow width (from curb towards crown)=  12.776(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       28.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.773(Ac.)
Runoff from this stream =      6.257(CFS)
Time of concentration =   11.90 min.
Rainfall intensity =     2.061(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     12.47     9.069     14.57    0.261      1.788
2      6.26     3.773     11.90    0.218      2.061
Qmax(1) =
         1.000 *    1.000 *    12.467) +
         0.852 *    1.000 *     6.257) + =      17.799
Qmax(2) =
         1.178 *    0.817 *    12.467) +
         1.000 *    1.000 *     6.257) + =      18.254

Total of 2 main streams to confluence:
Flow rates before confluence point:
      13.467       7.257
Maximum flow rates at confluence using above data:
       17.799       18.254
Area of streams before confluence:
        9.069        3.773
Effective area values after confluence:
       12.842       11.178


Results of confluence:
Total flow rate =     18.254(CFS)
Time of concentration =    11.898 min.
Effective stream area after confluence  =     11.178(Ac.)
Study area average Pervious fraction(Ap) =  0.508
Study area average soil loss rate(Fm) =    0.248(In/Hr)
Study area total =      12.84(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station       32.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.800(Ft.)
End of street segment elevation =  3189.700(Ft.)
Length of street segment  =   186.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     19.408(CFS)
Depth of flow =   0.513(Ft.), Average velocity =   2.516(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    0.51(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  19.307(Ft.)
Flow velocity =   2.52(Ft/s)
Travel time =    1.23 min.     TC =   13.13  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.923(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.786
Subarea runoff =      2.206(CFS) for    2.350(Ac.)
Total runoff =     20.459(CFS)
Effective area this stream =       13.53(Ac.)
Total Study Area (Main Stream No. 1) =       16.75(Ac.)
Area averaged Fm value =    0.243(In/Hr)
Street flow at end of street =     20.459(CFS)
Half street flow at end of street =     10.230(CFS)
Depth of flow =   0.522(Ft.), Average velocity =   2.528(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    0.89(Ft.)
Flow width (from curb towards crown)=  19.774(Ft.)
End of computations, Total Study Area =          16.75 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.
```

```
Area averaged pervious area fraction(Ap) = 0.507
Area averaged SCS curve number =  72.8
```

```
            San Bernardino County Rational Hydrology Program

                (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 06/11/18
------------------------------------------------------------------------
```

2-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA A5 TO A7
FILE: 16397ONSITEA5POST2YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is     2.0
Computed rainfall intensity:
Storm year =     2.00   1 hour rainfall =     0.384 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 1
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      26.000 to Point/Station      25.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  3205.600(Ft.)
Bottom (of initial area) elevation =  3194.400(Ft.)
Difference in elevation =    11.200(Ft.)
Slope =    0.01231  s(%)=       1.23
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.630 min.
Rainfall intensity =      1.031(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.593
Subarea runoff =      3.068(CFS)
Total initial stream area =        5.020(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station      25.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.020(Ac.)
Runoff from this stream =      3.068(CFS)
Time of concentration =   14.63 min.
Rainfall intensity =     1.031(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station      27.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.600(In/Hr)
Initial subarea data:
Initial area flow distance =   303.000(Ft.)
Top (of initial area) elevation =  3202.300(Ft.)
Bottom (of initial area) elevation =  3197.300(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.01650  s(%)=       1.65
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.204 min.
Rainfall intensity =      1.426(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.521
Subarea runoff =      0.907(CFS)
Total initial stream area =        1.220(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.600(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       25.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.300(Ft.)
End of street segment elevation =  3194.400(Ft.)
Length of street segment  =   268.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.417(CFS)
Depth of flow =   0.206(Ft.), Average velocity =   1.712(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.898(Ft.)
Flow velocity =   1.71(Ft/s)
Travel time =    2.61 min.     TC =   11.81  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      1.198(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.552
Subarea runoff =      0.906(CFS) for    1.520(Ac.)
Total runoff =      1.813(CFS)
Effective area this stream =        2.74(Ac.)
Total Study Area (Main Stream No. 2) =        7.76(Ac.)
Area averaged Fm value =    0.463(In/Hr)
Street flow at end of street =      1.813(CFS)
Half street flow at end of street =      0.907(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   1.808(Ft/s)
Flow width (from curb towards crown)=   6.599(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.740(Ac.)
Runoff from this stream =      1.813(CFS)
Time of concentration =   11.81 min.
Rainfall intensity =     1.198(In/Hr)
Area averaged loss rate (Fm) =    0.4626(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5445
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.07     5.020     14.63    0.352      1.031
2      1.81     2.740     11.81    0.463      1.198
Qmax(1) =
         1.000 *    1.000 *     3.068) +
         0.773 *    1.000 *     1.813) + =       4.470
Qmax(2) =
         1.245 *    0.807 *     3.068) +
         1.000 *    1.000 *     1.813) + =       4.898

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.068       2.813
Maximum flow rates at confluence using above data:
        4.470        4.898
Area of streams before confluence:
        5.020        2.740
Effective area values after confluence:
        7.760        6.793


Results of confluence:
Total flow rate =      4.898(CFS)
Time of concentration =    11.812 min.
Effective stream area after confluence  =      6.793(Ac.)
Study area average Pervious fraction(Ap) =  0.516
Study area average soil loss rate(Fm) =    0.391(In/Hr)
Study area total =       7.76(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station      28.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3194.400(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   475.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.987(CFS)
Depth of flow =   0.305(Ft.), Average velocity =   1.999(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.870(Ft.)
Flow velocity =   2.00(Ft/s)
Travel time =    3.96 min.     TC =   15.77  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      0.978(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.550
Subarea runoff =      0.061(CFS) for    2.430(Ac.)
Total runoff =      4.959(CFS)
Effective area this stream =        9.22(Ac.)
Total Study Area (Main Stream No. 1) =       10.19(Ac.)
Area averaged Fm value =    0.381(In/Hr)
Street flow at end of street =      4.959(CFS)
Half street flow at end of street =      2.480(CFS)
Depth of flow =   0.305(Ft.), Average velocity =   1.996(Ft/s)
Flow width (from curb towards crown)=  10.845(Ft.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       28.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.223(Ac.)
Runoff from this stream =      4.959(CFS)
Time of concentration =   15.77 min.
Rainfall intensity =     0.978(In/Hr)
Area averaged loss rate (Fm) =    0.3809(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5116
Program is now starting with Main Stream No. 2
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station      30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   536.000(Ft.)
Top (of initial area) elevation =  3198.500(Ft.)
Bottom (of initial area) elevation =  3192.100(Ft.)
Difference in elevation =     6.400(Ft.)
Slope =    0.01194  s(%)=       1.19
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.910 min.
Rainfall intensity =      1.191(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.634
Subarea runoff =      1.744(CFS)
Total initial stream area =       2.310(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station      30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.310(Ac.)
Runoff from this stream =      1.744(CFS)
Time of concentration =   11.91 min.
Rainfall intensity =     1.191(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station      30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  3195.300(Ft.)
Bottom (of initial area) elevation =  3192.100(Ft.)
Difference in elevation =     3.200(Ft.)
Slope =    0.01067  s(%)=       1.07
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.658 min.
Rainfall intensity =      1.379(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.670
Subarea runoff =      1.017(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      1.017(CFS)
Time of concentration =    9.66 min.
Rainfall intensity =     1.379(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      1.74     2.310     11.91    0.352      1.191
2      1.02     1.100      9.66    0.352      1.379
Qmax(1) =
         1.000 *    1.000 *     1.744) +
         0.817 *    1.000 *     1.017) + =       2.574
Qmax(2) =
         1.224 *    0.811 *     1.744) +
         1.000 *    1.000 *     1.017) + =       2.748

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.744       1.017
Maximum flow rates at confluence using above data:
        2.574        2.748
Area of streams before confluence:
        2.310        1.100
Effective area values after confluence:
        3.410        2.973
Results of confluence:
Total flow rate =      2.748(CFS)
Time of concentration =     9.658 min.
Effective stream area after confluence =      2.973(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.352(In/Hr)
Study area total (this main stream) =       3.41(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station      28.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3192.100(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   246.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.843(CFS)
Depth of flow =   0.274(Ft.), Average velocity =   1.523(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.312(Ft.)
Flow velocity =   1.52(Ft/s)
Travel time =    2.69 min.     TC =   12.35  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      2.747(CFS)
therefore the upstream flow rate of Q =      2.748(CFS) is being used
Rainfall intensity =      1.161(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.627
Subarea runoff =      0.000(CFS) for    0.800(Ac.)
Total runoff =      2.748(CFS)
Effective area this stream =        3.77(Ac.)
Total Study Area (Main Stream No. 2) =       14.40(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      2.748(CFS)
Half street flow at end of street =      1.374(CFS)
Depth of flow =   0.272(Ft.), Average velocity =   1.511(Ft/s)
Flow width (from curb towards crown)=   9.183(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      30.000 to Point/Station      28.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.773(Ac.)
Runoff from this stream =      2.748(CFS)
Time of concentration =   12.35 min.
Rainfall intensity =     1.161(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      4.96     9.223     15.77    0.381      0.978
2      2.75     3.773     12.35    0.352      1.161
Qmax(1) =
         1.000 *    1.000 *     4.959) +
         0.774 *    1.000 *     2.748) + =       7.086
Qmax(2) =
         1.306 *    0.783 *     4.959) +
         1.000 *    1.000 *     2.748) + =       7.818

Total of 2 main streams to confluence:
Flow rates before confluence point:
       5.959       3.748
Maximum flow rates at confluence using above data:
        7.086        7.818
Area of streams before confluence:
        9.223        3.773
Effective area values after confluence:
       12.996       10.995


Results of confluence:
Total flow rate =      7.818(CFS)
Time of concentration =    12.350 min.
Effective stream area after confluence  =     10.995(Ac.)
Study area average Pervious fraction(Ap) =  0.508
Study area average soil loss rate(Fm) =    0.373(In/Hr)
Study area total =      13.00(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station       32.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.800(Ft.)
End of street segment elevation =  3189.700(Ft.)
Length of street segment  =   186.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      8.196(CFS)
Depth of flow =   0.399(Ft.), Average velocity =   2.067(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.624(Ft.)
Flow velocity =   2.07(Ft/s)
Travel time =    1.50 min.     TC =   13.85  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      1.072(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.590
Subarea runoff =      0.619(CFS) for    2.350(Ac.)
Total runoff =      8.438(CFS)
Effective area this stream =       13.34(Ac.)
Total Study Area (Main Stream No. 1) =       16.75(Ac.)
Area averaged Fm value =    0.369(In/Hr)
Street flow at end of street =      8.438(CFS)
Half street flow at end of street =      4.219(CFS)
Depth of flow =   0.402(Ft.), Average velocity =   2.081(Ft/s)
Flow width (from curb towards crown)=  13.786(Ft.)
End of computations, Total Study Area =           16.75 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.507
Area averaged SCS curve number =  72.8
```

DA 3

RATIONAL METHOD

ONSITE PRE-DEVELOPED

100-YEAR, 10-YEAR & 2-YEAR

1-HOUR STORM EVENTS

```
           San Bernardino County Rational Hydrology Program

               (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 03/16/17
------------------------------------------------------------------------
```

100-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA AA1-AA2,
FILE: 16397ONSITEAA1PRE100YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.110 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
```

```
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Initial subarea data:
Initial area flow distance =   684.000(Ft.)
Top (of initial area) elevation =  3201.080(Ft.)
Bottom (of initial area) elevation =  3193.180(Ft.)
Difference in elevation =     7.900(Ft.)
Slope =    0.01155  s(%)=       1.15
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.459 min.
Rainfall intensity =      2.142(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.676
Subarea runoff =     14.485(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.532(In/Hr)
```

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.158(Ft.), Average velocity =   3.411(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2             10.00              0.00
      3             20.00              2.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     22.874(CFS)
  '     '    flow top width =     11.581(Ft.)
  '     '     velocity=    3.411(Ft/s)
  '     '    area =      6.707(Sq.Ft)
  '     '    Froude number =     0.790

Upstream point elevation =  3193.180(Ft.)
Downstream point elevation =  3182.900(Ft.)
Flow length =   749.000(Ft.)
Travel time  =    3.66 min.
Time of concentration =   27.12 min.
Depth of flow =   1.158(Ft.)
Average velocity =   3.411(Ft/s)
Total irregular channel flow =    22.874(CFS)
Irregular channel normal depth above invert elev. =   1.158(Ft.)
Average velocity of channel(s) =   3.411(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 3 = 70.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.532(In/Hr)
Rainfall intensity =      1.935(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.652
Subarea runoff =     16.698(CFS) for   14.700(Ac.)
Total runoff =     31.184(CFS)
Effective area this stream =       24.70(Ac.)
Total Study Area (Main Stream No. 1) =       24.70(Ac.)
Area averaged Fm value =    0.532(In/Hr)
Depth of flow =   1.301(Ft.), Average velocity =   3.685(Ft/s)
End of computations, Total Study Area =           24.70 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

```
            San Bernardino County Rational Hydrology Program

                (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/28/17
------------------------------------------------------------------------
```
10-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA AA1-AA2,
FILE: 16397ONSITEAA1PRE10YR.OUT
```
------------------------------------------------------------------------


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.664 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Initial subarea data:
Initial area flow distance =   662.000(Ft.)
Top (of initial area) elevation =  3201.080(Ft.)
Bottom (of initial area) elevation =  3193.990(Ft.)
Difference in elevation =     7.090(Ft.)
Slope =    0.01071  s(%)=       1.07
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.507 min.
Rainfall intensity =      1.280(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.331
Subarea runoff =      4.230(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.810(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.681(Ft.), Average velocity =   2.452(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              2.00
      2             10.00              0.00
      3             20.00              2.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      5.693(CFS)
  '     '    flow top width =      6.815(Ft.)
  '     '     velocity=    2.452(Ft/s)
  '     '    area =      2.322(Sq.Ft)
  '     '    Froude number =     0.740

Upstream point elevation =  3193.990(Ft.)
Downstream point elevation =  3182.900(Ft.)
Flow length =   771.000(Ft.)
Travel time  =    5.24 min.
Time of concentration =   28.75 min.
Depth of flow =   0.681(Ft.)
Average velocity =   2.452(Ft/s)
Total irregular channel flow =     5.693(CFS)
Irregular channel normal depth above invert elev. =   0.681(Ft.)
Average velocity of channel(s) =   2.452(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.810(In/Hr)
Rainfall intensity =      1.111(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.244
Subarea runoff =      2.841(CFS) for   16.030(Ac.)
```

Total runoff =   7.071(CFS)
Effective area this stream =   26.03(Ac.)
Total Study Area (Main Stream No. 1) =   26.03(Ac.)
Area averaged Fm value =   0.810(In/Hr)
Depth of flow =   0.739(Ft.), Average velocity =   2.588(Ft/s)
End of computations, Total Study Area =   26.03 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area

effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 50.0

```
          San Bernardino County Rational Hydrology Program

              (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/28/17
------------------------------------------------------------------------
```

2-YEAR, 1-HOUR RATIONAL STUDY ONSITE PRE-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA AA1-AA2,
FILE: 16397ONSITEAA1PRE2YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is     2.0
Computed rainfall intensity:
Storm year =     2.00   1 hour rainfall =     0.384 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 1
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 50.00
Adjusted SCS curve number for AMC 1 = 31.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.983(In/Hr)
Initial subarea data:
Initial area flow distance =   662.000(Ft.)
Top (of initial area) elevation =  3201.080(Ft.)
Bottom (of initial area) elevation =  3193.990(Ft.)
Difference in elevation =     7.090(Ft.)
Slope =    0.01071  s(%)=       1.07
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.507 min.
Rainfall intensity =      0.740(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.000
Subarea runoff =      0.000(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.983(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
```

Q2 = 0.0 (CFS)

DA 3 DMA A

RATIONAL METHOD

ONSITE POST-DEVELOPED

100-YEAR, 10-YEAR & 2-YEAR

1-HOUR STORM EVENTS

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/21/17

100-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA A1a TO A3b, Node 1 to Node 9 DA 3 DMA-A
FILE: 16397ONSITEA1POST100YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.110 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   976.000(Ft.)
Top (of initial area) elevation =  3204.600(Ft.)
Bottom (of initial area) elevation =  3197.100(Ft.)
Difference in elevation =     7.500(Ft.)
Slope =    0.00768  s(%)=       0.77
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.532 min.
Rainfall intensity =      2.737(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.873
Subarea runoff =     12.881(CFS)
Total initial stream area =        5.390(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.390(Ac.)
Runoff from this stream =     12.881(CFS)
Time of concentration =   16.53 min.
Rainfall intensity =     2.737(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   720.000(Ft.)
Top (of initial area) elevation =  3203.500(Ft.)
Bottom (of initial area) elevation =  3197.100(Ft.)
Difference in elevation =     6.400(Ft.)
Slope =    0.00889  s(%)=       0.89
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.218 min.
Rainfall intensity =      3.041(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.876
Subarea runoff =      8.578(CFS)
Total initial stream area =        3.220(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        2.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.220(Ac.)
Runoff from this stream =      8.578(CFS)
Time of concentration =   14.22 min.
Rainfall intensity =     3.041(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     12.88     5.390     16.53    0.081      2.737
2      8.58     3.220     14.22    0.081      3.041
Qmax(1) =
         1.000 *    1.000 *    12.881) +
         0.897 *    1.000 *     8.578) + =      20.576
Qmax(2) =
         1.115 *    0.860 *    12.881) +
         1.000 *    1.000 *     8.578) + =      20.927

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.881       8.578
Maximum flow rates at confluence using above data:
       20.576       20.927
Area of streams before confluence:
        5.390        3.220
Effective area values after confluence:
        8.610        7.855
Results of confluence:
Total flow rate =     20.927(CFS)
Time of concentration =    14.218 min.
Effective stream area after confluence =      7.855(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.081(In/Hr)
Study area total (this main stream) =       8.61(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station       4.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.100(Ft.)
End of street segment elevation =  3193.700(Ft.)
Length of street segment  =   312.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     21.724(CFS)
Depth of flow =   0.448(Ft.), Average velocity =   3.286(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.998(Ft.)
Flow velocity =   3.29(Ft/s)
Travel time =    1.58 min.     TC =   15.80  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.825(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.874
Subarea runoff =      1.481(CFS) for    1.220(Ac.)
Total runoff =     22.408(CFS)
Effective area this stream =        9.08(Ac.)
Total Study Area (Main Stream No. 1) =        9.83(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     22.408(CFS)
Half street flow at end of street =     11.204(CFS)
Depth of flow =   0.452(Ft.), Average velocity =   3.311(Ft/s)
Flow width (from curb towards crown)=  18.214(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.075(Ac.)
Runoff from this stream =     22.408(CFS)
Time of concentration =   15.80 min.
Rainfall intensity =     2.825(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   488.000(Ft.)
Top (of initial area) elevation =  3199.300(Ft.)
Bottom (of initial area) elevation =  3193.700(Ft.)
Difference in elevation =     5.600(Ft.)
Slope =    0.01148  s(%)=       1.15
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.563 min.
Rainfall intensity =      3.515(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.879
Subarea runoff =      8.683(CFS)
Total initial stream area =        2.810(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.810(Ac.)
Runoff from this stream =      8.683(CFS)
Time of concentration =   11.56 min.
Rainfall intensity =     3.515(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     22.41     9.075     15.80    0.081      2.825
2      8.68     2.810     11.56    0.081      3.515
Qmax(1) =
         1.000 *    1.000 *    22.408) +
         0.799 *    1.000 *     8.683) + =      29.346
Qmax(2) =
         1.251 *    0.732 *    22.408) +
         1.000 *    1.000 *     8.683) + =      29.206

Total of 2 streams to confluence:
Flow rates before confluence point:
      22.408       8.683
Maximum flow rates at confluence using above data:
       29.346       29.206
Area of streams before confluence:
        9.075        2.810
Effective area values after confluence:
       11.885        9.452
Results of confluence:
Total flow rate =     29.346(CFS)
Time of concentration =    15.800 min.
Effective stream area after confluence =     11.885(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.081(In/Hr)
Study area total (this main stream) =      11.89(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3193.700(Ft.)
End of street segment elevation =  3189.300(Ft.)
Length of street segment  =   432.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     30.815(CFS)
Depth of flow =   0.502(Ft.), Average velocity =   3.543(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.11(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   3.54(Ft/s)
Travel time =    2.03 min.     TC =   17.83  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.595(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.872
Subarea runoff =      2.750(CFS) for    2.300(Ac.)
Total runoff =     32.096(CFS)
Effective area this stream =       14.19(Ac.)
Total Study Area (Main Stream No. 1) =       14.94(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     32.096(CFS)
Half street flow at end of street =     16.048(CFS)
Depth of flow =   0.509(Ft.), Average velocity =   3.578(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.44(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       6.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     14.185(Ac.)
Runoff from this stream =     32.096(CFS)
Time of concentration =   17.83 min.
Rainfall intensity =     2.595(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station       8.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   891.000(Ft.)
Top (of initial area) elevation =  3202.600(Ft.)
Bottom (of initial area) elevation =  3192.700(Ft.)
Difference in elevation =     9.900(Ft.)
Slope =    0.01111  s(%)=       1.11
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.807 min.
Rainfall intensity =      2.956(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =     12.781(CFS)
Total initial stream area =        4.940(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station       9.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3192.700(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   289.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     13.805(CFS)
Depth of flow =   0.421(Ft.), Average velocity =   2.429(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.661(Ft.)
Flow velocity =   2.43(Ft/s)
Travel time =    1.98 min.     TC =   16.79  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.707(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.873
Subarea runoff =      1.871(CFS) for    1.260(Ac.)
Total runoff =     14.652(CFS)
Effective area this stream =        6.20(Ac.)
Total Study Area (Main Stream No. 2) =       21.14(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     14.652(CFS)
Half street flow at end of street =      7.326(CFS)
Depth of flow =   0.429(Ft.), Average velocity =   2.465(Ft/s)
Flow width (from curb towards crown)=  17.047(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.200(Ac.)
Runoff from this stream =     14.652(CFS)
Time of concentration =   16.79 min.
Rainfall intensity =     2.707(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       9.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   325.000(Ft.)
Top (of initial area) elevation =  3194.800(Ft.)
Bottom (of initial area) elevation =  3190.800(Ft.)
Difference in elevation =     4.000(Ft.)
Slope =    0.01231  s(%)=       1.23
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.691 min.
Rainfall intensity =      3.977(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff =      6.241(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station       9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.780(Ac.)
Runoff from this stream =      6.241(CFS)
Time of concentration =    9.69 min.
Rainfall intensity =     3.977(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     14.65     6.200     16.79    0.081      2.707
2      6.24     1.780      9.69    0.081      3.977
Qmax(1) =
         1.000 *    1.000 *    14.652) +
         0.674 *    1.000 *     6.241) + =      18.858
Qmax(2) =
         1.484 *    0.577 *    14.652) +
         1.000 *    1.000 *     6.241) + =      18.789

Total of 2 streams to confluence:
Flow rates before confluence point:
      14.652       6.241
Maximum flow rates at confluence using above data:
       18.858       18.789
Area of streams before confluence:
        6.200        1.780
Effective area values after confluence:
        7.980        5.359
Results of confluence:
Total flow rate =     18.858(CFS)
Time of concentration =    16.790 min.
Effective stream area after confluence =      7.980(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.081(In/Hr)
Study area total (this main stream) =       7.98(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.000 to Point/Station       6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.800(Ft.)
End of street segment elevation =  3189.300(Ft.)
Length of street segment  =   289.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     20.043(CFS)
Depth of flow =   0.490(Ft.), Average velocity =   2.442(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   2.44(Ft/s)
Travel time =    1.97 min.     TC =   18.76  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.505(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.871
Subarea runoff =      2.253(CFS) for    1.700(Ac.)
Total runoff =     21.111(CFS)
Effective area this stream =        9.68(Ac.)
Total Study Area (Main Stream No. 2) =       24.62(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     21.111(CFS)
Half street flow at end of street =     10.556(CFS)
Depth of flow =   0.496(Ft.), Average velocity =   2.493(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  20.000(Ft.)
```

++
Process from Point/Station 9.000 to Point/Station 6.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 9.680(Ac.)
Runoff from this stream = 21.111(CFS)
Time of concentration = 18.76 min.
Rainfall intensity = 2.505(In/Hr)
Area averaged loss rate (Fm) = 0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	32.10	14.185	17.83	0.081	2.595
2	21.11	9.680	18.76	0.081	2.505

```
Qmax(1) =
         1.000 *    1.000 *    32.096) +
         1.037 *    0.950 *    21.111) + =      52.912
Qmax(2) =
         0.964 *    1.000 *    32.096) +
         1.000 *    1.000 *    21.111) + =      52.049
```

Total of 2 main streams to confluence:
Flow rates before confluence point:
33.096 22.111
Maximum flow rates at confluence using above data:
52.912 52.049
Area of streams before confluence:
14.185 9.680
Effective area values after confluence:
23.386 23.865

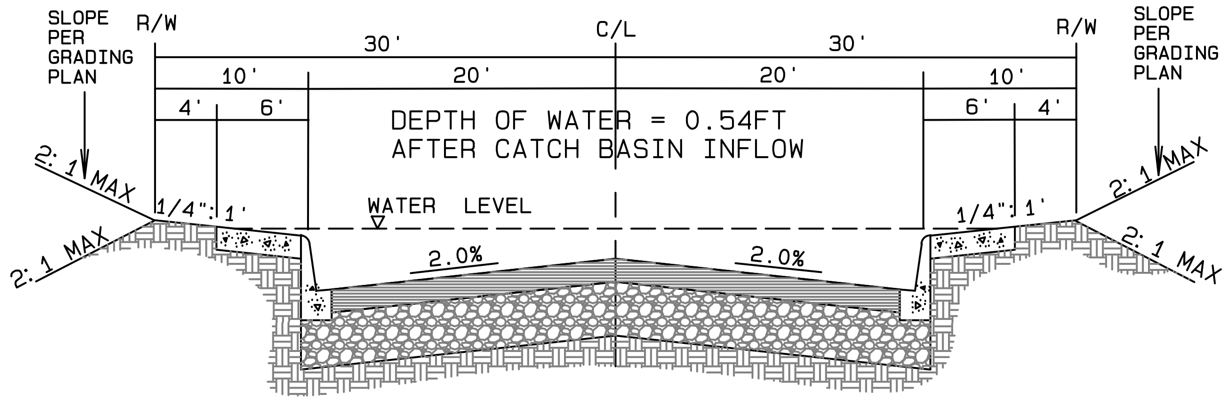
Results of confluence:
Total flow rate = 52.912(CFS)
Time of concentration = 17.832 min.
Effective stream area after confluence = 23.386(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.081(In/Hr)
Study area total = 23.87(Ac.)
End of computations, Total Study Area = 24.62 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500

```
Area averaged SCS curve number =  76.0
```

DA-3 , DMA-a
Q100=52.9 CFS
CONFLUENCE @ NODE 6

CATCH BASIN 7 & 8
INFLOW TO BASIN 3
Q=16.4 CFS (CAPTURED)
@ LOW POINT



@ CATCH BASIN 7 & 8 NINA PLACE/CROMMELL ST

TYPICAL SECTION (60'R/W)

N.T.S.

AFTER INLET FLOW TO CATCH BASIN,
DEPTH OF WATER REMAINS = 0.54 FT
ABOVE FL

PREPARED BY:
Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning
California
Corporate
109 East Third Street, San Bernardino, CA 92410
Phone: 909-884-8217 Fax: 909-889-0153

Pkwy Slope = .02 Cross Slope = .02 Half Street Width = 20
Half R/W Width = 30 Gutter Width = 1.5 Curb Hike = .118
Curb Batter = .083 Curb Depth = .5 N (Road) = .015 N (Parkway) = .017

Slope of Curb Face = .166 Slope of Gutter = .786667E-01
HT. of Crown above Gutter F.L = .48634

INTERIOR STREET 60'R/W; 6"CF.

Depth	Area	Road Flooding	Pkway Flooding (one side)	Q/S**.5
.1	.643893E-01	1.28779	0	.830369
.11	.779111E-01	1.41657	0	1.07066
.12	.927952E-01	1.61992	0	1.31289
.13	.111503	2.12158	0	1.50033
.14	.135227	2.62324	0	1.80434
.15	.163968	3.1249	0	2.22064
.16	.197725	3.62656	0	2.75326
.17	.236499	4.12822	0	3.40945
.18	.280289	4.62988	0	4.19778
.19	.329096	5.13154	0	5.12737
.2	.38292	5.6332	0	6.20747
.21	.44176	6.13486	0	7.44732
.22	.505617	6.63652	0	8.85607
.23	.574491	7.13818	0	10.4427
.24	.648381	7.63984	0	12.216
.25	.727288	8.1415	0	14.1848
.26	.811211	8.64316	0	16.3574
.27	.900151	9.14482	0	18.7423
.28	.994107	9.64648	0	21.3477
.29	1.09308	10.1481	0	24.1815
.3	1.19707	10.6498	0	27.2519
.31	1.30608	11.1515	0	30.5664
.32	1.4201	11.6531	0	34.133
.33	1.53914	12.1548	0	37.959
.34	1.66319	12.6564	0	42.052
.35	1.79227	13.1581	0	46.4193
.36	1.92636	13.6598	0	51.0682
.37	2.06546	14.1614	0	56.0059
.38	2.20959	14.6631	0	61.2394
.39	2.35872	15.1647	0	66.7758
.4	2.51288	15.6664	0	72.6219
.41	2.67205	16.1681	0	78.7846
.42	2.83624	16.6697	0	85.2706
.43	3.00545	17.1714	0	92.0867
.44	3.17967	17.673	0	99.2395
.45	3.35891	18.1747	0	106.736
.46	3.54316	18.6764	0	114.581
.47	3.73243	19.178	0	122.783
.48	3.92672	19.6797	0	131.348
T O P O F C R O W N E X C E E D E D				
.49	8.25139	39.9967	0	282.198
.5	8.62137	40	0	303.5
F L O W E X C E E D S T O P O F C U R B				
.51	8.98971	40	.5	325.431
.52	9.35805	40	1	348.024
.53	9.72639	40	1.5	371.306

$Q/(S)^{1/2}$

$36.5\ CFS/(0.8\%)^{1/2}$

=408

.54	10.0947	40	2	395.298
.55	10.4631	40	2.5	420.017
.56	10.8314	40	3	445.48
.57	11.1998	40	3.5	471.701
.58	11.5681	40	4	498.694
.59	[illegible]	40	4.5	526.473
.6	[illegible]	40	5	555.051
.61	12.6731	40	5.5	584.44
.62	13.0415	40	6	614.652
.63	13.4098	40	6.5	645.698
.64	13.7781	40	7	677.591
.65	14.1465	40	7.5	710.341
.66	14.5148	40	8	743.959
.67	14.8832	40	8.5	778.456
.68	15.2515	40	9	813.842
.69	15.6198	40	9.5	850.129
.7	15.9882	40	10	887.326

DEPTH= 0.54 FT

=408

```
                San Bernardino County Rational Hydrology Program

                    (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 11/27/17
------------------------------------------------------------------------
```
10-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA A1a TO A3b, Node 1 to Node 9   **DA 3 DMA-A**
FILE: 16397ONSITEA1POST10YR.OUT
```
------------------------------------------------------------------------


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.664 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   976.000(Ft.)
Top (of initial area) elevation =  3204.600(Ft.)
Bottom (of initial area) elevation =  3197.100(Ft.)
Difference in elevation =     7.500(Ft.)
Slope =    0.00768  s(%)=       0.77
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.532 min.
Rainfall intensity =      1.637(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.780
Subarea runoff =      6.882(CFS)
Total initial stream area =        5.390(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.390(Ac.)
Runoff from this stream =      6.882(CFS)
Time of concentration =   16.53 min.
Rainfall intensity =     1.637(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   720.000(Ft.)
Top (of initial area) elevation =  3203.500(Ft.)
Bottom (of initial area) elevation =  3197.100(Ft.)
Difference in elevation =     6.400(Ft.)
Slope =    0.00889  s(%)=       0.89
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.218 min.
Rainfall intensity =      1.819(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.792
Subarea runoff =      4.640(CFS)
Total initial stream area =        3.220(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       2.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.220(Ac.)
Runoff from this stream =      4.640(CFS)
Time of concentration =   14.22 min.
Rainfall intensity =     1.819(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      6.88     5.390     16.53    0.218      1.637
2      4.64     3.220     14.22    0.218      1.819
Qmax(1) =
         1.000 *    1.000 *     6.882) +
         0.886 *    1.000 *     4.640) + =      10.993
Qmax(2) =
         1.128 *    0.860 *     6.882) +
         1.000 *    1.000 *     4.640) + =      11.318

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.882       4.640
Maximum flow rates at confluence using above data:
       10.993       11.318
Area of streams before confluence:
        5.390        3.220
Effective area values after confluence:
        8.610        7.855
Results of confluence:
Total flow rate =     11.318(CFS)
Time of concentration =    14.218 min.
Effective stream area after confluence =      7.855(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.218(In/Hr)
Study area total (this main stream) =       8.61(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       4.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.100(Ft.)
End of street segment elevation =  3193.700(Ft.)
Length of street segment  =   312.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.667(CFS)
Depth of flow =   0.371(Ft.), Average velocity =   2.820(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.152(Ft.)
Flow velocity =   2.82(Ft/s)
Travel time =    1.84 min.     TC =   16.06  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.670(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.782
Subarea runoff =      0.542(CFS) for    1.220(Ac.)
Total runoff =     11.860(CFS)
Effective area this stream =        9.08(Ac.)
Total Study Area (Main Stream No. 1) =        9.83(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =     11.860(CFS)
Half street flow at end of street =      5.930(CFS)
Depth of flow =   0.373(Ft.), Average velocity =   2.831(Ft/s)
Flow width (from curb towards crown)=  14.243(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.075(Ac.)
Runoff from this stream =     11.860(CFS)
Time of concentration =   16.06 min.
Rainfall intensity =     1.670(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   488.000(Ft.)
Top (of initial area) elevation =  3199.300(Ft.)
Bottom (of initial area) elevation =  3193.700(Ft.)
Difference in elevation =     5.600(Ft.)
Slope =    0.01148  s(%)=       1.15
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.563 min.
Rainfall intensity =      2.102(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.807
Subarea runoff =      4.765(CFS)
Total initial stream area =        2.810(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       5.000 to Point/Station       4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.810(Ac.)
Runoff from this stream =      4.765(CFS)
Time of concentration =   11.56 min.
Rainfall intensity =     2.102(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     11.86     9.075     16.06    0.218      1.670
2      4.76     2.810     11.56    0.218      2.102
Qmax(1) =
         1.000 *    1.000 *    11.860) +
         0.771 *    1.000 *     4.765) + =      15.533
Qmax(2) =
         1.298 *    0.720 *    11.860) +
         1.000 *    1.000 *     4.765) + =      15.844

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.860       4.765
Maximum flow rates at confluence using above data:
       15.533       15.844
Area of streams before confluence:
        9.075        2.810
Effective area values after confluence:
       11.885        9.344
Results of confluence:
Total flow rate =     15.844(CFS)
Time of concentration =    11.563 min.
Effective stream area after confluence =      9.344(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.218(In/Hr)
Study area total (this main stream) =      11.89(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3193.700(Ft.)
End of street segment elevation =  3189.300(Ft.)
Length of street segment  =   432.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     16.519(CFS)
Depth of flow =   0.416(Ft.), Average velocity =   2.994(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.409(Ft.)
Flow velocity =   2.99(Ft/s)
Travel time =    2.40 min.     TC =   13.97  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.842(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.793
Subarea runoff =      1.171(CFS) for    2.300(Ac.)
Total runoff =     17.015(CFS)
Effective area this stream =       11.64(Ac.)
Total Study Area (Main Stream No. 1) =       14.94(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =     17.015(CFS)
Half street flow at end of street =      8.507(CFS)
Depth of flow =   0.420(Ft.), Average velocity =   3.016(Ft/s)
Flow width (from curb towards crown)=  16.597(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       4.000 to Point/Station       6.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     11.644(Ac.)
Runoff from this stream =     17.015(CFS)
Time of concentration =   13.97 min.
Rainfall intensity =     1.842(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station       8.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   891.000(Ft.)
Top (of initial area) elevation =  3202.600(Ft.)
Bottom (of initial area) elevation =  3192.700(Ft.)
Difference in elevation =     9.900(Ft.)
Slope =    0.01111  s(%)=       1.11
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.807 min.
Rainfall intensity =      1.768(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.789
Subarea runoff =      6.891(CFS)
Total initial stream area =        4.940(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       8.000 to Point/Station       9.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3192.700(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   289.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      7.354(CFS)
Depth of flow =   0.349(Ft.), Average velocity =   2.081(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.042(Ft.)
Flow velocity =   2.08(Ft/s)
Travel time =    2.31 min.     TC =   17.12  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.597(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.777
Subarea runoff =      0.804(CFS) for    1.260(Ac.)
Total runoff =      7.695(CFS)
Effective area this stream =        6.20(Ac.)
Total Study Area (Main Stream No. 2) =       21.14(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =      7.695(CFS)
Half street flow at end of street =      3.847(CFS)
Depth of flow =   0.354(Ft.), Average velocity =   2.104(Ft/s)
Flow width (from curb towards crown)=  13.275(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.200(Ac.)
Runoff from this stream =      7.695(CFS)
Time of concentration =   17.12 min.
Rainfall intensity =     1.597(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       9.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   325.000(Ft.)
Top (of initial area) elevation =  3194.800(Ft.)
Bottom (of initial area) elevation =  3190.800(Ft.)
Difference in elevation =     4.000(Ft.)
Slope =    0.01231  s(%)=       1.23
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.691 min.
Rainfall intensity =      2.379(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.817
Subarea runoff =      3.462(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.780(Ac.)
Runoff from this stream =      3.462(CFS)
Time of concentration =    9.69 min.
Rainfall intensity =     2.379(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      7.69     6.200     17.12    0.218      1.597
2      3.46     1.780      9.69    0.218      2.379
Qmax(1) =
         1.000 *    1.000 *     7.695) +
         0.638 *    1.000 *     3.462) + =       9.904
Qmax(2) =
         1.567 *    0.566 *     7.695) +
         1.000 *    1.000 *     3.462) + =      10.286

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.695       3.462
Maximum flow rates at confluence using above data:
        9.904       10.286
Area of streams before confluence:
        6.200        1.780
Effective area values after confluence:
        7.980        5.289
Results of confluence:
Total flow rate =     10.286(CFS)
Time of concentration =     9.691 min.
Effective stream area after confluence =      5.289(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.218(In/Hr)
Study area total (this main stream) =       7.98(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.000 to Point/Station       6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.800(Ft.)
End of street segment elevation =  3189.300(Ft.)
Length of street segment  =   289.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     10.974(CFS)
Depth of flow =   0.407(Ft.), Average velocity =   2.100(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.959(Ft.)
Flow velocity =   2.10(Ft/s)
Travel time =    2.29 min.     TC =   11.99  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      2.050(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.804
Subarea runoff =      1.238(CFS) for    1.700(Ac.)
Total runoff =     11.524(CFS)
Effective area this stream =        6.99(Ac.)
Total Study Area (Main Stream No. 2) =       24.62(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =     11.524(CFS)
Half street flow at end of street =      5.762(CFS)
Depth of flow =   0.413(Ft.), Average velocity =   2.125(Ft/s)
Flow width (from curb towards crown)=  16.264(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.000 to Point/Station       6.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.989(Ac.)
Runoff from this stream =     11.524(CFS)
Time of concentration =   11.99 min.
Rainfall intensity =     2.050(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     17.01    11.644     13.97    0.218      1.842
2     11.52     6.989     11.99    0.218      2.050
Qmax(1) =
         1.000 *    1.000 *    17.015) +
         0.886 *    1.000 *    11.524) + =      27.228
Qmax(2) =
         1.128 *    0.858 *    17.015) +
         1.000 *    1.000 *    11.524) + =      27.997

Total of 2 main streams to confluence:
Flow rates before confluence point:
      18.015      12.524
Maximum flow rates at confluence using above data:
       27.228       27.997
Area of streams before confluence:
       11.644        6.989
Effective area values after confluence:
       18.633       16.980


Results of confluence:
```

Total flow rate =   27.997(CFS)
Time of concentration =   11.985 min.
Effective stream area after confluence =   16.980(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) =   0.218(In/Hr)
Study area total =   18.63(Ac.)
End of computations, Total Study Area =   24.62 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500

Area averaged SCS curve number = 76.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/27/17

2-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 6397, CITY OF VICTORVILLE
AREA A1a TO A3b, Node 1 to Node 9 **DA 3 DMA-A**
FILE: 16397ONSITEA1POST2YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.384 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 1

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   976.000(Ft.)
Top (of initial area) elevation =  3204.600(Ft.)
Bottom (of initial area) elevation =  3197.100(Ft.)
Difference in elevation =     7.500(Ft.)
Slope =    0.00768  s(%)=       0.77
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.532 min.
Rainfall intensity =      0.947(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.565
Subarea runoff =      2.884(CFS)
Total initial stream area =        5.390(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.390(Ac.)
Runoff from this stream =      2.884(CFS)
Time of concentration =   16.53 min.
Rainfall intensity =     0.947(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       3.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   720.000(Ft.)
Top (of initial area) elevation =  3203.500(Ft.)
Bottom (of initial area) elevation =  3197.100(Ft.)
Difference in elevation =     6.400(Ft.)
Slope =    0.00889  s(%)=       0.89
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.218 min.
Rainfall intensity =      1.052(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.599
Subarea runoff =      2.028(CFS)
Total initial stream area =        3.220(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        2.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.220(Ac.)
Runoff from this stream =      2.028(CFS)
Time of concentration =   14.22 min.
Rainfall intensity =     1.052(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      2.88     5.390     16.53    0.352      0.947
2      2.03     3.220     14.22    0.352      1.052
Qmax(1) =
         1.000 *    1.000 *     2.884) +
         0.849 *    1.000 *     2.028) + =       4.606
Qmax(2) =
         1.177 *    0.860 *     2.884) +
         1.000 *    1.000 *     2.028) + =       4.948

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.884       2.028
Maximum flow rates at confluence using above data:
        4.606        4.948
Area of streams before confluence:
        5.390        3.220
Effective area values after confluence:
        8.610        7.855
Results of confluence:
Total flow rate =      4.948(CFS)
Time of concentration =    14.218 min.
Effective stream area after confluence =      7.855(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.352(In/Hr)
Study area total (this main stream) =       8.61(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       4.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3197.100(Ft.)
End of street segment elevation =  3193.700(Ft.)
Length of street segment  =   312.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      5.044(CFS)
Depth of flow =   0.291(Ft.), Average velocity =   2.301(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.150(Ft.)
Flow velocity =   2.30(Ft/s)
Travel time =    2.26 min.     TC =   16.48  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      4.873(CFS)
therefore the upstream flow rate of Q =      4.948(CFS) is being used
Rainfall intensity =      0.949(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.566
Subarea runoff =      0.000(CFS) for    1.220(Ac.)
Total runoff =      4.948(CFS)
Effective area this stream =        9.08(Ac.)
Total Study Area (Main Stream No. 1) =        9.83(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      4.948(CFS)
Half street flow at end of street =      2.474(CFS)
Depth of flow =   0.289(Ft.), Average velocity =   2.290(Ft/s)
Flow width (from curb towards crown)=  10.071(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.075(Ac.)
Runoff from this stream =      4.948(CFS)
Time of concentration =   16.48 min.
Rainfall intensity =     0.949(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   488.000(Ft.)
Top (of initial area) elevation =  3199.300(Ft.)
Bottom (of initial area) elevation =  3193.700(Ft.)
Difference in elevation =     5.600(Ft.)
Slope =    0.01148  s(%)=       1.15
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.563 min.
Rainfall intensity =      1.216(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.639
Subarea runoff =      2.184(CFS)
Total initial stream area =        2.810(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        4.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.810(Ac.)
Runoff from this stream =      2.184(CFS)
Time of concentration =   11.56 min.
Rainfall intensity =     1.216(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      4.95     9.075     16.48    0.352      0.949
2      2.18     2.810     11.56    0.352      1.216
Qmax(1) =
         1.000 *    1.000 *     4.948) +
         0.691 *    1.000 *     2.184) + =       6.457
Qmax(2) =
         1.447 *    0.702 *     4.948) +
         1.000 *    1.000 *     2.184) + =       7.210

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.948       2.184
Maximum flow rates at confluence using above data:
        6.457        7.210
Area of streams before confluence:
        9.075        2.810
Effective area values after confluence:
       11.885        9.179
Results of confluence:
Total flow rate =      7.210(CFS)
Time of concentration =    11.563 min.
Effective stream area after confluence =      9.179(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.352(In/Hr)
Study area total (this main stream) =      11.89(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3193.700(Ft.)
End of street segment elevation =  3189.300(Ft.)
Length of street segment  =   432.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      7.267(CFS)
Depth of flow =   0.326(Ft.), Average velocity =   2.449(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.907(Ft.)
Flow velocity =   2.45(Ft/s)
Travel time =    2.94 min.     TC =   14.50  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      7.080(CFS)
therefore the upstream flow rate of Q =      7.210(CFS) is being used
Rainfall intensity =      1.038(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.594
Subarea runoff =      0.000(CFS) for    2.300(Ac.)
Total runoff =      7.210(CFS)
Effective area this stream =       11.48(Ac.)
Total Study Area (Main Stream No. 1) =       14.94(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      7.210(CFS)
Half street flow at end of street =      3.605(CFS)
Depth of flow =   0.325(Ft.), Average velocity =   2.444(Ft/s)
Flow width (from curb towards crown)=  11.870(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        6.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     11.479(Ac.)
Runoff from this stream =      7.210(CFS)
Time of concentration =   14.50 min.
Rainfall intensity =     1.038(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       7.000 to Point/Station       8.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   891.000(Ft.)
Top (of initial area) elevation =  3202.600(Ft.)
Bottom (of initial area) elevation =  3192.700(Ft.)
Difference in elevation =     9.900(Ft.)
Slope =    0.01111  s(%)=       1.11
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.807 min.
Rainfall intensity =      1.023(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.590
Subarea runoff =      2.980(CFS)
Total initial stream area =        4.940(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3192.700(Ft.)
End of street segment elevation =  3190.800(Ft.)
Length of street segment  =   289.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.115(CFS)
Depth of flow =   0.273(Ft.), Average velocity =   1.692(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.244(Ft.)
Flow velocity =   1.69(Ft/s)
Travel time =    2.85 min.     TC =   17.65  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      0.904(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.549
Subarea runoff =      0.099(CFS) for    1.260(Ac.)
Total runoff =      3.080(CFS)
Effective area this stream =        6.20(Ac.)
Total Study Area (Main Stream No. 2) =       21.14(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      3.080(CFS)
Half street flow at end of street =      1.540(CFS)
Depth of flow =   0.272(Ft.), Average velocity =   1.687(Ft/s)
Flow width (from curb towards crown)=   9.201(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.200(Ac.)
Runoff from this stream =      3.080(CFS)
Time of concentration =   17.65 min.
Rainfall intensity =     0.904(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station       9.000
**** INITIAL AREA EVALUATION ****
```

```
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   325.000(Ft.)
Top (of initial area) elevation =  3194.800(Ft.)
Bottom (of initial area) elevation =  3190.800(Ft.)
Difference in elevation =     4.000(Ft.)
Slope =    0.01231  s(%)=       1.23
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.691 min.
Rainfall intensity =      1.376(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.670
Subarea runoff =      1.640(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.780(Ac.)
Runoff from this stream =      1.640(CFS)
Time of concentration =    9.69 min.
Rainfall intensity =     1.376(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.08     6.200     17.65    0.352      0.904
2      1.64     1.780      9.69    0.352      1.376
Qmax(1) =
         1.000 *    1.000 *     3.080) +
         0.539 *    1.000 *     1.640) + =       3.964
Qmax(2) =
         1.855 *    0.549 *     3.080) +
         1.000 *    1.000 *     1.640) + =       4.775

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.080       1.640
Maximum flow rates at confluence using above data:
        3.964        4.775
Area of streams before confluence:
        6.200        1.780
Effective area values after confluence:
        7.980        5.184
Results of confluence:
Total flow rate =      4.775(CFS)
Time of concentration =     9.691 min.
Effective stream area after confluence =      5.184(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.352(In/Hr)
Study area total (this main stream) =       7.98(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       9.000 to Point/Station       6.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  3190.800(Ft.)
End of street segment elevation =  3189.300(Ft.)
Length of street segment  =   289.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.959(CFS)
Depth of flow =   0.322(Ft.), Average velocity =   1.729(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.696(Ft.)
Flow velocity =   1.73(Ft/s)
Travel time =    2.79 min.     TC =   12.48  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      1.153(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.625
Subarea runoff =      0.184(CFS) for    1.700(Ac.)
Total runoff =      4.960(CFS)
Effective area this stream =        6.88(Ac.)
Total Study Area (Main Stream No. 2) =       24.62(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      4.960(CFS)
Half street flow at end of street =      2.480(CFS)
Depth of flow =   0.322(Ft.), Average velocity =   1.729(Ft/s)
Flow width (from curb towards crown)=  11.697(Ft.)
```

++
Process from Point/Station 9.000 to Point/Station 6.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 6.884(Ac.)
Runoff from this stream = 4.960(CFS)
Time of concentration = 12.48 min.
Rainfall intensity = 1.153(In/Hr)
Area averaged loss rate (Fm) = 0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	7.21	11.479	14.50	0.352	1.038
2	4.96	6.884	12.48	0.352	1.153

Qmax(1) =
1.000 * 1.000 * 7.210) +
0.856 * 1.000 * 4.960) + = 11.456
Qmax(2) =
1.168 * 0.860 * 7.210) +
1.000 * 1.000 * 4.960) + = 12.206

Total of 2 main streams to confluence:
Flow rates before confluence point:
8.210 5.960
Maximum flow rates at confluence using above data:
11.456 12.206
Area of streams before confluence:
11.479 6.884
Effective area values after confluence:
18.362 16.758

Results of confluence:
Total flow rate = 12.206(CFS)
Time of concentration = 12.477 min.
Effective stream area after confluence = 16.758(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.352(In/Hr)
Study area total = 18.36(Ac.)
End of computations, Total Study Area = 24.62 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500

Area averaged SCS curve number = 76.0

RATIONAL METHOD

ONSITE POST-DEVELOPED

AREA - A13a, A13b A13c
AREA - A14a, A14b, A14c

100-YEAR, 10-YEAR & 2-YEAR

1-HOUR STORM EVENTS

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          San Bernardino County Rational Hydrology Program

              (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 12/11/17
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100-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A13a, A13b & A13c
FILE: 16397ONSITEA13POST100YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.110 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 3
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      34.000 to Point/Station      35.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3203.600(Ft.)
Bottom (of initial area) elevation =  3190.700(Ft.)
Difference in elevation =    12.900(Ft.)
Slope =    0.01290  s(%)=       1.29
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.050 min.
Rainfall intensity =      2.922(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =      3.247(CFS)
Total initial stream area =        1.270(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station      36.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.700(Ft.)
End of street segment elevation =  3186.300(Ft.)
Length of street segment  =   303.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  40.000(Ft.)
Distance from crown to crossfall grade break  =  38.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.634(CFS)
Depth of flow =   0.310(Ft.), Average velocity =   2.801(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.096(Ft.)
Flow velocity =   2.80(Ft/s)
Travel time =    1.80 min.     TC =   16.85  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.700(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.873
Subarea runoff =      0.688(CFS) for    0.400(Ac.)
Total runoff =      3.936(CFS)
Effective area this stream =        1.67(Ac.)
Total Study Area (Main Stream No. 1) =        1.67(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =      3.936(CFS)
Half street flow at end of street =      3.936(CFS)
Depth of flow =   0.317(Ft.), Average velocity =   2.856(Ft/s)
Flow width (from curb towards crown)=  11.455(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station      36.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.670(Ac.)
Runoff from this stream =      3.936(CFS)
Time of concentration =   16.85 min.
Rainfall intensity =     2.700(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.000 to Point/Station       36.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =   985.000(Ft.)
Top (of initial area) elevation =  3188.900(Ft.)
Bottom (of initial area) elevation =  3186.300(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00264  s(%)=       0.26
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   20.546 min.
Rainfall intensity =      2.350(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.869
Subarea runoff =      1.674(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

++
Process from Point/Station 37.000 to Point/Station 36.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.820(Ac.)
Runoff from this stream = 1.674(CFS)
Time of concentration = 20.55 min.
Rainfall intensity = 2.350(In/Hr)
Area averaged loss rate (Fm) = 0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	3.94	1.670	16.85	0.081	2.700
2	1.67	0.820	20.55	0.081	2.350

```
Qmax(1) =
         1.000 *    1.000 *     3.936) +
         1.154 *    0.820 *     1.674) + =       5.521
Qmax(2) =
         0.866 *    1.000 *     3.936) +
         1.000 *    1.000 *     1.674) + =       5.085
```

Total of 2 streams to confluence:
Flow rates before confluence point:
3.936 1.674
Maximum flow rates at confluence using above data:
5.521 5.085
Area of streams before confluence:
1.670 0.820
Effective area values after confluence:
2.343 2.490
Results of confluence:
Total flow rate = 5.521(CFS)
Time of concentration = 16.853 min.
Effective stream area after confluence = 2.343(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.081(In/Hr)
Study area total (this main stream) = 2.49(Ac.)
End of computations, Total Study Area = 2.49 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 12/11/17

10-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A13a, A13b & A13c
FILE: 16397ONSITEA13POST10YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.664 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       35.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3203.600(Ft.)
Bottom (of initial area) elevation =  3190.700(Ft.)
Difference in elevation =    12.900(Ft.)
Slope =    0.01290  s(%)=       1.29
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.050 min.
Rainfall intensity =      1.748(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.788
Subarea runoff =      1.749(CFS)
Total initial stream area =        1.270(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.700(Ft.)
End of street segment elevation =  3186.300(Ft.)
Length of street segment  =   303.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  40.000(Ft.)
Distance from crown to crossfall grade break  =  38.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.939(CFS)
Depth of flow =   0.260(Ft.), Average velocity =   2.411(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.590(Ft.)
Flow velocity =   2.41(Ft/s)
Travel time =    2.09 min.     TC =   17.14  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.596(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.777
Subarea runoff =      0.322(CFS) for    0.400(Ac.)
Total runoff =      2.070(CFS)
Effective area this stream =        1.67(Ac.)
Total Study Area (Main Stream No. 1) =        1.67(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =      2.070(CFS)
Half street flow at end of street =      2.070(CFS)
Depth of flow =   0.265(Ft.), Average velocity =   2.449(Ft/s)
Flow width (from curb towards crown)=   8.828(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.670(Ac.)
Runoff from this stream =      2.070(CFS)
Time of concentration =   17.14 min.
Rainfall intensity =     1.596(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      37.000 to Point/Station      36.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =   985.000(Ft.)
Top (of initial area) elevation =  3188.900(Ft.)
Bottom (of initial area) elevation =  3186.300(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00264  s(%)=       0.26
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   20.546 min.
Rainfall intensity =      1.406(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.760
Subarea runoff =      0.876(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

++
Process from Point/Station 37.000 to Point/Station 36.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.820(Ac.)
Runoff from this stream = 0.876(CFS)
Time of concentration = 20.55 min.
Rainfall intensity = 1.406(In/Hr)
Area averaged loss rate (Fm) = 0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	2.07	1.670	17.14	0.218	1.596
2	0.88	0.820	20.55	0.218	1.406

```
Qmax(1) =
         1.000 *    1.000 *     2.070) +
         1.160 *    0.834 *     0.876) + =       2.919
Qmax(2) =
         0.862 *    1.000 *     2.070) +
         1.000 *    1.000 *     0.876) + =       2.661
```

Total of 2 streams to confluence:
Flow rates before confluence point:
2.070 0.876
Maximum flow rates at confluence using above data:
2.919 2.661
Area of streams before confluence:
1.670 0.820
Effective area values after confluence:
2.354 2.490
Results of confluence:
Total flow rate = 2.919(CFS)
Time of concentration = 17.145 min.
Effective stream area after confluence = 2.354(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.218(In/Hr)
Study area total (this main stream) = 2.49(Ac.)
End of computations, Total Study Area = 2.49 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 12/11/17

2-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A13a, A13b & A13c
FILE: 16397ONSITEA13POST2YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.384 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 1

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station      35.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3203.600(Ft.)
Bottom (of initial area) elevation =  3190.700(Ft.)
Difference in elevation =    12.900(Ft.)
Slope =    0.01290  s(%)=       1.29
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.050 min.
Rainfall intensity =      1.011(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.586
Subarea runoff =      0.753(CFS)
Total initial stream area =        1.270(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3190.700(Ft.)
End of street segment elevation =  3186.300(Ft.)
Length of street segment  =   303.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  40.000(Ft.)
Distance from crown to crossfall grade break  =  38.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.833(CFS)
Depth of flow =   0.207(Ft.), Average velocity =   1.990(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.937(Ft.)
Flow velocity =   1.99(Ft/s)
Travel time =    2.54 min.     TC =   17.59  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      0.907(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.550
Subarea runoff =      0.080(CFS) for    0.400(Ac.)
Total runoff =      0.833(CFS)
Effective area this stream =        1.67(Ac.)
Total Study Area (Main Stream No. 1) =        1.67(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      0.833(CFS)
Half street flow at end of street =      0.833(CFS)
Depth of flow =   0.207(Ft.), Average velocity =   1.990(Ft/s)
Flow width (from curb towards crown)=   5.938(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station      36.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.670(Ac.)
Runoff from this stream =      0.833(CFS)
Time of concentration =   17.59 min.
Rainfall intensity =     0.907(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.000 to Point/Station       36.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   985.000(Ft.)
Top (of initial area) elevation =  3188.900(Ft.)
Bottom (of initial area) elevation =  3186.300(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00264  s(%)=       0.26
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   20.546 min.
Rainfall intensity =      0.813(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.510
Subarea runoff =      0.340(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.000 to Point/Station       36.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.820(Ac.)
Runoff from this stream =      0.340(CFS)
Time of concentration =   20.55 min.
Rainfall intensity =     0.813(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      0.83     1.670     17.59    0.352      0.907
2      0.34     0.820     20.55    0.352      0.813
Qmax(1) =
         1.000 *    1.000 *     0.833) +
         1.203 *    0.856 *     0.340) + =       1.183
Qmax(2) =
         0.831 *    1.000 *     0.833) +
         1.000 *    1.000 *     0.340) + =       1.033

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.833       0.340
Maximum flow rates at confluence using above data:
        1.183        1.033
Area of streams before confluence:
        1.670        0.820
Effective area values after confluence:
        2.372        2.490
Results of confluence:
```

Total flow rate =   1.183(CFS)
Time of concentration =   17.588 min.
Effective stream area after confluence =   2.372(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) =   0.352(In/Hr)
Study area total (this main stream) =   2.49(Ac.)
End of computations, Total Study Area =   2.49 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 12/11/17

100-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A14c, A14d & A14e
FILE: 16397ONSITEA14CPOST100YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.110 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.767(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  16.27 min.  Rain intensity =       2.77(In/Hr)
Total area this stream =       19.66(Ac.)
Total Study Area (Main Stream No. 1) =      19.66(Ac.)
Total runoff =     38.80(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station      40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3184.800(Ft.)
End of street segment elevation =  3182.400(Ft.)
Length of street segment  =   447.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     41.568(CFS)
Depth of flow =   0.779(Ft.), Average velocity =   3.395(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.60(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  32.000(Ft.)
Flow velocity =   3.39(Ft/s)
Travel time =    2.19 min.     TC =   18.46  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.533(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.871
Subarea runoff =      5.613(CFS) for    0.470(Ac.)
Total runoff =     44.413(CFS)
Effective area this stream =       20.13(Ac.)
Total Study Area (Main Stream No. 1) =       20.13(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =     44.413(CFS)
Half street flow at end of street =     44.413(CFS)
Depth of flow =   0.795(Ft.), Average velocity =   3.458(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    6.39(Ft.)
Flow width (from curb towards crown)=  32.000(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station      40.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     20.130(Ac.)
Runoff from this stream =     44.413(CFS)
Time of concentration =   18.46 min.
Rainfall intensity =     2.533(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station      40.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3202.900(Ft.)
Bottom (of initial area) elevation =  3188.500(Ft.)
Difference in elevation =    14.400(Ft.)
Slope =    0.01440  s(%)=       1.44
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.723 min.
Rainfall intensity =      2.968(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =      1.221(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.081(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station      40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3188.500(Ft.)
End of street segment elevation =  3182.400(Ft.)
Length of street segment  =   303.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.531(CFS)
Depth of flow =   0.233(Ft.), Average velocity =   2.588(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.249(Ft.)
Flow velocity =   2.59(Ft/s)
Travel time =    1.95 min.     TC =   16.67  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 3 = 91.60
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.081(In/Hr)
Rainfall intensity =      2.720(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.873
Subarea runoff =      0.536(CFS) for    0.270(Ac.)
Total runoff =      1.757(CFS)
Effective area this stream =        0.74(Ac.)
Total Study Area (Main Stream No. 1) =       20.87(Ac.)
Area averaged Fm value =    0.081(In/Hr)
Street flow at end of street =      1.757(CFS)
Half street flow at end of street =      1.757(CFS)
Depth of flow =   0.242(Ft.), Average velocity =   2.671(Ft/s)
Flow width (from curb towards crown)=   7.694(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       40.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.740(Ac.)
Runoff from this stream =      1.757(CFS)
Time of concentration =   16.67 min.
Rainfall intensity =     2.720(In/Hr)
Area averaged loss rate (Fm) =    0.0813(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     44.41    20.130     18.46    0.081      2.533
2      1.76     0.740     16.67    0.081      2.720
Qmax(1) =
         1.000 *    1.000 *    44.413) +
         0.929 *    1.000 *     1.757) + =      46.046
Qmax(2) =
         1.076 *    0.903 *    44.413) +
         1.000 *    1.000 *     1.757) + =      44.931

Total of 2 streams to confluence:
Flow rates before confluence point:
      44.413       1.757
Maximum flow rates at confluence using above data:
       46.046       44.931
Area of streams before confluence:
       20.130        0.740
Effective area values after confluence:
       20.870       18.918
Results of confluence:
```

Total flow rate =   46.046(CFS)
Time of concentration =   18.464 min.
Effective stream area after confluence =   20.870(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) =   0.081(In/Hr)
Study area total (this main stream) =   20.87(Ac.)
End of computations, Total Study Area =   20.87 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

```
          San Bernardino County Rational Hydrology Program

              (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 12/11/17
------------------------------------------------------------------------
```

10-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A14c, A14d & A14e
FILE: 16397ONSITEA14CPOST10YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.664 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.655(In/Hr) for a    10.0 year storm
User specified values are as follows:
TC =  16.27 min.  Rain intensity =       1.66(In/Hr)
Total area this stream =         6.80(Ac.)
Total Study Area (Main Stream No. 1) =        6.80(Ac.)
Total runoff =     13.40(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station      40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3184.800(Ft.)
End of street segment elevation =  3182.400(Ft.)
Length of street segment  =   447.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     13.429(CFS)
Depth of flow =   0.535(Ft.), Average velocity =   2.654(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.348(Ft.)
Flow velocity =   2.65(Ft/s)
Travel time =    2.81 min.     TC =   19.08  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =      8.261(CFS)
therefore the upstream flow rate of Q =     13.400(CFS) is being used
Rainfall intensity =      1.481(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.767
Subarea runoff =      0.000(CFS) for    0.470(Ac.)
Total runoff =     13.400(CFS)
Effective area this stream =        7.27(Ac.)
Total Study Area (Main Stream No. 1) =        7.27(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =     13.400(CFS)
Half street flow at end of street =     13.400(CFS)
Depth of flow =   0.535(Ft.), Average velocity =   2.652(Ft/s)
Flow width (from curb towards crown)=  22.329(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       40.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.270(Ac.)
Runoff from this stream =     13.400(CFS)
Time of concentration =   19.08 min.
Rainfall intensity =     1.481(In/Hr)
Area averaged loss rate (Fm) =    0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       40.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3202.900(Ft.)
Bottom (of initial area) elevation =  3188.500(Ft.)
Difference in elevation =    14.400(Ft.)
Slope =    0.01440  s(%)=       1.44
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.723 min.
Rainfall intensity =      1.775(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.789
Subarea runoff =      0.659(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.218(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      42.000 to Point/Station      40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3188.500(Ft.)
End of street segment elevation =  3182.400(Ft.)
Length of street segment  =   303.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.820(CFS)
Depth of flow =   0.197(Ft.), Average velocity =   2.255(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.456(Ft.)
Flow velocity =   2.26(Ft/s)
Travel time =    2.24 min.     TC =   16.96  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.218(In/Hr)
Rainfall intensity =      1.608(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.778
Subarea runoff =      0.267(CFS) for    0.270(Ac.)
Total runoff =      0.925(CFS)
Effective area this stream =        0.74(Ac.)
Total Study Area (Main Stream No. 1) =        8.01(Ac.)
Area averaged Fm value =    0.218(In/Hr)
Street flow at end of street =      0.925(CFS)
Half street flow at end of street =      0.925(CFS)
Depth of flow =   0.204(Ft.), Average velocity =   2.314(Ft/s)
Flow width (from curb towards crown)=   5.779(Ft.)
```

++
Process from Point/Station 42.000 to Point/Station 40.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.740(Ac.)
Runoff from this stream = 0.925(CFS)
Time of concentration = 16.96 min.
Rainfall intensity = 1.608(In/Hr)
Area averaged loss rate (Fm) = 0.2183(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	13.40	7.270	19.08	0.218	1.481
2	0.93	0.740	16.96	0.218	1.608

```
Qmax(1) =
        1.000 *    1.000 *    13.400) +
        0.909 *    1.000 *     0.925) + =      14.241
Qmax(2) =
        1.101 *    0.889 *    13.400) +
        1.000 *    1.000 *     0.925) + =      14.038
```

Total of 2 streams to confluence:
Flow rates before confluence point:
13.400 0.925
Maximum flow rates at confluence using above data:
14.241 14.038
Area of streams before confluence:
7.270 0.740
Effective area values after confluence:
8.010 7.204
Results of confluence:
Total flow rate = 14.241(CFS)
Time of concentration = 19.077 min.
Effective stream area after confluence = 8.010(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.218(In/Hr)
Study area total (this main stream) = 8.01(Ac.)
End of computations, Total Study Area = 8.01 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

```
            San Bernardino County Rational Hydrology Program

                (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2005 Version 7.1
      Rational Hydrology Study        Date: 12/11/17
------------------------------------------------------------------------
```
2-YEAR, 1-HOUR RATIONAL STUDY ONSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
TRIBUTARY AREAS A14c, A14d & A14e
FILE: 16397ONSITEA14CPOST2YR.OUT

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


Program License Serial Number 4070

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is     2.0
Computed rainfall intensity:
Storm year =     2.00   1 hour rainfall =     0.384 (In.)
Slope used for rainfall intensity curve b =  0.7000
Soil antecedent moisture condition (AMC) = 1
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      39.000 to Point/Station      40.000
**** INITIAL AREA EVALUATION ****
```

```
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =   447.000(Ft.)
Top (of initial area) elevation =  3184.800(Ft.)
Bottom (of initial area) elevation =  3182.400(Ft.)
Difference in elevation =     2.400(Ft.)
Slope =    0.00537  s(%)=       0.54
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.996 min.
Rainfall intensity =      1.120(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.617
Subarea runoff =      0.325(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station      40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3184.800(Ft.)
End of street segment elevation =  3182.400(Ft.)
Length of street segment  =   447.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.401(CFS)
Depth of flow =   0.194(Ft.), Average velocity =   1.152(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.315(Ft.)
Flow velocity =   1.15(Ft/s)
Travel time =    6.47 min.     TC =   19.47  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      0.844(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.525
Subarea runoff =      0.091(CFS) for    0.470(Ac.)
Total runoff =      0.416(CFS)
Effective area this stream =        0.94(Ac.)
Total Study Area (Main Stream No. 1) =        0.94(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      0.416(CFS)
Half street flow at end of street =      0.416(CFS)
Depth of flow =   0.196(Ft.), Average velocity =   1.161(Ft/s)
Flow width (from curb towards crown)=   5.411(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station      40.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.940(Ac.)
Runoff from this stream =      0.416(CFS)
Time of concentration =   19.47 min.
Rainfall intensity =     0.844(In/Hr)
Area averaged loss rate (Fm) =    0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      42.000 to Point/Station      40.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3202.900(Ft.)
Bottom (of initial area) elevation =  3188.500(Ft.)
Difference in elevation =    14.400(Ft.)
Slope =    0.01440  s(%)=       1.44
TC = k(0.398)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.723 min.
Rainfall intensity =      1.027(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.591
Subarea runoff =      0.285(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.352(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3188.500(Ft.)
End of street segment elevation =  3182.400(Ft.)
Length of street segment  =   303.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.367(CFS)
Depth of flow =   0.158(Ft.), Average velocity =   1.945(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   3.504(Ft.)
Flow velocity =   1.95(Ft/s)
Travel time =    2.60 min.     TC =   17.32  min.
 Adding area flow to street
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 76.00
Adjusted SCS curve number for AMC 1 = 58.20
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.352(In/Hr)
Rainfall intensity =      0.916(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.554
Subarea runoff =      0.090(CFS) for    0.270(Ac.)
Total runoff =      0.376(CFS)
Effective area this stream =        0.74(Ac.)
Total Study Area (Main Stream No. 1) =        1.68(Ac.)
Area averaged Fm value =    0.352(In/Hr)
Street flow at end of street =      0.376(CFS)
Half street flow at end of street =      0.376(CFS)
Depth of flow =   0.159(Ft.), Average velocity =   1.952(Ft/s)
Flow width (from curb towards crown)=   3.557(Ft.)
```

++
Process from Point/Station 42.000 to Point/Station 40.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.740(Ac.)
Runoff from this stream = 0.376(CFS)
Time of concentration = 17.32 min.
Rainfall intensity = 0.916(In/Hr)
Area averaged loss rate (Fm) = 0.3522(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	0.42	0.940	19.47	0.352	0.844
2	0.38	0.740	17.32	0.352	0.916

Qmax(1) =
1.000 * 1.000 * 0.416) +
0.872 * 1.000 * 0.376) + = 0.744
Qmax(2) =
1.146 * 0.890 * 0.416) +
1.000 * 1.000 * 0.376) + = 0.800

Total of 2 streams to confluence:
Flow rates before confluence point:
0.416 0.376
Maximum flow rates at confluence using above data:
0.744 0.800
Area of streams before confluence:
0.940 0.740
Effective area values after confluence:
1.680 1.576
Results of confluence:
Total flow rate = 0.800(CFS)
Time of concentration = 17.319 min.
Effective stream area after confluence = 1.576(Ac.)
Study area average Pervious fraction(Ap) = 0.500
Study area average soil loss rate(Fm) = 0.352(In/Hr)
Study area total (this main stream) = 1.68(Ac.)
End of computations, Total Study Area = 1.68 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 76.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 03/01/17

100-YEAR, 1-HOUR RATIONAL STUDY OFFSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA12 & AA13, OFFSITE SOUTHEAST EXISTING PRE-DEV PROPERTY
FILE: 16397OFFSITEAA12POST100YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.110 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station      19.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.393(In/Hr)
Initial subarea data:
Initial area flow distance =   782.000(Ft.)
Top (of initial area) elevation =  3213.000(Ft.)
Bottom (of initial area) elevation =  3208.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00639  s(%)=      0.64
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.349 min.
Rainfall intensity =      2.883(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.777
Subarea runoff =     22.410(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.393(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       20.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3208.000(Ft.)
End of street segment elevation =  3205.000(Ft.)
Length of street segment  =   789.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     27.807(CFS)
Depth of flow =   0.571(Ft.), Average velocity =   2.379(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.53(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   2.38(Ft/s)
Travel time =    5.53 min.     TC =   20.88  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.393(In/Hr)
Rainfall intensity =      2.324(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.748
Subarea runoff =     10.621(CFS) for    9.000(Ac.)
Total runoff =     33.031(CFS)
Effective area this stream =       19.00(Ac.)
Total Study Area (Main Stream No. 1) =       19.00(Ac.)
Area averaged Fm value =    0.393(In/Hr)
Street flow at end of street =     33.031(CFS)
Half street flow at end of street =     16.516(CFS)
Depth of flow =   0.604(Ft.), Average velocity =   2.481(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.20(Ft.)
```

```
Flow width (from curb towards crown)=  20.000(Ft.)
End of computations, Total Study Area =          19.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 03/01/17

100-YEAR, 1-HOUR RATIONAL STUDY OFFSITE POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA14 & AA15, OFFSITE SOUTHWEST EXISTING PRE-DEV PROPERTY
FILE: 16397OFFSITEAA14POST100YR.OUT

Program License Serial Number 4070

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.110 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station      22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.393(In/Hr)
Initial subarea data:
Initial area flow distance =   897.000(Ft.)
Top (of initial area) elevation =  3223.000(Ft.)
Bottom (of initial area) elevation =  3207.000(Ft.)
Difference in elevation =    16.000(Ft.)
Slope =    0.01784  s(%)=       1.78
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.207 min.
Rainfall intensity =      3.202(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.790
Subarea runoff =     25.288(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.393(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  3207.000(Ft.)
End of street segment elevation =  3204.000(Ft.)
Length of street segment  =   735.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.416(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     31.826(CFS)
Depth of flow =   0.590(Ft.), Average velocity =   2.526(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.48(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   2.53(Ft/s)
Travel time =    4.85 min.     TC =   18.06  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.393(In/Hr)
Rainfall intensity =      2.573(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.763
Subarea runoff =     12.972(CFS) for    9.500(Ac.)
Total runoff =     38.260(CFS)
Effective area this stream =       19.50(Ac.)
Total Study Area (Main Stream No. 1) =       19.50(Ac.)
Area averaged Fm value =    0.393(In/Hr)
Street flow at end of street =     38.260(CFS)
Half street flow at end of street =     19.130(CFS)
Depth of flow =   0.627(Ft.), Average velocity =   2.642(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    6.33(Ft.)
```

Flow width (from curb towards crown)= 20.000(Ft.)
End of computations, Total Study Area =   19.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged SCS curve number = 32.0

DA 1

BASIN 1

ONSITE PRE-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

100-YEAR; 24-HOURS STORM EVENTS

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 03/16/17

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

Program License Serial Number 4070

100-YEAR, 24-HOURS UNIT HYDROGRAPH PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA5 & AA6 (EAST OF TRAPEZOIDAL CHANNEL, BASIN 1)
FILE: 16397UNITHYDAA5PRE100YR.OUT

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
28.60	1	1.11
Rainfall data for year 100		
28.60	6	2.38
Rainfall data for year 100		
28.60	24	4.96

++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 50.0      70.0         28.60      1.000     0.532    1.000    0.532

Area-averaged adjusted loss rate Fm (In/Hr) =  0.532

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    28.60   1.000         50.0      70.0       4.29     0.405

Area-averaged catchment yield fraction, Y =  0.405
Area-averaged low loss fraction, Yb =  0.595
User entry of time of concentration  =   0.405 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      28.60(Ac.)
Catchment Lag time =   0.324 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 25.7329
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.532(In/Hr)
Average low loss rate fraction (Yb) = 0.595 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.527(In)
Computed peak 30-minute rainfall =  0.902(In)
Specified peak 1-hour rainfall =  1.110(In)
Computed peak 3-hour rainfall =  1.772(In)
Specified peak 6-hour rainfall =  2.380(In)
Specified peak 24-hour rainfall =  4.960(In)


Rainfall depth area reduction factors:
Using a total area of      28.60(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.526(In)
30-minute factor = 0.999    Adjusted rainfall =  0.900(In)
1-hour factor = 0.999       Adjusted rainfall =  1.109(In)
3-hour factor = 1.000       Adjusted rainfall =  1.772(In)
6-hour factor = 1.000       Adjusted rainfall =  2.380(In)
24-hour factor = 1.000      Adjusted rainfall =  4.960(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values           ((CFS))
---------------------------------------------------------------------
           (K =       345.88 (CFS))

  1                1.405                     4.861
  2                6.919                    19.070
  3               21.269                    49.634
  4               43.176                    75.774
```

5	57.506	49.563
6	66.182	30.011
7	72.389	21.469
8	77.091	16.262
9	80.752	12.663
10	83.689	10.160
11	86.219	8.748
12	88.344	7.352
13	89.993	5.702
14	91.438	4.998
15	92.701	4.368
16	93.823	3.882
17	94.736	3.158
18	95.584	2.933
19	96.278	2.399
20	96.913	2.199
21	97.395	1.668
22	97.818	1.462
23	98.090	0.940
24	98.359	0.932
25	98.665	1.059
26	98.974	1.068
27	99.283	1.068
28	99.545	0.905
29	99.709	0.567
30	99.869	0.556
31	100.000	0.451

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5260	0.5260
2	0.6476	0.1216
3	0.7313	0.0838
4	0.7973	0.0659
5	0.8525	0.0552
6	0.9004	0.0479
7	0.9430	0.0426
8	0.9816	0.0385
9	1.0169	0.0353
10	1.0495	0.0327
11	1.0800	0.0304
12	1.1085	0.0286
13	1.1470	0.0385
14	1.1839	0.0369
15	1.2193	0.0354
16	1.2533	0.0340
17	1.2862	0.0328
18	1.3179	0.0318
19	1.3487	0.0308
20	1.3785	0.0298
21	1.4075	0.0290
22	1.4358	0.0282
23	1.4633	0.0275
24	1.4901	0.0268

241	4.5131	0.0099
242	4.5230	0.0099
243	4.5329	0.0099
244	4.5428	0.0099
245	4.5527	0.0099
246	4.5625	0.0098
247	4.5723	0.0098
248	4.5821	0.0098
249	4.5919	0.0098
250	4.6016	0.0098
251	4.6114	0.0097
252	4.6211	0.0097
253	4.6308	0.0097
254	4.6405	0.0097
255	4.6502	0.0097
256	4.6598	0.0097
257	4.6695	0.0096
258	4.6791	0.0096
259	4.6887	0.0096
260	4.6982	0.0096
261	4.7078	0.0096
262	4.7174	0.0095
263	4.7269	0.0095
264	4.7364	0.0095
265	4.7459	0.0095
266	4.7554	0.0095
267	4.7648	0.0095
268	4.7743	0.0094
269	4.7837	0.0094
270	4.7931	0.0094
271	4.8025	0.0094
272	4.8119	0.0094
273	4.8213	0.0094
274	4.8306	0.0093
275	4.8399	0.0093
276	4.8493	0.0093
277	4.8586	0.0093
278	4.8678	0.0093
279	4.8771	0.0093
280	4.8864	0.0093
281	4.8956	0.0092
282	4.9048	0.0092
283	4.9140	0.0092
284	4.9232	0.0092
285	4.9324	0.0092
286	4.9415	0.0092
287	4.9507	0.0091
288	4.9598	0.0091

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0091	0.0054	0.0037

272	0.0100	0.0059	0.0040
273	0.0099	0.0059	0.0040
274	0.0099	0.0059	0.0040
275	0.0098	0.0058	0.0040
276	0.0098	0.0058	0.0039
277	0.0097	0.0058	0.0039
278	0.0097	0.0057	0.0039
279	0.0096	0.0057	0.0039
280	0.0095	0.0057	0.0039
281	0.0095	0.0057	0.0038
282	0.0094	0.0056	0.0038
283	0.0094	0.0056	0.0038
284	0.0093	0.0056	0.0038
285	0.0093	0.0055	0.0038
286	0.0093	0.0055	0.0037
287	0.0092	0.0055	0.0037
288	0.0092	0.0055	0.0037

Total soil rain loss = 2.65(In)
Total effective rainfall = 2.31(In)
Peak flow rate in flood hydrograph = 45.04(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	12.5	25.0	37.5	50.0
0+ 5	0.0001	0.02	Q	|	|	|	|
0+10	0.0007	0.09	Q	|	|	|	|
0+15	0.0026	0.27	Q	|	|	|	|
0+20	0.0064	0.55	Q	|	|	|	|
0+25	0.0115	0.74	Q	|	|	|	|
0+30	0.0173	0.85	Q	|	|	|	|
0+35	0.0237	0.93	Q	|	|	|	|
0+40	0.0306	0.99	Q	|	|	|	|
0+45	0.0378	1.04	Q	|	|	|	|
0+50	0.0452	1.08	Q	|	|	|	|
0+55	0.0529	1.12	Q	|	|	|	|
1+ 0	0.0608	1.15	Q	|	|	|	|
1+ 5	0.0689	1.17	Q	|	|	|	|
1+10	0.0771	1.19	Q	|	|	|	|
1+15	0.0854	1.21	Q	|	|	|	|
1+20	0.0939	1.23	Q	|	|	|	|
1+25	0.1025	1.24	Q	|	|	|	|
1+30	0.1112	1.26	VQ	|	|	|	|
1+35	0.1199	1.27	VQ	|	|	|	|
1+40	0.1287	1.28	VQ	|	|	|	|
1+45	0.1376	1.29	|Q	|	|	|	|
1+50	0.1466	1.30	|Q	|	|	|	|

1+55	0.1556	1.31	Q			
2+ 0	0.1647	1.31	Q			
2+ 5	0.1738	1.32	Q			
2+10	0.1829	1.33	Q			
2+15	0.1921	1.34	Q			
2+20	0.2014	1.34	Q			
2+25	0.2107	1.35	Q			
2+30	0.2200	1.36	Q			
2+35	0.2294	1.36	Q			
2+40	0.2388	1.37	Q			
2+45	0.2482	1.37	Q			
2+50	0.2577	1.37	Q			
2+55	0.2672	1.38	Q			
3+ 0	0.2767	1.38	QV			
3+ 5	0.2862	1.38	QV			
3+10	0.2958	1.39	QV			
3+15	0.3054	1.39	QV			
3+20	0.3150	1.40	QV			
3+25	0.3246	1.40	QV			
3+30	0.3343	1.41	QV			
3+35	0.3440	1.41	QV			
3+40	0.3538	1.41	QV			
3+45	0.3635	1.42	QV			
3+50	0.3733	1.42	QV			
3+55	0.3832	1.43	QV			
4+ 0	0.3930	1.43	QV			
4+ 5	0.4029	1.44	QV			
4+10	0.4128	1.44	Q V			
4+15	0.4228	1.45	Q V			
4+20	0.4328	1.45	Q V			
4+25	0.4428	1.45	Q V			
4+30	0.4528	1.46	Q V			
4+35	0.4629	1.46	Q V			
4+40	0.4730	1.47	Q V			
4+45	0.4832	1.47	Q V			
4+50	0.4934	1.48	Q V			
4+55	0.5036	1.48	Q V			
5+ 0	0.5138	1.49	Q V			
5+ 5	0.5241	1.49	Q V			
5+10	0.5345	1.50	Q V			
5+15	0.5448	1.50	Q V			
5+20	0.5552	1.51	Q V			
5+25	0.5656	1.51	Q V			
5+30	0.5761	1.52	Q V			
5+35	0.5866	1.53	Q V			
5+40	0.5972	1.53	Q V			
5+45	0.6077	1.54	Q V			
5+50	0.6184	1.54	Q V			
5+55	0.6290	1.55	Q V			
6+ 0	0.6397	1.55	Q V			
6+ 5	0.6505	1.56	Q V			
6+10	0.6613	1.57	Q V			
6+15	0.6721	1.57	Q V			
6+20	0.6829	1.58	Q V			

```
 6+25       0.6938      1.58  |Q   V    |         |         |         |
 6+30       0.7048      1.59  |Q   V    |         |         |         |
 6+35       0.7158      1.60  |Q   V    |         |         |         |
 6+40       0.7268      1.60  |Q   V    |         |         |         |
 6+45       0.7379      1.61  |Q   V    |         |         |         |
 6+50       0.7490      1.62  |Q   V    |         |         |         |
 6+55       0.7602      1.62  |Q   V    |         |         |         |
 7+ 0       0.7714      1.63  |Q   V    |         |         |         |
 7+ 5       0.7827      1.64  |Q   V    |         |         |         |
 7+10       0.7940      1.64  |Q   V    |         |         |         |
 7+15       0.8053      1.65  |Q   V    |         |         |         |
 7+20       0.8167      1.66  |Q   V    |         |         |         |
 7+25       0.8282      1.66  |Q    V   |         |         |         |
 7+30       0.8397      1.67  |Q    V   |         |         |         |
 7+35       0.8512      1.68  |Q    V   |         |         |         |
 7+40       0.8628      1.68  |Q    V   |         |         |         |
 7+45       0.8745      1.69  |Q    V   |         |         |         |
 7+50       0.8862      1.70  |Q    V   |         |         |         |
 7+55       0.8980      1.71  |Q    V   |         |         |         |
 8+ 0       0.9098      1.72  |Q    V   |         |         |         |
 8+ 5       0.9216      1.72  |Q    V   |         |         |         |
 8+10       0.9336      1.73  |Q    V   |         |         |         |
 8+15       0.9456      1.74  |Q    V   |         |         |         |
 8+20       0.9576      1.75  |Q    V   |         |         |         |
 8+25       0.9697      1.76  |Q     V  |         |         |         |
 8+30       0.9818      1.77  |Q     V  |         |         |         |
 8+35       0.9941      1.77  |Q     V  |         |         |         |
 8+40       1.0063      1.78  |Q     V  |         |         |         |
 8+45       1.0187      1.79  |Q     V  |         |         |         |
 8+50       1.0311      1.80  |Q     V  |         |         |         |
 8+55       1.0435      1.81  |Q     V  |         |         |         |
 9+ 0       1.0561      1.82  |Q     V  |         |         |         |
 9+ 5       1.0687      1.83  |Q     V  |         |         |         |
 9+10       1.0813      1.84  |Q     V  |         |         |         |
 9+15       1.0941      1.85  |Q     V  |         |         |         |
 9+20       1.1069      1.86  |Q      V |         |         |         |
 9+25       1.1197      1.87  |Q      V |         |         |         |
 9+30       1.1327      1.88  |Q      V |         |         |         |
 9+35       1.1457      1.89  |Q      V |         |         |         |
 9+40       1.1588      1.90  |Q      V |         |         |         |
 9+45       1.1719      1.91  |Q      V |         |         |         |
 9+50       1.1852      1.92  |Q      V |         |         |         |
 9+55       1.1985      1.93  |Q      V |         |         |         |
10+ 0       1.2119      1.95  |Q      V |         |         |         |
10+ 5       1.2254      1.96  |Q      V |         |         |         |
10+10       1.2389      1.97  |Q       V|         |         |         |
10+15       1.2526      1.98  |Q       V|         |         |         |
10+20       1.2663      1.99  |Q       V|         |         |         |
10+25       1.2801      2.01  |Q       V|         |         |         |
10+30       1.2941      2.02  |Q       V|         |         |         |
10+35       1.3081      2.03  |Q       V|         |         |         |
10+40       1.3222      2.05  |Q       V|         |         |         |
10+45       1.3363      2.06  |Q       V|         |         |         |
10+50       1.3506      2.08  |Q       V|         |         |         |
```

```
10+55       1.3650      2.09  |Q       V|         |         |         |
11+ 0       1.3795      2.10  |Q        V         |         |         |
11+ 5       1.3941      2.12  |Q        V         |         |         |
11+10       1.4088      2.13  |Q        V         |         |         |
11+15       1.4236      2.15  |Q        V         |         |         |
11+20       1.4386      2.17  |Q        V         |         |         |
11+25       1.4536      2.18  |Q        V         |         |         |
11+30       1.4688      2.20  |Q        V         |         |         |
11+35       1.4840      2.22  |Q        V         |         |         |
11+40       1.4994      2.24  |Q        V         |         |         |
11+45       1.5150      2.25  |Q        |V        |         |         |
11+50       1.5306      2.27  |Q        |V        |         |         |
11+55       1.5464      2.29  |Q        |V        |         |         |
12+ 0       1.5623      2.31  |Q        |V        |         |         |
12+ 5       1.5783      2.33  |Q        |V        |         |         |
12+10       1.5943      2.32  |Q        |V        |         |         |
12+15       1.6100      2.27  |Q        |V        |         |         |
12+20       1.6251      2.19  |Q        |V        |         |         |
12+25       1.6398      2.14  |Q        |V        |         |         |
12+30       1.6545      2.13  |Q        | V       |         |         |
12+35       1.6690      2.12  |Q        | V       |         |         |
12+40       1.6837      2.12  |Q        | V       |         |         |
12+45       1.6983      2.13  |Q        | V       |         |         |
12+50       1.7131      2.14  |Q        | V       |         |         |
12+55       1.7280      2.16  |Q        | V       |         |         |
13+ 0       1.7429      2.18  |Q        | V       |         |         |
13+ 5       1.7581      2.20  |Q        | V       |         |         |
13+10       1.7734      2.22  |Q        | V       |         |         |
13+15       1.7889      2.25  |Q        |  V      |         |         |
13+20       1.8045      2.28  |Q        |  V      |         |         |
13+25       1.8204      2.31  |Q        |  V      |         |         |
13+30       1.8365      2.34  |Q        |  V      |         |         |
13+35       1.8529      2.37  |Q        |  V      |         |         |
13+40       1.8695      2.41  |Q        |  V      |         |         |
13+45       1.8864      2.45  |Q        |  V      |         |         |
13+50       1.9035      2.49  |Q        |  V      |         |         |
13+55       1.9210      2.54  | Q       |  V      |         |         |
14+ 0       1.9388      2.58  | Q       |   V     |         |         |
14+ 5       1.9569      2.63  | Q       |   V     |         |         |
14+10       1.9755      2.69  | Q       |   V     |         |         |
14+15       1.9944      2.74  | Q       |   V     |         |         |
14+20       2.0137      2.81  | Q       |   V     |         |         |
14+25       2.0334      2.87  | Q       |   V     |         |         |
14+30       2.0537      2.94  | Q       |   V     |         |         |
14+35       2.0745      3.01  | Q       |    V    |         |         |
14+40       2.0958      3.09  | Q       |    V    |         |         |
14+45       2.1177      3.18  | Q       |    V    |         |         |
14+50       2.1402      3.27  | Q       |    V    |         |         |
14+55       2.1635      3.38  | Q       |    V    |         |         |
15+ 0       2.1875      3.49  | Q       |    V    |         |         |
15+ 5       2.2123      3.61  | Q       |     V   |         |         |
15+10       2.2381      3.74  | Q       |     V   |         |         |
15+15       2.2650      3.89  |  Q      |     V   |         |         |
15+20       2.2929      4.06  |  Q      |     V   |         |         |
```

100-YR, 24-HR
Q100= 45.0 CFS
PRE-DEVELOPED

```
15+25       2.3221      4.23  |  Q      |     V   |         |         |
15+30       2.3521      4.36  |  Q      |      V  |         |         |
15+35       2.3823      4.38  |  Q      |         |         |         |
15+40       2.4120      4.31  |  Q      |         |         |         |
15+45       2.4425      4.42  |  Q      |         |         |         |
15+50       2.4750      4.72  |  Q      |         |         |         |
15+55       2.5111      5.25  |   Q     |       V |         |         |
16+ 0       2.5546      6.32  |    Q    |       V |         |         |
16+ 5       2.6259     10.35  |       Q |        V|         |         |
16+10       2.7591     19.34  |         |    Q    V         |         |
16+15       2.9976     34.62  |         |         |V     Q  |         |
16+20       3.3077     45.04  |         |         |   V     |     Q   |
16+25       3.5261     31.71  |         |         |    Q    |         |
16+30       3.6749     21.61  |         |      Q  |     V   |         |
16+35       3.7911     16.86  |         |  Q      |      V  |         |
16+40       3.8873     13.97  |         |Q        |       V |         |
16+45       3.9689     11.86  |        Q|         |       V |         |
16+50       4.0397     10.28  |       Q |         |        V|         |
16+55       4.1033      9.23  |      Q  |         |        V|         |
17+ 0       4.1598      8.21  |     Q   |         |         V         |
17+ 5       4.2091      7.15  |    Q    |         |         V         |
17+10       4.2542      6.56  |    Q    |         |         V         |
17+15       4.2958      6.03  |   Q     |         |         |V        |
17+20       4.3342      5.58  |   Q     |         |         |V        |
17+25       4.3690      5.05  |   Q     |         |         |V        |
17+30       4.4017      4.76  |  Q      |         |         | V       |
17+35       4.4317      4.35  |  Q      |         |         | V       |
17+40       4.4598      4.09  |  Q      |         |         | V       |
17+45       4.4853      3.70  | Q       |         |         | V       |
17+50       4.5092      3.47  | Q       |         |         | V       |
17+55       4.5308      3.13  | Q       |         |         | V       |
18+ 0       4.5518      3.04  | Q       |         |         |  V      |
18+ 5       4.5726      3.02  | Q       |         |         |  V      |
18+10       4.5931      2.98  | Q       |         |         |  V      |
18+15       4.6134      2.95  | Q       |         |         |  V      |
18+20       4.6334      2.89  | Q       |         |         |  V      |
18+25       4.6522      2.73  | Q       |         |         |  V      |
18+30       4.6707      2.69  | Q       |         |         |  V      |
18+35       4.6885      2.59  | Q       |         |         |   V     |
18+40       4.7047      2.35  |Q        |         |         |   V     |
18+45       4.7206      2.31  |Q        |         |         |   V     |
18+50       4.7363      2.27  |Q        |         |         |   V     |
18+55       4.7517      2.24  |Q        |         |         |   V     |
19+ 0       4.7669      2.21  |Q        |         |         |   V     |
19+ 5       4.7819      2.18  |Q        |         |         |   V     |
19+10       4.7967      2.15  |Q        |         |         |   V     |
19+15       4.8113      2.12  |Q        |         |         |   V     |
19+20       4.8257      2.09  |Q        |         |         |    V    |
19+25       4.8400      2.07  |Q        |         |         |    V    |
19+30       4.8540      2.04  |Q        |         |         |    V    |
19+35       4.8679      2.02  |Q        |         |         |    V    |
19+40       4.8816      1.99  |Q        |         |         |    V    |
19+45       4.8952      1.97  |Q        |         |         |    V    |
19+50       4.9086      1.95  |Q        |         |         |    V    |
```

```
   19+55       4.9218      1.92  |Q        |         |         |    V    |
   20+ 0       4.9349      1.90  |Q        |         |         |    V    |
   20+ 5       4.9479      1.88  |Q        |         |         |    V    |
   20+10       4.9607      1.86  |Q        |         |         |     V   |
   20+15       4.9734      1.84  |Q        |         |         |     V   |
   20+20       4.9859      1.82  |Q        |         |         |     V   |
   20+25       4.9983      1.80  |Q        |         |         |     V   |
   20+30       5.0106      1.79  |Q        |         |         |     V   |
   20+35       5.0228      1.77  |Q        |         |         |     V   |
   20+40       5.0349      1.75  |Q        |         |         |     V   |
   20+45       5.0469      1.74  |Q        |         |         |     V   |
   20+50       5.0587      1.72  |Q        |         |         |     V   |
   20+55       5.0704      1.70  |Q        |         |         |     V   |
   21+ 0       5.0821      1.69  |Q        |         |         |     V   |
   21+ 5       5.0936      1.67  |Q        |         |         |      V  |
   21+10       5.1050      1.66  |Q        |         |         |      V  |
   21+15       5.1163      1.64  |Q        |         |         |      V  |
   21+20       5.1276      1.63  |Q        |         |         |      V  |
   21+25       5.1387      1.62  |Q        |         |         |      V  |
   21+30       5.1498      1.60  |Q        |         |         |      V  |
   21+35       5.1607      1.59  |Q        |         |         |      V  |
   21+40       5.1716      1.58  |Q        |         |         |      V  |
   21+45       5.1824      1.57  |Q        |         |         |      V  |
   21+50       5.1931      1.56  |Q        |         |         |      V  |
   21+55       5.2038      1.54  |Q        |         |         |      V  |
   22+ 0       5.2143      1.53  |Q        |         |         |      V  |
   22+ 5       5.2248      1.52  |Q        |         |         |      V  |
   22+10       5.2352      1.51  |Q        |         |         |       V |
   22+15       5.2455      1.50  |Q        |         |         |       V |
   22+20       5.2558      1.49  |Q        |         |         |       V |
   22+25       5.2660      1.48  |Q        |         |         |       V |
   22+30       5.2761      1.47  |Q        |         |         |       V |
   22+35       5.2862      1.46  |Q        |         |         |       V |
   22+40       5.2962      1.45  |Q        |         |         |       V |
   22+45       5.3061      1.44  |Q        |         |         |       V |
   22+50       5.3160      1.43  |Q        |         |         |       V |
   22+55       5.3258      1.42  |Q        |         |         |       V |
   23+ 0       5.3355      1.41  |Q        |         |         |       V |
   23+ 5       5.3452      1.41  |Q        |         |         |       V |
   23+10       5.3548      1.40  |Q        |         |         |       V |
   23+15       5.3644      1.39  |Q        |         |         |        V|
   23+20       5.3739      1.38  |Q        |         |         |        V|
   23+25       5.3834      1.37  |Q        |         |         |        V|
   23+30       5.3928      1.37  |Q        |         |         |        V|
   23+35       5.4021      1.36  |Q        |         |         |        V|
   23+40       5.4114      1.35  |Q        |         |         |        V|
   23+45       5.4207      1.34  |Q        |         |         |        V|
   23+50       5.4299      1.34  |Q        |         |         |        V|
   23+55       5.4390      1.33  |Q        |         |         |        V|
   24+ 0       5.4481      1.32  |Q        |         |         |        V|
----------------------------------------------------------------------
```

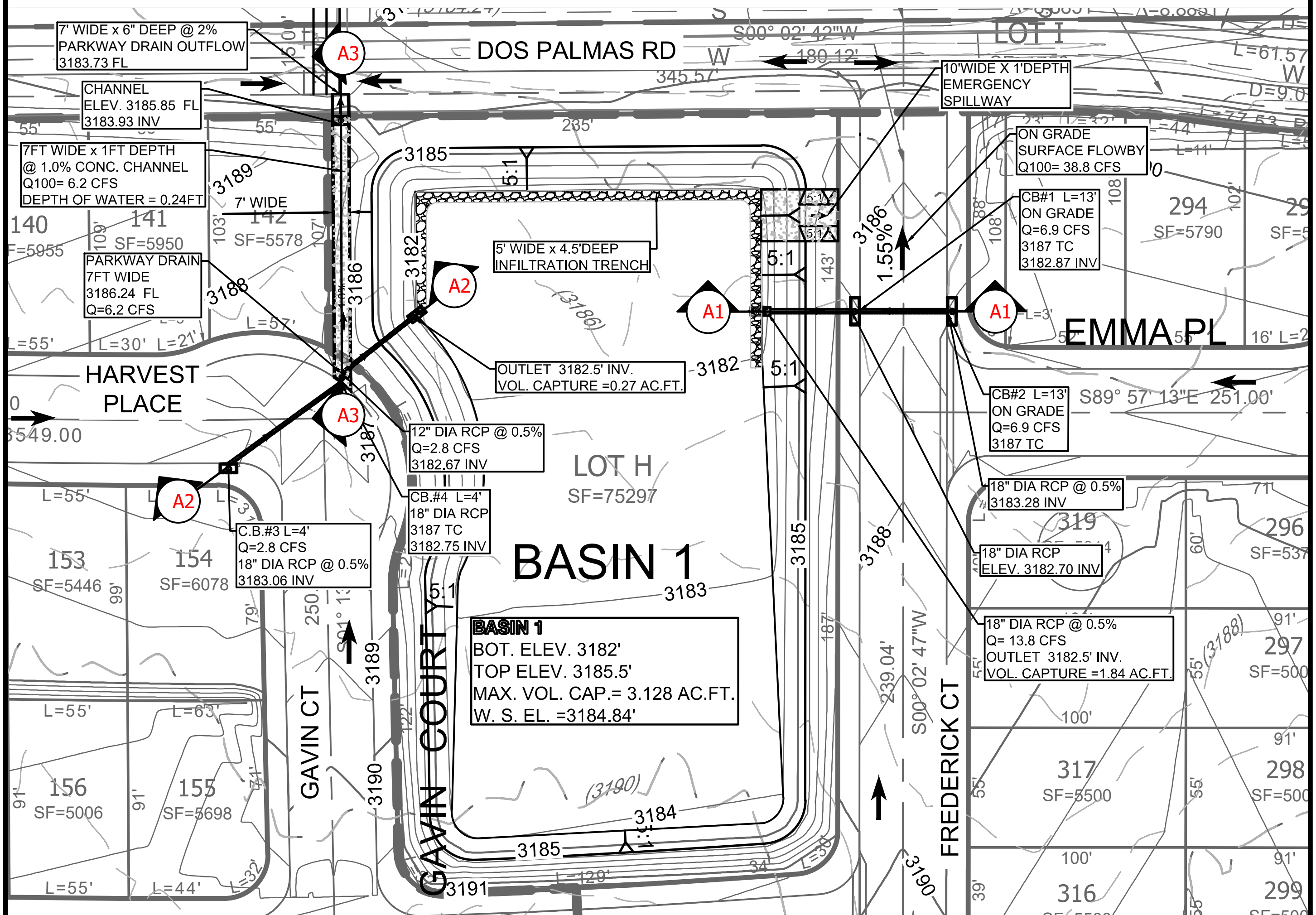
DA 1 DMA A

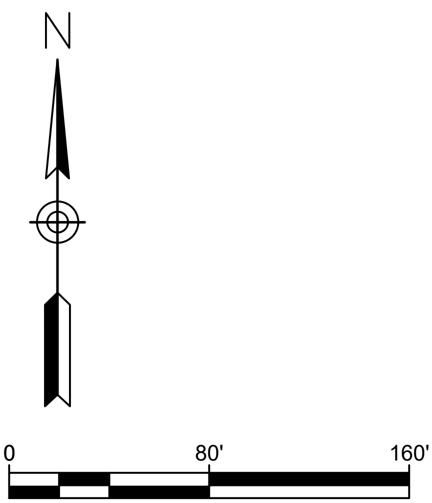
BASIN 1

ONSITE POST-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

100-YEAR; 24-HOURS STORM EVENTS





BASIN 1 STAGE STORAGE TABLE

ELEV	AREA (sq. ft.)	DEPTH (ft)	AREA (ac. ft.)	VOLUME (ac. ft.)	COML. VOL. (ac. ft.)	VOLUME VOL. (cu. ft.)
3,182.000	15,704.55	N/A	0.361			
				0.2062	0.2062	8984
3,182.500	20,231.71	1.000	0.464			
				0.2789	0.4851	21132
3,183.000	28,361.82	1.000	0.651			
				0.3769	0.8621	37552
3,183.500	37,315.50	1.000	0.857			
				0.4831	1.3452	58597
3,184.000	46,866.83	1.000	1.076			
				0.5607	1.9059	83020
3,184.500	50,821.92	1.000	1.167			
				0.5973	2.5031	109037
3,185.000	53,248.30	1.000	1.222			
				0.6254	3.1285	136278
3,185.500	55,715.44	1.000	1.279	TOTAL VOLUME		136,278
VOLUME CAPTURE = 2.11 AC.FT.				WATER SURFACE ELEVATION =3184.84'		

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CITY OF VICTORVILLE
TR. 16397
ONSITE DRAINAGE BASIN 1

CLIENT:
RY PROPERTIES

SCALE 1":80'

SHEET 1 OF 3

DESIGNED BY: AG | DRAWN BY: LC | CHECKED BY: JF

D-1

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

          Study date  11/29/17

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

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


Program License Serial Number 4070
```

100-YEAR, 24-HOURS UNIT HYDROGRAPH POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A8a TO A11c (SOUTHEAST OF BASIN 1) DA 1 DMA-A
FILE: 16397UNITHYDA8POST100YR.OUT

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

     Storm Event Year = 100

     Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
     Sub-Area        Duration        Isohyetal
     (Ac.)           (hours)          (In)
Rainfall data for year 100
         26.65           1           1.11
---------------------------------------------------------------------
Rainfall data for year 100
         26.65           6           2.38
---------------------------------------------------------------------
Rainfall data for year 100
         26.65          24           4.96
---------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
76.0	91.6	26.65	1.000	0.163	0.500	0.081

Area-averaged adjusted loss rate Fm (In/Hr) = 0.081

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
13.32	0.500	76.0	91.6	0.92	0.808
13.32	0.500	98.0	98.0	0.20	0.952

Area-averaged catchment yield fraction, Y = 0.880
Area-averaged low loss fraction, Yb = 0.120
User entry of time of concentration = 0.271 (hours)
++
Watershed area = 26.65(Ac.)
Catchment Lag time = 0.217 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 38.4138
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.081(In/Hr)
Average low loss rate fraction (Yb) = 0.120 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.527(In)
Computed peak 30-minute rainfall = 0.902(In)
Specified peak 1-hour rainfall = 1.110(In)
Computed peak 3-hour rainfall = 1.772(In)
Specified peak 6-hour rainfall = 2.380(In)
Specified peak 24-hour rainfall = 4.960(In)

Rainfall depth area reduction factors:
Using a total area of 26.65(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.526(In)
30-minute factor = 0.999 Adjusted rainfall = 0.900(In)
1-hour factor = 0.999 Adjusted rainfall = 1.109(In)
3-hour factor = 1.000 Adjusted rainfall = 1.772(In)
6-hour factor = 1.000 Adjusted rainfall = 2.380(In)
24-hour factor = 1.000 Adjusted rainfall = 4.960(In)

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

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 322.30 (CFS))	
1	2.578	8.308
2	16.927	46.248
3	46.766	96.169

4	63.991	55.518
5	73.438	30.448
6	79.750	20.340
7	84.211	14.378
8	87.727	11.332
9	90.269	8.193
10	92.310	6.581
11	93.981	5.384
12	95.307	4.275
13	96.384	3.472
14	97.235	2.740
15	97.854	1.998
16	98.260	1.306
17	98.706	1.438
18	99.167	1.486
19	99.561	1.271
20	99.807	0.791
21	100.000	0.623

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5260	0.5260
2	0.6476	0.1216
3	0.7314	0.0838
4	0.7973	0.0659
5	0.8525	0.0552
6	0.9005	0.0479
7	0.9431	0.0426
8	0.9816	0.0385
9	1.0169	0.0353
10	1.0496	0.0327
11	1.0800	0.0304
12	1.1086	0.0286
13	1.1471	0.0385
14	1.1840	0.0369
15	1.2194	0.0354
16	1.2534	0.0340
17	1.2862	0.0328
18	1.3180	0.0318
19	1.3488	0.0308
20	1.3786	0.0298
21	1.4076	0.0290
22	1.4358	0.0282
23	1.4633	0.0275
24	1.4901	0.0268
25	1.5163	0.0262
26	1.5419	0.0256
27	1.5669	0.0250
28	1.5914	0.0245
29	1.6155	0.0240
30	1.6390	0.0235
31	1.6621	0.0231
32	1.6848	0.0227
33	1.7070	0.0223

250	4.6017	0.0098
251	4.6114	0.0097
252	4.6211	0.0097
253	4.6308	0.0097
254	4.6405	0.0097
255	4.6502	0.0097
256	4.6598	0.0097
257	4.6695	0.0096
258	4.6791	0.0096
259	4.6887	0.0096
260	4.6983	0.0096
261	4.7078	0.0096
262	4.7174	0.0095
263	4.7269	0.0095
264	4.7364	0.0095
265	4.7459	0.0095
266	4.7554	0.0095
267	4.7648	0.0095
268	4.7743	0.0094
269	4.7837	0.0094
270	4.7931	0.0094
271	4.8025	0.0094
272	4.8119	0.0094
273	4.8213	0.0094
274	4.8306	0.0093
275	4.8400	0.0093
276	4.8493	0.0093
277	4.8586	0.0093
278	4.8678	0.0093
279	4.8771	0.0093
280	4.8864	0.0093
281	4.8956	0.0092
282	4.9048	0.0092
283	4.9140	0.0092
284	4.9232	0.0092
285	4.9324	0.0092
286	4.9416	0.0092
287	4.9507	0.0091
288	4.9598	0.0091

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0091	0.0011	0.0080
2	0.0091	0.0011	0.0080
3	0.0092	0.0011	0.0081
4	0.0092	0.0011	0.0081
5	0.0092	0.0011	0.0081
6	0.0092	0.0011	0.0081
7	0.0093	0.0011	0.0082
8	0.0093	0.0011	0.0082
9	0.0093	0.0011	0.0082
10	0.0093	0.0011	0.0082

```
281              0.0095          0.0011            0.0084
282              0.0094          0.0011            0.0083
283              0.0094          0.0011            0.0083
284              0.0093          0.0011            0.0082
285              0.0093          0.0011            0.0082
286              0.0093          0.0011            0.0081
287              0.0092          0.0011            0.0081
288              0.0092          0.0011            0.0081
--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      0.53(In)
Total effective rainfall =      4.43(In)
Peak flow rate in flood hydrograph =     64.80(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R   S T O R M
               R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

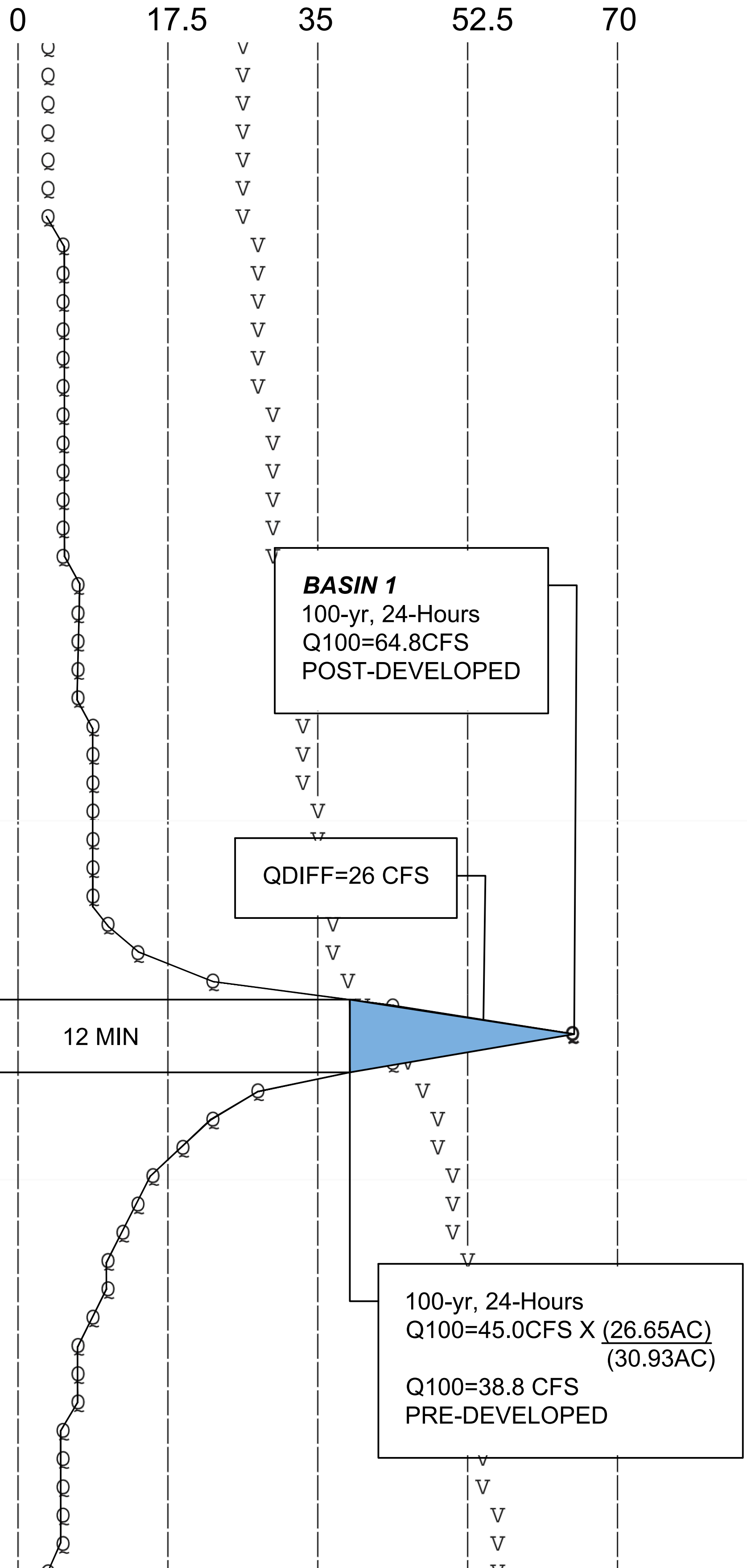
--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       17.5      35.0      52.5      70.0
-----------------------------------------------------------------------
  0+ 5       0.0005      0.07  Q         |         |         |         |
  0+10       0.0035      0.44  Q         |         |         |         |
  0+15       0.0118      1.21  Q         |         |         |         |
  0+20       0.0233      1.66  Q         |         |         |         |
  0+25       0.0364      1.91  VQ        |         |         |         |
  0+30       0.0507      2.08  VQ        |         |         |         |
  0+35       0.0659      2.20  VQ        |         |         |         |
  0+40       0.0817      2.29  VQ        |         |         |         |
  0+45       0.0980      2.37  VQ        |         |         |         |
  0+50       0.1147      2.43  VQ        |         |         |         |
  0+55       0.1317      2.47  VQ        |         |         |         |
  1+ 0       0.1490      2.52  VQ        |         |         |         |
  1+ 5       0.1666      2.55  VQ        |         |         |         |
  1+10       0.1844      2.58  VQ        |         |         |         |
  1+15       0.2023      2.60  VQ        |         |         |         |
  1+20       0.2203      2.62  VQ        |         |         |         |
  1+25       0.2385      2.64  VQ        |         |         |         |
  1+30       0.2567      2.66  |Q        |         |         |         |
  1+35       0.2751      2.67  |Q        |         |         |         |
  1+40       0.2936      2.69  |Q        |         |         |         |
  1+45       0.3122      2.70  |Q        |         |         |         |
  1+50       0.3309      2.71  |Q        |         |         |         |
  1+55       0.3495      2.71  |Q        |         |         |         |
  2+ 0       0.3683      2.72  |Q        |         |         |         |
  2+ 5       0.3871      2.73  |Q        |         |         |         |
  2+10       0.4059      2.74  |Q        |         |         |         |
  2+15       0.4248      2.74  |Q        |         |         |         |
  2+20       0.4437      2.75  |Q        |         |         |         |
  2+25       0.4627      2.76  |Q        |         |         |         |
  2+30       0.4818      2.77  |Q        |         |         |         |
  2+35       0.5009      2.77  |QV       |         |         |         |
```

2+40	0.5200	2.78	QV			
2+45	0.5393	2.79	QV			
2+50	0.5585	2.80	QV			
2+55	0.5778	2.81	QV			
3+ 0	0.5972	2.81	QV			
3+ 5	0.6167	2.82	QV			
3+10	0.6362	2.83	QV			
3+15	0.6557	2.84	QV			
3+20	0.6753	2.85	QV			
3+25	0.6950	2.86	QV			
3+30	0.7147	2.86	QV			
3+35	0.7345	2.87	QV			
3+40	0.7544	2.88	Q V			
3+45	0.7743	2.89	Q V			
3+50	0.7943	2.90	Q V			
3+55	0.8143	2.91	Q V			
4+ 0	0.8344	2.92	Q V			
4+ 5	0.8546	2.93	Q V			
4+10	0.8748	2.94	Q V			
4+15	0.8951	2.95	Q V			
4+20	0.9155	2.96	Q V			
4+25	0.9359	2.97	Q V			
4+30	0.9564	2.98	Q V			
4+35	0.9769	2.99	Q V			
4+40	0.9976	3.00	Q V			
4+45	1.0183	3.01	Q V			
4+50	1.0390	3.02	Q V			
4+55	1.0599	3.03	Q V			
5+ 0	1.0808	3.04	Q V			
5+ 5	1.1018	3.05	Q V			
5+10	1.1228	3.06	Q V			
5+15	1.1440	3.07	Q V			
5+20	1.1652	3.08	Q V			
5+25	1.1865	3.09	Q V			
5+30	1.2078	3.10	Q V			
5+35	1.2293	3.11	Q V			
5+40	1.2508	3.12	Q V			
5+45	1.2724	3.14	Q V			
5+50	1.2940	3.15	Q V			
5+55	1.3158	3.16	Q V			
6+ 0	1.3376	3.17	Q V			
6+ 5	1.3596	3.18	Q V			
6+10	1.3816	3.19	Q V			
6+15	1.4037	3.21	Q V			
6+20	1.4258	3.22	Q V			
6+25	1.4481	3.23	Q V			
6+30	1.4704	3.25	Q V			
6+35	1.4929	3.26	Q V			
6+40	1.5154	3.27	Q V			
6+45	1.5380	3.28	Q V			
6+50	1.5608	3.30	Q V			
6+55	1.5836	3.31	Q V			
7+ 0	1.6065	3.33	Q V			
7+ 5	1.6295	3.34	Q V			

```
  7+10       1.6526      3.35  |Q    V   |         |         |         |
  7+15       1.6758      3.37  |Q    V   |         |         |         |
  7+20       1.6991      3.38  |Q    V   |         |         |         |
  7+25       1.7225      3.40  |Q     V  |         |         |         |
  7+30       1.7460      3.41  |Q     V  |         |         |         |
  7+35       1.7696      3.43  |Q     V  |         |         |         |
  7+40       1.7933      3.44  |Q     V  |         |         |         |
  7+45       1.8171      3.46  |Q     V  |         |         |         |
  7+50       1.8410      3.47  |Q     V  |         |         |         |
  7+55       1.8651      3.49  |Q     V  |         |         |         |
  8+ 0       1.8892      3.51  | Q    V  |         |         |         |
  8+ 5       1.9135      3.52  | Q    V  |         |         |         |
  8+10       1.9379      3.54  | Q    V  |         |         |         |
  8+15       1.9624      3.56  | Q    V  |         |         |         |
  8+20       1.9870      3.57  | Q     V |         |         |         |
  8+25       2.0117      3.59  | Q     V |         |         |         |
  8+30       2.0366      3.61  | Q     V |         |         |         |
  8+35       2.0616      3.63  | Q     V |         |         |         |
  8+40       2.0867      3.65  | Q     V |         |         |         |
  8+45       2.1119      3.67  | Q     V |         |         |         |
  8+50       2.1373      3.68  | Q     V |         |         |         |
  8+55       2.1628      3.70  | Q     V |         |         |         |
  9+ 0       2.1884      3.72  | Q     V |         |         |         |
  9+ 5       2.2142      3.74  | Q     V |         |         |         |
  9+10       2.2401      3.76  | Q      V|         |         |         |
  9+15       2.2662      3.78  | Q      V|         |         |         |
  9+20       2.2924      3.80  | Q      V|         |         |         |
  9+25       2.3187      3.83  | Q      V|         |         |         |
  9+30       2.3452      3.85  | Q      V|         |         |         |
  9+35       2.3719      3.87  | Q      V|         |         |         |
  9+40       2.3987      3.89  | Q      V|         |         |         |
  9+45       2.4256      3.92  | Q      V|         |         |         |
  9+50       2.4528      3.94  | Q      V|         |         |         |
  9+55       2.4801      3.96  | Q       V         |         |         |
 10+ 0       2.5075      3.99  | Q       V         |         |         |
 10+ 5       2.5351      4.01  | Q       V         |         |         |
 10+10       2.5629      4.04  | Q       V         |         |         |
 10+15       2.5909      4.06  | Q       V         |         |         |
 10+20       2.6191      4.09  | Q       V         |         |         |
 10+25       2.6474      4.12  | Q       V         |         |         |
 10+30       2.6760      4.14  | Q       V         |         |         |
 10+35       2.7047      4.17  | Q       V         |         |         |
 10+40       2.7336      4.20  | Q       |V        |         |         |
 10+45       2.7627      4.23  | Q       |V        |         |         |
 10+50       2.7920      4.26  | Q       |V        |         |         |
 10+55       2.8216      4.29  | Q       |V        |         |         |
 11+ 0       2.8513      4.32  | Q       |V        |         |         |
 11+ 5       2.8813      4.35  | Q       |V        |         |         |
 11+10       2.9115      4.38  | Q       |V        |         |         |
 11+15       2.9419      4.42  | Q       |V        |         |         |
 11+20       2.9726      4.45  | Q       | V       |         |         |
 11+25       3.0035      4.49  | Q       | V       |         |         |
 11+30       3.0346      4.52  | Q       | V       |         |         |
 11+35       3.0661      4.56  | Q       | V       |         |         |
```

```
11+40       3.0977      4.60  | Q       | V       |         |         |
11+45       3.1297      4.64  | Q       | V       |         |         |
11+50       3.1619      4.68  | Q       | V       |         |         |
11+55       3.1943      4.72  | Q       | V       |         |         |
12+ 0       3.2271      4.76  | Q       |  V      |         |         |
12+ 5       3.2600      4.78  | Q       |  V      |         |         |
12+10       3.2923      4.68  | Q       |  V      |         |         |
12+15       3.3228      4.44  | Q       |  V      |         |         |
12+20       3.3526      4.32  | Q       |  V      |         |         |
12+25       3.3820      4.27  | Q       |  V      |         |         |
12+30       3.4113      4.26  | Q       |  V      |         |         |
12+35       3.4407      4.27  | Q       |  V      |         |         |
12+40       3.4703      4.29  | Q       |   V     |         |         |
12+45       3.5000      4.32  | Q       |   V     |         |         |
12+50       3.5300      4.35  | Q       |   V     |         |         |
12+55       3.5603      4.40  | Q       |   V     |         |         |
13+ 0       3.5909      4.45  | Q       |   V     |         |         |
13+ 5       3.6219      4.50  | Q       |   V     |         |         |
13+10       3.6533      4.56  | Q       |   V     |         |         |
13+15       3.6852      4.62  | Q       |   V     |         |         |
13+20       3.7175      4.69  | Q       |    V    |         |         |
13+25       3.7503      4.76  | Q       |    V    |         |         |
13+30       3.7836      4.84  | Q       |    V    |         |         |
13+35       3.8174      4.92  | Q       |    V    |         |         |
13+40       3.8519      5.00  | Q       |    V    |         |         |
13+45       3.8869      5.09  | Q       |    V    |         |         |
13+50       3.9226      5.18  | Q       |    V    |         |         |
13+55       3.9590      5.29  |  Q      |     V   |         |         |
14+ 0       3.9962      5.39  |  Q      |     V   |         |         |
14+ 5       4.0341      5.51  |  Q      |     V   |         |         |
14+10       4.0729      5.63  |  Q      |     V   |         |         |
14+15       4.1126      5.76  |  Q      |     V   |         |         |
14+20       4.1532      5.90  |  Q      |     V   |         |         |
14+25       4.1948      6.05  |  Q      |      V  |         |         |
14+30       4.2375      6.20  |  Q      |      V  |         |         |
14+35       4.2813      6.37  |  Q      |      V  |         |         |
14+40       4.3264      6.55  |  Q      |      V  |         |         |
14+45       4.3729      6.75  |  Q      |      V  |         |         |
14+50       4.4208      6.95  |  Q      |      V  |         |         |
14+55       4.4703      7.19  |   Q     |       V |         |         |
15+ 0       4.5215      7.44  |   Q     |       V |         |         |
15+ 5       4.5748      7.73  |   Q     |       V |         |         |
15+10       4.6301      8.04  |   Q     |       V |         |         |
15+15       4.6880      8.40  |   Q     |        V|         |         |
15+20       4.7485      8.79  |    Q    |        V|         |         |
15+25       4.8117      9.18  |    Q    |        V|         |         |
15+30       4.8752      9.22  |    Q    |        V|         |         |
15+35       4.9361      8.85  |    Q    |         V         |         |
15+40       4.9979      8.97  |    Q    |         V         |         |
15+45       5.0638      9.56  |    Q    |         V         |         |
15+50       5.1361     10.50  |    Q    |         V         |         |
15+55       5.2194     12.10  |     Q   |         |V        |         |
16+ 0       5.3225     14.97  |       Q |         |V        |         |
16+ 5       5.4846     23.54  |         |  Q      | V       |         |
```

TIME	Q	VOL
13+20	3.7175	4.69
13+25	3.7503	4.76
13+30	3.7836	4.84
13+35	3.8174	4.92
13+40	3.8519	5.00
13+45	3.8869	5.09
13+50	3.9226	5.18
13+55	3.9590	5.29
14+ 0	3.9962	5.39
14+ 5	4.0341	5.51
14+10	4.0729	5.63
14+15	4.1126	5.76
14+20	4.1532	5.90
14+25	4.1948	6.05
14+30	4.2375	6.20
14+35	4.2813	6.37
14+40	4.3264	6.55
14+45	4.3729	6.75
14+50	4.4208	6.95
14+55	4.4703	7.19
15+ 0	4.5215	7.44
15+ 5	4.5748	7.73
15+10	4.6301	8.04
15+15	4.6880	8.40
15+20	4.7485	8.79
15+25	4.8117	9.18
15+30	4.8752	9.22
15+35	4.9361	8.85
15+40	4.9979	8.97
15+45	5.0638	9.56
15+50	5.1361	10.50
15+55	5.2194	12.10
16+ 0	5.3225	14.97
16+ 5 16+9	5.4846	23.54
16+10	5.7883	44.09
16+15	**6.2345**	**64.80**
16+20	6.5368	43.90
16+25 16+21	6.7406	29.58
16+30	6.8987	22.96
16+35	7.0318	19.34
16+40	7.1485	16.94
16+45	7.2488	14.57
16+50	7.3382	12.98
16+55	7.4187	11.68
17+ 0	7.4912	10.53
17+ 5	7.5571	9.57
17+10	7.6172	8.72
17+15	7.6718	7.93
17+20	7.7218	7.26
17+25	7.7700	7.00
17+30	7.8162	6.71
17+35	7.8597	6.31
17+40	7.8997	5.81
17+45	7.9374	5.47
17+50	7.9716	4.97
17+55	8.0046	4.79
18+ 0	8.0365	4.63
18+ 5	8.0676	4.51
18+10	8.0987	4.52
18+15	8.1310	4.69
18+20	8.1636	4.74
18+25	8.1962	4.73
18+30	8.2285	4.69
18+35	8.2604	4.64
18+40	8.2920	4.59



$$\text{VOLUME} = \frac{26 \times 60 \times 12}{2 \times 43560}$$

VOLUME = 0.215 AC.FT.

VOLUME = 9,360 CU.FT.

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DA 1 DMA-A

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   20+40       8.9457      3.48  |Q        |         |         |     V   |
   20+45       8.9694      3.45  |Q        |         |         |     V   |
   20+50       8.9929      3.42  |Q        |         |         |     V   |
   20+55       9.0163      3.39  |Q        |         |         |     V   |
   21+ 0       9.0394      3.36  |Q        |         |         |     V   |
   21+ 5       9.0623      3.33  |Q        |         |         |     V   |
   21+10       9.0851      3.30  |Q        |         |         |     V   |
   21+15       9.1076      3.28  |Q        |         |         |      V  |
   21+20       9.1300      3.25  |Q        |         |         |      V  |
   21+25       9.1522      3.22  |Q        |         |         |      V  |
   21+30       9.1743      3.20  |Q        |         |         |      V  |
   21+35       9.1961      3.17  |Q        |         |         |      V  |
   21+40       9.2178      3.15  |Q        |         |         |      V  |
   21+45       9.2394      3.13  |Q        |         |         |      V  |
   21+50       9.2607      3.10  |Q        |         |         |      V  |
   21+55       9.2820      3.08  |Q        |         |         |      V  |
   22+ 0       9.3031      3.06  |Q        |         |         |      V  |
   22+ 5       9.3240      3.04  |Q        |         |         |      V  |
   22+10       9.3448      3.02  |Q        |         |         |      V  |
   22+15       9.3654      3.00  |Q        |         |         |       V |
   22+20       9.3859      2.98  |Q        |         |         |       V |
   22+25       9.4063      2.96  |Q        |         |         |       V |
   22+30       9.4266      2.94  |Q        |         |         |       V |
   22+35       9.4467      2.92  |Q        |         |         |       V |
   22+40       9.4667      2.90  |Q        |         |         |       V |
   22+45       9.4866      2.88  |Q        |         |         |       V |
   22+50       9.5063      2.87  |Q        |         |         |       V |
   22+55       9.5259      2.85  |Q        |         |         |       V |
   23+ 0       9.5454      2.83  |Q        |         |         |       V |
   23+ 5       9.5648      2.82  |Q        |         |         |       V |
   23+10       9.5841      2.80  |Q        |         |         |       V |
   23+15       9.6033      2.78  |Q        |         |         |        V|
   23+20       9.6223      2.77  |Q        |         |         |        V|
   23+25       9.6413      2.75  |Q        |         |         |        V|
   23+30       9.6601      2.74  |Q        |         |         |        V|
   23+35       9.6789      2.72  |Q        |         |         |        V|
   23+40       9.6975      2.71  |Q        |         |         |        V|
   23+45       9.7161      2.69  |Q        |         |         |        V|
   23+50       9.7345      2.68  |Q        |         |         |        V|
   23+55       9.7529      2.66  |Q        |         |         |        V|
   24+ 0       9.7711      2.65  |Q        |         |         |        V|
-----------------------------------------------------------------------
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<u>DA 1</u> ***<u>DMA A</u>***

BASIN 1

ONSITE POST-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

2-YEAR; 24-HOURS STORM EVENTS

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  11/29/17

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


Program License Serial Number 4070

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2-YEAR, 24-HOURS UNIT HYDROGRAPH POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A8a TO A11c (SOUTHEAST OF BASIN 1) DA1 DMA-A
FILE: 16397UNITHYDA8POSTE2YR.OUT

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

      Storm Event Year = 2

      Antecedent Moisture Condition = 1

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
      Sub-Area        Duration        Isohyetal
      (Ac.)            (hours)         (In)
Rainfall data for year 2
         26.65            1           0.38
--------------------------------------------------------------------
Rainfall data for year 2
         26.65            6           0.85
--------------------------------------------------------------------
Rainfall data for year 2
         26.65           24           1.55
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 1)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 76.0      58.2         26.65      1.000     0.704    0.500    0.352

Area-averaged adjusted loss rate Fm (In/Hr) =  0.352

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC1)           Yield Fr
    13.32   0.500         76.0      58.2       7.18     0.001
    13.32   0.500         98.0      98.0       0.20     0.858

Area-averaged catchment yield fraction, Y =  0.429
Area-averaged low loss fraction, Yb =  0.571
User entry of time of concentration  =   0.250 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      26.65(Ac.)
Catchment Lag time =   0.200 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 41.6667
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.352(In/Hr)
Average low loss rate fraction (Yb) = 0.571 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.182(In)
Computed peak 30-minute rainfall =  0.312(In)
Specified peak 1-hour rainfall =  0.384(In)
Computed peak 3-hour rainfall =  0.623(In)
Specified peak 6-hour rainfall =  0.846(In)
Specified peak 24-hour rainfall =  1.550(In)


Rainfall depth area reduction factors:
Using a total area of      26.65(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.182(In)
30-minute factor = 0.999    Adjusted rainfall =  0.312(In)
1-hour factor = 0.999       Adjusted rainfall =  0.384(In)
3-hour factor = 1.000       Adjusted rainfall =  0.623(In)
6-hour factor = 1.000       Adjusted rainfall =  0.846(In)
24-hour factor = 1.000      Adjusted rainfall =  1.550(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
           (K =       322.30 (CFS))

  1                2.935                   9.459
  2               20.613                  56.977
  3               51.467                  99.440
```

4	67.222	50.778
5	76.108	28.642
6	81.970	18.892
7	86.247	13.784
8	89.430	10.260
9	91.773	7.553
10	93.683	6.156
11	95.168	4.786
12	96.358	3.835
13	97.275	2.954
14	97.918	2.073
15	98.357	1.413
16	98.850	1.590
17	99.345	1.596
18	99.682	1.086
19	100.000	1.024

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1820	0.1820
2	0.2240	0.0421
3	0.2530	0.0290
4	0.2758	0.0228
5	0.2949	0.0191
6	0.3115	0.0166
7	0.3263	0.0147
8	0.3396	0.0133
9	0.3518	0.0122
10	0.3631	0.0113
11	0.3736	0.0105
12	0.3835	0.0099
13	0.3973	0.0138
14	0.4106	0.0132
15	0.4233	0.0127
16	0.4355	0.0122
17	0.4473	0.0118
18	0.4588	0.0114
19	0.4699	0.0111
20	0.4806	0.0108
21	0.4911	0.0105
22	0.5013	0.0102
23	0.5112	0.0099
24	0.5209	0.0097
25	0.5304	0.0095
26	0.5397	0.0093
27	0.5488	0.0091
28	0.5577	0.0089
29	0.5664	0.0087
30	0.5749	0.0085
31	0.5833	0.0084
32	0.5916	0.0082
33	0.5997	0.0081
34	0.6076	0.0080
35	0.6154	0.0078

252	1.4621	0.0025
253	1.4647	0.0025
254	1.4672	0.0025
255	1.4697	0.0025
256	1.4722	0.0025
257	1.4747	0.0025
258	1.4772	0.0025
259	1.4797	0.0025
260	1.4822	0.0025
261	1.4847	0.0025
262	1.4872	0.0025
263	1.4897	0.0025
264	1.4921	0.0025
265	1.4946	0.0025
266	1.4971	0.0025
267	1.4995	0.0025
268	1.5020	0.0025
269	1.5044	0.0024
270	1.5069	0.0024
271	1.5093	0.0024
272	1.5117	0.0024
273	1.5142	0.0024
274	1.5166	0.0024
275	1.5190	0.0024
276	1.5214	0.0024
277	1.5238	0.0024
278	1.5262	0.0024
279	1.5286	0.0024
280	1.5310	0.0024
281	1.5334	0.0024
282	1.5358	0.0024
283	1.5381	0.0024
284	1.5405	0.0024
285	1.5429	0.0024
286	1.5452	0.0024
287	1.5476	0.0024
288	1.5499	0.0024

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0024	0.0013	0.0010
2	0.0024	0.0013	0.0010
3	0.0024	0.0014	0.0010
4	0.0024	0.0014	0.0010
5	0.0024	0.0014	0.0010
6	0.0024	0.0014	0.0010
7	0.0024	0.0014	0.0010
8	0.0024	0.0014	0.0010
9	0.0024	0.0014	0.0010
10	0.0024	0.0014	0.0010
11	0.0024	0.0014	0.0010
12	0.0024	0.0014	0.0010

```
   283              0.0024           0.0014              0.0010
   284              0.0024           0.0014              0.0010
   285              0.0024           0.0014              0.0010
   286              0.0024           0.0014              0.0010
   287              0.0024           0.0014              0.0010
   288              0.0024           0.0013              0.0010
   --------------------------------------------------------------------
   --------------------------------------------------------------------
   Total soil rain loss =      0.81(In)
   Total effective rainfall =      0.74(In)
   Peak flow rate in flood hydrograph =     17.55(CFS)
   ---------------------------------------------------------------------
   ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     24 - H O U R   S T O R M
                R u n o f f     H y d r o g r a p h
   --------------------------------------------------------------------
               Hydrograph in   5   Minute intervals ((CFS))

   --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5      0.0001      0.01  Q          |         |         |         |
  0+10      0.0005      0.07  Q          |         |         |         |
  0+15      0.0017      0.17  Q          |         |         |         |
  0+20      0.0032      0.22  Q          |         |         |         |
  0+25      0.0049      0.25  Q          |         |         |         |
  0+30      0.0068      0.27  Q          |         |         |         |
  0+35      0.0087      0.28  Q          |         |         |         |
  0+40      0.0107      0.29  Q          |         |         |         |
  0+45      0.0128      0.30  Q          |         |         |         |
  0+50      0.0150      0.31  Q          |         |         |         |
  0+55      0.0172      0.32  Q          |         |         |         |
  1+ 0      0.0194      0.32  Q          |         |         |         |
  1+ 5      0.0216      0.33  Q          |         |         |         |
  1+10      0.0239      0.33  Q          |         |         |         |
  1+15      0.0261      0.33  Q          |         |         |         |
  1+20      0.0284      0.33  Q          |         |         |         |
  1+25      0.0308      0.34  Q          |         |         |         |
  1+30      0.0331      0.34  Q          |         |         |         |
  1+35      0.0354      0.34  Q          |         |         |         |
  1+40      0.0378      0.34  Q          |         |         |         |
  1+45      0.0401      0.34  Q          |         |         |         |
  1+50      0.0425      0.34  QV         |         |         |         |
  1+55      0.0449      0.34  QV         |         |         |         |
  2+ 0      0.0473      0.35  QV         |         |         |         |
  2+ 5      0.0496      0.35  QV         |         |         |         |
  2+10      0.0520      0.35  QV         |         |         |         |
  2+15      0.0544      0.35  QV         |         |         |         |
  2+20      0.0569      0.35  QV         |         |         |         |
  2+25      0.0593      0.35  QV         |         |         |         |
  2+30      0.0617      0.35  QV         |         |         |         |
  2+35      0.0641      0.35  QV         |         |         |         |
  2+40      0.0666      0.36  QV         |         |         |         |
  2+45      0.0690      0.36  QV         |         |         |         |
```

```
2+50       0.0715     0.36  QV         |         |         |         |
2+55       0.0740     0.36  QV         |         |         |         |
3+ 0       0.0765     0.36  QV         |         |         |         |
3+ 5       0.0789     0.36  QV         |         |         |         |
3+10       0.0814     0.36  QV         |         |         |         |
3+15       0.0840     0.36  Q V        |         |         |         |
3+20       0.0865     0.37  Q V        |         |         |         |
3+25       0.0890     0.37  Q V        |         |         |         |
3+30       0.0915     0.37  Q V        |         |         |         |
3+35       0.0941     0.37  Q V        |         |         |         |
3+40       0.0966     0.37  Q V        |         |         |         |
3+45       0.0992     0.37  Q V        |         |         |         |
3+50       0.1018     0.37  Q V        |         |         |         |
3+55       0.1043     0.37  Q V        |         |         |         |
4+ 0       0.1069     0.38  Q V        |         |         |         |
4+ 5       0.1095     0.38  Q V        |         |         |         |
4+10       0.1121     0.38  Q V        |         |         |         |
4+15       0.1148     0.38  Q V        |         |         |         |
4+20       0.1174     0.38  Q V        |         |         |         |
4+25       0.1200     0.38  Q V        |         |         |         |
4+30       0.1227     0.39  Q V        |         |         |         |
4+35       0.1253     0.39  Q  V       |         |         |         |
4+40       0.1280     0.39  Q  V       |         |         |         |
4+45       0.1307     0.39  Q  V       |         |         |         |
4+50       0.1334     0.39  Q  V       |         |         |         |
4+55       0.1361     0.39  Q  V       |         |         |         |
5+ 0       0.1388     0.39  Q  V       |         |         |         |
5+ 5       0.1416     0.40  Q  V       |         |         |         |
5+10       0.1443     0.40  Q  V       |         |         |         |
5+15       0.1470     0.40  Q  V       |         |         |         |
5+20       0.1498     0.40  Q  V       |         |         |         |
5+25       0.1526     0.40  Q  V       |         |         |         |
5+30       0.1554     0.40  Q  V       |         |         |         |
5+35       0.1582     0.41  Q  V       |         |         |         |
5+40       0.1610     0.41  Q  V       |         |         |         |
5+45       0.1638     0.41  Q  V       |         |         |         |
5+50       0.1666     0.41  Q   V      |         |         |         |
5+55       0.1695     0.41  Q   V      |         |         |         |
6+ 0       0.1724     0.42  Q   V      |         |         |         |
6+ 5       0.1752     0.42  Q   V      |         |         |         |
6+10       0.1781     0.42  Q   V      |         |         |         |
6+15       0.1810     0.42  Q   V      |         |         |         |
6+20       0.1839     0.42  Q   V      |         |         |         |
6+25       0.1869     0.43  Q   V      |         |         |         |
6+30       0.1898     0.43  Q   V      |         |         |         |
6+35       0.1928     0.43  Q   V      |         |         |         |
6+40       0.1957     0.43  Q   V      |         |         |         |
6+45       0.1987     0.43  Q   V      |         |         |         |
6+50       0.2017     0.44  Q   V      |         |         |         |
6+55       0.2047     0.44  Q   V      |         |         |         |
7+ 0       0.2078     0.44  Q    V     |         |         |         |
7+ 5       0.2108     0.44  Q    V     |         |         |         |
7+10       0.2139     0.44  Q    V     |         |         |         |
7+15       0.2169     0.45  Q    V     |         |         |         |
```

```
 7+20       0.2200      0.45  Q    V    |         |         |         |
 7+25       0.2231      0.45  Q    V    |         |         |         |
 7+30       0.2263      0.45  Q    V    |         |         |         |
 7+35       0.2294      0.46  Q    V    |         |         |         |
 7+40       0.2326      0.46  Q    V    |         |         |         |
 7+45       0.2358      0.46  Q    V    |         |         |         |
 7+50       0.2389      0.46  Q    V    |         |         |         |
 7+55       0.2422      0.47  Q    V    |         |         |         |
 8+ 0       0.2454      0.47  Q    V    |         |         |         |
 8+ 5       0.2486      0.47  Q     V   |         |         |         |
 8+10       0.2519      0.47  Q     V   |         |         |         |
 8+15       0.2552      0.48  Q     V   |         |         |         |
 8+20       0.2585      0.48  Q     V   |         |         |         |
 8+25       0.2618      0.48  Q     V   |         |         |         |
 8+30       0.2652      0.49  Q     V   |         |         |         |
 8+35       0.2685      0.49  Q     V   |         |         |         |
 8+40       0.2719      0.49  Q     V   |         |         |         |
 8+45       0.2753      0.49  Q     V   |         |         |         |
 8+50       0.2787      0.50  Q     V   |         |         |         |
 8+55       0.2822      0.50  |Q    V   |         |         |         |
 9+ 0       0.2857      0.50  |Q    V   |         |         |         |
 9+ 5       0.2892      0.51  |Q     V  |         |         |         |
 9+10       0.2927      0.51  |Q     V  |         |         |         |
 9+15       0.2962      0.51  |Q     V  |         |         |         |
 9+20       0.2998      0.52  |Q     V  |         |         |         |
 9+25       0.3034      0.52  |Q     V  |         |         |         |
 9+30       0.3070      0.52  |Q     V  |         |         |         |
 9+35       0.3106      0.53  |Q     V  |         |         |         |
 9+40       0.3143      0.53  |Q     V  |         |         |         |
 9+45       0.3179      0.54  |Q     V  |         |         |         |
 9+50       0.3217      0.54  |Q     V  |         |         |         |
 9+55       0.3254      0.54  |Q     V  |         |         |         |
10+ 0       0.3292      0.55  |Q      V |         |         |         |
10+ 5       0.3330      0.55  |Q      V |         |         |         |
10+10       0.3368      0.56  |Q      V |         |         |         |
10+15       0.3406      0.56  |Q      V |         |         |         |
10+20       0.3445      0.56  |Q      V |         |         |         |
10+25       0.3484      0.57  |Q      V |         |         |         |
10+30       0.3524      0.57  |Q      V |         |         |         |
10+35       0.3564      0.58  |Q      V |         |         |         |
10+40       0.3604      0.58  |Q      V |         |         |         |
10+45       0.3644      0.59  |Q      V |         |         |         |
10+50       0.3685      0.59  |Q      V |         |         |         |
10+55       0.3726      0.60  |Q       V|         |         |         |
11+ 0       0.3768      0.60  |Q       V|         |         |         |
11+ 5       0.3810      0.61  |Q       V|         |         |         |
11+10       0.3852      0.61  |Q       V|         |         |         |
11+15       0.3894      0.62  |Q       V|         |         |         |
11+20       0.3937      0.62  |Q       V|         |         |         |
11+25       0.3981      0.63  |Q       V|         |         |         |
11+30       0.4025      0.64  |Q       V|         |         |         |
11+35       0.4069      0.64  |Q       V|         |         |         |
11+40       0.4114      0.65  |Q        V         |         |         |
11+45       0.4159      0.66  |Q        V         |         |         |
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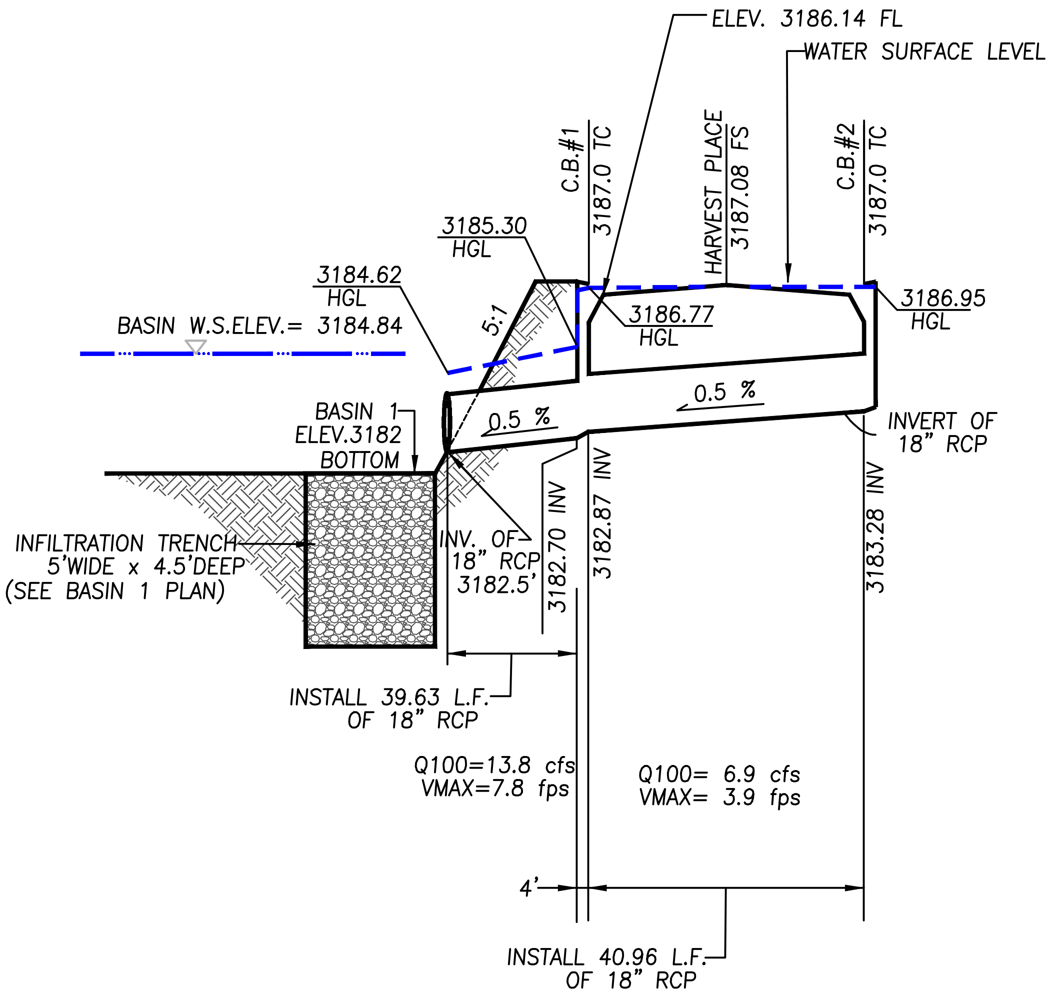
```
11+50       0.4205      0.66  |Q        V         |         |         |
11+55       0.4251      0.67  |Q        V         |         |         |
12+ 0       0.4297      0.68  |Q        V         |         |         |
12+ 5       0.4345      0.68  |Q        V         |         |         |
12+10       0.4392      0.69  |Q        V         |         |         |
12+15       0.4441      0.70  |Q        V         |         |         |
12+20       0.4490      0.71  |Q        V         |         |         |
12+25       0.4540      0.72  |Q        |V        |         |         |
12+30       0.4590      0.73  |Q        |V        |         |         |
12+35       0.4641      0.74  |Q        |V        |         |         |
12+40       0.4692      0.75  |Q        |V        |         |         |
12+45       0.4745      0.76  |Q        |V        |         |         |
12+50       0.4798      0.77  |Q        |V        |         |         |
12+55       0.4852      0.78  |Q        |V        |         |         |
13+ 0       0.4906      0.79  |Q        |V        |         |         |
13+ 5       0.4961      0.80  |Q        | V       |         |         |
13+10       0.5017      0.81  |Q        | V       |         |         |
13+15       0.5074      0.83  |Q        | V       |         |         |
13+20       0.5132      0.84  |Q        | V       |         |         |
13+25       0.5191      0.85  |Q        | V       |         |         |
13+30       0.5251      0.87  |Q        | V       |         |         |
13+35       0.5311      0.88  |Q        | V       |         |         |
13+40       0.5373      0.90  |Q        |  V      |         |         |
13+45       0.5436      0.91  |Q        |  V      |         |         |
13+50       0.5500      0.93  |Q        |  V      |         |         |
13+55       0.5565      0.95  |Q        |  V      |         |         |
14+ 0       0.5632      0.97  |Q        |  V      |         |         |
14+ 5       0.5700      0.99  |Q        |  V      |         |         |
14+10       0.5769      1.01  | Q       |   V     |         |         |
14+15       0.5840      1.03  | Q       |   V     |         |         |
14+20       0.5913      1.05  | Q       |   V     |         |         |
14+25       0.5987      1.08  | Q       |   V     |         |         |
14+30       0.6063      1.11  | Q       |   V     |         |         |
14+35       0.6142      1.14  | Q       |   V     |         |         |
14+40       0.6222      1.17  | Q       |    V    |         |         |
14+45       0.6305      1.20  | Q       |    V    |         |         |
14+50       0.6390      1.24  | Q       |    V    |         |         |
14+55       0.6479      1.28  | Q       |    V    |         |         |
15+ 0       0.6570      1.33  | Q       |    V    |         |         |
15+ 5       0.6665      1.38  | Q       |     V   |         |         |
15+10       0.6763      1.43  | Q       |     V   |         |         |
15+15       0.6866      1.49  | Q       |     V   |         |         |
15+20       0.6974      1.56  |  Q      |     V   |         |         |
15+25       0.7086      1.63  |  Q      |      V  |         |         |
15+30       0.7197      1.61  |  Q      |      V  |         |         |
15+35       0.7302      1.52  |  Q      |      V  |         |         |
15+40       0.7408      1.55  |  Q      |       V |         |         |
15+45       0.7522      1.65  |  Q      |       V |         |         |
15+50       0.7647      1.82  |  Q      |       V |         |         |
15+55       0.7792      2.10  |   Q     |       V |         |         |
16+ 0       0.7970      2.60  |    Q    |        V|         |         |
16+ 5       0.8296      4.72  |        Q|         V         |         |
16+10       0.9114     11.88  |         |         | VQ      |         |
16+15       1.0322     17.55  |         |         |    V    |    Q    |
```

```
16+20       1.1028     10.24  |         |         Q     V   |         |
16+25       1.1483      6.62  |         |  Q      |      V  |         |
16+30       1.1824      4.94  |        Q|         |       V |         |
16+35       1.2106      4.10  |       Q |         |        V|         |
16+40       1.2343      3.44  |     Q   |         |         V         |
16+45       1.2542      2.90  |    Q    |         |         V         |
16+50       1.2719      2.56  |    Q    |         |         V         |
16+55       1.2873      2.24  |   Q     |         |         |V        |
17+ 0       1.3011      2.00  |   Q     |         |         |V        |
17+ 5       1.3134      1.78  |  Q      |         |         |V        |
17+10       1.3242      1.57  |  Q      |         |         | V       |
17+15       1.3340      1.41  | Q       |         |         | V       |
17+20       1.3434      1.38  | Q       |         |         | V       |
17+25       1.3525      1.32  | Q       |         |         | V       |
17+30       1.3608      1.19  | Q       |         |         |  V      |
17+35       1.3685      1.13  | Q       |         |         |  V      |
17+40       1.3750      0.94  |Q        |         |         |  V      |
17+45       1.3812      0.90  |Q        |         |         |  V      |
17+50       1.3872      0.87  |Q        |         |         |  V      |
17+55       1.3930      0.84  |Q        |         |         |  V      |
18+ 0       1.3987      0.82  |Q        |         |         |   V     |
18+ 5       1.4041      0.79  |Q        |         |         |   V     |
18+10       1.4094      0.77  |Q        |         |         |   V     |
18+15       1.4146      0.75  |Q        |         |         |   V     |
18+20       1.4196      0.73  |Q        |         |         |   V     |
18+25       1.4245      0.71  |Q        |         |         |   V     |
18+30       1.4292      0.69  |Q        |         |         |   V     |
18+35       1.4339      0.68  |Q        |         |         |   V     |
18+40       1.4384      0.66  |Q        |         |         |    V    |
18+45       1.4429      0.65  |Q        |         |         |    V    |
18+50       1.4473      0.64  |Q        |         |         |    V    |
18+55       1.4516      0.62  |Q        |         |         |    V    |
19+ 0       1.4558      0.61  |Q        |         |         |    V    |
19+ 5       1.4599      0.60  |Q        |         |         |    V    |
19+10       1.4640      0.59  |Q        |         |         |    V    |
19+15       1.4680      0.58  |Q        |         |         |    V    |
19+20       1.4719      0.57  |Q        |         |         |    V    |
19+25       1.4758      0.56  |Q        |         |         |    V    |
19+30       1.4796      0.55  |Q        |         |         |     V   |
19+35       1.4834      0.55  |Q        |         |         |     V   |
19+40       1.4871      0.54  |Q        |         |         |     V   |
19+45       1.4907      0.53  |Q        |         |         |     V   |
19+50       1.4943      0.52  |Q        |         |         |     V   |
19+55       1.4979      0.52  |Q        |         |         |     V   |
20+ 0       1.5014      0.51  |Q        |         |         |     V   |
20+ 5       1.5048      0.50  |Q        |         |         |     V   |
20+10       1.5082      0.50  Q         |         |         |     V   |
20+15       1.5116      0.49  Q         |         |         |     V   |
20+20       1.5150      0.48  Q         |         |         |     V   |
20+25       1.5182      0.48  Q         |         |         |     V   |
20+30       1.5215      0.47  Q         |         |         |      V  |
20+35       1.5247      0.47  Q         |         |         |      V  |
20+40       1.5279      0.46  Q         |         |         |      V  |
20+45       1.5311      0.46  Q         |         |         |      V  |
```

```
 20+50        1.5342       0.45   Q           |          |          |      V   |
 20+55        1.5373       0.45   Q           |          |          |      V   |
 21+ 0        1.5403       0.44   Q           |          |          |      V   |
 21+ 5        1.5433       0.44   Q           |          |          |      V   |
 21+10        1.5463       0.43   Q           |          |          |      V   |
 21+15        1.5493       0.43   Q           |          |          |      V   |
 21+20        1.5522       0.43   Q           |          |          |      V   |
 21+25        1.5551       0.42   Q           |          |          |      V   |
 21+30        1.5580       0.42   Q           |          |          |      V   |
 21+35        1.5609       0.41   Q           |          |          |       V  |
 21+40        1.5637       0.41   Q           |          |          |       V  |
 21+45        1.5665       0.41   Q           |          |          |       V  |
 21+50        1.5693       0.40   Q           |          |          |       V  |
 21+55        1.5720       0.40   Q           |          |          |       V  |
 22+ 0        1.5748       0.40   Q           |          |          |       V  |
 22+ 5        1.5775       0.39   Q           |          |          |       V  |
 22+10        1.5802       0.39   Q           |          |          |       V  |
 22+15        1.5828       0.39   Q           |          |          |       V  |
 22+20        1.5855       0.38   Q           |          |          |       V  |
 22+25        1.5881       0.38   Q           |          |          |       V  |
 22+30        1.5907       0.38   Q           |          |          |       V  |
 22+35        1.5933       0.38   Q           |          |          |       V  |
 22+40        1.5958       0.37   Q           |          |          |       V  |
 22+45        1.5984       0.37   Q           |          |          |       V  |
 22+50        1.6009       0.37   Q           |          |          |       V  |
 22+55        1.6034       0.36   Q           |          |          |        V|
 23+ 0        1.6059       0.36   Q           |          |          |        V|
 23+ 5        1.6084       0.36   Q           |          |          |        V|
 23+10        1.6109       0.36   Q           |          |          |        V|
 23+15        1.6133       0.35   Q           |          |          |        V|
 23+20        1.6157       0.35   Q           |          |          |        V|
 23+25        1.6181       0.35   Q           |          |          |        V|
 23+30        1.6205       0.35   Q           |          |          |        V|
 23+35        1.6229       0.34   Q           |          |          |        V|
 23+40        1.6252       0.34   Q           |          |          |        V|
 23+45        1.6276       0.34   Q           |          |          |        V|
 23+50        1.6299       0.34   Q           |          |          |        V|
 23+55        1.6322       0.34   Q           |          |          |        V|
 24+ 0        1.6345       0.33   Q           |          |          |        V|
----------------------------------------------------------------------
```

2-YR, 24-HRS
VOLUME = 1.63 AC.FT.
DA 1   DMA A

WATER SURFACE
PROFILE GRADIENT CALCULATIONS
BASIN 1 LINE "A1"
INLET STORM DRAIN PIPE



SECTION "A1-A1"

BASIN 1 LINE "A1"

N.T.S.

Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning
109 East Third Street
San Bernardino, CA 92410
Phone: 909-884-8217
Fax: 909-889-0153
5890 Hwy. 95, Ste. B
Fort Mohave, AZ 88426
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Phone: 760-951-7676
Fax: 760-241-0573
2126 McCulloch Blvd., Ste. 8
Lake Havasu City, AZ 86403
Phone: 928-680-6060
Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397
PROFILE STORM DRAIN - BASIN 1 LINE "A1"

CLIENT:
RY PROPERTIES

SCALE	N.T.S.
SHEET	1 OF 4
DESIGNED BY: JC	DRAWN BY: LC
CHECKED BY: JF	D-1

```
T1  WSPGW LINE "A1" CATCH BASIN 1 &2  ,  BASIN 1                              0
T2  TRACT NO. 16397, CITY OF VICTORVILLE
T3  FILE: 16397WSPGWBASIN1LINEA1.OUT
SO   1000.0003182.500  1                         3184.620
R    1039.6303182.700  1      .013                                 .000    .000 0
JX   1043.6303182.780  4  3   .013   6.900        3184.280         90.0         .000
R    1084.5903182.980  3      .013                                 .000    .000 0
SH   1084.5903182.980  3                         3187.000
CD   1  4   1    .000   1.500     .000  .000  .000   .00
CD   2  4   1    .000   1.500     .000  .000  .000   .00
CD   3  4   1    .000   1.500     .000  .000  .000   .00
CD   4  4   1    .000   1.500     .000  .000  .000   .00
Q             6.900   .0
```

Program Package Serial Number: 1586

WATER SURFACE PROFILE LISTING Date:12- 4-2017 Time: 2:14:50

WSPGW LINE "A1" CATCH BASIN 1 &2 , BASIN 1

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGWBASIN1LINEA1.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	**3182.500**	**2.120**	**3184.620**	**13.80**	**7.81**	**.95**	**3185.57**	**.00**	**1.38**	**.00**	**1.500**	**.000**	**.00**	**1 .0**
39.630	.0050					.0173	.68	2.12	.00	1.50	.013	.00	.00	PIPE
1039.630	**3182.700**	**2.604**	**3185.304**	**13.80**	**7.81**	**.95**	**3186.25**	**.00**	**1.38**	**.00**	**1.500**	**.000**	**.00**	**1 .0**
JUNCT STR	.0200					.0108	.04	2.60	.00		.013	.00	.00	PIPE
1043.630	**3182.780**	**3.989**	**3186.769**	**6.90**	**3.90**	**.24**	**3187.01**	**.00**	**1.02**	**.00**	**1.500**	**.000**	**.00**	**1 .0**
40.960	.0049					.0043	.18	3.99	.00	1.16	.013	.00	.00	PIPE
1084.590	**3182.980**	**3.966**	**3186.946**	**6.90**	**3.90**	**.24**	**3187.18**	**.00**	**1.02**	**.00**	**1.500**	**.000**	**.00**	**1 .0**

```
FILE: 16397WSPGWBASIN1LINEA1.WSW          W S P G W  - EDIT LISTING - Version 14.06            Date:12- 4-2017  Time: 2:14:46
                                      WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING                            PAGE    1
 CARD  SECT  CHN   NO OF  AVE PIER  HEIGHT 1  BASE    ZL    ZR   INV   Y(1)  Y(2)  Y(3)  Y(4)  Y(5)  Y(6)  Y(7)  Y(8)  Y(9)  Y(10)
 CODE   NO   TYPE PIER/PIP WIDTH    DIAMETER  WIDTH              DROP

 CD      1    4      1            1.500
 CD      2    4      1            1.500
 CD      3    4      1            1.500
 CD      4    4      1            1.500
                                                       W S P G W                                                    PAGE NO   1
                            WATER SURFACE PROFILE - TITLE CARD LISTING
HEADING LINE NO 1 IS -
                               WSPGW LINE "A1" CATCH BASIN 1 &2  ,  BASIN 1
HEADING LINE NO 2 IS -
                               TRACT NO. 16397, CITY OF VICTORVILLE
HEADING LINE NO 3 IS -
                               FILE: 16397WSPGWBASIN1LINEA1.OUT
                                                       W S P G W                                                    PAGE NO   2
                            WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO   1 IS A SYSTEM OUTLET     *         *     *
                    U/S DATA   STATION    INVERT  SECT                                    W S ELEV
                               1000.000 3182.500    1                                      3184.620
 ELEMENT NO   2 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT             N                            RADIUS    ANGLE     ANG PT  MAN H
                               1039.630 3182.700    1             .013                           .000     .000      .000     0
 ELEMENT NO   3 IS A JUNCTION          *         *     *     *                  *                   *               *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2  N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                               1043.630 3182.780    4     3     0  .013     6.900      .003   184.280      .000  90.000     .000
                                                                                             RADIUS    ANGLE
                                                                                               .000     .000
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
 ELEMENT NO   4 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT             N                            RADIUS    ANGLE     ANG PT  MAN H
                               1084.590 3182.980    3             .013                           .000     .000      .000     0
 ELEMENT NO   5 IS A SYSTEM HEADWORKS                  *                      *
                    U/S DATA   STATION    INVERT  SECT                                    W S ELEV
                               1084.590 3182.980    3                                    3187.000
```

LUDWIG ENGINEERING
109 E. Third Street
San Bernardino, California 92410
(909)884-8217
Fax (909) 889-0153

JOB PA-0301

CATCH BASIN 1 & 2 @ Basin 1
NODE 15

CAPACITY OF CURB OPENING INLET ON A CONTINOUS GRADE:

HEIGHT OF CURB = 6" CF. Q 100 = 13 CFS ; ***CATCH BASIN # 1 & 2***

LOCAL DEPRESSION a = 4"

PONDING DEPTH y = 0.41'

h (eff.) = 0.56'

with h = 0.56'

PER NOMOGRAPH:

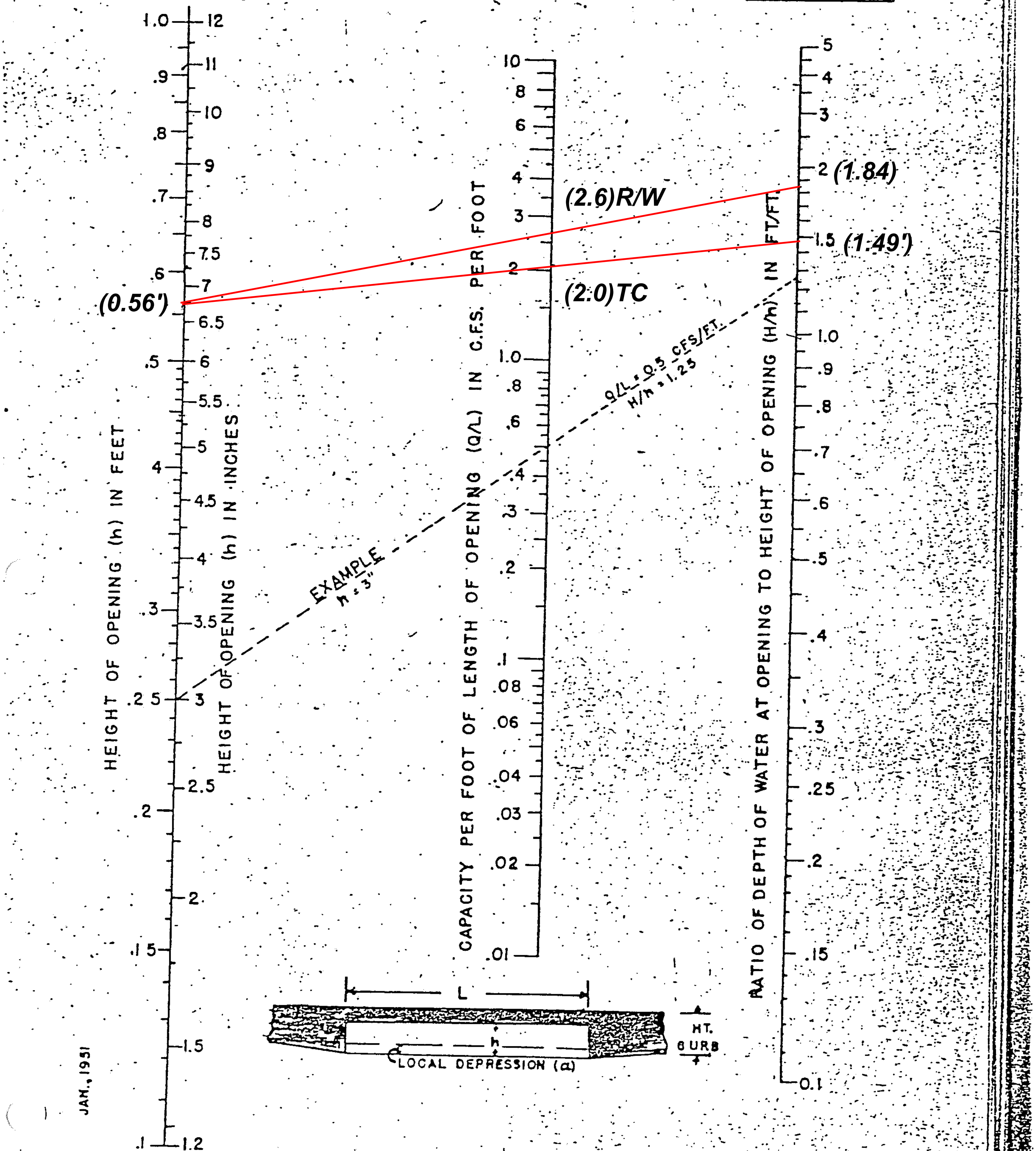
$$Q = 0.7 \ L \ (a + y)3/2$$

FOR CATCH BASIN #3;

$$L = \frac{Q}{0.7 \ (a + y)3/2}$$

$$L = \frac{13CFS}{0.7 \ (0.333 + .41)3/2}$$

L= 29' USE 10' LENGTH OF CATCH ***BASIN #1***
L= 29' USE 10' LENGTH OF CATCH ***BASIN #2***



BUREAU OF PUBLIC ROADS
DIVISION TWO WASH., D. C.

NOMOGRAPH FOR CAPACITY OF CURB OPENING INLETS AT LOW POINTS

DA 1   DMA B

ONSITE POST-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

100-YEAR; 24-HOURS STORM EVENTS

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

          Study date  11/29/17

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

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


Program License Serial Number 4070

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

100-YEAR, 24-HOURS UNIT HYDROGRAPH POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A12a TO A12b (SOUTHWEST OF BASIN 1) DA 1 DMA-B
FILE: 16397UNITHYDA12POST100YR.OUT

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

     Storm Event Year = 100

     Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
     Sub-Area        Duration        Isohyetal
     (Ac.)            (hours)         (In)
Rainfall data for year 100
          4.28            1           1.11
--------------------------------------------------------------------
Rainfall data for year 100
          4.28            6           2.38
--------------------------------------------------------------------
Rainfall data for year 100
          4.28           24           4.96
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction    (In/Hr)  (dec.)   (In/Hr)
 76.0      91.6          4.28      1.000     0.163    0.500    0.081

Area-averaged adjusted loss rate Fm (In/Hr) =  0.081

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)            Yield Fr
     2.14   0.500         76.0      91.6       0.92     0.808
     2.14   0.500         98.0      98.0       0.20     0.952

Area-averaged catchment yield fraction, Y =  0.880
Area-averaged low loss fraction, Yb =  0.120
User entry of time of concentration  =   0.225 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       4.28(Ac.)
Catchment Lag time =   0.180 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 46.3313
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.081(In/Hr)
Average low loss rate fraction (Yb) = 0.120 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.527(In)
Computed peak 30-minute rainfall =  0.902(In)
Specified peak 1-hour rainfall =  1.110(In)
Computed peak 3-hour rainfall =  1.772(In)
Specified peak 6-hour rainfall =  2.380(In)
Specified peak 24-hour rainfall =  4.960(In)


Rainfall depth area reduction factors:
Using a total area of       4.28(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.527(In)
30-minute factor = 1.000    Adjusted rainfall =  0.901(In)
1-hour factor = 1.000       Adjusted rainfall =  1.110(In)
3-hour factor = 1.000       Adjusted rainfall =  1.772(In)
6-hour factor = 1.000       Adjusted rainfall =  2.380(In)
24-hour factor = 1.000      Adjusted rainfall =  4.960(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
---------------------------------------------------------------------
           (K =        51.76 (CFS))

  1                3.494                   1.808
  2               26.165                  11.735
  3               56.977                  15.949
```

4	71.134	7.328
5	79.325	4.240
6	84.718	2.791
7	88.665	2.043
8	91.422	1.427
9	93.596	1.125
10	95.250	0.856
11	96.540	0.668
12	97.487	0.490
13	98.092	0.313
14	98.606	0.266
15	99.162	0.288
16	99.612	0.233
17	100.000	0.201

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5266	0.5266
2	0.6483	0.1217
3	0.7322	0.0839
4	0.7982	0.0660
5	0.8534	0.0553
6	0.9014	0.0480
7	0.9441	0.0427
8	0.9827	0.0386
9	1.0180	0.0353
10	1.0507	0.0327
11	1.0812	0.0305
12	1.1098	0.0286
13	1.1483	0.0385
14	1.1851	0.0368
15	1.2204	0.0353
16	1.2544	0.0340
17	1.2872	0.0328
18	1.3189	0.0317
19	1.3497	0.0307
20	1.3795	0.0298
21	1.4084	0.0290
22	1.4366	0.0282
23	1.4641	0.0275
24	1.4908	0.0268
25	1.5170	0.0261
26	1.5425	0.0255
27	1.5675	0.0250
28	1.5920	0.0245
29	1.6160	0.0240
30	1.6395	0.0235
31	1.6625	0.0231
32	1.6851	0.0226
33	1.7074	0.0222
34	1.7292	0.0218
35	1.7507	0.0215
36	1.7718	0.0211
37	1.7926	0.0208

254	4.6407	0.0097
255	4.6503	0.0097
256	4.6600	0.0097
257	4.6696	0.0096
258	4.6792	0.0096
259	4.6888	0.0096
260	4.6984	0.0096
261	4.7080	0.0096
262	4.7175	0.0095
263	4.7270	0.0095
264	4.7366	0.0095
265	4.7461	0.0095
266	4.7555	0.0095
267	4.7650	0.0095
268	4.7744	0.0094
269	4.7839	0.0094
270	4.7933	0.0094
271	4.8027	0.0094
272	4.8121	0.0094
273	4.8214	0.0094
274	4.8308	0.0093
275	4.8401	0.0093
276	4.8494	0.0093
277	4.8587	0.0093
278	4.8680	0.0093
279	4.8773	0.0093
280	4.8865	0.0093
281	4.8957	0.0092
282	4.9050	0.0092
283	4.9142	0.0092
284	4.9234	0.0092
285	4.9325	0.0092
286	4.9417	0.0092
287	4.9508	0.0091
288	4.9600	0.0091

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0091	0.0011	0.0080
2	0.0091	0.0011	0.0080
3	0.0092	0.0011	0.0081
4	0.0092	0.0011	0.0081
5	0.0092	0.0011	0.0081
6	0.0092	0.0011	0.0081
7	0.0093	0.0011	0.0082
8	0.0093	0.0011	0.0082
9	0.0093	0.0011	0.0082
10	0.0093	0.0011	0.0082
11	0.0094	0.0011	0.0082
12	0.0094	0.0011	0.0083
13	0.0094	0.0011	0.0083
14	0.0094	0.0011	0.0083

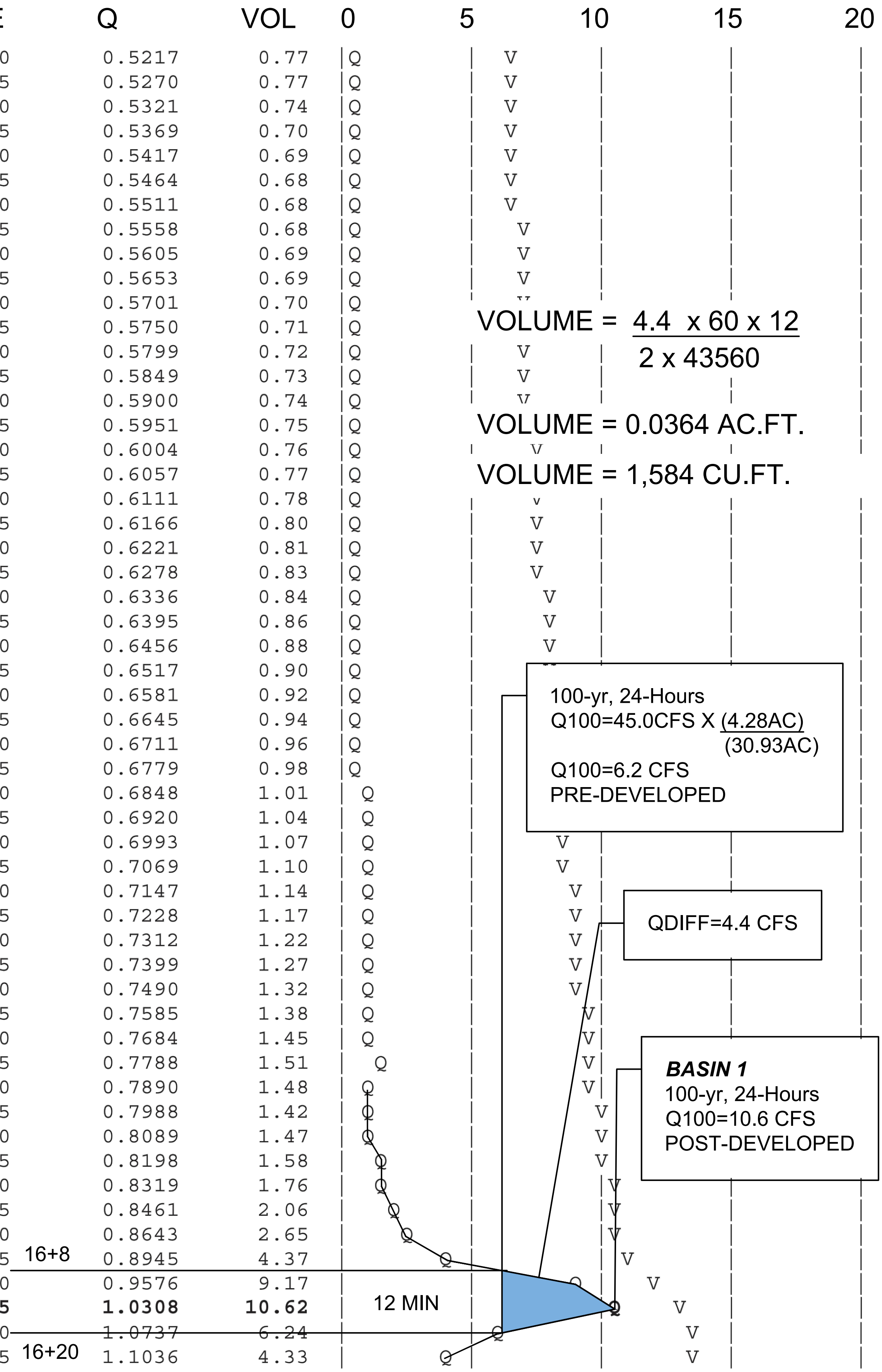
```
285              0.0093           0.0011              0.0082
286              0.0093           0.0011              0.0081
287              0.0092           0.0011              0.0081
288              0.0092           0.0011              0.0081
--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      0.53(In)
Total effective rainfall =      4.43(In)
Peak flow rate in flood hydrograph =     10.62(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R   S T O R M
               R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0001      0.01  Q          |         |         |         |
  0+10       0.0008      0.11  Q          |         |         |         |
  0+15       0.0025      0.24  Q          |         |         |         |
  0+20       0.0045      0.30  Q          |         |         |         |
  0+25       0.0068      0.33  Q          |         |         |         |
  0+30       0.0093      0.35  Q          |         |         |         |
  0+35       0.0118      0.37  Q          |         |         |         |
  0+40       0.0145      0.38  Q          |         |         |         |
  0+45       0.0172      0.39  Q          |         |         |         |
  0+50       0.0199      0.40  Q          |         |         |         |
  0+55       0.0228      0.41  Q          |         |         |         |
  1+ 0       0.0256      0.41  Q          |         |         |         |
  1+ 5       0.0285      0.42  Q          |         |         |         |
  1+10       0.0314      0.42  Q          |         |         |         |
  1+15       0.0343      0.42  Q          |         |         |         |
  1+20       0.0372      0.43  Q          |         |         |         |
  1+25       0.0402      0.43  QV         |         |         |         |
  1+30       0.0432      0.43  QV         |         |         |         |
  1+35       0.0461      0.43  QV         |         |         |         |
  1+40       0.0491      0.43  QV         |         |         |         |
  1+45       0.0521      0.43  QV         |         |         |         |
  1+50       0.0551      0.44  QV         |         |         |         |
  1+55       0.0581      0.44  QV         |         |         |         |
  2+ 0       0.0611      0.44  QV         |         |         |         |
  2+ 5       0.0641      0.44  QV         |         |         |         |
  2+10       0.0672      0.44  QV         |         |         |         |
  2+15       0.0702      0.44  QV         |         |         |         |
  2+20       0.0733      0.44  QV         |         |         |         |
  2+25       0.0763      0.44  QV         |         |         |         |
  2+30       0.0794      0.45  Q V        |         |         |         |
  2+35       0.0825      0.45  Q V        |         |         |         |
  2+40       0.0855      0.45  Q V        |         |         |         |
  2+45       0.0886      0.45  Q V        |         |         |         |
  2+50       0.0917      0.45  Q V        |         |         |         |
  2+55       0.0948      0.45  Q V        |         |         |         |
```

```
3+ 0       0.0980      0.45  Q V       |         |         |         |
3+ 5       0.1011      0.45  Q V       |         |         |         |
3+10       0.1042      0.46  Q V       |         |         |         |
3+15       0.1074      0.46  Q V       |         |         |         |
3+20       0.1105      0.46  Q V       |         |         |         |
3+25       0.1137      0.46  Q V       |         |         |         |
3+30       0.1169      0.46  Q V       |         |         |         |
3+35       0.1200      0.46  Q  V      |         |         |         |
3+40       0.1232      0.46  Q  V      |         |         |         |
3+45       0.1264      0.47  Q  V      |         |         |         |
3+50       0.1297      0.47  Q  V      |         |         |         |
3+55       0.1329      0.47  Q  V      |         |         |         |
4+ 0       0.1361      0.47  Q  V      |         |         |         |
4+ 5       0.1394      0.47  Q  V      |         |         |         |
4+10       0.1426      0.47  Q  V      |         |         |         |
4+15       0.1459      0.47  Q  V      |         |         |         |
4+20       0.1492      0.48  Q  V      |         |         |         |
4+25       0.1525      0.48  Q  V      |         |         |         |
4+30       0.1558      0.48  Q  V      |         |         |         |
4+35       0.1591      0.48  Q   V     |         |         |         |
4+40       0.1624      0.48  Q   V     |         |         |         |
4+45       0.1657      0.48  Q   V     |         |         |         |
4+50       0.1691      0.49  Q   V     |         |         |         |
4+55       0.1724      0.49  Q   V     |         |         |         |
5+ 0       0.1758      0.49  Q   V     |         |         |         |
5+ 5       0.1792      0.49  Q   V     |         |         |         |
5+10       0.1825      0.49  Q   V     |         |         |         |
5+15       0.1859      0.49  Q   V     |         |         |         |
5+20       0.1894      0.50  Q   V     |         |         |         |
5+25       0.1928      0.50  Q   V     |         |         |         |
5+30       0.1962      0.50  Q   V     |         |         |         |
5+35       0.1997      0.50  |Q   V    |         |         |         |
5+40       0.2031      0.50  |Q   V    |         |         |         |
5+45       0.2066      0.50  |Q   V    |         |         |         |
5+50       0.2101      0.51  |Q   V    |         |         |         |
5+55       0.2136      0.51  |Q   V    |         |         |         |
6+ 0       0.2171      0.51  |Q   V    |         |         |         |
6+ 5       0.2206      0.51  |Q   V    |         |         |         |
6+10       0.2242      0.51  |Q   V    |         |         |         |
6+15       0.2277      0.52  |Q   V    |         |         |         |
6+20       0.2313      0.52  |Q   V    |         |         |         |
6+25       0.2349      0.52  |Q   V    |         |         |         |
6+30       0.2385      0.52  |Q    V   |         |         |         |
6+35       0.2421      0.52  |Q    V   |         |         |         |
6+40       0.2457      0.53  |Q    V   |         |         |         |
6+45       0.2494      0.53  |Q    V   |         |         |         |
6+50       0.2530      0.53  |Q    V   |         |         |         |
6+55       0.2567      0.53  |Q    V   |         |         |         |
7+ 0       0.2604      0.54  |Q    V   |         |         |         |
7+ 5       0.2641      0.54  |Q    V   |         |         |         |
7+10       0.2678      0.54  |Q    V   |         |         |         |
7+15       0.2716      0.54  |Q    V   |         |         |         |
7+20       0.2753      0.54  |Q    V   |         |         |         |
7+25       0.2791      0.55  |Q     V  |         |         |         |
```

```
 7+30       0.2829      0.55  |Q      V  |         |         |         |
 7+35       0.2867      0.55  |Q      V  |         |         |         |
 7+40       0.2905      0.55  |Q      V  |         |         |         |
 7+45       0.2943      0.56  |Q      V  |         |         |         |
 7+50       0.2982      0.56  |Q      V  |         |         |         |
 7+55       0.3021      0.56  |Q      V  |         |         |         |
 8+ 0       0.3059      0.56  |Q      V  |         |         |         |
 8+ 5       0.3098      0.57  |Q      V  |         |         |         |
 8+10       0.3138      0.57  |Q      V  |         |         |         |
 8+15       0.3177      0.57  |Q       V |         |         |         |
 8+20       0.3217      0.58  |Q       V |         |         |         |
 8+25       0.3257      0.58  |Q       V |         |         |         |
 8+30       0.3297      0.58  |Q       V |         |         |         |
 8+35       0.3337      0.58  |Q       V |         |         |         |
 8+40       0.3378      0.59  |Q       V |         |         |         |
 8+45       0.3418      0.59  |Q       V |         |         |         |
 8+50       0.3459      0.59  |Q       V |         |         |         |
 8+55       0.3500      0.60  |Q       V |         |         |         |
 9+ 0       0.3541      0.60  |Q       V |         |         |         |
 9+ 5       0.3583      0.60  |Q        V|         |         |         |
 9+10       0.3625      0.61  |Q        V|         |         |         |
 9+15       0.3667      0.61  |Q        V|         |         |         |
 9+20       0.3709      0.61  |Q        V|         |         |         |
 9+25       0.3751      0.62  |Q        V|         |         |         |
 9+30       0.3794      0.62  |Q        V|         |         |         |
 9+35       0.3837      0.62  |Q        V|         |         |         |
 9+40       0.3880      0.63  |Q        V|         |         |         |
 9+45       0.3924      0.63  |Q        V|         |         |         |
 9+50       0.3968      0.63  |Q         V         |         |         |
 9+55       0.4012      0.64  |Q         V         |         |         |
10+ 0       0.4056      0.64  |Q         V         |         |         |
10+ 5       0.4100      0.65  |Q         V         |         |         |
10+10       0.4145      0.65  |Q         V         |         |         |
10+15       0.4190      0.66  |Q         V         |         |         |
10+20       0.4236      0.66  |Q         V         |         |         |
10+25       0.4281      0.66  |Q         V         |         |         |
10+30       0.4327      0.67  |Q         V         |         |         |
10+35       0.4374      0.67  |Q         |V        |         |         |
10+40       0.4420      0.68  |Q         |V        |         |         |
10+45       0.4467      0.68  |Q         |V        |         |         |
10+50       0.4515      0.69  |Q         |V        |         |         |
10+55       0.4562      0.69  |Q         |V        |         |         |
11+ 0       0.4610      0.70  |Q         |V        |         |         |
11+ 5       0.4659      0.70  |Q         |V        |         |         |
11+10       0.4707      0.71  |Q         |V        |         |         |
11+15       0.4757      0.71  |Q         | V       |         |         |
11+20       0.4806      0.72  |Q         | V       |         |         |
11+25       0.4856      0.72  |Q         | V       |         |         |
11+30       0.4906      0.73  |Q         | V       |         |         |
11+35       0.4957      0.74  |Q         | V       |         |         |
11+40       0.5008      0.74  |Q         | V       |         |         |
11+45       0.5060      0.75  |Q         | V       |         |         |
11+50       0.5112      0.76  |Q         | V       |         |         |
11+55       0.5164      0.76  |Q         |  V      |         |         |
```

TIME	Q	VOL
12+ 0	0.5217	0.77
12+ 5	0.5270	0.77
12+10	0.5321	0.74
12+15	0.5369	0.70
12+20	0.5417	0.69
12+25	0.5464	0.68
12+30	0.5511	0.68
12+35	0.5558	0.68
12+40	0.5605	0.69
12+45	0.5653	0.69
12+50	0.5701	0.70
12+55	0.5750	0.71
13+ 0	0.5799	0.72
13+ 5	0.5849	0.73
13+10	0.5900	0.74
13+15	0.5951	0.75
13+20	0.6004	0.76
13+25	0.6057	0.77
13+30	0.6111	0.78
13+35	0.6166	0.80
13+40	0.6221	0.81
13+45	0.6278	0.83
13+50	0.6336	0.84
13+55	0.6395	0.86
14+ 0	0.6456	0.88
14+ 5	0.6517	0.90
14+10	0.6581	0.92
14+15	0.6645	0.94
14+20	0.6711	0.96
14+25	0.6779	0.98
14+30	0.6848	1.01
14+35	0.6920	1.04
14+40	0.6993	1.07
14+45	0.7069	1.10
14+50	0.7147	1.14
14+55	0.7228	1.17
15+ 0	0.7312	1.22
15+ 5	0.7399	1.27
15+10	0.7490	1.32
15+15	0.7585	1.38
15+20	0.7684	1.45
15+25	0.7788	1.51
15+30	0.7890	1.48
15+35	0.7988	1.42
15+40	0.8089	1.47
15+45	0.8198	1.58
15+50	0.8319	1.76
15+55	0.8461	2.06
16+ 0	0.8643	2.65
16+ 5	0.8945	4.37
16+10	0.9576	9.17
16+15	**1.0308**	**10.62**
16+20	1.0737	6.24
16+25	1.1036	4.33



DA 1 DMA-B

```
16+30       1.1270      3.40  |     Q   |         |       V |         |
16+35       1.1470      2.91  |    Q    |         |        V|         |
16+40       1.1640      2.46  |   Q     |         |        V|         |
16+45       1.1790      2.17  |   Q     |         |        V|         |
16+50       1.1921      1.91  |  Q      |         |         V         |
16+55       1.2039      1.71  |  Q      |         |         V         |
17+ 0       1.2144      1.52  |  Q      |         |         V         |
17+ 5       1.2237      1.36  | Q       |         |         V         |
17+10       1.2324      1.26  | Q       |         |         |V        |
17+15       1.2407      1.21  | Q       |         |         |V        |
17+20       1.2485      1.12  | Q       |         |         |V        |
17+25       1.2556      1.04  | Q       |         |         |V        |
17+30       1.2619      0.90  |Q        |         |         |V        |
17+35       1.2678      0.86  |Q        |         |         | V       |
17+40       1.2735      0.83  |Q        |         |         | V       |
17+45       1.2790      0.80  |Q        |         |         | V       |
17+50       1.2843      0.77  |Q        |         |         | V       |
17+55       1.2894      0.74  |Q        |         |         | V       |
18+ 0       1.2944      0.72  |Q        |         |         | V       |
18+ 5       1.2993      0.71  |Q        |         |         | V       |
18+10       1.3042      0.72  |Q        |         |         |  V      |
18+15       1.3094      0.75  |Q        |         |         |  V      |
18+20       1.3147      0.76  |Q        |         |         |  V      |
18+25       1.3199      0.75  |Q        |         |         |  V      |
18+30       1.3250      0.75  |Q        |         |         |  V      |
18+35       1.3301      0.74  |Q        |         |         |  V      |
18+40       1.3352      0.73  |Q        |         |         |  V      |
18+45       1.3401      0.72  |Q        |         |         |  V      |
18+50       1.3450      0.71  |Q        |         |         |   V     |
18+55       1.3499      0.70  |Q        |         |         |   V     |
19+ 0       1.3547      0.70  |Q        |         |         |   V     |
19+ 5       1.3594      0.69  |Q        |         |         |   V     |
19+10       1.3641      0.68  |Q        |         |         |   V     |
19+15       1.3687      0.67  |Q        |         |         |   V     |
19+20       1.3732      0.66  |Q        |         |         |   V     |
19+25       1.3777      0.65  |Q        |         |         |   V     |
19+30       1.3822      0.64  |Q        |         |         |   V     |
19+35       1.3865      0.64  |Q        |         |         |    V    |
19+40       1.3909      0.63  |Q        |         |         |    V    |
19+45       1.3952      0.62  |Q        |         |         |    V    |
19+50       1.3994      0.61  |Q        |         |         |    V    |
19+55       1.4036      0.61  |Q        |         |         |    V    |
20+ 0       1.4077      0.60  |Q        |         |         |    V    |
20+ 5       1.4118      0.59  |Q        |         |         |    V    |
20+10       1.4159      0.59  |Q        |         |         |    V    |
20+15       1.4199      0.58  |Q        |         |         |    V    |
20+20       1.4238      0.58  |Q        |         |         |     V   |
20+25       1.4278      0.57  |Q        |         |         |     V   |
20+30       1.4317      0.57  |Q        |         |         |     V   |
20+35       1.4355      0.56  |Q        |         |         |     V   |
20+40       1.4393      0.56  |Q        |         |         |     V   |
20+45       1.4431      0.55  |Q        |         |         |     V   |
20+50       1.4469      0.55  |Q        |         |         |     V   |
20+55       1.4506      0.54  |Q        |         |         |     V   |
```

```
   21+ 0       1.4543      0.54  |Q        |         |         |     V   |
   21+ 5       1.4580      0.53  |Q        |         |         |     V   |
   21+10       1.4616      0.53  |Q        |         |         |     V   |
   21+15       1.4652      0.52  |Q        |         |         |      V  |
   21+20       1.4688      0.52  |Q        |         |         |      V  |
   21+25       1.4723      0.51  |Q        |         |         |      V  |
   21+30       1.4758      0.51  |Q        |         |         |      V  |
   21+35       1.4793      0.51  |Q        |         |         |      V  |
   21+40       1.4828      0.50  |Q        |         |         |      V  |
   21+45       1.4862      0.50  Q         |         |         |      V  |
   21+50       1.4897      0.50  Q         |         |         |      V  |
   21+55       1.4931      0.49  Q         |         |         |      V  |
   22+ 0       1.4964      0.49  Q         |         |         |      V  |
   22+ 5       1.4998      0.49  Q         |         |         |      V  |
   22+10       1.5031      0.48  Q         |         |         |       V |
   22+15       1.5064      0.48  Q         |         |         |       V |
   22+20       1.5097      0.48  Q         |         |         |       V |
   22+25       1.5129      0.47  Q         |         |         |       V |
   22+30       1.5162      0.47  Q         |         |         |       V |
   22+35       1.5194      0.47  Q         |         |         |       V |
   22+40       1.5226      0.46  Q         |         |         |       V |
   22+45       1.5258      0.46  Q         |         |         |       V |
   22+50       1.5289      0.46  Q         |         |         |       V |
   22+55       1.5321      0.46  Q         |         |         |       V |
   23+ 0       1.5352      0.45  Q         |         |         |       V |
   23+ 5       1.5383      0.45  Q         |         |         |       V |
   23+10       1.5414      0.45  Q         |         |         |        V|
   23+15       1.5444      0.45  Q         |         |         |        V|
   23+20       1.5475      0.44  Q         |         |         |        V|
   23+25       1.5505      0.44  Q         |         |         |        V|
   23+30       1.5535      0.44  Q         |         |         |        V|
   23+35       1.5565      0.44  Q         |         |         |        V|
   23+40       1.5595      0.43  Q         |         |         |        V|
   23+45       1.5625      0.43  Q         |         |         |        V|
   23+50       1.5654      0.43  Q         |         |         |        V|
   23+55       1.5684      0.43  Q         |         |         |        V|
   24+ 0       1.5713      0.42  Q         |         |         |        V|
----------------------------------------------------------------------
```

DA 1 DMA B

ONSITE POST-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

2-YEAR; 24-HOURS STORM EVENTS

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  11/29/17

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


Program License Serial Number 4070

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```

2-YEAR, 24-HOURS UNIT HYDROGRAPH POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A12a TO A12b (SOUTHWEST OF BASIN 1) DA 1 DMA-B
FILE: 16397UNITHYDA12POST2YR.OUT

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

      Storm Event Year = 2

      Antecedent Moisture Condition = 1

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
      Sub-Area        Duration        Isohyetal
      (Ac.)            (hours)         (In)
Rainfall data for year 2
           4.28            1           0.38
--------------------------------------------------------------------
Rainfall data for year 2
           4.28            6           0.85
--------------------------------------------------------------------
Rainfall data for year 2
           4.28           24           1.55
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 1)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
76.0	58.2	4.28	1.000	0.704	0.500	0.352

Area-averaged adjusted loss rate Fm (In/Hr) = 0.352

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
2.14	0.500	76.0	58.2	7.18	0.001
2.14	0.500	98.0	98.0	0.20	0.858

Area-averaged catchment yield fraction, Y = 0.429
Area-averaged low loss fraction, Yb = 0.571
User entry of time of concentration = 0.158 (hours)
++
Watershed area = 4.28(Ac.)
Catchment Lag time = 0.126 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 66.1376
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.352(In/Hr)
Average low loss rate fraction (Yb) = 0.571 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.182(In)
Computed peak 30-minute rainfall = 0.312(In)
Specified peak 1-hour rainfall = 0.384(In)
Computed peak 3-hour rainfall = 0.625(In)
Specified peak 6-hour rainfall = 0.849(In)
Specified peak 24-hour rainfall = 1.550(In)

Rainfall depth area reduction factors:
Using a total area of 4.28(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000	Adjusted rainfall = 0.182(In)
30-minute factor = 1.000	Adjusted rainfall = 0.312(In)
1-hour factor = 1.000	Adjusted rainfall = 0.384(In)
3-hour factor = 1.000	Adjusted rainfall = 0.625(In)
6-hour factor = 1.000	Adjusted rainfall = 0.849(In)
24-hour factor = 1.000	Adjusted rainfall = 1.550(In)

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

+++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K =	51.76 (CFS))	
1	6.856	3.549
2	47.271	20.919
3	71.619	12.603

4	82.152	5.452
5	88.353	3.210
6	92.223	2.003
7	94.905	1.388
8	96.746	0.952
9	97.895	0.595
10	98.640	0.385
11	99.400	0.394
12	100.000	0.310

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1822	0.1822
2	0.2243	0.0421
3	0.2533	0.0290
4	0.2761	0.0228
5	0.2952	0.0191
6	0.3118	0.0166
7	0.3266	0.0148
8	0.3400	0.0133
9	0.3522	0.0122
10	0.3635	0.0113
11	0.3740	0.0105
12	0.3839	0.0099
13	0.3978	0.0139
14	0.4111	0.0133
15	0.4238	0.0128
16	0.4361	0.0123
17	0.4480	0.0119
18	0.4595	0.0115
19	0.4706	0.0111
20	0.4814	0.0108
21	0.4919	0.0105
22	0.5022	0.0102
23	0.5122	0.0100
24	0.5219	0.0097
25	0.5314	0.0095
26	0.5407	0.0093
27	0.5499	0.0091
28	0.5588	0.0089
29	0.5675	0.0088
30	0.5761	0.0086
31	0.5846	0.0084
32	0.5928	0.0083
33	0.6010	0.0081
34	0.6090	0.0080
35	0.6168	0.0079
36	0.6246	0.0077
37	0.6322	0.0076
38	0.6397	0.0075
39	0.6471	0.0074
40	0.6544	0.0073
41	0.6616	0.0072
42	0.6687	0.0071

259	1.4802	0.0025
260	1.4827	0.0025
261	1.4851	0.0025
262	1.4876	0.0025
263	1.4901	0.0025
264	1.4925	0.0025
265	1.4950	0.0025
266	1.4974	0.0024
267	1.4999	0.0024
268	1.5023	0.0024
269	1.5047	0.0024
270	1.5072	0.0024
271	1.5096	0.0024
272	1.5120	0.0024
273	1.5144	0.0024
274	1.5168	0.0024
275	1.5192	0.0024
276	1.5216	0.0024
277	1.5240	0.0024
278	1.5264	0.0024
279	1.5288	0.0024
280	1.5311	0.0024
281	1.5335	0.0024
282	1.5359	0.0024
283	1.5382	0.0024
284	1.5406	0.0024
285	1.5430	0.0024
286	1.5453	0.0023
287	1.5477	0.0023
288	1.5500	0.0023

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0023	0.0013	0.0010
2	0.0023	0.0013	0.0010
3	0.0024	0.0013	0.0010
4	0.0024	0.0013	0.0010
5	0.0024	0.0014	0.0010
6	0.0024	0.0014	0.0010
7	0.0024	0.0014	0.0010
8	0.0024	0.0014	0.0010
9	0.0024	0.0014	0.0010
10	0.0024	0.0014	0.0010
11	0.0024	0.0014	0.0010
12	0.0024	0.0014	0.0010
13	0.0024	0.0014	0.0010
14	0.0024	0.0014	0.0010
15	0.0024	0.0014	0.0010
16	0.0024	0.0014	0.0011
17	0.0025	0.0014	0.0011
18	0.0025	0.0014	0.0011
19	0.0025	0.0014	0.0011

```
----------------------------------------------------------------------
Total soil rain loss =       0.81(In)
Total effective rainfall =       0.74(In)
Peak flow rate in flood hydrograph =       3.59(CFS)
-----------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
               R u n o f f      H y d r o g r a p h
----------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q          |         |         |         |
  0+10       0.0002      0.02  Q          |         |         |         |
  0+15       0.0005      0.04  Q          |         |         |         |
  0+20       0.0007      0.04  Q          |         |         |         |
  0+25       0.0011      0.05  Q          |         |         |         |
  0+30       0.0014      0.05  Q          |         |         |         |
  0+35       0.0017      0.05  Q          |         |         |         |
  0+40       0.0021      0.05  Q          |         |         |         |
  0+45       0.0024      0.05  Q          |         |         |         |
  0+50       0.0028      0.05  Q          |         |         |         |
  0+55       0.0032      0.05  Q          |         |         |         |
  1+ 0       0.0035      0.05  Q          |         |         |         |
  1+ 5       0.0039      0.05  Q          |         |         |         |
  1+10       0.0043      0.05  Q          |         |         |         |
  1+15       0.0047      0.05  Q          |         |         |         |
  1+20       0.0050      0.05  Q          |         |         |         |
  1+25       0.0054      0.05  Q          |         |         |         |
  1+30       0.0058      0.05  Q          |         |         |         |
  1+35       0.0061      0.05  Q          |         |         |         |
  1+40       0.0065      0.05  Q          |         |         |         |
  1+45       0.0069      0.05  QV         |         |         |         |
  1+50       0.0073      0.06  QV         |         |         |         |
  1+55       0.0077      0.06  QV         |         |         |         |
  2+ 0       0.0080      0.06  QV         |         |         |         |
  2+ 5       0.0084      0.06  QV         |         |         |         |
  2+10       0.0088      0.06  QV         |         |         |         |
  2+15       0.0092      0.06  QV         |         |         |         |
  2+20       0.0096      0.06  QV         |         |         |         |
  2+25       0.0100      0.06  QV         |         |         |         |
  2+30       0.0104      0.06  QV         |         |         |         |
  2+35       0.0108      0.06  QV         |         |         |         |
  2+40       0.0111      0.06  QV         |         |         |         |
  2+45       0.0115      0.06  QV         |         |         |         |
  2+50       0.0119      0.06  QV         |         |         |         |
  2+55       0.0123      0.06  QV         |         |         |         |
  3+ 0       0.0127      0.06  QV         |         |         |         |
  3+ 5       0.0131      0.06  QV         |         |         |         |
  3+10       0.0135      0.06  Q V        |         |         |         |
  3+15       0.0139      0.06  Q V        |         |         |         |
  3+20       0.0143      0.06  Q V        |         |         |         |
```

```
3+25       0.0147      0.06  Q V       |         |         |         |
3+30       0.0151      0.06  Q V       |         |         |         |
3+35       0.0156      0.06  Q V       |         |         |         |
3+40       0.0160      0.06  Q V       |         |         |         |
3+45       0.0164      0.06  Q V       |         |         |         |
3+50       0.0168      0.06  Q V       |         |         |         |
3+55       0.0172      0.06  Q V       |         |         |         |
4+ 0       0.0176      0.06  Q V       |         |         |         |
4+ 5       0.0180      0.06  Q V       |         |         |         |
4+10       0.0185      0.06  Q V       |         |         |         |
4+15       0.0189      0.06  Q V       |         |         |         |
4+20       0.0193      0.06  Q V       |         |         |         |
4+25       0.0197      0.06  Q V       |         |         |         |
4+30       0.0202      0.06  Q  V      |         |         |         |
4+35       0.0206      0.06  Q  V      |         |         |         |
4+40       0.0210      0.06  Q  V      |         |         |         |
4+45       0.0214      0.06  Q  V      |         |         |         |
4+50       0.0219      0.06  Q  V      |         |         |         |
4+55       0.0223      0.06  Q  V      |         |         |         |
5+ 0       0.0227      0.06  Q  V      |         |         |         |
5+ 5       0.0232      0.06  Q  V      |         |         |         |
5+10       0.0236      0.06  Q  V      |         |         |         |
5+15       0.0241      0.06  Q  V      |         |         |         |
5+20       0.0245      0.06  Q  V      |         |         |         |
5+25       0.0250      0.06  Q  V      |         |         |         |
5+30       0.0254      0.07  Q  V      |         |         |         |
5+35       0.0259      0.07  Q  V      |         |         |         |
5+40       0.0263      0.07  Q  V      |         |         |         |
5+45       0.0268      0.07  Q   V     |         |         |         |
5+50       0.0272      0.07  Q   V     |         |         |         |
5+55       0.0277      0.07  Q   V     |         |         |         |
6+ 0       0.0281      0.07  Q   V     |         |         |         |
6+ 5       0.0286      0.07  Q   V     |         |         |         |
6+10       0.0291      0.07  Q   V     |         |         |         |
6+15       0.0295      0.07  Q   V     |         |         |         |
6+20       0.0300      0.07  Q   V     |         |         |         |
6+25       0.0305      0.07  Q   V     |         |         |         |
6+30       0.0309      0.07  Q   V     |         |         |         |
6+35       0.0314      0.07  Q   V     |         |         |         |
6+40       0.0319      0.07  Q   V     |         |         |         |
6+45       0.0324      0.07  Q   V     |         |         |         |
6+50       0.0329      0.07  Q   V     |         |         |         |
6+55       0.0333      0.07  Q    V    |         |         |         |
7+ 0       0.0338      0.07  Q    V    |         |         |         |
7+ 5       0.0343      0.07  Q    V    |         |         |         |
7+10       0.0348      0.07  Q    V    |         |         |         |
7+15       0.0353      0.07  Q    V    |         |         |         |
7+20       0.0358      0.07  Q    V    |         |         |         |
7+25       0.0363      0.07  Q    V    |         |         |         |
7+30       0.0368      0.07  Q    V    |         |         |         |
7+35       0.0373      0.07  Q    V    |         |         |         |
7+40       0.0378      0.07  Q    V    |         |         |         |
7+45       0.0383      0.07  Q    V    |         |         |         |
7+50       0.0388      0.07  Q    V    |         |         |         |
```

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 7+55       0.0394      0.08  Q    V    |         |         |         |
 8+ 0       0.0399      0.08  Q     V   |         |         |         |
 8+ 5       0.0404      0.08  Q     V   |         |         |         |
 8+10       0.0409      0.08  Q     V   |         |         |         |
 8+15       0.0415      0.08  Q     V   |         |         |         |
 8+20       0.0420      0.08  Q     V   |         |         |         |
 8+25       0.0425      0.08  Q     V   |         |         |         |
 8+30       0.0431      0.08  Q     V   |         |         |         |
 8+35       0.0436      0.08  Q     V   |         |         |         |
 8+40       0.0442      0.08  Q     V   |         |         |         |
 8+45       0.0447      0.08  Q     V   |         |         |         |
 8+50       0.0453      0.08  Q     V   |         |         |         |
 8+55       0.0458      0.08  Q     V   |         |         |         |
 9+ 0       0.0464      0.08  Q      V  |         |         |         |
 9+ 5       0.0469      0.08  Q      V  |         |         |         |
 9+10       0.0475      0.08  Q      V  |         |         |         |
 9+15       0.0481      0.08  Q      V  |         |         |         |
 9+20       0.0487      0.08  Q      V  |         |         |         |
 9+25       0.0492      0.08  Q      V  |         |         |         |
 9+30       0.0498      0.08  Q      V  |         |         |         |
 9+35       0.0504      0.09  Q      V  |         |         |         |
 9+40       0.0510      0.09  Q      V  |         |         |         |
 9+45       0.0516      0.09  Q      V  |         |         |         |
 9+50       0.0522      0.09  Q      V  |         |         |         |
 9+55       0.0528      0.09  Q       V |         |         |         |
10+ 0       0.0534      0.09  Q       V |         |         |         |
10+ 5       0.0540      0.09  Q       V |         |         |         |
10+10       0.0546      0.09  Q       V |         |         |         |
10+15       0.0553      0.09  Q       V |         |         |         |
10+20       0.0559      0.09  Q       V |         |         |         |
10+25       0.0565      0.09  Q       V |         |         |         |
10+30       0.0572      0.09  Q       V |         |         |         |
10+35       0.0578      0.09  Q       V |         |         |         |
10+40       0.0584      0.09  Q       V |         |         |         |
10+45       0.0591      0.09  Q       V |         |         |         |
10+50       0.0598      0.10  Q        V|         |         |         |
10+55       0.0604      0.10  Q        V|         |         |         |
11+ 0       0.0611      0.10  Q        V|         |         |         |
11+ 5       0.0618      0.10  Q        V|         |         |         |
11+10       0.0625      0.10  Q        V|         |         |         |
11+15       0.0632      0.10  Q        V|         |         |         |
11+20       0.0638      0.10  Q        V|         |         |         |
11+25       0.0646      0.10  Q        V|         |         |         |
11+30       0.0653      0.10  Q        V|         |         |         |
11+35       0.0660      0.10  Q         V         |         |         |
11+40       0.0667      0.11  Q         V         |         |         |
11+45       0.0674      0.11  Q         V         |         |         |
11+50       0.0682      0.11  Q         V         |         |         |
11+55       0.0689      0.11  Q         V         |         |         |
12+ 0       0.0697      0.11  Q         V         |         |         |
12+ 5       0.0705      0.11  Q         V         |         |         |
12+10       0.0712      0.11  Q         V         |         |         |
12+15       0.0720      0.12  Q         V         |         |         |
12+20       0.0728      0.12  Q         |V        |         |         |
```

```
12+25       0.0737      0.12  Q         |V        |         |         |
12+30       0.0745      0.12  Q         |V        |         |         |
12+35       0.0753      0.12  Q         |V        |         |         |
12+40       0.0762      0.12  Q         |V        |         |         |
12+45       0.0770      0.12  Q         |V        |         |         |
12+50       0.0779      0.13  Q         |V        |         |         |
12+55       0.0788      0.13  Q         |V        |         |         |
13+ 0       0.0797      0.13  Q         | V       |         |         |
13+ 5       0.0806      0.13  Q         | V       |         |         |
13+10       0.0815      0.13  Q         | V       |         |         |
13+15       0.0825      0.14  Q         | V       |         |         |
13+20       0.0834      0.14  Q         | V       |         |         |
13+25       0.0844      0.14  Q         | V       |         |         |
13+30       0.0854      0.14  Q         | V       |         |         |
13+35       0.0864      0.15  Q         |  V      |         |         |
13+40       0.0874      0.15  Q         |  V      |         |         |
13+45       0.0884      0.15  Q         |  V      |         |         |
13+50       0.0895      0.15  Q         |  V      |         |         |
13+55       0.0906      0.16  Q         |  V      |         |         |
14+ 0       0.0917      0.16  Q         |  V      |         |         |
14+ 5       0.0928      0.16  Q         |   V     |         |         |
14+10       0.0939      0.17  Q         |   V     |         |         |
14+15       0.0951      0.17  Q         |   V     |         |         |
14+20       0.0963      0.18  Q         |   V     |         |         |
14+25       0.0976      0.18  Q         |   V     |         |         |
14+30       0.0988      0.18  Q         |   V     |         |         |
14+35       0.1001      0.19  Q         |    V    |         |         |
14+40       0.1015      0.20  Q         |    V    |         |         |
14+45       0.1029      0.20  Q         |    V    |         |         |
14+50       0.1043      0.21  Q         |    V    |         |         |
14+55       0.1058      0.21  Q         |     V   |         |         |
15+ 0       0.1073      0.22  Q         |     V   |         |         |
15+ 5       0.1089      0.23  Q         |     V   |         |         |
15+10       0.1106      0.24  Q         |     V   |         |         |
15+15       0.1123      0.25  |Q        |      V  |         |         |
15+20       0.1141      0.27  |Q        |      V  |         |         |
15+25       0.1160      0.27  |Q        |      V  |         |         |
15+30       0.1178      0.25  |Q        |      V  |         |         |
15+35       0.1194      0.24  Q         |       V |         |         |
15+40       0.1212      0.26  |Q        |       V |         |         |
15+45       0.1232      0.28  |Q        |       V |         |         |
15+50       0.1254      0.32  |Q        |        V|         |         |
15+55       0.1280      0.38  |Q        |        V|         |         |
16+ 0       0.1316      0.52  | Q       |        V|         |         |
16+ 5       0.1397      1.18  |   Q     |         |V        |         |
16+10       0.1644      3.59  |         |   Q     |   V     |         |
16+15       0.1805      2.33  |        Q|         |      V  |         |
16+20       0.1888      1.22  |   Q     |         |       V |         |
16+25       0.1945      0.82  |  Q      |         |        V|         |
16+30       0.1988      0.63  | Q       |         |         V         |
16+35       0.2023      0.51  | Q       |         |         V         |
16+40       0.2052      0.42  |Q        |         |         |V        |
16+45       0.2076      0.35  |Q        |         |         |V        |
16+50       0.2097      0.30  |Q        |         |         |V        |
```

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16+55       0.2116      0.28  |Q        |         |         | V       |
17+ 0       0.2133      0.25  |Q        |         |         | V       |
17+ 5       0.2147      0.19  Q         |         |         | V       |
17+10       0.2159      0.18  Q         |         |         | V       |
17+15       0.2171      0.17  Q         |         |         | V       |
17+20       0.2183      0.17  Q         |         |         |  V      |
17+25       0.2194      0.16  Q         |         |         |  V      |
17+30       0.2204      0.15  Q         |         |         |  V      |
17+35       0.2214      0.15  Q         |         |         |  V      |
17+40       0.2224      0.14  Q         |         |         |  V      |
17+45       0.2234      0.14  Q         |         |         |  V      |
17+50       0.2243      0.13  Q         |         |         |   V     |
17+55       0.2252      0.13  Q         |         |         |   V     |
18+ 0       0.2260      0.13  Q         |         |         |   V     |
18+ 5       0.2269      0.12  Q         |         |         |   V     |
18+10       0.2277      0.12  Q         |         |         |   V     |
18+15       0.2285      0.12  Q         |         |         |   V     |
18+20       0.2293      0.11  Q         |         |         |   V     |
18+25       0.2300      0.11  Q         |         |         |   V     |
18+30       0.2308      0.11  Q         |         |         |   V     |
18+35       0.2315      0.10  Q         |         |         |    V    |
18+40       0.2322      0.10  Q         |         |         |    V    |
18+45       0.2329      0.10  Q         |         |         |    V    |
18+50       0.2336      0.10  Q         |         |         |    V    |
18+55       0.2342      0.10  Q         |         |         |    V    |
19+ 0       0.2349      0.10  Q         |         |         |    V    |
19+ 5       0.2355      0.09  Q         |         |         |    V    |
19+10       0.2362      0.09  Q         |         |         |    V    |
19+15       0.2368      0.09  Q         |         |         |    V    |
19+20       0.2374      0.09  Q         |         |         |    V    |
19+25       0.2380      0.09  Q         |         |         |     V   |
19+30       0.2386      0.09  Q         |         |         |     V   |
19+35       0.2392      0.09  Q         |         |         |     V   |
19+40       0.2398      0.08  Q         |         |         |     V   |
19+45       0.2404      0.08  Q         |         |         |     V   |
19+50       0.2409      0.08  Q         |         |         |     V   |
19+55       0.2415      0.08  Q         |         |         |     V   |
20+ 0       0.2420      0.08  Q         |         |         |     V   |
20+ 5       0.2426      0.08  Q         |         |         |     V   |
20+10       0.2431      0.08  Q         |         |         |     V   |
20+15       0.2436      0.08  Q         |         |         |     V   |
20+20       0.2442      0.08  Q         |         |         |      V  |
20+25       0.2447      0.08  Q         |         |         |      V  |
20+30       0.2452      0.07  Q         |         |         |      V  |
20+35       0.2457      0.07  Q         |         |         |      V  |
20+40       0.2462      0.07  Q         |         |         |      V  |
20+45       0.2467      0.07  Q         |         |         |      V  |
20+50       0.2472      0.07  Q         |         |         |      V  |
20+55       0.2477      0.07  Q         |         |         |      V  |
21+ 0       0.2482      0.07  Q         |         |         |      V  |
21+ 5       0.2486      0.07  Q         |         |         |      V  |
21+10       0.2491      0.07  Q         |         |         |      V  |
21+15       0.2496      0.07  Q         |         |         |      V  |
21+20       0.2500      0.07  Q         |         |         |      V  |
```

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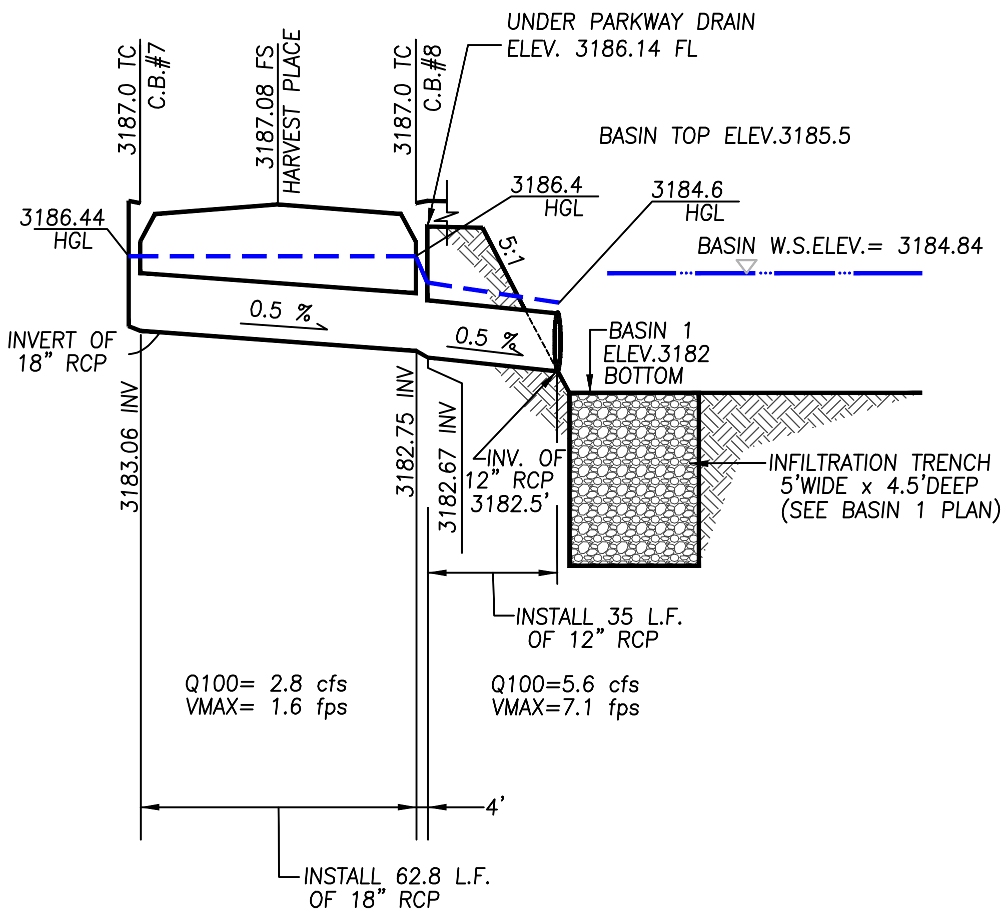
  21+25         0.2505       0.07   Q          |          |          |        V   |
  21+30         0.2509       0.07   Q          |          |          |         V  |
  21+35         0.2514       0.07   Q          |          |          |         V  |
  21+40         0.2518       0.06   Q          |          |          |         V  |
  21+45         0.2523       0.06   Q          |          |          |         V  |
  21+50         0.2527       0.06   Q          |          |          |         V  |
  21+55         0.2532       0.06   Q          |          |          |         V  |
  22+ 0         0.2536       0.06   Q          |          |          |         V  |
  22+ 5         0.2540       0.06   Q          |          |          |         V  |
  22+10         0.2544       0.06   Q          |          |          |         V  |
  22+15         0.2549       0.06   Q          |          |          |         V  |
  22+20         0.2553       0.06   Q          |          |          |         V  |
  22+25         0.2557       0.06   Q          |          |          |         V  |
  22+30         0.2561       0.06   Q          |          |          |         V  |
  22+35         0.2565       0.06   Q          |          |          |         V  |
  22+40         0.2569       0.06   Q          |          |          |         V  |
  22+45         0.2573       0.06   Q          |          |          |          V|
  22+50         0.2577       0.06   Q          |          |          |          V|
  22+55         0.2581       0.06   Q          |          |          |          V|
  23+ 0         0.2585       0.06   Q          |          |          |          V|
  23+ 5         0.2589       0.06   Q          |          |          |          V|
  23+10         0.2593       0.06   Q          |          |          |          V|
  23+15         0.2597       0.06   Q          |          |          |          V|
  23+20         0.2601       0.06   Q          |          |          |          V|
  23+25         0.2604       0.06   Q          |          |          |          V|
  23+30         0.2608       0.05   Q          |          |          |          V|
  23+35         0.2612       0.05   Q          |          |          |          V|
  23+40         0.2616       0.05   Q          |          |          |          V|
  23+45         0.2619       0.05   Q          |          |          |          V|
  23+50         0.2623       0.05   Q          |          |          |          V|
  23+55         0.2627       0.05   Q          |          |          |          V|
  24+ 0         0.2630       0.05   Q          |          |          |          V|
-----------------------------------------------------------------------
```

2-YR, 24-HOURS
VOLUME =0.23 AC.FT.
DA 1 DMA B

WATER SURFACE
PROFILE GRADIENT CALCULATIONS
BASIN 1 LINE "A2"
INLET STORM DRAIN PIPE



SECTION "A2-A2"

BASIN 1 LINE "A2"

N.T.S.

Ludwig Engineering ASSOCIATES, INC.

Civil Engineering • Surveying • Planning

109 East Third Street
San Bernardino, CA 92410
Phone: 909-884-8217
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5890 Hwy. 95, Ste. B
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15252 Seneca Rd.
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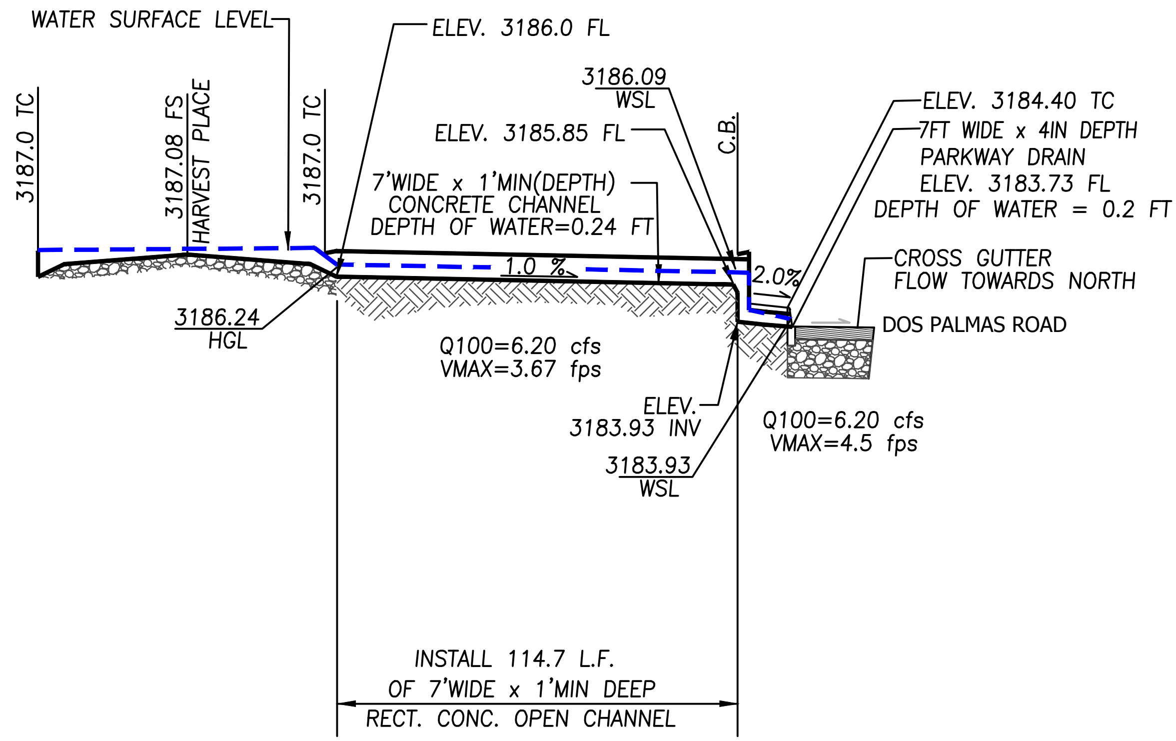
Fax: 760-241-0573

2126 McCulloch Blvd., Ste. 8
Lake Havasu City, AZ 86403
Phone: 928-680-6060
Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397
PROFILE STORM DRAIN - BASIN 1 LINE "A2"

CLIENT:
RY PROPERTIES

SCALE	SHEET	DESIGNED BY:	DRAWN BY:	CHECKED BY:	
N.T.S.	2 OF 4	JC	LC	JF	D-1



SECTION "A3-A3"

BASIN 1 PARKWAY DRAIN

N.T.S.

Ludwig Engineering
ASSOCIATES, INC.
Civil Engineering • Surveying • Planning

109 East Third Street
San Bernardino, CA 92410
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Fax: 909-889-0153

5890 Hwy. 95, Ste. B
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Phone: 928-768-1857
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15252 Seneca Rd.
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Fax: 760-241-0573

2126 McCulloch Blvd., Ste. 8
Lake Havasu City, AZ 86403
Phone: 928-680-6060
Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397
PROF. PARKWAY DRAIN TO DOS PALMAS @ BASIN 1

CLIENT:
RY PROPERTIES

SCALE	SHEET	
N.T.S.	2 OF 4	D-1

DESIGNED BY:	DRAWN BY:	CHECKED BY:
JC	LC	JF

Ludwig Engineering
109 E. Third St.
San Bernardino, CA 92410
Ph. 909-884-8217 Fax 909-889-0153

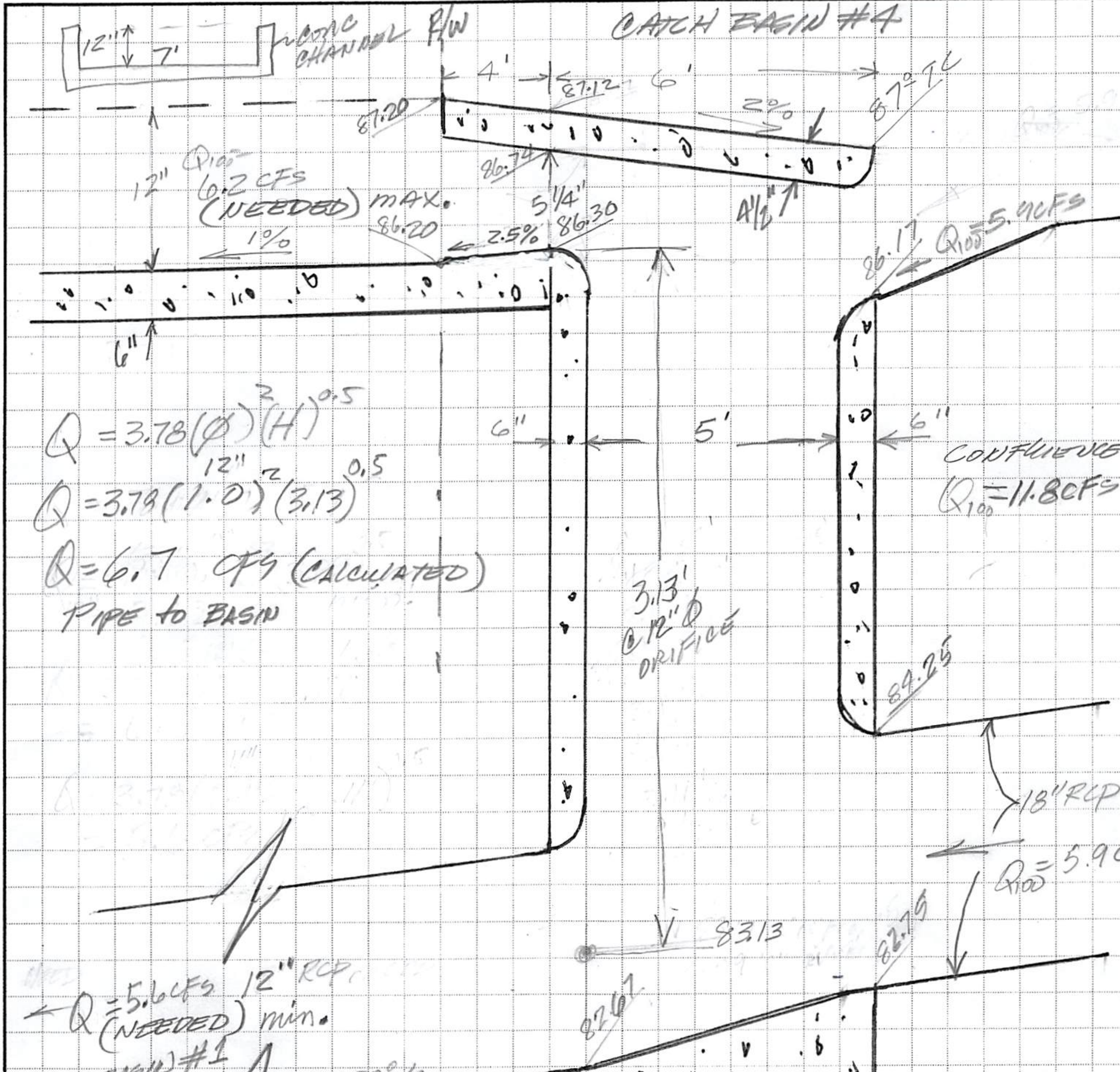
JOB RY-0324 RY-PROPERTIES

SHEET NO. ______ OF ______

CALCULATED BY GAG DATE 12-14-17

CHECKED BY ______ DATE ______

SCALE ______



$$Q = 3.78(\varnothing)^2(H)^{0.5}$$

$$Q = 3.78(1.0)^2(3.13)^{0.5}$$ (12")

$Q = 6.7$ CFS (CALCULATED)

PIPE to BASIN

$Q = 3.087(L)(H)^{3/2}$ @ CHANNEL $H = 5\frac{1}{4}" \Rightarrow 0.43'$

$Q = 3.087(7)(0.44)^{3/2} = 6.25$ CFS (CALCULATED)

(D-02) STANDARD DROP INLET CATCH BASIN (MODIFIED)

N.T.S. CATCH BASIN #4

```
T1  WSPGW LINE "A2" CATCH BASIN 3 & 4  ,  BASIN 1                              0
T2  TRACT NO. 16397, CITY OF VICTORVILLE
T3  FILE: 16397WSPGWBASIN1LINEA2.OUT
SO   1000.0003182.500  1                          3184.620
R    1035.0003182.670  1      .013                                 .000    .000 0
JX   1039.0003182.750  4  3   .013    2.800         3184.610        90.0         .000
R    1101.8003183.060  3      .013                                 .000    .000 0
SH   1101.8003183.060  3                          3189.550
CD   1  4   1    .000   1.000     .000  .000  .000   .00
CD   2  4   1    .000   1.500     .000  .000  .000   .00
CD   3  4   1    .000   1.500     .000  .000  .000   .00
CD   4  4   1    .000   1.500     .000  .000  .000   .00
Q             2.800   .0
```

```
FILE: 16397WSPGWBASIN1LINEA2.WSW          W S P G W - CIVILDESIGN Version 14.06                                    PAGE    1
                               Program Package Serial Number: 1586
                                                   WATER SURFACE PROFILE LISTING                  Date:12- 4-2017  Time: 3:23:32
                          WSPGW LINE "A2" CATCH BASIN 3 & 4  ,  BASIN 1
                            TRACT NO. 16397, CITY OF VICTORVILLE
                              FILE: 16397WSPGWBASIN1LINEA2.OUT
************************************************************************************************************************ ********
         | Invert  |  Depth |  Water   |    Q     |  Vel     Vel   |  Energy  | Super  |Critical|Flow Top|Height/|Base Wt|     |No Wth
 Station |  Elev   |  (FT)  |  Elev    |  (CFS)   | (FPS)    Head  | Grd.El.|  Elev  | Depth  | Width  |Dia.-FT|or I.D.|  ZL |Prs/Pip
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-   -|
 L/Elem  |Ch Slope |        |          |          |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |          |          |               |          |        |        |        |       |       |     |
 1000.000  3182.500   2.120  3184.620      5.60    7.13      .79  3185.41     .00      .94      .00   1.000    .000   .00   1   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-   |-
  35.000    .0049                                          .0247      .86    2.12      .00    1.00    .013      .00   .00  PIPE
         |         |        |          |          |               |          |        |        |        |       |       |     |
 1035.000  3182.670   2.815  3185.485      5.60    7.13      .79  3186.27     .00      .94      .00   1.000    .000   .00   1   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-   |-
JUNCT STR   .0200                                          .0127      .05    2.81      .00             .013      .00   .00  PIPE
         |         |        |          |          |               |          |        |        |        |       |       |     |
 1039.000  3182.750   3.649  3186.399      2.80    1.58      .04  3186.44     .00      .64      .00   1.500    .000   .00   1   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-   |-
  62.800    .0049                                          .0007      .04    3.65      .00     .64    .013      .00   .00  PIPE
         |         |        |          |          |               |          |        |        |        |       |       |     |
 1101.800  3183.060   3.384  3186.444      2.80    1.58      .04  3186.48     .00      .64      .00   1.500    .000   .00   1   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-   |-
```

```
FILE: 16397WSPGWBASIN1LINEA2.WSW          W S P G W  - EDIT LISTING - Version 14.06            Date:12- 4-2017  Time: 3:23:29
                                      WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING                         PAGE    1
 CARD  SECT  CHN   NO OF  AVE PIER  HEIGHT 1  BASE    ZL    ZR   INV   Y(1)  Y(2)  Y(3)  Y(4)  Y(5)  Y(6)  Y(7)  Y(8)  Y(9)  Y(10)
 CODE   NO   TYPE PIER/PIP WIDTH    DIAMETER  WIDTH              DROP

 CD      1    4      1           1.000
 CD      2    4      1           1.500
 CD      3    4      1           1.500
 CD      4    4      1           1.500
                                                       W S P G W                                                   PAGE NO   1
                            WATER SURFACE PROFILE - TITLE CARD LISTING
HEADING LINE NO 1 IS -
                               WSPGW LINE "A2" CATCH BASIN 3 & 4  ,  BASIN 1
HEADING LINE NO 2 IS -
                               TRACT NO. 16397, CITY OF VICTORVILLE
HEADING LINE NO 3 IS -
                               FILE: 16397WSPGWBASIN1LINEA2.OUT
                                                       W S P G W                                                   PAGE NO   2
                            WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO   1 IS A SYSTEM OUTLET     *         *     *
                     U/S DATA   STATION    INVERT  SECT                                 W S ELEV
                                1000.000 3182.500    1                                   3184.620
 ELEMENT NO   2 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                                1035.000 3182.670    1              .013                        .000     .000      .000     0
 ELEMENT NO   3 IS A JUNCTION          *         *     *     *                *                   *               *
                     U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2  N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                                1039.000 3182.750    4     3     0  .013     2.800      .000  3184.610      .000  90.000     .000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .000
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
 ELEMENT NO   4 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT              N                        RADIUS    ANGLE     ANG PT  MAN H
                                1101.800 3183.060    3              .013                        .000     .000      .000     0
 ELEMENT NO   5 IS A SYSTEM HEADWORKS                  *                      *
                     U/S DATA   STATION    INVERT  SECT                                 W S ELEV
                                1101.800 3183.060    3                                 3189.550
```

LUDWIG ENGINEERING
109 E. Third Street
San Bernardino, California 92410
(909)884-8217
Fax (909) 889-0153

JOB VI-0349

CATCH BASIN #3 AND #4 @ BASIN 1
NODE 22

CAPACITY OF CURB OPENING INLET ON A SUMP CONDITION:

HEIGHT OF CURB = 6" CF.

Q 100 = 2.8 CFS ; CATCH BASIN # 3
Q 100 = 2.8 CFS ; CATCH BASIN # 4

LOCAL DEPRESSION = 4"

PONDING DEPTH = 6" + 4" = H = 10" TO TC.

h (eff.) = 0.56'

with h = 0.56' and $\frac{H}{h} = \frac{0.833'}{0.56'} = 1.49$

PER NOMOGRAPH:

$\frac{Q}{L} = 2.0$ CFS/FT

FOR CATCH ***BASIN #1***;

$L = \frac{2.8}{2.0}$

L = 1.4' SAY 4'

FOR CATCH ***BASIN #2:***

$L = \frac{2.8}{2.0}$

L = 1.4' SAY 4'

MAXIMUM PONDING DEPTH = 6" + 4" + 0.2' = 1.033' TO R/W

H = 1.033' h = 0.56' $\frac{H}{h} = \frac{1.033'}{0.56'} = 1.84'$

PER NOMOGRAPH 1073.3

$\frac{Q}{L} = 2.6$ CFS/FT

$L = \frac{Q}{2.6} = \frac{2.8}{2.6} =$ 1.1' USE W = ***4' CATCH BASIN #3***

$L = \frac{Q}{2.6} = \frac{2.8}{2.6} =$ 1.1' USE W = ***4' CATCH BASIN #4***

```
  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 7.0
--------------------------------------------------------------------
```

7FT WIDE X 1 FT FLOWBY CHANNEL CAPACITY @ BASIN 1 NODE 22
TR 16397, CITY OF VICTORVILLE
Q=6.2 CFS (PRE-DEVELOPED CONDITION Q OUTFLOW)
FILE: 16397FLOWBYBASIN1.OUT

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


Program License Serial Number 4070

--------------------------------------------------------------------
           *** Improved Channel Analysis ***

     Upstream (headworks) Elevation =   3186.000(Ft.)
     Downstream (outlet) Elevation =   3184.860(Ft.)
     Runoff/Flow Distance =    114.000(Ft.)
     Maximum flow rate in channel(s) =      6.200(CFS)
--------------------------------------------------------------------




--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

*** CALCULATED DEPTH DATA AT FLOW =    6.20(CFS) ***
Channel base width  =    7.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru channel =      6.200(CFS)
```

Depth of flow =   0.241(Ft.)

```
Average velocity =   3.672(Ft/s)
Total flow rate in 1/2 street =   6.200(CFS)
Channel flow top width =    7.000(Ft.)
Depth of flow in channel =   0.24(Ft.)

Total number of channels (same dimensions) = 1
Flow Velocity =    3.67(Ft/s)
```

Individual channel flow =   6.200(CFS)
Total capacity of channel(s) =   6.200(CFS)

```
Sub-Channel No. 1 Critical depth =      0.289(Ft.)
  '     '       '     Critical flow top width =      7.000(Ft.)
  '     '       '     Critical flow velocity=    3.064(Ft/s)
  '     '       '     Critical flow area =      2.023(Sq.Ft)
```

Created Revised
06-Dec-17 06-Dec-17 10:21

MANNING'S EQUATION Rec/Trap/Tria

BASIN 1 Node 40 - Flowby Parkway drain to Dos Palmas- 7ft wide x .5ft depth capacity

Units (ft)	=	FEET	Area (sq ft)	=	1.37
Depth (ft)	=	<.2> <---	Velocity (ft/s)	=	4.54
Discharge (cfs)	=	<6.2>	Froude Number	=	1.81
Manning's n	=	<.015>	Critical Depth (ft)	=	0.29
Slope(decimal)	=	<.02>	Normal Depth (ft)	=	0.20
Bottom Width(ft)	=	<7>	Hydraulic Radius (ft)	=	0.18
			Depth to Centroid(ft)	=	0.10
Side Slope	=	<0>	Top Width (ft)	=	7.00

_DA 2_

BASIN 2

ONSITE PRE-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

100-YEAR; 24-HOURS STORM EVENTS

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  03/16/17

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

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


Program License Serial Number 4070

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

100-YEAR, 24-HOURS UNIT HYDROGRAPH PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA3 & AA4 (EAST OF TRAPEZOIDAL CHANNEL, BASIN 2)
FILE: 16397UNITHYDAA4PRE100YR.OUT

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

      Storm Event Year = 100

      Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
      Sub-Area        Duration        Isohyetal
      (Ac.)            (hours)         (In)
Rainfall data for year 100
          17.35            1           1.11
--------------------------------------------------------------------
Rainfall data for year 100
          17.35            6           2.38
--------------------------------------------------------------------
Rainfall data for year 100
          17.35           24           4.96
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
50.0	70.0	17.35	1.000	0.532	1.000	0.532

Area-averaged adjusted loss rate Fm (In/Hr) = 0.532

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
17.35	1.000	50.0	70.0	4.29	0.405

Area-averaged catchment yield fraction, Y = 0.405
Area-averaged low loss fraction, Yb = 0.595
User entry of time of concentration = 0.454 (hours)
+++
Watershed area = 17.35(Ac.)
Catchment Lag time = 0.363 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 22.9695
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.532(In/Hr)
Average low loss rate fraction (Yb) = 0.595 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.527(In)
Computed peak 30-minute rainfall = 0.902(In)
Specified peak 1-hour rainfall = 1.110(In)
Computed peak 3-hour rainfall = 1.772(In)
Specified peak 6-hour rainfall = 2.380(In)
Specified peak 24-hour rainfall = 4.960(In)

Rainfall depth area reduction factors:
Using a total area of 17.35(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.526(In)
30-minute factor = 0.999 Adjusted rainfall = 0.901(In)
1-hour factor = 0.999 Adjusted rainfall = 1.109(In)
3-hour factor = 1.000 Adjusted rainfall = 1.772(In)
6-hour factor = 1.000 Adjusted rainfall = 2.380(In)
24-hour factor = 1.000 Adjusted rainfall = 4.960(In)

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

+++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 209.83 (CFS))	
1	1.202	2.521
2	5.688	9.414
3	15.704	21.015
4	35.691	41.938

5	51.560	33.298
6	61.554	20.970
7	68.255	14.060
8	73.412	10.820
9	77.463	8.500
10	80.692	6.777
11	83.346	5.567
12	85.658	4.853
13	87.669	4.220
14	89.304	3.431
15	90.650	2.824
16	91.884	2.589
17	92.971	2.281
18	93.947	2.048
19	94.748	1.680
20	95.513	1.606
21	96.143	1.320
22	96.735	1.243
23	97.203	0.981
24	97.616	0.867
25	97.928	0.654
26	98.157	0.482
27	98.405	0.519
28	98.680	0.578
29	98.956	0.578
30	99.231	0.578
31	99.489	0.540
32	99.647	0.333
33	99.791	0.301
34	100.000	0.151

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5263	0.5263
2	0.6479	0.1216
3	0.7317	0.0838
4	0.7977	0.0660
5	0.8529	0.0552
6	0.9009	0.0480
7	0.9435	0.0426
8	0.9821	0.0386
9	1.0174	0.0353
10	1.0501	0.0327
11	1.0805	0.0305
12	1.1091	0.0286
13	1.1476	0.0385
14	1.1844	0.0368
15	1.2198	0.0354
16	1.2538	0.0340
17	1.2867	0.0328
18	1.3184	0.0317
19	1.3491	0.0307
20	1.3790	0.0298
21	1.4079	0.0290

238	4.4834	0.0100	
239	4.4933	0.0100	
240	4.5033	0.0099	
241	4.5132	0.0099	
242	4.5231	0.0099	
243	4.5330	0.0099	
244	4.5429	0.0099	
245	4.5527	0.0099	
246	4.5626	0.0098	
247	4.5724	0.0098	
248	4.5822	0.0098	
249	4.5920	0.0098	
250	4.6017	0.0098	
251	4.6115	0.0097	
252	4.6212	0.0097	
253	4.6309	0.0097	
254	4.6406	0.0097	
255	4.6502	0.0097	
256	4.6599	0.0097	
257	4.6695	0.0096	
258	4.6791	0.0096	
259	4.6887	0.0096	
260	4.6983	0.0096	
261	4.7079	0.0096	
262	4.7174	0.0095	
263	4.7270	0.0095	
264	4.7365	0.0095	
265	4.7460	0.0095	
266	4.7554	0.0095	
267	4.7649	0.0095	
268	4.7744	0.0094	
269	4.7838	0.0094	
270	4.7932	0.0094	
271	4.8026	0.0094	
272	4.8120	0.0094	
273	4.8213	0.0094	
274	4.8307	0.0093	
275	4.8400	0.0093	
276	4.8493	0.0093	
277	4.8586	0.0093	
278	4.8679	0.0093	
279	4.8772	0.0093	
280	4.8864	0.0093	
281	4.8957	0.0092	
282	4.9049	0.0092	
283	4.9141	0.0092	
284	4.9233	0.0092	
285	4.9325	0.0092	
286	4.9416	0.0092	
287	4.9508	0.0091	
288	4.9599	0.0091	
Unit Period	Unit Rainfall	Unit Soil-Loss	Effective Rainfall

269	0.0102	0.0061	0.0041
270	0.0101	0.0060	0.0041
271	0.0100	0.0060	0.0041
272	0.0100	0.0059	0.0040
273	0.0099	0.0059	0.0040
274	0.0099	0.0059	0.0040
275	0.0098	0.0058	0.0040
276	0.0098	0.0058	0.0039
277	0.0097	0.0058	0.0039
278	0.0097	0.0057	0.0039
279	0.0096	0.0057	0.0039
280	0.0095	0.0057	0.0039
281	0.0095	0.0057	0.0038
282	0.0094	0.0056	0.0038
283	0.0094	0.0056	0.0038
284	0.0093	0.0056	0.0038
285	0.0093	0.0055	0.0038
286	0.0093	0.0055	0.0037
287	0.0092	0.0055	0.0037
288	0.0092	0.0055	0.0037

Total soil rain loss = 2.65(In)
Total effective rainfall = 2.31(In)
Peak flow rate in flood hydrograph = 25.60(CFS)

++

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0001	0.01	Q	|	|	|	|
0+10	0.0004	0.04	Q	|	|	|	|
0+15	0.0012	0.12	Q	|	|	|	|
0+20	0.0031	0.28	Q	|	|	|	|
0+25	0.0059	0.40	Q	|	|	|	|
0+30	0.0092	0.48	Q	|	|	|	|
0+35	0.0128	0.53	Q	|	|	|	|
0+40	0.0168	0.57	Q	|	|	|	|
0+45	0.0210	0.61	Q	|	|	|	|
0+50	0.0253	0.63	Q	|	|	|	|
0+55	0.0298	0.65	Q	|	|	|	|
1+ 0	0.0345	0.67	Q	|	|	|	|
1+ 5	0.0392	0.69	Q	|	|	|	|
1+10	0.0441	0.71	Q	|	|	|	|
1+15	0.0491	0.72	Q	|	|	|	|
1+20	0.0541	0.73	Q	|	|	|	|
1+25	0.0592	0.74	Q	|	|	|	|
1+30	0.0643	0.75	Q	|	|	|	|
1+35	0.0696	0.76	VQ	|	|	|	|

```
1+40        0.0748       0.77  VQ         |          |          |          |
1+45        0.0802       0.77  VQ         |          |          |          |
1+50        0.0855       0.78  |Q         |          |          |          |
1+55        0.0909       0.79  |Q         |          |          |          |
2+ 0        0.0964       0.79  |Q         |          |          |          |
2+ 5        0.1018       0.79  |Q         |          |          |          |
2+10        0.1073       0.80  |Q         |          |          |          |
2+15        0.1129       0.80  |Q         |          |          |          |
2+20        0.1184       0.81  |Q         |          |          |          |
2+25        0.1240       0.81  |Q         |          |          |          |
2+30        0.1296       0.82  |Q         |          |          |          |
2+35        0.1353       0.82  |Q         |          |          |          |
2+40        0.1410       0.82  |Q         |          |          |          |
2+45        0.1467       0.83  |Q         |          |          |          |
2+50        0.1524       0.83  |Q         |          |          |          |
2+55        0.1581       0.83  |Q         |          |          |          |
3+ 0        0.1639       0.84  |Q         |          |          |          |
3+ 5        0.1696       0.84  |QV        |          |          |          |
3+10        0.1754       0.84  |QV        |          |          |          |
3+15        0.1812       0.84  |QV        |          |          |          |
3+20        0.1870       0.84  |QV        |          |          |          |
3+25        0.1929       0.85  |QV        |          |          |          |
3+30        0.1987       0.85  |QV        |          |          |          |
3+35        0.2046       0.85  |QV        |          |          |          |
3+40        0.2105       0.86  |QV        |          |          |          |
3+45        0.2164       0.86  |QV        |          |          |          |
3+50        0.2223       0.86  |QV        |          |          |          |
3+55        0.2283       0.86  |QV        |          |          |          |
4+ 0        0.2342       0.87  |QV        |          |          |          |
4+ 5        0.2402       0.87  |QV        |          |          |          |
4+10        0.2462       0.87  |QV        |          |          |          |
4+15        0.2522       0.87  |Q V       |          |          |          |
4+20        0.2583       0.88  |Q V       |          |          |          |
4+25        0.2643       0.88  |Q V       |          |          |          |
4+30        0.2704       0.88  |Q V       |          |          |          |
4+35        0.2765       0.89  |Q V       |          |          |          |
4+40        0.2826       0.89  |Q V       |          |          |          |
4+45        0.2887       0.89  |Q V       |          |          |          |
4+50        0.2949       0.89  |Q V       |          |          |          |
4+55        0.3011       0.90  |Q V       |          |          |          |
5+ 0        0.3073       0.90  |Q V       |          |          |          |
5+ 5        0.3135       0.90  |Q V       |          |          |          |
5+10        0.3197       0.91  |Q V       |          |          |          |
5+15        0.3260       0.91  |Q V       |          |          |          |
5+20        0.3323       0.91  |Q V       |          |          |          |
5+25        0.3386       0.92  |Q  V      |          |          |          |
5+30        0.3449       0.92  |Q  V      |          |          |          |
5+35        0.3513       0.92  |Q  V      |          |          |          |
5+40        0.3576       0.93  |Q  V      |          |          |          |
5+45        0.3640       0.93  |Q  V      |          |          |          |
5+50        0.3704       0.93  |Q  V      |          |          |          |
5+55        0.3769       0.94  |Q  V      |          |          |          |
6+ 0        0.3834       0.94  |Q  V      |          |          |          |
6+ 5        0.3899       0.94  |Q  V      |          |          |          |
```

```
 6+10       0.3964      0.95  |Q  V     |         |         |         |
 6+15       0.4029      0.95  |Q  V     |         |         |         |
 6+20       0.4095      0.95  |Q  V     |         |         |         |
 6+25       0.4161      0.96  |Q  V     |         |         |         |
 6+30       0.4227      0.96  |Q   V    |         |         |         |
 6+35       0.4293      0.96  |Q   V    |         |         |         |
 6+40       0.4360      0.97  |Q   V    |         |         |         |
 6+45       0.4427      0.97  |Q   V    |         |         |         |
 6+50       0.4494      0.98  |Q   V    |         |         |         |
 6+55       0.4562      0.98  |Q   V    |         |         |         |
 7+ 0       0.4629      0.98  |Q   V    |         |         |         |
 7+ 5       0.4697      0.99  |Q   V    |         |         |         |
 7+10       0.4766      0.99  |Q   V    |         |         |         |
 7+15       0.4834      1.00  |Q   V    |         |         |         |
 7+20       0.4903      1.00  |Q   V    |         |         |         |
 7+25       0.4972      1.00  |Q   V    |         |         |         |
 7+30       0.5042      1.01  |Q    V   |         |         |         |
 7+35       0.5112      1.01  |Q    V   |         |         |         |
 7+40       0.5182      1.02  |Q    V   |         |         |         |
 7+45       0.5252      1.02  |Q    V   |         |         |         |
 7+50       0.5323      1.03  |Q    V   |         |         |         |
 7+55       0.5394      1.03  |Q    V   |         |         |         |
 8+ 0       0.5465      1.04  |Q    V   |         |         |         |
 8+ 5       0.5537      1.04  |Q    V   |         |         |         |
 8+10       0.5609      1.05  |Q    V   |         |         |         |
 8+15       0.5681      1.05  |Q    V   |         |         |         |
 8+20       0.5754      1.06  |Q    V   |         |         |         |
 8+25       0.5827      1.06  |Q    V   |         |         |         |
 8+30       0.5901      1.07  |Q     V  |         |         |         |
 8+35       0.5974      1.07  |Q     V  |         |         |         |
 8+40       0.6049      1.08  |Q     V  |         |         |         |
 8+45       0.6123      1.08  |Q     V  |         |         |         |
 8+50       0.6198      1.09  |Q     V  |         |         |         |
 8+55       0.6273      1.09  |Q     V  |         |         |         |
 9+ 0       0.6349      1.10  |Q     V  |         |         |         |
 9+ 5       0.6425      1.10  |Q     V  |         |         |         |
 9+10       0.6501      1.11  |Q     V  |         |         |         |
 9+15       0.6578      1.12  |Q     V  |         |         |         |
 9+20       0.6656      1.12  |Q     V  |         |         |         |
 9+25       0.6733      1.13  |Q      V |         |         |         |
 9+30       0.6811      1.13  |Q      V |         |         |         |
 9+35       0.6890      1.14  |Q      V |         |         |         |
 9+40       0.6969      1.15  |Q      V |         |         |         |
 9+45       0.7048      1.15  |Q      V |         |         |         |
 9+50       0.7128      1.16  |Q      V |         |         |         |
 9+55       0.7209      1.17  |Q      V |         |         |         |
10+ 0       0.7290      1.17  |Q      V |         |         |         |
10+ 5       0.7371      1.18  |Q      V |         |         |         |
10+10       0.7453      1.19  |Q      V |         |         |         |
10+15       0.7535      1.20  |Q       V|         |         |         |
10+20       0.7618      1.20  |Q       V|         |         |         |
10+25       0.7702      1.21  |Q       V|         |         |         |
10+30       0.7785      1.22  |Q       V|         |         |         |
10+35       0.7870      1.23  |Q       V|         |         |         |
```

```
10+40       0.7955      1.24  |Q       V|         |         |         |
10+45       0.8041      1.24  |Q       V|         |         |         |
10+50       0.8127      1.25  |Q       V|         |         |         |
10+55       0.8214      1.26  |Q       V|         |         |         |
11+ 0       0.8301      1.27  |Q       V|         |         |         |
11+ 5       0.8389      1.28  |Q        V         |         |         |
11+10       0.8478      1.29  |Q        V         |         |         |
11+15       0.8567      1.30  |Q        V         |         |         |
11+20       0.8657      1.31  |Q        V         |         |         |
11+25       0.8748      1.32  |Q        V         |         |         |
11+30       0.8839      1.33  |Q        V         |         |         |
11+35       0.8931      1.34  |Q        V         |         |         |
11+40       0.9024      1.35  |Q        V         |         |         |
11+45       0.9118      1.36  |Q        V         |         |         |
11+50       0.9212      1.37  |Q        |V        |         |         |
11+55       0.9307      1.38  |Q        |V        |         |         |
12+ 0       0.9403      1.39  |Q        |V        |         |         |
12+ 5       0.9500      1.40  |Q        |V        |         |         |
12+10       0.9596      1.40  |Q        |V        |         |         |
12+15       0.9692      1.39  |Q        |V        |         |         |
12+20       0.9784      1.34  |Q        |V        |         |         |
12+25       0.9874      1.31  |Q        |V        |         |         |
12+30       0.9963      1.29  |Q        |V        |         |         |
12+35       1.0052      1.29  |Q        | V       |         |         |
12+40       1.0140      1.29  |Q        | V       |         |         |
12+45       1.0229      1.29  |Q        | V       |         |         |
12+50       1.0319      1.30  |Q        | V       |         |         |
12+55       1.0409      1.31  |Q        | V       |         |         |
13+ 0       1.0499      1.32  |Q        | V       |         |         |
13+ 5       1.0591      1.33  |Q        | V       |         |         |
13+10       1.0683      1.34  |Q        | V       |         |         |
13+15       1.0776      1.36  |Q        | V       |         |         |
13+20       1.0871      1.37  |Q        |  V      |         |         |
13+25       1.0967      1.39  |Q        |  V      |         |         |
13+30       1.1064      1.41  |Q        |  V      |         |         |
13+35       1.1162      1.43  |Q        |  V      |         |         |
13+40       1.1262      1.45  |Q        |  V      |         |         |
13+45       1.1363      1.47  |Q        |  V      |         |         |
13+50       1.1467      1.50  |Q        |  V      |         |         |
13+55       1.1571      1.52  | Q       |  V      |         |         |
14+ 0       1.1678      1.55  | Q       |   V     |         |         |
14+ 5       1.1787      1.58  | Q       |   V     |         |         |
14+10       1.1898      1.61  | Q       |   V     |         |         |
14+15       1.2011      1.64  | Q       |   V     |         |         |
14+20       1.2127      1.68  | Q       |   V     |         |         |
14+25       1.2245      1.72  | Q       |   V     |         |         |
14+30       1.2366      1.76  | Q       |   V     |         |         |
14+35       1.2491      1.80  | Q       |   V     |         |         |
14+40       1.2618      1.85  | Q       |    V    |         |         |
14+45       1.2749      1.90  | Q       |    V    |         |         |
14+50       1.2883      1.95  | Q       |    V    |         |         |
14+55       1.3021      2.01  | Q       |    V    |         |         |
15+ 0       1.3165      2.08  | Q       |    V    |         |         |
15+ 5       1.3312      2.15  | Q       |    V    |         |         |
```

```
15+10       1.3466      2.23  | Q       |     V   |         |         |
15+15       1.3625      2.31  |  Q      |     V   |         |         |
15+20       1.3791      2.41  |  Q      |     V   |         |         |
15+25       1.3963      2.51  |  Q      |     V   |         |         |
15+30       1.4142      2.59  |  Q      |     V   |         |         |
15+35       1.4323      2.63  |  Q      |      V  |         |         |
15+40       1.4502      2.60  |  Q      |         |         |         |
15+45       1.4684      2.64  |  Q      |         |         |         |
15+50       1.4876      2.79  |  Q      |         |         |         |
15+55       1.5087      3.06  |   Q     |         |         |         |
16+ 0       1.5337      3.63  |   Q     |       V |         |         |
16+ 5       1.5728      5.67  |      Q  |       V |         |         |
16+10       1.6421     10.07  |         |  Q     V|         |         |
16+15       1.7562     16.57  |         |         |VQ       |         |
16+20       1.9325     25.60  |         |         |  V      |   Q     |
16+25       2.0763     20.87  |         |         |   V  Q  |         |
16+30       2.1763     14.52  |         |        Q|     V   |         |
16+35       2.2508     10.83  |         |   Q     |      V  |         |
16+40       2.3128      9.00  |         | Q       |      V  |         |
16+45       2.3656      7.66  |         Q         |       V |         |
16+50       2.4110      6.60  |       Q |         |       V |         |
16+55       2.4511      5.81  |      Q  |         |        V|         |
17+ 0       2.4874      5.27  |      Q  |         |        V|         |
17+ 5       2.5203      4.78  |     Q   |         |         V         |
17+10       2.5495      4.24  |    Q    |         |         V         |
17+15       2.5758      3.82  |    Q    |         |         V         |
17+20       2.6004      3.57  |   Q     |         |         |V        |
17+25       2.6232      3.31  |   Q     |         |         |V        |
17+30       2.6445      3.09  |   Q     |         |         |V        |
17+35       2.6639      2.82  |  Q      |         |         |V        |
17+40       2.6824      2.69  |  Q      |         |         | V       |
17+45       2.6995      2.47  |  Q      |         |         | V       |
17+50       2.7157      2.35  |  Q      |         |         | V       |
17+55       2.7305      2.16  | Q       |         |         | V       |
18+ 0       2.7445      2.03  | Q       |         |         | V       |
18+ 5       2.7574      1.87  | Q       |         |         |  V      |
18+10       2.7695      1.76  | Q       |         |         |  V      |
18+15       2.7816      1.76  | Q       |         |         |  V      |
18+20       2.7940      1.80  | Q       |         |         |  V      |
18+25       2.8065      1.81  | Q       |         |         |  V      |
18+30       2.8188      1.79  | Q       |         |         |  V      |
18+35       2.8308      1.74  | Q       |         |         |  V      |
18+40       2.8420      1.62  | Q       |         |         |   V     |
18+45       2.8528      1.57  | Q       |         |         |   V     |
18+50       2.8629      1.47  |Q        |         |         |   V     |
18+55       2.8724      1.38  |Q        |         |         |   V     |
19+ 0       2.8818      1.36  |Q        |         |         |   V     |
19+ 5       2.8910      1.34  |Q        |         |         |   V     |
19+10       2.9001      1.32  |Q        |         |         |   V     |
19+15       2.9090      1.30  |Q        |         |         |   V     |
19+20       2.9178      1.28  |Q        |         |         |    V    |
19+25       2.9265      1.26  |Q        |         |         |    V    |
19+30       2.9351      1.25  |Q        |         |         |    V    |
19+35       2.9436      1.23  |Q        |         |         |    V    |
```

100-YR, 24-HR
Q100= 25.6 CFS
PRE-DEVELOPED

```
19+40       2.9520      1.22  |Q        |         |         |    V    |
19+45       2.9603      1.20  |Q        |         |         |    V    |
19+50       2.9685      1.19  |Q        |         |         |    V    |
19+55       2.9765      1.17  |Q        |         |         |    V    |
20+ 0       2.9845      1.16  |Q        |         |         |    V    |
20+ 5       2.9924      1.15  |Q        |         |         |    V    |
20+10       3.0003      1.14  |Q        |         |         |     V   |
20+15       3.0080      1.12  |Q        |         |         |     V   |
20+20       3.0157      1.11  |Q        |         |         |     V   |
20+25       3.0232      1.10  |Q        |         |         |     V   |
20+30       3.0307      1.09  |Q        |         |         |     V   |
20+35       3.0382      1.08  |Q        |         |         |     V   |
20+40       3.0455      1.07  |Q        |         |         |     V   |
20+45       3.0528      1.06  |Q        |         |         |     V   |
20+50       3.0601      1.05  |Q        |         |         |     V   |
20+55       3.0672      1.04  |Q        |         |         |     V   |
21+ 0       3.0743      1.03  |Q        |         |         |     V   |
21+ 5       3.0813      1.02  |Q        |         |         |     V   |
21+10       3.0883      1.01  |Q        |         |         |      V  |
21+15       3.0952      1.00  |Q        |         |         |      V  |
21+20       3.1021      0.99  |Q        |         |         |      V  |
21+25       3.1089      0.99  |Q        |         |         |      V  |
21+30       3.1156      0.98  |Q        |         |         |      V  |
21+35       3.1223      0.97  |Q        |         |         |      V  |
21+40       3.1289      0.96  |Q        |         |         |      V  |
21+45       3.1355      0.95  |Q        |         |         |      V  |
21+50       3.1420      0.95  |Q        |         |         |      V  |
21+55       3.1485      0.94  |Q        |         |         |      V  |
22+ 0       3.1549      0.93  |Q        |         |         |      V  |
22+ 5       3.1613      0.93  |Q        |         |         |      V  |
22+10       3.1676      0.92  |Q        |         |         |       V |
22+15       3.1739      0.91  |Q        |         |         |       V |
22+20       3.1802      0.91  |Q        |         |         |       V |
22+25       3.1864      0.90  |Q        |         |         |       V |
22+30       3.1925      0.89  |Q        |         |         |       V |
22+35       3.1987      0.89  |Q        |         |         |       V |
22+40       3.2047      0.88  |Q        |         |         |       V |
22+45       3.2108      0.88  |Q        |         |         |       V |
22+50       3.2168      0.87  |Q        |         |         |       V |
22+55       3.2228      0.87  |Q        |         |         |       V |
23+ 0       3.2287      0.86  |Q        |         |         |       V |
23+ 5       3.2346      0.86  |Q        |         |         |       V |
23+10       3.2404      0.85  |Q        |         |         |       V |
23+15       3.2463      0.85  |Q        |         |         |       V |
23+20       3.2521      0.84  |Q        |         |         |        V|
23+25       3.2578      0.84  |Q        |         |         |        V|
23+30       3.2635      0.83  |Q        |         |         |        V|
23+35       3.2692      0.83  |Q        |         |         |        V|
23+40       3.2749      0.82  |Q        |         |         |        V|
23+45       3.2805      0.82  |Q        |         |         |        V|
23+50       3.2861      0.81  |Q        |         |         |        V|
23+55       3.2917      0.81  |Q        |         |         |        V|
24+ 0       3.2972      0.80  |Q        |         |         |        V|
-----------------------------------------------------------------------
```

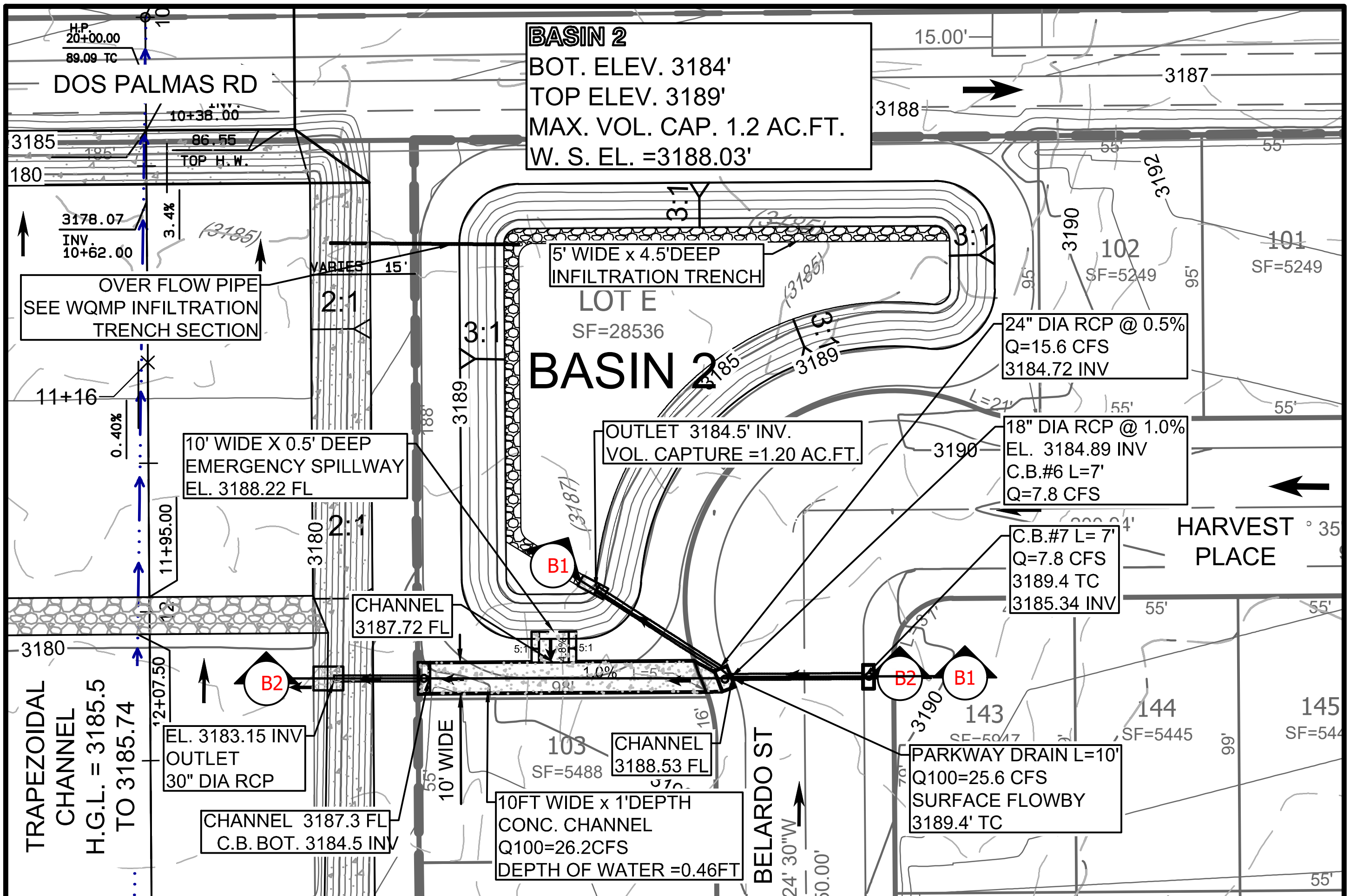
DA 2   DMA A

BASIN 2

ONSITE POST-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

100-YEAR; 24-HOURS STORM EVENTS



BASIN 2 STAGE STORAGE TABLE

ELEV	AREA (sq. ft.)	DEPTH (ft)	AREA (ac. ft.)	VOLUME (ac. ft.)	COML. VOL. (ac. ft.)	VOLUME VOL. (cu. ft.)
3,184.000	8869.3	N/A	0.204			
				0.2209	0.2209	9623
3,185.000	10,377.5	1.000	0.238			
				0.2562	0.4771	20783
3,186.000	11,941.91	1.000	0.274			
				0.2928	0.7699	33536
3,187.000	13,562.89	1.000	0.311			
				0.3306	1.1005	47937
3,188.000	15,240.56	1.000	0.350			
				0.3698	1.4703	64045
3,189.000	16,974.90	1.000	0.390			
					TOTAL VOLUME	64,045
VOLUME CAPTURE = 1.2 AC.FT.			WATER SURFACE ELEVATION =3188.03'			

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Civil Engineering • Surveying • Planning

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Lake Havasu City, AZ 86403
Phone: 928-680-6060
Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397
ONSITE DRAINAGE BASIN 2 PLAN

CLIENT:
RY PROPERTIES

SCALE 1":60'

SHEET 1 OF 3

DESIGNED BY: AG | DRAWN BY: LC | CHECKED BY: JF

D-1

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  11/29/17

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

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


Program License Serial Number 4070

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

100-YEAR, 24-HOURS UNIT HYDROGRAPH POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A5a TO A7 (EAST OF TRAPEZOIDAL CHANNEL) DA 2 DMA-A
FILE: 16397UNITHYDA5POSTE100YR.OUT

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

     Storm Event Year = 100

     Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
      Sub-Area        Duration        Isohyetal
      (Ac.)            (hours)         (In)
Rainfall data for year 100
          16.87           1          1.11
--------------------------------------------------------------------
Rainfall data for year 100
          16.87           6          2.38
--------------------------------------------------------------------
Rainfall data for year 100
          16.87          24          4.96
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
76.0	91.6	16.87	1.000	0.163	0.500	0.081

Area-averaged adjusted loss rate Fm (In/Hr) = 0.081

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
8.44	0.500	76.0	91.6	0.92	0.808
8.44	0.500	98.0	98.0	0.20	0.952

Area-averaged catchment yield fraction, Y = 0.880
Area-averaged low loss fraction, Yb = 0.120
User entry of time of concentration = 0.211 (hours)
++
Watershed area = 16.87(Ac.)
Catchment Lag time = 0.169 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 49.4384
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.081(In/Hr)
Average low loss rate fraction (Yb) = 0.120 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.527(In)
Computed peak 30-minute rainfall = 0.902(In)
Specified peak 1-hour rainfall = 1.110(In)
Computed peak 3-hour rainfall = 1.772(In)
Specified peak 6-hour rainfall = 2.380(In)
Specified peak 24-hour rainfall = 4.960(In)

Rainfall depth area reduction factors:
Using a total area of 16.87(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.526(In)
30-minute factor = 0.999 Adjusted rainfall = 0.901(In)
1-hour factor = 0.999 Adjusted rainfall = 1.109(In)
3-hour factor = 1.000 Adjusted rainfall = 1.772(In)
6-hour factor = 1.000 Adjusted rainfall = 2.380(In)
24-hour factor = 1.000 Adjusted rainfall = 4.960(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 204.02 (CFS))		
1	3.889	7.935
2	29.849	52.964
3	60.051	61.618

4	73.391	27.215
5	81.145	15.821
6	86.327	10.572
7	89.961	7.414
8	92.580	5.343
9	94.586	4.093
10	96.109	3.108
11	97.241	2.310
12	97.982	1.512
13	98.517	1.090
14	99.109	1.209
15	99.602	1.005
16	100.000	0.812

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5263	0.5263
2	0.6479	0.1216
3	0.7317	0.0838
4	0.7977	0.0660
5	0.8529	0.0552
6	0.9009	0.0480
7	0.9435	0.0426
8	0.9821	0.0386
9	1.0174	0.0353
10	1.0501	0.0327
11	1.0805	0.0305
12	1.1091	0.0286
13	1.1476	0.0385
14	1.1845	0.0368
15	1.2198	0.0354
16	1.2538	0.0340
17	1.2867	0.0328
18	1.3184	0.0317
19	1.3492	0.0307
20	1.3790	0.0298
21	1.4080	0.0290
22	1.4362	0.0282
23	1.4636	0.0275
24	1.4904	0.0268
25	1.5166	0.0262
26	1.5422	0.0256
27	1.5672	0.0250
28	1.5917	0.0245
29	1.6157	0.0240
30	1.6392	0.0235
31	1.6623	0.0231
32	1.6849	0.0227
33	1.7072	0.0222
34	1.7290	0.0219
35	1.7505	0.0215
36	1.7717	0.0212
37	1.7925	0.0208
38	1.8129	0.0205

255	4.6502	0.0097
256	4.6599	0.0097
257	4.6695	0.0096
258	4.6791	0.0096
259	4.6887	0.0096
260	4.6983	0.0096
261	4.7079	0.0096
262	4.7174	0.0095
263	4.7270	0.0095
264	4.7365	0.0095
265	4.7460	0.0095
266	4.7555	0.0095
267	4.7649	0.0095
268	4.7744	0.0094
269	4.7838	0.0094
270	4.7932	0.0094
271	4.8026	0.0094
272	4.8120	0.0094
273	4.8213	0.0094
274	4.8307	0.0093
275	4.8400	0.0093
276	4.8493	0.0093
277	4.8586	0.0093
278	4.8679	0.0093
279	4.8772	0.0093
280	4.8864	0.0093
281	4.8957	0.0092
282	4.9049	0.0092
283	4.9141	0.0092
284	4.9233	0.0092
285	4.9325	0.0092
286	4.9416	0.0092
287	4.9508	0.0091
288	4.9599	0.0091

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0091	0.0011	0.0080
2	0.0091	0.0011	0.0080
3	0.0092	0.0011	0.0081
4	0.0092	0.0011	0.0081
5	0.0092	0.0011	0.0081
6	0.0092	0.0011	0.0081
7	0.0093	0.0011	0.0082
8	0.0093	0.0011	0.0082
9	0.0093	0.0011	0.0082
10	0.0093	0.0011	0.0082
11	0.0094	0.0011	0.0082
12	0.0094	0.0011	0.0083
13	0.0094	0.0011	0.0083
14	0.0094	0.0011	0.0083
15	0.0095	0.0011	0.0083

286	0.0093	0.0011	0.0081
287	0.0092	0.0011	0.0081
288	0.0092	0.0011	0.0081

```
----------------------------------------------------------------------
----------------------------------------------------------------------
Total soil rain loss =      0.53(In)
Total effective rainfall =      4.43(In)
Peak flow rate in flood hydrograph =     41.23(CFS)
-----------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
               R u n o f f      H y d r o g r a p h
----------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       12.5      25.0      37.5      50.0
-----------------------------------------------------------------------
  0+ 5       0.0004      0.06  Q         |         |         |         |
  0+10       0.0038      0.49  Q         |         |         |         |
  0+15       0.0106      0.99  Q         |         |         |         |
  0+20       0.0189      1.21  Q         |         |         |         |
  0+25       0.0281      1.34  VQ        |         |         |         |
  0+30       0.0379      1.42  VQ        |         |         |         |
  0+35       0.0482      1.49  VQ        |         |         |         |
  0+40       0.0587      1.53  VQ        |         |         |         |
  0+45       0.0696      1.57  VQ        |         |         |         |
  0+50       0.0806      1.60  VQ        |         |         |         |
  0+55       0.0918      1.62  VQ        |         |         |         |
  1+ 0       0.1030      1.64  VQ        |         |         |         |
  1+ 5       0.1144      1.65  VQ        |         |         |         |
  1+10       0.1259      1.67  VQ        |         |         |         |
  1+15       0.1375      1.68  VQ        |         |         |         |
  1+20       0.1491      1.69  VQ        |         |         |         |
  1+25       0.1608      1.69  |Q        |         |         |         |
  1+30       0.1725      1.70  |Q        |         |         |         |
  1+35       0.1842      1.70  |Q        |         |         |         |
  1+40       0.1959      1.71  |Q        |         |         |         |
  1+45       0.2077      1.71  |Q        |         |         |         |
  1+50       0.2196      1.72  |Q        |         |         |         |
  1+55       0.2314      1.72  |Q        |         |         |         |
  2+ 0       0.2433      1.73  |Q        |         |         |         |
  2+ 5       0.2552      1.73  |Q        |         |         |         |
  2+10       0.2672      1.74  |Q        |         |         |         |
  2+15       0.2792      1.74  |Q        |         |         |         |
  2+20       0.2912      1.75  |Q        |         |         |         |
  2+25       0.3032      1.75  |Q        |         |         |         |
  2+30       0.3153      1.76  |QV       |         |         |         |
  2+35       0.3274      1.76  |QV       |         |         |         |
  2+40       0.3396      1.77  |QV       |         |         |         |
  2+45       0.3518      1.77  |QV       |         |         |         |
  2+50       0.3640      1.78  |QV       |         |         |         |
  2+55       0.3763      1.78  |QV       |         |         |         |
  3+ 0       0.3886      1.79  |QV       |         |         |         |
```

3+ 5	0.4009	1.79	QV			
3+10	0.4133	1.80	QV			
3+15	0.4257	1.80	QV			
3+20	0.4381	1.81	QV			
3+25	0.4506	1.81	QV			
3+30	0.4631	1.82	QV			
3+35	0.4757	1.82	Q V			
3+40	0.4883	1.83	Q V			
3+45	0.5009	1.84	Q V			
3+50	0.5136	1.84	Q V			
3+55	0.5263	1.85	Q V			
4+ 0	0.5391	1.85	Q V			
4+ 5	0.5519	1.86	Q V			
4+10	0.5647	1.86	Q V			
4+15	0.5776	1.87	Q V			
4+20	0.5905	1.88	Q V			
4+25	0.6035	1.88	Q V			
4+30	0.6165	1.89	Q V			
4+35	0.6296	1.90	Q V			
4+40	0.6427	1.90	Q V			
4+45	0.6558	1.91	Q V			
4+50	0.6690	1.91	Q V			
4+55	0.6822	1.92	Q V			
5+ 0	0.6955	1.93	Q V			
5+ 5	0.7088	1.93	Q V			
5+10	0.7222	1.94	Q V			
5+15	0.7356	1.95	Q V			
5+20	0.7491	1.96	Q V			
5+25	0.7626	1.96	Q V			
5+30	0.7761	1.97	Q V			
5+35	0.7898	1.98	Q V			
5+40	0.8034	1.98	Q V			
5+45	0.8171	1.99	Q V			
5+50	0.8309	2.00	Q V			
5+55	0.8447	2.01	Q V			
6+ 0	0.8586	2.01	Q V			
6+ 5	0.8725	2.02	Q V			
6+10	0.8865	2.03	Q V			
6+15	0.9005	2.04	Q V			
6+20	0.9146	2.04	Q V			
6+25	0.9287	2.05	Q V			
6+30	0.9429	2.06	Q V			
6+35	0.9572	2.07	Q V			
6+40	0.9715	2.08	Q V			
6+45	0.9859	2.09	Q V			
6+50	1.0003	2.09	Q V			
6+55	1.0148	2.10	Q V			
7+ 0	1.0293	2.11	Q V			
7+ 5	1.0439	2.12	Q V			
7+10	1.0586	2.13	Q V			
7+15	1.0733	2.14	Q V			
7+20	1.0881	2.15	Q V			
7+25	1.1030	2.16	Q V			
7+30	1.1179	2.17	Q V			

```
 7+35       1.1329      2.18  |Q     V  |         |         |         |
 7+40       1.1480      2.19  |Q     V  |         |         |         |
 7+45       1.1631      2.20  |Q     V  |         |         |         |
 7+50       1.1783      2.21  |Q     V  |         |         |         |
 7+55       1.1936      2.22  |Q     V  |         |         |         |
 8+ 0       1.2090      2.23  |Q     V  |         |         |         |
 8+ 5       1.2244      2.24  |Q     V  |         |         |         |
 8+10       1.2399      2.25  |Q     V  |         |         |         |
 8+15       1.2554      2.26  |Q      V |         |         |         |
 8+20       1.2711      2.27  |Q      V |         |         |         |
 8+25       1.2868      2.28  |Q      V |         |         |         |
 8+30       1.3026      2.29  |Q      V |         |         |         |
 8+35       1.3185      2.31  |Q      V |         |         |         |
 8+40       1.3345      2.32  |Q      V |         |         |         |
 8+45       1.3505      2.33  |Q      V |         |         |         |
 8+50       1.3666      2.34  |Q      V |         |         |         |
 8+55       1.3829      2.35  |Q      V |         |         |         |
 9+ 0       1.3992      2.37  |Q      V |         |         |         |
 9+ 5       1.4155      2.38  |Q       V|         |         |         |
 9+10       1.4320      2.39  |Q       V|         |         |         |
 9+15       1.4486      2.41  |Q       V|         |         |         |
 9+20       1.4653      2.42  |Q       V|         |         |         |
 9+25       1.4820      2.43  |Q       V|         |         |         |
 9+30       1.4989      2.45  |Q       V|         |         |         |
 9+35       1.5158      2.46  |Q       V|         |         |         |
 9+40       1.5329      2.48  |Q       V|         |         |         |
 9+45       1.5500      2.49  |Q       V|         |         |         |
 9+50       1.5673      2.51  | Q       V         |         |         |
 9+55       1.5846      2.52  | Q       V         |         |         |
10+ 0       1.6021      2.54  | Q       V         |         |         |
10+ 5       1.6197      2.55  | Q       V         |         |         |
10+10       1.6374      2.57  | Q       V         |         |         |
10+15       1.6552      2.59  | Q       V         |         |         |
10+20       1.6731      2.60  | Q       V         |         |         |
10+25       1.6911      2.62  | Q       V         |         |         |
10+30       1.7093      2.64  | Q       V         |         |         |
10+35       1.7276      2.65  | Q       |V        |         |         |
10+40       1.7460      2.67  | Q       |V        |         |         |
10+45       1.7645      2.69  | Q       |V        |         |         |
10+50       1.7832      2.71  | Q       |V        |         |         |
10+55       1.8020      2.73  | Q       |V        |         |         |
11+ 0       1.8210      2.75  | Q       |V        |         |         |
11+ 5       1.8401      2.77  | Q       |V        |         |         |
11+10       1.8593      2.79  | Q       |V        |         |         |
11+15       1.8787      2.81  | Q       | V       |         |         |
11+20       1.8982      2.84  | Q       | V       |         |         |
11+25       1.9179      2.86  | Q       | V       |         |         |
11+30       1.9377      2.88  | Q       | V       |         |         |
11+35       1.9578      2.91  | Q       | V       |         |         |
11+40       1.9779      2.93  | Q       | V       |         |         |
11+45       1.9983      2.96  | Q       | V       |         |         |
11+50       2.0188      2.98  | Q       | V       |         |         |
11+55       2.0395      3.01  | Q       |  V      |         |         |
12+ 0       2.0604      3.04  | Q       |  V      |         |         |
```

TIME	Q	VOL
12+ 5	2.0814	3.04
12+10	2.1014	2.91
12+15	2.1203	2.75
12+20	2.1389	2.70
12+25	2.1574	2.68
12+30	2.1759	2.68
12+35	2.1944	2.69
12+40	2.2131	2.71
12+45	2.2319	2.74
12+50	2.2510	2.76
12+55	2.2702	2.79
13+ 0	2.2897	2.83
13+ 5	2.3095	2.87
13+10	2.3295	2.91
13+15	2.3498	2.95
13+20	2.3705	3.00
13+25	2.3914	3.04
13+30	2.4128	3.10
13+35	2.4345	3.15
13+40	2.4566	3.21
13+45	2.4791	3.27
13+50	2.5020	3.33
13+55	2.5254	3.40
14+ 0	2.5493	3.47
14+ 5	2.5737	3.54
14+10	2.5986	3.62
14+15	2.6242	3.71
14+20	2.6504	3.80
14+25	2.6772	3.90
14+30	2.7047	4.00
14+35	2.7331	4.11
14+40	2.7622	4.23
14+45	2.7922	4.36
14+50	2.8233	4.51
14+55	2.8554	4.66
15+ 0	2.8887	4.83
15+ 5	2.9233	5.02
15+10	2.9593	5.24
15+15	2.9971	5.48
15+20	3.0367	5.76
15+25	3.0780	5.99
15+30	3.1180	5.81
15+35	3.1565	5.60
15+40	3.1967	5.82
15+45	3.2400	6.29
15+50	3.2885	7.05
15+55	3.3455	8.27
16+ 0	3.4197	10.78
16+ 5	3.5444	18.10
16+10	3.8144	39.22
16+15	**4.0984**	**41.23**
16+20	4.2615	23.68
16+25	4.3751	16.49
16+30	4.4652	13.09

0 12.5 25 37.5 50

16+7

16+19

12 MIN

VOLUME = $\frac{15.6 \times 60 \times 12}{2 \times 43560}$

VOLUME = 0.129 AC.FT.

VOLUME = 5,616 CU.FT.

100-Yr, 24-Hours
Q100=25.6CFS
PRE-DEVELOPED

QDIFF=15.6 CFS

BASIN 2
100-Yr, 24-Hours
Q100=41.2 CFS
POST-DEVELOPED

DA 2 DMA-A

```
16+35       4.5416     11.09  |       Q |         |        V|         |
16+40       4.6068      9.47  |      Q  |         |        V|         |
16+45       4.6639      8.29  |     Q   |         |        V|         |
16+50       4.7142      7.30  |    Q    |         |         V         |
16+55       4.7588      6.47  |    Q    |         |         V         |
17+ 0       4.7982      5.72  |   Q     |         |         V         |
17+ 5       4.8341      5.22  |   Q     |         |         |V        |
17+10       4.8684      4.98  |  Q      |         |         |V        |
17+15       4.9002      4.62  |  Q      |         |         |V        |
17+20       4.9295      4.26  |  Q      |         |         |V        |
17+25       4.9549      3.68  | Q       |         |         |V        |
17+30       4.9790      3.50  | Q       |         |         |V        |
17+35       5.0021      3.36  | Q       |         |         | V       |
17+40       5.0244      3.23  | Q       |         |         | V       |
17+45       5.0459      3.11  | Q       |         |         | V       |
17+50       5.0666      3.01  | Q       |         |         | V       |
17+55       5.0866      2.91  | Q       |         |         | V       |
18+ 0       5.1061      2.82  | Q       |         |         | V       |
18+ 5       5.1251      2.77  | Q       |         |         | V       |
18+10       5.1447      2.85  | Q       |         |         |  V      |
18+15       5.1652      2.97  | Q       |         |         |  V      |
18+20       5.1857      2.99  | Q       |         |         |  V      |
18+25       5.2062      2.97  | Q       |         |         |  V      |
18+30       5.2265      2.95  | Q       |         |         |  V      |
18+35       5.2466      2.92  | Q       |         |         |  V      |
18+40       5.2664      2.88  | Q       |         |         |  V      |
18+45       5.2860      2.84  | Q       |         |         |  V      |
18+50       5.3054      2.81  | Q       |         |         |   V     |
18+55       5.3245      2.77  | Q       |         |         |   V     |
19+ 0       5.3433      2.73  | Q       |         |         |   V     |
19+ 5       5.3619      2.70  | Q       |         |         |   V     |
19+10       5.3802      2.66  | Q       |         |         |   V     |
19+15       5.3983      2.63  | Q       |         |         |   V     |
19+20       5.4162      2.60  | Q       |         |         |   V     |
19+25       5.4339      2.56  | Q       |         |         |   V     |
19+30       5.4513      2.53  | Q       |         |         |    V    |
19+35       5.4685      2.50  | Q       |         |         |    V    |
19+40       5.4856      2.47  |Q        |         |         |    V    |
19+45       5.5024      2.44  |Q        |         |         |    V    |
19+50       5.5190      2.42  |Q        |         |         |    V    |
19+55       5.5355      2.39  |Q        |         |         |    V    |
20+ 0       5.5518      2.36  |Q        |         |         |    V    |
20+ 5       5.5679      2.34  |Q        |         |         |    V    |
20+10       5.5838      2.31  |Q        |         |         |    V    |
20+15       5.5996      2.29  |Q        |         |         |    V    |
20+20       5.6152      2.27  |Q        |         |         |     V   |
20+25       5.6307      2.25  |Q        |         |         |     V   |
20+30       5.6460      2.22  |Q        |         |         |     V   |
20+35       5.6612      2.20  |Q        |         |         |     V   |
20+40       5.6762      2.18  |Q        |         |         |     V   |
20+45       5.6911      2.16  |Q        |         |         |     V   |
20+50       5.7059      2.15  |Q        |         |         |     V   |
20+55       5.7206      2.13  |Q        |         |         |     V   |
21+ 0       5.7351      2.11  |Q        |         |         |     V   |
```

```
   21+ 5       5.7495      2.09  |Q        |         |         |     V   |
   21+10       5.7638      2.07  |Q        |         |         |      V  |
   21+15       5.7779      2.06  |Q        |         |         |      V  |
   21+20       5.7920      2.04  |Q        |         |         |      V  |
   21+25       5.8060      2.03  |Q        |         |         |      V  |
   21+30       5.8198      2.01  |Q        |         |         |      V  |
   21+35       5.8336      2.00  |Q        |         |         |      V  |
   21+40       5.8472      1.98  |Q        |         |         |      V  |
   21+45       5.8607      1.97  |Q        |         |         |      V  |
   21+50       5.8742      1.95  |Q        |         |         |      V  |
   21+55       5.8875      1.94  |Q        |         |         |      V  |
   22+ 0       5.9008      1.93  |Q        |         |         |      V  |
   22+ 5       5.9140      1.91  |Q        |         |         |      V  |
   22+10       5.9271      1.90  |Q        |         |         |       V |
   22+15       5.9400      1.89  |Q        |         |         |       V |
   22+20       5.9530      1.87  |Q        |         |         |       V |
   22+25       5.9658      1.86  |Q        |         |         |       V |
   22+30       5.9785      1.85  |Q        |         |         |       V |
   22+35       5.9912      1.84  |Q        |         |         |       V |
   22+40       6.0038      1.83  |Q        |         |         |       V |
   22+45       6.0163      1.82  |Q        |         |         |       V |
   22+50       6.0287      1.80  |Q        |         |         |       V |
   22+55       6.0411      1.79  |Q        |         |         |       V |
   23+ 0       6.0533      1.78  |Q        |         |         |       V |
   23+ 5       6.0656      1.77  |Q        |         |         |       V |
   23+10       6.0777      1.76  |Q        |         |         |        V|
   23+15       6.0898      1.75  |Q        |         |         |        V|
   23+20       6.1018      1.74  |Q        |         |         |        V|
   23+25       6.1137      1.73  |Q        |         |         |        V|
   23+30       6.1256      1.72  |Q        |         |         |        V|
   23+35       6.1374      1.71  |Q        |         |         |        V|
   23+40       6.1491      1.71  |Q        |         |         |        V|
   23+45       6.1608      1.70  |Q        |         |         |        V|
   23+50       6.1724      1.69  |Q        |         |         |        V|
   23+55       6.1840      1.68  |Q        |         |         |        V|
   24+ 0       6.1955      1.67  |Q        |         |         |        V|
----------------------------------------------------------------------
```

DA 2   DMA A

BASIN 2

ONSITE POST-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

2-YEAR; 24-HOURS STORM EVENTS

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 11/29/17

++

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

Program License Serial Number 4070

2-YEAR, 24-HOURS UNIT HYDROGRAPH POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A5 TO A7 (EAST OF TRAPEZOIDAL CHANNEL) **DA 2   DMA-A**
FILE: 16397UNITHYDA5POSTE2YR.OUT

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 2		
16.87	1	0.38
Rainfall data for year 2		
16.87	6	0.85
Rainfall data for year 2		
16.87	24	1.55

++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 1)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 76.0      58.2         16.87      1.000     0.704    0.500    0.352

Area-averaged adjusted loss rate Fm (In/Hr) =  0.352

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC1)           Yield Fr
     8.44   0.500         76.0      58.2       7.18     0.001
     8.44   0.500         98.0      98.0       0.20     0.858

Area-averaged catchment yield fraction, Y =  0.429
Area-averaged low loss fraction, Yb =  0.571
User entry of time of concentration  =   0.230 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      16.87(Ac.)
Catchment Lag time =   0.184 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 45.2250
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.352(In/Hr)
Average low loss rate fraction (Yb) = 0.571 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.182(In)
Computed peak 30-minute rainfall =  0.312(In)
Specified peak 1-hour rainfall =  0.384(In)
Computed peak 3-hour rainfall =  0.623(In)
Specified peak 6-hour rainfall =  0.846(In)
Specified peak 24-hour rainfall =  1.550(In)


Rainfall depth area reduction factors:
Using a total area of      16.87(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.182(In)
30-minute factor = 0.999    Adjusted rainfall =  0.312(In)
1-hour factor = 0.999       Adjusted rainfall =  0.384(In)
3-hour factor = 1.000       Adjusted rainfall =  0.623(In)
6-hour factor = 1.000       Adjusted rainfall =  0.846(In)
24-hour factor = 1.000      Adjusted rainfall =  1.550(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
           (K =       204.02 (CFS))

  1                3.357                   6.849
  2               24.845                  43.840
  3               55.773                  63.100
```

4	70.274	29.584
5	78.614	17.016
6	84.103	11.199
7	88.154	8.264
8	90.979	5.764
9	93.201	4.533
10	94.907	3.481
11	96.246	2.732
12	97.261	2.070
13	97.948	1.402
14	98.430	0.982
15	98.969	1.101
16	99.476	1.035
17	99.789	0.637
18	100.000	0.431

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1821	0.1821
2	0.2242	0.0421
3	0.2531	0.0290
4	0.2760	0.0228
5	0.2951	0.0191
6	0.3117	0.0166
7	0.3264	0.0148
8	0.3398	0.0133
9	0.3520	0.0122
10	0.3633	0.0113
11	0.3738	0.0105
12	0.3837	0.0099
13	0.3975	0.0138
14	0.4107	0.0132
15	0.4234	0.0127
16	0.4357	0.0122
17	0.4475	0.0118
18	0.4589	0.0114
19	0.4700	0.0111
20	0.4808	0.0108
21	0.4912	0.0105
22	0.5014	0.0102
23	0.5114	0.0099
24	0.5211	0.0097
25	0.5305	0.0095
26	0.5398	0.0093
27	0.5489	0.0091
28	0.5577	0.0089
29	0.5665	0.0087
30	0.5750	0.0085
31	0.5834	0.0084
32	0.5916	0.0082
33	0.5997	0.0081
34	0.6077	0.0080
35	0.6155	0.0078
36	0.6232	0.0077

253	1.4647	0.0025
254	1.4672	0.0025
255	1.4697	0.0025
256	1.4722	0.0025
257	1.4748	0.0025
258	1.4773	0.0025
259	1.4798	0.0025
260	1.4822	0.0025
261	1.4847	0.0025
262	1.4872	0.0025
263	1.4897	0.0025
264	1.4922	0.0025
265	1.4946	0.0025
266	1.4971	0.0025
267	1.4995	0.0025
268	1.5020	0.0025
269	1.5044	0.0024
270	1.5069	0.0024
271	1.5093	0.0024
272	1.5117	0.0024
273	1.5142	0.0024
274	1.5166	0.0024
275	1.5190	0.0024
276	1.5214	0.0024
277	1.5238	0.0024
278	1.5262	0.0024
279	1.5286	0.0024
280	1.5310	0.0024
281	1.5334	0.0024
282	1.5358	0.0024
283	1.5382	0.0024
284	1.5405	0.0024
285	1.5429	0.0024
286	1.5453	0.0024
287	1.5476	0.0024
288	1.5500	0.0024

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0024	0.0013	0.0010
2	0.0024	0.0013	0.0010
3	0.0024	0.0014	0.0010
4	0.0024	0.0014	0.0010
5	0.0024	0.0014	0.0010
6	0.0024	0.0014	0.0010
7	0.0024	0.0014	0.0010
8	0.0024	0.0014	0.0010
9	0.0024	0.0014	0.0010
10	0.0024	0.0014	0.0010
11	0.0024	0.0014	0.0010
12	0.0024	0.0014	0.0010
13	0.0024	0.0014	0.0010

```
284             0.0024           0.0014             0.0010
285             0.0024           0.0014             0.0010
286             0.0024           0.0014             0.0010
287             0.0024           0.0014             0.0010
288             0.0024           0.0013             0.0010
--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      0.81(In)
Total effective rainfall =      0.74(In)
Peak flow rate in flood hydrograph =     11.13(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                   24 - H O U R   S T O R M
               R u n o f f    H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0000      0.01  Q        |         |         |         |
  0+10       0.0004      0.05  Q        |         |         |         |
  0+15       0.0012      0.12  Q        |         |         |         |
  0+20       0.0022      0.15  Q        |         |         |         |
  0+25       0.0033      0.16  Q        |         |         |         |
  0+30       0.0045      0.17  Q        |         |         |         |
  0+35       0.0058      0.18  Q        |         |         |         |
  0+40       0.0071      0.19  Q        |         |         |         |
  0+45       0.0084      0.20  Q        |         |         |         |
  0+50       0.0098      0.20  Q        |         |         |         |
  0+55       0.0112      0.20  Q        |         |         |         |
  1+ 0       0.0126      0.21  Q        |         |         |         |
  1+ 5       0.0140      0.21  Q        |         |         |         |
  1+10       0.0155      0.21  Q        |         |         |         |
  1+15       0.0169      0.21  Q        |         |         |         |
  1+20       0.0184      0.21  Q        |         |         |         |
  1+25       0.0199      0.21  Q        |         |         |         |
  1+30       0.0214      0.21  Q        |         |         |         |
  1+35       0.0228      0.22  Q        |         |         |         |
  1+40       0.0243      0.22  Q        |         |         |         |
  1+45       0.0258      0.22  Q        |         |         |         |
  1+50       0.0273      0.22  QV       |         |         |         |
  1+55       0.0288      0.22  QV       |         |         |         |
  2+ 0       0.0303      0.22  QV       |         |         |         |
  2+ 5       0.0318      0.22  QV       |         |         |         |
  2+10       0.0334      0.22  QV       |         |         |         |
  2+15       0.0349      0.22  QV       |         |         |         |
  2+20       0.0364      0.22  QV       |         |         |         |
  2+25       0.0379      0.22  QV       |         |         |         |
  2+30       0.0395      0.22  QV       |         |         |         |
  2+35       0.0410      0.22  QV       |         |         |         |
  2+40       0.0426      0.23  QV       |         |         |         |
  2+45       0.0441      0.23  QV       |         |         |         |
  2+50       0.0457      0.23  QV       |         |         |         |
```

2+55	0.0473	0.23	QV				
3+ 0	0.0488	0.23	QV				
3+ 5	0.0504	0.23	QV				
3+10	0.0520	0.23	QV				
3+15	0.0536	0.23	Q V				
3+20	0.0552	0.23	Q V				
3+25	0.0568	0.23	Q V				
3+30	0.0584	0.23	Q V				
3+35	0.0600	0.23	Q V				
3+40	0.0616	0.23	Q V				
3+45	0.0632	0.24	Q V				
3+50	0.0649	0.24	Q V				
3+55	0.0665	0.24	Q V				
4+ 0	0.0681	0.24	Q V				
4+ 5	0.0698	0.24	Q V				
4+10	0.0714	0.24	Q V				
4+15	0.0731	0.24	Q V				
4+20	0.0748	0.24	Q V				
4+25	0.0764	0.24	Q V				
4+30	0.0781	0.24	Q V				
4+35	0.0798	0.25	Q V				
4+40	0.0815	0.25	Q V				
4+45	0.0832	0.25	Q V				
4+50	0.0849	0.25	Q V				
4+55	0.0866	0.25	Q V				
5+ 0	0.0884	0.25	Q V				
5+ 5	0.0901	0.25	Q V				
5+10	0.0918	0.25	Q V				
5+15	0.0936	0.25	Q V				
5+20	0.0953	0.25	Q V				
5+25	0.0971	0.26	Q V				
5+30	0.0988	0.26	Q V				
5+35	0.1006	0.26	Q V				
5+40	0.1024	0.26	Q V				
5+45	0.1042	0.26	Q V				
5+50	0.1060	0.26	Q V				
5+55	0.1078	0.26	Q V				
6+ 0	0.1096	0.26	Q V				
6+ 5	0.1114	0.26	Q V				
6+10	0.1133	0.27	Q V				
6+15	0.1151	0.27	Q V				
6+20	0.1169	0.27	Q V				
6+25	0.1188	0.27	Q V				
6+30	0.1207	0.27	Q V				
6+35	0.1225	0.27	Q V				
6+40	0.1244	0.27	Q V				
6+45	0.1263	0.27	Q V				
6+50	0.1282	0.28	Q V				
6+55	0.1301	0.28	Q V				
7+ 0	0.1320	0.28	Q V				
7+ 5	0.1340	0.28	Q V				
7+10	0.1359	0.28	Q V				
7+15	0.1379	0.28	Q V				
7+20	0.1398	0.28	Q V				

```
 7+25      0.1418      0.29  Q    V    |         |         |         |
 7+30      0.1438      0.29  Q    V    |         |         |         |
 7+35      0.1458      0.29  Q    V    |         |         |         |
 7+40      0.1478      0.29  Q    V    |         |         |         |
 7+45      0.1498      0.29  Q    V    |         |         |         |
 7+50      0.1518      0.29  Q    V    |         |         |         |
 7+55      0.1539      0.30  Q    V    |         |         |         |
 8+ 0      0.1559      0.30  Q    V    |         |         |         |
 8+ 5      0.1580      0.30  Q     V   |         |         |         |
 8+10      0.1600      0.30  Q     V   |         |         |         |
 8+15      0.1621      0.30  Q     V   |         |         |         |
 8+20      0.1642      0.30  Q     V   |         |         |         |
 8+25      0.1663      0.31  Q     V   |         |         |         |
 8+30      0.1684      0.31  Q     V   |         |         |         |
 8+35      0.1706      0.31  Q     V   |         |         |         |
 8+40      0.1727      0.31  Q     V   |         |         |         |
 8+45      0.1749      0.31  Q     V   |         |         |         |
 8+50      0.1770      0.32  Q     V   |         |         |         |
 8+55      0.1792      0.32  Q     V   |         |         |         |
 9+ 0      0.1814      0.32  Q     V   |         |         |         |
 9+ 5      0.1836      0.32  Q      V  |         |         |         |
 9+10      0.1859      0.32  Q      V  |         |         |         |
 9+15      0.1881      0.33  Q      V  |         |         |         |
 9+20      0.1904      0.33  Q      V  |         |         |         |
 9+25      0.1927      0.33  Q      V  |         |         |         |
 9+30      0.1949      0.33  Q      V  |         |         |         |
 9+35      0.1972      0.33  Q      V  |         |         |         |
 9+40      0.1996      0.34  Q      V  |         |         |         |
 9+45      0.2019      0.34  Q      V  |         |         |         |
 9+50      0.2043      0.34  Q      V  |         |         |         |
 9+55      0.2066      0.34  Q      V  |         |         |         |
10+ 0      0.2090      0.35  Q       V |         |         |         |
10+ 5      0.2114      0.35  Q       V |         |         |         |
10+10      0.2139      0.35  Q       V |         |         |         |
10+15      0.2163      0.35  Q       V |         |         |         |
10+20      0.2188      0.36  Q       V |         |         |         |
10+25      0.2213      0.36  Q       V |         |         |         |
10+30      0.2238      0.36  Q       V |         |         |         |
10+35      0.2263      0.37  Q       V |         |         |         |
10+40      0.2288      0.37  Q       V |         |         |         |
10+45      0.2314      0.37  Q       V |         |         |         |
10+50      0.2340      0.38  Q       V |         |         |         |
10+55      0.2366      0.38  Q        V|         |         |         |
11+ 0      0.2392      0.38  Q        V|         |         |         |
11+ 5      0.2419      0.39  Q        V|         |         |         |
11+10      0.2446      0.39  Q        V|         |         |         |
11+15      0.2473      0.39  Q        V|         |         |         |
11+20      0.2500      0.40  Q        V|         |         |         |
11+25      0.2527      0.40  Q        V|         |         |         |
11+30      0.2555      0.40  Q        V|         |         |         |
11+35      0.2583      0.41  Q        V|         |         |         |
11+40      0.2612      0.41  Q         V         |         |         |
11+45      0.2641      0.42  Q         V         |         |         |
11+50      0.2669      0.42  Q         V         |         |         |
```

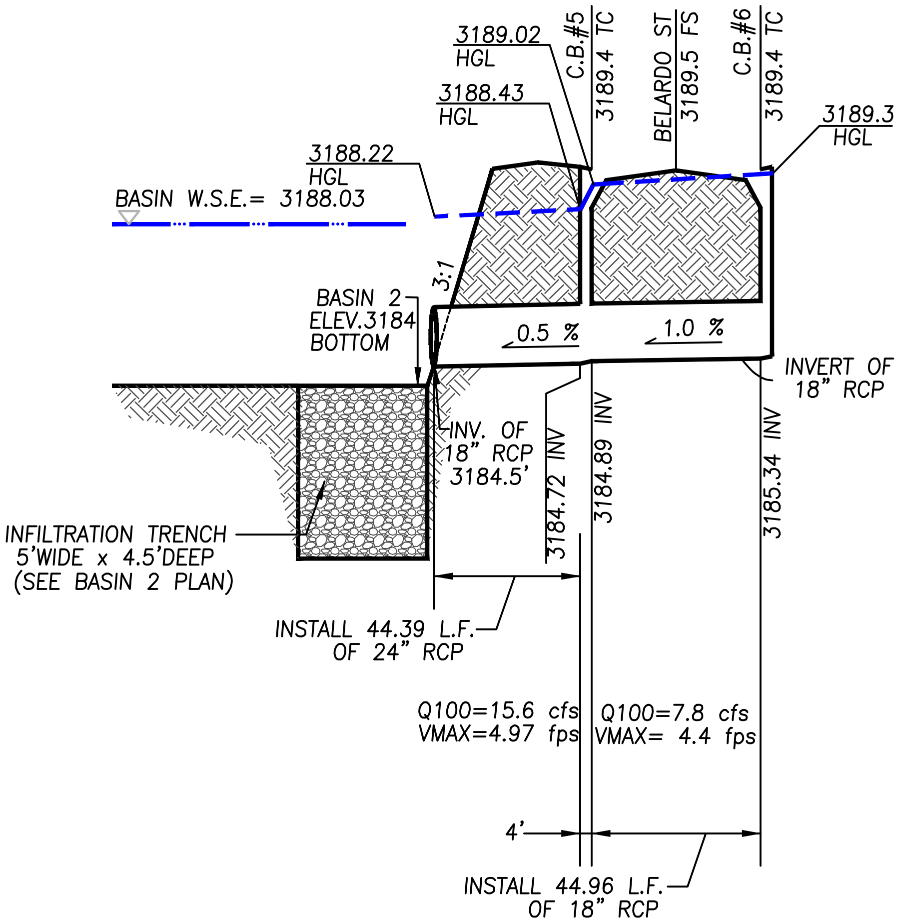
```
11+55       0.2699      0.43  Q         V         |         |         |
12+ 0       0.2728      0.43  Q         V         |         |         |
12+ 5       0.2758      0.43  Q         V         |         |         |
12+10       0.2789      0.44  Q         V         |         |         |
12+15       0.2819      0.45  Q         V         |         |         |
12+20       0.2851      0.45  Q         V         |         |         |
12+25       0.2882      0.46  Q         |V        |         |         |
12+30       0.2914      0.46  Q         |V        |         |         |
12+35       0.2947      0.47  Q         |V        |         |         |
12+40       0.2979      0.48  Q         |V        |         |         |
12+45       0.3013      0.48  Q         |V        |         |         |
12+50       0.3046      0.49  Q         |V        |         |         |
12+55       0.3080      0.50  Q         |V        |         |         |
13+ 0       0.3115      0.50  |Q        |V        |         |         |
13+ 5       0.3150      0.51  |Q        | V       |         |         |
13+10       0.3186      0.52  |Q        | V       |         |         |
13+15       0.3222      0.53  |Q        | V       |         |         |
13+20       0.3259      0.53  |Q        | V       |         |         |
13+25       0.3296      0.54  |Q        | V       |         |         |
13+30       0.3334      0.55  |Q        | V       |         |         |
13+35       0.3373      0.56  |Q        | V       |         |         |
13+40       0.3412      0.57  |Q        |  V      |         |         |
13+45       0.3452      0.58  |Q        |  V      |         |         |
13+50       0.3492      0.59  |Q        |  V      |         |         |
13+55       0.3534      0.60  |Q        |  V      |         |         |
14+ 0       0.3576      0.61  |Q        |  V      |         |         |
14+ 5       0.3619      0.63  |Q        |  V      |         |         |
14+10       0.3664      0.64  |Q        |   V     |         |         |
14+15       0.3709      0.66  |Q        |   V     |         |         |
14+20       0.3755      0.67  |Q        |   V     |         |         |
14+25       0.3802      0.69  |Q        |   V     |         |         |
14+30       0.3851      0.71  |Q        |   V     |         |         |
14+35       0.3901      0.72  |Q        |    V    |         |         |
14+40       0.3952      0.74  |Q        |    V    |         |         |
14+45       0.4005      0.77  |Q        |    V    |         |         |
14+50       0.4059      0.79  |Q        |    V    |         |         |
14+55       0.4116      0.82  |Q        |    V    |         |         |
15+ 0       0.4174      0.85  |Q        |     V   |         |         |
15+ 5       0.4234      0.88  |Q        |     V   |         |         |
15+10       0.4297      0.91  |Q        |     V   |         |         |
15+15       0.4363      0.95  |Q        |     V   |         |         |
15+20       0.4432      1.00  | Q       |      V  |         |         |
15+25       0.4504      1.04  | Q       |      V  |         |         |
15+30       0.4573      1.01  | Q       |      V  |         |         |
15+35       0.4640      0.96  |Q        |      V  |         |         |
15+40       0.4708      0.99  |Q        |       V |         |         |
15+45       0.4780      1.06  | Q       |       V |         |         |
15+50       0.4861      1.17  | Q       |       V |         |         |
15+55       0.4955      1.36  | Q       |        V|         |         |
16+ 0       0.5073      1.71  |  Q      |        V|         |         |
16+ 5       0.5294      3.21  |     Q   |         V         |         |
16+10       0.5890      8.66  |         |      Q  | V       |         |
16+15       0.6656     11.13  |         |         | Q  V    |         |
16+20       0.7076      6.10  |         | Q       |      V  |         |
```

```
16+25       0.7352      4.00  |      Q  |         |       V |         |
16+30       0.7558      3.00  |     Q   |         |        V|         |
16+35       0.7731      2.51  |    Q    |         |        V|         |
16+40       0.7873      2.05  |   Q     |         |         V         |
16+45       0.7995      1.78  |  Q      |         |         V         |
16+50       0.8101      1.54  |  Q      |         |         |V        |
16+55       0.8194      1.36  | Q       |         |         |V        |
17+ 0       0.8277      1.19  | Q       |         |         |V        |
17+ 5       0.8348      1.04  | Q       |         |         | V       |
17+10       0.8413      0.94  |Q        |         |         | V       |
17+15       0.8476      0.91  |Q        |         |         | V       |
17+20       0.8535      0.86  |Q        |         |         | V       |
17+25       0.8587      0.76  |Q        |         |         |  V      |
17+30       0.8635      0.70  |Q        |         |         |  V      |
17+35       0.8677      0.61  |Q        |         |         |  V      |
17+40       0.8718      0.58  |Q        |         |         |  V      |
17+45       0.8756      0.56  |Q        |         |         |  V      |
17+50       0.8794      0.54  |Q        |         |         |  V      |
17+55       0.8830      0.53  |Q        |         |         |  V      |
18+ 0       0.8865      0.51  |Q        |         |         |   V     |
18+ 5       0.8900      0.50  Q         |         |         |   V     |
18+10       0.8933      0.48  Q         |         |         |   V     |
18+15       0.8965      0.47  Q         |         |         |   V     |
18+20       0.8996      0.46  Q         |         |         |   V     |
18+25       0.9027      0.44  Q         |         |         |   V     |
18+30       0.9057      0.43  Q         |         |         |   V     |
18+35       0.9086      0.42  Q         |         |         |   V     |
18+40       0.9115      0.42  Q         |         |         |    V    |
18+45       0.9143      0.41  Q         |         |         |    V    |
18+50       0.9171      0.40  Q         |         |         |    V    |
18+55       0.9198      0.39  Q         |         |         |    V    |
19+ 0       0.9224      0.38  Q         |         |         |    V    |
19+ 5       0.9250      0.38  Q         |         |         |    V    |
19+10       0.9276      0.37  Q         |         |         |    V    |
19+15       0.9301      0.37  Q         |         |         |    V    |
19+20       0.9326      0.36  Q         |         |         |    V    |
19+25       0.9350      0.35  Q         |         |         |    V    |
19+30       0.9374      0.35  Q         |         |         |     V   |
19+35       0.9398      0.34  Q         |         |         |     V   |
19+40       0.9421      0.34  Q         |         |         |     V   |
19+45       0.9444      0.33  Q         |         |         |     V   |
19+50       0.9467      0.33  Q         |         |         |     V   |
19+55       0.9489      0.32  Q         |         |         |     V   |
20+ 0       0.9511      0.32  Q         |         |         |     V   |
20+ 5       0.9533      0.32  Q         |         |         |     V   |
20+10       0.9554      0.31  Q         |         |         |     V   |
20+15       0.9576      0.31  Q         |         |         |     V   |
20+20       0.9597      0.31  Q         |         |         |     V   |
20+25       0.9618      0.30  Q         |         |         |     V   |
20+30       0.9638      0.30  Q         |         |         |      V  |
20+35       0.9658      0.29  Q         |         |         |      V  |
20+40       0.9679      0.29  Q         |         |         |      V  |
20+45       0.9698      0.29  Q         |         |         |      V  |
20+50       0.9718      0.29  Q         |         |         |      V  |
```

```
 20+55         0.9737        0.28   Q          |          |          |       V   |
 21+ 0         0.9757        0.28   Q          |          |          |       V   |
 21+ 5         0.9776        0.28   Q          |          |          |       V   |
 21+10         0.9795        0.27   Q          |          |          |       V   |
 21+15         0.9813        0.27   Q          |          |          |       V   |
 21+20         0.9832        0.27   Q          |          |          |       V   |
 21+25         0.9850        0.27   Q          |          |          |       V   |
 21+30         0.9868        0.26   Q          |          |          |       V   |
 21+35         0.9886        0.26   Q          |          |          |        V  |
 21+40         0.9904        0.26   Q          |          |          |        V  |
 21+45         0.9922        0.26   Q          |          |          |        V  |
 21+50         0.9940        0.25   Q          |          |          |        V  |
 21+55         0.9957        0.25   Q          |          |          |        V  |
 22+ 0         0.9974        0.25   Q          |          |          |        V  |
 22+ 5         0.9991        0.25   Q          |          |          |        V  |
 22+10         1.0008        0.25   Q          |          |          |        V  |
 22+15         1.0025        0.24   Q          |          |          |        V  |
 22+20         1.0042        0.24   Q          |          |          |        V  |
 22+25         1.0058        0.24   Q          |          |          |        V  |
 22+30         1.0075        0.24   Q          |          |          |        V  |
 22+35         1.0091        0.24   Q          |          |          |        V  |
 22+40         1.0107        0.24   Q          |          |          |        V  |
 22+45         1.0124        0.23   Q          |          |          |        V  |
 22+50         1.0139        0.23   Q          |          |          |         V|
 22+55         1.0155        0.23   Q          |          |          |         V|
 23+ 0         1.0171        0.23   Q          |          |          |         V|
 23+ 5         1.0187        0.23   Q          |          |          |         V|
 23+10         1.0202        0.23   Q          |          |          |         V|
 23+15         1.0218        0.22   Q          |          |          |         V|
 23+20         1.0233        0.22   Q          |          |          |         V|
 23+25         1.0248        0.22   Q          |          |          |         V|
 23+30         1.0263        0.22   Q          |          |          |         V|
 23+35         1.0278        0.22   Q          |          |          |         V|
 23+40         1.0293        0.22   Q          |          |          |         V|
 23+45         1.0308        0.22   Q          |          |          |         V|
 23+50         1.0323        0.21   Q          |          |          |         V|
 23+55         1.0337        0.21   Q          |          |          |         V|
 24+ 0         1.0352        0.21   Q          |          |          |         V|
----------------------------------------------------------------------------------
```

2-YR, 24-HRS
VOLUME= 1.03 AC.FT.
DA 2   DMA A

WATER SURFACE
PROFILE GRADIENT CALCULATIONS
BASIN 2
INLET STORM DRAIN PIPE



SECTION "B1-B1"

BASIN 2 LINE "B1"

N.T.S.

Ludwig Engineering Associates, Inc.
Civil Engineering • Surveying • Planning

109 East Third Street
San Bernardino, CA 92410
Phone: 909-884-8217
Fax: 909-889-0153

5890 Hwy. 95, Ste. B
Fort Mohave, AZ 88426
Phone: 928-768-1857
Fax: 928-768-7086

15252 Seneca Rd.
Victorville, CA 92392
Phone: 760-951-7676
Fax: 760-241-0573

2126 McCulloch Blvd., Ste. 8
Lake Havasu City, AZ 86403
Phone: 928-680-6060
Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397
PROFILE STORM DRAIN - BASIN 2 LINE B1

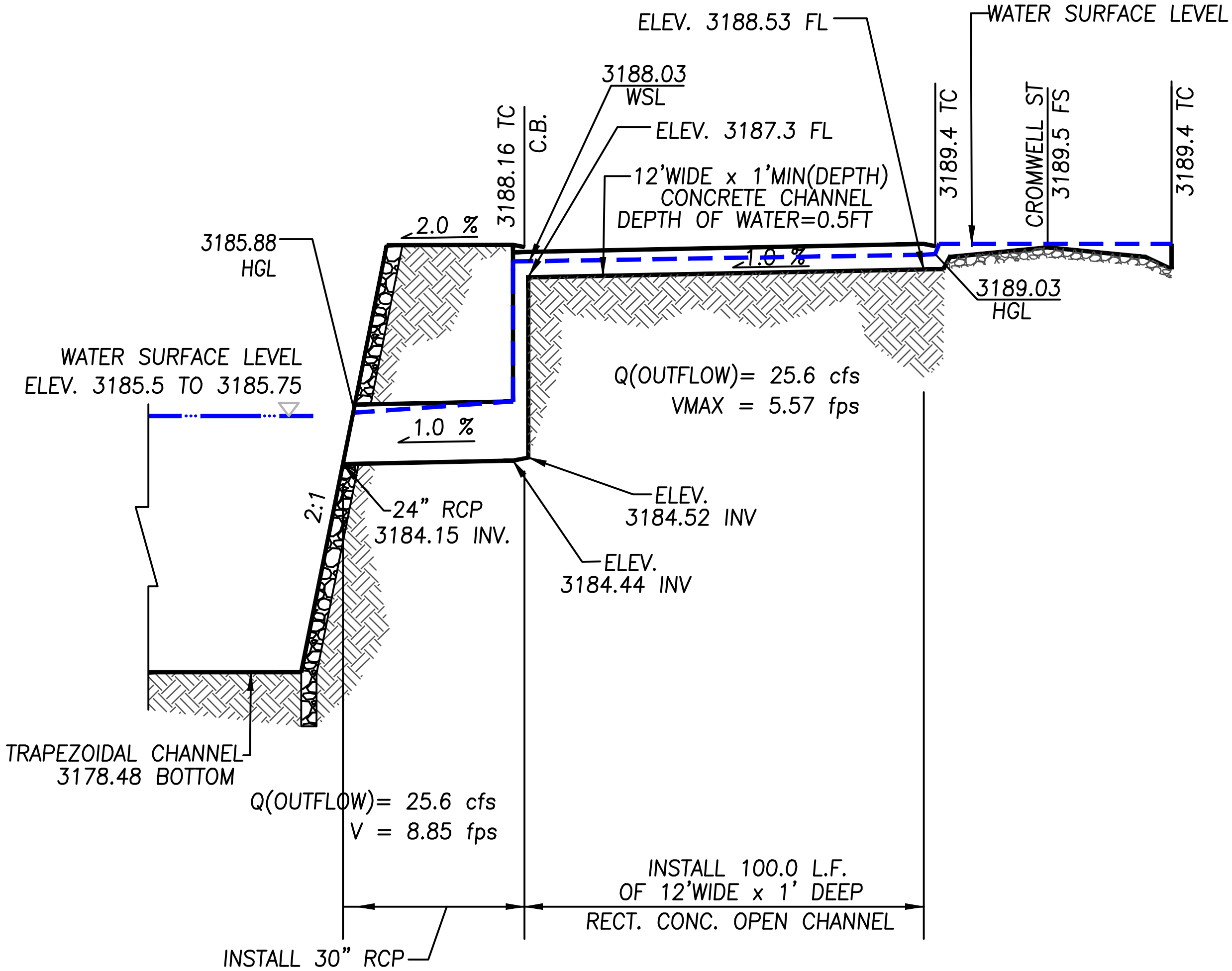
CLIENT:
RY PROPERTIES

DESIGNED BY:	DRAWN BY:	CHECKED BY:
JC	LC	JF

SCALE N.T.S.

SHEET 3 OF 4

D-1



SECTION "B2-B2"

BASIN 2 PARKWAY DRAIN

N.T.S.

Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning

109 East Third Street
San Bernardino, CA 92410
Phone: 909-884-8217
Fax: 909-889-0153

5890 Hwy. 95, Ste. B
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Fax: 760-241-0573

2126 McCulloch Blvd., Ste. 8
Lake Havasu City, AZ 86403
Phone: 928-680-6060
Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397
PROF. PARKWAY DRAIN CHANNEL TO TRAP. CHANNEL

CLIENT:
RY PROPERTIES

DESIGNED BY:	DRAWN BY:	CHECKED BY:
JC	LC	JF

SCALE N.T.S.

SHEET 3 OF 4

D-1

Ludwig Engineering
109 E. Third St.
San Bernardino, CA 92410
Ph. 909-884-8217 Fax 909-889-0153

JOB RY-0324 RY PROPERTIES

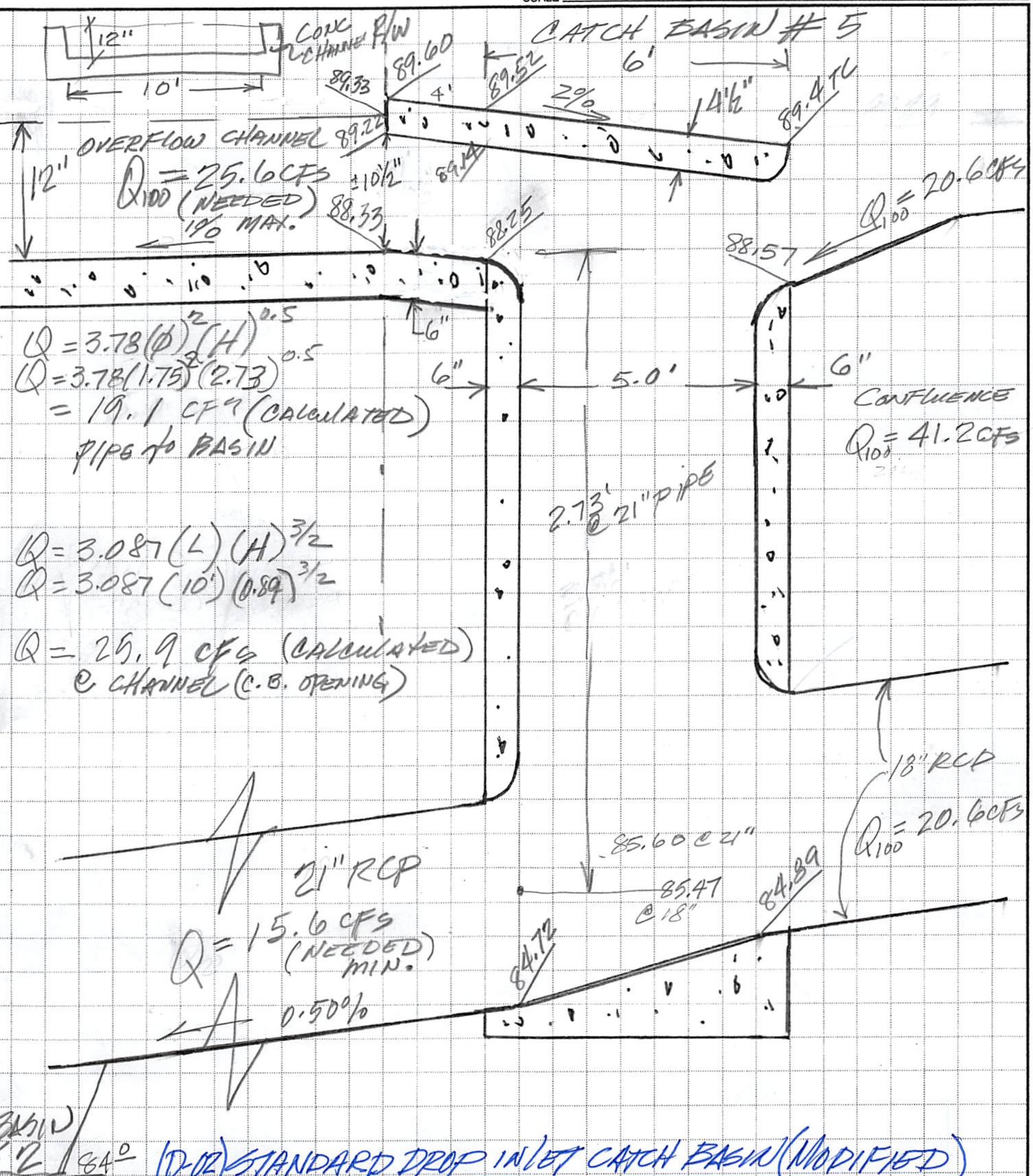
SHEET NO. ______ OF ______

CALCULATED BY GAG DATE 12-14-17

CHECKED BY ______ DATE ______

SCALE ______

CATCH BASIN #5



Q_{100} = 25.6 CFS (NEEDED)

$Q = 3.78(\phi)^2(H)^{0.5}$

$Q = 3.78(1.75)^2(2.73)^{0.5}$

= 19.1 CFS (CALCULATED) PIPE TO BASIN

$Q = 3.087(L)(H)^{3/2}$

$Q = 3.087(10')(0.89)^{3/2}$

Q = 25.9 CFS (CALCULATED) @ CHANNEL (C.B. OPENING)

Q = 15.6 CFS (NEEDED) MIN.

(D-02) STANDARD DROP INLET CATCH BASIN (MODIFIED)
N.T.S.

CATCH BASIN #5

```
T1 WSPGW LINE "B" CATCH BASIN 2       0
T2 TRACT NO. 16397, CITY OF VICTORVILLE
T3 FILE: 16397WSPGWBASIN2.OUT
SO   1000.0003184.500  1                          3188.220
R    1044.3903184.720  1      .013                                  .000    .000 0
JX   1053.5203184.880  4  3   .013    7.800          3186.170          90.0          .000
R    1098.4803185.330  3      .013                                  .000 -30.000 0
SH   1098.4803185.340  3                          3189.400
CD   1  4   1    .000   2.000     .000  .000  .000   .00
CD   2  4   1    .000   1.500     .000  .000  .000   .00
CD   3  4   1    .000   1.500     .000  .000  .000   .00
CD   4  4   1    .000   1.500     .000  .000  .000   .00
Q             7.800   .0
```

```
                         Program Package Serial Number: 1586
                                       WATER SURFACE PROFILE LISTING                  Date:12- 5-2017  Time: 9: 9:53
                    WSPGW LINE "B" CATCH BASIN 2        0
                     TRACT NO. 16397, CITY OF VICTORVILLE
                       FILE: 16397WSPGWBASIN2.OUT
************************************************************************************************************************************
         | Invert  | Depth | Water   |    Q    |  Vel    Vel   | Energy  | Super |Critical|Flow Top|Height/|Base Wt|     |No Wth
 Station |  Elev   |  (FT) | Elev    |  (CFS)  | (FPS)   Head  | Grd.El.| Elev  | Depth  | Width  |Dia.-FT|or I.D.| ZL  |Prs/Pip
        -|-       -|-     -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    -|
 L/Elem  |Ch Slope |       |         |         |       | SF Ave|   HF    |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall| ZR  |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |         |         |       |       |         |       |        |        |       |       |     |
 1000.000  3184.500   3.720  3188.220     15.60    4.97     .38  3188.60     .00     1.42      .00   2.000    .000   .00   1   .0
        -|-       -|-     -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
   44.390    .0050                                      .0048      .21    3.72      .00    1.60    .013      .00   .00  PIPE
         |         |        |         |         |       |       |         |       |        |        |       |       |     |
 1044.390  3184.720   3.711  3188.431     15.60    4.97     .38  3188.81     .00     1.42      .00   2.000    .000   .00   1   .0
        -|-       -|-     -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
JUNCT STR    .0175                                      .0051      .05    3.71      .00            .013      .00   .00  PIPE
         |         |        |         |         |       |       |         |       |        |        |       |       |     |
 1053.520  3184.880   4.143  3189.022      7.80    4.41     .30  3189.32     .00     1.08      .00   1.500    .000   .00   1   .0
        -|-       -|-     -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
   44.960    .0100                                      .0055      .25    4.14      .00     .96    .013      .00   .00  PIPE
         |         |        |         |         |       |       |         |       |        |        |       |       |     |
 1098.480  3185.330   3.970  3189.300      7.80    4.41     .30  3189.60     .00     1.08      .00   1.500    .000   .00   1   .0
        -|-       -|-     -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    |-
```

```
FILE: 16397WSPGWBASIN2.WSW              W S P G W  - EDIT LISTING - Version 14.06             Date:12- 5-2017  Time: 9: 9:50
                                    WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING                              PAGE    1
 CARD  SECT  CHN   NO OF  AVE PIER  HEIGHT 1  BASE    ZL    ZR   INV   Y(1)  Y(2)  Y(3)  Y(4)  Y(5)  Y(6)  Y(7)  Y(8)  Y(9)  Y(10)
 CODE   NO   TYPE PIER/PIP WIDTH    DIAMETER  WIDTH              DROP

 CD      1    4      1             2.000
 CD      2    4      1             1.500
 CD      3    4      1             1.500
 CD      4    4      1             1.500
                                                W S P G W                                                          PAGE NO   1
                            WATER SURFACE PROFILE - TITLE CARD LISTING
HEADING LINE NO 1 IS -
                              WSPGW LINE "B" CATCH BASIN 2       0
HEADING LINE NO 2 IS -
                              TRACT NO. 16397, CITY OF VICTORVILLE
HEADING LINE NO 3 IS -
                              FILE: 16397WSPGWBASIN2.OUT
                                                W S P G W                                                          PAGE NO   2
                            WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO   1 IS A SYSTEM OUTLET     *         *     *
                     U/S DATA   STATION    INVERT  SECT                                   W S ELEV
                                1000.000 3184.500    1                                     3188.220
 ELEMENT NO   2 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                                1044.390 3184.720    1              .013                         .000     .000      .000     0
 ELEMENT NO   3 IS A JUNCTION          *         *     *     *                *                   *               *
                     U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                                1053.520 3184.880    4     3     0   .013     7.800      .000  3186.170     .000  90.000     .000
                                                                                                RADIUS    ANGLE
                                                                                                  .000     .000
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
 ELEMENT NO   4 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT              N                          RADIUS    ANGLE     ANG PT  MAN H
                                1098.480 3185.330    3              .013                         .000     .000   -30.000     0
 ELEMENT NO   5 IS A SYSTEM HEADWORKS              *               *
                     U/S DATA   STATION    INVERT  SECT                                   W S ELEV
                                1098.480 3185.340    3                                    3189.400
```

LUDWIG ENGINEERING
109 E. Third Street
San Bernardino, California 92410
(909)884-8217
Fax (909) 889-0153

JOB VI-0349

CATCH BASIN #5 AND #6 @ BASIN 2
NODE 32

CAPACITY OF CURB OPENING INLET ON A SUMP CONDITION:

HEIGHT OF CURB = 6" CF.

$$Q\ 100 = \frac{41.8CFS - 25.6CFS}{2} = 8.1\ CFS;\ \text{CATCH BASIN \#5}$$

$$Q\ 100 = 8.1\ CFS\ ;\ \text{CATCH BASIN \#4}$$

LOCAL DEPRESSION = 4"

PONDING DEPTH = 6" + 4" = H = 10" TO TC.

h (eff.) = 0.56'

with h = 0.56' and $\frac{H}{h} = \frac{0.833'}{0.56'} = 1.49$

PER NOMOGRAPH:

$$\frac{Q}{L} = 2.0\ CFS/FT$$

FOR CATCH ***BASIN #5***;

$$L = \frac{8.1}{2.0}$$

L = 4.05' SAY 4'

FOR CATCH ***BASIN #6:***

$$L = \frac{8.1}{2.0}$$

L = 4.05' SAY 4'

MAXIMUM PONDING DEPTH = 6" + 4" + 0.2' = 1.033' TO R/W

H = 1.033' h = 0.56' $\frac{H}{h} = \frac{1.033'}{0.56'} = 1.84'$

PER NOMOGRAPH 1073.3

$$\frac{Q}{L} = 2.6\ CFS/FT$$

$L = \frac{Q}{2.6} = \frac{8.1}{2.6} =$ 3.1' USE W = ***4' CATCH BASIN #5***

$L = \frac{Q}{2.6} = \frac{8.1}{2.6} =$ 3.1' USE W = ***4' CATCH BASIN #6***

```
  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 7.0
--------------------------------------------------------------------
10FT WIDE X 1 FT FLOWBY CHANNEL CAPACITY @ BASIN 2 NODE 32
TR 16397, CITY OF VICTORVILLE
Q=25.6 CFS (PRE-DEVELOPED CONDITION Q OUTFLOW)
FILE: 16397FLOWBYBASIN2.OUT
--------------------------------------------------------------------


Program License Serial Number 4070

--------------------------------------------------------------------
           *** Improved Channel Analysis ***

      Upstream (headworks) Elevation =   3188.280(Ft.)
      Downstream (outlet) Elevation =   3187.300(Ft.)
      Runoff/Flow Distance =     97.850(Ft.)
      Maximum flow rate in channel(s) =     25.600(CFS)
--------------------------------------------------------------------




--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

*** CALCULATED DEPTH DATA AT FLOW =   25.60(CFS) ***
Channel base width  =   10.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru channel =     25.600(CFS)
Depth of flow =   0.460(Ft.)
Average velocity =   5.569(Ft/s)
Total flow rate in 1/2 street =  25.600(CFS)
Channel flow top width =   10.000(Ft.)
Depth of flow in channel =   0.46(Ft.)

Total number of channels (same dimensions) = 1
Flow Velocity =    5.57(Ft/s)
Individual channel flow =   25.600(CFS)
Total capacity of channel(s) =     25.600(CFS)

Sub-Channel No. 1 Critical depth =      0.586(Ft.)
  '     '       '     Critical flow top width =     10.000(Ft.)
  '     '       '     Critical flow velocity=    4.369(Ft/s)
  '     '       '     Critical flow area =      5.859(Sq.Ft)
```

Created Revised
06-Dec-17 06-Dec-17 10:06

MANNING'S EQUATION Circular cross-section

BASIN 2 - Flowby Outflow Pipe - 24"dia. R.C.P. capacity, Q=25.6 cfs

Units (ft)	= FEET	Area (sq ft)	= 2.89
Depth (ft)	= <1.73> <---	Velocity (ft/s)	= 8.85
Discharge (cfs)	= <25.6>	Froude Number	= 1.07
Manning's n	= <.012>	Critical Depth (ft)	= 1.78
Slope(decimal)	= <.01>	Normal Depth (ft)	= 1.73/ 1.98
Diameter (in)	= <24>	Hydraulic Radius (ft)	= 0.60
		Depth to Centroid(ft)	= 0.81
		Top Width (ft)	= 1.36

DA 3

BASIN 3

ONSITE PRE-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

100-YEAR; 24-HOURS STORM EVENTS

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  03/16/17

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


Program License Serial Number 4070

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```

100-YEAR, 24-HOURS UNIT HYDROGRAPH PRE-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA AA1 & AA2 (WEST OF TRAPEZOIDAL CHANNEL, BASIN 3)
FILE: 16397UNITHYDAA1PRE100YR.OUT

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

     Storm Event Year = 100

     Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
     Sub-Area        Duration        Isohyetal
     (Ac.)            (hours)         (In)
Rainfall data for year 100
         24.70            1           1.11
--------------------------------------------------------------------
Rainfall data for year 100
         24.70            6           2.38
--------------------------------------------------------------------
Rainfall data for year 100
         24.70           24           4.96
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 50.0      70.0         24.70      1.000     0.532    1.000    0.532

Area-averaged adjusted loss rate Fm (In/Hr) =  0.532

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    24.70   1.000         50.0      70.0       4.29     0.405

Area-averaged catchment yield fraction, Y =  0.405
Area-averaged low loss fraction, Yb =  0.595
User entry of time of concentration  =   0.452 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      24.70(Ac.)
Catchment Lag time =   0.362 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 23.0457
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.532(In/Hr)
Average low loss rate fraction (Yb) = 0.595 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.527(In)
Computed peak 30-minute rainfall =  0.902(In)
Specified peak 1-hour rainfall =  1.110(In)
Computed peak 3-hour rainfall =  1.772(In)
Specified peak 6-hour rainfall =  2.380(In)
Specified peak 24-hour rainfall =  4.960(In)


Rainfall depth area reduction factors:
Using a total area of      24.70(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.526(In)
30-minute factor = 0.999    Adjusted rainfall =  0.901(In)
1-hour factor = 0.999       Adjusted rainfall =  1.109(In)
3-hour factor = 1.000       Adjusted rainfall =  1.772(In)
6-hour factor = 1.000       Adjusted rainfall =  2.380(In)
24-hour factor = 1.000      Adjusted rainfall =  4.960(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
           (K =       298.72 (CFS))

  1                1.207                  3.606
  2                5.721                 13.483
  3               15.841                 30.231
  4               35.917                 59.970
```

5	51.746	47.284
6	61.697	29.724
7	68.380	19.963
8	73.522	15.360
9	77.565	12.077
10	80.784	9.616
11	83.431	7.906
12	85.742	6.903
13	87.746	5.986
14	89.367	4.843
15	90.713	4.020
16	91.943	3.675
17	93.028	3.241
18	93.998	2.897
19	94.796	2.384
20	95.559	2.279
21	96.183	1.866
22	96.774	1.764
23	97.234	1.373
24	97.647	1.234
25	97.946	0.895
26	98.177	0.688
27	98.429	0.752
28	98.705	0.826
29	98.982	0.826
30	99.258	0.826
31	99.509	0.749
32	99.662	0.458
33	99.806	0.430
34	100.000	0.215

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5261	0.5261
2	0.6477	0.1216
3	0.7315	0.0838
4	0.7974	0.0659
5	0.8526	0.0552
6	0.9006	0.0479
7	0.9432	0.0426
8	0.9817	0.0386
9	1.0170	0.0353
10	1.0497	0.0327
11	1.0801	0.0304
12	1.1087	0.0286
13	1.1472	0.0385
14	1.1841	0.0368
15	1.2194	0.0354
16	1.2535	0.0340
17	1.2863	0.0328
18	1.3181	0.0318
19	1.3488	0.0308
20	1.3787	0.0298
21	1.4077	0.0290

238	4.4833	0.0100	
239	4.4933	0.0100	
240	4.5032	0.0099	
241	4.5132	0.0099	
242	4.5231	0.0099	
243	4.5330	0.0099	
244	4.5428	0.0099	
245	4.5527	0.0099	
246	4.5625	0.0098	
247	4.5723	0.0098	
248	4.5821	0.0098	
249	4.5919	0.0098	
250	4.6017	0.0098	
251	4.6114	0.0097	
252	4.6211	0.0097	
253	4.6308	0.0097	
254	4.6405	0.0097	
255	4.6502	0.0097	
256	4.6598	0.0097	
257	4.6695	0.0096	
258	4.6791	0.0096	
259	4.6887	0.0096	
260	4.6983	0.0096	
261	4.7078	0.0096	
262	4.7174	0.0095	
263	4.7269	0.0095	
264	4.7364	0.0095	
265	4.7459	0.0095	
266	4.7554	0.0095	
267	4.7649	0.0095	
268	4.7743	0.0094	
269	4.7837	0.0094	
270	4.7931	0.0094	
271	4.8025	0.0094	
272	4.8119	0.0094	
273	4.8213	0.0094	
274	4.8306	0.0093	
275	4.8400	0.0093	
276	4.8493	0.0093	
277	4.8586	0.0093	
278	4.8679	0.0093	
279	4.8771	0.0093	
280	4.8864	0.0093	
281	4.8956	0.0092	
282	4.9048	0.0092	
283	4.9140	0.0092	
284	4.9232	0.0092	
285	4.9324	0.0092	
286	4.9416	0.0092	
287	4.9507	0.0091	
288	4.9598	0.0091	
Unit Period	Unit Rainfall	Unit Soil-Loss	Effective Rainfall

269	0.0102	0.0061	0.0041
270	0.0101	0.0060	0.0041
271	0.0100	0.0060	0.0041
272	0.0100	0.0059	0.0040
273	0.0099	0.0059	0.0040
274	0.0099	0.0059	0.0040
275	0.0098	0.0058	0.0040
276	0.0098	0.0058	0.0039
277	0.0097	0.0058	0.0039
278	0.0097	0.0057	0.0039
279	0.0096	0.0057	0.0039
280	0.0095	0.0057	0.0039
281	0.0095	0.0057	0.0038
282	0.0094	0.0056	0.0038
283	0.0094	0.0056	0.0038
284	0.0093	0.0056	0.0038
285	0.0093	0.0055	0.0038
286	0.0093	0.0055	0.0037
287	0.0092	0.0055	0.0037
288	0.0092	0.0055	0.0037

Total soil rain loss = 2.65(In)
Total effective rainfall = 2.31(In)
Peak flow rate in flood hydrograph = 36.55(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	**Volume Ac.Ft**	**Q(CFS)**	**0**	**10.0**	**20.0**	**30.0**	**40.0**
0+ 5	0.0001	0.01	Q	|	|	|	|
0+10	0.0005	0.06	Q	|	|	|	|
0+15	0.0017	0.17	Q	|	|	|	|
0+20	0.0045	0.40	Q	|	|	|	|
0+25	0.0084	0.57	Q	|	|	|	|
0+30	0.0131	0.68	Q	|	|	|	|
0+35	0.0183	0.76	Q	|	|	|	|
0+40	0.0240	0.82	Q	|	|	|	|
0+45	0.0299	0.86	Q	|	|	|	|
0+50	0.0361	0.90	Q	|	|	|	|
0+55	0.0426	0.93	Q	|	|	|	|
1+ 0	0.0492	0.96	Q	|	|	|	|
1+ 5	0.0560	0.99	Q	|	|	|	|
1+10	0.0629	1.01	VQ	|	|	|	|
1+15	0.0699	1.02	VQ	|	|	|	|
1+20	0.0771	1.04	VQ	|	|	|	|
1+25	0.0844	1.05	VQ	|	|	|	|
1+30	0.0917	1.07	VQ	|	|	|	|
1+35	0.0992	1.08	VQ	|	|	|	|

1+40	0.1067	1.09	VQ	|	|	|	|
1+45	0.1143	1.10	VQ	|	|	|	|
1+50	0.1219	1.11	|Q	|	|	|	|
1+55	0.1296	1.12	|Q	|	|	|	|
2+ 0	0.1373	1.13	|Q	|	|	|	|
2+ 5	0.1451	1.13	|Q	|	|	|	|
2+10	0.1530	1.14	|Q	|	|	|	|
2+15	0.1609	1.14	|Q	|	|	|	|
2+20	0.1688	1.15	|Q	|	|	|	|
2+25	0.1767	1.16	|Q	|	|	|	|
2+30	0.1847	1.16	|Q	|	|	|	|
2+35	0.1928	1.17	|Q	|	|	|	|
2+40	0.2009	1.17	|Q	|	|	|	|
2+45	0.2090	1.18	|Q	|	|	|	|
2+50	0.2171	1.18	|Q	|	|	|	|
2+55	0.2253	1.19	|Q	|	|	|	|
3+ 0	0.2335	1.19	|Q	|	|	|	|
3+ 5	0.2417	1.19	|QV	|	|	|	|
3+10	0.2499	1.20	|QV	|	|	|	|
3+15	0.2582	1.20	|QV	|	|	|	|
3+20	0.2665	1.20	|QV	|	|	|	|
3+25	0.2748	1.21	|QV	|	|	|	|
3+30	0.2831	1.21	|QV	|	|	|	|
3+35	0.2915	1.21	|QV	|	|	|	|
3+40	0.2999	1.22	|QV	|	|	|	|
3+45	0.3083	1.22	|QV	|	|	|	|
3+50	0.3167	1.22	|QV	|	|	|	|
3+55	0.3252	1.23	|QV	|	|	|	|
4+ 0	0.3336	1.23	|QV	|	|	|	|
4+ 5	0.3422	1.24	|QV	|	|	|	|
4+10	0.3507	1.24	|QV	|	|	|	|
4+15	0.3593	1.24	|Q V	|	|	|	|
4+20	0.3679	1.25	|Q V	|	|	|	|
4+25	0.3765	1.25	|Q V	|	|	|	|
4+30	0.3851	1.26	|Q V	|	|	|	|
4+35	0.3938	1.26	|Q V	|	|	|	|
4+40	0.4025	1.26	|Q V	|	|	|	|
4+45	0.4113	1.27	|Q V	|	|	|	|
4+50	0.4200	1.27	|Q V	|	|	|	|
4+55	0.4288	1.28	|Q V	|	|	|	|
5+ 0	0.4377	1.28	|Q V	|	|	|	|
5+ 5	0.4465	1.29	|Q V	|	|	|	|
5+10	0.4554	1.29	|Q V	|	|	|	|
5+15	0.4643	1.29	|Q V	|	|	|	|
5+20	0.4733	1.30	|Q V	|	|	|	|
5+25	0.4822	1.30	|Q V	|	|	|	|
5+30	0.4913	1.31	|Q V	|	|	|	|
5+35	0.5003	1.31	|Q V	|	|	|	|
5+40	0.5094	1.32	|Q V	|	|	|	|
5+45	0.5185	1.32	|Q V	|	|	|	|
5+50	0.5276	1.33	|Q V	|	|	|	|
5+55	0.5368	1.33	|Q V	|	|	|	|
6+ 0	0.5460	1.34	|Q V	|	|	|	|
6+ 5	0.5553	1.34	|Q V	|	|	|	|

```
 6+10       0.5645      1.35  |Q  V     |         |         |         |
 6+15       0.5738      1.35  |Q  V     |         |         |         |
 6+20       0.5832      1.36  |Q  V     |         |         |         |
 6+25       0.5926      1.36  |Q  V     |         |         |         |
 6+30       0.6020      1.37  |Q   V    |         |         |         |
 6+35       0.6115      1.37  |Q   V    |         |         |         |
 6+40       0.6209      1.38  |Q   V    |         |         |         |
 6+45       0.6305      1.38  |Q   V    |         |         |         |
 6+50       0.6401      1.39  |Q   V    |         |         |         |
 6+55       0.6497      1.40  |Q   V    |         |         |         |
 7+ 0       0.6593      1.40  |Q   V    |         |         |         |
 7+ 5       0.6690      1.41  |Q   V    |         |         |         |
 7+10       0.6787      1.41  |Q   V    |         |         |         |
 7+15       0.6885      1.42  |Q   V    |         |         |         |
 7+20       0.6983      1.42  |Q   V    |         |         |         |
 7+25       0.7082      1.43  |Q   V    |         |         |         |
 7+30       0.7181      1.44  |Q    V   |         |         |         |
 7+35       0.7280      1.44  |Q    V   |         |         |         |
 7+40       0.7380      1.45  |Q    V   |         |         |         |
 7+45       0.7480      1.46  |Q    V   |         |         |         |
 7+50       0.7581      1.46  |Q    V   |         |         |         |
 7+55       0.7682      1.47  |Q    V   |         |         |         |
 8+ 0       0.7784      1.48  |Q    V   |         |         |         |
 8+ 5       0.7886      1.48  |Q    V   |         |         |         |
 8+10       0.7988      1.49  |Q    V   |         |         |         |
 8+15       0.8091      1.50  |Q    V   |         |         |         |
 8+20       0.8195      1.50  |Q    V   |         |         |         |
 8+25       0.8299      1.51  |Q    V   |         |         |         |
 8+30       0.8403      1.52  |Q     V  |         |         |         |
 8+35       0.8509      1.53  |Q     V  |         |         |         |
 8+40       0.8614      1.53  |Q     V  |         |         |         |
 8+45       0.8720      1.54  |Q     V  |         |         |         |
 8+50       0.8827      1.55  |Q     V  |         |         |         |
 8+55       0.8934      1.56  |Q     V  |         |         |         |
 9+ 0       0.9042      1.56  |Q     V  |         |         |         |
 9+ 5       0.9150      1.57  |Q     V  |         |         |         |
 9+10       0.9259      1.58  |Q     V  |         |         |         |
 9+15       0.9368      1.59  |Q     V  |         |         |         |
 9+20       0.9478      1.60  |Q     V  |         |         |         |
 9+25       0.9589      1.61  |Q      V |         |         |         |
 9+30       0.9700      1.62  |Q      V |         |         |         |
 9+35       0.9812      1.62  |Q      V |         |         |         |
 9+40       0.9925      1.63  |Q      V |         |         |         |
 9+45       1.0038      1.64  |Q      V |         |         |         |
 9+50       1.0152      1.65  |Q      V |         |         |         |
 9+55       1.0266      1.66  |Q      V |         |         |         |
10+ 0       1.0381      1.67  |Q      V |         |         |         |
10+ 5       1.0497      1.68  |Q      V |         |         |         |
10+10       1.0614      1.69  |Q      V |         |         |         |
10+15       1.0731      1.70  |Q       V|         |         |         |
10+20       1.0849      1.71  |Q       V|         |         |         |
10+25       1.0968      1.72  |Q       V|         |         |         |
10+30       1.1087      1.74  |Q       V|         |         |         |
10+35       1.1208      1.75  |Q       V|         |         |         |
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10+40       1.1329      1.76  |Q       V|         |         |         |
10+45       1.1451      1.77  |Q       V|         |         |         |
10+50       1.1574      1.78  |Q       V|         |         |         |
10+55       1.1697      1.79  |Q       V|         |         |         |
11+ 0       1.1822      1.81  |Q       V|         |         |         |
11+ 5       1.1947      1.82  |Q        V         |         |         |
11+10       1.2073      1.83  |Q        V         |         |         |
11+15       1.2201      1.85  |Q        V         |         |         |
11+20       1.2329      1.86  |Q        V         |         |         |
11+25       1.2458      1.87  |Q        V         |         |         |
11+30       1.2588      1.89  |Q        V         |         |         |
11+35       1.2719      1.90  |Q        V         |         |         |
11+40       1.2851      1.92  |Q        V         |         |         |
11+45       1.2985      1.94  |Q        V         |         |         |
11+50       1.3119      1.95  |Q        |V        |         |         |
11+55       1.3255      1.97  |Q        |V        |         |         |
12+ 0       1.3391      1.98  |Q        |V        |         |         |
12+ 5       1.3529      2.00  |Q        |V        |         |         |
12+10       1.3666      2.00  |Q        |V        |         |         |
12+15       1.3802      1.97  |Q        |V        |         |         |
12+20       1.3933      1.91  |Q        |V        |         |         |
12+25       1.4062      1.86  |Q        |V        |         |         |
12+30       1.4188      1.84  |Q        |V        |         |         |
12+35       1.4315      1.83  |Q        | V       |         |         |
12+40       1.4441      1.83  |Q        | V       |         |         |
12+45       1.4567      1.84  |Q        | V       |         |         |
12+50       1.4694      1.85  |Q        | V       |         |         |
12+55       1.4822      1.86  |Q        | V       |         |         |
13+ 0       1.4952      1.87  |Q        | V       |         |         |
13+ 5       1.5082      1.89  |Q        | V       |         |         |
13+10       1.5213      1.91  |Q        | V       |         |         |
13+15       1.5346      1.93  |Q        | V       |         |         |
13+20       1.5481      1.95  |Q        |  V      |         |         |
13+25       1.5617      1.98  |Q        |  V      |         |         |
13+30       1.5755      2.01  | Q       |  V      |         |         |
13+35       1.5896      2.03  | Q       |  V      |         |         |
13+40       1.6038      2.07  | Q       |  V      |         |         |
13+45       1.6182      2.10  | Q       |  V      |         |         |
13+50       1.6329      2.13  | Q       |  V      |         |         |
13+55       1.6479      2.17  | Q       |  V      |         |         |
14+ 0       1.6631      2.21  | Q       |   V     |         |         |
14+ 5       1.6786      2.25  | Q       |   V     |         |         |
14+10       1.6944      2.30  | Q       |   V     |         |         |
14+15       1.7105      2.34  | Q       |   V     |         |         |
14+20       1.7270      2.39  | Q       |   V     |         |         |
14+25       1.7439      2.45  | Q       |   V     |         |         |
14+30       1.7611      2.51  | Q       |   V     |         |         |
14+35       1.7788      2.57  | Q       |   V     |         |         |
14+40       1.7969      2.63  | Q       |    V    |         |         |
14+45       1.8156      2.70  | Q       |    V    |         |         |
14+50       1.8347      2.78  | Q       |    V    |         |         |
14+55       1.8545      2.87  | Q       |    V    |         |         |
15+ 0       1.8748      2.96  | Q       |    V    |         |         |
15+ 5       1.8959      3.06  |  Q      |    V    |         |         |
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15+10       1.9178      3.17  |  Q      |     V   |         |         |
15+15       1.9404      3.29  |  Q      |     V   |         |         |
15+20       1.9641      3.43  |  Q      |     V   |         |         |
15+25       1.9887      3.57  |  Q      |     V   |         |         |
15+30       2.0141      3.69  |  Q      |     V   |         |         |
15+35       2.0399      3.75  |  Q                          |         |
15+40       2.0655      3.71  |  Q                          |         |
15+45       2.0914      3.76  |  Q                          |         |
15+50       2.1188      3.98  |  Q                          |         |
15+55       2.1488      4.37  |   Q                         |         |
16+ 0       2.1845      5.17  |    Q    |       V |         |         |
16+ 5       2.2402      8.10  |       Q |       V |         |         |
16+10       2.3393     14.39            |   Q    V|         |         |
16+15       2.5028     23.74            |         |V Q      |         |
16+20       2.7545     36.55  |         |         |  V      |     Q   |
16+25       2.9586     29.64  |         |         |   V    Q|         |
16+30       3.1005     20.60  |         |         Q     V   |         |
16+35       3.2064     15.38  |         |    Q    |      V  |         |
16+40       3.2945     12.79  |         | Q       |      V  |         |
16+45       3.3695     10.88  |         Q         |       V |         |
16+50       3.4340      9.38  |        Q|         |       V |         |
16+55       3.4910      8.26  |       Q |         |        V|         |
17+ 0       3.5426      7.50  |      Q  |         |        V|         |
17+ 5       3.5894      6.79  |     Q   |         |         V         |
17+10       3.6308      6.02  |     Q   |         |         V         |
17+15       3.6682      5.43  |    Q    |         |         V         |
17+20       3.7032      5.08  |    Q    |         |         |V        |
17+25       3.7356      4.71  |   Q     |         |         |V        |
17+30       3.7658      4.39  |   Q     |         |         |V        |
17+35       3.7934      4.01  |   Q     |         |         |V        |
17+40       3.8198      3.82  |  Q      |         |         | V       |
17+45       3.8440      3.51  |  Q      |         |         | V       |
17+50       3.8670      3.34  |  Q      |         |         | V       |
17+55       3.8880      3.05  |  Q      |         |         | V       |
18+ 0       3.9079      2.88  | Q       |         |         | V       |
18+ 5       3.9261      2.64  | Q       |         |         |  V      |
18+10       3.9433      2.50  | Q       |         |         |  V      |
18+15       3.9606      2.51  | Q       |         |         |  V      |
18+20       3.9783      2.57  | Q       |         |         |  V      |
18+25       3.9960      2.58  | Q       |         |         |  V      |
18+30       4.0136      2.55  | Q       |         |         |  V      |
18+35       4.0306      2.47  | Q       |         |         |  V      |
18+40       4.0465      2.30  | Q       |         |         |   V     |
18+45       4.0619      2.24  | Q       |         |         |   V     |
18+50       4.0763      2.10  | Q       |         |         |   V     |
18+55       4.0898      1.96  |Q        |         |         |   V     |
19+ 0       4.1031      1.93  |Q        |         |         |   V     |
19+ 5       4.1162      1.90  |Q        |         |         |   V     |
19+10       4.1292      1.88  |Q        |         |         |   V     |
19+15       4.1419      1.85  |Q        |         |         |   V     |
19+20       4.1545      1.82  |Q        |         |         |    V    |
19+25       4.1668      1.80  |Q        |         |         |    V    |
19+30       4.1791      1.78  |Q        |         |         |    V    |
19+35       4.1912      1.75  |Q        |         |         |    V    |
```

100-YR, 24-HR
Q100= 36.55 CFS
PRE-DEVELOPED

19+40	4.2031	1.73	Q				V
19+45	4.2149	1.71	Q				V
19+50	4.2265	1.69	Q				V
19+55	4.2380	1.67	Q				V
20+ 0	4.2494	1.65	Q				V
20+ 5	4.2607	1.63	Q				V
20+10	4.2718	1.62	Q				V
20+15	4.2828	1.60	Q				V
20+20	4.2937	1.58	Q				V
20+25	4.3045	1.57	Q				V
20+30	4.3152	1.55	Q				V
20+35	4.3258	1.54	Q				V
20+40	4.3363	1.52	Q				V
20+45	4.3466	1.51	Q				V
20+50	4.3569	1.49	Q				V
20+55	4.3671	1.48	Q				V
21+ 0	4.3772	1.47	Q				V
21+ 5	4.3872	1.45	Q				V
21+10	4.3971	1.44	Q				V
21+15	4.4070	1.43	Q				V
21+20	4.4167	1.42	Q				V
21+25	4.4264	1.40	Q				V
21+30	4.4360	1.39	Q				V
21+35	4.4455	1.38	Q				V
21+40	4.4549	1.37	Q				V
21+45	4.4643	1.36	Q				V
21+50	4.4736	1.35	Q				V
21+55	4.4828	1.34	Q				V
22+ 0	4.4920	1.33	Q				V
22+ 5	4.5010	1.32	Q				V
22+10	4.5101	1.31	Q				V
22+15	4.5190	1.30	Q				V
22+20	4.5279	1.29	Q				V
22+25	4.5367	1.28	Q				V
22+30	4.5455	1.27	Q				V
22+35	4.5542	1.27	Q				V
22+40	4.5629	1.26	Q				V
22+45	4.5715	1.25	Q				V
22+50	4.5801	1.24	Q				V
22+55	4.5885	1.23	Q				V
23+ 0	4.5970	1.23	Q				V
23+ 5	4.6054	1.22	Q				V
23+10	4.6137	1.21	Q				V
23+15	4.6220	1.20	Q				V
23+20	4.6303	1.20	Q				V
23+25	4.6384	1.19	Q				V
23+30	4.6466	1.18	Q				V
23+35	4.6547	1.18	Q				V
23+40	4.6627	1.17	Q				V
23+45	4.6708	1.16	Q				V
23+50	4.6787	1.16	Q				V
23+55	4.6866	1.15	Q				V
24+ 0	4.6945	1.14	Q				V

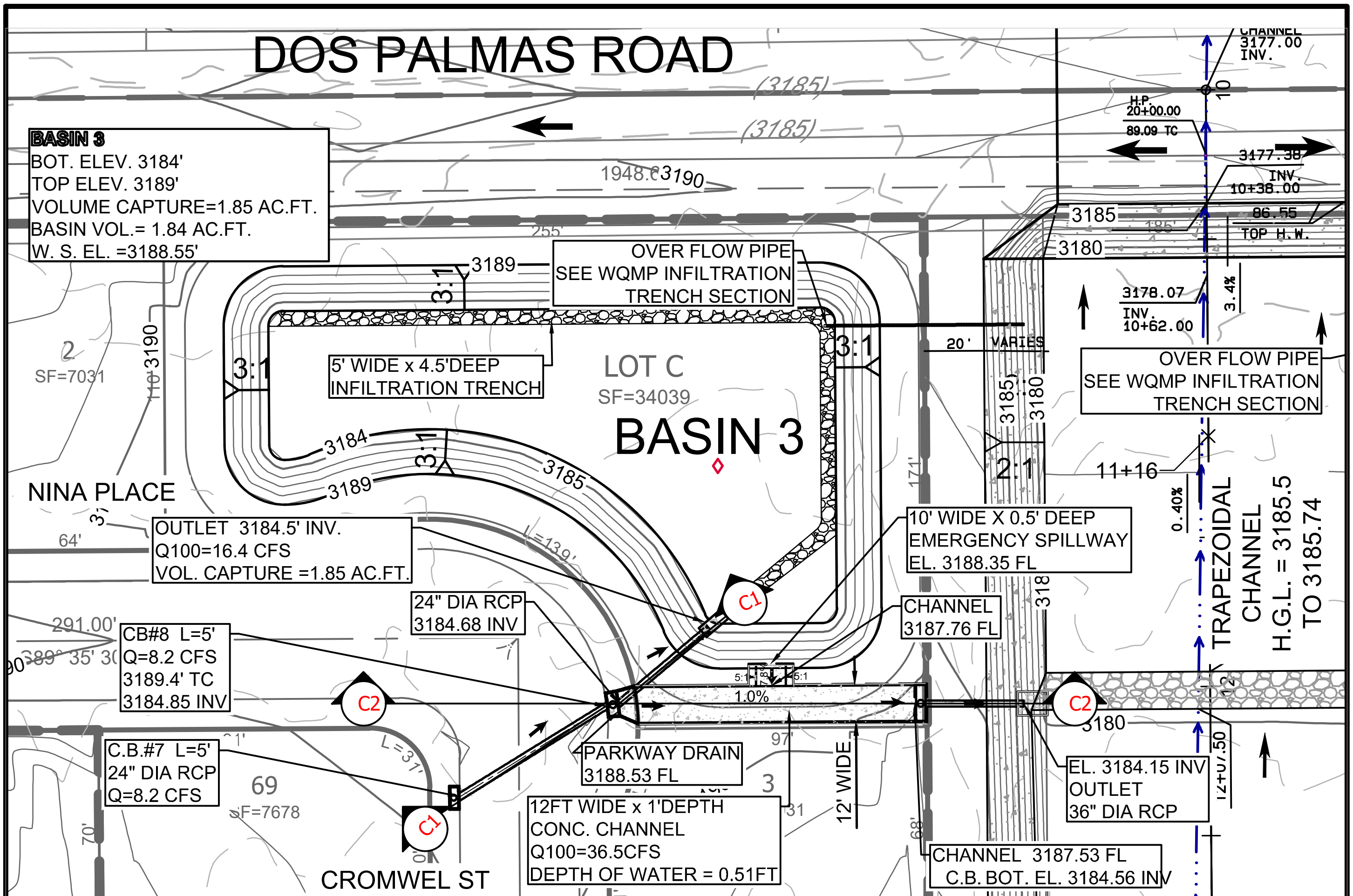
DA 3 DMA A

BASIN 3

ONSITE POST-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

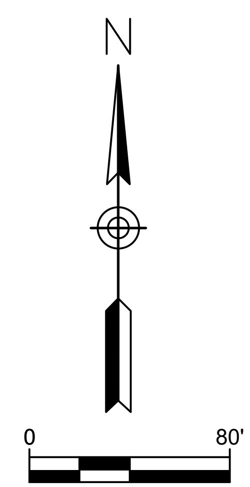
100-YEAR; 24-HOURS STORM EVENTS



BASIN 3 STAGE STORAGE TABLE

ELEV	AREA (sq. ft.)	DEPTH (ft)	AREA (ac. ft.)	VOLUME (ac. ft.)	COML. VOL. (ac. ft.)	VOLUME VOL. (cu. ft.)
3,184.000	12,149.42	N/A	0.279			
				0.2978	0.2978	12972
3,185.000	13,794.24	1.000	0.317			
				0.3362	0.6340	27619
3,186.000	15,499.78	1.000	0.356			
				0.3761	1.0101	44002
3,187.000	17,266.72	1.000	0.396			
				0.4173	1.4275	62180
3,188.000	19,089.76	1.000	0.438			
				0.481	1.8871	82201
3,189.000	20,950.88	1.000	0.481			
				TOTAL VOLUME		82,201

VOLUME CAPTURE = 1.84 AC.FT.   WATER SURFACE ELEVATION =3188.89'



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CITY OF VICTORVILLE
TR. 16397
ONSITE DRAINAGE BASIN 3 PLAN

CLIENT:
RY PROPERTIES

SCALE	SHEET
1":60'	1 OF 3

DESIGNED BY:	DRAWN BY:	CHECKED BY:	
AG	LC	JF	D-1

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

Study date 11/29/17

++

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

Program License Serial Number 4070

100-YEAR, 24-HOURS UNIT HYDROGRAPH POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A1 TO A4 (WEST OF TRAPEZOIDAL CHANNEL) DA 3 DMA-A
FILE: 16397UNITHYDA1POST100YR.OUT

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
24.62	1	1.11
Rainfall data for year 100		
24.62	6	2.38
Rainfall data for year 100		
24.62	24	4.96

++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction    (In/Hr)  (dec.)   (In/Hr)
 76.0      91.6         24.62      1.000     0.163    0.500    0.081

Area-averaged adjusted loss rate Fm (In/Hr) =  0.081

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    12.31   0.500         76.0      91.6       0.92     0.808
    12.31   0.500         98.0      98.0       0.20     0.952

Area-averaged catchment yield fraction, Y =  0.880
Area-averaged low loss fraction, Yb =  0.120
User entry of time of concentration  =   0.297 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      24.62(Ac.)
Catchment Lag time =   0.238 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 35.0529
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.081(In/Hr)
Average low loss rate fraction (Yb) = 0.120 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.527(In)
Computed peak 30-minute rainfall =  0.902(In)
Specified peak 1-hour rainfall =  1.110(In)
Computed peak 3-hour rainfall =  1.772(In)
Specified peak 6-hour rainfall =  2.380(In)
Specified peak 24-hour rainfall =  4.960(In)


Rainfall depth area reduction factors:
Using a total area of      24.62(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.526(In)
30-minute factor = 0.999    Adjusted rainfall =  0.901(In)
1-hour factor = 0.999       Adjusted rainfall =  1.109(In)
3-hour factor = 1.000       Adjusted rainfall =  1.772(In)
6-hour factor = 1.000       Adjusted rainfall =  2.380(In)
24-hour factor = 1.000      Adjusted rainfall =  4.960(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
           (K =       297.75 (CFS))

  1                2.238                  6.664
  2               13.444                 33.365
  3               41.049                 82.195
```

4	60.064	56.615
5	70.231	30.273
6	77.017	20.205
7	81.833	14.340
8	85.528	11.000
9	88.468	8.754
10	90.643	6.477
11	92.460	5.411
12	93.976	4.513
13	95.194	3.626
14	96.204	3.007
15	97.039	2.488
16	97.666	1.868
17	98.084	1.243
18	98.462	1.125
19	98.882	1.251
20	99.302	1.252
21	99.616	0.935
22	99.835	0.652
23	100.000	0.491

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5261	0.5261
2	0.6477	0.1216
3	0.7315	0.0838
4	0.7974	0.0659
5	0.8526	0.0552
6	0.9006	0.0479
7	0.9432	0.0426
8	0.9817	0.0386
9	1.0170	0.0353
10	1.0497	0.0327
11	1.0802	0.0304
12	1.1087	0.0286
13	1.1472	0.0385
14	1.1841	0.0368
15	1.2195	0.0354
16	1.2535	0.0340
17	1.2863	0.0328
18	1.3181	0.0318
19	1.3488	0.0308
20	1.3787	0.0298
21	1.4077	0.0290
22	1.4359	0.0282
23	1.4634	0.0275
24	1.4902	0.0268
25	1.5164	0.0262
26	1.5420	0.0256
27	1.5670	0.0250
28	1.5915	0.0245
29	1.6155	0.0240
30	1.6390	0.0235
31	1.6621	0.0231

248	4.5821	0.0098
249	4.5919	0.0098
250	4.6017	0.0098
251	4.6114	0.0097
252	4.6211	0.0097
253	4.6308	0.0097
254	4.6405	0.0097
255	4.6502	0.0097
256	4.6598	0.0097
257	4.6695	0.0096
258	4.6791	0.0096
259	4.6887	0.0096
260	4.6983	0.0096
261	4.7078	0.0096
262	4.7174	0.0095
263	4.7269	0.0095
264	4.7364	0.0095
265	4.7459	0.0095
266	4.7554	0.0095
267	4.7649	0.0095
268	4.7743	0.0094
269	4.7837	0.0094
270	4.7931	0.0094
271	4.8025	0.0094
272	4.8119	0.0094
273	4.8213	0.0094
274	4.8306	0.0093
275	4.8400	0.0093
276	4.8493	0.0093
277	4.8586	0.0093
278	4.8679	0.0093
279	4.8771	0.0093
280	4.8864	0.0093
281	4.8956	0.0092
282	4.9048	0.0092
283	4.9140	0.0092
284	4.9232	0.0092
285	4.9324	0.0092
286	4.9416	0.0092
287	4.9507	0.0091
288	4.9598	0.0091

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0091	0.0011	0.0080
2	0.0091	0.0011	0.0080
3	0.0092	0.0011	0.0081
4	0.0092	0.0011	0.0081
5	0.0092	0.0011	0.0081
6	0.0092	0.0011	0.0081
7	0.0093	0.0011	0.0082
8	0.0093	0.0011	0.0082

279	0.0096	0.0012	0.0084
280	0.0095	0.0011	0.0084
281	0.0095	0.0011	0.0084
282	0.0094	0.0011	0.0083
283	0.0094	0.0011	0.0083
284	0.0093	0.0011	0.0082
285	0.0093	0.0011	0.0082
286	0.0093	0.0011	0.0081
287	0.0092	0.0011	0.0081
288	0.0092	0.0011	0.0081

```
--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      0.53(In)
Total effective rainfall =      4.43(In)
Peak flow rate in flood hydrograph =     56.91(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R   S T O R M
               R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

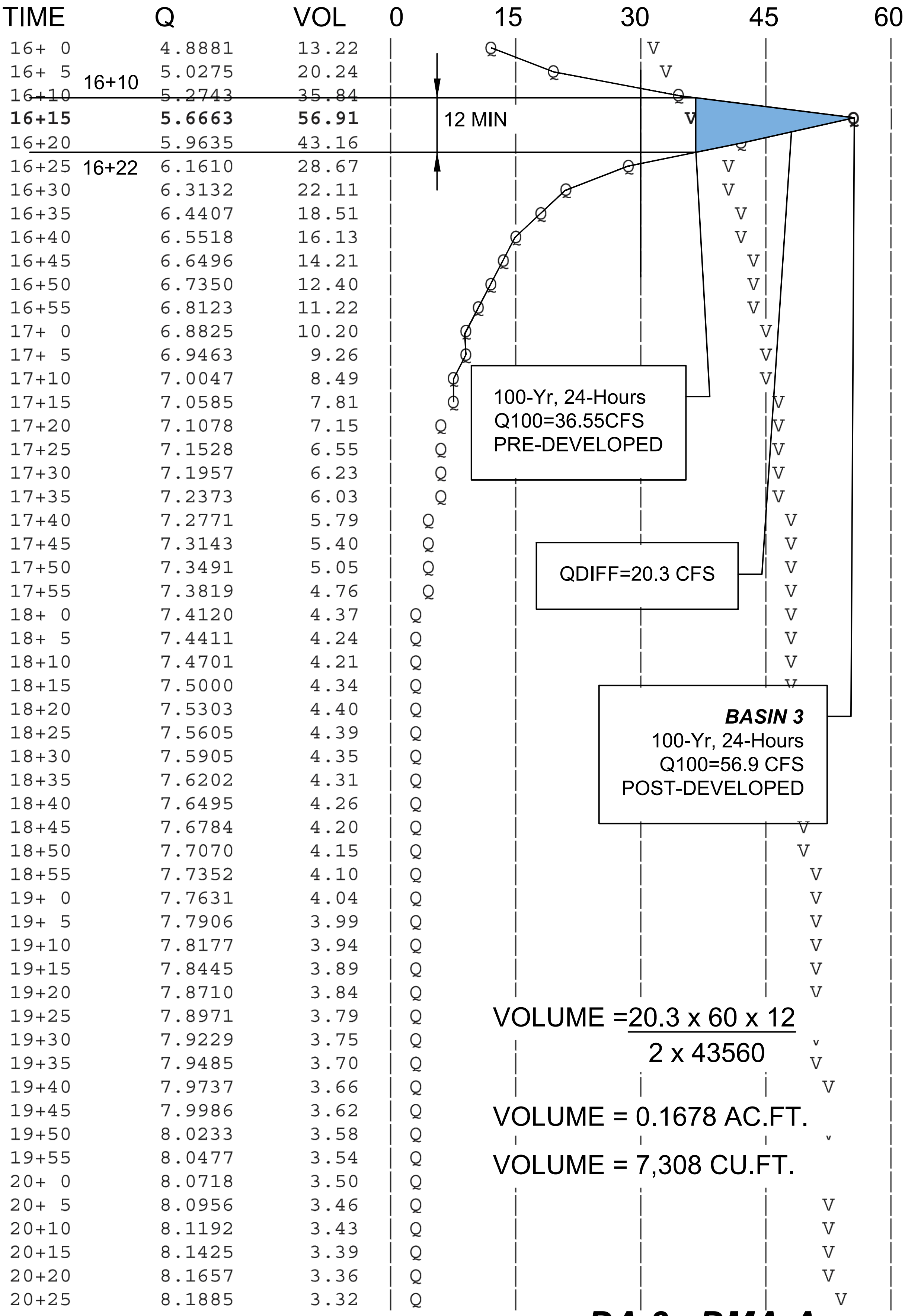
    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       15.0      30.0      45.0      60.0
-----------------------------------------------------------------------
  0+ 5       0.0004      0.05  Q         |         |         |         |
  0+10       0.0026      0.32  Q         |         |         |         |
  0+15       0.0094      0.98  Q         |         |         |         |
  0+20       0.0193      1.44  Q         |         |         |         |
  0+25       0.0309      1.69  VQ        |         |         |         |
  0+30       0.0436      1.85  VQ        |         |         |         |
  0+35       0.0572      1.97  VQ        |         |         |         |
  0+40       0.0715      2.07  VQ        |         |         |         |
  0+45       0.0862      2.14  VQ        |         |         |         |
  0+50       0.1014      2.20  VQ        |         |         |         |
  0+55       0.1168      2.25  VQ        |         |         |         |
  1+ 0       0.1326      2.29  VQ        |         |         |         |
  1+ 5       0.1486      2.33  VQ        |         |         |         |
  1+10       0.1648      2.36  VQ        |         |         |         |
  1+15       0.1812      2.38  VQ        |         |         |         |
  1+20       0.1978      2.40  VQ        |         |         |         |
  1+25       0.2144      2.42  VQ        |         |         |         |
  1+30       0.2312      2.43  |Q        |         |         |         |
  1+35       0.2481      2.45  |Q        |         |         |         |
  1+40       0.2651      2.47  |Q        |         |         |         |
  1+45       0.2822      2.48  |Q        |         |         |         |
  1+50       0.2993      2.49  |Q        |         |         |         |
  1+55       0.3166      2.50  |Q        |         |         |         |
  2+ 0       0.3339      2.51  |Q        |         |         |         |
  2+ 5       0.3512      2.52  |Q        |         |         |         |
  2+10       0.3686      2.52  |Q        |         |         |         |
  2+15       0.3860      2.53  |Q        |         |         |         |
  2+20       0.4035      2.54  |Q        |         |         |         |
  2+25       0.4210      2.55  |Q        |         |         |         |
```

```
  2+30       0.4386       2.55  |Q         |         |         |         |
  2+35       0.4563       2.56  |QV        |         |         |         |
  2+40       0.4739       2.57  |QV        |         |         |         |
  2+45       0.4917       2.57  |QV        |         |         |         |
  2+50       0.5094       2.58  |QV        |         |         |         |
  2+55       0.5273       2.59  |QV        |         |         |         |
  3+ 0       0.5452       2.60  |QV        |         |         |         |
  3+ 5       0.5631       2.60  |QV        |         |         |         |
  3+10       0.5811       2.61  |QV        |         |         |         |
  3+15       0.5991       2.62  |QV        |         |         |         |
  3+20       0.6172       2.63  |QV        |         |         |         |
  3+25       0.6354       2.64  |QV        |         |         |         |
  3+30       0.6536       2.64  |QV        |         |         |         |
  3+35       0.6719       2.65  |QV        |         |         |         |
  3+40       0.6902       2.66  |Q V       |         |         |         |
  3+45       0.7086       2.67  |Q V       |         |         |         |
  3+50       0.7270       2.68  |Q V       |         |         |         |
  3+55       0.7455       2.68  |Q V       |         |         |         |
  4+ 0       0.7640       2.69  |Q V       |         |         |         |
  4+ 5       0.7826       2.70  |Q V       |         |         |         |
  4+10       0.8013       2.71  |Q V       |         |         |         |
  4+15       0.8200       2.72  |Q V       |         |         |         |
  4+20       0.8388       2.73  |Q V       |         |         |         |
  4+25       0.8577       2.74  |Q V       |         |         |         |
  4+30       0.8766       2.75  |Q V       |         |         |         |
  4+35       0.8956       2.76  |Q V       |         |         |         |
  4+40       0.9146       2.76  |Q  V      |         |         |         |
  4+45       0.9337       2.77  |Q  V      |         |         |         |
  4+50       0.9529       2.78  |Q  V      |         |         |         |
  4+55       0.9721       2.79  |Q  V      |         |         |         |
  5+ 0       0.9914       2.80  |Q  V      |         |         |         |
  5+ 5       1.0107       2.81  |Q  V      |         |         |         |
  5+10       1.0302       2.82  |Q  V      |         |         |         |
  5+15       1.0497       2.83  |Q  V      |         |         |         |
  5+20       1.0692       2.84  |Q  V      |         |         |         |
  5+25       1.0889       2.85  |Q  V      |         |         |         |
  5+30       1.1086       2.86  |Q  V      |         |         |         |
  5+35       1.1284       2.87  |Q  V      |         |         |         |
  5+40       1.1482       2.88  |Q   V     |         |         |         |
  5+45       1.1681       2.89  |Q   V     |         |         |         |
  5+50       1.1881       2.90  |Q   V     |         |         |         |
  5+55       1.2082       2.91  |Q   V     |         |         |         |
  6+ 0       1.2284       2.93  |Q   V     |         |         |         |
  6+ 5       1.2486       2.94  |Q   V     |         |         |         |
  6+10       1.2689       2.95  |Q   V     |         |         |         |
  6+15       1.2893       2.96  |Q   V     |         |         |         |
  6+20       1.3097       2.97  |Q   V     |         |         |         |
  6+25       1.3303       2.98  |Q   V     |         |         |         |
  6+30       1.3509       2.99  |Q   V     |         |         |         |
  6+35       1.3716       3.01  | Q   V    |         |         |         |
  6+40       1.3924       3.02  | Q   V    |         |         |         |
  6+45       1.4132       3.03  | Q   V    |         |         |         |
  6+50       1.4342       3.04  | Q   V    |         |         |         |
  6+55       1.4552       3.06  | Q   V    |         |         |         |
```

```
 7+ 0       1.4764      3.07  | Q   V   |         |         |         |
 7+ 5       1.4976      3.08  | Q   V   |         |         |         |
 7+10       1.5189      3.09  | Q   V   |         |         |         |
 7+15       1.5403      3.11  | Q   V   |         |         |         |
 7+20       1.5618      3.12  | Q   V   |         |         |         |
 7+25       1.5833      3.13  | Q   V   |         |         |         |
 7+30       1.6050      3.15  | Q    V  |         |         |         |
 7+35       1.6268      3.16  | Q    V  |         |         |         |
 7+40       1.6487      3.18  | Q    V  |         |         |         |
 7+45       1.6706      3.19  | Q    V  |         |         |         |
 7+50       1.6927      3.20  | Q    V  |         |         |         |
 7+55       1.7149      3.22  | Q    V  |         |         |         |
 8+ 0       1.7371      3.23  | Q    V  |         |         |         |
 8+ 5       1.7595      3.25  | Q    V  |         |         |         |
 8+10       1.7820      3.26  | Q    V  |         |         |         |
 8+15       1.8046      3.28  | Q    V  |         |         |         |
 8+20       1.8273      3.30  | Q     V |         |         |         |
 8+25       1.8501      3.31  | Q     V |         |         |         |
 8+30       1.8730      3.33  | Q     V |         |         |         |
 8+35       1.8961      3.35  | Q     V |         |         |         |
 8+40       1.9192      3.36  | Q     V |         |         |         |
 8+45       1.9425      3.38  | Q     V |         |         |         |
 8+50       1.9659      3.40  | Q     V |         |         |         |
 8+55       1.9894      3.41  | Q     V |         |         |         |
 9+ 0       2.0131      3.43  | Q     V |         |         |         |
 9+ 5       2.0368      3.45  | Q     V |         |         |         |
 9+10       2.0607      3.47  | Q      V|         |         |         |
 9+15       2.0848      3.49  | Q      V|         |         |         |
 9+20       2.1089      3.51  | Q      V|         |         |         |
 9+25       2.1332      3.53  | Q      V|         |         |         |
 9+30       2.1576      3.55  | Q      V|         |         |         |
 9+35       2.1822      3.57  | Q      V|         |         |         |
 9+40       2.2069      3.59  | Q      V|         |         |         |
 9+45       2.2318      3.61  | Q      V|         |         |         |
 9+50       2.2568      3.63  | Q      V|         |         |         |
 9+55       2.2820      3.65  | Q       V         |         |         |
10+ 0       2.3073      3.67  | Q       V         |         |         |
10+ 5       2.3327      3.70  | Q       V         |         |         |
10+10       2.3584      3.72  | Q       V         |         |         |
10+15       2.3842      3.74  | Q       V         |         |         |
10+20       2.4101      3.77  | Q       V         |         |         |
10+25       2.4362      3.79  | Q       V         |         |         |
10+30       2.4625      3.82  | Q       V         |         |         |
10+35       2.4890      3.84  | Q       V         |         |         |
10+40       2.5157      3.87  | Q       |V        |         |         |
10+45       2.5425      3.90  | Q       |V        |         |         |
10+50       2.5695      3.92  | Q       |V        |         |         |
10+55       2.5967      3.95  | Q       |V        |         |         |
11+ 0       2.6242      3.98  | Q       |V        |         |         |
11+ 5       2.6518      4.01  | Q       |V        |         |         |
11+10       2.6796      4.04  | Q       |V        |         |         |
11+15       2.7076      4.07  | Q       |V        |         |         |
11+20       2.7359      4.10  | Q       | V       |         |         |
11+25       2.7644      4.13  | Q       | V       |         |         |
```

```
11+30       2.7931      4.17  | Q       | V       |         |         |
11+35       2.8220      4.20  | Q       | V       |         |         |
11+40       2.8512      4.24  | Q       | V       |         |         |
11+45       2.8806      4.27  | Q       | V       |         |         |
11+50       2.9102      4.31  | Q       | V       |         |         |
11+55       2.9402      4.35  | Q       | V       |         |         |
12+ 0       2.9704      4.38  | Q       |  V      |         |         |
12+ 5       3.0007      4.40  | Q       |  V      |         |         |
12+10       3.0306      4.34  | Q       |  V      |         |         |
12+15       3.0591      4.14  | Q       |  V      |         |         |
12+20       3.0867      4.01  | Q       |  V      |         |         |
12+25       3.1140      3.96  | Q       |  V      |         |         |
12+30       3.1411      3.94  | Q       |  V      |         |         |
12+35       3.1683      3.95  | Q       |  V      |         |         |
12+40       3.1956      3.96  | Q       |   V     |         |         |
12+45       3.2231      3.99  | Q       |   V     |         |         |
12+50       3.2508      4.02  | Q       |   V     |         |         |
12+55       3.2787      4.06  | Q       |   V     |         |         |
13+ 0       3.3070      4.10  | Q       |   V     |         |         |
13+ 5       3.3356      4.15  | Q       |   V     |         |         |
13+10       3.3645      4.20  | Q       |   V     |         |         |
13+15       3.3938      4.26  | Q       |   V     |         |         |
13+20       3.4235      4.32  | Q       |    V    |         |         |
13+25       3.4537      4.38  | Q       |    V    |         |         |
13+30       3.4843      4.45  | Q       |    V    |         |         |
13+35       3.5155      4.52  |  Q      |    V    |         |         |
13+40       3.5471      4.60  |  Q      |    V    |         |         |
13+45       3.5794      4.68  |  Q      |    V    |         |         |
13+50       3.6122      4.76  |  Q      |    V    |         |         |
13+55       3.6456      4.85  |  Q      |     V   |         |         |
14+ 0       3.6797      4.95  |  Q      |     V   |         |         |
14+ 5       3.7145      5.05  |  Q      |     V   |         |         |
14+10       3.7500      5.16  |  Q      |     V   |         |         |
14+15       3.7864      5.28  |  Q      |     V   |         |         |
14+20       3.8236      5.41  |  Q      |     V   |         |         |
14+25       3.8618      5.54  |  Q      |     V   |         |         |
14+30       3.9009      5.68  |  Q      |      V  |         |         |
14+35       3.9411      5.83  |  Q      |      V  |         |         |
14+40       3.9824      5.99  |  Q      |      V  |         |         |
14+45       4.0249      6.17  |   Q     |      V  |         |         |
14+50       4.0687      6.36  |   Q     |      V  |         |         |
14+55       4.1140      6.58  |   Q     |       V |         |         |
15+ 0       4.1608      6.80  |   Q     |       V |         |         |
15+ 5       4.2094      7.06  |   Q     |       V |         |         |
15+10       4.2600      7.34  |   Q     |       V |         |         |
15+15       4.3127      7.66  |    Q    |       V |         |         |
15+20       4.3679      8.01  |    Q    |        V|         |         |
15+25       4.4255      8.36  |    Q    |        V|         |         |
15+30       4.4838      8.48  |    Q    |        V|         |         |
15+35       4.5402      8.19  |    Q    |        V|         |         |
15+40       4.5969      8.22  |    Q    |         V         |         |
15+45       4.6569      8.71  |    Q    |         V         |         |
15+50       4.7222      9.49  |     Q   |         V         |         |
15+55       4.7970     10.86  |      Q  |         |V        |         |
```

TIME	Q	VOL
16+ 0	4.8881	13.22
16+ 5	5.0275	20.24
16+10	5.2743	35.84
16+15	**5.6663**	**56.91**
16+20	5.9635	43.16
16+25	6.1610	28.67
16+30	6.3132	22.11
16+35	6.4407	18.51
16+40	6.5518	16.13
16+45	6.6496	14.21
16+50	6.7350	12.40
16+55	6.8123	11.22
17+ 0	6.8825	10.20
17+ 5	6.9463	9.26
17+10	7.0047	8.49
17+15	7.0585	7.81
17+20	7.1078	7.15
17+25	7.1528	6.55
17+30	7.1957	6.23
17+35	7.2373	6.03
17+40	7.2771	5.79
17+45	7.3143	5.40
17+50	7.3491	5.05
17+55	7.3819	4.76
18+ 0	7.4120	4.37
18+ 5	7.4411	4.24
18+10	7.4701	4.21
18+15	7.5000	4.34
18+20	7.5303	4.40
18+25	7.5605	4.39
18+30	7.5905	4.35
18+35	7.6202	4.31
18+40	7.6495	4.26
18+45	7.6784	4.20
18+50	7.7070	4.15
18+55	7.7352	4.10
19+ 0	7.7631	4.04
19+ 5	7.7906	3.99
19+10	7.8177	3.94
19+15	7.8445	3.89
19+20	7.8710	3.84
19+25	7.8971	3.79
19+30	7.9229	3.75
19+35	7.9485	3.70
19+40	7.9737	3.66
19+45	7.9986	3.62
19+50	8.0233	3.58
19+55	8.0477	3.54
20+ 0	8.0718	3.50
20+ 5	8.0956	3.46
20+10	8.1192	3.43
20+15	8.1425	3.39
20+20	8.1657	3.36
20+25	8.1885	3.32



$$\text{VOLUME} = \frac{20.3 \times 60 \times 12}{2 \times 43560}$$

VOLUME = 0.1678 AC.FT.

VOLUME = 7,308 CU.FT.

DA 3 DMA-A

```
   20+30       8.2112      3.29  | Q       |         |         |     V   |
   20+35       8.2336      3.26  | Q       |         |         |     V   |
   20+40       8.2559      3.23  | Q       |         |         |     V   |
   20+45       8.2779      3.20  | Q       |         |         |     V   |
   20+50       8.2997      3.17  | Q       |         |         |     V   |
   20+55       8.3213      3.14  | Q       |         |         |     V   |
   21+ 0       8.3428      3.11  | Q       |         |         |     V   |
   21+ 5       8.3640      3.09  | Q       |         |         |     V   |
   21+10       8.3851      3.06  | Q       |         |         |     V   |
   21+15       8.4060      3.04  | Q       |         |         |     V   |
   21+20       8.4268      3.01  | Q       |         |         |      V  |
   21+25       8.4474      2.99  |Q        |         |         |      V  |
   21+30       8.4678      2.96  |Q        |         |         |      V  |
   21+35       8.4880      2.94  |Q        |         |         |      V  |
   21+40       8.5081      2.92  |Q        |         |         |      V  |
   21+45       8.5281      2.90  |Q        |         |         |      V  |
   21+50       8.5479      2.88  |Q        |         |         |      V  |
   21+55       8.5676      2.86  |Q        |         |         |      V  |
   22+ 0       8.5871      2.84  |Q        |         |         |      V  |
   22+ 5       8.6065      2.82  |Q        |         |         |      V  |
   22+10       8.6258      2.80  |Q        |         |         |      V  |
   22+15       8.6449      2.78  |Q        |         |         |       V |
   22+20       8.6639      2.76  |Q        |         |         |       V |
   22+25       8.6828      2.74  |Q        |         |         |       V |
   22+30       8.7015      2.72  |Q        |         |         |       V |
   22+35       8.7201      2.71  |Q        |         |         |       V |
   22+40       8.7387      2.69  |Q        |         |         |       V |
   22+45       8.7571      2.67  |Q        |         |         |       V |
   22+50       8.7753      2.66  |Q        |         |         |       V |
   22+55       8.7935      2.64  |Q        |         |         |       V |
   23+ 0       8.8116      2.62  |Q        |         |         |       V |
   23+ 5       8.8295      2.61  |Q        |         |         |       V |
   23+10       8.8474      2.59  |Q        |         |         |       V |
   23+15       8.8652      2.58  |Q        |         |         |        V|
   23+20       8.8828      2.56  |Q        |         |         |        V|
   23+25       8.9004      2.55  |Q        |         |         |        V|
   23+30       8.9178      2.53  |Q        |         |         |        V|
   23+35       8.9352      2.52  |Q        |         |         |        V|
   23+40       8.9524      2.51  |Q        |         |         |        V|
   23+45       8.9696      2.49  |Q        |         |         |        V|
   23+50       8.9867      2.48  |Q        |         |         |        V|
   23+55       9.0037      2.47  |Q        |         |         |        V|
   24+ 0       9.0206      2.45  |Q        |         |         |        V|
-----------------------------------------------------------------------
```

DA 3 DMA A

ONSITE POST-DEVELOPED

UNIT HYDROGRAPH HYDROLOGY

2-YEAR; 24-HOURS STORM EVENTS

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

          Study date  11/28/17

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

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


Program License Serial Number 4070

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

2-YEAR, 24-HOURS UNIT HYDROGRAPH POST-DEVELOPED CONDITION
TR. 16397, CITY OF VICTORVILLE
AREA A1 TO A4 (WEST OF TRAPEZOIDAL CHANNEL) DA 3 DMA-A
FILE: 16397UNITHYDA1PSOT2YR.OUT

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

      Storm Event Year = 2

      Antecedent Moisture Condition = 1

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
      Sub-Area        Duration        Isohyetal
      (Ac.)            (hours)         (In)
Rainfall data for year 2
         24.62            1           0.38
--------------------------------------------------------------------
Rainfall data for year 2
         24.62            6           0.85
--------------------------------------------------------------------
Rainfall data for year 2
         24.62           24           1.55
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 1)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
76.0	58.2	24.62	1.000	0.704	0.500	0.352

Area-averaged adjusted loss rate Fm (In/Hr) = 0.352

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
12.31	0.500	76.0	58.2	7.18	0.001
12.31	0.500	98.0	98.0	0.20	0.858

Area-averaged catchment yield fraction, Y = 0.429
Area-averaged low loss fraction, Yb = 0.571
User entry of time of concentration =   0.208 (hours)
+++
Watershed area =   24.62(Ac.)
Catchment Lag time =   0.166 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 50.0801
Hydrograph baseflow =   0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.352(In/Hr)
Average low loss rate fraction (Yb) = 0.571 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.182(In)
Computed peak 30-minute rainfall = 0.312(In)
Specified peak 1-hour rainfall = 0.384(In)
Computed peak 3-hour rainfall = 0.623(In)
Specified peak 6-hour rainfall = 0.846(In)
Specified peak 24-hour rainfall = 1.550(In)

Rainfall depth area reduction factors:
Using a total area of   24.62(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999	Adjusted rainfall = 0.182(In)
30-minute factor = 0.999	Adjusted rainfall = 0.312(In)
1-hour factor = 0.999	Adjusted rainfall = 0.384(In)
3-hour factor = 1.000	Adjusted rainfall = 0.623(In)
6-hour factor = 1.000	Adjusted rainfall = 0.846(In)
24-hour factor = 1.000	Adjusted rainfall = 1.550(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K =	297.75 (CFS))	
1	3.973	11.830
2	30.607	79.302
3	60.634	89.406

4	73.829	39.287
5	81.493	22.819
6	86.639	15.321
7	90.205	10.619
8	92.803	7.734
9	94.773	5.867
10	96.270	4.456
11	97.365	3.261
12	98.059	2.067
13	98.612	1.646
14	99.213	1.789
15	99.664	1.342
16	100.000	1.002

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.1820	0.1820
2	0.2241	0.0421
3	0.2531	0.0290
4	0.2759	0.0228
5	0.2950	0.0191
6	0.3115	0.0166
7	0.3263	0.0147
8	0.3396	0.0133
9	0.3518	0.0122
10	0.3631	0.0113
11	0.3737	0.0105
12	0.3836	0.0099
13	0.3974	0.0138
14	0.4106	0.0132
15	0.4233	0.0127
16	0.4355	0.0122
17	0.4474	0.0118
18	0.4588	0.0114
19	0.4699	0.0111
20	0.4807	0.0108
21	0.4911	0.0105
22	0.5013	0.0102
23	0.5113	0.0099
24	0.5210	0.0097
25	0.5304	0.0095
26	0.5397	0.0093
27	0.5488	0.0091
28	0.5577	0.0089
29	0.5664	0.0087
30	0.5749	0.0085
31	0.5833	0.0084
32	0.5916	0.0082
33	0.5997	0.0081
34	0.6076	0.0080
35	0.6155	0.0078
36	0.6232	0.0077
37	0.6307	0.0076
38	0.6382	0.0075

255	1.4697	0.0025
256	1.4722	0.0025
257	1.4747	0.0025
258	1.4772	0.0025
259	1.4797	0.0025
260	1.4822	0.0025
261	1.4847	0.0025
262	1.4872	0.0025
263	1.4897	0.0025
264	1.4921	0.0025
265	1.4946	0.0025
266	1.4971	0.0025
267	1.4995	0.0025
268	1.5020	0.0025
269	1.5044	0.0024
270	1.5069	0.0024
271	1.5093	0.0024
272	1.5117	0.0024
273	1.5142	0.0024
274	1.5166	0.0024
275	1.5190	0.0024
276	1.5214	0.0024
277	1.5238	0.0024
278	1.5262	0.0024
279	1.5286	0.0024
280	1.5310	0.0024
281	1.5334	0.0024
282	1.5358	0.0024
283	1.5381	0.0024
284	1.5405	0.0024
285	1.5429	0.0024
286	1.5452	0.0024
287	1.5476	0.0024
288	1.5500	0.0024

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0024	0.0013	0.0010
2	0.0024	0.0013	0.0010
3	0.0024	0.0014	0.0010
4	0.0024	0.0014	0.0010
5	0.0024	0.0014	0.0010
6	0.0024	0.0014	0.0010
7	0.0024	0.0014	0.0010
8	0.0024	0.0014	0.0010
9	0.0024	0.0014	0.0010
10	0.0024	0.0014	0.0010
11	0.0024	0.0014	0.0010
12	0.0024	0.0014	0.0010
13	0.0024	0.0014	0.0010
14	0.0024	0.0014	0.0011
15	0.0025	0.0014	0.0011

```
    286              0.0024          0.0014            0.0010
    287              0.0024          0.0014            0.0010
    288              0.0024          0.0013            0.0010
    ----------------------------------------------------------------------
    ----------------------------------------------------------------------
    Total soil rain loss =      0.81(In)
    Total effective rainfall =      0.74(In)
    Peak flow rate in flood hydrograph =     15.84(CFS)
    ----------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R   S T O R M
                   R u n o f f    H y d r o g r a p h
    ----------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    ----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0       10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5      0.0001      0.01  Q         |         |         |         |
  0+10      0.0007      0.09  Q         |         |         |         |
  0+15      0.0020      0.18  Q         |         |         |         |
  0+20      0.0035      0.22  Q         |         |         |         |
  0+25      0.0052      0.25  Q         |         |         |         |
  0+30      0.0070      0.26  Q         |         |         |         |
  0+35      0.0089      0.27  Q         |         |         |         |
  0+40      0.0109      0.28  Q         |         |         |         |
  0+45      0.0129      0.29  Q         |         |         |         |
  0+50      0.0149      0.30  Q         |         |         |         |
  0+55      0.0169      0.30  Q         |         |         |         |
  1+ 0      0.0190      0.30  Q         |         |         |         |
  1+ 5      0.0211      0.30  Q         |         |         |         |
  1+10      0.0232      0.31  Q         |         |         |         |
  1+15      0.0254      0.31  Q         |         |         |         |
  1+20      0.0275      0.31  Q         |         |         |         |
  1+25      0.0297      0.31  Q         |         |         |         |
  1+30      0.0318      0.31  Q         |         |         |         |
  1+35      0.0340      0.31  Q         |         |         |         |
  1+40      0.0362      0.32  Q         |         |         |         |
  1+45      0.0384      0.32  QV        |         |         |         |
  1+50      0.0406      0.32  QV        |         |         |         |
  1+55      0.0428      0.32  QV        |         |         |         |
  2+ 0      0.0450      0.32  QV        |         |         |         |
  2+ 5      0.0472      0.32  QV        |         |         |         |
  2+10      0.0494      0.32  QV        |         |         |         |
  2+15      0.0516      0.32  QV        |         |         |         |
  2+20      0.0538      0.32  QV        |         |         |         |
  2+25      0.0561      0.33  QV        |         |         |         |
  2+30      0.0583      0.33  QV        |         |         |         |
  2+35      0.0606      0.33  QV        |         |         |         |
  2+40      0.0629      0.33  QV        |         |         |         |
  2+45      0.0651      0.33  QV        |         |         |         |
  2+50      0.0674      0.33  QV        |         |         |         |
  2+55      0.0697      0.33  QV        |         |         |         |
  3+ 0      0.0720      0.33  QV        |         |         |         |
```

```
3+ 5      0.0743      0.33  QV        |         |         |         |
3+10      0.0766      0.34  Q V       |         |         |         |
3+15      0.0789      0.34  Q V       |         |         |         |
3+20      0.0813      0.34  Q V       |         |         |         |
3+25      0.0836      0.34  Q V       |         |         |         |
3+30      0.0859      0.34  Q V       |         |         |         |
3+35      0.0883      0.34  Q V       |         |         |         |
3+40      0.0907      0.34  Q V       |         |         |         |
3+45      0.0930      0.34  Q V       |         |         |         |
3+50      0.0954      0.35  Q V       |         |         |         |
3+55      0.0978      0.35  Q V       |         |         |         |
4+ 0      0.1002      0.35  Q V       |         |         |         |
4+ 5      0.1026      0.35  Q V       |         |         |         |
4+10      0.1050      0.35  Q V       |         |         |         |
4+15      0.1075      0.35  Q V       |         |         |         |
4+20      0.1099      0.35  Q V       |         |         |         |
4+25      0.1123      0.36  Q V       |         |         |         |
4+30      0.1148      0.36  Q  V      |         |         |         |
4+35      0.1173      0.36  Q  V      |         |         |         |
4+40      0.1197      0.36  Q  V      |         |         |         |
4+45      0.1222      0.36  Q  V      |         |         |         |
4+50      0.1247      0.36  Q  V      |         |         |         |
4+55      0.1272      0.36  Q  V      |         |         |         |
5+ 0      0.1297      0.37  Q  V      |         |         |         |
5+ 5      0.1323      0.37  Q  V      |         |         |         |
5+10      0.1348      0.37  Q  V      |         |         |         |
5+15      0.1374      0.37  Q  V      |         |         |         |
5+20      0.1399      0.37  Q  V      |         |         |         |
5+25      0.1425      0.37  Q  V      |         |         |         |
5+30      0.1451      0.37  Q  V      |         |         |         |
5+35      0.1477      0.38  Q  V      |         |         |         |
5+40      0.1503      0.38  Q  V      |         |         |         |
5+45      0.1529      0.38  Q   V     |         |         |         |
5+50      0.1555      0.38  Q   V     |         |         |         |
5+55      0.1581      0.38  Q   V     |         |         |         |
6+ 0      0.1608      0.38  Q   V     |         |         |         |
6+ 5      0.1635      0.39  Q   V     |         |         |         |
6+10      0.1661      0.39  Q   V     |         |         |         |
6+15      0.1688      0.39  Q   V     |         |         |         |
6+20      0.1715      0.39  Q   V     |         |         |         |
6+25      0.1742      0.39  Q   V     |         |         |         |
6+30      0.1770      0.40  Q   V     |         |         |         |
6+35      0.1797      0.40  Q   V     |         |         |         |
6+40      0.1824      0.40  Q   V     |         |         |         |
6+45      0.1852      0.40  Q   V     |         |         |         |
6+50      0.1880      0.40  Q   V     |         |         |         |
6+55      0.1908      0.41  Q    V    |         |         |         |
7+ 0      0.1936      0.41  Q    V    |         |         |         |
7+ 5      0.1964      0.41  Q    V    |         |         |         |
7+10      0.1993      0.41  Q    V    |         |         |         |
7+15      0.2021      0.41  Q    V    |         |         |         |
7+20      0.2050      0.42  Q    V    |         |         |         |
7+25      0.2079      0.42  Q    V    |         |         |         |
7+30      0.2107      0.42  Q    V    |         |         |         |
```

```
 7+35       0.2137      0.42  Q    V    |         |         |         |
 7+40       0.2166      0.43  Q    V    |         |         |         |
 7+45       0.2195      0.43  Q    V    |         |         |         |
 7+50       0.2225      0.43  Q    V    |         |         |         |
 7+55       0.2255      0.43  Q    V    |         |         |         |
 8+ 0       0.2285      0.43  Q     V   |         |         |         |
 8+ 5       0.2315      0.44  Q     V   |         |         |         |
 8+10       0.2345      0.44  Q     V   |         |         |         |
 8+15       0.2375      0.44  Q     V   |         |         |         |
 8+20       0.2406      0.44  Q     V   |         |         |         |
 8+25       0.2437      0.45  Q     V   |         |         |         |
 8+30       0.2468      0.45  Q     V   |         |         |         |
 8+35       0.2499      0.45  Q     V   |         |         |         |
 8+40       0.2530      0.46  Q     V   |         |         |         |
 8+45       0.2562      0.46  Q     V   |         |         |         |
 8+50       0.2594      0.46  Q     V   |         |         |         |
 8+55       0.2626      0.46  Q     V   |         |         |         |
 9+ 0       0.2658      0.47  Q      V  |         |         |         |
 9+ 5       0.2690      0.47  Q      V  |         |         |         |
 9+10       0.2723      0.47  Q      V  |         |         |         |
 9+15       0.2756      0.48  Q      V  |         |         |         |
 9+20       0.2789      0.48  Q      V  |         |         |         |
 9+25       0.2822      0.48  Q      V  |         |         |         |
 9+30       0.2856      0.49  Q      V  |         |         |         |
 9+35       0.2889      0.49  Q      V  |         |         |         |
 9+40       0.2923      0.49  Q      V  |         |         |         |
 9+45       0.2957      0.50  Q      V  |         |         |         |
 9+50       0.2992      0.50  |Q     V  |         |         |         |
 9+55       0.3027      0.50  |Q     V  |         |         |         |
10+ 0       0.3062      0.51  |Q      V |         |         |         |
10+ 5       0.3097      0.51  |Q      V |         |         |         |
10+10       0.3132      0.52  |Q      V |         |         |         |
10+15       0.3168      0.52  |Q      V |         |         |         |
10+20       0.3204      0.52  |Q      V |         |         |         |
10+25       0.3240      0.53  |Q      V |         |         |         |
10+30       0.3277      0.53  |Q      V |         |         |         |
10+35       0.3314      0.54  |Q      V |         |         |         |
10+40       0.3351      0.54  |Q      V |         |         |         |
10+45       0.3389      0.55  |Q      V |         |         |         |
10+50       0.3427      0.55  |Q       V|         |         |         |
10+55       0.3465      0.55  |Q       V|         |         |         |
11+ 0       0.3503      0.56  |Q       V|         |         |         |
11+ 5       0.3542      0.56  |Q       V|         |         |         |
11+10       0.3581      0.57  |Q       V|         |         |         |
11+15       0.3621      0.57  |Q       V|         |         |         |
11+20       0.3661      0.58  |Q       V|         |         |         |
11+25       0.3701      0.59  |Q       V|         |         |         |
11+30       0.3742      0.59  |Q       V|         |         |         |
11+35       0.3783      0.60  |Q       V|         |         |         |
11+40       0.3825      0.60  |Q        V         |         |         |
11+45       0.3867      0.61  |Q        V         |         |         |
11+50       0.3909      0.62  |Q        V         |         |         |
11+55       0.3952      0.62  |Q        V         |         |         |
12+ 0       0.3995      0.63  |Q        V         |         |         |
```

```
12+ 5       0.4039      0.64  |Q        V         |         |         |
12+10       0.4084      0.65  |Q        V         |         |         |
12+15       0.4129      0.65  |Q        V         |         |         |
12+20       0.4174      0.66  |Q        |V        |         |         |
12+25       0.4221      0.67  |Q        |V        |         |         |
12+30       0.4267      0.68  |Q        |V        |         |         |
12+35       0.4315      0.69  |Q        |V        |         |         |
12+40       0.4363      0.70  |Q        |V        |         |         |
12+45       0.4412      0.71  |Q        |V        |         |         |
12+50       0.4461      0.72  |Q        |V        |         |         |
12+55       0.4511      0.73  |Q        |V        |         |         |
13+ 0       0.4562      0.74  |Q        | V       |         |         |
13+ 5       0.4613      0.75  |Q        | V       |         |         |
13+10       0.4665      0.76  |Q        | V       |         |         |
13+15       0.4719      0.77  |Q        | V       |         |         |
13+20       0.4772      0.78  |Q        | V       |         |         |
13+25       0.4827      0.79  |Q        | V       |         |         |
13+30       0.4883      0.81  |Q        | V       |         |         |
13+35       0.4939      0.82  |Q        |  V      |         |         |
13+40       0.4997      0.84  |Q        |  V      |         |         |
13+45       0.5056      0.85  |Q        |  V      |         |         |
13+50       0.5115      0.87  |Q        |  V      |         |         |
13+55       0.5176      0.88  |Q        |  V      |         |         |
14+ 0       0.5238      0.90  |Q        |  V      |         |         |
14+ 5       0.5302      0.92  |Q        |  V      |         |         |
14+10       0.5367      0.94  |Q        |   V     |         |         |
14+15       0.5433      0.96  |Q        |   V     |         |         |
14+20       0.5501      0.99  |Q        |   V     |         |         |
14+25       0.5571      1.01  | Q       |   V     |         |         |
14+30       0.5642      1.04  | Q       |   V     |         |         |
14+35       0.5715      1.07  | Q       |    V    |         |         |
14+40       0.5791      1.10  | Q       |    V    |         |         |
14+45       0.5869      1.13  | Q       |    V    |         |         |
14+50       0.5949      1.16  | Q       |    V    |         |         |
14+55       0.6032      1.20  | Q       |    V    |         |         |
15+ 0       0.6118      1.25  | Q       |     V   |         |         |
15+ 5       0.6207      1.30  | Q       |     V   |         |         |
15+10       0.6300      1.35  | Q       |     V   |         |         |
15+15       0.6397      1.41  | Q       |     V   |         |         |
15+20       0.6499      1.48  | Q       |      V  |         |         |
15+25       0.6604      1.53  |  Q      |      V  |         |         |
15+30       0.6706      1.47  | Q       |      V  |         |         |
15+35       0.6802      1.40  | Q       |      V  |         |         |
15+40       0.6902      1.45  | Q       |       V |         |         |
15+45       0.7010      1.56  |  Q      |       V |         |         |
15+50       0.7130      1.75  |  Q      |       V |         |         |
15+55       0.7271      2.04  |   Q     |        V|         |         |
16+ 0       0.7451      2.62  |    Q    |        V|         |         |
16+ 5       0.7804      5.12  |         Q         V         |         |
16+10       0.8825     14.83  |         |         |  V     Q|         |
16+15       0.9916     15.84  |         |         |     V   |Q        |
16+20       1.0487      8.29  |         |     Q   |      V  |         |
16+25       1.0865      5.48  |         Q         |       V |         |
16+30       1.1154      4.20  |       Q |         |        V|         |
```

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16+35       1.1390      3.42  |     Q   |         |         V         |
16+40       1.1586      2.86  |    Q    |         |         V         |
16+45       1.1755      2.45  |   Q     |         |         V         |
16+50       1.1901      2.12  |   Q     |         |         |V        |
16+55       1.2028      1.84  |  Q      |         |         |V        |
17+ 0       1.2136      1.58  |  Q      |         |         |V        |
17+ 5       1.2235      1.44  | Q       |         |         | V       |
17+10       1.2331      1.39  | Q       |         |         | V       |
17+15       1.2417      1.26  | Q       |         |         | V       |
17+20       1.2496      1.14  | Q       |         |         | V       |
17+25       1.2561      0.95  |Q        |         |         |  V      |
17+30       1.2624      0.91  |Q        |         |         |  V      |
17+35       1.2684      0.87  |Q        |         |         |  V      |
17+40       1.2742      0.84  |Q        |         |         |  V      |
17+45       1.2798      0.81  |Q        |         |         |  V      |
17+50       1.2852      0.78  |Q        |         |         |  V      |
17+55       1.2904      0.76  |Q        |         |         |   V     |
18+ 0       1.2955      0.74  |Q        |         |         |   V     |
18+ 5       1.3004      0.72  |Q        |         |         |   V     |
18+10       1.3052      0.70  |Q        |         |         |   V     |
18+15       1.3098      0.68  |Q        |         |         |   V     |
18+20       1.3144      0.66  |Q        |         |         |   V     |
18+25       1.3188      0.64  |Q        |         |         |   V     |
18+30       1.3231      0.63  |Q        |         |         |   V     |
18+35       1.3274      0.62  |Q        |         |         |   V     |
18+40       1.3315      0.60  |Q        |         |         |    V    |
18+45       1.3356      0.59  |Q        |         |         |    V    |
18+50       1.3396      0.58  |Q        |         |         |    V    |
18+55       1.3435      0.57  |Q        |         |         |    V    |
19+ 0       1.3473      0.56  |Q        |         |         |    V    |
19+ 5       1.3511      0.55  |Q        |         |         |    V    |
19+10       1.3548      0.54  |Q        |         |         |    V    |
19+15       1.3585      0.53  |Q        |         |         |    V    |
19+20       1.3621      0.52  |Q        |         |         |    V    |
19+25       1.3656      0.51  |Q        |         |         |    V    |
19+30       1.3691      0.51  |Q        |         |         |     V   |
19+35       1.3725      0.50  Q         |         |         |     V   |
19+40       1.3759      0.49  Q         |         |         |     V   |
19+45       1.3793      0.48  Q         |         |         |     V   |
19+50       1.3826      0.48  Q         |         |         |     V   |
19+55       1.3858      0.47  Q         |         |         |     V   |
20+ 0       1.3890      0.47  Q         |         |         |     V   |
20+ 5       1.3922      0.46  Q         |         |         |     V   |
20+10       1.3953      0.45  Q         |         |         |     V   |
20+15       1.3984      0.45  Q         |         |         |     V   |
20+20       1.4015      0.44  Q         |         |         |     V   |
20+25       1.4045      0.44  Q         |         |         |      V  |
20+30       1.4075      0.43  Q         |         |         |      V  |
20+35       1.4104      0.43  Q         |         |         |      V  |
20+40       1.4133      0.42  Q         |         |         |      V  |
20+45       1.4162      0.42  Q         |         |         |      V  |
20+50       1.4191      0.42  Q         |         |         |      V  |
20+55       1.4219      0.41  Q         |         |         |      V  |
21+ 0       1.4247      0.41  Q         |         |         |      V  |
```

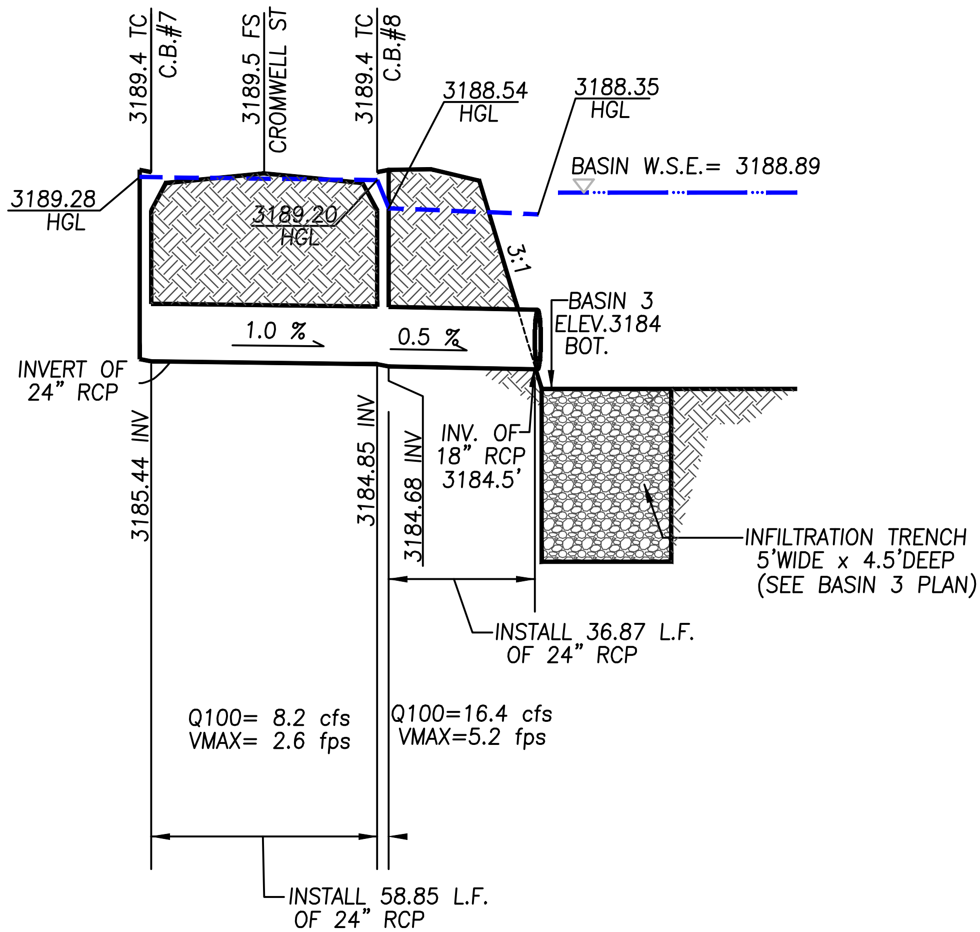
```
 21+ 5       1.4275     0.40  Q         |         |         |      V   |
 21+10       1.4302     0.40  Q         |         |         |      V   |
 21+15       1.4330     0.39  Q         |         |         |      V   |
 21+20       1.4357     0.39  Q         |         |         |      V   |
 21+25       1.4383     0.39  Q         |         |         |      V   |
 21+30       1.4410     0.38  Q         |         |         |      V   |
 21+35       1.4436     0.38  Q         |         |         |       V  |
 21+40       1.4462     0.38  Q         |         |         |       V  |
 21+45       1.4488     0.37  Q         |         |         |       V  |
 21+50       1.4513     0.37  Q         |         |         |       V  |
 21+55       1.4538     0.37  Q         |         |         |       V  |
 22+ 0       1.4564     0.36  Q         |         |         |       V  |
 22+ 5       1.4588     0.36  Q         |         |         |       V  |
 22+10       1.4613     0.36  Q         |         |         |       V  |
 22+15       1.4638     0.36  Q         |         |         |       V  |
 22+20       1.4662     0.35  Q         |         |         |       V  |
 22+25       1.4686     0.35  Q         |         |         |       V  |
 22+30       1.4710     0.35  Q         |         |         |       V  |
 22+35       1.4734     0.35  Q         |         |         |       V  |
 22+40       1.4757     0.34  Q         |         |         |       V  |
 22+45       1.4781     0.34  Q         |         |         |       V  |
 22+50       1.4804     0.34  Q         |         |         |        V|
 22+55       1.4827     0.34  Q         |         |         |        V|
 23+ 0       1.4850     0.33  Q         |         |         |        V|
 23+ 5       1.4873     0.33  Q         |         |         |        V|
 23+10       1.4895     0.33  Q         |         |         |        V|
 23+15       1.4918     0.33  Q         |         |         |        V|
 23+20       1.4940     0.32  Q         |         |         |        V|
 23+25       1.4962     0.32  Q         |         |         |        V|
 23+30       1.4984     0.32  Q         |         |         |        V|
 23+35       1.5006     0.32  Q         |         |         |        V|
 23+40       1.5028     0.32  Q         |         |         |        V|
 23+45       1.5049     0.31  Q         |         |         |        V|
 23+50       1.5071     0.31  Q         |         |         |        V|
 23+55       1.5092     0.31  Q         |         |         |        V|
 24+ 0       1.5113     0.31  Q         |         |         |        V|
----------------------------------------------------------------------
```

2-YR, 24-HRS
VOLUME= 1.51 AC.FT.
DA 3 DMA A

WATER SURFACE
PROFILE GRADIENT CALCULATIONS
BASIN 3
INLET STORM DRAIN PIPE

CATCH BASIN 7 & 8
CALCULATIONS

BASIN 3
FLOWBY CHANNEL
CALCULATIONS



SECTION "C1-C1"

BASIN 3 LINE "C1"

N.T.S.

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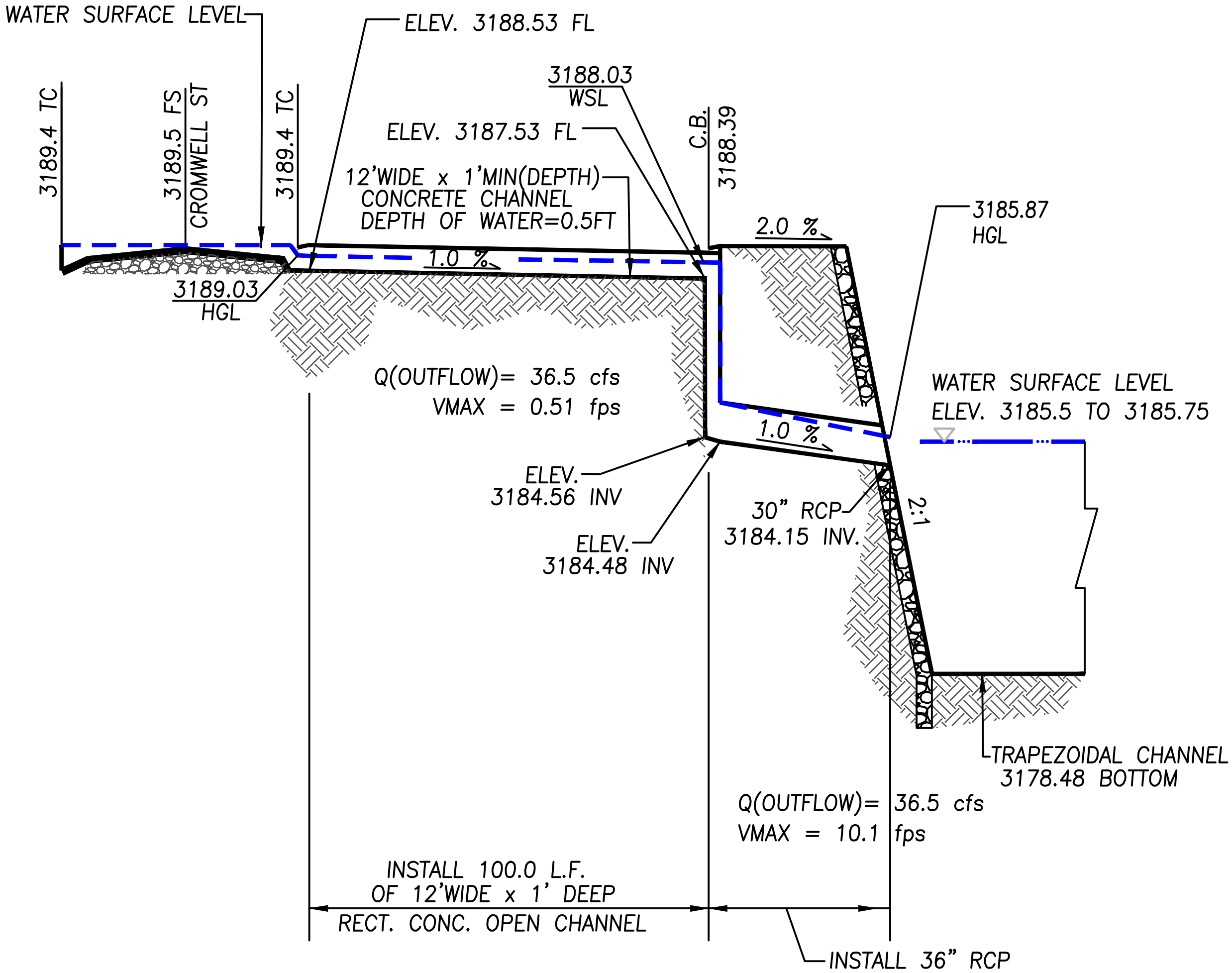
CITY OF VICTORVILLE
TR. 16397
PROFILE STORM DRAIN - BASIN 3 LINE C1

CLIENT:
RY PROPERTIES

SCALE	SHEET	
N.T.S.	4 OF 4	D-1

DESIGNED BY:	DRAWN BY:	CHECKED BY:
JC	LC	JF



SECTION "C2-C2"

BASIN 3 PARKWAY DRAIN

N.T.S.

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CITY OF VICTORVILLE
TR. 16397
PROF. PARKWAY DRAIN CHANNEL TO TRAP. CHANNEL

CLIENT:
RY PROPERTIES

DESIGNED BY:	DRAWN BY:	CHECKED BY:
JC	LC	JF

SCALE N.T.S.

SHEET 4 OF 4

D-1

Ludwig Engineering
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Ph. 909-884-8217 Fax 909-889-0153

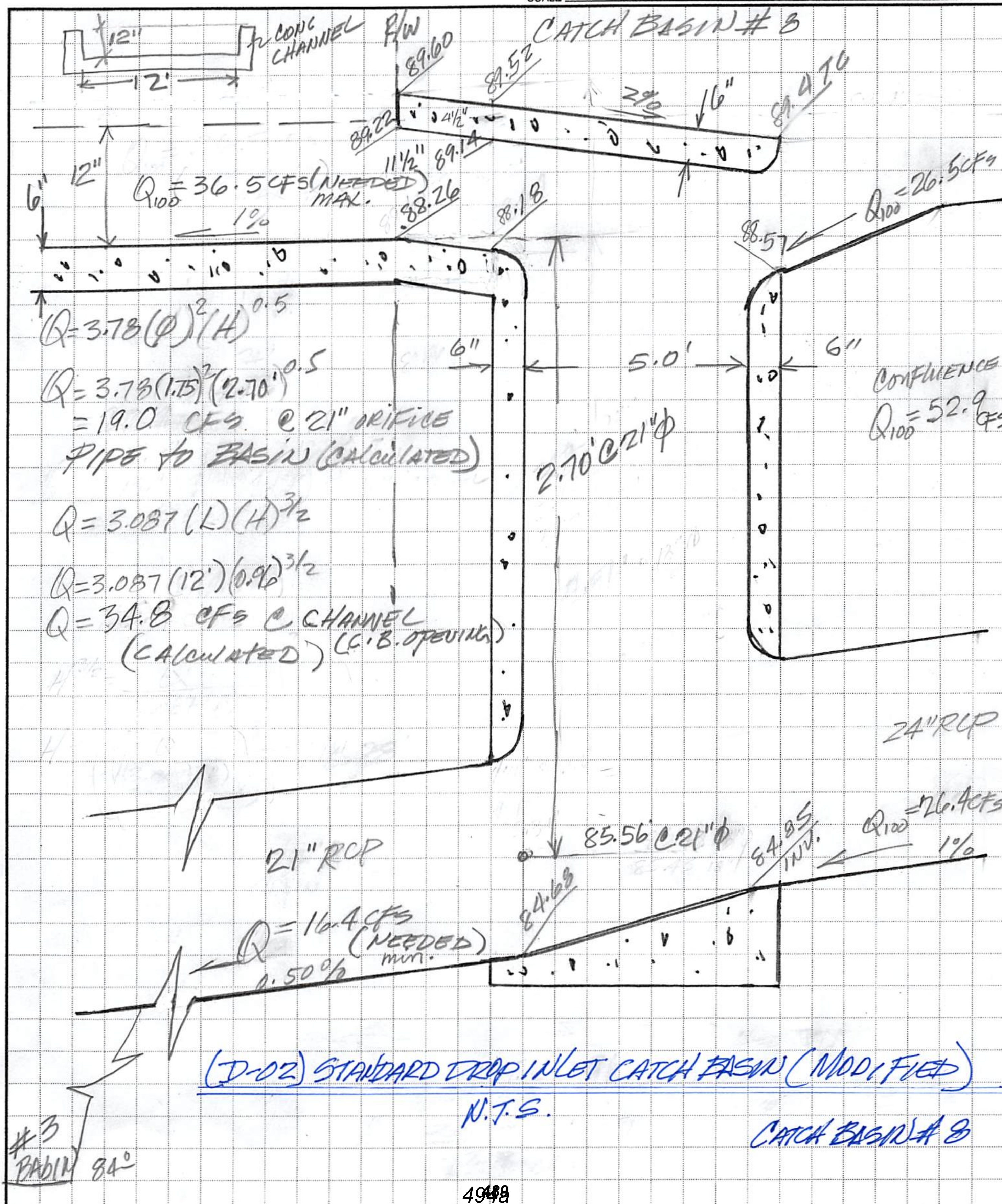
JOB RY-032A RY-properties

SHEET NO. ______ OF ______

CALCULATED BY GAG DATE 12-14-17

CHECKED BY ______ DATE ______

SCALE ______



```
T1 WSPGW LINE "C" BASIN 3       0
T2 TRACT NO. 16397, CITY OF VICTORVILLE
T3 FILE: 16397WSPGWBASIN3.OUT
SO   1000.0003184.500  1                          3188.350
R    1036.8703184.684  1      .013                                  .000    .000 0
JX   1044.8703184.854  4  3   .013    8.200         3186.354         90.0         .000
R    1103.7203185.442  3      .013                                  .000    .000 0
SH   1103.7203185.442  3                          3189.400
CD   1  4   1    .000   2.000     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   3  4   1    .000   2.000     .000  .000  .000   .00
CD   4  4   1    .000   2.000     .000  .000  .000   .00
Q             8.200   .0
```

```
FILE: 16397WSPGWBASIN3.WSW                 W S P G W - CIVILDESIGN Version 14.06                                    PAGE    1
                               Program Package Serial Number: 1586
                                                   WATER SURFACE PROFILE LISTING                   Date:12- 4-2017  Time: 4: 3:44
                         WSPGW LINE "C" BASIN 3       0
                           TRACT NO. 16397, CITY OF VICTORVILLE
                             FILE: 16397WSPGWBASIN3.OUT
************************************************************************************************************************* ********
         | Invert  | Depth | Water   |   Q     | Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|     |No Wth
 Station |  Elev   | (FT)  | Elev    | (CFS)   | (FPS)   Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL |Prs/Pip
        -|-       -|-     -|-       -|-       -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-   -|
 L/Elem  |Ch Slope |       |         |         |        SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |         |         |              |         |       |        |        |       |       |     |
 1000.000  3184.500   3.850  3188.350     16.40    5.22      .42  3188.77     .00    1.46      .00   2.000    .000   .00   1   .0
        -|-       -|-     -|-       -|-       -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
   36.870    .0050                                         .0053      .19    3.85     .00    1.69   .013       .00   .00  PIPE
         |         |        |         |         |              |         |       |        |        |       |       |     |
 1036.870  3184.684   3.860  3188.544     16.40    5.22      .42  3188.97     .00    1.46      .00   2.000    .000   .00   1   .0
        -|-       -|-     -|-       -|-       -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
JUNCT STR   .0212                                          .0033      .03    3.86     .00            .013       .00   .00  PIPE
         |         |        |         |         |              |         |       |        |        |       |       |     |
 1044.870  3184.854   4.351  3189.205      8.20    2.61      .11  3189.31     .00    1.02      .00   2.000    .000   .00   1   .0
        -|-       -|-     -|-       -|-       -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
   58.850    .0100                                         .0013      .08    4.35     .00     .83   .013       .00   .00  PIPE
         |         |        |         |         |              |         |       |        |        |       |       |     |
 1103.720  3185.442   3.840  3189.282      8.20    2.61      .11  3189.39     .00    1.02      .00   2.000    .000   .00   1   .0
        -|-       -|-     -|-       -|-       -|-      -|-    -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
```

```
FILE: 16397WSPGWBASIN3.WSW                W S P G W  - EDIT LISTING - Version 14.06              Date:12- 4-2017  Time: 4: 3:38
                                      WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING                                 PAGE    1
 CARD  SECT  CHN   NO OF  AVE PIER  HEIGHT 1  BASE    ZL    ZR    INV   Y(1)  Y(2)  Y(3)  Y(4)  Y(5)  Y(6)  Y(7)  Y(8)  Y(9)  Y(10)
 CODE   NO   TYPE PIER/PIP WIDTH    DIAMETER  WIDTH               DROP

 CD      1    4      1            2.000
 CD      2    4      1            2.000
 CD      3    4      1            2.000
 CD      4    4      1            2.000
                                                         W S P G W                                                        PAGE NO   1
                            WATER SURFACE PROFILE - TITLE CARD LISTING
HEADING LINE NO 1 IS -
                              WSPGW LINE "C" BASIN 3       0
HEADING LINE NO 2 IS -
                              TRACT NO. 16397, CITY OF VICTORVILLE
HEADING LINE NO 3 IS -
                              FILE: 16397WSPGWBASIN3.OUT
                                                         W S P G W                                                        PAGE NO   2
                            WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO   1 IS A SYSTEM OUTLET     *         *     *
                     U/S DATA   STATION    INVERT  SECT                                     W S ELEV
                                1000.000 3184.500    1                                        3188.350
 ELEMENT NO   2 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT              N                              RADIUS    ANGLE     ANG PT  MAN H
                                1036.870 3184.684    1              .013                             .000     .000      .000     0
 ELEMENT NO   3 IS A JUNCTION          *         *     *     *                  *                   *               *
                     U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2  N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                                1044.870 3184.854    4     3     0  .013     8.200      .000  3186.354      .000  90.000     .000
                                                                                                    RADIUS    ANGLE
                                                                                                      .000     .000
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
 ELEMENT NO   4 IS A REACH             *         *     *
                     U/S DATA   STATION    INVERT  SECT              N                              RADIUS    ANGLE     ANG PT  MAN H
                                1103.720 3185.442    3              .013                             .000     .000      .000     0
 ELEMENT NO   5 IS A SYSTEM HEADWORKS                  *                       *
                     U/S DATA   STATION    INVERT  SECT                                     W S ELEV
                                1103.720 3185.442    3                                     3189.400
```

LUDWIG ENGINEERING
109 E. Third Street
San Bernardino, California 92410
(909)884-8217
Fax (909) 889-0153

JOB VI-0349

CATCH BASIN #7 AND #8 @ BASIN 3
NODE 6

CAPACITY OF CURB OPENING INLET ON A SUMP CONDITION:

HEIGHT OF CURB = 6" CF.

$$Q\,100 = \frac{52.9\text{ CFS} - 36.5\text{CFS}}{2} = 8.2\text{ CFS}$$ CATCH BASIN #7

Q 100 = 8.2 CFS ; CATCH BASIN #8

LOCAL DEPRESSION = 4"

PONDING DEPTH = 6" + 4" = H = 10" TO TC.

h (eff.) = 0.56'

with h = 0.56' and $\frac{H}{h} = \frac{0.833'}{0.56'} = 1.49$

PER NOMOGRAPH:

$$\frac{Q}{L} = 2.0\text{ CFS/FT}$$

FOR CATCH ***BASIN #7;***

$$L = \frac{8.2}{2.0}$$

L = 4.1' SAY 5'

FOR CATCH ***BASIN #8:***

$$L = \frac{8.2}{2.0}$$

L = 4.1' SAY 5'

MAXIMUM PONDING DEPTH = 6" + 4" + 0.2' = 1.033' TO R/W

H = 1.033' h = 0.56' $\frac{H}{h} = \frac{1.033'}{0.56'} = 1.84'$

PER NOMOGRAPH 1073.3

$$\frac{Q}{L} = 2.6\text{ CFS/FT}$$

$L = \frac{Q}{2.6} = \frac{8.2}{2.6} =$ 3.1' USE W = ***5' CATCH BASIN #7***

$L = \frac{Q}{2.6} = \frac{8.2}{2.6} =$ 3.1' USE W = ***5' CATCH BASIN #8***

```
  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 7.0
--------------------------------------------------------------------
```

12FT WIDE X 1 FT FLOWBY CHANNEL CAPACITY @ BASIN 3 NODE 6
TR 16397, CITY OF VICTORVILLE
Q=36.5 CFS (PRE-DEVELOPED CONDITION Q OUTFLOW)
FILE: 16397FLOWBYBASIN3.OUT

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


Program License Serial Number 4070

--------------------------------------------------------------------
           *** Improved Channel Analysis ***

     Upstream (headworks) Elevation =   3188.280(Ft.)
     Downstream (outlet) Elevation =   3187.240(Ft.)
     Runoff/Flow Distance =    104.000(Ft.)
     Maximum flow rate in channel(s) =     36.500(CFS)
--------------------------------------------------------------------




--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

*** CALCULATED DEPTH DATA AT FLOW =   36.50(CFS) ***
Channel base width  =   12.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
```

Flow(q) thru channel =   36.500(CFS)
Depth of flow =   0.509(Ft.)

```
Average velocity =   5.979(Ft/s)
Total flow rate in 1/2 street =  36.500(CFS)
Channel flow top width =   12.000(Ft.)
Depth of flow in channel =   0.51(Ft.)

Total number of channels (same dimensions) = 1
Flow Velocity =    5.98(Ft/s)
Individual channel flow =   36.500(CFS)
Total capacity of channel(s) =     36.500(CFS)

Sub-Channel No. 1 Critical depth =      0.656(Ft.)
  '     '       '     Critical flow top width =     12.000(Ft.)
  '     '       '     Critical flow velocity=    4.635(Ft/s)
  '     '       '     Critical flow area =      7.875(Sq.Ft)
```

Created Revised
06-Dec-17 06-Dec-17 10:04

MANNING'S EQUATION Circular cross-section

BASIN 3 - Flowby Outflow Pipe - 30"dia. R.C.P. capacity, Q=36.5 cfs

Units (ft)	= FEET	Area (sq ft)	= 3.61
Depth (ft)	= <1.72> <---	Velocity (ft/s)	= 10.10
Discharge (cfs)	= <36.5>	Froude Number	= 1.43
Manning's n	= <.012>	Critical Depth (ft)	= 2.05
Slope(decimal)	= <.01>	Normal Depth (ft)	= 1.72
Diameter (in)	= <30>	Hydraulic Radius (ft)	= 0.74
		Depth to Centroid(ft)	= 0.76
		Top Width (ft)	= 2.31

BALDY MESA LINE A-05, A-03 & A-04
POST-DEVELOPED CHANNEL FLOW
FROM NODE 2- 3

THE ATTACHED CALCULATIONS SHOWS
OFFSITE TRIBUTARY AREAS
FOR THE 100-YEAR,
24-HOURS UNIT HYDROGRAPH

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 03/02/17

++

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

Program License Serial Number 4070

100-YEAR, 24-HOURS UNIT HYDROGRAPH, POST DEVELOPED
TRACT NO. 16397, CITY OF VICTORVILLE
UPSTREAM TRIBUTARY AREAS OF AQUADUCT NODE 2(SOUTHWEST)
FILE: 16397UNITHYDNODE2.OUT

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
1409.00	1	1.31
Rainfall data for year 100		
1409.00	6	3.06
Rainfall data for year 100		
1409.00	24	6.36

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	1409.00	1.000	0.785	0.800	0.628

Area-averaged adjusted loss rate Fm (In/Hr) = 0.628

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
1127.20	0.800	32.0	52.0	9.23	0.233
281.80	0.200	98.0	98.0	0.20	0.962

Area-averaged catchment yield fraction, Y = 0.379
Area-averaged low loss fraction, Yb = 0.621
++
Watercourse length =   15337.00(Ft.)
Length from concentration point to centroid =   6343.00(Ft.)
Elevation difference along watercourse =   275.00(Ft.)
Mannings friction factor along watercourse = 0.035
Watershed area =   1409.00(Ac.)
Catchment Lag time =   0.569 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 14.6477
Hydrograph baseflow =   177.00(CFS)
Average maximum watershed loss rate(Fm) = 0.628(In/Hr)
Average low loss rate fraction (Yb) = 0.621 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.622(In)
Computed peak 30-minute rainfall = 1.064(In)
Specified peak 1-hour rainfall = 1.310(In)
Computed peak 3-hour rainfall = 2.204(In)
Specified peak 6-hour rainfall = 3.060(In)
Specified peak 24-hour rainfall = 6.360(In)

Rainfall depth area reduction factors:
Using a total area of   1409.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.934   Adjusted rainfall = 0.581(In)
30-minute factor = 0.934   Adjusted rainfall = 0.994(In)
1-hour factor = 0.934   Adjusted rainfall = 1.223(In)
3-hour factor = 0.992   Adjusted rainfall = 2.185(In)
6-hour factor = 0.996   Adjusted rainfall = 3.047(In)
24-hour factor = 0.998   Adjusted rainfall = 6.349(In)

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

(K =   17040.09 (CFS))

268	6.1113	0.0121
269	6.1234	0.0121
270	6.1354	0.0120
271	6.1475	0.0120
272	6.1595	0.0120
273	6.1715	0.0120
274	6.1834	0.0120
275	6.1954	0.0119
276	6.2073	0.0119
277	6.2192	0.0119
278	6.2311	0.0119
279	6.2429	0.0119
280	6.2548	0.0118
281	6.2666	0.0118
282	6.2784	0.0118
283	6.2902	0.0118
284	6.3019	0.0118
285	6.3137	0.0117
286	6.3254	0.0117
287	6.3371	0.0117
288	6.3488	0.0117

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0117	0.0073	0.0044
2	0.0117	0.0073	0.0044
3	0.0117	0.0073	0.0045
4	0.0118	0.0073	0.0045
5	0.0118	0.0073	0.0045
6	0.0118	0.0073	0.0045
7	0.0119	0.0074	0.0045
8	0.0119	0.0074	0.0045
9	0.0119	0.0074	0.0045
10	0.0119	0.0074	0.0045
11	0.0120	0.0074	0.0045
12	0.0120	0.0075	0.0045
13	0.0120	0.0075	0.0046
14	0.0121	0.0075	0.0046
15	0.0121	0.0075	0.0046
16	0.0121	0.0075	0.0046
17	0.0122	0.0076	0.0046
18	0.0122	0.0076	0.0046
19	0.0122	0.0076	0.0046
20	0.0123	0.0076	0.0046
21	0.0123	0.0076	0.0047
22	0.0123	0.0077	0.0047
23	0.0124	0.0077	0.0047
24	0.0124	0.0077	0.0047
25	0.0124	0.0077	0.0047
26	0.0125	0.0077	0.0047
27	0.0125	0.0078	0.0047
28	0.0125	0.0078	0.0048

245	0.0156	0.0097	0.0059
246	0.0154	0.0096	0.0058
247	0.0153	0.0095	0.0058
248	0.0152	0.0094	0.0057
249	0.0150	0.0093	0.0057
250	0.0149	0.0093	0.0056
251	0.0148	0.0092	0.0056
252	0.0147	0.0091	0.0056
253	0.0145	0.0090	0.0055
254	0.0144	0.0090	0.0055
255	0.0143	0.0089	0.0054
256	0.0142	0.0088	0.0054
257	0.0141	0.0088	0.0053
258	0.0140	0.0087	0.0053
259	0.0139	0.0086	0.0053
260	0.0138	0.0086	0.0052
261	0.0137	0.0085	0.0052
262	0.0136	0.0085	0.0052
263	0.0135	0.0084	0.0051
264	0.0134	0.0083	0.0051
265	0.0134	0.0083	0.0051
266	0.0133	0.0082	0.0050
267	0.0132	0.0082	0.0050
268	0.0131	0.0081	0.0050
269	0.0130	0.0081	0.0049
270	0.0129	0.0080	0.0049
271	0.0129	0.0080	0.0049
272	0.0128	0.0079	0.0048
273	0.0127	0.0079	0.0048
274	0.0126	0.0078	0.0048
275	0.0126	0.0078	0.0048
276	0.0125	0.0078	0.0047
277	0.0124	0.0077	0.0047
278	0.0124	0.0077	0.0047
279	0.0123	0.0076	0.0047
280	0.0122	0.0076	0.0046
281	0.0122	0.0075	0.0046
282	0.0121	0.0075	0.0046
283	0.0120	0.0075	0.0046
284	0.0120	0.0074	0.0045
285	0.0119	0.0074	0.0045
286	0.0118	0.0074	0.0045
287	0.0118	0.0073	0.0045
288	0.0117	0.0073	0.0044

Total soil rain loss = 3.60(In)
Total effective rainfall = 2.75(In)
Peak flow rate in flood hydrograph = 1836.96(CFS)

++

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

Hydrograph in 5 Minute intervals ((CFS))

```
   ----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0      475.0     950.0    1425.0    1900.0
-----------------------------------------------------------------------
  0+ 5      1.2224    177.50  V  Q       |         |         |         |
  0+10      2.4557    179.07  V  Q       |         |         |         |
  0+15      3.7070    181.69  V  Q       |         |         |         |
  0+20      4.9869    185.84  V  Q       |         |         |         |
  0+25      6.3215    193.79  V   Q      |         |         |         |
  0+30      7.7283    204.27  V   Q      |         |         |         |
  0+35      9.1920    212.53  V   Q      |         |         |         |
  0+40     10.6985    218.74  V   Q      |         |         |         |
  0+45     12.2367    223.35  V   Q      |         |         |         |
  0+50     13.7996    226.93  V   Q      |         |         |         |
  0+55     15.3831    229.93  V   Q      |         |         |         |
  1+ 0     16.9847    232.54  V   Q      |         |         |         |
  1+ 5     18.6014    234.75  |V  Q      |         |         |         |
  1+10     20.2320    236.76  |V  Q      |         |         |         |
  1+15     21.8742    238.45  |V   Q     |         |         |         |
  1+20     23.5272    240.01  |V   Q     |         |         |         |
  1+25     25.1896    241.39  |V   Q     |         |         |         |
  1+30     26.8610    242.69  |V   Q     |         |         |         |
  1+35     28.5409    243.91  |V   Q     |         |         |         |
  1+40     30.2284    245.03  |V   Q     |         |         |         |
  1+45     31.9230    246.06  |V   Q     |         |         |         |
  1+50     33.6236    246.93  |V   Q     |         |         |         |
  1+55     35.3300    247.76  |V   Q     |         |         |         |
  2+ 0     37.0419    248.57  | V  Q     |         |         |         |
  2+ 5     38.7590    249.33  | V  Q     |         |         |         |
  2+10     40.4811    250.05  | V  Q     |         |         |         |
  2+15     42.2080    250.74  | V  Q     |         |         |         |
  2+20     43.9394    251.40  | V  Q     |         |         |         |
  2+25     45.6748    251.98  | V  Q     |         |         |         |
  2+30     47.4142    252.57  | V  Q     |         |         |         |
  2+35     49.1577    253.15  | V  Q     |         |         |         |
  2+40     50.9047    253.67  | V  Q     |         |         |         |
  2+45     52.6552    254.17  | V  Q     |         |         |         |
  2+50     54.4091    254.67  | V  Q     |         |         |         |
  2+55     56.1663    255.15  |  V Q     |         |         |         |
  3+ 0     57.9264    255.57  |  V Q     |         |         |         |
  3+ 5     59.6895    255.99  |  V Q     |         |         |         |
  3+10     61.4553    256.41  |  V Q     |         |         |         |
  3+15     63.2237    256.76  |  V Q     |         |         |         |
  3+20     64.9943    257.10  |  V Q     |         |         |         |
  3+25     66.7674    257.45  |  V Q     |         |         |         |
  3+30     68.5429    257.81  |  V Q     |         |         |         |
  3+35     70.3210    258.18  |  V Q     |         |         |         |
  3+40     72.1016    258.55  |  V Q     |         |         |         |
  3+45     73.8849    258.93  |   VQ     |         |         |         |
  3+50     75.6707    259.31  |   VQ     |         |         |         |
  3+55     77.4592    259.69  |   VQ     |         |         |         |
  4+ 0     79.2503    260.07  |   VQ     |         |         |         |
  4+ 5     81.0438    260.41  |   VQ     |         |         |         |
```

```
 4+10     82.8396    260.74  |   VQ    |         |         |         |
 4+15     84.6376    261.07  |   VQ    |         |         |         |
 4+20     86.4378    261.40  |   VQ    |         |         |         |
 4+25     88.2404    261.74  |   VQ    |         |         |         |
 4+30     90.0452    262.06  |   VQ    |         |         |         |
 4+35     91.8519    262.33  |   VQ    |         |         |         |
 4+40     93.6605    262.60  |    Q    |         |         |         |
 4+45     95.4709    262.88  |    Q    |         |         |         |
 4+50     97.2833    263.16  |    Q    |         |         |         |
 4+55     99.0976    263.44  |    Q    |         |         |         |
 5+ 0    100.9139    263.73  |    Q    |         |         |         |
 5+ 5    102.7322    264.01  |    Q    |         |         |         |
 5+10    104.5525    264.31  |    Q    |         |         |         |
 5+15    106.3748    264.60  |    Q    |         |         |         |
 5+20    108.1991    264.90  |    Q    |         |         |         |
 5+25    110.0256    265.20  |    Q    |         |         |         |
 5+30    111.8541    265.50  |    QV   |         |         |         |
 5+35    113.6847    265.81  |    QV   |         |         |         |
 5+40    115.5175    266.12  |    QV   |         |         |         |
 5+45    117.3524    266.43  |    QV   |         |         |         |
 5+50    119.1896    266.75  |    QV   |         |         |         |
 5+55    121.0289    267.07  |    QV   |         |         |         |
 6+ 0    122.8705    267.40  |    QV   |         |         |         |
 6+ 5    124.7143    267.72  |    QV   |         |         |         |
 6+10    126.5605    268.06  |    QV   |         |         |         |
 6+15    128.4089    268.39  |    QV   |         |         |         |
 6+20    130.2597    268.73  |    Q V  |         |         |         |
 6+25    132.1128    269.08  |    Q V  |         |         |         |
 6+30    133.9684    269.43  |    Q V  |         |         |         |
 6+35    135.8263    269.78  |    Q V  |         |         |         |
 6+40    137.6868    270.13  |    Q V  |         |         |         |
 6+45    139.5497    270.49  |    Q V  |         |         |         |
 6+50    141.4151    270.86  |    Q V  |         |         |         |
 6+55    143.2831    271.23  |    Q V  |         |         |         |
 7+ 0    145.1536    271.60  |    Q V  |         |         |         |
 7+ 5    147.0268    271.98  |    Q V  |         |         |         |
 7+10    148.9026    272.37  |    Q  V |         |         |         |
 7+15    150.7811    272.76  |    Q  V |         |         |         |
 7+20    152.6623    273.15  |    Q  V |         |         |         |
 7+25    154.5462    273.55  |    Q  V |         |         |         |
 7+30    156.4330    273.95  |    Q  V |         |         |         |
 7+35    158.3225    274.36  |    Q  V |         |         |         |
 7+40    160.2149    274.78  |    Q  V |         |         |         |
 7+45    162.1102    275.20  |    Q  V |         |         |         |
 7+50    164.0084    275.62  |    Q  V |         |         |         |
 7+55    165.9097    276.06  |    Q  V |         |         |         |
 8+ 0    167.8139    276.50  |    Q   V|         |         |         |
 8+ 5    169.7212    276.94  |    Q   V|         |         |         |
 8+10    171.6316    277.39  |    Q   V|         |         |         |
 8+15    173.5451    277.85  |    Q   V|         |         |         |
 8+20    175.4619    278.31  |    Q   V|         |         |         |
 8+25    177.3818    278.78  |    Q   V|         |         |         |
 8+30    179.3051    279.26  |    Q   V|         |         |         |
 8+35    181.2317    279.74  |    Q   V|         |         |         |
```

```
 8+40     183.1617    280.24  |    Q   V|         |         |         |
 8+45     185.0951    280.73  |    Q    V         |         |         |
 8+50     187.0321    281.24  |    Q    V         |         |         |
 8+55     188.9725    281.76  |    Q    V         |         |         |
 9+ 0     190.9166    282.28  |    Q    V         |         |         |
 9+ 5     192.8643    282.81  |    Q    V         |         |         |
 9+10     194.8158    283.35  |    Q    V         |         |         |
 9+15     196.7710    283.90  |    Q    V         |         |         |
 9+20     198.7301    284.46  |    Q    V         |         |         |
 9+25     200.6930    285.02  |     Q   V         |         |         |
 9+30     202.6600    285.60  |     Q   V         |         |         |
 9+35     204.6309    286.18  |     Q   |V        |         |         |
 9+40     206.6060    286.78  |     Q   |V        |         |         |
 9+45     208.5852    287.39  |     Q   |V        |         |         |
 9+50     210.5687    288.01  |     Q   |V        |         |         |
 9+55     212.5566    288.63  |     Q   |V        |         |         |
10+ 0     214.5488    289.27  |     Q   |V        |         |         |
10+ 5     216.5455    289.92  |     Q   |V        |         |         |
10+10     218.5468    290.59  |     Q   |V        |         |         |
10+15     220.5527    291.26  |     Q   |V        |         |         |
10+20     222.5634    291.95  |     Q   | V       |         |         |
10+25     224.5789    292.65  |     Q   | V       |         |         |
10+30     226.5994    293.37  |     Q   | V       |         |         |
10+35     228.6248    294.10  |     Q   | V       |         |         |
10+40     230.6554    294.84  |     Q   | V       |         |         |
10+45     232.6912    295.60  |     Q   | V       |         |         |
10+50     234.7324    296.38  |     Q   | V       |         |         |
10+55     236.7790    297.17  |     Q   | V       |         |         |
11+ 0     238.8312    297.98  |     Q   | V       |         |         |
11+ 5     240.8890    298.80  |     Q   |  V      |         |         |
11+10     242.9527    299.64  |     Q   |  V      |         |         |
11+15     245.0223    300.50  |     Q   |  V      |         |         |
11+20     247.0979    301.39  |     Q   |  V      |         |         |
11+25     249.1798    302.29  |     Q   |  V      |         |         |
11+30     251.2680    303.21  |     Q   |  V      |         |         |
11+35     253.3628    304.15  |     Q   |  V      |         |         |
11+40     255.4642    305.12  |     Q   |  V      |         |         |
11+45     257.5724    306.11  |     Q   |  V      |         |         |
11+50     259.6876    307.13  |     Q   |   V     |         |         |
11+55     261.8100    308.17  |     Q   |   V     |         |         |
12+ 0     263.9397    309.24  |     Q   |   V     |         |         |
12+ 5     266.0764    310.24  |     Q   |   V     |         |         |
12+10     268.2188    311.08  |     Q   |   V     |         |         |
12+15     270.3660    311.76  |     Q   |   V     |         |         |
12+20     272.5161    312.20  |     Q   |   V     |         |         |
12+25     274.6646    311.97  |     Q   |   V     |         |         |
12+30     276.8087    311.32  |     Q   |   V     |         |         |
12+35     278.9514    311.12  |     Q   |    V    |         |         |
12+40     281.0956    311.34  |     Q   |    V    |         |         |
12+45     283.2437    311.89  |     Q   |    V    |         |         |
12+50     285.3972    312.69  |     Q   |    V    |         |         |
12+55     287.5572    313.63  |     Q   |    V    |         |         |
13+ 0     289.7246    314.70  |     Q   |    V    |         |         |
13+ 5     291.9001    315.90  |     Q   |    V    |         |         |
```

```
13+10     294.0846    317.19  |     Q   |    V    |         |         |
13+15     296.2788    318.59  |     Q   |     V   |         |         |
13+20     298.4833    320.09  |     Q   |     V   |         |         |
13+25     300.6988    321.69  |     Q   |     V   |         |         |
13+30     302.9259    323.38  |     Q   |     V   |         |         |
13+35     305.1652    325.15  |     Q   |     V   |         |         |
13+40     307.4174    327.03  |     Q   |     V   |         |         |
13+45     309.6833    329.01  |     Q   |     V   |         |         |
13+50     311.9638    331.12  |     Q   |     V   |         |         |
13+55     314.2595    333.34  |      Q  |      V  |         |         |
14+ 0     316.5713    335.68  |      Q  |      V  |         |         |
14+ 5     318.9009    338.26  |      Q  |      V  |         |         |
14+10     321.2513    341.27  |      Q  |      V  |         |         |
14+15     323.6250    344.67  |      Q  |      V  |         |         |
14+20     326.0261    348.64  |      Q  |      V  |         |         |
14+25     328.4623    353.73  |      Q  |      V  |         |         |
14+30     330.9393    359.67  |      Q  |      V  |         |         |
14+35     333.4546    365.22  |      Q  |       V |         |         |
14+40     336.0062    370.50  |      Q  |       V |         |         |
14+45     338.5930    375.60  |      Q  |       V |         |         |
14+50     341.2151    380.73  |       Q |       V |         |         |
14+55     343.8736    386.02  |       Q |       V |         |         |
15+ 0     346.5705    391.58  |       Q |       V |         |         |
15+ 5     349.3076    397.43  |       Q |       V |         |         |
15+10     352.0880    403.71  |       Q |        V|         |         |
15+15     354.9147    410.44  |       Q |        V|         |         |
15+20     357.7922    417.80  |       Q |        V|         |         |
15+25     360.7181    424.85  |       Q |        V|         |         |
15+30     363.6840    430.65  |        Q|        V|         |         |
15+35     366.6825    435.38  |        Q|        V|         |         |
15+40     369.7016    438.39  |        Q|         |         |         |
15+45     372.7009    435.49  |        Q|         |         |         |
15+50     375.6614    429.87  |        Q|         |         |         |
15+55     378.6438    433.03  |        Q|         |         |         |
16+ 0     381.7541    451.62  |        Q|         |         |         |
16+ 5     385.4746    540.22  |         |Q        |         |         |
16+10     390.3041    701.24  |         |   Q     |V        |         |
16+15     396.3101    872.08  |         |       Q |V        |         |
16+20     404.0054   1117.36  |         |         |V Q      |         |
16+25     414.8974   1581.52  |         |         | V       |  Q      |
16+30     427.5486   1836.96  |         |         |  V      |       Q |
16+35     438.1884   1544.90  |         |         |  V      | Q       |
16+40     446.9339   1269.84  |         |         |   V Q   |         |
16+45     454.2347   1060.08  |         |         | Q V     |         |
16+50     460.6259    928.00  |         |        Q|   V     |         |
16+55     466.4694    848.47  |         |      Q  |    V    |         |
17+ 0     471.8983    788.28  |         |     Q   |    V    |         |
17+ 5     476.9110    727.85  |         |    Q    |    V    |         |
17+10     481.6635    690.06  |         |   Q     |     V   |         |
17+15     486.0826    641.65  |         |  Q      |     V   |         |
17+20     490.3052    613.13  |         | Q       |     V   |         |
17+25     494.2962    579.49  |         | Q       |     V   |         |
17+30     498.1463    559.03  |         |Q        |     V   |         |
17+35     501.8557    538.61  |         |Q        |      V  |         |
```

100-YEAR, 24-HOURS
Q100= 1,837 CFS
POST-DEVELOPED
LINE A-01
NODE 2-3

```
17+40     505.4010    514.78  |         Q         |      V  |         |
17+45     508.8118    495.25  |         Q         |      V  |         |
17+50     512.0397    468.68  |        Q|         |      V  |         |
17+55     515.1863    456.90  |        Q|         |      V  |         |
18+ 0     518.2631    446.75  |        Q|         |       V |         |
18+ 5     521.2562    434.59  |        Q|         |       V |         |
18+10     524.1790    424.39  |       Q |         |       V |         |
18+15     527.0395    415.34  |       Q |         |       V |         |
18+20     529.8387    406.44  |       Q |         |       V |         |
18+25     532.5545    394.34  |       Q |         |       V |         |
18+30     535.2477    391.05  |       Q |         |       V |         |
18+35     537.9155    387.36  |       Q |         |        V|         |
18+40     540.5146    377.40  |      Q  |         |        V|         |
18+45     543.0747    371.73  |      Q  |         |        V|         |
18+50     545.6108    368.24  |      Q  |         |        V|         |
18+55     548.0969    360.97  |      Q  |         |        V|         |
19+ 0     550.5201    351.86  |      Q  |         |        V|         |
19+ 5     552.9209    348.59  |      Q  |         |        V|         |
19+10     555.2907    344.10  |      Q  |         |         V         |
19+15     557.5903    333.90  |      Q  |         |         V         |
19+20     559.8625    329.93  |     Q   |         |         V         |
19+25     562.1210    327.93  |     Q   |         |         V         |
19+30     564.3759    327.42  |     Q   |         |         V         |
19+35     566.6249    326.56  |     Q   |         |         V         |
19+40     568.8604    324.58  |     Q   |         |         V         |
19+45     571.0822    322.61  |     Q   |         |         V         |
19+50     573.2907    320.67  |     Q   |         |         |V        |
19+55     575.4858    318.73  |     Q   |         |         |V        |
20+ 0     577.6635    316.22  |     Q   |         |         |V        |
20+ 5     579.7946    309.43  |     Q   |         |         |V        |
20+10     581.8984    305.46  |     Q   |         |         |V        |
20+15     583.9909    303.83  |     Q   |         |         |V        |
20+20     586.0723    302.23  |     Q   |         |         |V        |
20+25     588.1401    300.24  |     Q   |         |         |V        |
20+30     590.1791    296.07  |     Q   |         |         |V        |
20+35     592.1672    288.67  |     Q   |         |         | V       |
20+40     594.1452    287.21  |     Q   |         |         | V       |
20+45     596.1144    285.93  |     Q   |         |         | V       |
20+50     598.0752    284.71  |    Q    |         |         | V       |
20+55     600.0275    283.46  |    Q    |         |         | V       |
21+ 0     601.9715    282.27  |    Q    |         |         | V       |
21+ 5     603.9078    281.14  |    Q    |         |         | V       |
21+10     605.8366    280.07  |    Q    |         |         | V       |
21+15     607.7583    279.03  |    Q    |         |         | V       |
21+20     609.6730    278.02  |    Q    |         |         |  V      |
21+25     611.5811    277.05  |    Q    |         |         |  V      |
21+30     613.4827    276.12  |    Q    |         |         |  V      |
21+35     615.3783    275.23  |    Q    |         |         |  V      |
21+40     617.2679    274.38  |    Q    |         |         |  V      |
21+45     619.1519    273.55  |    Q    |         |         |  V      |
21+50     621.0303    272.75  |    Q    |         |         |  V      |
21+55     622.9034    271.97  |    Q    |         |         |  V      |
22+ 0     624.7712    271.21  |    Q    |         |         |  V      |
22+ 5     626.6340    270.47  |    Q    |         |         |  V      |
```

22+10	628.4917	269.74	Q			V
22+15	630.3445	269.03	Q			V
22+20	632.1926	268.34	Q			V
22+25	634.0361	267.67	Q			V
22+30	635.8750	267.01	Q			V
22+35	637.7095	266.36	Q			V
22+40	639.5396	265.73	Q			V
22+45	641.3654	265.10	Q			V
22+50	643.1870	264.50	Q			V
22+55	645.0045	263.90	Q			V
23+ 0	646.8180	263.32	Q			V
23+ 5	648.6275	262.75	Q			V
23+10	650.4333	262.19	Q			V
23+15	652.2353	261.65	Q			V
23+20	654.0336	261.11	Q			V
23+25	655.8283	260.59	Q			V
23+30	657.6194	260.08	Q			V
23+35	659.4071	259.57	Q			V
23+40	661.1914	259.08	Q			V
23+45	662.9724	258.60	Q			V
23+50	664.7501	258.12	Q			V
23+55	666.5246	257.65	Q			V
24+ 0	668.2959	257.20	Q			V

BALDY MESA LINE A-02
POST-DEVELOPED CHANNEL FLOW
FROM NODE 6- 7

THE ATTACHED CALCULATIONS SHOWS
OFFSITE TRIBUTARY AREAS
FOR THE 100-YEAR,
24-HOURS UNIT HYDROGRAPH

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  03/02/17

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

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


Program License Serial Number 4070

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

100-YEAR, 24-HOURS UNIT HYDROGRAPH, POST DEVELOPED
TRACT NO. 16397, CITY OF VICTORVILLE
UPSTREAM TRIBUTARY AREAS OF AQUADUCT NODE 6(SOUTHWEST)
FILE: 16397UNITHYDNODE6.OUT

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

      Storm Event Year = 100

      Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
      Sub-Area        Duration        Isohyetal
      (Ac.)            (hours)         (In)
Rainfall data for year 100
        1083.00           1           1.31
--------------------------------------------------------------------
Rainfall data for year 100
        1083.00           6           3.06
--------------------------------------------------------------------
Rainfall data for year 100
        1083.00          24           6.36
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction    (In/Hr)  (dec.)   (In/Hr)
 32.0      52.0       1083.00      1.000     0.785    0.800    0.628

Area-averaged adjusted loss rate Fm (In/Hr) =  0.628

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
   866.40   0.800         32.0      52.0       9.23     0.233
   216.60   0.200         98.0      98.0       0.20     0.962

Area-averaged catchment yield fraction, Y =  0.379
Area-averaged low loss fraction, Yb =  0.621
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =   17155.00(Ft.)
Length from concentration point to centroid =    6955.00(Ft.)
Elevation difference along watercourse =     290.00(Ft.)
Mannings friction factor along watercourse =  0.035
Watershed area =    1083.00(Ac.)
Catchment Lag time =   0.622 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 13.4036
Hydrograph baseflow =   548.20(CFS)
Average maximum watershed loss rate(Fm) =  0.628(In/Hr)
Average low loss rate fraction (Yb) = 0.621 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.622(In)
Computed peak 30-minute rainfall =  1.064(In)
Specified peak 1-hour rainfall =  1.310(In)
Computed peak 3-hour rainfall =  2.204(In)
Specified peak 6-hour rainfall =  3.060(In)
Specified peak 24-hour rainfall =  6.360(In)


Rainfall depth area reduction factors:
Using a total area of    1083.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.949     Adjusted rainfall =  0.590(In)
30-minute factor = 0.949    Adjusted rainfall =  1.010(In)
1-hour factor = 0.949       Adjusted rainfall =  1.243(In)
3-hour factor = 0.994       Adjusted rainfall =  2.190(In)
6-hour factor = 0.997       Adjusted rainfall =  3.050(In)
24-hour factor = 0.999      Adjusted rainfall =  6.351(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
           (K =     13097.53 (CFS))
```

1	0.592	77.563
2	2.387	235.135
3	5.334	385.972
4	9.611	560.107
5	17.395	1019.512
6	29.805	1625.418
7	41.355	1512.817
8	50.103	1145.785
9	56.908	891.290
10	61.977	663.867
11	66.033	531.269
12	69.488	452.490
13	72.505	395.131
14	75.046	332.878
15	77.350	301.667
16	79.324	258.556
17	81.086	230.771
18	82.633	202.631
19	84.071	188.321
20	85.392	173.006
21	86.653	165.254
22	87.754	144.195
23	88.775	133.739
24	89.599	107.895
25	90.388	103.343
26	91.140	98.525
27	91.849	92.778
28	92.493	84.353
29	93.108	80.599
30	93.696	77.027
31	94.200	65.922
32	94.655	59.688
33	95.111	59.688
34	95.557	58.408
35	95.923	47.950
36	96.272	45.644
37	96.620	45.644
38	96.942	42.236
39	97.189	32.246
40	97.430	31.600
41	97.671	31.600
42	97.862	25.043
43	97.997	17.563
44	98.131	17.555
45	98.265	17.653
46	98.418	20.042
47	98.579	21.066
48	98.740	21.066
49	98.901	21.066
50	99.062	21.066
51	99.223	21.066
52	99.383	21.066
53	99.521	18.033
54	99.607	11.227

55	99.691	10.972
56	99.774	10.972
57	99.858	10.972
58	99.942	10.972
59	100.000	7.607

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5901	0.5901
2	0.7264	0.1364
3	0.8204	0.0940
4	0.8944	0.0739
5	0.9563	0.0619
6	1.0100	0.0538
7	1.0578	0.0478
8	1.1011	0.0432
9	1.1407	0.0396
10	1.1773	0.0366
11	1.2115	0.0341
12	1.2435	0.0320
13	1.2958	0.0523
14	1.3462	0.0504
15	1.3949	0.0487
16	1.4421	0.0471
17	1.4878	0.0457
18	1.5323	0.0445
19	1.5756	0.0433
20	1.6177	0.0422
21	1.6589	0.0412
22	1.6991	0.0402
23	1.7385	0.0393
24	1.7770	0.0385
25	1.8148	0.0378
26	1.8518	0.0370
27	1.8881	0.0363
28	1.9238	0.0357
29	1.9589	0.0351
30	1.9934	0.0345
31	2.0274	0.0340
32	2.0608	0.0334
33	2.0937	0.0329
34	2.1262	0.0324
35	2.1582	0.0320
36	2.1897	0.0315
37	2.2186	0.0289
38	2.2470	0.0285
39	2.2751	0.0281
40	2.3028	0.0277
41	2.3301	0.0273
42	2.3571	0.0270
43	2.3838	0.0267
44	2.4101	0.0263
45	2.4361	0.0260
46	2.4618	0.0257

263	6.0534	0.0122
264	6.0656	0.0122
265	6.0777	0.0121
266	6.0898	0.0121
267	6.1019	0.0121
268	6.1140	0.0121
269	6.1261	0.0121
270	6.1381	0.0120
271	6.1501	0.0120
272	6.1621	0.0120
273	6.1741	0.0120
274	6.1861	0.0120
275	6.1980	0.0119
276	6.2099	0.0119
277	6.2218	0.0119
278	6.2337	0.0119
279	6.2456	0.0119
280	6.2574	0.0118
281	6.2692	0.0118
282	6.2810	0.0118
283	6.2928	0.0118
284	6.3046	0.0118
285	6.3163	0.0117
286	6.3280	0.0117
287	6.3397	0.0117
288	6.3514	0.0117

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0117	0.0073	0.0044
2	0.0117	0.0073	0.0044
3	0.0117	0.0073	0.0044
4	0.0118	0.0073	0.0045
5	0.0118	0.0073	0.0045
6	0.0118	0.0073	0.0045
7	0.0119	0.0074	0.0045
8	0.0119	0.0074	0.0045
9	0.0119	0.0074	0.0045
10	0.0119	0.0074	0.0045
11	0.0120	0.0074	0.0045
12	0.0120	0.0075	0.0045
13	0.0120	0.0075	0.0046
14	0.0121	0.0075	0.0046
15	0.0121	0.0075	0.0046
16	0.0121	0.0075	0.0046
17	0.0122	0.0076	0.0046
18	0.0122	0.0076	0.0046
19	0.0122	0.0076	0.0046
20	0.0123	0.0076	0.0046
21	0.0123	0.0076	0.0047
22	0.0123	0.0077	0.0047
23	0.0124	0.0077	0.0047

240	0.0163	0.0101	0.0062
241	0.0161	0.0100	0.0061
242	0.0160	0.0099	0.0061
243	0.0158	0.0098	0.0060
244	0.0157	0.0097	0.0059
245	0.0156	0.0097	0.0059
246	0.0154	0.0096	0.0058
247	0.0153	0.0095	0.0058
248	0.0151	0.0094	0.0057
249	0.0150	0.0093	0.0057
250	0.0149	0.0093	0.0056
251	0.0148	0.0092	0.0056
252	0.0147	0.0091	0.0056
253	0.0145	0.0090	0.0055
254	0.0144	0.0090	0.0055
255	0.0143	0.0089	0.0054
256	0.0142	0.0088	0.0054
257	0.0141	0.0088	0.0053
258	0.0140	0.0087	0.0053
259	0.0139	0.0086	0.0053
260	0.0138	0.0086	0.0052
261	0.0137	0.0085	0.0052
262	0.0136	0.0085	0.0052
263	0.0135	0.0084	0.0051
264	0.0134	0.0083	0.0051
265	0.0133	0.0083	0.0051
266	0.0133	0.0082	0.0050
267	0.0132	0.0082	0.0050
268	0.0131	0.0081	0.0050
269	0.0130	0.0081	0.0049
270	0.0129	0.0080	0.0049
271	0.0129	0.0080	0.0049
272	0.0128	0.0079	0.0048
273	0.0127	0.0079	0.0048
274	0.0126	0.0078	0.0048
275	0.0126	0.0078	0.0048
276	0.0125	0.0078	0.0047
277	0.0124	0.0077	0.0047
278	0.0123	0.0077	0.0047
279	0.0123	0.0076	0.0047
280	0.0122	0.0076	0.0046
281	0.0121	0.0075	0.0046
282	0.0121	0.0075	0.0046
283	0.0120	0.0075	0.0046
284	0.0120	0.0074	0.0045
285	0.0119	0.0074	0.0045
286	0.0118	0.0074	0.0045
287	0.0118	0.0073	0.0045
288	0.0117	0.0073	0.0044

Total soil rain loss = 3.59(In)
Total effective rainfall = 2.76(In)
Peak flow rate in flood hydrograph = 1752.37(CFS)

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                  24 - H O U R   S T O R M
               R u n o f f    H y d r o g r a p h
 ----------------------------------------------------------------------
               Hydrograph in   5  Minute intervals ((CFS))

 ----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0      450.0     900.0    1350.0    1800.0
-----------------------------------------------------------------------
  0+ 5       3.7778    548.54  V         | Q       |         |         |
  0+10       7.5629    549.58  V         | Q       |         |         |
  0+15      11.3597    551.30  V         | Q       |         |         |
  0+20      15.1736    553.78  V         | Q       |         |         |
  0+25      19.0187    558.31  V         | Q       |         |         |
  0+30      22.9135    565.53  V         | Q       |         |         |
  0+35      26.8547    572.26  V         | Q       |         |         |
  0+40      30.8312    577.39  V         | Q       |         |         |
  0+45      34.8354    581.41  V         | Q       |         |         |
  0+50      38.8604    584.43  V         | Q       |         |         |
  0+55      42.9022    586.87  |V        |  Q      |         |         |
  1+ 0      46.9584    588.97  |V        |  Q      |         |         |
  1+ 5      51.0274    590.82  |V        |  Q      |         |         |
  1+10      55.1073    592.40  |V        |  Q      |         |         |
  1+15      59.1972    593.85  |V        |  Q      |         |         |
  1+20      63.2957    595.11  |V        |  Q      |         |         |
  1+25      67.4021    596.25  |V        |  Q      |         |         |
  1+30      71.5156    597.27  |V        |  Q      |         |         |
  1+35      75.6356    598.23  |V        |  Q      |         |         |
  1+40      79.7619    599.13  | V       |  Q      |         |         |
  1+45      83.8940    599.99  | V       |  Q      |         |         |
  1+50      88.0316    600.77  | V       |  Q      |         |         |
  1+55      92.1741    601.50  | V       |  Q      |         |         |
  2+ 0      96.3209    602.12  | V       |  Q      |         |         |
  2+ 5     100.4719    602.72  | V       |  Q      |         |         |
  2+10     104.6268    603.30  | V       |  Q      |         |         |
  2+15     108.7856    603.86  | V       |  Q      |         |         |
  2+20     112.9481    604.38  | V       |  Q      |         |         |
  2+25     117.1140    604.89  |  V      |  Q      |         |         |
  2+30     121.2833    605.39  |  V      |  Q      |         |         |
  2+35     125.4558    605.84  |  V      |  Q      |         |         |
  2+40     129.6311    606.26  |  V      |  Q      |         |         |
  2+45     133.8094    606.69  |  V      |  Q      |         |         |
  2+50     137.9906    607.11  |  V      |  Q      |         |         |
  2+55     142.1744    607.49  |  V      |  Q      |         |         |
  3+ 0     146.3608    607.86  |  V      |  Q      |         |         |
  3+ 5     150.5497    608.23  |  V      |  Q      |         |         |
  3+10     154.7411    608.59  |  V      |  Q      |         |         |
  3+15     158.9346    608.90  |   V     |  Q      |         |         |
  3+20     163.1304    609.22  |   V     |  Q      |         |         |
  3+25     167.3283    609.54  |   V     |  Q      |         |         |
  3+30     171.5282    609.83  |   V     |  Q      |         |         |
  3+35     175.7299    610.09  |   V     |  Q      |         |         |
  3+40     179.9334    610.35  |   V     |  Q      |         |         |
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3+45     184.1387    610.61  |   V     |  Q      |         |         |
3+50     188.3460    610.89  |   V     |  Q      |         |         |
3+55     192.5551    611.17  |   V     |  Q      |         |         |
4+ 0     196.7663    611.46  |    V    |  Q      |         |         |
4+ 5     200.9793    611.74  |    V    |  Q      |         |         |
4+10     205.1944    612.03  |    V    |  Q      |         |         |
4+15     209.4115    612.32  |    V    |  Q      |         |         |
4+20     213.6306    612.61  |    V    |  Q      |         |         |
4+25     217.8517    612.90  |    V    |  Q      |         |         |
4+30     222.0745    613.15  |    V    |  Q      |         |         |
4+35     226.2990    613.40  |    V    |  Q      |         |         |
4+40     230.5253    613.66  |    V    |  Q      |         |         |
4+45     234.7534    613.92  |     V   |  Q      |         |         |
4+50     238.9833    614.18  |     V   |  Q      |         |         |
4+55     243.2150    614.43  |     V   |  Q      |         |         |
5+ 0     247.4481    614.65  |     V   |  Q      |         |         |
5+ 5     251.6827    614.87  |     V   |  Q      |         |         |
5+10     255.9189    615.09  |     V   |  Q      |         |         |
5+15     260.1566    615.31  |     V   |  Q      |         |         |
5+20     264.3958    615.54  |     V   |  Q      |         |         |
5+25     268.6367    615.77  |     V   |  Q      |         |         |
5+30     272.8791    616.00  |      V  |  Q      |         |         |
5+35     277.1232    616.24  |      V  |  Q      |         |         |
5+40     281.3689    616.47  |      V  |  Q      |         |         |
5+45     285.6162    616.71  |      V  |  Q      |         |         |
5+50     289.8652    616.96  |      V  |  Q      |         |         |
5+55     294.1159    617.20  |      V  |  Q      |         |         |
6+ 0     298.3683    617.45  |      V  |  Q      |         |         |
6+ 5     302.6224    617.70  |      V  |  Q      |         |         |
6+10     306.8783    617.95  |      V  |  Q      |         |         |
6+15     311.1359    618.21  |       V |  Q      |         |         |
6+20     315.3953    618.47  |       V |  Q      |         |         |
6+25     319.6565    618.73  |       V |  Q      |         |         |
6+30     323.9195    618.99  |       V |  Q      |         |         |
6+35     328.1844    619.26  |       V |  Q      |         |         |
6+40     332.4512    619.53  |       V |  Q      |         |         |
6+45     336.7198    619.81  |       V |  Q      |         |         |
6+50     340.9904    620.09  |       V |  Q      |         |         |
6+55     345.2629    620.37  |       V |  Q      |         |         |
7+ 0     349.5373    620.65  |       V |  Q      |         |         |
7+ 5     353.8138    620.94  |        V|  Q      |         |         |
7+10     358.0922    621.23  |        V|  Q      |         |         |
7+15     362.3727    621.53  |        V|  Q      |         |         |
7+20     366.6553    621.83  |        V|  Q      |         |         |
7+25     370.9400    622.13  |        V|  Q      |         |         |
7+30     375.2267    622.44  |        V|  Q      |         |         |
7+35     379.5157    622.75  |        V|  Q      |         |         |
7+40     383.8068    623.07  |        V|  Q      |         |         |
7+45     388.1001    623.39  |        V|  Q      |         |         |
7+50     392.3956    623.71  |         V  Q      |         |         |
7+55     396.6934    624.04  |         V  Q      |         |         |
8+ 0     400.9935    624.37  |         V  Q      |         |         |
8+ 5     405.2959    624.71  |         V  Q      |         |         |
8+10     409.6007    625.05  |         V  Q      |         |         |
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 8+15     413.9079    625.40  |         V  Q      |         |         |
 8+20     418.2175    625.76  |         V  Q      |         |         |
 8+25     422.5296    626.11  |         V  Q      |         |         |
 8+30     426.8441    626.48  |         V  Q      |         |         |
 8+35     431.1612    626.84  |         |V Q      |         |         |
 8+40     435.4809    627.22  |         |V Q      |         |         |
 8+45     439.8032    627.60  |         |V Q      |         |         |
 8+50     444.1282    627.98  |         |V Q      |         |         |
 8+55     448.4558    628.37  |         |V Q      |         |         |
 9+ 0     452.7862    628.77  |         |V Q      |         |         |
 9+ 5     457.1194    629.17  |         |V Q      |         |         |
 9+10     461.4553    629.58  |         |V Q      |         |         |
 9+15     465.7942    630.00  |         |V  Q     |         |         |
 9+20     470.1360    630.42  |         | V Q     |         |         |
 9+25     474.4807    630.86  |         | V Q     |         |         |
 9+30     478.8284    631.29  |         | V Q     |         |         |
 9+35     483.1792    631.74  |         | V Q     |         |         |
 9+40     487.5332    632.19  |         | V Q     |         |         |
 9+45     491.8903    632.65  |         | V Q     |         |         |
 9+50     496.2506    633.12  |         | V Q     |         |         |
 9+55     500.6142    633.60  |         | V Q     |         |         |
10+ 0     504.9811    634.08  |         | V Q     |         |         |
10+ 5     509.3515    634.57  |         |  VQ     |         |         |
10+10     513.7253    635.08  |         |  VQ     |         |         |
10+15     518.1026    635.59  |         |  VQ     |         |         |
10+20     522.4836    636.11  |         |  VQ     |         |         |
10+25     526.8682    636.64  |         |  VQ     |         |         |
10+30     531.2565    637.19  |         |  VQ     |         |         |
10+35     535.6487    637.74  |         |  VQ     |         |         |
10+40     540.0447    638.30  |         |  VQ     |         |         |
10+45     544.4447    638.88  |         |   Q     |         |         |
10+50     548.8487    639.47  |         |   Q     |         |         |
10+55     553.2569    640.06  |         |   Q     |         |         |
11+ 0     557.6692    640.68  |         |   Q     |         |         |
11+ 5     562.0859    641.30  |         |   Q     |         |         |
11+10     566.5070    641.94  |         |   Q     |         |         |
11+15     570.9325    642.59  |         |   Q     |         |         |
11+20     575.3627    643.26  |         |   Q     |         |         |
11+25     579.7975    643.94  |         |   Q     |         |         |
11+30     584.2372    644.64  |         |   QV    |         |         |
11+35     588.6818    645.35  |         |   QV    |         |         |
11+40     593.1314    646.08  |         |   QV    |         |         |
11+45     597.5862    646.83  |         |   QV    |         |         |
11+50     602.0462    647.60  |         |   QV    |         |         |
11+55     606.5117    648.39  |         |   QV    |         |         |
12+ 0     610.9827    649.19  |         |   QV    |         |         |
12+ 5     615.4590    649.96  |         |   QV    |         |         |
12+10     619.9398    650.61  |         |   QV    |         |         |
12+15     624.4244    651.17  |         |   Q V   |         |         |
12+20     628.9121    651.60  |         |   Q V   |         |         |
12+25     633.4003    651.68  |         |   Q V   |         |         |
12+30     637.8858    651.30  |         |   Q V   |         |         |
12+35     642.3694    651.03  |         |   Q V   |         |         |
12+40     646.8535    651.09  |         |   Q V   |         |         |
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12+45     651.3397    651.39  |         |   Q V   |         |         |
12+50     655.8295    651.92  |         |   Q V   |         |         |
12+55     660.3238    652.59  |         |   Q V   |         |         |
13+ 0     664.8235    653.36  |         |   Q  V  |         |         |
13+ 5     669.3291    654.21  |         |   Q  V  |         |         |
13+10     673.8413    655.16  |         |   Q  V  |         |         |
13+15     678.3604    656.18  |         |   Q  V  |         |         |
13+20     682.8872    657.28  |         |   Q  V  |         |         |
13+25     687.4220    658.46  |         |   Q  V  |         |         |
13+30     691.9655    659.71  |         |   Q  V  |         |         |
13+35     696.5180    661.03  |         |   Q  V  |         |         |
13+40     701.0802    662.42  |         |   Q   V |         |         |
13+45     705.6524    663.89  |         |   Q   V |         |         |
13+50     710.2354    665.44  |         |   Q   V |         |         |
13+55     714.8295    667.08  |         |   Q   V |         |         |
14+ 0     719.4357    668.82  |         |   Q   V |         |         |
14+ 5     724.0550    670.71  |         |   Q   V |         |         |
14+10     728.6889    672.85  |         |   Q   V |         |         |
14+15     733.3391    675.22  |         |    Q  V |         |         |
14+20     738.0076    677.86  |         |    Q  V |         |         |
14+25     742.6978    681.01  |         |    Q   V|         |         |
14+30     747.4143    684.83  |         |    Q   V|         |         |
14+35     752.1574    688.71  |         |    Q   V|         |         |
14+40     756.9264    692.45  |         |    Q   V|         |         |
14+45     761.7208    696.15  |         |    Q   V|         |         |
14+50     766.5408    699.87  |         |    Q   V|         |         |
14+55     771.3872    703.70  |         |    Q   V|         |         |
15+ 0     776.2614    707.73  |         |    Q   V|         |         |
15+ 5     781.1650    712.00  |         |    Q    V         |         |
15+10     786.1001    716.57  |         |    Q    V         |         |
15+15     791.0692    721.51  |         |     Q   V         |         |
15+20     796.0752    726.88  |         |     Q   V         |         |
15+25     801.1173    732.10  |         |     Q   V         |         |
15+30     806.1905    736.63  |         |     Q   V         |         |
15+35     811.2913    740.63  |         |     Q   V         |         |
15+40     816.4160    744.10  |         |     Q   V         |         |
15+45     821.5461    744.89  |         |     Q   |V        |         |
15+50     826.6576    742.20  |         |     Q   |V        |         |
15+55     831.7784    743.53  |         |     Q   |V        |         |
16+ 0     836.9834    755.78  |         |     Q   |V        |         |
16+ 5     842.6073    816.58  |         |       Q |V        |         |
16+10     848.9628    922.83  |         |         QV        |         |
16+15     856.0773   1033.01  |         |         | Q       |         |
16+20     864.1453   1171.48  |         |         | V   Q   |         |
16+25     874.1245   1448.98  |         |         | V       | Q       |
16+30     886.1931   1752.37  |         |         | V       |       Q |
16+35     897.6904   1669.40  |         |         |  V      |      Q  |
16+40     907.7047   1454.08  |         |         |  V      | Q       |
16+45     916.6457   1298.22  |         |         |  V    Q |         |
16+50     924.6866   1167.54  |         |         |  V Q    |         |
16+55     932.1854   1088.83  |         |         |  VQ     |         |
17+ 0     939.3311   1037.55  |         |         |  QV     |         |
17+ 5     946.1972    996.96  |         |         | Q V     |         |
17+10     952.7732    954.84  |         |         |Q  V     |         |
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17+15     959.1648    928.06  |         |         Q   V     |         |
17+20     965.3395    896.56  |         |        Q|   V     |         |
17+25     971.3523    873.07  |         |        Q|   V     |         |
17+30     977.2061    849.97  |         |       Q |    V    |         |
17+35     982.9536    834.54  |         |       Q |    V    |         |
17+40     988.5971    819.44  |         |       Q |    V    |         |
17+45     994.1624    808.08  |         |      Q  |    V    |         |
17+50     999.6080    790.71  |         |      Q  |    V    |         |
17+55    1004.9705    778.63  |         |      Q  |    V    |         |
18+ 0    1010.2069    760.32  |         |     Q   |    V    |         |
18+ 5    1015.3943    753.22  |         |     Q   |     V   |         |
18+10    1020.5346    746.36  |         |     Q   |     V   |         |
18+15    1025.6267    739.38  |         |     Q   |     V   |         |
18+20    1030.6647    731.51  |         |     Q   |     V   |         |
18+25    1035.6680    726.48  |         |     Q   |     V   |         |
18+30    1040.6398    721.92  |         |     Q   |     V   |         |
18+35    1045.5572    714.00  |         |    Q    |     V   |         |
18+40    1050.4380    708.70  |         |    Q    |      V  |         |
18+45    1055.3025    706.32  |         |    Q    |      V  |         |
18+50    1060.1436    702.93  |         |    Q    |      V  |         |
18+55    1064.9323    695.32  |         |    Q    |      V  |         |
19+ 0    1069.6977    691.93  |         |    Q    |      V  |         |
19+ 5    1074.4466    689.54  |         |    Q    |      V  |         |
19+10    1079.1657    685.22  |         |    Q    |      V  |         |
19+15    1083.8353    678.03  |         |    Q    |      V  |         |
19+20    1088.4881    675.58  |         |    Q    |      V  |         |
19+25    1093.1247    673.24  |         |   Q     |       V |         |
19+30    1097.7231    667.68  |         |   Q     |       V |         |
19+35    1102.2830    662.09  |         |   Q     |       V |         |
19+40    1106.8318    660.49  |         |   Q     |       V |         |
19+45    1111.3720    659.24  |         |   Q     |       V |         |
19+50    1115.9115    659.14  |         |   Q     |       V |         |
19+55    1120.4453    658.30  |         |   Q     |       V |         |
20+ 0    1124.9698    656.95  |         |   Q     |       V |         |
20+ 5    1129.4850    655.61  |         |   Q     |        V|         |
20+10    1133.9912    654.29  |         |   Q     |        V|         |
20+15    1138.4882    652.97  |         |   Q     |        V|         |
20+20    1142.9750    651.48  |         |   Q     |        V|         |
20+25    1147.4402    648.34  |         |   Q     |        V|         |
20+30    1151.8732    643.67  |         |   Q     |        V|         |
20+35    1156.2974    642.39  |         |   Q     |        V|         |
20+40    1160.7141    641.30  |         |   Q     |        V|         |
20+45    1165.1230    640.17  |         |   Q     |        V|         |
20+50    1169.5221    638.75  |         |   Q     |         V         |
20+55    1173.8990    635.52  |         |   Q     |         V         |
21+ 0    1178.2418    630.58  |         |   Q     |         V         |
21+ 5    1182.5778    629.58  |         |  Q      |         V         |
21+10    1186.9077    628.71  |         |  Q      |         V         |
21+15    1191.2318    627.86  |         |  Q      |         V         |
21+20    1195.5500    627.00  |         |  Q      |         V         |
21+25    1199.8626    626.19  |         |  Q      |         V         |
21+30    1204.1698    625.41  |         |  Q      |         V         |
21+35    1208.4719    624.66  |         |  Q      |         |V        |
21+40    1212.7690    623.94  |         |  Q      |         |V        |
```

21+45	1217.0613	623.24		Q		V
21+50	1221.3490	622.57		Q		V
21+55	1225.6322	621.93		Q		V
22+ 0	1229.9112	621.31		Q		V
22+ 5	1234.1861	620.71		Q		V
22+10	1238.4570	620.14		Q		V
22+15	1242.7241	619.57		Q		V
22+20	1246.9873	619.03		Q		V
22+25	1251.2469	618.49		Q		V
22+30	1255.5029	617.97		Q		V
22+35	1259.7553	617.45		Q		V
22+40	1264.0043	616.95		Q		V
22+45	1268.2500	616.47		Q		V
22+50	1272.4923	615.99		Q		V
22+55	1276.7315	615.53		Q		V
23+ 0	1280.9675	615.06		Q		V
23+ 5	1285.2003	614.61		Q		V
23+10	1289.4301	614.17		Q		V
23+15	1293.6570	613.74		Q		V
23+20	1297.8809	613.31		Q		V
23+25	1302.1020	612.90		Q		V
23+30	1306.3202	612.49		Q		V
23+35	1310.5358	612.10		Q		V
23+40	1314.7486	611.71		Q		V
23+45	1318.9588	611.32		Q		V
23+50	1323.1664	610.95		Q		V
23+55	1327.3715	610.58		Q		V
24+ 0	1331.5742	610.22		Q		V

BALDY MESA LINE A-01-01
POST-DEVELOPED CHANNEL FLOW
FROM NODE 12- 13

THE ATTACHED CALCULATIONS SHOWS
OFFSITE TRIBUTARY AREAS
FOR THE 100-YEAR,
24-HOURS UNIT HYDROGRAPH

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  03/02/17

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


Program License Serial Number 4070

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100-YEAR, 24-HOURS UNIT HYDROGRAPH, POST DEVELOPED
TRACT NO. 16397, CITY OF VICTORVILLE
UPSTREAM TRIBUTARY AREAS OF AQUADUCT NODE 12(SOUTHWEST)
FILE: 16397UNITHYDNODE12.OUT

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

      Storm Event Year = 100

      Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
      Sub-Area        Duration        Isohyetal
      (Ac.)            (hours)         (In)
Rainfall data for year 100
         553.00            1           1.31
--------------------------------------------------------------------
Rainfall data for year 100
         553.00            6           3.06
--------------------------------------------------------------------
Rainfall data for year 100
         553.00           24           6.36
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	553.00	1.000	0.785	0.800	0.628

Area-averaged adjusted loss rate Fm (In/Hr) = 0.628

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
442.40	0.800	32.0	52.0	9.23	0.233
110.60	0.200	98.0	98.0	0.20	0.962

Area-averaged catchment yield fraction, Y = 0.379
Area-averaged low loss fraction, Yb = 0.621
++
Watercourse length = 12448.00(Ft.)
Length from concentration point to centroid = 7170.00(Ft.)
Elevation difference along watercourse = 213.00(Ft.)
Mannings friction factor along watercourse = 0.035
Watershed area = 553.00(Ac.)
Catchment Lag time = 0.556 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 15.0013
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.628(In/Hr)
Average low loss rate fraction (Yb) = 0.621 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.622(In)
Computed peak 30-minute rainfall = 1.064(In)
Specified peak 1-hour rainfall = 1.310(In)
Computed peak 3-hour rainfall = 2.204(In)
Specified peak 6-hour rainfall = 3.060(In)
Specified peak 24-hour rainfall = 6.360(In)

Rainfall depth area reduction factors:
Using a total area of 553.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.974	Adjusted rainfall = 0.605(In)
30-minute factor = 0.974	Adjusted rainfall = 1.036(In)
1-hour factor = 0.974	Adjusted rainfall = 1.276(In)
3-hour factor = 0.997	Adjusted rainfall = 2.197(In)
6-hour factor = 0.998	Adjusted rainfall = 3.055(In)
24-hour factor = 0.999	Adjusted rainfall = 6.356(In)

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

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

(K = 6687.84 (CFS))

1	0.677	45.259
2	2.847	145.148
3	6.466	242.028
4	12.356	393.907
5	23.706	759.063
6	37.681	934.639
7	48.305	710.529
8	56.249	531.303
9	62.024	386.176
10	66.513	300.260
11	70.295	252.900
12	73.483	213.209
13	76.188	180.901
14	78.603	161.493
15	80.613	134.423
16	82.412	120.360
17	84.022	107.678
18	85.502	98.977
19	86.889	92.729
20	88.102	81.144
21	89.152	70.193
22	90.048	59.970
23	90.902	57.070
24	91.715	54.388
25	92.442	48.597
26	93.131	46.141
27	93.783	43.578
28	94.326	36.325
29	94.836	34.111
30	95.346	34.111
31	95.796	30.077
32	96.186	26.085
33	96.576	26.085
34	96.939	24.285
35	97.216	18.497
36	97.486	18.059
37	97.749	17.604
38	97.925	11.799
39	98.076	10.033
40	98.226	10.033
41	98.391	11.043
42	98.571	12.039
43	98.751	12.039
44	98.931	12.039
45	99.111	12.039
46	99.291	12.039
47	99.466	11.711
48	99.579	7.536
49	99.672	6.270
50	99.766	6.270
51	99.860	6.270
52	100.000	3.135

Peak Unit   Adjusted mass rainfall Unit rainfall

270	6.1425	0.0120
271	6.1545	0.0120
272	6.1665	0.0120
273	6.1785	0.0120
274	6.1904	0.0120
275	6.2023	0.0119
276	6.2142	0.0119
277	6.2261	0.0119
278	6.2380	0.0119
279	6.2499	0.0118
280	6.2617	0.0118
281	6.2735	0.0118
282	6.2853	0.0118
283	6.2970	0.0118
284	6.3088	0.0117
285	6.3205	0.0117
286	6.3322	0.0117
287	6.3439	0.0117
288	6.3556	0.0117

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0117	0.0072	0.0044
2	0.0117	0.0073	0.0044
3	0.0117	0.0073	0.0044
4	0.0117	0.0073	0.0045
5	0.0118	0.0073	0.0045
6	0.0118	0.0073	0.0045
7	0.0118	0.0074	0.0045
8	0.0119	0.0074	0.0045
9	0.0119	0.0074	0.0045
10	0.0119	0.0074	0.0045
11	0.0120	0.0074	0.0045
12	0.0120	0.0074	0.0045
13	0.0120	0.0075	0.0046
14	0.0121	0.0075	0.0046
15	0.0121	0.0075	0.0046
16	0.0121	0.0075	0.0046
17	0.0122	0.0076	0.0046
18	0.0122	0.0076	0.0046
19	0.0122	0.0076	0.0046
20	0.0123	0.0076	0.0046
21	0.0123	0.0076	0.0047
22	0.0123	0.0076	0.0047
23	0.0124	0.0077	0.0047
24	0.0124	0.0077	0.0047
25	0.0124	0.0077	0.0047
26	0.0125	0.0077	0.0047
27	0.0125	0.0078	0.0047
28	0.0125	0.0078	0.0047
29	0.0126	0.0078	0.0048
30	0.0126	0.0078	0.0048

247	0.0153	0.0095	0.0058
248	0.0151	0.0094	0.0057
249	0.0150	0.0093	0.0057
250	0.0149	0.0092	0.0056
251	0.0148	0.0092	0.0056
252	0.0147	0.0091	0.0056
253	0.0145	0.0090	0.0055
254	0.0144	0.0090	0.0055
255	0.0143	0.0089	0.0054
256	0.0142	0.0088	0.0054
257	0.0141	0.0088	0.0053
258	0.0140	0.0087	0.0053
259	0.0139	0.0086	0.0053
260	0.0138	0.0086	0.0052
261	0.0137	0.0085	0.0052
262	0.0136	0.0085	0.0052
263	0.0135	0.0084	0.0051
264	0.0134	0.0083	0.0051
265	0.0133	0.0083	0.0051
266	0.0133	0.0082	0.0050
267	0.0132	0.0082	0.0050
268	0.0131	0.0081	0.0050
269	0.0130	0.0081	0.0049
270	0.0129	0.0080	0.0049
271	0.0128	0.0080	0.0049
272	0.0128	0.0079	0.0048
273	0.0127	0.0079	0.0048
274	0.0126	0.0078	0.0048
275	0.0126	0.0078	0.0048
276	0.0125	0.0078	0.0047
277	0.0124	0.0077	0.0047
278	0.0123	0.0077	0.0047
279	0.0123	0.0076	0.0047
280	0.0122	0.0076	0.0046
281	0.0121	0.0075	0.0046
282	0.0121	0.0075	0.0046
283	0.0120	0.0075	0.0046
284	0.0120	0.0074	0.0045
285	0.0119	0.0074	0.0045
286	0.0118	0.0073	0.0045
287	0.0118	0.0073	0.0045
288	0.0117	0.0073	0.0044

Total soil rain loss = 3.58(In)
Total effective rainfall = 2.77(In)
Peak flow rate in flood hydrograph = 686.51(CFS)

+++

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	175.0	350.0	525.0	700.0
0+ 5	0.0014	0.20	Q	|	|	|	|
0+10	0.0072	0.84	Q	|	|	|	|
0+15	0.0204	1.91	Q	|	|	|	|
0+20	0.0456	3.66	Q	|	|	|	|
0+25	0.0940	7.03	Q	|	|	|	|
0+30	0.1710	11.18	Q	|	|	|	|
0+35	0.2698	14.35	Q	|	|	|	|
0+40	0.3850	16.73	Q	|	|	|	|
0+45	0.5123	18.48	VQ	|	|	|	|
0+50	0.6490	19.85	VQ	|	|	|	|
0+55	0.7938	21.02	VQ	|	|	|	|
1+ 0	0.9454	22.02	VQ	|	|	|	|
1+ 5	1.1030	22.87	VQ	|	|	|	|
1+10	1.2658	23.65	VQ	|	|	|	|
1+15	1.4332	24.30	VQ	|	|	|	|
1+20	1.6047	24.90	VQ	|	|	|	|
1+25	1.7798	25.44	VQ	|	|	|	|
1+30	1.9585	25.94	VQ	|	|	|	|
1+35	2.1404	26.42	VQ	|	|	|	|
1+40	2.3253	26.85	VQ	|	|	|	|
1+45	2.5128	27.23	VQ	|	|	|	|
1+50	2.7027	27.56	VQ	|	|	|	|
1+55	2.8947	27.89	VQ	|	|	|	|
2+ 0	3.0890	28.20	VQ	|	|	|	|
2+ 5	3.2852	28.49	|Q	|	|	|	|
2+10	3.4834	28.78	|Q	|	|	|	|
2+15	3.6834	29.05	|Q	|	|	|	|
2+20	3.8851	29.29	|Q	|	|	|	|
2+25	4.0884	29.52	|Q	|	|	|	|
2+30	4.2933	29.75	|Q	|	|	|	|
2+35	4.4997	29.96	|Q	|	|	|	|
2+40	4.7074	30.16	|Q	|	|	|	|
2+45	4.9165	30.36	|Q	|	|	|	|
2+50	5.1270	30.56	|Q	|	|	|	|
2+55	5.3386	30.72	|Q	|	|	|	|
3+ 0	5.5513	30.89	|Q	|	|	|	|
3+ 5	5.7652	31.06	|Q	|	|	|	|
3+10	5.9801	31.20	|Q	|	|	|	|
3+15	6.1959	31.33	|Q	|	|	|	|
3+20	6.4126	31.47	|QV	|	|	|	|
3+25	6.6303	31.61	|QV	|	|	|	|
3+30	6.8490	31.76	|QV	|	|	|	|
3+35	7.0688	31.90	|QV	|	|	|	|
3+40	7.2895	32.05	|QV	|	|	|	|
3+45	7.5113	32.20	|QV	|	|	|	|
3+50	7.7341	32.35	|QV	|	|	|	|
3+55	7.9580	32.50	|QV	|	|	|	|
4+ 0	8.1827	32.64	|QV	|	|	|	|
4+ 5	8.4084	32.76	|QV	|	|	|	|
4+10	8.6349	32.89	|QV	|	|	|	|
4+15	8.8623	33.02	|QV	|	|	|	|

```
4+20        9.0906      33.14  |QV       |         |         |         |
4+25        9.3195      33.25  |QV       |         |         |         |
4+30        9.5492      33.35  |QV       |         |         |         |
4+35        9.7797      33.46  |Q V      |         |         |         |
4+40       10.0108      33.57  |Q V      |         |         |         |
4+45       10.2428      33.67  |Q V      |         |         |         |
4+50       10.4754      33.78  |Q V      |         |         |         |
4+55       10.7089      33.90  |Q V      |         |         |         |
5+ 0       10.9431      34.01  |Q V      |         |         |         |
5+ 5       11.1781      34.12  |Q V      |         |         |         |
5+10       11.4139      34.24  |Q V      |         |         |         |
5+15       11.6505      34.35  |Q V      |         |         |         |
5+20       11.8879      34.47  |Q V      |         |         |         |
5+25       12.1261      34.59  |Q V      |         |         |         |
5+30       12.3651      34.71  |Q V      |         |         |         |
5+35       12.6050      34.83  |Q V      |         |         |         |
5+40       12.8457      34.95  |Q  V     |         |         |         |
5+45       13.0872      35.07  | Q V     |         |         |         |
5+50       13.3297      35.20  | Q V     |         |         |         |
5+55       13.5729      35.33  | Q V     |         |         |         |
6+ 0       13.8171      35.45  | Q V     |         |         |         |
6+ 5       14.0622      35.58  | Q V     |         |         |         |
6+10       14.3081      35.71  | Q V     |         |         |         |
6+15       14.5550      35.85  | Q V     |         |         |         |
6+20       14.8028      35.98  | Q V     |         |         |         |
6+25       15.0516      36.12  | Q V     |         |         |         |
6+30       15.3012      36.25  | Q V     |         |         |         |
6+35       15.5519      36.39  | Q V     |         |         |         |
6+40       15.8035      36.53  | Q V     |         |         |         |
6+45       16.0560      36.67  | Q  V    |         |         |         |
6+50       16.3096      36.82  | Q  V    |         |         |         |
6+55       16.5642      36.96  | Q  V    |         |         |         |
7+ 0       16.8198      37.11  | Q  V    |         |         |         |
7+ 5       17.0764      37.26  | Q  V    |         |         |         |
7+10       17.3341      37.41  | Q  V    |         |         |         |
7+15       17.5928      37.57  | Q  V    |         |         |         |
7+20       17.8526      37.72  | Q  V    |         |         |         |
7+25       18.1134      37.88  | Q  V    |         |         |         |
7+30       18.3754      38.04  | Q  V    |         |         |         |
7+35       18.6385      38.20  | Q  V    |         |         |         |
7+40       18.9027      38.36  | Q  V    |         |         |         |
7+45       19.1680      38.53  | Q   V   |         |         |         |
7+50       19.4345      38.70  | Q   V   |         |         |         |
7+55       19.7022      38.87  | Q   V   |         |         |         |
8+ 0       19.9710      39.04  | Q   V   |         |         |         |
8+ 5       20.2411      39.21  | Q   V   |         |         |         |
8+10       20.5124      39.39  | Q   V   |         |         |         |
8+15       20.7849      39.57  | Q   V   |         |         |         |
8+20       21.0587      39.75  | Q   V   |         |         |         |
8+25       21.3338      39.94  | Q   V   |         |         |         |
8+30       21.6102      40.13  | Q   V   |         |         |         |
8+35       21.8878      40.32  | Q   V   |         |         |         |
8+40       22.1669      40.51  | Q   V   |         |         |         |
8+45       22.4472      40.71  | Q    V  |         |         |         |
```

```
 8+50      22.7290     40.91   | Q    V  |         |         |         |
 8+55      23.0121     41.11   | Q    V  |         |         |         |
 9+ 0      23.2967     41.32   | Q    V  |         |         |         |
 9+ 5      23.5827     41.53   | Q    V  |         |         |         |
 9+10      23.8702     41.74   | Q    V  |         |         |         |
 9+15      24.1592     41.96   | Q    V  |         |         |         |
 9+20      24.4496     42.18   | Q    V  |         |         |         |
 9+25      24.7417     42.40   | Q    V  |         |         |         |
 9+30      25.0352     42.63   | Q    V  |         |         |         |
 9+35      25.3304     42.86   | Q    V  |         |         |         |
 9+40      25.6272     43.10   | Q     V |         |         |         |
 9+45      25.9257     43.33   | Q     V |         |         |         |
 9+50      26.2258     43.58   | Q     V |         |         |         |
 9+55      26.5276     43.83   | Q     V |         |         |         |
10+ 0      26.8312     44.08   | Q     V |         |         |         |
10+ 5      27.1365     44.34   | Q     V |         |         |         |
10+10      27.4437     44.60   | Q     V |         |         |         |
10+15      27.7527     44.86   | Q     V |         |         |         |
10+20      28.0635     45.14   | Q     V |         |         |         |
10+25      28.3763     45.41   | Q     V |         |         |         |
10+30      28.6910     45.69   | Q     V |         |         |         |
10+35      29.0076     45.98   | Q      V|         |         |         |
10+40      29.3264     46.28   | Q      V|         |         |         |
10+45      29.6471     46.58   | Q      V|         |         |         |
10+50      29.9700     46.88   | Q      V|         |         |         |
10+55      30.2950     47.19   | Q      V|         |         |         |
11+ 0      30.6223     47.51   | Q      V|         |         |         |
11+ 5      30.9517     47.84   | Q      V|         |         |         |
11+10      31.2835     48.17   | Q      V|         |         |         |
11+15      31.6176     48.51   | Q      V|         |         |         |
11+20      31.9541     48.86   | Q       V         |         |         |
11+25      32.2931     49.22   | Q       V         |         |         |
11+30      32.6346     49.58   | Q       V         |         |         |
11+35      32.9786     49.96   | Q       V         |         |         |
11+40      33.3253     50.34   | Q       V         |         |         |
11+45      33.6747     50.73   | Q       V         |         |         |
11+50      34.0268     51.13   | Q       V         |         |         |
11+55      34.3818     51.54   | Q       V         |         |         |
12+ 0      34.7397     51.96   | Q       V         |         |         |
12+ 5      35.1003     52.36   | Q       V         |         |         |
12+10      35.4631     52.68   |  Q      |V        |         |         |
12+15      35.8276     52.93   |  Q      |V        |         |         |
12+20      36.1931     53.07   |  Q      |V        |         |         |
12+25      36.5575     52.91   |  Q      |V        |         |         |
12+30      36.9199     52.61   |  Q      |V        |         |         |
12+35      37.2816     52.52   |  Q      |V        |         |         |
12+40      37.6439     52.60   |  Q      |V        |         |         |
12+45      38.0076     52.82   |  Q      |V        |         |         |
12+50      38.3735     53.13   |  Q      | V       |         |         |
12+55      38.7419     53.49   |  Q      | V       |         |         |
13+ 0      39.1133     53.92   |  Q      | V       |         |         |
13+ 5      39.4878     54.38   |  Q      | V       |         |         |
13+10      39.8659     54.89   |  Q      | V       |         |         |
13+15      40.2477     55.45   |  Q      | V       |         |         |
```

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13+20      40.6337     56.04  |  Q      | V       |         |         |
13+25      41.0240     56.67  |  Q      | V       |         |         |
13+30      41.4188     57.34  |  Q      | V       |         |         |
13+35      41.8185     58.04  |  Q      |  V      |         |         |
13+40      42.2234     58.78  |  Q      |  V      |         |         |
13+45      42.6336     59.57  |  Q      |  V      |         |         |
13+50      43.0496     60.40  |  Q      |  V      |         |         |
13+55      43.4717     61.28  |  Q      |  V      |         |         |
14+ 0      43.9001     62.21  |  Q      |  V      |         |         |
14+ 5      44.3354     63.20  |  Q      |  V      |         |         |
14+10      44.7782     64.30  |  Q      |   V     |         |         |
14+15      45.2293     65.49  |  Q      |   V     |         |         |
14+20      45.6895     66.83  |  Q      |   V     |         |         |
14+25      46.1605     68.38  |  Q      |   V     |         |         |
14+30      46.6432     70.09  |   Q     |   V     |         |         |
14+35      47.1376     71.79  |   Q     |   V     |         |         |
14+40      47.6438     73.50  |   Q     |   V     |         |         |
14+45      48.1621     75.26  |   Q     |    V    |         |         |
14+50      48.6931     77.09  |   Q     |    V    |         |         |
14+55      49.2374     79.04  |   Q     |    V    |         |         |
15+ 0      49.7960     81.12  |   Q     |    V    |         |         |
15+ 5      50.3700     83.35  |   Q     |    V    |         |         |
15+10      50.9607     85.77  |   Q     |    V    |         |         |
15+15      51.5696     88.40  |    Q    |     V   |         |         |
15+20      52.1984     91.30  |    Q    |     V   |         |         |
15+25      52.8468     94.15  |    Q    |     V   |         |         |
15+30      53.5121     96.59  |    Q    |     V   |         |         |
15+35      54.1919     98.72  |    Q    |     V   |         |         |
15+40      54.8820    100.20  |    Q    |      V  |         |         |
15+45      55.5675     99.53  |    Q    |      V  |         |         |
15+50      56.2456     98.45  |    Q    |      V  |         |         |
15+55      56.9417    101.08  |    Q    |      V  |         |         |
16+ 0      57.7001    110.11  |     Q   |       V |         |         |
16+ 5      58.7249    148.80  |       Q |       V |         |         |
16+10      60.2328    218.95  |         | Q     V |         |         |
16+15      62.2606    294.44  |         |     Q  V|         |         |
16+20      65.0588    406.30  |         |         V  Q      |         |
16+25      69.2543    609.19  |         |         |V        |   Q     |
16+30      73.9823    686.51  |         |         |  V      |        Q|
16+35      77.7846    552.08  |         |         |   V     |Q        |
16+40      80.8173    440.35  |         |         |    Q    |         |
16+45      83.2475    352.86  |         |         Q     V   |         |
16+50      85.3197    300.88  |         |      Q  |     V   |         |
16+55      87.1729    269.09  |         |    Q    |      V  |         |
17+ 0      88.8377    241.72  |         |  Q      |      V  |         |
17+ 5      90.3431    218.59  |         | Q       |       V |         |
17+10      91.7349    202.08  |         |Q        |       V |         |
17+15      92.9925    182.62  |         Q         |        V|         |
17+20      94.1651    170.26  |        Q|         |        V|         |
17+25      95.2605    159.05  |        Q|         |        V|         |
17+30      96.2947    150.16  |       Q |         |         V         |
17+35      97.2760    142.49  |       Q |         |         V         |
17+40      98.1877    132.37  |      Q  |         |         V         |
17+45      99.0346    122.97  |      Q  |         |         |V        |
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17+50      99.8240    114.62  |     Q   |         |         |V        |
17+55     100.5839    110.33  |     Q   |         |         |V        |
18+ 0     101.3154    106.22  |     Q   |         |         |V        |
18+ 5     102.0097    100.81  |    Q    |         |         |V        |
18+10     102.6793     97.22  |    Q    |         |         | V       |
18+15     103.3243     93.65  |    Q    |         |         | V       |
18+20     103.9317     88.19  |    Q    |         |         | V       |
18+25     104.5226     85.80  |   Q     |         |         | V       |
18+30     105.1056     84.65  |   Q     |         |         | V       |
18+35     105.6659     81.36  |   Q     |         |         |  V      |
18+40     106.2041     78.15  |   Q     |         |         |  V      |
18+45     106.7331     76.80  |   Q     |         |         |  V      |
18+50     107.2453     74.38  |   Q     |         |         |  V      |
18+55     107.7286     70.17  |   Q     |         |         |  V      |
19+ 0     108.2015     68.67  |  Q      |         |         |  V      |
19+ 5     108.6629     67.00  |  Q      |         |         |   V     |
19+10     109.0957     62.84  |  Q      |         |         |   V     |
19+15     109.5153     60.93  |  Q      |         |         |   V     |
19+20     109.9294     60.13  |  Q      |         |         |   V     |
19+25     110.3420     59.92  |  Q      |         |         |   V     |
19+30     110.7528     59.64  |  Q      |         |         |   V     |
19+35     111.1581     58.85  |  Q      |         |         |   V     |
19+40     111.5580     58.08  |  Q      |         |         |   V     |
19+45     111.9529     57.33  |  Q      |         |         |    V    |
19+50     112.3420     56.50  |  Q      |         |         |    V    |
19+55     112.7230     55.32  |  Q      |         |         |    V    |
20+ 0     113.0834     52.33  | Q       |         |         |    V    |
20+ 5     113.4342     50.93  | Q       |         |         |    V    |
20+10     113.7799     50.20  | Q       |         |         |    V    |
20+15     114.1194     49.30  | Q       |         |         |    V    |
20+20     114.4419     46.81  | Q       |         |         |    V    |
20+25     114.7485     44.52  | Q       |         |         |    V    |
20+30     115.0511     43.94  | Q       |         |         |     V   |
20+35     115.3501     43.41  | Q       |         |         |     V   |
20+40     115.6455     42.90  | Q       |         |         |     V   |
20+45     115.9375     42.40  | Q       |         |         |     V   |
20+50     116.2262     41.92  | Q       |         |         |     V   |
20+55     116.5117     41.46  | Q       |         |         |     V   |
21+ 0     116.7942     41.02  | Q       |         |         |     V   |
21+ 5     117.0738     40.60  | Q       |         |         |     V   |
21+10     117.3506     40.19  | Q       |         |         |     V   |
21+15     117.6247     39.80  | Q       |         |         |     V   |
21+20     117.8962     39.42  | Q       |         |         |     V   |
21+25     118.1652     39.06  | Q       |         |         |      V  |
21+30     118.4317     38.70  | Q       |         |         |      V  |
21+35     118.6960     38.37  | Q       |         |         |      V  |
21+40     118.9579     38.04  | Q       |         |         |      V  |
21+45     119.2177     37.72  | Q       |         |         |      V  |
21+50     119.4753     37.41  | Q       |         |         |      V  |
21+55     119.7309     37.11  | Q       |         |         |      V  |
22+ 0     119.9844     36.81  | Q       |         |         |      V  |
22+ 5     120.2359     36.52  | Q       |         |         |      V  |
22+10     120.4856     36.24  | Q       |         |         |      V  |
22+15     120.7333     35.97  | Q       |         |         |      V  |
```

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   22+20     120.9791     35.70  | Q       |         |         |      V  |
   22+25     121.2232     35.43  | Q       |         |         |      V  |
   22+30     121.4654     35.17  | Q       |         |         |       V |
   22+35     121.7059     34.92  |Q        |         |         |       V |
   22+40     121.9447     34.67  |Q        |         |         |       V |
   22+45     122.1819     34.43  |Q        |         |         |       V |
   22+50     122.4174     34.20  |Q        |         |         |       V |
   22+55     122.6513     33.97  |Q        |         |         |       V |
   23+ 0     122.8837     33.74  |Q        |         |         |       V |
   23+ 5     123.1145     33.52  |Q        |         |         |       V |
   23+10     123.3438     33.30  |Q        |         |         |       V |
   23+15     123.5717     33.09  |Q        |         |         |       V |
   23+20     123.7982     32.88  |Q        |         |         |       V |
   23+25     124.0232     32.68  |Q        |         |         |       V |
   23+30     124.2469     32.48  |Q        |         |         |       V |
   23+35     124.4692     32.28  |Q        |         |         |       V |
   23+40     124.6902     32.09  |Q        |         |         |        V|
   23+45     124.9099     31.90  |Q        |         |         |        V|
   23+50     125.1283     31.71  |Q        |         |         |        V|
   23+55     125.3455     31.53  |Q        |         |         |        V|
   24+ 0     125.5614     31.35  |Q        |         |         |        V|
-----------------------------------------------------------------------
```

BALDY MESA LINE A-01
POST-DEVELOPED CHANNEL FLOW
FROM NODE 11- 14

THE ATTACHED CALCULATIONS SHOWS
OFFSITE TRIBUTARY AREAS
FOR THE 100-YEAR,
24-HOURS UNIT HYDROGRAPH

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 03/02/17

++

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

Program License Serial Number 4070

100-YEAR, 24-HOURS UNIT HYDROGRAPH, POST DEVELOPED – LINE A-01
TRACT NO. 16397, CITY OF VICTORVILLE
UPSTREAM TRIBUTARY AREAS OF AQUADUCT NODE 11(SOUTHWEST)
FILE: 16397UNITHYDNODE11.OUT

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
757.00	1	1.31
Rainfall data for year 100		
757.00	6	3.06
Rainfall data for year 100		
757.00	24	6.36

++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      52.0        757.00      1.000     0.785    0.800    0.628

Area-averaged adjusted loss rate Fm (In/Hr) =  0.628

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
   605.60   0.800         32.0      52.0       9.23     0.233
   151.40   0.200         98.0      98.0       0.20     0.962

Area-averaged catchment yield fraction, Y =  0.379
Area-averaged low loss fraction, Yb =  0.621
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =   16688.00(Ft.)
Length from concentration point to centroid =    6131.00(Ft.)
Elevation difference along watercourse =     181.00(Ft.)
Mannings friction factor along watercourse =  0.035
Watershed area =     757.00(Ac.)
Catchment Lag time =   0.638 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 13.0608
Hydrograph baseflow =   334.40(CFS)
Average maximum watershed loss rate(Fm) =  0.628(In/Hr)
Average low loss rate fraction (Yb) = 0.621 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.622(In)
Computed peak 30-minute rainfall =  1.064(In)
Specified peak 1-hour rainfall =  1.310(In)
Computed peak 3-hour rainfall =  2.204(In)
Specified peak 6-hour rainfall =  3.060(In)
Specified peak 24-hour rainfall =  6.360(In)


Rainfall depth area reduction factors:
Using a total area of     757.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.965     Adjusted rainfall =  0.600(In)
30-minute factor = 0.965    Adjusted rainfall =  1.026(In)
1-hour factor = 0.965       Adjusted rainfall =  1.264(In)
3-hour factor = 0.996       Adjusted rainfall =  2.194(In)
6-hour factor = 0.998       Adjusted rainfall =  3.053(In)
24-hour factor = 0.999      Adjusted rainfall =  6.354(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values           ((CFS))
---------------------------------------------------------------------
           (K =      9154.97 (CFS))
```

1	0.576	52.699
2	2.295	157.422
3	5.107	257.441
4	9.118	367.187
5	16.231	651.151
6	27.985	1076.151
7	39.643	1067.219
8	48.599	819.969
9	55.596	640.551
10	60.859	481.829
11	65.017	380.678
12	68.511	319.850
13	71.601	282.892
14	74.207	238.626
15	76.509	210.744
16	78.599	191.328
17	80.346	159.943
18	81.977	149.264
19	83.395	129.877
20	84.748	123.847
21	86.004	114.931
22	87.164	106.254
23	88.209	95.675
24	89.116	82.983
25	89.899	71.710
26	90.651	68.827
27	91.380	66.764
28	92.040	60.438
29	92.665	57.196
30	93.253	53.823
31	93.818	51.775
32	94.288	42.998
33	94.732	40.654
34	95.176	40.654
35	95.605	39.230
36	95.955	32.076
37	96.295	31.088
38	96.634	31.088
39	96.947	28.627
40	97.186	21.905
41	97.421	21.523
42	97.656	21.523
43	97.850	17.742
44	97.981	12.016
45	98.112	11.957
46	98.243	11.962
47	98.388	13.294
48	98.545	14.348
49	98.701	14.348
50	98.858	14.348
51	99.015	14.348
52	99.172	14.348
53	99.328	14.348
54	99.479	13.787

55	99.574	8.693
56	99.655	7.473
57	99.737	7.473
58	99.819	7.473
59	99.900	7.473
60	100.000	3.737

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5996	0.5996
2	0.7381	0.1386
3	0.8336	0.0955
4	0.9087	0.0751
5	0.9717	0.0629
6	1.0263	0.0546
7	1.0749	0.0486
8	1.1188	0.0439
9	1.1590	0.0402
10	1.1963	0.0372
11	1.2310	0.0347
12	1.2635	0.0326
13	1.3153	0.0518
14	1.3652	0.0499
15	1.4134	0.0481
16	1.4599	0.0466
17	1.5051	0.0451
18	1.5489	0.0438
19	1.5916	0.0426
20	1.6331	0.0415
21	1.6736	0.0405
22	1.7132	0.0396
23	1.7519	0.0387
24	1.7897	0.0379
25	1.8268	0.0371
26	1.8631	0.0363
27	1.8988	0.0357
28	1.9338	0.0350
29	1.9682	0.0344
30	2.0020	0.0338
31	2.0352	0.0332
32	2.0679	0.0327
33	2.1001	0.0322
34	2.1319	0.0317
35	2.1631	0.0313
36	2.1940	0.0308
37	2.2228	0.0288
38	2.2512	0.0284
39	2.2793	0.0280
40	2.3069	0.0277
41	2.3342	0.0273
42	2.3612	0.0270
43	2.3878	0.0266
44	2.4141	0.0263
45	2.4401	0.0260

262	6.0439	0.0122	
263	6.0561	0.0122	
264	6.0683	0.0122	
265	6.0804	0.0121	
266	6.0925	0.0121	
267	6.1046	0.0121	
268	6.1167	0.0121	
269	6.1288	0.0121	
270	6.1408	0.0120	
271	6.1528	0.0120	
272	6.1648	0.0120	
273	6.1768	0.0120	
274	6.1887	0.0120	
275	6.2007	0.0119	
276	6.2126	0.0119	
277	6.2245	0.0119	
278	6.2364	0.0119	
279	6.2482	0.0119	
280	6.2600	0.0118	
281	6.2718	0.0118	
282	6.2836	0.0118	
283	6.2954	0.0118	
284	6.3072	0.0118	
285	6.3189	0.0117	
286	6.3306	0.0117	
287	6.3423	0.0117	
288	6.3540	0.0117	

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0117	0.0073	0.0044
2	0.0117	0.0073	0.0044
3	0.0117	0.0073	0.0044
4	0.0118	0.0073	0.0045
5	0.0118	0.0073	0.0045
6	0.0118	0.0073	0.0045
7	0.0119	0.0074	0.0045
8	0.0119	0.0074	0.0045
9	0.0119	0.0074	0.0045
10	0.0119	0.0074	0.0045
11	0.0120	0.0074	0.0045
12	0.0120	0.0074	0.0045
13	0.0120	0.0075	0.0046
14	0.0121	0.0075	0.0046
15	0.0121	0.0075	0.0046
16	0.0121	0.0075	0.0046
17	0.0122	0.0076	0.0046
18	0.0122	0.0076	0.0046
19	0.0122	0.0076	0.0046
20	0.0123	0.0076	0.0046
21	0.0123	0.0076	0.0047
22	0.0123	0.0077	0.0047

239	0.0165	0.0102	0.0062
240	0.0163	0.0101	0.0062
241	0.0161	0.0100	0.0061
242	0.0160	0.0099	0.0061
243	0.0158	0.0098	0.0060
244	0.0157	0.0097	0.0059
245	0.0156	0.0097	0.0059
246	0.0154	0.0096	0.0058
247	0.0153	0.0095	0.0058
248	0.0151	0.0094	0.0057
249	0.0150	0.0093	0.0057
250	0.0149	0.0092	0.0056
251	0.0148	0.0092	0.0056
252	0.0147	0.0091	0.0056
253	0.0145	0.0090	0.0055
254	0.0144	0.0090	0.0055
255	0.0143	0.0089	0.0054
256	0.0142	0.0088	0.0054
257	0.0141	0.0088	0.0053
258	0.0140	0.0087	0.0053
259	0.0139	0.0086	0.0053
260	0.0138	0.0086	0.0052
261	0.0137	0.0085	0.0052
262	0.0136	0.0085	0.0052
263	0.0135	0.0084	0.0051
264	0.0134	0.0083	0.0051
265	0.0133	0.0083	0.0051
266	0.0133	0.0082	0.0050
267	0.0132	0.0082	0.0050
268	0.0131	0.0081	0.0050
269	0.0130	0.0081	0.0049
270	0.0129	0.0080	0.0049
271	0.0129	0.0080	0.0049
272	0.0128	0.0079	0.0048
273	0.0127	0.0079	0.0048
274	0.0126	0.0078	0.0048
275	0.0126	0.0078	0.0048
276	0.0125	0.0078	0.0047
277	0.0124	0.0077	0.0047
278	0.0123	0.0077	0.0047
279	0.0123	0.0076	0.0047
280	0.0122	0.0076	0.0046
281	0.0121	0.0075	0.0046
282	0.0121	0.0075	0.0046
283	0.0120	0.0075	0.0046
284	0.0120	0.0074	0.0045
285	0.0119	0.0074	0.0045
286	0.0118	0.0073	0.0045
287	0.0118	0.0073	0.0045
288	0.0117	0.0073	0.0044

Total soil rain loss =   3.59(In)
Total effective rainfall =   2.77(In)

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    Peak flow rate in flood hydrograph =   1159.46(CFS)
    ---------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R   S T O R M
                   R u n o f f    H y d r o g r a p h
    --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0      300.0     600.0     900.0    1200.0
-----------------------------------------------------------------------
  0+ 5       2.3046    334.63  V         |Q        |         |         |
  0+10       4.6141    335.33  V         |Q        |         |         |
  0+15       6.9314    336.47  V         |Q        |         |         |
  0+20       9.2599    338.10  V         |Q        |         |         |
  0+25      11.6083    340.99  V         |Q        |         |         |
  0+30      13.9896    345.77  V         |Q        |         |         |
  0+35      16.4036    350.51  V         |Q        |         |         |
  0+40      18.8429    354.18  V         |Q        |         |         |
  0+45      21.3020    357.06  V         |Q        |         |         |
  0+50      23.7762    359.25  V         |Q        |         |         |
  0+55      26.2624    361.00  |V        | Q       |         |         |
  1+ 0      28.7588    362.48  |V        | Q       |         |         |
  1+ 5      31.2643    363.80  |V        | Q       |         |         |
  1+10      33.7776    364.93  |V        | Q       |         |         |
  1+15      36.2978    365.94  |V        | Q       |         |         |
  1+20      38.8244    366.87  |V        | Q       |         |         |
  1+25      41.3565    367.66  |V        | Q       |         |         |
  1+30      43.8937    368.40  |V        | Q       |         |         |
  1+35      46.4355    369.07  |V        | Q       |         |         |
  1+40      48.9817    369.71  | V       | Q       |         |         |
  1+45      51.5320    370.31  | V       | Q       |         |         |
  1+50      54.0862    370.87  | V       | Q       |         |         |
  1+55      56.6440    371.39  | V       | Q       |         |         |
  2+ 0      59.2050    371.86  | V       | Q       |         |         |
  2+ 5      61.7689    372.27  | V       | Q       |         |         |
  2+10      64.3355    372.68  | V       | Q       |         |         |
  2+15      66.9049    373.08  | V       | Q       |         |         |
  2+20      69.4769    373.45  | V       | Q       |         |         |
  2+25      72.0513    373.81  | V       | Q       |         |         |
  2+30      74.6282    374.16  |  V      | Q       |         |         |
  2+35      77.2073    374.49  |  V      | Q       |         |         |
  2+40      79.7885    374.79  |  V      | Q       |         |         |
  2+45      82.3718    375.09  |  V      | Q       |         |         |
  2+50      84.9571    375.38  |  V      | Q       |         |         |
  2+55      87.5443    375.67  |  V      | Q       |         |         |
  3+ 0      90.1333    375.93  |  V      | Q       |         |         |
  3+ 5      92.7241    376.18  |  V      | Q       |         |         |
  3+10      95.3167    376.44  |  V      | Q       |         |         |
  3+15      97.9110    376.69  |   V     | Q       |         |         |
  3+20     100.5068    376.91  |   V     | Q       |         |         |
  3+25     103.1041    377.13  |   V     | Q       |         |         |
  3+30     105.7029    377.35  |   V     | Q       |         |         |
  3+35     108.3031    377.55  |   V     | Q       |         |         |
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3+40     110.9045    377.73  |   V     | Q       |         |         |
3+45     113.5073    377.91  |   V     | Q       |         |         |
3+50     116.1112    378.10  |   V     | Q       |         |         |
3+55     118.7165    378.29  |   V     | Q       |         |         |
4+ 0     121.3232    378.49  |   V     | Q       |         |         |
4+ 5     123.9312    378.68  |    V    | Q       |         |         |
4+10     126.5406    378.88  |    V    | Q       |         |         |
4+15     129.1514    379.08  |    V    | Q       |         |         |
4+20     131.7635    379.29  |    V    | Q       |         |         |
4+25     134.3771    379.49  |    V    | Q       |         |         |
4+30     136.9921    379.69  |    V    | Q       |         |         |
4+35     139.6083    379.88  |    V    | Q       |         |         |
4+40     142.2258    380.06  |    V    | Q       |         |         |
4+45     144.8445    380.23  |    V    | Q       |         |         |
4+50     147.4644    380.42  |     V   | Q       |         |         |
4+55     150.0856    380.60  |     V   | Q       |         |         |
5+ 0     152.7080    380.77  |     V   | Q       |         |         |
5+ 5     155.3314    380.92  |     V   | Q       |         |         |
5+10     157.9559    381.08  |     V   | Q       |         |         |
5+15     160.5815    381.23  |     V   | Q       |         |         |
5+20     163.2082    381.39  |     V   | Q       |         |         |
5+25     165.8359    381.55  |     V   | Q       |         |         |
5+30     168.4648    381.71  |     V   | Q       |         |         |
5+35     171.0948    381.88  |      V  | Q       |         |         |
5+40     173.7259    382.04  |      V  | Q       |         |         |
5+45     176.3582    382.21  |      V  | Q       |         |         |
5+50     178.9916    382.38  |      V  | Q       |         |         |
5+55     181.6262    382.55  |      V  | Q       |         |         |
6+ 0     184.2621    382.72  |      V  | Q       |         |         |
6+ 5     186.8991    382.89  |      V  | Q       |         |         |
6+10     189.5373    383.07  |      V  | Q       |         |         |
6+15     192.1767    383.25  |      V  | Q       |         |         |
6+20     194.8174    383.43  |       V | Q       |         |         |
6+25     197.4594    383.61  |       V | Q       |         |         |
6+30     200.1026    383.80  |       V | Q       |         |         |
6+35     202.7471    383.98  |       V | Q       |         |         |
6+40     205.3930    384.17  |       V | Q       |         |         |
6+45     208.0401    384.36  |       V | Q       |         |         |
6+50     210.6886    384.56  |       V | Q       |         |         |
6+55     213.3384    384.75  |       V | Q       |         |         |
7+ 0     215.9896    384.95  |       V | Q       |         |         |
7+ 5     218.6422    385.15  |       V | Q       |         |         |
7+10     221.2962    385.36  |        V| Q       |         |         |
7+15     223.9516    385.56  |        V| Q       |         |         |
7+20     226.6084    385.77  |        V| Q       |         |         |
7+25     229.2667    385.99  |        V| Q       |         |         |
7+30     231.9265    386.20  |        V| Q       |         |         |
7+35     234.5877    386.42  |        V| Q       |         |         |
7+40     237.2505    386.64  |        V| Q       |         |         |
7+45     239.9149    386.86  |        V| Q       |         |         |
7+50     242.5807    387.09  |        V| Q       |         |         |
7+55     245.2482    387.32  |         V Q       |         |         |
8+ 0     247.9173    387.55  |         V Q       |         |         |
8+ 5     250.5879    387.78  |         V Q       |         |         |
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  8+10     253.2603    388.02  |         V Q       |         |         |
  8+15     255.9343    388.26  |         V Q       |         |         |
  8+20     258.6100    388.51  |         V Q       |         |         |
  8+25     261.2874    388.76  |         V Q       |         |         |
  8+30     263.9665    389.01  |         V Q       |         |         |
  8+35     266.6474    389.27  |         V Q       |         |         |
  8+40     269.3301    389.53  |         |VQ       |         |         |
  8+45     272.0147    389.79  |         |VQ       |         |         |
  8+50     274.7010    390.06  |         |V Q      |         |         |
  8+55     277.3893    390.33  |         |V Q      |         |         |
  9+ 0     280.0795    390.61  |         |V Q      |         |         |
  9+ 5     282.7716    390.89  |         |V Q      |         |         |
  9+10     285.4656    391.18  |         |V Q      |         |         |
  9+15     288.1617    391.47  |         |V Q      |         |         |
  9+20     290.8598    391.76  |         |V Q      |         |         |
  9+25     293.5599    392.06  |         | VQ      |         |         |
  9+30     296.2622    392.37  |         | VQ      |         |         |
  9+35     298.9666    392.68  |         | VQ      |         |         |
  9+40     301.6732    392.99  |         | VQ      |         |         |
  9+45     304.3819    393.31  |         | VQ      |         |         |
  9+50     307.0930    393.64  |         | VQ      |         |         |
  9+55     309.8063    393.97  |         | VQ      |         |         |
 10+ 0     312.5219    394.31  |         | VQ      |         |         |
 10+ 5     315.2399    394.65  |         | VQ      |         |         |
 10+10     317.9603    395.00  |         |  Q      |         |         |
 10+15     320.6832    395.36  |         |  Q      |         |         |
 10+20     323.4086    395.72  |         |  Q      |         |         |
 10+25     326.1365    396.09  |         |  Q      |         |         |
 10+30     328.8670    396.47  |         |  Q      |         |         |
 10+35     331.6002    396.86  |         |  Q      |         |         |
 10+40     334.3361    397.25  |         |  Q      |         |         |
 10+45     337.0747    397.65  |         |  Q      |         |         |
 10+50     339.8162    398.06  |         |  Q      |         |         |
 10+55     342.5605    398.48  |         |  QV     |         |         |
 11+ 0     345.3077    398.90  |         |  QV     |         |         |
 11+ 5     348.0580    399.34  |         |  QV     |         |         |
 11+10     350.8113    399.78  |         |  QV     |         |         |
 11+15     353.5677    400.23  |         |  QV     |         |         |
 11+20     356.3274    400.70  |         |  QV     |         |         |
 11+25     359.0903    401.17  |         |  QV     |         |         |
 11+30     361.8565    401.66  |         |  QV     |         |         |
 11+35     364.6262    402.16  |         |  QV     |         |         |
 11+40     367.3994    402.67  |         |  Q V    |         |         |
 11+45     370.1762    403.19  |         |  Q V    |         |         |
 11+50     372.9566    403.72  |         |  Q V    |         |         |
 11+55     375.7408    404.27  |         |  Q V    |         |         |
 12+ 0     378.5289    404.83  |         |  Q V    |         |         |
 12+ 5     381.3206    405.36  |         |  Q V    |         |         |
 12+10     384.1155    405.82  |         |  Q V    |         |         |
 12+15     386.9131    406.21  |         |  Q V    |         |         |
 12+20     389.7129    406.53  |         |  Q  V   |         |         |
 12+25     392.5133    406.62  |         |  Q  V   |         |         |
 12+30     395.3120    406.38  |         |  Q  V   |         |         |
 12+35     398.1092    406.16  |         |  Q  V   |         |         |
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12+40     400.9066    406.17  |         |  Q  V   |         |         |
12+45     403.7052    406.36  |         |  Q  V   |         |         |
12+50     406.5061    406.70  |         |  Q  V   |         |         |
12+55     409.3101    407.14  |         |  Q  V   |         |         |
13+ 0     412.1178    407.67  |         |  Q  V   |         |         |
13+ 5     414.9295    408.25  |         |  Q   V  |         |         |
13+10     417.7456    408.91  |         |  Q   V  |         |         |
13+15     420.5666    409.61  |         |  Q   V  |         |         |
13+20     423.3928    410.36  |         |  Q   V  |         |         |
13+25     426.2246    411.17  |         |  Q   V  |         |         |
13+30     429.0623    412.03  |         |  Q   V  |         |         |
13+35     431.9062    412.95  |         |  Q   V  |         |         |
13+40     434.7569    413.91  |         |  Q   V  |         |         |
13+45     437.6145    414.92  |         |  Q   V  |         |         |
13+50     440.4794    416.00  |         |  Q    V |         |         |
13+55     443.3522    417.12  |         |  Q    V |         |         |
14+ 0     446.2332    418.32  |         |  Q    V |         |         |
14+ 5     449.1232    419.62  |         |  Q    V |         |         |
14+10     452.0230    421.05  |         |   Q   V |         |         |
14+15     454.9336    422.62  |         |   Q   V |         |         |
14+20     457.8560    424.33  |         |   Q   V |         |         |
14+25     460.7919    426.30  |         |   Q   V |         |         |
14+30     463.7439    428.62  |         |   Q    V|         |         |
14+35     466.7124    431.04  |         |   Q    V|         |         |
14+40     469.6975    433.43  |         |   Q    V|         |         |
14+45     472.6992    435.85  |         |   Q    V|         |         |
14+50     475.7179    438.32  |         |   Q    V|         |         |
14+55     478.7543    440.88  |         |   Q    V|         |         |
15+ 0     481.8093    443.60  |         |   Q    V|         |         |
15+ 5     484.8843    446.49  |         |   Q    V|         |         |
15+10     487.9808    449.61  |         |   Q     V         |         |
15+15     491.1004    452.97  |         |    Q    V         |         |
15+20     494.2454    456.66  |         |    Q    V         |         |
15+25     497.4153    460.27  |         |    Q    V         |         |
15+30     500.6074    463.48  |         |    Q    V         |         |
15+35     503.8195    466.40  |         |    Q    V         |         |
15+40     507.0503    469.11  |         |    Q    V         |         |
15+45     510.2896    470.35  |         |    Q    V         |         |
15+50     513.5217    469.30  |         |    Q    |V        |         |
15+55     516.7619    470.48  |         |    Q    |V        |         |
16+ 0     520.0614    479.10  |         |    Q    |V        |         |
16+ 5     523.6504    521.12  |         |      Q  |V        |         |
16+10     527.7359    593.21  |         |        Q|V        |         |
16+15     532.3342    667.68  |         |         |VQ       |         |
16+20     537.5584    758.55  |         |         | V  Q    |         |
16+25     544.0217    938.47  |         |         | V       |Q        |
16+30     552.0069   1159.46  |         |         | V       |       Q |
16+35     559.8421   1137.66  |         |         |  V      |      Q  |
16+40     566.6583    989.72  |         |         |  V      | Q       |
16+45     572.7016    877.48  |         |         |  V     Q|         |
16+50     578.0950    783.12  |         |         |  V  Q   |         |
16+55     583.0677    722.05  |         |         |  VQ     |         |
17+ 0     587.7680    682.47  |         |         | Q V     |         |
17+ 5     592.2783    654.90  |         |         |Q  V     |         |
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17+10     596.5783    624.36  |         |         Q   V     |         |
17+15     600.7281    602.55  |         |         Q   V     |         |
17+20     604.7577    585.10  |         |        Q|   V     |         |
17+25     608.6335    562.76  |         |       Q |    V    |         |
17+30     612.4268    550.80  |         |       Q |    V    |         |
17+35     616.1143    535.41  |         |      Q  |    V    |         |
17+40     619.7452    527.20  |         |      Q  |    V    |         |
17+45     623.3109    517.75  |         |      Q  |    V    |         |
17+50     626.8135    508.57  |         |     Q   |    V    |         |
17+55     630.2466    498.49  |         |     Q   |    V    |         |
18+ 0     633.6064    487.84  |         |     Q   |     V   |         |
18+ 5     636.9033    478.70  |         |    Q    |     V   |         |
18+10     640.1691    474.20  |         |    Q    |     V   |         |
18+15     643.4076    470.22  |         |    Q    |     V   |         |
18+20     646.6062    464.44  |         |    Q    |     V   |         |
18+25     649.7781    460.57  |         |    Q    |     V   |         |
18+30     652.9262    457.09  |         |    Q    |     V   |         |
18+35     656.0540    454.15  |         |    Q    |     V   |         |
18+40     659.1396    448.04  |         |   Q     |      V  |         |
18+45     662.2065    445.31  |         |   Q     |      V  |         |
18+50     665.2616    443.60  |         |   Q     |      V  |         |
18+55     668.2985    440.96  |         |   Q     |      V  |         |
19+ 0     671.2992    435.71  |         |   Q     |      V  |         |
19+ 5     674.2861    433.69  |         |   Q     |      V  |         |
19+10     677.2616    432.05  |         |   Q     |      V  |         |
19+15     680.2163    429.01  |         |   Q     |      V  |         |
19+20     683.1371    424.11  |         |   Q     |       V |         |
19+25     686.0467    422.48  |         |   Q     |       V |         |
19+30     688.9455    420.90  |         |   Q     |       V |         |
19+35     691.8201    417.39  |         |  Q      |       V |         |
19+40     694.6659    413.21  |         |  Q      |       V |         |
19+45     697.5040    412.09  |         |  Q      |       V |         |
19+50     700.3358    411.18  |         |  Q      |       V |         |
19+55     703.1664    411.01  |         |  Q      |       V |         |
20+ 0     705.9945    410.63  |         |  Q      |        V|         |
20+ 5     708.8162    409.72  |         |  Q      |        V|         |
20+10     711.6318    408.82  |         |  Q      |        V|         |
20+15     714.4412    407.93  |         |  Q      |        V|         |
20+20     717.2447    407.06  |         |  Q      |        V|         |
20+25     720.0416    406.12  |         |  Q      |        V|         |
20+30     722.8287    404.68  |         |  Q      |        V|         |
20+35     725.5915    401.15  |         |  Q      |        V|         |
20+40     728.3443    399.71  |         |  Q      |        V|         |
20+45     731.0917    398.94  |         |  Q      |         V         |
20+50     733.8337    398.13  |         |  Q      |         V         |
20+55     736.5685    397.09  |         |  Q      |         V         |
21+ 0     739.2832    394.18  |         |  Q      |         V         |
21+ 5     741.9796    391.51  |         |  Q      |         V         |
21+10     744.6713    390.84  |         |  Q      |         V         |
21+15     747.3589    390.24  |         |  Q      |         V         |
21+20     750.0425    389.65  |         | Q       |         V         |
21+25     752.7221    389.07  |         | Q       |         V         |
21+30     755.3978    388.51  |         | Q       |         |V        |
21+35     758.0698    387.98  |         | Q       |         |V        |
```

```
    21+40     760.7384    387.47  |         | Q        |         |V        |
    21+45     763.4035    386.98  |         | Q        |         |V        |
    21+50     766.0654    386.50  |         | Q        |         |V        |
    21+55     768.7241    386.04  |         | Q        |         |V        |
    22+ 0     771.3798    385.60  |         | Q        |         |V        |
    22+ 5     774.0325    385.18  |         | Q        |         |V        |
    22+10     776.6824    384.77  |         | Q        |         |V        |
    22+15     779.3296    384.37  |         | Q        |         | V       |
    22+20     781.9741    383.98  |         | Q        |         | V       |
    22+25     784.6161    383.61  |         | Q        |         | V       |
    22+30     787.2555    383.24  |         | Q        |         | V       |
    22+35     789.8924    382.88  |         | Q        |         | V       |
    22+40     792.5269    382.53  |         | Q        |         | V       |
    22+45     795.1590    382.18  |         | Q        |         | V       |
    22+50     797.7888    381.85  |         | Q        |         | V       |
    22+55     800.4164    381.52  |         | Q        |         | V       |
    23+ 0     803.0417    381.20  |         | Q        |         | V       |
    23+ 5     805.6648    380.88  |         | Q        |         |  V      |
    23+10     808.2858    380.57  |         | Q        |         |  V      |
    23+15     810.9047    380.26  |         | Q        |         |  V      |
    23+20     813.5216    379.96  |         | Q        |         |  V      |
    23+25     816.1364    379.67  |         | Q        |         |  V      |
    23+30     818.7492    379.39  |         | Q        |         |  V      |
    23+35     821.3602    379.11  |         | Q        |         |  V      |
    23+40     823.9692    378.83  |         | Q        |         |  V      |
    23+45     826.5764    378.56  |         | Q        |         |  V      |
    23+50     829.1818    378.30  |         | Q        |         |   V     |
    23+55     831.7853    378.04  |         | Q        |         |   V     |
    24+ 0     834.3872    377.79  |         | Q        |         |   V     |
-----------------------------------------------------------------------
```

BALDY MESA LINE A-03
POST-DEVELOPED CHANNEL FLOW
<u>FROM NODE 3- 4</u>

THE ATTACHED CALCULATIONS SHOWS
OFFSITE TRIBUTARY AREAS
<u>FOR THE 100-YEAR,</u>
<u>24-HOURS UNIT HYDROGRAPH</u>

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  03/02/17

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

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


Program License Serial Number 4070

---------------------------------------------------------------------
100-YEAR, 24-HOURS UNIT HYDROGRAPH, POST DEVELOPED – LINE A-01
TRACT NO. 16397, CITY OF VICTORVILLE
DOWNSTREAM TRIBUTARY AREAS FROM AQUADUCT NODE 3(NORTHEAST)
FILE: 16397UNITHYDNODE3.OUT
--------------------------------------------------------------------

      Storm Event Year = 100

      Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
     Sub-Area        Duration        Isohyetal
     (Ac.)            (hours)         (In)
Rainfall data for year 100
        597.00            1           1.23
--------------------------------------------------------------------
Rainfall data for year 100
        597.00            6           2.78
--------------------------------------------------------------------
Rainfall data for year 100
        597.00           24           5.92
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      52.0        597.00      1.000     0.785    0.700    0.550

Area-averaged adjusted loss rate Fm (In/Hr) =  0.550

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
   417.90   0.700         32.0      52.0       9.23     0.211
   179.10   0.300         98.0      98.0       0.20     0.960

Area-averaged catchment yield fraction, Y =  0.435
Area-averaged low loss fraction, Yb =  0.565
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =   11458.00(Ft.)
Length from concentration point to centroid =    5840.00(Ft.)
Elevation difference along watercourse =     185.00(Ft.)
Mannings friction factor along watercourse =  0.035
Watershed area =     597.00(Ac.)
Catchment Lag time =   0.503 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 16.5530
Hydrograph baseflow =  1837.00(CFS)
Average maximum watershed loss rate(Fm) =  0.550(In/Hr)
Average low loss rate fraction (Yb) = 0.565 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.584(In)
Computed peak 30-minute rainfall =  0.999(In)
Specified peak 1-hour rainfall =  1.230(In)
Computed peak 3-hour rainfall =  2.028(In)
Specified peak 6-hour rainfall =  2.780(In)
Specified peak 24-hour rainfall =  5.920(In)


Rainfall depth area reduction factors:
Using a total area of     597.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.972     Adjusted rainfall =  0.567(In)
30-minute factor = 0.972    Adjusted rainfall =  0.971(In)
1-hour factor = 0.972       Adjusted rainfall =  1.196(In)
3-hour factor = 0.996       Adjusted rainfall =  2.021(In)
6-hour factor = 0.998       Adjusted rainfall =  2.775(In)
24-hour factor = 0.999      Adjusted rainfall =  5.916(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
           (K =      7219.97 (CFS))
```

1	0.768	55.451
2	3.330	184.983
3	7.656	312.313
4	15.739	583.639
5	30.470	1063.541
6	44.120	985.529
7	53.901	706.151
8	60.853	501.934
9	66.007	372.176
10	70.229	304.785
11	73.725	252.407
12	76.673	212.872
13	79.210	183.180
14	81.364	155.523
15	83.222	134.112
16	84.930	123.304
17	86.500	113.378
18	87.874	99.206
19	89.071	86.431
20	90.063	71.570
21	91.003	67.887
22	91.881	63.426
23	92.673	57.180
24	93.416	53.609
25	94.086	48.418
26	94.651	40.796
27	95.214	40.634
28	95.733	37.462
29	96.166	31.238
30	96.596	31.073
31	96.985	28.060
32	97.286	21.715
33	97.583	21.512
34	97.842	18.653
35	98.011	12.197
36	98.176	11.951
37	98.351	12.628
38	98.549	14.268
39	98.747	14.341
40	98.946	14.341
41	99.145	14.341
42	99.343	14.341
43	99.518	12.602
44	99.625	7.756
45	99.729	7.469
46	99.832	7.469
47	99.936	7.469
48	100.000	4.642

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5673	0.5673
2	0.6984	0.1311
3	0.7888	0.0903

274	5.7568	0.0115
275	5.7682	0.0115
276	5.7797	0.0114
277	5.7911	0.0114
278	5.8025	0.0114
279	5.8139	0.0114
280	5.8253	0.0114
281	5.8366	0.0114
282	5.8480	0.0113
283	5.8593	0.0113
284	5.8706	0.0113
285	5.8819	0.0113
286	5.8931	0.0113
287	5.9044	0.0112
288	5.9156	0.0112

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0112	0.0063	0.0049
2	0.0112	0.0063	0.0049
3	0.0113	0.0064	0.0049
4	0.0113	0.0064	0.0049
5	0.0113	0.0064	0.0049
6	0.0114	0.0064	0.0049
7	0.0114	0.0064	0.0050
8	0.0114	0.0064	0.0050
9	0.0114	0.0065	0.0050
10	0.0115	0.0065	0.0050
11	0.0115	0.0065	0.0050
12	0.0115	0.0065	0.0050
13	0.0116	0.0065	0.0050
14	0.0116	0.0065	0.0050
15	0.0116	0.0066	0.0051
16	0.0116	0.0066	0.0051
17	0.0117	0.0066	0.0051
18	0.0117	0.0066	0.0051
19	0.0117	0.0066	0.0051
20	0.0118	0.0066	0.0051
21	0.0118	0.0067	0.0051
22	0.0118	0.0067	0.0051
23	0.0119	0.0067	0.0052
24	0.0119	0.0067	0.0052
25	0.0119	0.0067	0.0052
26	0.0119	0.0067	0.0052
27	0.0120	0.0068	0.0052
28	0.0120	0.0068	0.0052
29	0.0121	0.0068	0.0053
30	0.0121	0.0068	0.0053
31	0.0121	0.0068	0.0053
32	0.0121	0.0069	0.0053
33	0.0122	0.0069	0.0053
34	0.0122	0.0069	0.0053

251	0.0141	0.0079	0.0061
252	0.0140	0.0079	0.0061
253	0.0139	0.0078	0.0060
254	0.0138	0.0078	0.0060
255	0.0137	0.0077	0.0059
256	0.0136	0.0077	0.0059
257	0.0135	0.0076	0.0059
258	0.0134	0.0075	0.0058
259	0.0133	0.0075	0.0058
260	0.0132	0.0074	0.0057
261	0.0131	0.0074	0.0057
262	0.0130	0.0073	0.0057
263	0.0129	0.0073	0.0056
264	0.0128	0.0073	0.0056
265	0.0128	0.0072	0.0056
266	0.0127	0.0072	0.0055
267	0.0126	0.0071	0.0055
268	0.0125	0.0071	0.0055
269	0.0125	0.0070	0.0054
270	0.0124	0.0070	0.0054
271	0.0123	0.0070	0.0054
272	0.0122	0.0069	0.0053
273	0.0122	0.0069	0.0053
274	0.0121	0.0068	0.0053
275	0.0120	0.0068	0.0052
276	0.0120	0.0068	0.0052
277	0.0119	0.0067	0.0052
278	0.0118	0.0067	0.0052
279	0.0118	0.0067	0.0051
280	0.0117	0.0066	0.0051
281	0.0117	0.0066	0.0051
282	0.0116	0.0065	0.0051
283	0.0115	0.0065	0.0050
284	0.0115	0.0065	0.0050
285	0.0114	0.0065	0.0050
286	0.0114	0.0064	0.0050
287	0.0113	0.0064	0.0049
288	0.0113	0.0064	0.0049

```
--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      3.03(In)
Total effective rainfall =      2.88(In)
Peak flow rate in flood hydrograph =   2594.26(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

24 - H O U R   S T O R M

R u n o f f   H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0     650.0    1300.0    1950.0    2600.0
--------------------------------------------------------------------
  0+ 5      12.6534   1837.27  V         |         |       Q |         |
```

```
0+10      25.3130   1838.18  V         |         |       Q |         |
0+15      37.9831   1839.70  V         |         |       Q |         |
0+20      50.6730   1842.56  V         |         |       Q |         |
0+25      63.3987   1847.77  V         |         |       Q |         |
0+30      76.1577   1852.61  V         |         |       Q |         |
0+35      88.9408   1856.10  V         |         |       Q |         |
0+40     101.7410   1858.60  V         |         |       Q |         |
0+45     114.5542   1860.47  |V        |         |       Q |         |
0+50     127.3780   1862.01  |V        |         |       Q |         |
0+55     140.2107   1863.31  |V        |         |       Q |         |
1+ 0     153.0510   1864.41  |V        |         |       Q |         |
1+ 5     165.8979   1865.38  |V        |         |       Q |         |
1+10     178.7506   1866.20  |V        |         |       Q |         |
1+15     191.6082   1866.93  |V        |         |       Q |         |
1+20     204.4706   1867.61  |V        |         |       Q |         |
1+25     217.3372   1868.24  |V        |         |       Q |         |
1+30     230.2078   1868.80  | V       |         |       Q |         |
1+35     243.0817   1869.30  | V       |         |       Q |         |
1+40     255.9587   1869.73  | V       |         |       Q |         |
1+45     268.8385   1870.15  | V       |         |       Q |         |
1+50     281.7211   1870.54  | V       |         |       Q |         |
1+55     294.6061   1870.91  | V       |         |       Q |         |
2+ 0     307.4936   1871.26  | V       |         |       Q |         |
2+ 5     320.3833   1871.58  | V       |         |       Q |         |
2+10     333.2750   1871.87  |  V      |         |       Q |         |
2+15     346.1687   1872.16  |  V      |         |       Q |         |
2+20     359.0642   1872.44  |  V      |         |       Q |         |
2+25     371.9615   1872.69  |  V      |         |       Q |         |
2+30     384.8605   1872.93  |  V      |         |       Q |         |
2+35     397.7611   1873.17  |  V      |         |       Q |         |
2+40     410.6631   1873.37  |  V      |         |       Q |         |
2+45     423.5665   1873.57  |  V      |         |       Q |         |
2+50     436.4712   1873.76  |  V      |         |       Q |         |
2+55     449.3770   1873.92  |   V     |         |       Q |         |
3+ 0     462.2839   1874.08  |   V     |         |       Q |         |
3+ 5     475.1919   1874.25  |   V     |         |       Q |         |
3+10     488.1011   1874.42  |   V     |         |       Q |         |
3+15     501.0116   1874.60  |   V     |         |       Q |         |
3+20     513.9232   1874.77  |   V     |         |       Q |         |
3+25     526.8361   1874.95  |   V     |         |       Q |         |
3+30     539.7502   1875.13  |   V     |         |       Q |         |
3+35     552.6654   1875.30  |    V    |         |       Q |         |
3+40     565.5817   1875.44  |    V    |         |       Q |         |
3+45     578.4990   1875.59  |    V    |         |       Q |         |
3+50     591.4174   1875.74  |    V    |         |       Q |         |
3+55     604.3367   1875.89  |    V    |         |       Q |         |
4+ 0     617.2571   1876.03  |    V    |         |       Q |         |
4+ 5     630.1782   1876.15  |    V    |         |       Q |         |
4+10     643.1001   1876.26  |    V    |         |       Q |         |
4+15     656.0229   1876.38  |    V    |         |       Q |         |
4+20     668.9464   1876.50  |     V   |         |       Q |         |
4+25     681.8708   1876.62  |     V   |         |       Q |         |
4+30     694.7961   1876.74  |     V   |         |       Q |         |
4+35     707.7221   1876.87  |     V   |         |       Q |         |
```

```
4+40      720.6491  1876.99  |     V   |         |       Q |         |
4+45      733.5769  1877.12  |     V   |         |       Q |         |
4+50      746.5056  1877.24  |     V   |         |       Q |         |
4+55      759.4351  1877.37  |     V   |         |       Q |         |
5+ 0      772.3656  1877.50  |      V  |         |       Q |         |
5+ 5      785.2969  1877.63  |      V  |         |       Q |         |
5+10      798.2292  1877.76  |      V  |         |       Q |         |
5+15      811.1624  1877.90  |      V  |         |       Q |         |
5+20      824.0965  1878.03  |      V  |         |       Q |         |
5+25      837.0316  1878.17  |      V  |         |       Q |         |
5+30      849.9676  1878.31  |      V  |         |       Q |         |
5+35      862.9045  1878.45  |      V  |         |       Q |         |
5+40      875.8425  1878.59  |      V  |         |       Q |         |
5+45      888.7814  1878.73  |       V |         |       Q |         |
5+50      901.7213  1878.87  |       V |         |       Q |         |
5+55      914.6622  1879.02  |       V |         |       Q |         |
6+ 0      927.6042  1879.17  |       V |         |       Q |         |
6+ 5      940.5471  1879.32  |       V |         |       Q |         |
6+10      953.4911  1879.47  |       V |         |       Q |         |
6+15      966.4362  1879.62  |       V |         |       Q |         |
6+20      979.3823  1879.77  |       V |         |       Q |         |
6+25      992.3294  1879.93  |        V|         |       Q |         |
6+30     1005.2777  1880.09  |        V|         |       Q |         |
6+35     1018.2271  1880.25  |        V|         |       Q |         |
6+40     1031.1776  1880.41  |        V|         |       Q |         |
6+45     1044.1292  1880.57  |        V|         |       Q |         |
6+50     1057.0819  1880.74  |        V|         |       Q |         |
6+55     1070.0358  1880.91  |        V|         |       Q |         |
7+ 0     1082.9909  1881.08  |        V|         |       Q |         |
7+ 5     1095.9472  1881.25  |         V         |       Q |         |
7+10     1108.9046  1881.42  |         V         |       Q |         |
7+15     1121.8633  1881.60  |         V         |       Q |         |
7+20     1134.8232  1881.78  |         V         |       Q |         |
7+25     1147.7843  1881.96  |         V         |       Q |         |
7+30     1160.7467  1882.14  |         V         |       Q |         |
7+35     1173.7104  1882.33  |         V         |       Q |         |
7+40     1186.6754  1882.52  |         V         |       Q |         |
7+45     1199.6417  1882.71  |         V         |       Q |         |
7+50     1212.6093  1882.90  |         |V        |       Q |         |
7+55     1225.5783  1883.10  |         |V        |       Q |         |
8+ 0     1238.5486  1883.29  |         |V        |       Q |         |
8+ 5     1251.5204  1883.50  |         |V        |       Q |         |
8+10     1264.4935  1883.70  |         |V        |       Q |         |
8+15     1277.4681  1883.91  |         |V        |       Q |         |
8+20     1290.4441  1884.12  |         |V        |       Q |         |
8+25     1303.4216  1884.33  |         |V        |       Q |         |
8+30     1316.4005  1884.55  |         | V       |       Q |         |
8+35     1329.3810  1884.77  |         | V       |       Q |         |
8+40     1342.3630  1884.99  |         | V       |       Q |         |
8+45     1355.3466  1885.22  |         | V       |        Q|         |
8+50     1368.3318  1885.44  |         | V       |        Q|         |
8+55     1381.3185  1885.68  |         | V       |        Q|         |
9+ 0     1394.3069  1885.91  |         | V       |        Q|         |
9+ 5     1407.2970  1886.16  |         | V       |        Q|         |
```

```
 9+10    1420.2887   1886.40  |         | V       |        Q|         |
 9+15    1433.2822   1886.65  |         |  V      |        Q|         |
 9+20    1446.2774   1886.90  |         |  V      |        Q|         |
 9+25    1459.2743   1887.16  |         |  V      |        Q|         |
 9+30    1472.2731   1887.42  |         |  V      |        Q|         |
 9+35    1485.2737   1887.69  |         |  V      |        Q|         |
 9+40    1498.2761   1887.95  |         |  V      |        Q|         |
 9+45    1511.2804   1888.23  |         |  V      |        Q|         |
 9+50    1524.2867   1888.51  |         |  V      |        Q|         |
 9+55    1537.2949   1888.79  |         |   V     |        Q|         |
10+ 0    1550.3051   1889.08  |         |   V     |        Q|         |
10+ 5    1563.3174   1889.38  |         |   V     |        Q|         |
10+10    1576.3317   1889.68  |         |   V     |        Q|         |
10+15    1589.3481   1889.99  |         |   V     |        Q|         |
10+20    1602.3667   1890.30  |         |   V     |        Q|         |
10+25    1615.3874   1890.61  |         |   V     |        Q|         |
10+30    1628.4104   1890.94  |         |   V     |        Q|         |
10+35    1641.4357   1891.27  |         |   V     |        Q|         |
10+40    1654.4633   1891.60  |         |    V    |        Q|         |
10+45    1667.4932   1891.95  |         |    V    |        Q|         |
10+50    1680.5256   1892.30  |         |    V    |        Q|         |
10+55    1693.5604   1892.66  |         |    V    |        Q|         |
11+ 0    1706.5978   1893.02  |         |    V    |        Q|         |
11+ 5    1719.6377   1893.40  |         |    V    |        Q|         |
11+10    1732.6803   1893.78  |         |    V    |        Q|         |
11+15    1745.7255   1894.17  |         |    V    |        Q|         |
11+20    1758.7735   1894.57  |         |     V   |        Q|         |
11+25    1771.8244   1894.98  |         |     V   |        Q|         |
11+30    1784.8780   1895.40  |         |     V   |        Q|         |
11+35    1797.9347   1895.83  |         |     V   |        Q|         |
11+40    1810.9943   1896.26  |         |     V   |        Q|         |
11+45    1824.0571   1896.71  |         |     V   |        Q|         |
11+50    1837.1230   1897.17  |         |     V   |        Q|         |
11+55    1850.1922   1897.64  |         |     V   |        Q|         |
12+ 0    1863.2647   1898.13  |         |      V  |        Q|         |
12+ 5    1876.3400   1898.54  |         |      V  |        Q|         |
12+10    1889.4170   1898.78  |         |      V  |        Q|         |
12+15    1902.4944   1898.84  |         |      V  |        Q|         |
12+20    1915.5695   1898.51  |         |      V  |        Q|         |
12+25    1928.6376   1897.48  |         |      V  |        Q|         |
12+30    1941.6995   1896.59  |         |      V  |        Q|         |
12+35    1954.7582   1896.13  |         |      V  |        Q|         |
12+40    1967.8160   1895.99  |         |      V  |        Q|         |
12+45    1980.8743   1896.06  |         |       V |        Q|         |
12+50    1993.9339   1896.26  |         |       V |        Q|         |
12+55    2006.9956   1896.55  |         |       V |        Q|         |
13+ 0    2020.0598   1896.93  |         |       V |        Q|         |
13+ 5    2033.1271   1897.38  |         |       V |        Q|         |
13+10    2046.1980   1897.88  |         |       V |        Q|         |
13+15    2059.2728   1898.46  |         |       V |        Q|         |
13+20    2072.3518   1899.07  |         |       V |        Q|         |
13+25    2085.4354   1899.74  |         |        V|        Q|         |
13+30    2098.5240   1900.46  |         |        V|        Q|         |
13+35    2111.6179   1901.24  |         |        V|        Q|         |
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13+40    2124.7176   1902.07  |         |        V|        Q|         |
13+45    2137.8234   1902.96  |         |        V|        Q|         |
13+50    2150.9356   1903.89  |         |        V|        Q|         |
13+55    2164.0547   1904.89  |         |        V|        Q|         |
14+ 0    2177.1809   1905.94  |         |        V|        Q|         |
14+ 5    2190.3152   1907.09  |         |        V|        Q|         |
14+10    2203.4582   1908.36  |         |         V        Q|         |
14+15    2216.6110   1909.79  |         |         V        Q|         |
14+20    2229.7749   1911.41  |         |         V        Q|         |
14+25    2242.9524   1913.37  |         |         V        Q|         |
14+30    2256.1437   1915.37  |         |         V        Q|         |
14+35    2269.3487   1917.36  |         |         V        Q|         |
14+40    2282.5674   1919.35  |         |         V        Q|         |
14+45    2295.8003   1921.43  |         |         V        Q|         |
14+50    2309.0482   1923.59  |         |         |V       Q|         |
14+55    2322.3121   1925.92  |         |         |V       Q|         |
15+ 0    2335.5929   1928.38  |         |         |V       Q|         |
15+ 5    2348.8923   1931.07  |         |         |V       Q|         |
15+10    2362.2115   1933.95  |         |         |V       Q|         |
15+15    2375.5526   1937.13  |         |         |V       Q|         |
15+20    2388.9177   1940.61  |         |         |V       Q|         |
15+25    2402.3069   1944.10  |         |         |V       Q|         |
15+30    2415.7160   1947.01  |         |         | V      Q|         |
15+35    2429.1427   1949.56  |         |         | V      Q|         |
15+40    2442.5770   1950.66  |         |         | V       Q         |
15+45    2456.0001   1949.03  |         |         | V      Q|         |
15+50    2469.4242   1949.18  |         |         | V      Q|         |
15+55    2482.8816   1954.01  |         |         | V       Q         |
16+ 0    2496.4241   1966.38  |         |         | V       Q         |
16+ 5    2510.2895   2013.25  |         |         | V       Q         |
16+10    2524.7536   2100.19  |         |         |  V      | Q       |
16+15    2539.8812   2196.52  |         |         |  V      |  Q      |
16+20    2556.1557   2363.06  |         |         |  V      |     Q   |
16+25    2574.0224   2594.26  |         |         |  V      |        Q|
16+30    2591.4943   2536.92  |         |         |  V      |        Q|
16+35    2607.8746   2378.43  |         |         |  V      |     Q   |
16+40    2623.4413   2260.28  |         |         |  V      |   Q     |
16+45    2638.4993   2186.42  |         |         |   V     |  Q      |
16+50    2653.2724   2145.04  |         |         |   V     |  Q      |
16+55    2667.8128   2111.27  |         |         |   V     | Q       |
17+ 0    2682.1658   2084.06  |         |         |   V     | Q       |
17+ 5    2696.3663   2061.91  |         |         |   V     |Q        |
17+10    2710.4267   2041.57  |         |         |   V     |Q        |
17+15    2724.3743   2025.19  |         |         |   V     |Q        |
17+20    2738.2464   2014.22  |         |         |   V     Q         |
17+25    2752.0453   2003.60  |         |         |    V    Q         |
17+30    2765.7591   1991.24  |         |         |    V    Q         |
17+35    2779.3952   1979.96  |         |         |    V    Q         |
17+40    2792.9535   1968.67  |         |         |    V    Q         |
17+45    2806.4739   1963.17  |         |         |    V    Q         |
17+50    2819.9553   1957.50  |         |         |    V    Q         |
17+55    2833.3939   1951.27  |         |         |    V    Q         |
18+ 0    2846.7987   1946.38  |         |         |    V   Q|         |
18+ 5    2860.1661   1940.94  |         |         |     V  Q|         |
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18+10	2873.4927	1935.03			V Q	
18+15	2886.8048	1932.91			V Q	
18+20	2900.0955	1929.81			V Q	
18+25	2913.3619	1926.27			V Q	
18+30	2926.6224	1925.43			V Q	
18+35	2939.8650	1922.83			V Q	
18+40	2953.0788	1918.65			V Q	
18+45	2966.2823	1917.14			V Q	
18+50	2979.4661	1914.29			V Q	
18+55	2992.6207	1910.05			V Q	
19+ 0	3005.7678	1908.95			V Q	
19+ 5	3018.9113	1908.45			V Q	
19+10	3032.0542	1908.35			V Q	
19+15	3045.1909	1907.45			V Q	
19+20	3058.3212	1906.52			V Q	
19+25	3071.4452	1905.61			VQ	
19+30	3084.5620	1904.56			VQ	
19+35	3097.6650	1902.55			VQ	
19+40	3110.7454	1899.27			VQ	
19+45	3123.8188	1898.26			VQ	
19+50	3136.8863	1897.40			VQ	
19+55	3149.9467	1896.38			VQ	
20+ 0	3162.9904	1893.94			VQ	
20+ 5	3176.0130	1890.88			VQ	
20+10	3189.0306	1890.16			Q	
20+15	3202.0438	1889.52			Q	
20+20	3215.0529	1888.92			Q	
20+25	3228.0578	1888.30			Q	
20+30	3241.0586	1887.73			Q	
20+35	3254.0558	1887.18			Q	
20+40	3267.0492	1886.65			Q	
20+45	3280.0392	1886.15			Q	
20+50	3293.0258	1885.66			QV	
20+55	3306.0092	1885.18			QV	
21+ 0	3318.9893	1884.72			Q V	
21+ 5	3331.9664	1884.28			Q V	
21+10	3344.9406	1883.86			Q V	
21+15	3357.9120	1883.45			Q V	
21+20	3370.8807	1883.05			Q V	
21+25	3383.8468	1882.67			Q V	
21+30	3396.8103	1882.30			Q	V
21+35	3409.7713	1881.94			Q	V
21+40	3422.7299	1881.58			Q	V
21+45	3435.6860	1881.23			Q	V
21+50	3448.6398	1880.90			Q	V
21+55	3461.5914	1880.57			Q	V
22+ 0	3474.5407	1880.24			Q	V
22+ 5	3487.4878	1879.92			Q	V
22+10	3500.4327	1879.60			Q	V
22+15	3513.3755	1879.29			Q	V
22+20	3526.3163	1878.99			Q	V
22+25	3539.2550	1878.70			Q	V
22+30	3552.1917	1878.41			Q	V
22+35	3565.1265	1878.13			Q	V

22+40	3578.0594	1877.86			Q	V
22+45	3590.9904	1877.59			Q	V
22+50	3603.9197	1877.33			Q	V
22+55	3616.8471	1877.07			Q	V
23+ 0	3629.7729	1876.82			Q	V
23+ 5	3642.6969	1876.57			Q	V
23+10	3655.6193	1876.33			Q	V
23+15	3668.5400	1876.09			Q	V
23+20	3681.4592	1875.86			Q	V
23+25	3694.3767	1875.63			Q	V
23+30	3707.2928	1875.41			Q	V
23+35	3720.2073	1875.19			Q	V
23+40	3733.1203	1874.97			Q	V
23+45	3746.0319	1874.76			Q	V
23+50	3758.9420	1874.55			Q	V
23+55	3771.8508	1874.35			Q	V
24+ 0	3784.7581	1874.15			Q	V

BALDY MESA LINE A-02 & A-01
POST-DEVELOPED CHANNEL FLOW
FROM NODE 13- 4

THE ATTACHED CALCULATIONS SHOWS
OFFSITE TRIBUTARY AREAS
FOR THE 100-YEAR,
24-HOURS UNIT HYDROGRAPH

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 03/02/17

++

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

Program License Serial Number 4070

100-YEAR, 24-HOURS UNIT HYDROGRAPH, POST DEVELOPED – LINE A-01
TRACT NO. 16397, CITY OF VICTORVILLE
DOWNSTREAM TRIBUTARY AREAS FROM AQUADUCT NODE 13(NORTHEAST)
FILE: 16397UNITHYDNODE13.OUT

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
848.00	1	1.23
Rainfall data for year 100		
848.00	6	2.78
Rainfall data for year 100		
848.00	24	5.92

++

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

```
SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      52.0        848.00      1.000     0.785    0.700    0.550

Area-averaged adjusted loss rate Fm (In/Hr) =  0.550

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
   593.60   0.700         32.0      52.0       9.23     0.211
   254.40   0.300         98.0      98.0       0.20     0.960

Area-averaged catchment yield fraction, Y =  0.435
Area-averaged low loss fraction, Yb =  0.565
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =   11917.00(Ft.)
Length from concentration point to centroid =    4897.00(Ft.)
Elevation difference along watercourse =     187.00(Ft.)
Mannings friction factor along watercourse =  0.035
Watershed area =     848.00(Ac.)
Catchment Lag time =   0.481 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 17.3422
Hydrograph baseflow =  3597.00(CFS)
Average maximum watershed loss rate(Fm) =  0.550(In/Hr)
Average low loss rate fraction (Yb) = 0.565 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.584(In)
Computed peak 30-minute rainfall =  0.999(In)
Specified peak 1-hour rainfall =  1.230(In)
Computed peak 3-hour rainfall =  2.028(In)
Specified peak 6-hour rainfall =  2.780(In)
Specified peak 24-hour rainfall =  5.920(In)


Rainfall depth area reduction factors:
Using a total area of     848.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.960     Adjusted rainfall =  0.560(In)
30-minute factor = 0.960    Adjusted rainfall =  0.959(In)
1-hour factor = 0.960       Adjusted rainfall =  1.181(In)
3-hour factor = 0.995       Adjusted rainfall =  2.018(In)
6-hour factor = 0.997       Adjusted rainfall =  2.773(In)
24-hour factor = 0.999      Adjusted rainfall =  5.914(In)
---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values           ((CFS))
---------------------------------------------------------------------
           (K =     10255.50 (CFS))
```

1	0.817	83.801
2	3.587	284.017
3	8.324	485.800
4	17.869	978.911
5	33.748	1628.535
6	46.984	1357.346
7	56.306	956.076
8	62.852	671.254
9	67.790	506.486
10	71.903	421.740
11	75.244	342.695
12	78.137	296.663
13	80.514	243.832
14	82.585	212.335
15	84.422	188.438
16	86.102	172.293
17	87.592	152.740
18	88.894	133.540
19	89.947	108.061
20	90.938	101.548
21	91.862	94.838
22	92.692	85.101
23	93.469	79.638
24	94.156	70.484
25	94.746	60.508
26	95.335	60.451
27	95.849	52.640
28	96.300	46.242
29	96.749	46.040
30	97.109	36.932
31	97.421	32.013
32	97.727	31.434
33	97.936	21.418
34	98.110	17.785
35	98.286	18.073
36	98.488	20.707
37	98.696	21.342
38	98.904	21.342
39	99.112	21.342
40	99.320	21.342
41	99.508	19.275
42	99.623	11.794
43	99.732	11.116
44	99.840	11.116
45	100.000	5.558

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5604	0.5604
2	0.6900	0.1295
3	0.7792	0.0892
4	0.8495	0.0702
5	0.9083	0.0588
6	0.9594	0.0511

277	5.7892	0.0114
278	5.8006	0.0114
279	5.8120	0.0114
280	5.8234	0.0114
281	5.8347	0.0114
282	5.8461	0.0113
283	5.8574	0.0113
284	5.8687	0.0113
285	5.8800	0.0113
286	5.8912	0.0113
287	5.9025	0.0112
288	5.9137	0.0112

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0112	0.0063	0.0049
2	0.0112	0.0063	0.0049
3	0.0113	0.0064	0.0049
4	0.0113	0.0064	0.0049
5	0.0113	0.0064	0.0049
6	0.0114	0.0064	0.0049
7	0.0114	0.0064	0.0050
8	0.0114	0.0064	0.0050
9	0.0114	0.0065	0.0050
10	0.0115	0.0065	0.0050
11	0.0115	0.0065	0.0050
12	0.0115	0.0065	0.0050
13	0.0116	0.0065	0.0050
14	0.0116	0.0065	0.0050
15	0.0116	0.0066	0.0051
16	0.0116	0.0066	0.0051
17	0.0117	0.0066	0.0051
18	0.0117	0.0066	0.0051
19	0.0117	0.0066	0.0051
20	0.0118	0.0066	0.0051
21	0.0118	0.0067	0.0051
22	0.0118	0.0067	0.0051
23	0.0119	0.0067	0.0052
24	0.0119	0.0067	0.0052
25	0.0119	0.0067	0.0052
26	0.0120	0.0067	0.0052
27	0.0120	0.0068	0.0052
28	0.0120	0.0068	0.0052
29	0.0121	0.0068	0.0053
30	0.0121	0.0068	0.0053
31	0.0121	0.0068	0.0053
32	0.0122	0.0069	0.0053
33	0.0122	0.0069	0.0053
34	0.0122	0.0069	0.0053
35	0.0123	0.0069	0.0053
36	0.0123	0.0069	0.0054
37	0.0123	0.0070	0.0054

38	0.0124	0.0070	0.0054
39	0.0124	0.0070	0.0054
40	0.0124	0.0070	0.0054
41	0.0125	0.0070	0.0054
42	0.0125	0.0071	0.0054
43	0.0126	0.0071	0.0055
44	0.0126	0.0071	0.0055
45	0.0126	0.0071	0.0055
46	0.0127	0.0072	0.0055
47	0.0127	0.0072	0.0055
48	0.0127	0.0072	0.0055
49	0.0128	0.0072	0.0056
50	0.0128	0.0072	0.0056
51	0.0129	0.0073	0.0056
52	0.0129	0.0073	0.0056
53	0.0130	0.0073	0.0056
54	0.0130	0.0073	0.0057
55	0.0130	0.0074	0.0057
56	0.0131	0.0074	0.0057
57	0.0131	0.0074	0.0057
58	0.0132	0.0074	0.0057
59	0.0132	0.0075	0.0058
60	0.0133	0.0075	0.0058
61	0.0133	0.0075	0.0058
62	0.0133	0.0075	0.0058
63	0.0134	0.0076	0.0058
64	0.0134	0.0076	0.0059
65	0.0135	0.0076	0.0059
66	0.0135	0.0076	0.0059
67	0.0136	0.0077	0.0059
68	0.0136	0.0077	0.0059
69	0.0137	0.0077	0.0060
70	0.0137	0.0078	0.0060
71	0.0138	0.0078	0.0060
72	0.0138	0.0078	0.0060
73	0.0139	0.0078	0.0061
74	0.0139	0.0079	0.0061
75	0.0140	0.0079	0.0061
76	0.0140	0.0079	0.0061
77	0.0141	0.0080	0.0061
78	0.0142	0.0080	0.0062
79	0.0142	0.0080	0.0062
80	0.0143	0.0081	0.0062
81	0.0143	0.0081	0.0062
82	0.0144	0.0081	0.0063
83	0.0145	0.0082	0.0063
84	0.0145	0.0082	0.0063
85	0.0146	0.0082	0.0064
86	0.0146	0.0083	0.0064
87	0.0147	0.0083	0.0064
88	0.0148	0.0083	0.0064
89	0.0148	0.0084	0.0065
90	0.0149	0.0084	0.0065
91	0.0150	0.0085	0.0065

92	0.0150	0.0085	0.0065
93	0.0151	0.0085	0.0066
94	0.0152	0.0086	0.0066
95	0.0152	0.0086	0.0066
96	0.0153	0.0086	0.0067
97	0.0154	0.0087	0.0067
98	0.0154	0.0087	0.0067
99	0.0155	0.0088	0.0068
100	0.0156	0.0088	0.0068
101	0.0157	0.0089	0.0068
102	0.0157	0.0089	0.0069
103	0.0158	0.0089	0.0069
104	0.0159	0.0090	0.0069
105	0.0160	0.0090	0.0070
106	0.0161	0.0091	0.0070
107	0.0162	0.0091	0.0070
108	0.0162	0.0092	0.0071
109	0.0164	0.0092	0.0071
110	0.0164	0.0093	0.0071
111	0.0165	0.0093	0.0072
112	0.0166	0.0094	0.0072
113	0.0167	0.0094	0.0073
114	0.0168	0.0095	0.0073
115	0.0169	0.0095	0.0074
116	0.0170	0.0096	0.0074
117	0.0171	0.0097	0.0075
118	0.0172	0.0097	0.0075
119	0.0173	0.0098	0.0075
120	0.0174	0.0098	0.0076
121	0.0175	0.0099	0.0076
122	0.0176	0.0099	0.0077
123	0.0178	0.0100	0.0077
124	0.0178	0.0101	0.0078
125	0.0180	0.0102	0.0078
126	0.0181	0.0102	0.0079
127	0.0183	0.0103	0.0079
128	0.0183	0.0104	0.0080
129	0.0185	0.0105	0.0081
130	0.0186	0.0105	0.0081
131	0.0188	0.0106	0.0082
132	0.0189	0.0107	0.0082
133	0.0191	0.0108	0.0083
134	0.0192	0.0108	0.0083
135	0.0194	0.0109	0.0084
136	0.0195	0.0110	0.0085
137	0.0197	0.0111	0.0086
138	0.0198	0.0112	0.0086
139	0.0200	0.0113	0.0087
140	0.0201	0.0114	0.0088
141	0.0204	0.0115	0.0089
142	0.0205	0.0116	0.0089
143	0.0207	0.0117	0.0090
144	0.0208	0.0118	0.0091
145	0.0177	0.0100	0.0077

146	0.0179	0.0101	0.0078
147	0.0181	0.0102	0.0079
148	0.0183	0.0103	0.0080
149	0.0186	0.0105	0.0081
150	0.0187	0.0106	0.0082
151	0.0191	0.0108	0.0083
152	0.0192	0.0109	0.0084
153	0.0196	0.0111	0.0085
154	0.0198	0.0112	0.0086
155	0.0201	0.0114	0.0088
156	0.0203	0.0115	0.0089
157	0.0207	0.0117	0.0090
158	0.0210	0.0118	0.0091
159	0.0214	0.0121	0.0093
160	0.0216	0.0122	0.0094
161	0.0221	0.0125	0.0096
162	0.0224	0.0126	0.0097
163	0.0229	0.0129	0.0100
164	0.0232	0.0131	0.0101
165	0.0238	0.0134	0.0104
166	0.0241	0.0136	0.0105
167	0.0248	0.0140	0.0108
168	0.0251	0.0142	0.0109
169	0.0275	0.0155	0.0120
170	0.0279	0.0158	0.0122
171	0.0288	0.0163	0.0125
172	0.0293	0.0165	0.0127
173	0.0303	0.0171	0.0132
174	0.0308	0.0174	0.0134
175	0.0320	0.0180	0.0139
176	0.0326	0.0184	0.0142
177	0.0340	0.0192	0.0148
178	0.0348	0.0196	0.0151
179	0.0365	0.0206	0.0159
180	0.0374	0.0211	0.0163
181	0.0395	0.0223	0.0172
182	0.0408	0.0230	0.0177
183	0.0435	0.0246	0.0190
184	0.0452	0.0255	0.0197
185	0.0304	0.0172	0.0133
186	0.0324	0.0183	0.0141
187	0.0376	0.0212	0.0164
188	0.0411	0.0232	0.0179
189	0.0511	0.0288	0.0222
190	0.0588	0.0332	0.0256
191	0.0892	0.0458	0.0434
192	0.1295	0.0458	0.0837
193	0.5604	0.0458	0.5146
194	0.0702	0.0397	0.0306
195	0.0454	0.0256	0.0198
196	0.0348	0.0196	0.0151
197	0.0470	0.0265	0.0205
198	0.0421	0.0238	0.0183
199	0.0384	0.0217	0.0167

200	0.0356	0.0201	0.0155
201	0.0333	0.0188	0.0145
202	0.0314	0.0177	0.0137
203	0.0297	0.0168	0.0130
204	0.0283	0.0160	0.0123
205	0.0255	0.0144	0.0111
206	0.0244	0.0138	0.0106
207	0.0235	0.0133	0.0102
208	0.0226	0.0128	0.0099
209	0.0219	0.0123	0.0095
210	0.0212	0.0120	0.0092
211	0.0205	0.0116	0.0089
212	0.0199	0.0113	0.0087
213	0.0194	0.0110	0.0084
214	0.0189	0.0107	0.0082
215	0.0184	0.0104	0.0080
216	0.0180	0.0102	0.0078
217	0.0210	0.0118	0.0091
218	0.0206	0.0116	0.0090
219	0.0202	0.0114	0.0088
220	0.0199	0.0112	0.0087
221	0.0196	0.0110	0.0085
222	0.0193	0.0109	0.0084
223	0.0190	0.0107	0.0083
224	0.0187	0.0106	0.0081
225	0.0184	0.0104	0.0080
226	0.0182	0.0103	0.0079
227	0.0179	0.0101	0.0078
228	0.0177	0.0100	0.0077
229	0.0175	0.0099	0.0076
230	0.0173	0.0097	0.0075
231	0.0170	0.0096	0.0074
232	0.0168	0.0095	0.0073
233	0.0167	0.0094	0.0073
234	0.0165	0.0093	0.0072
235	0.0163	0.0092	0.0071
236	0.0161	0.0091	0.0070
237	0.0160	0.0090	0.0069
238	0.0158	0.0089	0.0069
239	0.0156	0.0088	0.0068
240	0.0155	0.0087	0.0067
241	0.0153	0.0087	0.0067
242	0.0152	0.0086	0.0066
243	0.0151	0.0085	0.0066
244	0.0149	0.0084	0.0065
245	0.0148	0.0084	0.0064
246	0.0147	0.0083	0.0064
247	0.0145	0.0082	0.0063
248	0.0144	0.0081	0.0063
249	0.0143	0.0081	0.0062
250	0.0142	0.0080	0.0062
251	0.0141	0.0080	0.0061
252	0.0140	0.0079	0.0061
253	0.0139	0.0078	0.0060

254	0.0138	0.0078	0.0060
255	0.0137	0.0077	0.0059
256	0.0136	0.0077	0.0059
257	0.0135	0.0076	0.0059
258	0.0134	0.0076	0.0058
259	0.0133	0.0075	0.0058
260	0.0132	0.0074	0.0057
261	0.0131	0.0074	0.0057
262	0.0130	0.0073	0.0057
263	0.0129	0.0073	0.0056
264	0.0129	0.0073	0.0056
265	0.0128	0.0072	0.0056
266	0.0127	0.0072	0.0055
267	0.0126	0.0071	0.0055
268	0.0125	0.0071	0.0055
269	0.0125	0.0070	0.0054
270	0.0124	0.0070	0.0054
271	0.0123	0.0070	0.0054
272	0.0122	0.0069	0.0053
273	0.0122	0.0069	0.0053
274	0.0121	0.0068	0.0053
275	0.0120	0.0068	0.0052
276	0.0120	0.0068	0.0052
277	0.0119	0.0067	0.0052
278	0.0118	0.0067	0.0052
279	0.0118	0.0067	0.0051
280	0.0117	0.0066	0.0051
281	0.0117	0.0066	0.0051
282	0.0116	0.0066	0.0051
283	0.0115	0.0065	0.0050
284	0.0115	0.0065	0.0050
285	0.0114	0.0065	0.0050
286	0.0114	0.0064	0.0050
287	0.0113	0.0064	0.0049
288	0.0113	0.0064	0.0049

Total soil rain loss = 3.04(In)
Total effective rainfall = 2.88(In)
Peak flow rate in flood hydrograph = 4714.98(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0     1200.0    2400.0    3600.0    4800.0
---------------------------------------------------------------------------
  0+ 5      24.7755   3597.41  V         |         |       Q|         |
  0+10      49.5607   3598.80  V         |         |       Q|         |
  0+15      74.3622   3601.18  V         |         |        Q         |
  0+20      99.1967   3605.97  V         |         |        Q         |
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0+25     124.0862   3613.95  V         |         |         Q         |
0+30     149.0216   3620.63  V         |         |         Q         |
0+35     173.9896   3625.36  V         |         |         Q         |
0+40     198.9807   3628.70  V         |         |         Q         |
0+45     223.9894   3631.26  |V        |         |         Q         |
0+50     249.0128   3633.40  |V        |         |         Q         |
0+55     274.0484   3635.16  |V        |         |         Q         |
1+ 0     299.0945   3636.71  |V        |         |         Q         |
1+ 5     324.1496   3638.00  |V        |         |         Q         |
1+10     349.2125   3639.13  |V        |         |         Q         |
1+15     374.2825   3640.16  |V        |         |         Q         |
1+20     399.3590   3641.11  |V        |         |         Q         |
1+25     424.4414   3641.96  | V       |         |         Q         |
1+30     449.5290   3642.73  | V       |         |         Q         |
1+35     474.6211   3643.37  | V       |         |         Q         |
1+40     499.7175   3643.99  | V       |         |         Q         |
1+45     524.8178   3644.57  | V       |         |         Q         |
1+50     549.9218   3645.11  | V       |         |         Q         |
1+55     575.0294   3645.62  | V       |         |         Q         |
2+ 0     600.1402   3646.09  | V       |         |         Q         |
2+ 5     625.2539   3646.51  | V       |         |         Q         |
2+10     650.3706   3646.94  |  V      |         |         Q         |
2+15     675.4899   3647.32  |  V      |         |         Q         |
2+20     700.6116   3647.68  |  V      |         |         Q         |
2+25     725.7359   3648.04  |  V      |         |         Q         |
2+30     750.8623   3648.36  |  V      |         |         Q         |
2+35     775.9908   3648.65  |  V      |         |         Q         |
2+40     801.1213   3648.94  |  V      |         |         Q         |
2+45     826.2534   3649.19  |  V      |         |         Q         |
2+50     851.3871   3649.42  |   V     |         |         Q         |
2+55     876.5225   3649.65  |   V     |         |         Q         |
3+ 0     901.6595   3649.90  |   V     |         |         Q         |
3+ 5     926.7983   3650.15  |   V     |         |         Q         |
3+10     951.9387   3650.40  |   V     |         |         Q         |
3+15     977.0810   3650.65  |   V     |         |         Q         |
3+20    1002.2250   3650.91  |   V     |         |         Q         |
3+25    1027.3707   3651.16  |   V     |         |         Q         |
3+30    1052.5178   3651.37  |   V     |         |         Q         |
3+35    1077.6664   3651.58  |    V    |         |         Q         |
3+40    1102.8165   3651.79  |    V    |         |         Q         |
3+45    1127.9679   3651.98  |    V    |         |         Q         |
3+50    1153.1203   3652.14  |    V    |         |         Q         |
3+55    1178.2739   3652.30  |    V    |         |         Q         |
4+ 0    1203.4286   3652.46  |    V    |         |         Q         |
4+ 5    1228.5844   3652.63  |    V    |         |         Q         |
4+10    1253.7414   3652.79  |    V    |         |         Q         |
4+15    1278.8996   3652.96  |     V   |         |         Q         |
4+20    1304.0589   3653.13  |     V   |         |         Q         |
4+25    1329.2194   3653.31  |     V   |         |         Q         |
4+30    1354.3811   3653.48  |     V   |         |         Q         |
4+35    1379.5440   3653.66  |     V   |         |         Q         |
4+40    1404.7082   3653.83  |     V   |         |         Q         |
4+45    1429.8735   3654.01  |     V   |         |         Q         |
4+50    1455.0401   3654.19  |     V   |         |         Q         |
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4+55    1480.2080   3654.37  |      V  |         |         Q         |
5+ 0    1505.3771   3654.56  |      V  |         |         Q         |
5+ 5    1530.5475   3654.74  |      V  |         |         Q         |
5+10    1555.7193   3654.93  |      V  |         |         Q         |
5+15    1580.8923   3655.12  |      V  |         |         Q         |
5+20    1606.0666   3655.32  |      V  |         |         Q         |
5+25    1631.2423   3655.51  |      V  |         |         Q         |
5+30    1656.4194   3655.71  |      V  |         |         Q         |
5+35    1681.5978   3655.91  |      V  |         |         Q         |
5+40    1706.7776   3656.11  |       V |         |         Q         |
5+45    1731.9588   3656.31  |       V |         |         Q         |
5+50    1757.1414   3656.51  |       V |         |         Q         |
5+55    1782.3254   3656.72  |       V |         |         Q         |
6+ 0    1807.5109   3656.93  |       V |         |         Q         |
6+ 5    1832.6978   3657.14  |       V |         |         Q         |
6+10    1857.8862   3657.36  |       V |         |         Q         |
6+15    1883.0761   3657.58  |       V |         |         Q         |
6+20    1908.2676   3657.79  |        V|         |         Q         |
6+25    1933.4605   3658.02  |        V|         |         Q         |
6+30    1958.6550   3658.24  |        V|         |         Q         |
6+35    1983.8511   3658.47  |        V|         |         Q         |
6+40    2009.0488   3658.70  |        V|         |         Q         |
6+45    2034.2480   3658.93  |        V|         |         Q         |
6+50    2059.4489   3659.17  |        V|         |         Q         |
6+55    2084.6515   3659.41  |        V|         |         Q         |
7+ 0    2109.8557   3659.65  |         V         |         Q         |
7+ 5    2135.0615   3659.90  |         V         |         Q         |
7+10    2160.2691   3660.14  |         V         |         Q         |
7+15    2185.4785   3660.39  |         V         |         Q         |
7+20    2210.6895   3660.65  |         V         |         Q         |
7+25    2235.9024   3660.91  |         V         |         Q         |
7+30    2261.1171   3661.17  |         V         |         Q         |
7+35    2286.3335   3661.43  |         V         |         Q         |
7+40    2311.5519   3661.70  |         V         |         Q         |
7+45    2336.7721   3661.97  |         |V        |         Q         |
7+50    2361.9941   3662.25  |         |V        |         Q         |
7+55    2387.2182   3662.53  |         |V        |         Q         |
8+ 0    2412.4441   3662.81  |         |V        |         Q         |
8+ 5    2437.6721   3663.10  |         |V        |         Q         |
8+10    2462.9020   3663.39  |         |V        |         Q         |
8+15    2488.1340   3663.68  |         |V        |         Q         |
8+20    2513.3680   3663.98  |         |V        |         Q         |
8+25    2538.6042   3664.29  |         | V       |         Q         |
8+30    2563.8425   3664.60  |         | V       |         Q         |
8+35    2589.0829   3664.91  |         | V       |         Q         |
8+40    2614.3255   3665.23  |         | V       |         Q         |
8+45    2639.5703   3665.55  |         | V       |         Q         |
8+50    2664.8174   3665.88  |         | V       |         Q         |
8+55    2690.0668   3666.21  |         | V       |         Q         |
9+ 0    2715.3185   3666.55  |         | V       |         Q         |
9+ 5    2740.5726   3666.89  |         |  V      |         Q         |
9+10    2765.8290   3667.24  |         |  V      |         Q         |
9+15    2791.0880   3667.60  |         |  V      |         Q         |
9+20    2816.3494   3667.95  |         |  V      |         Q         |
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 9+25    2841.6133   3668.32  |         |  V      |         Q         |
 9+30    2866.8798   3668.69  |         |  V      |         Q         |
 9+35    2892.1489   3669.07  |         |  V      |         Q         |
 9+40    2917.4206   3669.46  |         |  V      |         Q         |
 9+45    2942.6951   3669.85  |         |  V      |         Q         |
 9+50    2967.9722   3670.25  |         |   V     |         Q         |
 9+55    2993.2522   3670.66  |         |   V     |         Q         |
10+ 0    3018.5351   3671.07  |         |   V     |         Q         |
10+ 5    3043.8208   3671.49  |         |   V     |         Q         |
10+10    3069.1095   3671.92  |         |   V     |         Q         |
10+15    3094.4012   3672.36  |         |   V     |         Q         |
10+20    3119.6960   3672.80  |         |   V     |         Q         |
10+25    3144.9939   3673.26  |         |   V     |         Q         |
10+30    3170.2950   3673.72  |         |    V    |         Q         |
10+35    3195.5993   3674.19  |         |    V    |         Q         |
10+40    3220.9069   3674.67  |         |    V    |         Q         |
10+45    3246.2180   3675.16  |         |    V    |         Q         |
10+50    3271.5324   3675.66  |         |    V    |         Q         |
10+55    3296.8504   3676.18  |         |    V    |         Q         |
11+ 0    3322.1720   3676.70  |         |    V    |         Q         |
11+ 5    3347.4973   3677.23  |         |    V    |         Q         |
11+10    3372.8264   3677.78  |         |     V   |         Q         |
11+15    3398.1593   3678.34  |         |     V   |         Q         |
11+20    3423.4961   3678.90  |         |     V   |         Q         |
11+25    3448.8369   3679.49  |         |     V   |         Q         |
11+30    3474.1819   3680.09  |         |     V   |         Q         |
11+35    3499.5310   3680.70  |         |     V   |         Q         |
11+40    3524.8845   3681.32  |         |     V   |         Q         |
11+45    3550.2424   3681.97  |         |     V   |         Q         |
11+50    3575.6048   3682.62  |         |     V   |         Q         |
11+55    3600.9719   3683.30  |         |      V  |         Q         |
12+ 0    3626.3438   3683.99  |         |      V  |         Q         |
12+ 5    3651.7197   3684.58  |         |      V  |         Q         |
12+10    3677.0977   3684.89  |         |      V  |         Q         |
12+15    3702.4760   3684.93  |         |      V  |         Q         |
12+20    3727.8496   3684.25  |         |      V  |         Q         |
12+25    3753.2122   3682.65  |         |      V  |         Q         |
12+30    3778.5667   3681.47  |         |      V  |         Q         |
12+35    3803.9173   3680.90  |         |       V |         Q         |
12+40    3829.2670   3680.78  |         |       V |         Q         |
12+45    3854.6178   3680.94  |         |       V |         Q         |
12+50    3879.9707   3681.24  |         |       V |         Q         |
12+55    3905.3267   3681.70  |         |       V |         Q         |
13+ 0    3930.6866   3682.25  |         |       V |         Q         |
13+ 5    3956.0511   3682.92  |         |       V |         Q         |
13+10    3981.4207   3683.67  |         |       V |         Q         |
13+15    4006.7961   3684.51  |         |        V|         Q         |
13+20    4032.1777   3685.40  |         |        V|         Q         |
13+25    4057.5660   3686.38  |         |        V|         Q         |
13+30    4082.9614   3687.42  |         |        V|         Q         |
13+35    4108.3648   3688.57  |         |        V|         Q         |
13+40    4133.7764   3689.77  |         |        V|         Q         |
13+45    4159.1968   3691.05  |         |        V|         Q         |
13+50    4184.6265   3692.40  |         |        V|         Q         |
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13+55    4210.0662   3693.84  |         |        V|         Q         |
14+ 0    4235.5163   3695.36  |         |         V         Q         |
14+ 5    4260.9781   3697.05  |         |         V         Q         |
14+10    4286.4529   3698.95  |         |         V         Q         |
14+15    4311.9428   3701.13  |         |         V         Q         |
14+20    4337.4508   3703.75  |         |         V         Q         |
14+25    4362.9809   3706.98  |         |         V         Q         |
14+30    4388.5328   3710.13  |         |         V         Q         |
14+35    4414.1057   3713.19  |         |         V         Q         |
14+40    4439.6992   3716.18  |         |         |V        Q         |
14+45    4465.3141   3719.28  |         |         |V        Q         |
14+50    4490.9511   3722.50  |         |         |V        |Q        |
14+55    4516.6117   3725.92  |         |         |V        |Q        |
15+ 0    4542.2973   3729.54  |         |         |V        |Q        |
15+ 5    4568.0098   3733.46  |         |         |V        |Q        |
15+10    4593.7513   3737.67  |         |         |V        |Q        |
15+15    4619.5248   3742.32  |         |         |V        |Q        |
15+20    4645.3333   3747.39  |         |         | V       |Q        |
15+25    4671.1764   3752.42  |         |         | V       |Q        |
15+30    4697.0474   3756.47  |         |         | V       |Q        |
15+35    4722.9412   3759.78  |         |         | V       |Q        |
15+40    4748.8370   3760.07  |         |         | V       |Q        |
15+45    4774.7085   3756.55  |         |         | V       |Q        |
15+50    4800.5829   3756.96  |         |         | V       |Q        |
15+55    4826.5079   3764.31  |         |         | V       |Q        |
16+ 0    4852.5606   3782.85  |         |         |  V      |Q        |
16+ 5    4879.0953   3852.84  |         |         |  V      | Q       |
16+10    4906.5429   3985.39  |         |         |  V      |  Q      |
16+15    4935.0228   4135.28  |         |         |  V      |   Q     |
16+20    4965.4346   4415.80  |         |         |  V      |     Q   |
16+25    4997.9069   4714.98  |         |         |  V      |        Q|
16+30    5029.2781   4555.10  |         |         |  V      |      Q  |
16+35    5059.0962   4329.58  |         |         |   V     |     Q   |
16+40    5087.8047   4168.48  |         |         |   V     |   Q     |
16+45    5115.8784   4076.30  |         |         |   V     |  Q      |
16+50    5143.5905   4023.80  |         |         |   V     |  Q      |
16+55    5170.9649   3974.76  |         |         |   V     |  Q      |
17+ 0    5198.1067   3940.99  |         |         |   V     | Q       |
17+ 5    5225.0030   3905.33  |         |         |   V     | Q       |
17+10    5251.7311   3880.93  |         |         |   V     | Q       |
17+15    5278.3214   3860.91  |         |         |    V    | Q       |
17+20    5304.8000   3844.69  |         |         |    V    | Q       |
17+25    5331.1544   3826.66  |         |         |    V    |Q        |
17+30    5357.3891   3809.28  |         |         |    V    |Q        |
17+35    5383.4950   3790.58  |         |         |    V    |Q        |
17+40    5409.5394   3781.65  |         |         |    V    |Q        |
17+45    5435.5246   3773.05  |         |         |    V    |Q        |
17+50    5461.4442   3763.52  |         |         |    V    |Q        |
17+55    5487.3123   3756.05  |         |         |     V   |Q        |
18+ 0    5513.1194   3747.19  |         |         |     V   |Q        |
18+ 5    5538.8687   3738.79  |         |         |     V   |Q        |
18+10    5564.5939   3735.31  |         |         |     V   |Q        |
18+15    5590.2742   3728.77  |         |         |     V   |Q        |
18+20    5615.9210   3723.92  |         |         |     V   |Q        |
```

18+25	5641.5596	3722.72			V |Q	
18+30	5667.1608	3717.31			V Q	
18+35	5692.7360	3713.51			V Q	
18+40	5718.2949	3711.15			V Q	
18+45	5743.8086	3704.60			V Q	
18+50	5769.3004	3701.40			V Q	
18+55	5794.7843	3700.26			V Q	
19+ 0	5820.2680	3700.24			V Q	
19+ 5	5845.7446	3699.21			V Q	
19+10	5871.2120	3697.86			V Q	
19+15	5896.6698	3696.48			V Q	
19+20	5922.1169	3694.92			V Q	
19+25	5947.5451	3692.17			V Q	
19+30	5972.9388	3687.16			V Q	
19+35	5998.3203	3685.40			V Q	
19+40	6023.6906	3683.77			V Q	
19+45	6049.0322	3679.59			V Q	
19+50	6074.3470	3675.71			V Q	
19+55	6099.6542	3674.61			V Q	
20+ 0	6124.9548	3673.64			VQ	
20+ 5	6150.2488	3672.69			VQ	
20+10	6175.5365	3671.77			VQ	
20+15	6200.8180	3670.88			VQ	
20+20	6226.0937	3670.04			VQ	
20+25	6251.3640	3669.23			VQ	
20+30	6276.6288	3668.46			VQ	
20+35	6301.8886	3667.72			VQ	
20+40	6327.1434	3667.00			Q	
20+45	6352.3934	3666.30			Q	
20+50	6377.6388	3665.63			Q	
20+55	6402.8797	3664.98			Q	
21+ 0	6428.1164	3664.36			Q	
21+ 5	6453.3489	3663.76			Q	
21+10	6478.5774	3663.18			Q	
21+15	6503.8020	3662.62			Q	
21+20	6529.0229	3662.08			Q	
21+25	6554.2402	3661.55			QV	
21+30	6579.4538	3661.02			QV	
21+35	6604.6640	3660.51			QV	
21+40	6629.8707	3660.01			QV	
21+45	6655.0740	3659.52			QV	
21+50	6680.2740	3659.04			QV	
21+55	6705.4707	3658.56			QV	
22+ 0	6730.6643	3658.10			QV	
22+ 5	6755.8547	3657.65			Q V	
22+10	6781.0421	3657.21			Q V	
22+15	6806.2265	3656.78			Q V	
22+20	6831.4081	3656.36			Q V	
22+25	6856.5868	3655.95			Q V	
22+30	6881.7628	3655.55			Q V	
22+35	6906.9361	3655.16			Q V	
22+40	6932.1067	3654.78			Q V	
22+45	6957.2747	3654.40			Q V	
22+50	6982.4403	3654.03			Q V	

22+55	7007.6033	3653.67				Q V
23+ 0	7032.7639	3653.32				Q V
23+ 5	7057.9221	3652.97				Q V
23+10	7083.0780	3652.64				Q V
23+15	7108.2316	3652.30				Q V
23+20	7133.3830	3651.98				Q V
23+25	7158.5321	3651.66				Q V
23+30	7183.6791	3651.34				Q V
23+35	7208.8240	3651.04				Q V
23+40	7233.9668	3650.73				Q V
23+45	7259.1076	3650.44				Q V
23+50	7284.2463	3650.15				Q V
23+55	7309.3831	3649.86				Q V
24+ 0	7334.5179	3649.58				Q V

BALDY MESA LINE A-01
POST-DEVELOPED CHANNEL FLOW
FROM NODE 4 - 15

THE ATTACHED CALCULATIONS SHOWS
OFFSITE TRIBUTARY AREAS
FOR THE 100-YEAR,
24-HOURS UNIT HYDROGRAPH

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

     Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

           Study date  03/02/17

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

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


Program License Serial Number 4070

---------------------------------------------------------------------
100-YEAR, 24-HOURS UNIT HYDROGRAPH, POST DEVELOPED - LINE A-01
TRACT NO. 16397, CITY OF VICTORVILLE
UPSTREAM TRIBUTARY AREAS FROM TR. 16397, NODE 4(NORTHEAST)
FILE: 16397UNITHYDNODE4.OUT
--------------------------------------------------------------------

      Storm Event Year = 100

      Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
      Sub-Area        Duration        Isohyetal
      (Ac.)            (hours)         (In)
Rainfall data for year 100
         396.00            1           1.11
--------------------------------------------------------------------
Rainfall data for year 100
         396.00            6           2.38
--------------------------------------------------------------------
Rainfall data for year 100
         396.00           24           4.96
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	396.00	1.000	0.785	0.700	0.550

Area-averaged adjusted loss rate Fm (In/Hr) = 0.550

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
277.20	0.700	32.0	52.0	9.23	0.158
118.80	0.300	98.0	98.0	0.20	0.952

Area-averaged catchment yield fraction, Y = 0.397
Area-averaged low loss fraction, Yb = 0.603
++
Watercourse length =   5932.00(Ft.)
Length from concentration point to centroid =   2702.00(Ft.)
Elevation difference along watercourse =   396.00(Ft.)
Mannings friction factor along watercourse = 0.035
Watershed area =   396.00(Ac.)
Catchment Lag time =   0.223 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 37.3112
Hydrograph baseflow = 7174.00(CFS)
Average maximum watershed loss rate(Fm) = 0.550(In/Hr)
Average low loss rate fraction (Yb) = 0.603 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.527(In)
Computed peak 30-minute rainfall = 0.902(In)
Specified peak 1-hour rainfall = 1.110(In)
Computed peak 3-hour rainfall = 1.772(In)
Specified peak 6-hour rainfall = 2.380(In)
Specified peak 24-hour rainfall = 4.960(In)

Rainfall depth area reduction factors:
Using a total area of   396.00(Ac.) (Ref: fig. E-4)

5-minute factor = 0.981   Adjusted rainfall = 0.517(In)
30-minute factor = 0.981   Adjusted rainfall = 0.885(In)
1-hour factor = 0.981   Adjusted rainfall = 1.089(In)
3-hour factor = 0.998   Adjusted rainfall = 1.768(In)
6-hour factor = 0.999   Adjusted rainfall = 2.377(In)
24-hour factor = 1.000   Adjusted rainfall = 4.958(In)

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

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

(K =   4789.13 (CFS))

1	2.464	118.010
2	15.731	635.360
3	44.989	1401.185
4	62.790	852.523
5	72.443	462.294
6	78.901	309.276
7	83.472	218.926
8	87.046	171.154
9	89.722	128.161
10	91.792	99.156
11	93.523	82.887
12	94.889	65.403
13	96.026	54.448
14	96.943	43.919
15	97.628	32.832
16	98.083	21.792
17	98.488	19.378
18	98.935	21.431
19	99.377	21.149
20	99.672	14.144
21	100.000	7.072

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5169	0.5169
2	0.6364	0.1195
3	0.7187	0.0823
4	0.7835	0.0648
5	0.8378	0.0542
6	0.8849	0.0471
7	0.9267	0.0419
8	0.9646	0.0379
9	0.9993	0.0347
10	1.0314	0.0321
11	1.0613	0.0299
12	1.0894	0.0281
13	1.1285	0.0391
14	1.1660	0.0375
15	1.2019	0.0360
16	1.2366	0.0347
17	1.2701	0.0335
18	1.3025	0.0324
19	1.3339	0.0314
20	1.3644	0.0305
21	1.3940	0.0296
22	1.4229	0.0289
23	1.4510	0.0281
24	1.4785	0.0275
25	1.5053	0.0268
26	1.5316	0.0262
27	1.5573	0.0257
28	1.5824	0.0252
29	1.6071	0.0247
30	1.6312	0.0242

247	4.5699	0.0098
248	4.5797	0.0098
249	4.5894	0.0098
250	4.5992	0.0098
251	4.6090	0.0097
252	4.6187	0.0097
253	4.6284	0.0097
254	4.6381	0.0097
255	4.6478	0.0097
256	4.6574	0.0097
257	4.6670	0.0096
258	4.6767	0.0096
259	4.6863	0.0096
260	4.6959	0.0096
261	4.7054	0.0096
262	4.7150	0.0096
263	4.7245	0.0095
264	4.7340	0.0095
265	4.7435	0.0095
266	4.7530	0.0095
267	4.7625	0.0095
268	4.7719	0.0094
269	4.7814	0.0094
270	4.7908	0.0094
271	4.8002	0.0094
272	4.8096	0.0094
273	4.8189	0.0094
274	4.8283	0.0094
275	4.8376	0.0093
276	4.8469	0.0093
277	4.8562	0.0093
278	4.8655	0.0093
279	4.8748	0.0093
280	4.8840	0.0093
281	4.8933	0.0092
282	4.9025	0.0092
283	4.9117	0.0092
284	4.9209	0.0092
285	4.9301	0.0092
286	4.9393	0.0092
287	4.9484	0.0091
288	4.9575	0.0091

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0091	0.0055	0.0036
2	0.0091	0.0055	0.0036
3	0.0092	0.0055	0.0036
4	0.0092	0.0055	0.0036
5	0.0092	0.0056	0.0037
6	0.0092	0.0056	0.0037
7	0.0093	0.0056	0.0037

```
   278           0.0097        0.0058          0.0038
   279           0.0096        0.0058          0.0038
   280           0.0096        0.0058          0.0038
   281           0.0095        0.0057          0.0038
   282           0.0094        0.0057          0.0037
   283           0.0094        0.0057          0.0037
   284           0.0094        0.0056          0.0037
   285           0.0093        0.0056          0.0037
   286           0.0093        0.0056          0.0037
   287           0.0092        0.0056          0.0037
   288           0.0092        0.0055          0.0036
   ----------------------------------------------------------------------
   ----------------------------------------------------------------------
   Total soil rain loss =      2.70(In)
   Total effective rainfall =      2.26(In)
   Peak flow rate in flood hydrograph =   7953.23(CFS)
   -----------------------------------------------------------------------
   +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       24 - H O U R   S T O R M
                  R u n o f f    H y d r o g r a p h
   ----------------------------------------------------------------------
               Hydrograph in   5   Minute intervals ((CFS))

   ----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0     2000.0    4000.0    6000.0    8000.0
-----------------------------------------------------------------------
  0+ 5      49.4107   7174.43  V         |         |         |    Q    |
  0+10      98.8372   7176.73  V         |         |         |    Q    |
  0+15     148.2987   7181.81  V         |         |         |    Q    |
  0+20     197.7816   7184.91  V         |         |         |    Q    |
  0+25     247.2762   7186.62  V         |         |         |    Q    |
  0+30     296.7787   7187.77  V         |         |         |    Q    |
  0+35     346.2869   7188.59  V         |         |         |    Q    |
  0+40     395.7996   7189.25  |V        |         |         |    Q    |
  0+45     445.3158   7189.75  |V        |         |         |    Q    |
  0+50     494.8348   7190.15  |V        |         |         |    Q    |
  0+55     544.3561   7190.49  |V        |         |         |    Q    |
  1+ 0     593.8793   7190.77  |V        |         |         |    Q    |
  1+ 5     643.4042   7191.01  |V        |         |         |    Q    |
  1+10     692.9304   7191.21  |V        |         |         |    Q    |
  1+15     742.4578   7191.38  |V        |         |         |    Q    |
  1+20     791.9861   7191.50  | V       |         |         |    Q    |
  1+25     841.5151   7191.62  | V       |         |         |    Q    |
  1+30     891.0450   7191.74  | V       |         |         |    Q    |
  1+35     940.5757   7191.86  | V       |         |         |    Q    |
  1+40     990.1072   7191.96  | V       |         |         |    Q    |
  1+45    1039.6391   7192.04  | V       |         |         |    Q    |
  1+50    1089.1714   7192.08  | V       |         |         |    Q    |
  1+55    1138.7040   7192.13  | V       |         |         |    Q    |
  2+ 0    1188.2369   7192.18  |  V      |         |         |    Q    |
  2+ 5    1237.7702   7192.23  |  V      |         |         |    Q    |
  2+10    1287.3038   7192.28  |  V      |         |         |    Q    |
  2+15    1336.8378   7192.33  |  V      |         |         |    Q    |
  2+20    1386.3721   7192.38  |  V      |         |         |    Q    |
```

```
2+25    1435.9068   7192.44  |  V      |         |         |    Q    |
2+30    1485.4418   7192.49  |  V      |         |         |    Q    |
2+35    1534.9772   7192.54  |   V     |         |         |    Q    |
2+40    1584.5130   7192.59  |   V     |         |         |    Q    |
2+45    1634.0491   7192.65  |   V     |         |         |    Q    |
2+50    1683.5856   7192.70  |   V     |         |         |    Q    |
2+55    1733.1225   7192.75  |   V     |         |         |    Q    |
3+ 0    1782.6597   7192.81  |   V     |         |         |    Q    |
3+ 5    1832.1974   7192.86  |   V     |         |         |    Q    |
3+10    1881.7354   7192.92  |   V     |         |         |    Q    |
3+15    1931.2738   7192.98  |    V    |         |         |    Q    |
3+20    1980.8126   7193.03  |    V    |         |         |    Q    |
3+25    2030.3518   7193.09  |    V    |         |         |    Q    |
3+30    2079.8914   7193.15  |    V    |         |         |    Q    |
3+35    2129.4314   7193.21  |    V    |         |         |    Q    |
3+40    2178.9717   7193.26  |    V    |         |         |    Q    |
3+45    2228.5126   7193.33  |    V    |         |         |    Q    |
3+50    2278.0538   7193.38  |    V    |         |         |    Q    |
3+55    2327.5954   7193.45  |     V   |         |         |    Q    |
4+ 0    2377.1375   7193.51  |     V   |         |         |    Q    |
4+ 5    2426.6800   7193.57  |     V   |         |         |    Q    |
4+10    2476.2229   7193.63  |     V   |         |         |    Q    |
4+15    2525.7662   7193.70  |     V   |         |         |    Q    |
4+20    2575.3100   7193.76  |     V   |         |         |    Q    |
4+25    2624.8543   7193.82  |     V   |         |         |    Q    |
4+30    2674.3990   7193.89  |     V   |         |         |    Q    |
4+35    2723.9441   7193.96  |      V  |         |         |    Q    |
4+40    2773.4897   7194.02  |      V  |         |         |    Q    |
4+45    2823.0358   7194.09  |      V  |         |         |    Q    |
4+50    2872.5823   7194.16  |      V  |         |         |    Q    |
4+55    2922.1293   7194.23  |      V  |         |         |    Q    |
5+ 0    2971.6768   7194.29  |      V  |         |         |    Q    |
5+ 5    3021.2247   7194.36  |      V  |         |         |    Q    |
5+10    3070.7732   7194.43  |       V |         |         |    Q    |
5+15    3120.3221   7194.51  |       V |         |         |    Q    |
5+20    3169.8716   7194.58  |       V |         |         |    Q    |
5+25    3219.4215   7194.65  |       V |         |         |    Q    |
5+30    3268.9720   7194.73  |       V |         |         |    Q    |
5+35    3318.5230   7194.80  |       V |         |         |    Q    |
5+40    3368.0744   7194.88  |       V |         |         |    Q    |
5+45    3417.6265   7194.95  |       V |         |         |    Q    |
5+50    3467.1790   7195.03  |        V|         |         |    Q    |
5+55    3516.7321   7195.11  |        V|         |         |    Q    |
6+ 0    3566.2858   7195.19  |        V|         |         |    Q    |
6+ 5    3615.8400   7195.27  |        V|         |         |    Q    |
6+10    3665.3947   7195.35  |        V|         |         |    Q    |
6+15    3714.9501   7195.43  |        V|         |         |    Q    |
6+20    3764.5060   7195.52  |        V|         |         |    Q    |
6+25    3814.0624   7195.60  |        V|         |         |    Q    |
6+30    3863.6195   7195.69  |         V         |         |    Q    |
6+35    3913.1772   7195.77  |         V         |         |    Q    |
6+40    3962.7354   7195.86  |         V         |         |    Q    |
6+45    4012.2943   7195.95  |         V         |         |    Q    |
6+50    4061.8538   7196.04  |         V         |         |    Q    |
```

```
 6+55    4111.4139   7196.13  |         V         |         |    Q    |
 7+ 0    4160.9747   7196.22  |         V         |         |    Q    |
 7+ 5    4210.5361   7196.32  |         |V        |         |    Q    |
 7+10    4260.0981   7196.41  |         |V        |         |    Q    |
 7+15    4309.6608   7196.51  |         |V        |         |    Q    |
 7+20    4359.2242   7196.60  |         |V        |         |    Q    |
 7+25    4408.7883   7196.70  |         |V        |         |    Q    |
 7+30    4458.3530   7196.80  |         |V        |         |    Q    |
 7+35    4507.9185   7196.90  |         |V        |         |    Q    |
 7+40    4557.4846   7197.00  |         |V        |         |    Q    |
 7+45    4607.0515   7197.11  |         | V       |         |    Q    |
 7+50    4656.6190   7197.21  |         | V       |         |    Q    |
 7+55    4706.1874   7197.32  |         | V       |         |    Q    |
 8+ 0    4755.7564   7197.43  |         | V       |         |    Q    |
 8+ 5    4805.3263   7197.54  |         | V       |         |    Q    |
 8+10    4854.8969   7197.65  |         | V       |         |    Q    |
 8+15    4904.4683   7197.77  |         | V       |         |    Q    |
 8+20    4954.0404   7197.88  |         | V       |         |    Q    |
 8+25    5003.6134   7198.00  |         |  V      |         |    Q    |
 8+30    5053.1872   7198.11  |         |  V      |         |    Q    |
 8+35    5102.7619   7198.24  |         |  V      |         |    Q    |
 8+40    5152.3373   7198.36  |         |  V      |         |    Q    |
 8+45    5201.9137   7198.49  |         |  V      |         |    Q    |
 8+50    5251.4909   7198.61  |         |  V      |         |    Q    |
 8+55    5301.0690   7198.74  |         |  V      |         |    Q    |
 9+ 0    5350.6480   7198.87  |         |  V      |         |    Q    |
 9+ 5    5400.2279   7199.00  |         |   V     |         |    Q    |
 9+10    5449.8087   7199.14  |         |   V     |         |    Q    |
 9+15    5499.3905   7199.28  |         |   V     |         |    Q    |
 9+20    5548.9732   7199.41  |         |   V     |         |    Q    |
 9+25    5598.5570   7199.56  |         |   V     |         |    Q    |
 9+30    5648.1417   7199.70  |         |   V     |         |    Q    |
 9+35    5697.7275   7199.85  |         |   V     |         |    Q    |
 9+40    5747.3142   7200.00  |         |    V    |         |    Q    |
 9+45    5796.9021   7200.16  |         |    V    |         |     Q   |
 9+50    5846.4910   7200.31  |         |    V    |         |     Q   |
 9+55    5896.0810   7200.47  |         |    V    |         |     Q   |
10+ 0    5945.6721   7200.63  |         |    V    |         |     Q   |
10+ 5    5995.2644   7200.80  |         |    V    |         |     Q   |
10+10    6044.8578   7200.96  |         |    V    |         |     Q   |
10+15    6094.4524   7201.14  |         |    V    |         |     Q   |
10+20    6144.0481   7201.31  |         |     V   |         |     Q   |
10+25    6193.6452   7201.49  |         |     V   |         |     Q   |
10+30    6243.2435   7201.67  |         |     V   |         |     Q   |
10+35    6292.8430   7201.86  |         |     V   |         |     Q   |
10+40    6342.4439   7202.04  |         |     V   |         |     Q   |
10+45    6392.0461   7202.24  |         |     V   |         |     Q   |
10+50    6441.6497   7202.44  |         |     V   |         |     Q   |
10+55    6491.2547   7202.65  |         |     V   |         |     Q   |
11+ 0    6540.8611   7202.85  |         |      V  |         |     Q   |
11+ 5    6590.4690   7203.07  |         |      V  |         |     Q   |
11+10    6640.0783   7203.28  |         |      V  |         |     Q   |
11+15    6689.6892   7203.51  |         |      V  |         |     Q   |
11+20    6739.3017   7203.73  |         |      V  |         |     Q   |
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11+25    6788.9158   7203.97  |         |      V  |         |     Q   |
11+30    6838.5315   7204.20  |         |      V  |         |     Q   |
11+35    6888.1489   7204.45  |         |       V |         |     Q   |
11+40    6937.7681   7204.70  |         |       V |         |     Q   |
11+45    6987.3890   7204.96  |         |       V |         |     Q   |
11+50    7037.0118   7205.22  |         |       V |         |     Q   |
11+55    7086.6365   7205.50  |         |       V |         |     Q   |
12+ 0    7136.2630   7205.78  |         |       V |         |     Q   |
12+ 5    7185.8905   7205.91  |         |       V |         |     Q   |
12+10    7235.5141   7205.35  |         |       V |         |     Q   |
12+15    7285.1268   7203.77  |         |        V|         |     Q   |
12+20    7334.7338   7202.93  |         |        V|         |     Q   |
12+25    7384.3387   7202.63  |         |        V|         |     Q   |
12+30    7433.9429   7202.54  |         |        V|         |     Q   |
12+35    7483.5476   7202.60  |         |        V|         |     Q   |
12+40    7533.1530   7202.71  |         |        V|         |     Q   |
12+45    7582.7599   7202.91  |         |        V|         |     Q   |
12+50    7632.3684   7203.15  |         |        V|         |     Q   |
12+55    7681.9789   7203.44  |         |         V         |     Q   |
13+ 0    7731.5915   7203.76  |         |         V         |     Q   |
13+ 5    7781.2066   7204.12  |         |         V         |     Q   |
13+10    7830.8244   7204.49  |         |         V         |     Q   |
13+15    7880.4450   7204.92  |         |         V         |     Q   |
13+20    7930.0687   7205.36  |         |         V         |     Q   |
13+25    7979.6958   7205.85  |         |         V         |     Q   |
13+30    8029.3262   7206.34  |         |         |V        |     Q   |
13+35    8078.9603   7206.87  |         |         |V        |     Q   |
13+40    8128.5982   7207.42  |         |         |V        |     Q   |
13+45    8178.2403   7208.03  |         |         |V        |     Q   |
13+50    8227.8867   7208.65  |         |         |V        |     Q   |
13+55    8277.5378   7209.34  |         |         |V        |     Q   |
14+ 0    8327.1937   7210.04  |         |         |V        |     Q   |
14+ 5    8376.8551   7210.84  |         |         |V        |     Q   |
14+10    8426.5230   7211.78  |         |         | V       |     Q   |
14+15    8476.1993   7213.01  |         |         | V       |     Q   |
14+20    8525.8833   7214.11  |         |         | V       |     Q   |
14+25    8575.5749   7215.22  |         |         | V       |     Q   |
14+30    8625.2740   7216.31  |         |         | V       |     Q   |
14+35    8674.9814   7217.51  |         |         | V       |     Q   |
14+40    8724.6971   7218.72  |         |         | V       |     Q   |
14+45    8774.4223   7220.09  |         |         | V       |     Q   |
14+50    8824.1570   7221.49  |         |         |  V      |     Q   |
14+55    8873.9029   7223.09  |         |         |  V      |     Q   |
15+ 0    8923.6601   7224.76  |         |         |  V      |     Q   |
15+ 5    8973.4307   7226.69  |         |         |  V      |     Q   |
15+10    9023.2154   7228.73  |         |         |  V      |     Q   |
15+15    9073.0166   7231.13  |         |         |  V      |     Q   |
15+20    9122.8355   7233.72  |         |         |  V      |     Q   |
15+25    9172.6718   7236.23  |         |         |  V      |     Q   |
15+30    9222.5093   7236.41  |         |         |   V     |     Q   |
15+35    9272.3263   7233.42  |         |         |   V     |     Q   |
15+40    9322.1447   7233.64  |         |         |   V     |     Q   |
15+45    9371.9876   7237.18  |         |         |   V     |     Q   |
15+50    9421.8703   7242.98  |         |         |   V     |     Q   |
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15+55	9471.8254	7253.48			V	Q
16+ 0	9521.9323	7275.52			V	Q
16+ 5	9572.7030	7371.91			V	Q
16+10	9625.3182	7639.72			V	Q
16+15	**9680.0925**	**7953.23**			**V**	**Q**
16+20	9733.0199	7685.06			V	Q
16+25	9784.6050	7490.16			V	Q
16+30	9835.6185	7407.15			V	Q
16+35	9886.3109	7360.55			V	Q
16+40	9936.8088	7332.29			V	Q
16+45	9987.1287	7306.45			V	Q
16+50	10037.3197	7287.74			V	Q
16+55	10087.4243	7275.18			V	Q
17+ 0	10137.4445	7262.94			V	Q
17+ 5	10187.4030	7253.96			V	Q
17+10	10237.3025	7245.41			V	Q
17+15	10287.1432	7236.87			V	Q
17+20	10336.9312	7229.23			V	Q
17+25	10386.6969	7225.98			V	Q
17+30	10436.4545	7224.79			V	Q
17+35	10486.1956	7222.42			V	Q
17+40	10535.9004	7217.13			V	Q
17+45	10585.5700	7212.03			V	Q
17+50	10635.2082	7207.46			V	Q
17+55	10684.8379	7206.24			V	Q
18+ 0	10734.4602	7205.16			V	Q
18+ 5	10784.0769	7204.34			V	Q
18+10	10833.6932	7204.28			V	Q
18+15	10883.3167	7205.33			V	Q
18+20	10932.9428	7205.71			V	Q
18+25	10982.5683	7205.62			V	Q
18+30	11032.1921	7205.37			V	Q
18+35	11081.8135	7205.04			V	Q
18+40	11131.4326	7204.68			V	Q
18+45	11181.0490	7204.30			V	Q
18+50	11230.6628	7203.92			V	Q
18+55	11280.2739	7203.54			V	Q
19+ 0	11329.8825	7203.16			V	Q
19+ 5	11379.4885	7202.79			V	Q
19+10	11429.0919	7202.43			V	Q
19+15	11478.6929	7202.07			V	Q
19+20	11528.2915	7201.71			V	Q
19+25	11577.8877	7201.36			V	Q
19+30	11627.4816	7201.04			V	Q
19+35	11677.0734	7200.73			V	Q
19+40	11726.6630	7200.42			V	Q
19+45	11776.2506	7200.11			V	Q
19+50	11825.8360	7199.81			V	Q
19+55	11875.4195	7199.52				V Q
20+ 0	11925.0010	7199.23				V Q
20+ 5	11974.5806	7198.96				V Q
20+10	12024.1584	7198.70				V Q
20+15	12073.7344	7198.44				V Q
20+20	12123.3088	7198.20				V Q

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   20+25   12172.8815   7197.96   |         |         |         |V   Q     |
   20+30   12222.4526   7197.72   |         |         |         |V   Q     |
   20+35   12272.0221   7197.50   |         |         |         | V  Q     |
   20+40   12321.5902   7197.28   |         |         |         | V  Q     |
   20+45   12371.1568   7197.07   |         |         |         | V  Q     |
   20+50   12420.7219   7196.86   |         |         |         | V  Q     |
   20+55   12470.2857   7196.66   |         |         |         | V  Q     |
   21+ 0   12519.8482   7196.47   |         |         |         | V  Q     |
   21+ 5   12569.4093   7196.28   |         |         |         | V  Q     |
   21+10   12618.9692   7196.09   |         |         |         |  V Q     |
   21+15   12668.5278   7195.91   |         |         |         |  V Q     |
   21+20   12718.0852   7195.74   |         |         |         |  V Q     |
   21+25   12767.6414   7195.56   |         |         |         |  V Q     |
   21+30   12817.1965   7195.40   |         |         |         |  V Q     |
   21+35   12866.7505   7195.23   |         |         |         |  V Q     |
   21+40   12916.3033   7195.08   |         |         |         |  V Q     |
   21+45   12965.8551   7194.92   |         |         |         |  V Q     |
   21+50   13015.4059   7194.77   |         |         |         |   VQ     |
   21+55   13064.9556   7194.62   |         |         |         |   VQ     |
   22+ 0   13114.5043   7194.47   |         |         |         |   VQ     |
   22+ 5   13164.0521   7194.33   |         |         |         |   VQ     |
   22+10   13213.5988   7194.19   |         |         |         |   VQ     |
   22+15   13263.1447   7194.06   |         |         |         |   VQ     |
   22+20   13312.6896   7193.92   |         |         |         |   VQ     |
   22+25   13362.2336   7193.79   |         |         |         |   VQ     |
   22+30   13411.7768   7193.66   |         |         |         |    Q     |
   22+35   13461.3191   7193.54   |         |         |         |    Q     |
   22+40   13510.8605   7193.42   |         |         |         |    Q     |
   22+45   13560.4011   7193.30   |         |         |         |    Q     |
   22+50   13609.9409   7193.18   |         |         |         |    Q     |
   22+55   13659.4799   7193.06   |         |         |         |    Q     |
   23+ 0   13709.0181   7192.95   |         |         |         |    Q     |
   23+ 5   13758.5556   7192.84   |         |         |         |    Q     |
   23+10   13808.0922   7192.73   |         |         |         |    QV    |
   23+15   13857.6282   7192.62   |         |         |         |    QV    |
   23+20   13907.1634   7192.51   |         |         |         |    QV    |
   23+25   13956.6979   7192.41   |         |         |         |    QV    |
   23+30   14006.2317   7192.31   |         |         |         |    QV    |
   23+35   14055.7648   7192.21   |         |         |         |    QV    |
   23+40   14105.2972   7192.11   |         |         |         |    QV    |
   23+45   14154.8290   7192.01   |         |         |         |    Q V   |
   23+50   14204.3601   7191.92   |         |         |         |    Q V   |
   23+55   14253.8906   7191.82   |         |         |         |    Q V   |
   24+ 0   14303.4204   7191.73   |         |         |         |    Q V   |
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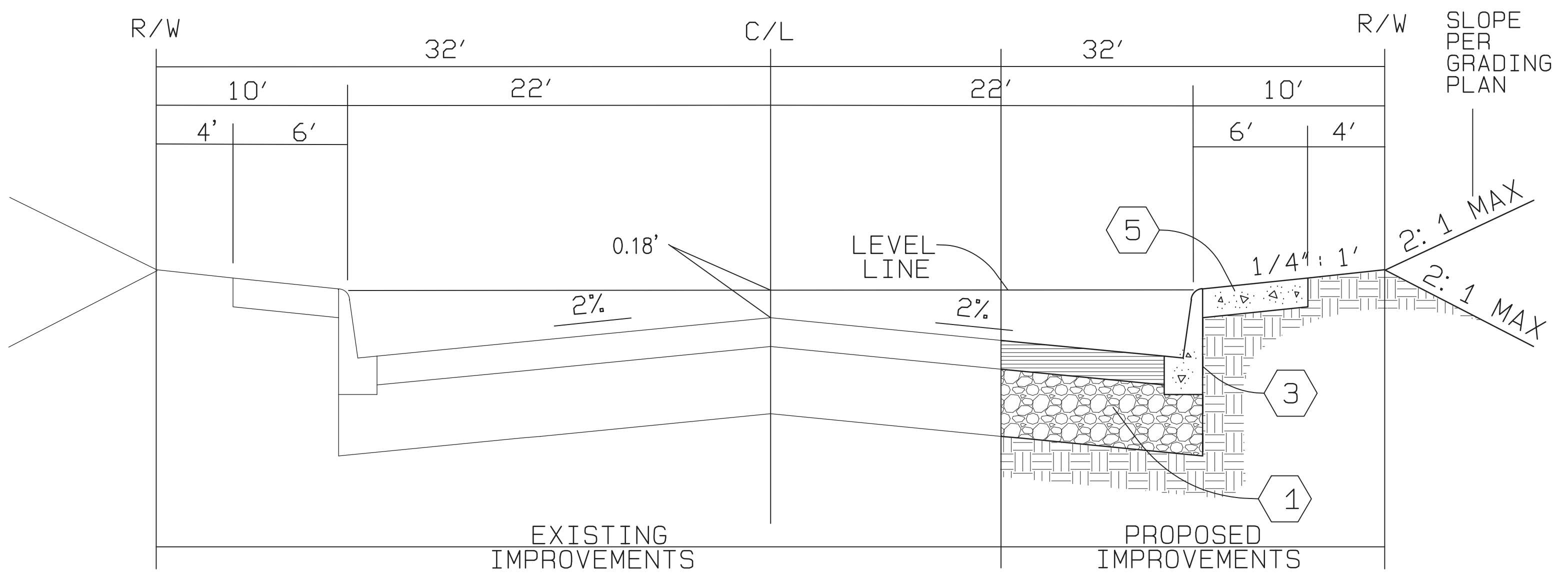
TYPICAL STREET CROSS SECTION AND STREET CAPACITY TABLES



T.I.= 8

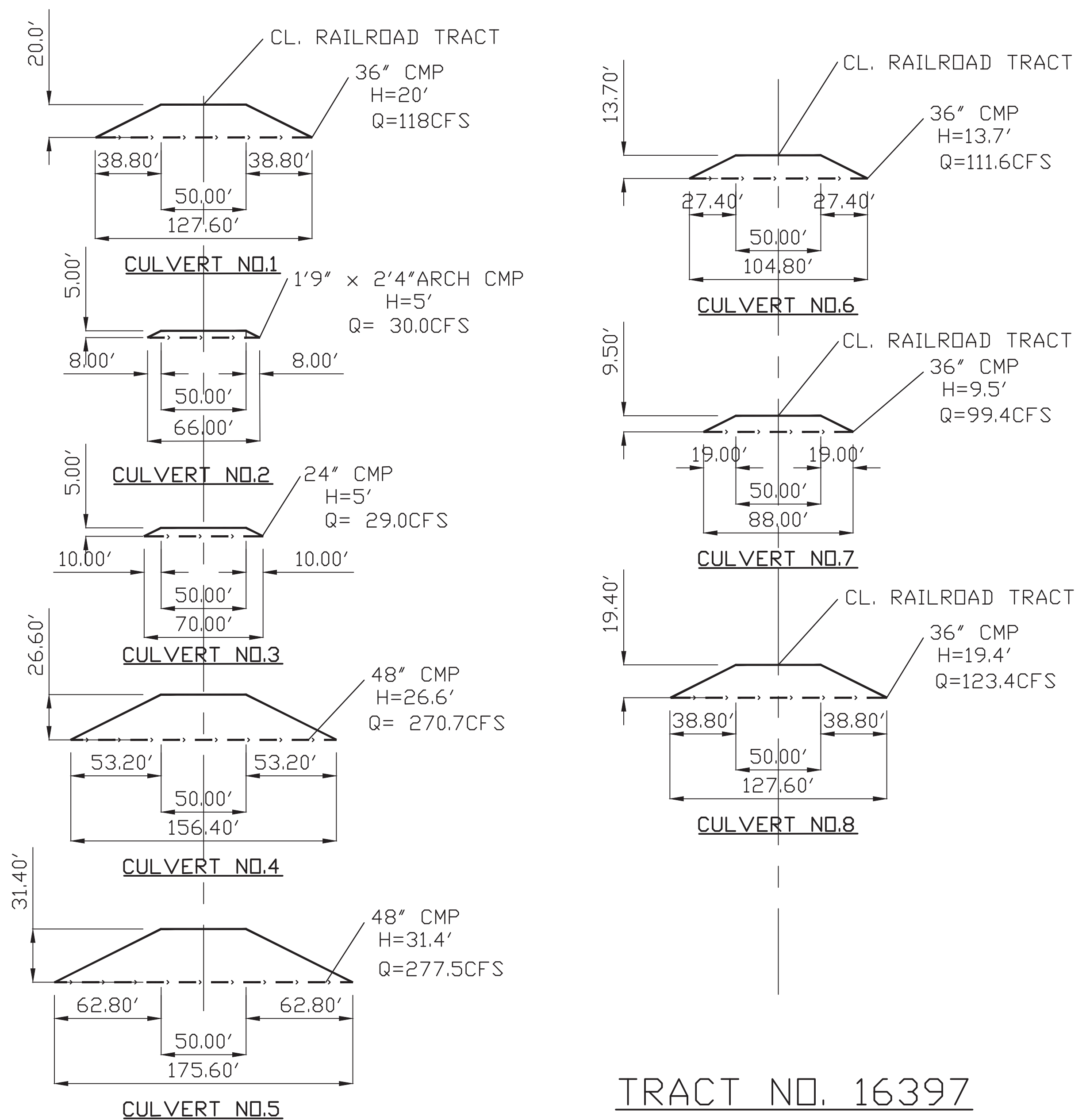
DOS PALMAS ROAD

TYPICAL SECTION (64' R/W)

STA. 29+66.77 TO 36+50.86

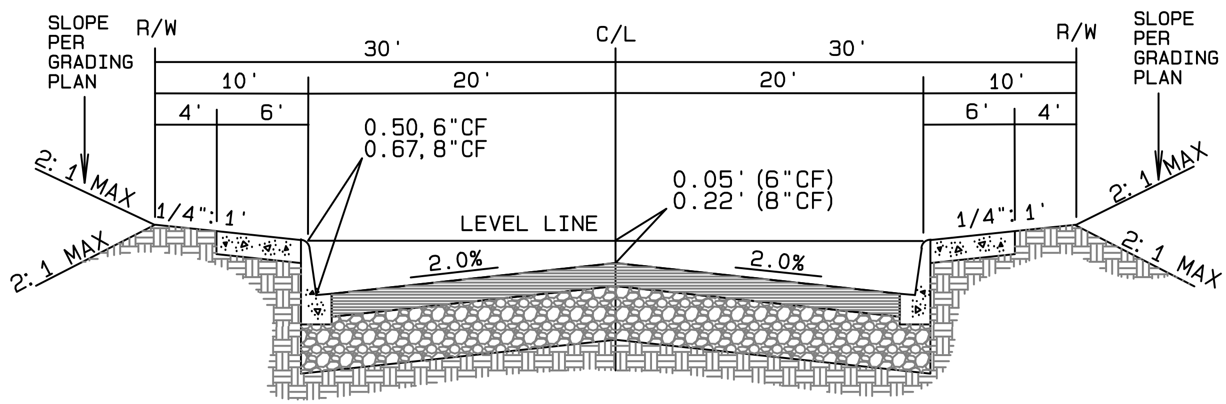
SCALES: HORIZONTAL 1" = 10' VERTICAL 1" = 2'

PLACE MIN. 3" A.C. PAVEMENT OVER MIN. 8" CLASS II
APPROVED BASE MATERIAL PER GENERAL NOTE 15



TRACT NO. 16397

EXISTING CULVERT OUTLET @ RAILROAD TRACT



T.I.= 6

LOCAL STREETS

TYPICAL SECTION (60'R/W)

N. T. S.

PREPARED BY:

Ludwig Engineering ASSOCIATES, INC.

Civil Engineering • Surveying • Planning

California
Corporate
109 East Third Street, San Bernardino, CA 92410
Phone: 909-884-8217 Fax: 909-889-0153

Pkwy Slope = .02 Cross Slope = .02 Half Street Width = 20
Half R/W Width = 30 Gutter Width = 1.5 Curb Hike = .118
Curb Batter = .083 Curb Depth = .5 N (Road) = .015 N (Parkway) = .017

Slope of Curb Face = .166 Slope of Gutter = .786667E-01
HT. of Crown above Gutter F.L = .48634

INTERIOR STREET 60'R/W; 6"CF.

Depth	Area	Road Flooding	Pkway Flooding (one side)	Q/S**.5
.1	.643893E-01	1.28779	0	.830369
.11	.779111E-01	1.41657	0	1.07066
.12	.927952E-01	1.61992	0	1.31289
.13	.111503	2.12158	0	1.50033
.14	.135227	2.62324	0	1.80434
.15	.163968	3.1249	0	2.22064
.16	.197725	3.62656	0	2.75326
.17	.236499	4.12822	0	3.40945
.18	.280289	4.62988	0	4.19778
.19	.329096	5.13154	0	5.12737
.2	.38292	5.6332	0	6.20747
.21	.44176	6.13486	0	7.44732
.22	.505617	6.63652	0	8.85607
.23	.574491	7.13818	0	10.4427
.24	.648381	7.63984	0	12.216
.25	.727288	8.1415	0	14.1848
.26	.811211	8.64316	0	16.3574
.27	.900151	9.14482	0	18.7423
.28	.994107	9.64648	0	21.3477
.29	1.09308	10.1481	0	24.1815
.3	1.19707	10.6498	0	27.2519
.31	1.30608	11.1515	0	30.5664
.32	1.4201	11.6531	0	34.133
.33	1.53914	12.1548	0	37.959
.34	1.66319	12.6564	0	42.052
.35	1.79227	13.1581	0	46.4193
.36	1.92636	13.6598	0	51.0682
.37	2.06546	14.1614	0	56.0059
.38	2.20959	14.6631	0	61.2394
.39	2.35872	15.1647	0	66.7758
.4	2.51288	15.6664	0	72.6219
.41	2.67205	16.1681	0	78.7846
.42	2.83624	16.6697	0	85.2706
.43	3.00545	17.1714	0	92.0867
.44	3.17967	17.673	0	99.2395
.45	3.35891	18.1747	0	106.736
.46	3.54316	18.6764	0	114.581
.47	3.73243	19.178	0	122.783
.48	3.92672	19.6797	0	131.348 1
TOP OF CROWN EXCEEDED				
.49	8.25139	39.9967	0	282.198
.5	8.62137	40	0	303.5 2
FLOW EXCEEDS TOP OF CURB				
.51	8.98971	40	.5	325.431
.52	9.35805	40	1	348.024
.53	9.72639	40	1.5	371.306

.54	10.0947	40	2	395.298
.55	10.4631	40	2.5	420.017
.56	10.8314	40	3	445.48
.57	11.1998	40	3.5	471.701
.58	11.5681	40	4	498.694
.59	11.9364	40	4.5	526.473
.6	12.3048	40	5	555.051
.61	12.6731	40	5.5	584.44
.62	13.0415	40	6	614.652
.63	13.4098	40	6.5	645.698
.64	13.7781	40	7	677.591
.65	14.1465	40	7.5	710.341
.66	14.5148	40	8	743.959
.67	14.8832	40	8.5	778.456
.68	15.2515	40	9	813.842
.69	15.6198	40	9.5	850.129
.7	15.9882	40	10	887.326 3

Q100 STREET CAPACITY CALC'S.

TRACT NO. 16397

CITY OF VICTORVILLE

6" CURB	60' ROW	(CFS)	(CFS)	(CFS)	TO FIND	VELOCITY (FT/S)	
INTERIOR STREET	GRADE	CROWN	T.C.	R/W	CROWN	T.C.	R/W
	4	*1*	*2*	*3*	*5*	*6*	*7*
%	DECIMAL	131.34	303.5	887.326	3.926	8.621	15.988
0.50%	0.005	9.29	21.46	62.74	2.37	2.49	3.92
0.60%	0.006	10.17	23.51	68.73	2.59	2.73	4.30
0.70%	0.007	10.99	25.39	74.24	2.80	2.95	4.64
0.80%	0.008	11.75	27.15	79.36	2.99	3.15	4.96
0.90%	0.009	12.46	28.79	84.18	3.17	3.34	5.27
1.00%	0.01	13.13	28.79	88.73	3.35	3.34	5.55
1.10%	0.011	13.78	31.83	93.06	3.51	3.69	5.82
1.20%	0.012	14.39	33.25	97.20	3.66	3.86	6.08
1.30%	0.013	14.98	34.60	101.17	3.81	4.01	6.33
1.40%	0.014	15.54	35.91	104.99	3.96	4.17	6.57
1.50%	0.015	16.09	37.17	108.67	4.10	4.31	6.80
1.60%	0.016	16.61	38.39	112.24	4.23	4.45	7.02
1.70%	0.017	17.12	39.57	115.69	4.36	4.59	7.24
1.80%	0.018	17.62	40.72	119.05	4.49	4.72	7.45
1.90%	0.019	18.10	41.83	122.31	4.61	4.85	7.65
2.00%	0.02	18.57	42.92	125.49	4.73	4.98	7.85
2.10%	0.021	19.03	43.98	128.59	4.85	5.10	8.04
2.20%	0.022	19.48	45.02	131.61	4.96	5.22	8.23
2.30%	0.023	19.92	46.03	134.57	5.07	5.34	8.42
2.40%	0.024	20.35	47.02	137.46	5.18	5.45	8.60
2.50%	0.025	20.77	47.99	140.30	5.29	5.57	8.78
2.60%	0.026	21.18	48.94	143.08	5.39	5.68	8.95
2.70%	0.027	21.58	49.87	145.80	5.50	5.78	9.12
2.80%	0.028	21.98	50.79	148.48	5.60	5.89	9.29
2.90%	0.029	22.37	51.68	151.11	5.70	6.00	9.45
3.00%	0.03	22.75	52.57	153.69	5.79	6.10	9.61

NOTE:

SEE INTERIOR STREET 60'R/W PRINT OUT:

1	$Q(CFS) / (SLOPE)^{1/2}$	(TO CROWN)
2	$Q(CFS) / (SLOPE)^{1/2}$	(TO TOP OF CURB)
3	$Q(CFS) / (SLOPE)^{1/2}$	(TO RIGHT OF WAY)

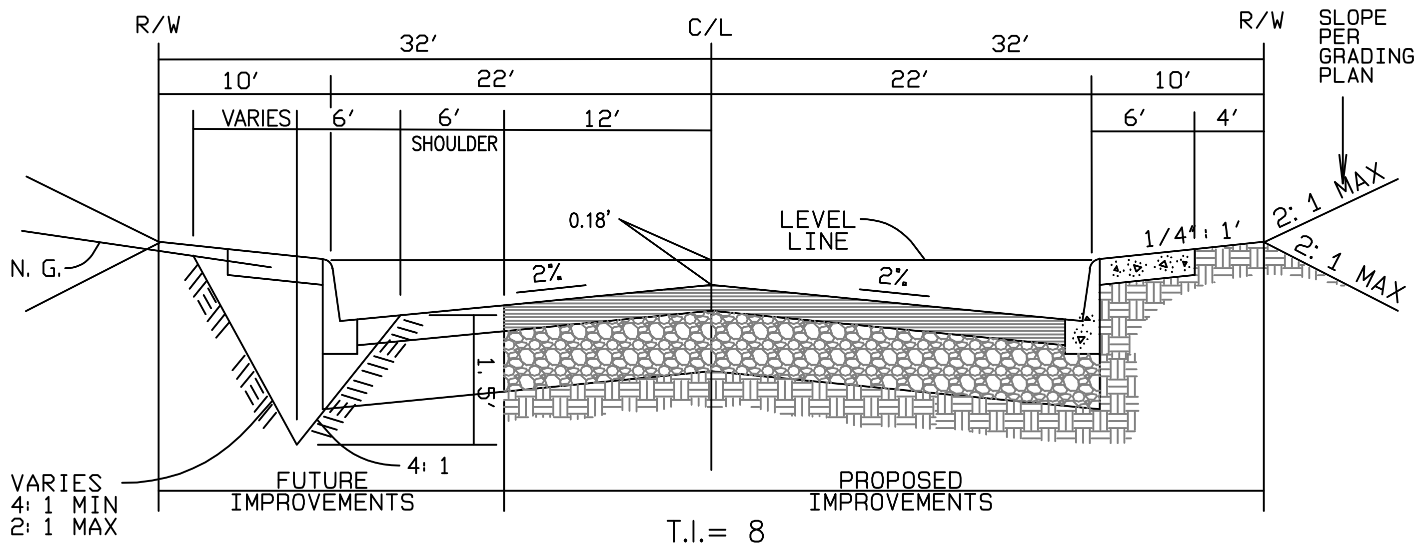
TO DETERMINED Q @ ANY STREET SLOPE: (SLOPE IN DECIMAL)

(VALUE OF 1, 2 OR 3) X $(SLOPE)^{1/2}$

TO FIND DEPTH OF FLOW:

SEE ROW AT EQUIVALENT DEPTH $Q(CFS)/ (SLOPE)^{1/2}$
IN INTERIOR STREET 60'R/W PRINT OUT:

VELOCITY:
FOR ANY STREET SLOPE Q / ***(VALUE OF 5, 6 OR 7)***



T.I.= 8

DOS PALMAS ROAD

TYPICAL SECTION (64' R/W)

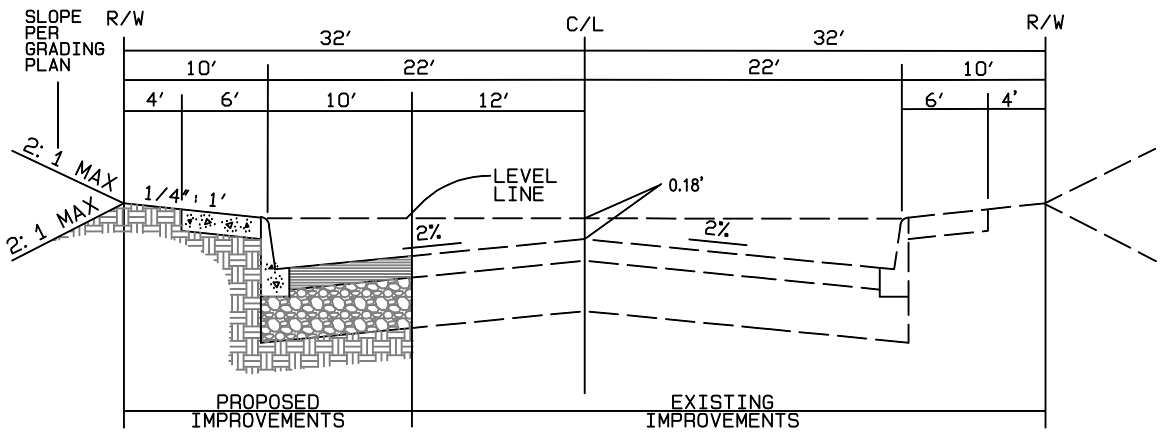
N. T. S.

PREPARED BY:

Ludwig Engineering ASSOCIATES, INC.

Civil Engineering • Surveying • Planning

California
Corporate
109 East Third Street, San Bernardino, CA 92410
Phone: 909-884-8217 Fax: 909-889-0153



T.I.= 8

MESA VIEW ROAD

TYPICAL SECTION (64' R/W)

N. T. S.

PREPARED BY:

Ludwig Engineering ASSOCIATES, INC.

Civil Engineering • Surveying • Planning

California
Corporate
109 East Third Street, San Bernardino, CA 92410
Phone: 909-884-8217 Fax: 909-889-0153

Pkwy Slope = .02 Cross Slope = .02 Half Street Width = 22
Half R/W Width = 32 Gutter Width = 1.5 Curb Hike = .118
Curb Batter = .083 Curb Depth = .67 N (Road) = .015 N (Parkway) = .017

Slope of Curb Face = .123881 Slope of Gutter = .786667E-01
HT. of Crown above Gutter F.L = .52634

DOS PALMAS /MESA VIEW 64R/W; 8"CF

Depth	Area	Road Flooding	Pkway Flooding (one side)	Q/S**.5
.1	.641787E-01	1.28357	0	.826089
.11	.776563E-01	1.41193	0	1.06514
.12	.924919E-01	1.61487	0	1.30611
.13	.111147	2.1161	0	1.49271
.14	.134814	2.61734	0	1.79554
.15	.163494	3.11858	0	2.21037
.16	.197186	3.61982	0	2.74123
.17	.23589	4.12106	0	3.39538
.18	.279607	4.6223	0	4.1814
.19	.328336	5.12354	0	5.10838
.2	.382078	5.62478	0	6.18558
.21	.440832	6.12601	0	7.42224
.22	.504598	6.62725	0	8.82748
.23	.573377	7.12849	0	10.4103
.24	.647168	7.62973	0	12.1795
.25	.725971	8.13097	0	14.1437
.26	.809787	8.63221	0	16.3115
.27	.898615	9.13345	0	18.6912
.28	.992456	9.63469	0	21.291
.29	1.09131	10.1359	0	24.119
.3	1.19517	10.6372	0	27.183
.31	1.30405	11.1384	0	30.4909
.32	1.41794	11.6396	0	34.0503
.33	1.53685	12.1409	0	37.8688
.34	1.66076	12.6421	0	41.9539
.35	1.78969	13.1434	0	46.3129
.36	1.92363	13.6446	0	50.953
.37	2.06258	14.1458	0	55.8814
.38	2.20654	14.6471	0	61.1053
.39	2.35552	15.1483	0	66.6314
.4	2.50951	15.6496	0	72.4669
.41	2.66851	16.1508	0	78.6185
.42	2.83253	16.652	0	85.093
.43	3.00155	17.1533	0	91.897
.44	3.17559	17.6545	0	99.0372
.45	3.35464	18.1557	0	106.52
.46	3.53871	18.657	0	114.352
.47	3.72778	19.1582	0	122.54
.48	3.92187	19.6595	0	131.09
.49	4.12097	20.1607	0	140.008
.5	4.32509	20.6619	0	149.301
.51	4.53421	21.1632	0	158.975
.52	4.74835	21.6644	0	169.035 1
T O P O F C R O W N E X C E E D E D				
.53	9.93433	43.9653	0	360.885
.54	10.344	43.9678	0	385.912
.55	10.7537	43.9703	0	411.599
.56	11.1634	43.9727	0	437.935

.57	11.5731	43.9752	0	464.912
.58	11.9829	43.9777	0	492.523
.59	12.3927	43.9802	0	520.758
.6	12.8025	43.9827	0	549.611
.61	13.2123	43.9851	0	579.074
.62	13.6222	43.9876	0	609.14
.63	14.0321	43.9901	0	639.803
.64	14.442	43.9926	0	671.056
.65	14.8519	43.995	0	702.893
.66	15.2619	43.9975	0	735.308
.67	15.6719	44	0	768.295 2

F L O W E X C E E D S T O P O F C U R B

.68	16.0802	44	.5	801.961
.69	16.4886	44	1	836.257
.7	16.8969	44	1.5	871.213
.71	17.3053	44	2	906.852
.72	17.7136	44	2.5	943.195
.73	18.1219	44	3	980.261
.74	18.5303	44	3.5	1018.07
.75	18.9386	44	4	1056.63
.76	19.347	44	4.5	1095.96
.77	19.7553	44	5	1136.08
.78	20.1636	44	5.5	1177.01
.79	20.572	44	6	1218.74
.8	20.9803	44	6.5	1261.31
.81	21.3887	44	7	1304.71
.82	21.797	44	7.5	1348.97
.83	22.2053	44	8	1394.09
.84	22.6137	44	8.5	1440.09
.85	23.022	44	9	1486.98
.86	23.4304	44	9.5	1534.77
.87	23.8387	44	10	1583.48 3

Q100 STREET CAPACITY CALC'S.

TRACT NO. 16397

CITY OF VICTORVILLE

6" CURB	64' ROW	(CFS)	(CFS)	(CFS)	TO FIND	VELOCITY (FT/S)	
DOS PALMAS	GRADE	CROWN	T.C.	R/W	CROWN	T.C.	R/W
MESA VIEW	4	1	2	3	5	6	7
%	DECIMAL	169.035	768.295	1583.48	4.748	15.672	23.838
0.50%	0.005	11.95	54.33	111.97	2.52	3.47	4.70
0.60%	0.006	13.09	59.51	122.66	2.76	3.80	5.15
0.70%	0.007	14.14	64.28	132.48	2.98	4.10	5.56
0.80%	0.008	15.12	68.72	141.63	3.18	4.38	5.94
0.90%	0.009	16.04	72.89	150.22	3.38	4.65	6.30
1.00%	0.01	16.90	76.83	158.35	3.56	4.90	6.64
1.10%	0.011	17.73	80.58	166.08	3.73	5.14	6.97
1.20%	0.012	18.52	84.16	173.46	3.90	5.37	7.28
1.30%	0.013	19.27	87.60	180.54	4.06	5.59	7.57
1.40%	0.014	20.00	90.91	187.36	4.21	5.80	7.86
1.50%	0.015	20.70	94.10	193.94	4.36	6.00	8.14
1.60%	0.016	21.38	97.18	200.30	4.50	6.20	8.40
1.70%	0.017	22.04	100.17	206.46	4.64	6.39	8.66
1.80%	0.018	22.68	103.08	212.45	4.78	6.58	8.91
1.90%	0.019	23.30	105.90	218.27	4.91	6.76	9.16
2.00%	0.02	23.91	108.65	223.94	5.03	6.93	9.39
2.10%	0.021	24.50	111.34	229.47	5.16	7.10	9.63
2.20%	0.022	25.07	113.96	234.87	5.28	7.27	9.85
2.30%	0.023	25.64	116.52	240.15	5.40	7.43	10.07
2.40%	0.024	26.19	119.02	245.31	5.52	7.59	10.29
2.50%	0.025	26.73	121.48	250.37	5.63	7.75	10.50
2.60%	0.026	27.26	123.88	255.33	5.74	7.90	10.71
2.70%	0.027	27.78	126.24	260.19	5.85	8.06	10.92
2.80%	0.028	28.28	128.56	264.97	5.96	8.20	11.12
2.90%	0.029	28.79	130.84	269.66	6.06	8.35	11.31
3.00%	0.03	29.28	133.07	274.27	6.17	8.49	11.51

NOTE:

SEE DOS PALMAS RD & MESA VIEW RD 64'R/W PRINT OUT:

1	Q(CFS) / (SLOPE)$^{1/2}$	(TO CROWN)
2	Q(CFS) / (SLOPE)$^{1/2}$	(TO TOP OF CURB)
3	Q(CFS) / (SLOPE)$^{1/2}$	(TO RIGHT OF WAY)

TO DETERMINED Q @ ANY STREET SLOPE: (SLOPE IN DECIMAL)

(VALUE OF 1, 2 OR 3) X (SLOPE)$^{1/2}$

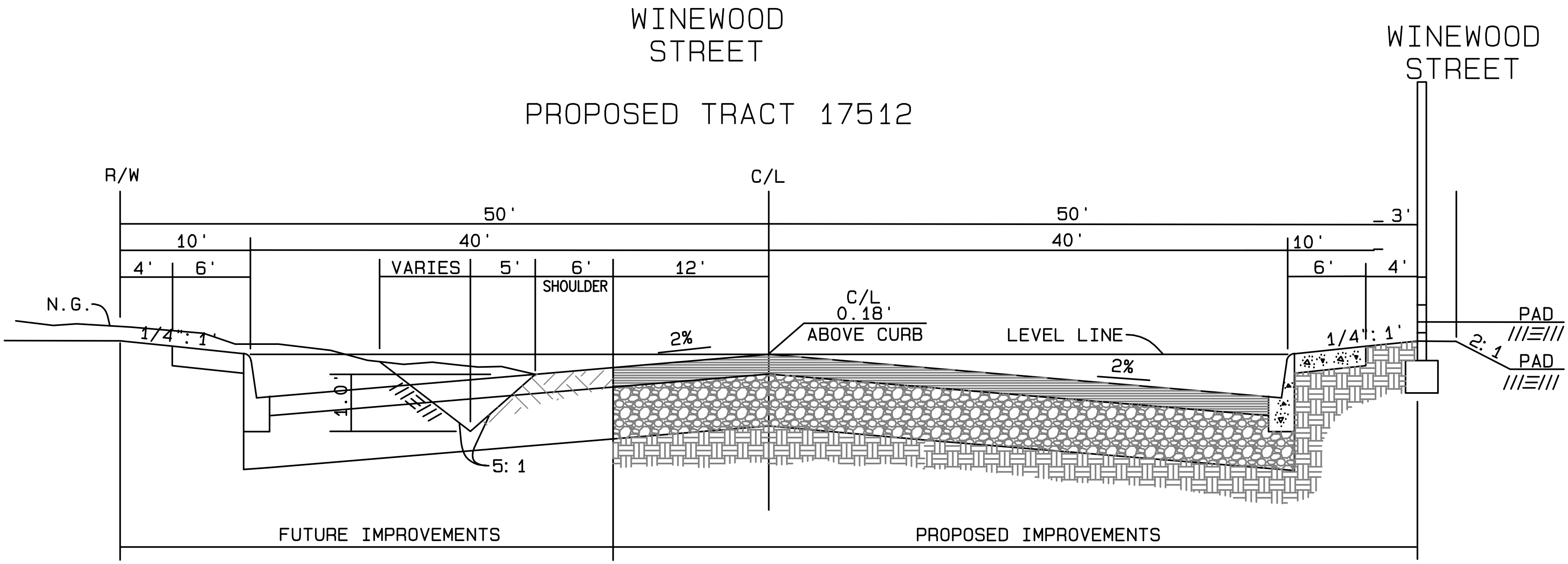
TO FIND DEPTH OF FLOW:

SEE ROW AT EQUIVALENT DEPTH Q(CFS)/ (SLOPE)$^{1/2}$

IN DOS PALMAS RD & MESA VIEW RD 64'R/W PRINT OUT:

VELOCITY:

FOR ANY STREET SLOPE Q / ***(VALUE OF 5, 6 OR 7)***



T.I.= 11

BELLFLOWER STREET

TYPICAL SECTION (100'R/W)

N. T. S.

PREPARED BY:

Ludwig Engineering
ASSOCIATES, INC.

Civil Engineering • Surveying • Planning

California
Corporate
109 East Third Street, San Bernardino, CA 92410
Phone: 909-884-8217 Fax: 909-889-0153

Pkwy Slope = .02
Half R/W Width = 50
Curb Batter = .083

Cross Slope = .02
Gutter Width = 1.5
Curb Depth = .67 N (Road) = .015 N (Parkway) = .017

Half Street Width = 40
Curb Hike = .118

Slope of Curb Face = .123881
HT. of Crown above Gutter F.L = .88634

Slope of Gutter = .786667E-01

BELLFLOWER STREET 100'R/W; 8"CF

Depth	Area	Road Flooding	Pkway Flooding (one side)	Q/S**.5
.1	.641787E-01	1.28357	0	.826089
.11	.776563E-01	1.41193	0	1.06514
.12	.924919E-01	1.61487	0	1.30611
.13	.111147	2.1161	0	1.49271
.14	.134814	2.61734	0	1.79554
.15	.163494	3.11858	0	2.21037
.16	.197186	3.61982	0	2.74123
.17	.23589	4.12106	0	3.39538
.18	.279607	4.6223	0	4.1814
.19	.328336	5.12354	0	5.10838
.2	.382078	5.62478	0	6.18558
.21	.440832	6.12601	0	7.42224
.22	.504598	6.62725	0	8.82748
.23	.573377	7.12849	0	10.4103
.24	.647168	7.62973	0	12.1795
.25	.725971	8.13097	0	14.1437
.26	.809787	8.63221	0	16.3115
.27	.898615	9.13345	0	18.6912
.28	.992456	9.63469	0	21.291
.29	1.09131	10.1359	0	24.119
.3	1.19517	10.6372	0	27.183
.31	1.30405	11.1384	0	30.4909
.32	1.41794	11.6396	0	34.0503
.33	1.53685	12.1409	0	37.8688
.34	1.66076	12.6421	0	41.9539
.35	1.78969	13.1434	0	46.3129
.36	1.92363	13.6446	0	50.953
.37	2.06258	14.1458	0	55.8814
.38	2.20654	14.6471	0	61.1053
.39	2.35552	15.1483	0	66.6314
.4	2.50951	15.6496	0	72.4669
.41	2.66851	16.1508	0	78.6185
.42	2.83253	16.652	0	85.093
.43	3.00155	17.1533	0	91.897
.44	3.17559	17.6545	0	99.0372
.45	3.35464	18.1557	0	106.52
.46	3.53871	18.657	0	114.352
.47	3.72778	19.1582	0	122.54
.48	3.92187	19.6595	0	131.09
.49	4.12097	20.1607	0	140.008
.5	4.32509	20.6619	0	149.301
.51	4.53421	21.1632	0	158.975
.52	4.74835	21.6644	0	169.035
.53	4.9675	22.1657	0	179.489
.54	5.19166	22.6669	0	190.342
.55	5.42084	23.1681	0	201.6
.56	5.65502	23.6694	0	213.269
.57	5.89422	24.1706	0	225.355
.58	6.13844	24.6719	0	237.865
.59	6.38766	25.1731	0	250.803

.6	6.6419	25.6743	0	264.176
.61	6.90115	26.1756	0	277.989
.62	7.16541	26.6768	0	292.248
.63	7.43468	27.178	0	306.959
.64	7.70897	27.6793	0	322.128
.65	7.98827	28.1805	0	337.759
.66	8.27258	28.6818	0	353.86
.67	8.56191	29.183	0	370.434

2

F L O W E X C E E D S T O P O F C U R B

.68	8.85541	29.683	.5	387.52
.69	9.15391	30.183	1	405.122
.7	9.45741	30.683	1.5	423.261
.71	9.76591	31.183	2	441.959
.72	10.0794	31.683	2.5	461.233
.73	10.3979	32.183	3	481.099
.74	10.7214	32.683	3.5	501.575
.75	11.0499	33.183	4	522.676
.76	11.3834	33.683	4.5	544.416
.77	11.7219	34.183	5	566.81
.78	12.0654	34.683	5.5	589.873
.79	12.4139	35.183	6	613.619
.8	12.7674	35.683	6.5	638.061
.81	13.1259	36.183	7	663.212
.82	13.4894	36.683	7.5	689.087
.83	13.8579	37.183	8	715.697
.84	14.2314	37.683	8.5	743.055
.85	14.6099	38.183	9	771.175
.86	14.9934	38.683	9.5	800.068
.87	15.3819	39.183	10	829.746

3

Q100 STREET CAPACITY CALC'S.

TRACT NO. 16397

CITY OF VICTORVILLE

8" CURB	**100' ROW**	(CFS)	(CFS)	(CFS)	**TO FIND**	**VELOCITY** (FT/S)	
BELLFLOWER	**GRADE**	**CROWN**	**T.C.**	**R/W**	**CROWN**	**T.C.**	**R/W**
	4	*1*	*2*	*3*	*5*	*6*	*7*
%	**DECIMAL**	**468.54**	**430.41**	**3186.98**	**10.21**	**9.58**	**41.14**
0.50%	0.005	33.13	30.43	225.35	3.24	3.18	5.48
0.60%	0.006	36.29	33.34	246.86	3.55	3.48	6.00
0.70%	0.007	39.20	36.01	266.64	3.84	3.76	6.48
0.80%	0.008	41.91	38.50	285.05	4.10	4.02	6.93
0.90%	0.009	44.45	40.83	302.34	4.35	4.26	7.35
1.00%	0.01	46.85	43.04	318.70	4.59	4.49	7.75
1.10%	0.011	49.14	45.14	334.25	4.81	4.71	8.12
1.20%	0.012	51.33	47.15	349.12	5.03	4.92	8.49
1.30%	0.013	53.42	49.07	363.37	5.23	5.12	8.83
1.40%	0.014	55.44	50.93	377.09	5.43	5.32	9.17
1.50%	0.015	57.38	52.71	390.32	5.62	5.50	9.49
1.60%	0.016	59.27	54.44	403.12	5.80	5.68	9.80
1.70%	0.017	61.09	56.12	415.53	5.98	5.86	10.10
1.80%	0.018	62.86	57.75	427.58	6.16	6.03	10.39
1.90%	0.019	64.58	59.33	439.29	6.33	6.19	10.68
2.00%	0.02	66.26	60.87	450.71	6.49	6.35	10.96
2.10%	0.021	67.90	62.37	461.84	6.65	6.51	11.23
2.20%	0.022	69.50	63.84	472.71	6.81	6.66	11.49
2.30%	0.023	71.06	65.27	483.33	6.96	6.81	11.75
2.40%	0.024	72.59	66.68	493.72	7.11	6.96	12.00
2.50%	0.025	74.08	68.05	503.91	7.26	7.10	12.25
2.60%	0.026	75.55	69.40	513.89	7.40	7.24	12.49
2.70%	0.027	76.99	70.72	523.67	7.54	7.38	12.73
2.80%	0.028	78.40	72.02	533.28	7.68	7.52	12.96
2.90%	0.029	79.79	73.30	542.72	7.81	7.65	13.19
3.00%	0.03	81.15	74.55	552.00	7.95	7.78	13.42

NOTE:

SEE BELLFLOWER RD 100'R/W PRINT OUT:

1	Q(CFS) / (SLOPE)$^{1/2}$	(TO CROWN)
2	Q(CFS) / (SLOPE)$^{1/2}$	(TO TOP OF CURB)
3	Q(CFS) / (SLOPE)$^{1/2}$	(TO RIGHT OF WAY)

TO DETERMINED Q @ ANY STREET SLOPE: (SLOPE IN DECIMAL)

(VALUE OF 1, 2 OR 3) X (SLOPE)$^{1/2}$

TO FIND DEPTH OF FLOW:

SEE ROW AT EQUIVALENT DEPTH Q(CFS)/ (SLOPE)$^{1/2}$

IN BELLFLOWER RD 100' R/W PRINT OUT:

VELOCITY:

FOR ANY STREET SLOPE Q / ***(VALUE OF 5, 6 OR 7)***

WATER SURFACE
PROFILE GRADIENT CALCULATIONS
TRAPEZOIDAL CHANNEL

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
DESIGN CRITERIA

1) Hydrology calculations shall adhere to the San Bernardino County Hydrology Manual.

2) Structural calculations shall adhere to the Los Angeles County Flood Control District Structural Design Manual and to the State of California Department of Transportation Bridge Planning and Design Manuals and the Standard Plans.

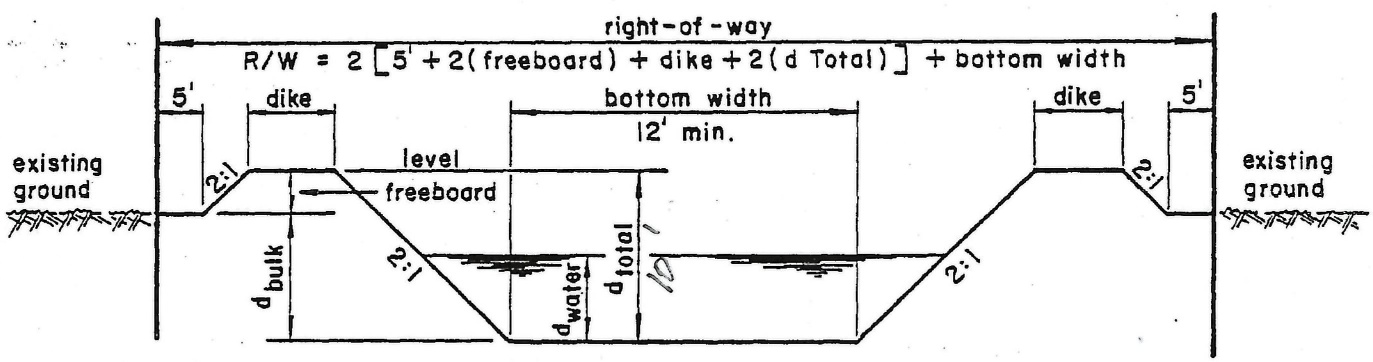
3) Basin structural design shall adhere to the Los Angeles County Flood Control District Design Manual for Debris Dams and Basins.

4) Hydraulic design shall adhere to the Los Angeles County Flood Control District Hydraulic Design Manual and to the State of California Department of Transportation Highway Design Manual. Lined drainage facilities shall be designed with a bulking factor of 50% increase in water depth when there are no facilities to remove debris. Closed conduit systems shall be designed with a surface backup system to handle a Q_{100} frequency storm, a bulking factor of 50% increase in Q_{100} and a debris basin system to remove debris. Culverts under roadways, except when connected to lined open channels, shall be designed in accordance with Caltrans Highway Design Manual.

5) Earth channel design shall adhere to the following:
   a) Bulk depth
      i) For graded earth channels, use $d_{bulk} = 1.5 d_{water}$
      ii) For natural drainage courses, compute d_{bulk} based upon $Q_{bulk} = 2\ Q_{100}$
   b) For total depth use *$d_{total} = d_{bulk}$ + freeboard

      * When "V" < 6 f.p.s. - use d_{water} + 2' freeboard
      8 f.p.s.> "V"≥6 f.p.s. use d_{bulk} + 2' freeboard "V" = velocity
      "V"≥8 f.p.s. use d_{bulk} + 3' freeboard
   c) Dike width

      When bottom width = 12' to 40' use dike width + 15'.
      bottom width = 40' or more use dike width = 18'

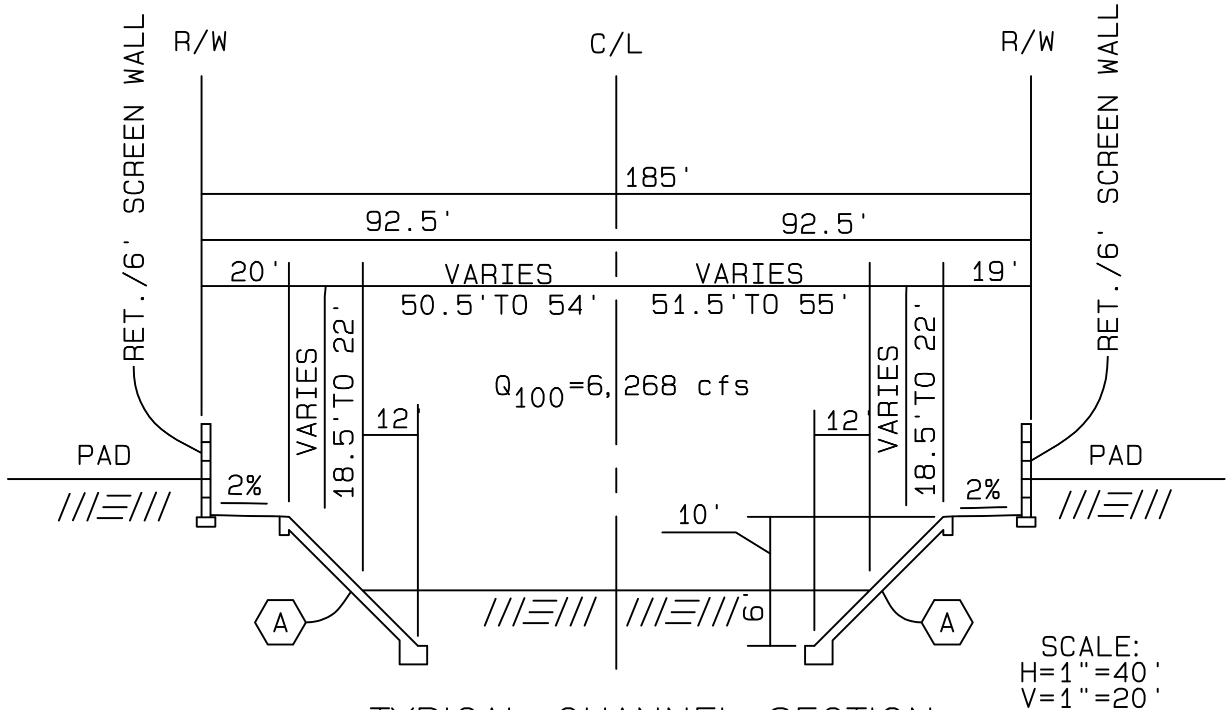


EARTH CHANNEL SECTION

$d_{water} = \pm 5'$ $D_{total} = 10$ FT
$d_{bulk} = 1.5\, d_{water}$
$= 1.5 + 5' = 7.5'$
$d_{total} = d_{bulk}$ + Freeboard $= 7.5' + 2' = 9.5'$

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT		
REVISIONS	DWN. BY	DATE
	FILE NO. S.P. 100	

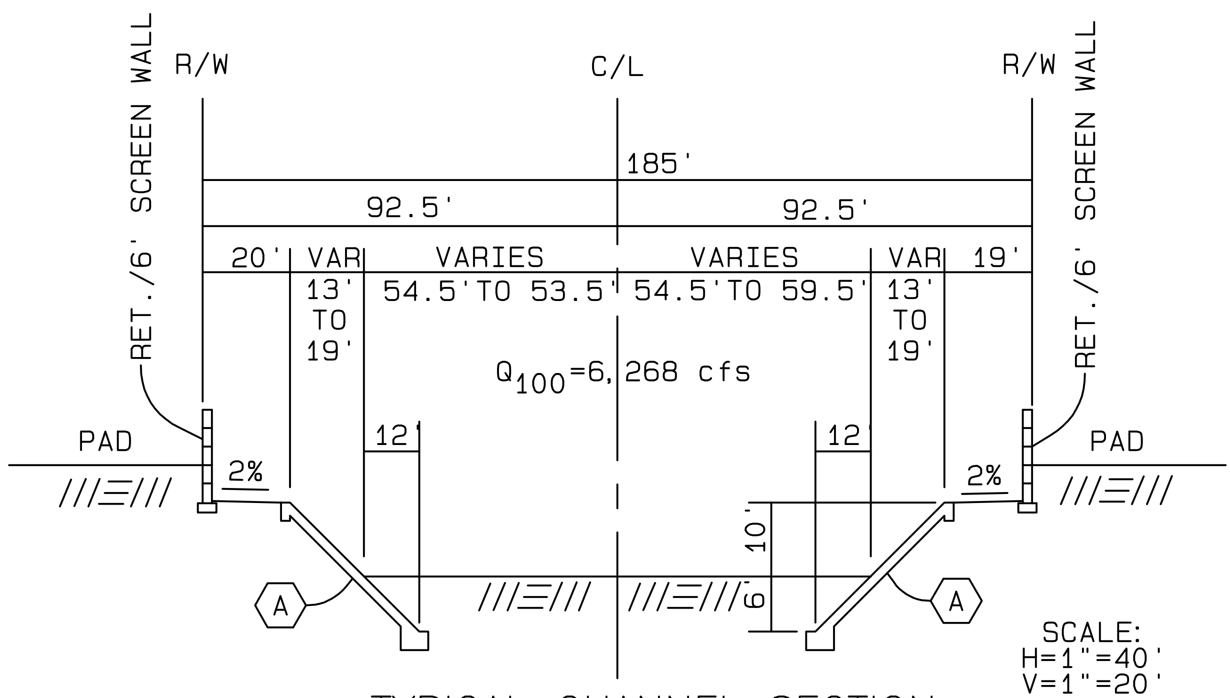
DIETERICH-POST CLEARPRINT 1020-10



TYPICAL CHANNEL SECTION

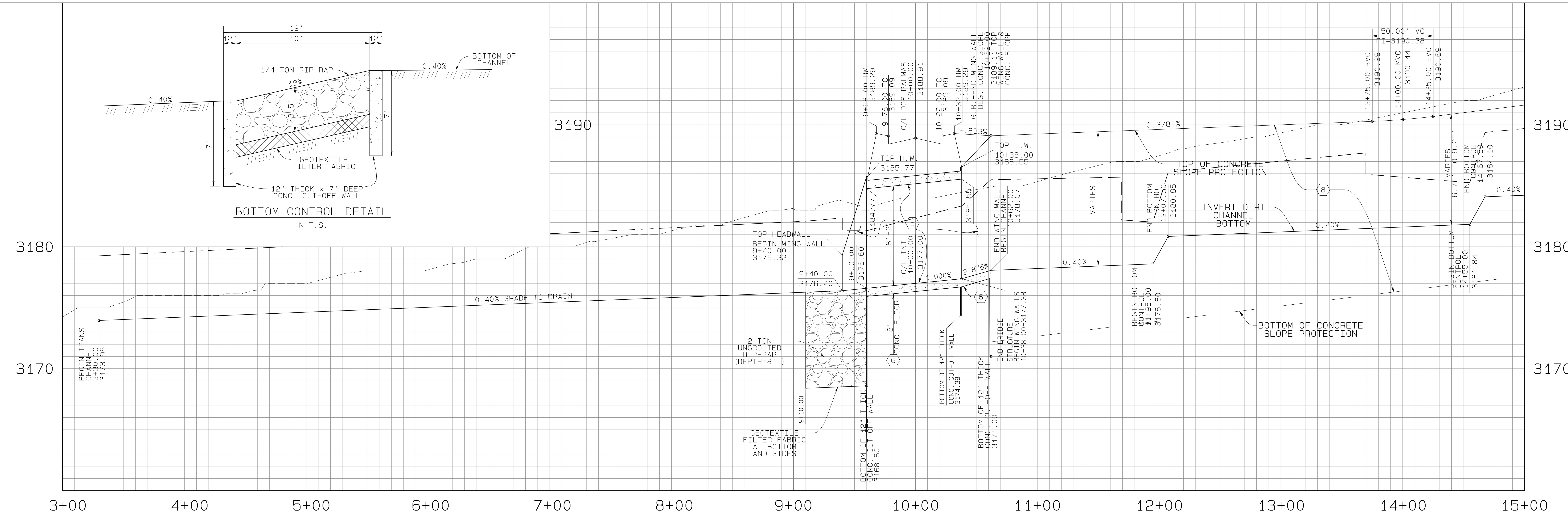
STA. 10+62.00 TO 14+00.00

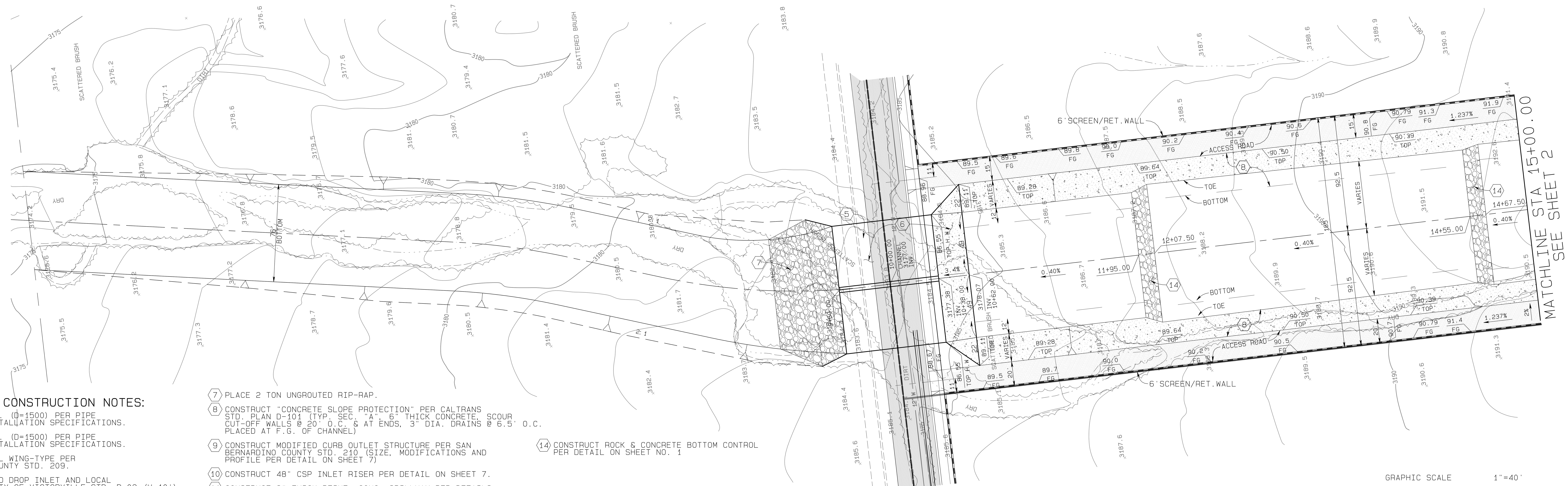
(A) CONSTRUCT "SLOPE PROTECTION" PER CALTRANS STD. PLAN D–101 (TYPICAL SECTION "A", 6" THICK CONCRETE SCOUR CUT–OFF WALLS @ 20' O.C. AND AT THE ENDS, 3" DIA. DRAINS @ 6.5'O.C. PLACED AT F.G. OF CHANNEL.



TYPICAL CHANNEL SECTION

STA. 14+00.00 TO 23+38.82





STORM DRAIN CONSTRUCTION NOTES:

1. INSTALL 36" R.C.P. (D=1500) PER PIPE MANUFACTURERS INSTALLATION SPECIFICATIONS.
2. INSTALL 30" R.C.P. (D=1500) PER PIPE MANUFACTURERS INSTALLATION SPECIFICATIONS.
3. CONSTRUCT HEADWALL WING-TYPE PER SAN BERNARDINO COUNTY STD. 209.
4. CONSTRUCT STANDARD DROP INLET AND LOCAL DEPRESSION PER CITY OF VICTORVILLE STD. D-02 (W=10')
5. CONSTRUCT 78 L.F. OF DOUBLE-CELL, 48 FT. SPAN x 8.17 FT. RISE CON/SPAN PRECAST CONCRETE BRIDGE ARCHED UNITS. (INCLUDES HEADWALLS, WINGWALLS AND NOSECONES)
6. CONSTRUCT 8" THICK, CLASS "A" CONCRETE FLOOR WITH #4 BARS @ 18" O.C.E.W. & 3" COVER ON BOTTOM STEEL.
7. PLACE 2 TON UNGROUTED RIP-RAP.
8. CONSTRUCT "CONCRETE SLOPE PROTECTION" PER CALTRANS STD. PLAN D-101 (TYP. SEC. "A", 6" THICK CONCRETE, SCOUR CUT-OFF WALLS @ 20' O.C. & AT ENDS, 3" DIA. DRAINS @ 6.5' O.C. PLACED AT F.G. OF CHANNEL)
9. CONSTRUCT MODIFIED CURB OUTLET STRUCTURE PER SAN BERNARDINO COUNTY STD. 210 (SIZE, MODIFICATIONS AND PROFILE PER DETAIL ON SHEET 7)
10. CONSTRUCT 48" CSP INLET RISER PER DETAIL ON SHEET 7.
11. CONSTRUCT 6" THICK REINF. CONC. SPILLWAY PER DETAILS ON SHEET 7.
12. CONSTRUCT JUNCTION STRUCTURE - PIPE TO RCB PER A.P.W.A. STANDARD PLAN 330-0.
13. PLACE 1/2 TON UNGROUTED RIP-RAP (T=4.2', PLACEMENT METHOD B) ON 2:1 SLOPE PER PLAN
14. CONSTRUCT ROCK & CONCRETE BOTTOM CONTROL PER DETAIL ON SHEET NO. 1

DRAINAGE CHANNEL

SEE TYPICAL SECTION ON SHEET 7

GRAPHIC SCALE 1"=40'
0 40 80 120

"ALTERNATE DESIGN"

Underground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER JIMMY J. FRY NO. C040692 Exp. 3-31-19 CIVIL STATE OF CALIFORNIA

JIMMY JOE FRY R.C.E. NO. C040692 DATE
REGISTRATION EXPIRES MARCH 31, 2009

BENCH MARK V-109 CITY OF VICTORVILLE

BRASS CAP IN THE TOP OF CURB AT THE SOUTHEAST BCR OF EAGLE RANCH PARKWAY AND BEDROCK ROAD.

ELEVATION: 3260.438

Ludwig Engineering Associates, Inc.
Civil Engineering • Surveying • Planning
109 East 3rd Street
San Bernardino, CA 92410
(909) 884-8217
Fax: (909) 889-0153

FIELD BOOK REF.

MARK	REVISIONS	APPR	DATE

CITY OF VICTORVILLE

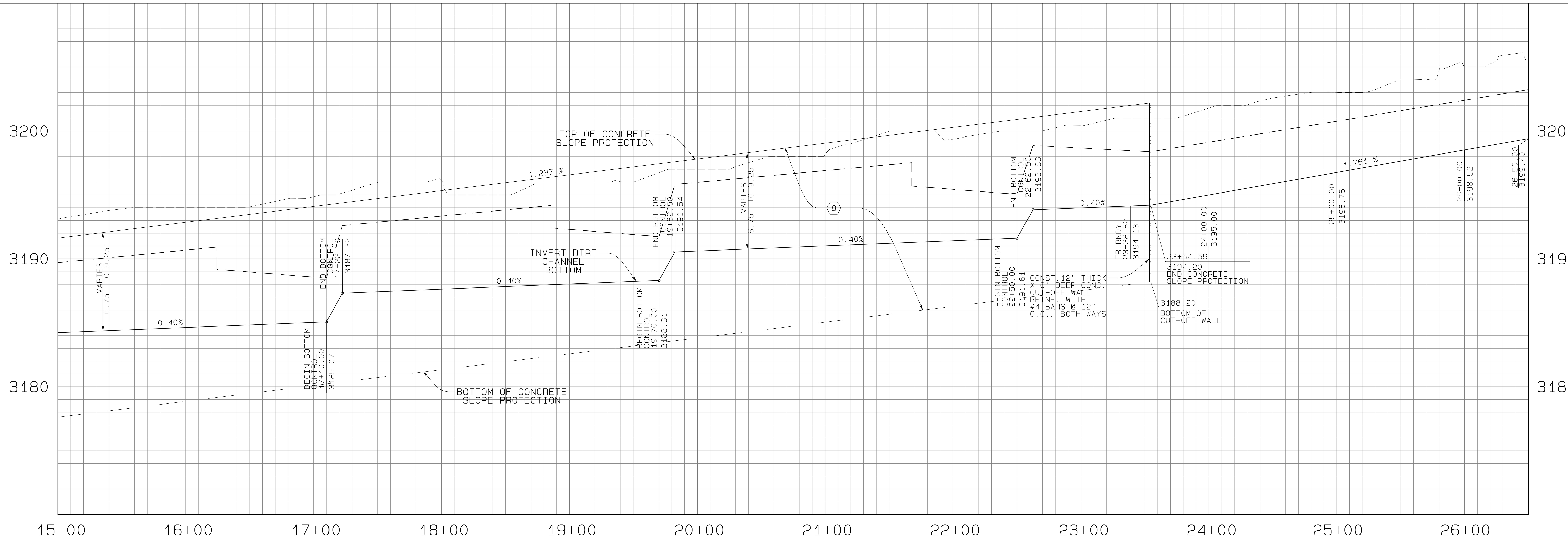
DESIGNED BY BW
DRAWN BY LC
CHECKED BY
RECOMMENDED BY

APPROVED ______ DATE

JOHN A. McGLADE, CITY ENGINEER
R.C.E. 40935 EXP. 3-31-09

STORM DRAIN PLANS
TRACT NO. 16397
DRAINAGE CHANNEL
STA. 3+00.00 TO 15+00.00
CITY OF VICTORVILLE, CA

SHEET 1 OF 2



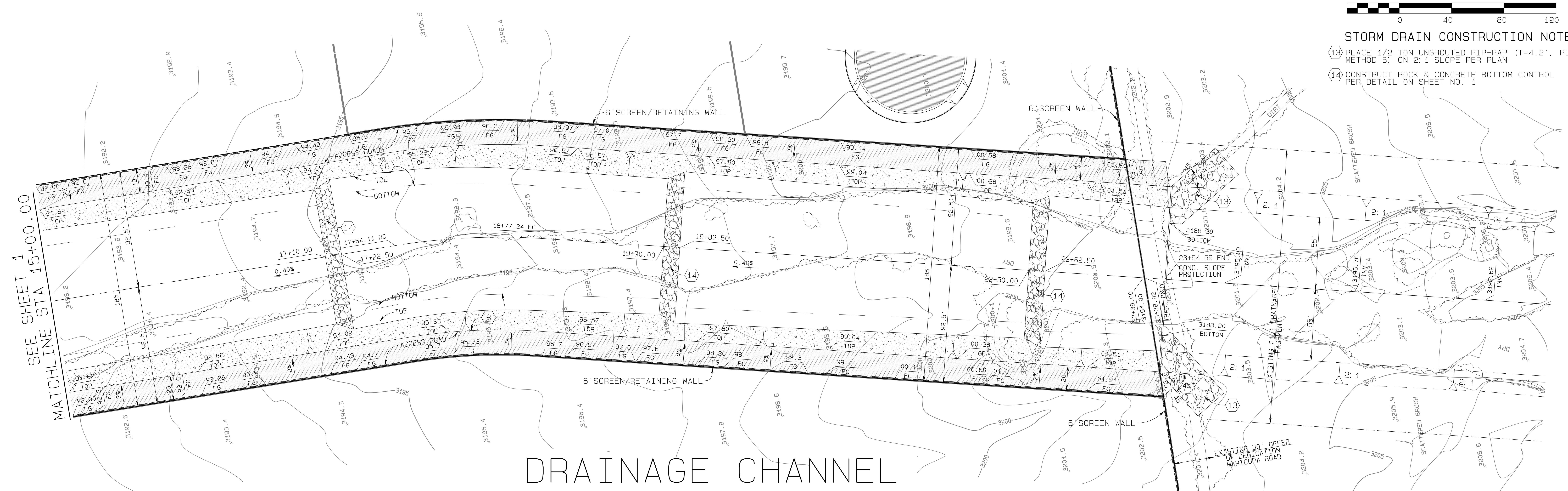
GRAPHIC SCALE 1"=40'

0 40 80 120

STORM DRAIN CONSTRUCTION NOTES:

(13) PLACE 1/2 TON UNGROUTED RIP-RAP (T=4.2', PLACEMENT METHOD B) ON 2:1 SLOPE PER PLAN

(14) CONSTRUCT ROCK & CONCRETE BOTTOM CONTROL PER DETAIL ON SHEET NO. 1



DRAINAGE CHANNEL

SEE TYPICAL SECTION ON SHEET 7

(8) CONSTRUCT "CONCRETE SLOPE PROTECTION" PER CALTRANS STD. PLAN D-101 (TYP. SEC. "A", 6" THICK CONCRETE, SCOUR CUT-OFF WALLS @ 20' O.C. & AT ENDS, 3" DIA. DRAINS @ 6.5' O.C. PLACED AT F.G. OF CHANNEL)

(13) PLACE 1/2 TON UNGROUTED RIP-RAP (T=4.2', PLACEMENT METHOD B) ON 2:1 SLOPE PER PLAN

"ALTERNATE DESIGN"

V:\plans\TR. 16397 (RY Properties)\Final Engineering\16397CHANNEL-ALT DESIGN_ABE.pro 13 Dec 2017 2:51PM

Underground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER JIMMY J. FRY NO. C040692 Exp. 3-31-19 CIVIL STATE OF CALIFORNIA

JIMMY JOE FRY R.C.E. NO. C040692 DATE
REGISTRATION EXPIRES MARCH 31, 2009

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BRASS CAP IN THE TOP OF CURB AT THE SOUTHEAST BCR OF EAGLE RANCH PARKWAY AND BEDROCK ROAD.

ELEVATION: 3260.438

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Fax: (909) 889-0153

FIELD BOOK REF.

MARK	REVISIONS	APPR	DATE

CITY OF VICTORVILLE

DESIGNED BY BW
DRAWN BY LC
CHECKED BY
RECOMMENDED BY

APPROVED ______ DATE

JOHN A. McGLADE, CITY ENGINEER
R.C.E. 40935 EXP. 3-31-09

STORM DRAIN PLANS
TRACT NO. 16397
DRAINAGE CHANNEL
STA. 15+00.00 TO 23+54.59
CITY OF VICTORVILLE, CA

SHEET 2 OF 2

FILE: 16397WSPGW10.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 1

Program Package Serial Number: 1586

WATER SURFACE PROFILE LISTING Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
330.000	3173.980	5.277	3179.257	7953.00	12.50	2.43	3181.68	.00	5.28	131.11	10.000	110.000	2.00	0 .0
13.090	.0040					.0051	.07	5.28	1.00	5.82	.025	.00	2.00	TRAP
343.090	3174.032	5.513	3179.545	7953.00	11.92	2.21	3181.75	.00	5.28	132.05	10.000	110.000	2.00	0 .0
96.698	.0040					.0044	.43	5.51	.93	5.82	.025	.00	2.00	TRAP
439.788	3174.416	5.759	3180.174	7953.00	11.36	2.01	3182.18	.00	5.28	133.04	10.000	110.000	2.00	0 .0
213.067	.0040					.0040	.86	5.76	.87	5.82	.025	.00	2.00	TRAP
652.855	3175.260	5.818	3181.078	7953.00	11.24	1.96	3183.04	.00	5.28	133.27	10.000	110.000	2.00	0 .0
257.145	.0040					.0040	1.02	5.82	.86	5.82	.025	.00	2.00	TRAP
910.000	3176.280	5.818	3182.098	7953.00	11.24	1.96	3184.06	.00	5.28	133.27	8.000	110.000	2.00	0 .0
4.589	.0040					.0057	.03	5.82	.86	6.46	.030	.00	2.00	TRAP
914.589	3176.298	5.842	3182.141	7953.00	11.19	1.94	3184.08	.00	5.28	133.37	8.000	110.000	2.00	0 .0
HYDRAULIC JUMP														
914.589	3176.298	4.747	3181.046	7953.00	14.02	3.05	3184.10	.00	5.28	128.99	8.000	110.000	2.00	0 .0
11.930	.0040					.0123	.15	4.75	1.18	6.46	.030	.00	2.00	TRAP
926.519	3176.346	4.544	3180.890	7953.00	14.70	3.35	3184.24	.00	5.28	128.18	8.000	110.000	2.00	0 .0
13.481	.0040					.0143	.19	4.54	1.26	6.46	.030	.00	2.00	TRAP
940.000	3176.400	4.347	3180.747	7953.00	16.94	4.46	3185.20	.00	5.52	112.00	8.000	112.000	.00	1 4.0
20.000	.0100					.0217	.43	4.35	1.46	5.43	.030	.00	.00	BOX

Program Package Serial Number: 1586
WATER SURFACE PROFILE LISTING   Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD
TRACT NO. 16397, CITY OF VICTORVILLE
FILE: 16397WSPGW10.OUT

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**************************************************************************************************** ********
          | Invert  |  Depth |  Water   |    Q     |  Vel    Vel  |  Energy  | Super |Critical|Flow Top|Height/|Base Wt|     |No Wth
 Station  |  Elev   |  (FT)  |  Elev    |  (CFS)   | (FPS)   Head |  Grd.El. | Elev  | Depth  | Width  |Dia.-FT|or I.D.| ZL  |Prs/Pip
         -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-   -|
 L/Elem   |Ch Slope |        |          |          |       SF Ave|    HF    |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall| ZR  |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|*****|*******
          |         |        |          |          |              |          |       |        |        |       |       |     |
  960.000  3176.600   4.152  3180.752   7953.00   17.74    4.89  3185.64    .00     5.52   112.00    8.000  112.000   .00   1  4.0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
   15.282    .0100                                        .0043      .07    4.15    1.56     3.20    .013      .00   .00  BOX
          |         |        |          |          |              |          |       |        |        |       |       |     |
  975.282  3176.753   4.219  3180.972   7953.00   17.45    4.73  3185.70    .00     5.52   112.00    8.000  112.000   .00   1  4.0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
   36.511    .0100                                        .0039      .14    4.22    1.52     3.20    .013      .00   .00  BOX
          |         |        |          |          |              |          |       |        |        |       |       |     |
 1011.792  3177.118   4.425  3181.543   7953.00   16.64    4.30  3185.84    .00     5.52   112.00    8.000  112.000   .00   1  4.0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
   26.208    .0100                                        .0033      .09    4.43    1.42     3.20    .013      .00   .00  BOX
          |         |        |          |          |              |          |       |        |        |       |       |     |
 1038.000  3177.380   4.641  3182.021   7953.00   15.87    3.91  3185.93    .00     5.52   112.00    8.000  112.000   .00   1  4.0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
TRANS STR   .0342                                         .0027      .06    4.64    1.32             .014      .00   .00  BOX
          |         |        |          |          |              |          |       |        |        |       |       |     |
 1062.000  3178.200   5.365  3183.565   7953.00   12.85    2.56  3186.13    .00     5.37   120.73   10.000  110.000  1.00   0   .0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
          |         |        |          |          |              |          |       |        |        |       |       |     |
 1062.000  3178.200   5.277  3183.477   7953.00   12.50    2.43  3185.90    .00     5.28   131.11   10.000  110.000  2.00   0   .0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
    3.500    .0030                                        .0074      .03    5.28    1.00     7.02    .030      .00  2.00  TRAP
          |         |        |          |          |              |          |       |        |        |       |       |     |
 1065.500  3178.210   5.513  3183.724   7953.00   11.92    2.21  3185.93    .00     5.28   132.05   10.000  110.000  2.00   0   .0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
   13.382    .0030                                        .0064      .09    5.51     .93     7.02    .030      .00  2.00  TRAP
          |         |        |          |          |              |          |       |        |        |       |       |     |
 1078.883  3178.251   5.759  3184.010   7953.00   11.36    2.01  3186.02    .00     5.28   133.04   10.000  110.000  2.00   0   .0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
   14.433    .0030                                        .0057      .08    5.76     .87     7.02    .030      .00  2.00  TRAP
          |         |        |          |          |              |          |       |        |        |       |       |     |
 1093.316  3178.294   5.895  3184.189   7953.00   11.08    1.91  3186.09    .00     5.28   133.58   10.000  110.000  2.00   0   .0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
HYDRAULIC JUMP
          |         |        |          |          |              |          |       |        |        |       |       |     |
 1093.316  3178.294   4.700  3182.994   7953.00   14.17    3.12  3186.11    .00     5.28   128.80   10.000  110.000  2.00   0   .0
        -|-       -|-      -|-        -|-        -|-      -|-   -|-        -|-     -|-      -|-      -|-     -|-     -|-     |-
    6.795    .0030                                        .0123      .08    4.70    1.20     7.02    .030      .00  2.00  TRAP
```

Program Package Serial Number: 1586

WATER SURFACE PROFILE LISTING Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1100.110	3178.315	4.576	3182.891	7953.00	14.59	3.30	3186.19	.00	5.28	128.30	10.000	110.000	2.00	0 .0
12.094	.0030					.0139	.17	4.58	1.25	7.02	.030	.00	2.00	TRAP
1112.205	3178.351	4.378	3182.729	7953.00	15.30	3.63	3186.36	.00	5.28	127.51	10.000	110.000	2.00	0 .0
13.149	.0030					.0162	.21	4.38	1.34	7.02	.030	.00	2.00	TRAP
1125.353	3178.391	4.187	3182.578	7953.00	16.04	4.00	3186.58	.00	5.28	126.75	10.000	110.000	2.00	0 .0
13.760	.0030					.0188	.26	4.19	1.43	7.02	.030	.00	2.00	TRAP
1139.113	3178.432	4.005	3182.437	7953.00	16.83	4.40	3186.83	.00	5.28	126.02	10.000	110.000	2.00	0 .0
14.050	.0030					.0218	.31	4.00	1.53	7.02	.030	.00	2.00	TRAP
1153.164	3178.474	3.830	3182.304	7953.00	17.65	4.84	3187.14	.00	5.28	125.32	10.000	110.000	2.00	0 .0
14.105	.0030					.0254	.36	3.83	1.64	7.02	.030	.00	2.00	TRAP
1167.269	3178.517	3.662	3182.179	7953.00	18.51	5.32	3187.50	.00	5.28	124.65	10.000	110.000	2.00	0 .0
13.988	.0030					.0295	.41	3.66	1.76	7.02	.030	.00	2.00	TRAP
1181.256	3178.559	3.501	3182.060	7953.00	19.41	5.85	3187.91	.00	5.28	124.00	10.000	110.000	2.00	0 .0
13.744	.0030					.0344	.47	3.50	1.88	7.02	.030	.00	2.00	TRAP
1195.000	3178.600	3.347	3181.947	7953.00	20.36	6.44	3188.38	.00	5.28	123.39	10.000	110.000	2.00	0 .0
.704	.2000					.0495	.03	3.35	2.02	2.22	.035	.00	2.00	TRAP
1195.704	3178.740	3.382	3182.123	7953.00	20.14	6.30	3188.42	.00	5.28	123.53	10.000	110.000	2.00	0 .0
2.692	.2000					.0452	.12	3.38	1.98	2.22	.035	.00	2.00	TRAP

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD
TRACT NO. 16397, CITY OF VICTORVILLE
FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth / Type Ch	Prs/Pip
1198.396	3179.279	3.538	3182.817	7953.00	19.20	5.72	3188.54	.00	5.28	124.15	10.000	110.000	2.00	0	.0
2.221	.2000					.0388	.09	3.54	1.85	2.22	.035	.00	2.00	TRAP	
1200.617	3179.723	3.700	3183.424	7953.00	18.31	5.20	3188.63	.00	5.28	124.80	10.000	110.000	2.00	0	.0
1.822	.2000					.0334	.06	3.70	1.73	2.22	.035	.00	2.00	TRAP	
1202.439	3180.088	3.870	3183.958	7953.00	17.45	4.73	3188.69	.00	5.28	125.48	10.000	110.000	2.00	0	.0
1.479	.2000					.0287	.04	3.87	1.61	2.22	.035	.00	2.00	TRAP	
1203.918	3180.384	4.047	3184.430	7953.00	16.64	4.30	3188.73	.00	5.28	126.19	10.000	110.000	2.00	0	.0
1.179	.2000					.0247	.03	4.05	1.51	2.22	.035	.00	2.00	TRAP	
1205.097	3180.619	4.231	3184.850	7953.00	15.87	3.91	3188.76	.00	5.28	126.92	10.000	110.000	2.00	0	.0
.913	.2000					.0213	.02	4.23	1.41	2.22	.035	.00	2.00	TRAP	
1206.011	3180.802	4.423	3185.225	7953.00	15.13	3.55	3188.78	.00	5.28	127.69	10.000	110.000	2.00	0	.0
.676	.2000					.0183	.01	4.42	1.31	2.22	.035	.00	2.00	TRAP	
1206.687	3180.937	4.623	3185.561	7953.00	14.43	3.23	3188.79	.00	5.28	128.49	10.000	110.000	2.00	0	.0
.461	.2000					.0158	.01	4.62	1.23	2.22	.035	.00	2.00	TRAP	
1207.148	3181.030	4.832	3185.862	7953.00	13.75	2.94	3188.80	.00	5.28	129.33	10.000	110.000	2.00	0	.0
.266	.2000					.0136	.00	4.83	1.15	2.22	.035	.00	2.00	TRAP	
1207.414	3181.083	5.050	3186.132	7953.00	13.11	2.67	3188.80	.00	5.28	130.20	10.000	110.000	2.00	0	.0
.086	.2000					.0117	.00	5.05	1.07	2.22	.035	.00	2.00	TRAP	

Program Package Serial Number: 1586
WATER SURFACE PROFILE LISTING Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD
TRACT NO. 16397, CITY OF VICTORVILLE
FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1207.500	3181.100	5.277	3186.377	7953.00	12.50	2.43	3188.80	.00	5.28	131.11	10.000	110.000	2.00	0 .0
3.486	.0030					.0074	.03	5.28	1.00	7.04	.030	.00	2.00	TRAP
1210.986	3181.111	5.513	3186.624	7953.00	11.92	2.21	3188.83	.00	5.28	132.05	10.000	110.000	2.00	0 .0
13.308	.0030					.0064	.08	5.51	.93	7.04	.030	.00	2.00	TRAP
1224.294	3181.150	5.759	3186.909	7953.00	11.36	2.01	3188.91	.00	5.28	133.04	10.000	110.000	2.00	0 .0
29.194	.0030					.0055	.16	5.76	.87	7.04	.030	.00	2.00	TRAP
1253.487	3181.238	6.015	3187.252	7953.00	10.84	1.82	3189.08	.00	5.28	134.06	10.000	110.000	2.00	0 .0
57.034	.0030					.0048	.27	6.01	.82	7.04	.030	.00	2.00	TRAP
1310.521	3181.408	6.281	3187.689	7953.00	10.33	1.66	3189.35	.00	5.28	135.12	10.000	110.000	2.00	0 .0
113.660	.0030					.0041	.47	6.28	.76	7.04	.030	.00	2.00	TRAP
1424.181	3181.748	6.558	3188.306	7953.00	9.85	1.51	3189.81	.00	5.28	136.23	10.000	110.000	2.00	0 .0
30.819	.0030					.0038	.12	6.56	.71	7.04	.030	.00	2.00	TRAP
1455.000	3181.840	6.605	3188.446	7953.00	9.77	1.48	3189.93	.00	5.28	136.42	10.000	110.000	2.00	0 .0
15.058	.0127					.0040	.06	6.61	.71	4.60	.030	.00	2.00	TRAP
1470.058	3182.031	6.327	3188.357	7953.00	10.25	1.63	3189.99	.00	5.28	135.31	10.000	110.000	2.00	0 .0
8.621	.0127					.0045	.04	6.33	.75	4.60	.030	.00	2.00	TRAP
1478.679	3182.140	6.155	3188.295	7953.00	10.56	1.73	3190.03	.00	5.28	134.62	10.000	110.000	2.00	0 .0

HYDRAULIC JUMP

Program Package Serial Number: 1586

WATER SURFACE PROFILE LISTING Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1478.679	3182.140	4.480	3186.620	7953.00	14.92	3.46	3190.08	.00	5.28	127.92	10.000	110.000	2.00	0 .0
51.033	.0127					.0144	.73	4.48	1.29	4.60	.030	.00	2.00	TRAP
1529.712	3182.786	4.378	3187.164	7953.00	15.30	3.63	3190.80	.00	5.28	127.51	10.000	110.000	2.00	0 .0
49.364	.0127					.0162	.80	4.38	1.34	4.60	.030	.00	2.00	TRAP
1579.077	3183.412	4.187	3187.599	7953.00	16.04	4.00	3191.60	.00	5.28	126.75	10.000	110.000	2.00	0 .0
35.446	.0127					.0188	.67	4.19	1.43	4.60	.030	.00	2.00	TRAP
1614.523	3183.861	4.005	3187.865	7953.00	16.83	4.40	3192.26	.00	5.28	126.02	10.000	110.000	2.00	0 .0
28.830	.0127					.0218	.63	4.00	1.53	4.60	.030	.00	2.00	TRAP
1643.353	3184.226	3.830	3188.056	7953.00	17.65	4.84	3192.89	.00	5.28	125.32	10.000	110.000	2.00	0 .0
24.800	.0127					.0254	.63	3.83	1.64	4.60	.030	.00	2.00	TRAP
1668.153	3184.540	3.662	3188.202	7953.00	18.51	5.32	3193.52	.00	5.28	124.65	10.000	110.000	2.00	0 .0
21.990	.0127					.0295	.65	3.66	1.76	4.60	.030	.00	2.00	TRAP
1690.143	3184.819	3.501	3188.320	7953.00	19.41	5.85	3194.17	.00	5.28	124.00	10.000	110.000	2.00	0 .0
19.857	.0127					.0344	.68	3.50	1.88	4.60	.030	.00	2.00	TRAP
1710.000	3185.070	3.347	3188.417	7953.00	20.36	6.44	3194.85	.00	5.28	123.39	10.000	110.000	2.00	0 .0
.704	.2000					.0495	.03	3.35	2.02	2.22	.035	.00	2.00	TRAP
1710.704	3185.210	3.382	3188.593	7953.00	20.14	6.30	3194.89	.00	5.28	123.53	10.000	110.000	2.00	0 .0
2.692	.2000					.0452	.12	3.38	1.98	2.22	.035	.00	2.00	TRAP

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1713.396	3185.749	3.538	3189.287	7953.00	19.20	5.72	3195.01	.00	5.28	124.15	10.000	110.000	2.00	0 .0
2.221	.2000					.0388	.09	3.54	1.85	2.22	.035	.00	2.00	TRAP
1715.617	3186.193	3.700	3189.894	7953.00	18.31	5.20	3195.10	.00	5.28	124.80	10.000	110.000	2.00	0 .0
1.822	.2000					.0334	.06	3.70	1.73	2.22	.035	.00	2.00	TRAP
1717.439	3186.558	3.870	3190.427	7953.00	17.45	4.73	3195.16	.00	5.28	125.48	10.000	110.000	2.00	0 .0
1.479	.2000					.0287	.04	3.87	1.61	2.22	.035	.00	2.00	TRAP
1718.918	3186.854	4.047	3190.900	7953.00	16.64	4.30	3195.20	.00	5.28	126.19	10.000	110.000	2.00	0 .0
1.179	.2000					.0247	.03	4.05	1.51	2.22	.035	.00	2.00	TRAP
1720.097	3187.089	4.231	3191.320	7953.00	15.87	3.91	3195.23	.00	5.28	126.92	10.000	110.000	2.00	0 .0
.913	.2000					.0213	.02	4.23	1.41	2.22	.035	.00	2.00	TRAP
1721.011	3187.272	4.423	3191.695	7953.00	15.13	3.55	3195.25	.00	5.28	127.69	10.000	110.000	2.00	0 .0
.676	.2000					.0183	.01	4.42	1.31	2.22	.035	.00	2.00	TRAP
1721.687	3187.407	4.623	3192.031	7953.00	14.43	3.23	3195.26	.00	5.28	128.49	10.000	110.000	2.00	0 .0
.461	.2000					.0158	.01	4.62	1.23	2.22	.035	.00	2.00	TRAP
1722.148	3187.500	4.832	3192.332	7953.00	13.75	2.94	3195.27	.00	5.28	129.33	10.000	110.000	2.00	0 .0
.266	.2000					.0136	.00	4.83	1.15	2.22	.035	.00	2.00	TRAP
1722.414	3187.553	5.050	3192.602	7953.00	13.11	2.67	3195.27	.00	5.28	130.20	10.000	110.000	2.00	0 .0
.086	.2000					.0117	.00	5.05	1.07	2.22	.035	.00	2.00	TRAP

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD
TRACT NO. 16397, CITY OF VICTORVILLE
FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1722.500	3187.570	5.277	3192.847	7953.00	12.50	2.43	3195.27	.00	5.28	131.11	10.000	110.000	2.00	0 .0
3.486	.0030					.0074	.03	5.28	1.00	7.04	.030	.00	2.00	TRAP
1725.986	3187.581	5.513	3193.094	7953.00	11.92	2.21	3195.30	.00	5.28	132.05	10.000	110.000	2.00	0 .0
13.308	.0030					.0064	.08	5.51	.93	7.04	.030	.00	2.00	TRAP
1739.294	3187.620	5.759	3193.379	7953.00	11.36	2.01	3195.38	.00	5.28	133.04	10.000	110.000	2.00	0 .0
29.194	.0030					.0055	.16	5.76	.87	7.04	.030	.00	2.00	TRAP
1768.487	3187.708	6.015	3193.722	7953.00	10.84	1.82	3195.55	.00	5.28	134.06	10.000	110.000	2.00	0 .0
57.034	.0030					.0048	.27	6.01	.82	7.04	.030	.00	2.00	TRAP
1825.521	3187.878	6.281	3194.159	7953.00	10.33	1.66	3195.82	.00	5.28	135.12	10.000	110.000	2.00	0 .0
70.772	.0030					.0042	.30	6.28	.76	7.04	.030	.00	2.00	TRAP
1896.293	3188.090	6.458	3194.548	7953.00	10.02	1.56	3196.11	.00	5.28	135.83	10.000	110.000	2.00	0 .0
HYDRAULIC JUMP														
1896.293	3188.090	4.241	3192.331	7953.00	15.83	3.89	3196.22	.00	5.28	126.96	10.000	110.000	2.00	0 .0
4.120	.0030					.0170	.07	4.24	1.40	7.04	.030	.00	2.00	TRAP
1900.413	3188.102	4.187	3192.289	7953.00	16.04	4.00	3196.29	.00	5.28	126.75	10.000	110.000	2.00	0 .0
13.744	.0030					.0188	.26	4.19	1.43	7.04	.030	.00	2.00	TRAP
1914.157	3188.143	4.005	3192.148	7953.00	16.83	4.40	3196.54	.00	5.28	126.02	10.000	110.000	2.00	0 .0
14.036	.0030					.0218	.31	4.00	1.53	7.04	.030	.00	2.00	TRAP

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD
TRACT NO. 16397, CITY OF VICTORVILLE
FILE: 16397WSPGW10.OUT

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth	Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
1928.193	3188.185	3.830	3192.015	7953.00	17.65	4.84	3196.85	.00	5.28	125.32	10.000	110.000	2.00	0	.0
14.093	.0030					.0254	.36	3.83	1.64	7.04	.030	.00	2.00	TRAP	
1942.287	3188.227	3.662	3191.889	7953.00	18.51	5.32	3197.21	.00	5.28	124.65	10.000	110.000	2.00	0	.0
13.978	.0030					.0295	.41	3.66	1.76	7.04	.030	.00	2.00	TRAP	
1956.264	3188.269	3.501	3191.770	7953.00	19.41	5.85	3197.62	.00	5.28	124.00	10.000	110.000	2.00	0	.0
13.736	.0030					.0344	.47	3.50	1.88	7.04	.030	.00	2.00	TRAP	
1970.000	3188.310	3.347	3191.657	7953.00	20.36	6.44	3198.09	.00	5.28	123.39	10.000	110.000	2.00	0	.0
.704	.2000					.0495	.03	3.35	2.02	2.22	.035	.00	2.00	TRAP	
1970.704	3188.450	3.382	3191.833	7953.00	20.14	6.30	3198.13	.00	5.28	123.53	10.000	110.000	2.00	0	.0
2.692	.2000					.0452	.12	3.38	1.98	2.22	.035	.00	2.00	TRAP	
1973.396	3188.989	3.538	3192.527	7953.00	19.20	5.72	3198.25	.00	5.28	124.15	10.000	110.000	2.00	0	.0
2.221	.2000					.0388	.09	3.54	1.85	2.22	.035	.00	2.00	TRAP	
1975.617	3189.433	3.700	3193.134	7953.00	18.31	5.20	3198.34	.00	5.28	124.80	10.000	110.000	2.00	0	.0
1.822	.2000					.0334	.06	3.70	1.73	2.22	.035	.00	2.00	TRAP	
1977.439	3189.798	3.870	3193.667	7953.00	17.45	4.73	3198.40	.00	5.28	125.48	10.000	110.000	2.00	0	.0
1.479	.2000					.0287	.04	3.87	1.61	2.22	.035	.00	2.00	TRAP	
1978.918	3190.094	4.047	3194.140	7953.00	16.64	4.30	3198.44	.00	5.28	126.19	10.000	110.000	2.00	0	.0
1.179	.2000					.0247	.03	4.05	1.51	2.22	.035	.00	2.00	TRAP	

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Program Package Serial Number: 1586

WATER SURFACE PROFILE LISTING   Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1980.097	3190.329	4.231	3194.560	7953.00	15.87	3.91	3198.47	.00	5.28	126.92	10.000	110.000	2.00	0 .0
.913	.2000					.0213	.02	4.23	1.41	2.22	.035	.00	2.00	TRAP
1981.011	3190.512	4.423	3194.935	7953.00	15.13	3.55	3198.49	.00	5.28	127.69	10.000	110.000	2.00	0 .0
.676	.2000					.0183	.01	4.42	1.31	2.22	.035	.00	2.00	TRAP
1981.687	3190.647	4.623	3195.271	7953.00	14.43	3.23	3198.50	.00	5.28	128.49	10.000	110.000	2.00	0 .0
.461	.2000					.0158	.01	4.62	1.23	2.22	.035	.00	2.00	TRAP
1982.148	3190.740	4.832	3195.572	7953.00	13.75	2.94	3198.51	.00	5.28	129.33	10.000	110.000	2.00	0 .0
.266	.2000					.0136	.00	4.83	1.15	2.22	.035	.00	2.00	TRAP
1982.414	3190.793	5.050	3195.842	7953.00	13.11	2.67	3198.51	.00	5.28	130.20	10.000	110.000	2.00	0 .0
.086	.2000					.0117	.00	5.05	1.07	2.22	.035	.00	2.00	TRAP
1982.500	3190.810	5.277	3196.087	7953.00	12.50	2.43	3198.51	.00	5.28	131.11	10.000	110.000	2.00	0 .0
3.486	.0030					.0074	.03	5.28	1.00	7.03	.030	.00	2.00	TRAP
1985.986	3190.821	5.513	3196.334	7953.00	11.92	2.21	3198.54	.00	5.28	132.05	10.000	110.000	2.00	0 .0
13.312	.0030					.0064	.08	5.51	.93	7.03	.030	.00	2.00	TRAP
1999.298	3190.860	5.759	3196.619	7953.00	11.36	2.01	3198.62	.00	5.28	133.04	10.000	110.000	2.00	0 .0
29.205	.0030					.0055	.16	5.76	.87	7.03	.030	.00	2.00	TRAP
2028.503	3190.948	6.015	3196.962	7953.00	10.84	1.82	3198.79	.00	5.28	134.06	10.000	110.000	2.00	0 .0
57.065	.0030					.0048	.27	6.01	.82	7.03	.030	.00	2.00	TRAP

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2085.569	3191.118	6.281	3197.399	7953.00	10.33	1.66	3199.06	.00	5.28	135.12	10.000	110.000	2.00	0 .0
94.233	.0030					.0041	.39	6.28	.76	7.03	.030	.00	2.00	TRAP
2179.802	3191.400	6.514	3197.914	7953.00	9.92	1.53	3199.44	.00	5.28	136.05	10.000	110.000	2.00	0 .0
HYDRAULIC JUMP														
2179.802	3191.400	4.201	3195.601	7953.00	15.99	3.97	3199.57	.00	5.28	126.80	10.000	110.000	2.00	0 .0
.612	.0030					.0172	.01	4.20	1.42	7.03	.030	.00	2.00	TRAP
2180.413	3191.402	4.193	3195.595	7953.00	16.02	3.99	3199.58	.00	5.28	126.77	10.000	110.000	2.00	0 .0
13.731	.0030					.0187	.26	4.19	1.43	7.03	.030	.00	2.00	TRAP
2194.144	3191.443	4.010	3195.454	7953.00	16.80	4.38	3199.84	.00	5.28	126.04	10.000	110.000	2.00	0 .0
14.032	.0030					.0217	.31	4.01	1.53	7.03	.030	.00	2.00	TRAP
2208.176	3191.485	3.835	3195.320	7953.00	17.62	4.82	3200.14	.00	5.28	125.34	10.000	110.000	2.00	0 .0
14.095	.0030					.0253	.36	3.84	1.64	7.03	.030	.00	2.00	TRAP
2222.271	3191.527	3.667	3195.195	7953.00	18.48	5.30	3200.50	.00	5.28	124.67	10.000	110.000	2.00	0 .0
13.984	.0030					.0294	.41	3.67	1.75	7.03	.030	.00	2.00	TRAP
2236.255	3191.569	3.506	3195.075	7953.00	19.39	5.84	3200.91	.00	5.28	124.02	10.000	110.000	2.00	0 .0
13.745	.0030					.0342	.47	3.51	1.88	7.03	.030	.00	2.00	TRAP
2250.000	3191.610	3.352	3194.962	7953.00	20.33	6.42	3201.38	.00	5.28	123.41	10.000	110.000	2.00	0 .0
2.517	.1848					.0473	.12	3.35	2.01	2.27	.035	.00	2.00	TRAP

Program Package Serial Number: 1586

WATER SURFACE PROFILE LISTING Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGW10.OUT

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2252.517	3192.075	3.474	3195.549	7953.00	19.58	5.95	3201.50	.00	5.28	123.90	10.000	110.000	2.00	0 .0
2.657	.1848					.0413	.11	3.47	1.91	2.27	.035	.00	2.00	TRAP
2255.175	3192.566	3.634	3196.200	7953.00	18.67	5.41	3201.61	.00	5.28	124.53	10.000	110.000	2.00	0 .0
2.179	.1848					.0355	.08	3.63	1.78	2.27	.035	.00	2.00	TRAP
2257.354	3192.969	3.800	3196.769	7953.00	17.80	4.92	3201.69	.00	5.28	125.20	10.000	110.000	2.00	0 .0
1.772	.1848					.0305	.05	3.80	1.66	2.27	.035	.00	2.00	TRAP
2259.125	3193.296	3.974	3197.270	7953.00	16.97	4.47	3201.74	.00	5.28	125.90	10.000	110.000	2.00	0 .0
1.421	.1848					.0263	.04	3.97	1.55	2.27	.035	.00	2.00	TRAP
2260.546	3193.559	4.155	3197.714	7953.00	16.18	4.06	3201.78	.00	5.28	126.62	10.000	110.000	2.00	0 .0
1.113	.1848					.0226	.03	4.15	1.45	2.27	.035	.00	2.00	TRAP
2261.660	3193.765	4.344	3198.109	7953.00	15.43	3.69	3201.80	.00	5.28	127.38	10.000	110.000	2.00	0 .0
.840	.1848					.0195	.02	4.34	1.35	2.27	.035	.00	2.00	TRAP
2262.500	3193.920	4.541	3198.460	7953.00	14.71	3.36	3201.82	.00	5.28	128.16	10.000	110.000	2.00	0 .0
6.415	.0030					.0094	.06	4.54	1.26	6.29	.025	.00	2.00	TRAP
2268.916	3193.939	4.475	3198.414	7953.00	14.94	3.47	3201.88	.00	5.28	127.90	10.000	110.000	2.00	0 .0
20.628	.0030					.0104	.22	4.48	1.29	6.29	.025	.00	2.00	TRAP
2289.543	3194.002	4.281	3198.283	7953.00	15.67	3.81	3202.10	.00	5.28	127.12	10.000	110.000	2.00	0 .0
21.484	.0030					.0121	.26	4.28	1.38	6.29	.025	.00	2.00	TRAP

WATER SURFACE PROFILE LISTING Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD
TRACT NO. 16397, CITY OF VICTORVILLE
FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2311.028	3194.067	4.094	3198.162	7953.00	16.43	4.19	3202.36	.00	5.28	126.38	10.000	110.000	2.00	0 .0
21.804	.0030					.0141	.31	4.09	1.48	6.29	.025	.00	2.00	TRAP
2332.832	3194.134	3.916	3198.050	7953.00	17.24	4.61	3202.66	.00	5.28	125.66	10.000	110.000	2.00	0 .0
21.758	.0030					.0164	.36	3.92	1.59	6.29	.025	.00	2.00	TRAP
2354.590	3194.200	3.744	3197.945	7953.00	18.08	5.07	3203.02	.00	5.28	124.98	10.000	110.000	2.00	0 .0
253.142	.0176					.0176	4.46	3.74	1.70	3.74	.025	.00	2.00	TRAP
2607.733	3198.656	3.744	3202.400	7953.00	18.08	5.07	3207.47	.00	5.28	124.98	10.000	110.000	2.00	0 .0
236.108	.0176					.0167	3.94	3.74	1.70	3.74	.025	.00	2.00	TRAP
2843.841	3202.812	3.870	3206.681	7953.00	17.45	4.73	3211.41	.00	5.28	125.48	10.000	110.000	2.00	0 .0
85.844	.0176					.0147	1.26	3.87	1.61	3.74	.025	.00	2.00	TRAP
2929.685	3204.323	4.047	3208.369	7953.00	16.64	4.30	3212.67	.00	5.28	126.19	10.000	110.000	2.00	0 .0
41.355	.0176					.0126	.52	4.05	1.51	3.74	.025	.00	2.00	TRAP
2971.040	3205.050	4.231	3209.281	7953.00	15.87	3.91	3213.19	.00	5.28	126.92	10.000	110.000	2.00	0 .0
24.172	.0176					.0108	.26	4.23	1.41	3.74	.025	.00	2.00	TRAP
2995.212	3205.476	4.423	3209.899	7953.00	15.13	3.55	3213.45	.00	5.28	127.69	10.000	110.000	2.00	0 .0
14.862	.0176					.0093	.14	4.42	1.31	3.74	.025	.00	2.00	TRAP
3010.074	3205.737	4.623	3210.361	7953.00	14.43	3.23	3213.59	.00	5.28	128.49	10.000	110.000	2.00	0 .0
8.891	.0176					.0080	.07	4.62	1.23	3.74	.025	.00	2.00	TRAP

Program Package Serial Number: 1586

WATER SURFACE PROFILE LISTING Date: 3-14-2017 Time: 4:23:43

WSPGW LINE "A" PROPOSED CHANNEL AND CULVERT ACROSS DOS PALMAS ROAD

TRACT NO. 16397, CITY OF VICTORVILLE

FILE: 16397WSPGW10.OUT

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
3018.965	3205.894	4.832	3210.726	7953.00	13.75	2.94	3213.66	.00	5.28	129.33	10.000	110.000	2.00	0 .0
4.642	.0176					.0069	.03	4.83	1.15	3.74	.025	.00	2.00	TRAP
3023.607	3205.976	5.050	3211.025	7953.00	13.11	2.67	3213.70	.00	5.28	130.20	10.000	110.000	2.00	0 .0
1.393	.0176					.0060	.01	5.05	1.07	3.74	.025	.00	2.00	TRAP
3025.000	3206.000	5.277	3211.277	7953.00	12.50	2.43	3213.70	.00	5.28	131.11	10.000	110.000	2.00	0 .0

SOUTHWEST OFFSITE
INTERIM TRAPEZOIDAL CHANNEL
OUTFLOW TO MAIN CHANNEL

```
  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 7.0
--------------------------------------------------------------------
SOUTHWEST PROPERTY OFFSITE DIVERSION CHANNEL FLOW TO MAIN CHANNEL
TR 16397, CITY OF VICTORVILLE
TRAPEZOIDAL CHANNEL BOTTOM= 3' SIDE SLOPE 5:1 Q100= 38.3CFS
FILE: TR16397OFFSITECHANNEL1.OUT
--------------------------------------------------------------------


Program License Serial Number 4070

--------------------------------------------------------------------
           *** Improved Channel Analysis ***

      Upstream (headworks) Elevation =   3203.000(Ft.)
      Downstream (outlet) Elevation =   3199.000(Ft.)
      Runoff/Flow Distance =    740.000(Ft.)
      Maximum flow rate in channel(s) =     38.300(CFS)
--------------------------------------------------------------------




--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

*** CALCULATED DEPTH DATA AT FLOW =   38.30(CFS) ***
Channel base width  =    3.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Manning's 'N'    = 0.022
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru channel =     38.300(CFS)
Depth of flow =   1.144(Ft.)
Average velocity =   3.840(Ft/s)
Total flow rate in 1/2 street =  38.300(CFS)
Channel flow top width =   14.438(Ft.)
Depth of flow in channel =   1.14(Ft.)

Total number of channels (same dimensions) = 1
Flow Velocity =    3.84(Ft/s)
Individual channel flow =   38.300(CFS)
Total capacity of channel(s) =     38.300(CFS)

Sub-Channel No. 1 Critical depth =      1.031(Ft.)
  '     '       '     Critical flow top width =     13.313(Ft.)
  '     '       '     Critical flow velocity=    4.553(Ft/s)
  '     '       '     Critical flow area =      8.411(Sq.Ft)

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

```
  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 7.0
--------------------------------------------------------------------
```

SOUTHWEST PROPERTY OFFSITE DIVERSION CHANNEL FLOW TO MAIN CHANNEL
TR 16397, CITY OF VICTORVILLE
TRAPEZOIDAL CHANNEL BOTTOM= 3' SIDE SLOPE 5:1 MAX.FLOW= 148 CFS
FILE: TR16397OFFSITECHANNEL1.OUT

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

Program License Serial Number 4070

--------------------------------------------------------------------
           *** Improved Channel Analysis ***

     Upstream (headworks) Elevation =   3203.000(Ft.)
     Downstream (outlet) Elevation =   3198.000(Ft.)
     Runoff/Flow Distance =    740.000(Ft.)
     Maximum flow rate in channel(s) =    147.900(CFS)
--------------------------------------------------------------------

--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

***** CALCULATED DEPTH DATA AT FLOW = 147.90(CFS) *****

```
Channel base width  =    3.000(Ft.)
Slope or 'Z' of left channel bank =   5.000
Slope or 'Z' of right channel bank =   5.000
Manning's 'N'    = 0.022
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru channel =    147.900(CFS)
```

Depth of flow =   1.961(Ft.)

```
Average velocity =   5.888(Ft/s)
Total flow rate in 1/2 street = 147.900(CFS)
Channel flow top width =   22.614(Ft.)
Depth of flow in channel =   1.96(Ft.)

Total number of channels (same dimensions) = 1
```

Flow Velocity =   5.89(Ft/s)
Individual channel flow = 147.900(CFS)
Total capacity of channel(s) =   147.900(CFS)

```
Sub-Channel No. 1 Critical depth =      1.953(Ft.)
  '     '       '     Critical flow top width =     22.531(Ft.)
  '     '       '     Critical flow velocity=    5.932(Ft/s)
  '     '       '     Critical flow area =     24.933(Sq.Ft)

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

```
  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 7.0
--------------------------------------------------------------------
```

SOUTHWEST BOUNDARY OFFSITE EXISTING DIRT CHANNEL
TR 16397, CITY OF VICTORVILLE
MAX. FLOW CAPACITY - UPSTREAM OFFSITE FLOWLINE
FILE: TR16397OFFSITECHANNEL1B.OUT

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


Program License Serial Number 4070

--------------------------------------------------------------------
           *** Irregular Channel Analysis ***

      Upstream (headworks) Elevation =   3203.000(Ft.)
      Downstream (outlet) Elevation =   3199.000(Ft.)
      Runoff/Flow Distance =    740.000(Ft.)
      Maximum depth(HGL) of flow at headworks =      0.690(Ft.)
--------------------------------------------------------------------
```

Depth of flow =   0.690(Ft.)
Average velocity =   2.042(Ft/s)
Total flow rate in 1/2 street = 147.914(CFS)

```
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              0.69
      2             70.75              0.01
      3             93.29              0.00
      4            123.31              0.12
      5            172.56              0.69
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =    147.914(CFS)
  '     '   flow top width =    172.560(Ft.)
  '     '    wetted perimeter =    172.567(Ft.)
  '     '   velocity=    2.042(Ft/s)
  '     '   area =     72.444(Sq.Ft)
  '     '   Froude number =     0.555

Upstream point elevation = 3203.000(Ft.)
Downstream point elevation = 3199.000(Ft.)
Flow length =   740.000(Ft.)
```

Depth of flow =   0.690(Ft.)
Average velocity =   2.042(Ft/s)

```
Total irregular channel flow =   147.914(CFS)
Irregular channel normal depth above invert elev. =   0.690(Ft.)
Average velocity of channel(s) =   2.042(Ft/s)
-----------------------------------------------------------------
```

EXHIBIT 1

ONSITE POST-DEVELOPED CONDITION
DRAINAGE MAP

TR. No. 16397 ONSITE DRAINAGE MAP POST-DEVELOPED CONDITION CITY OF VICTORVILLE

June 11, 2018

EXHIBIT 1

EXHIBIT 2

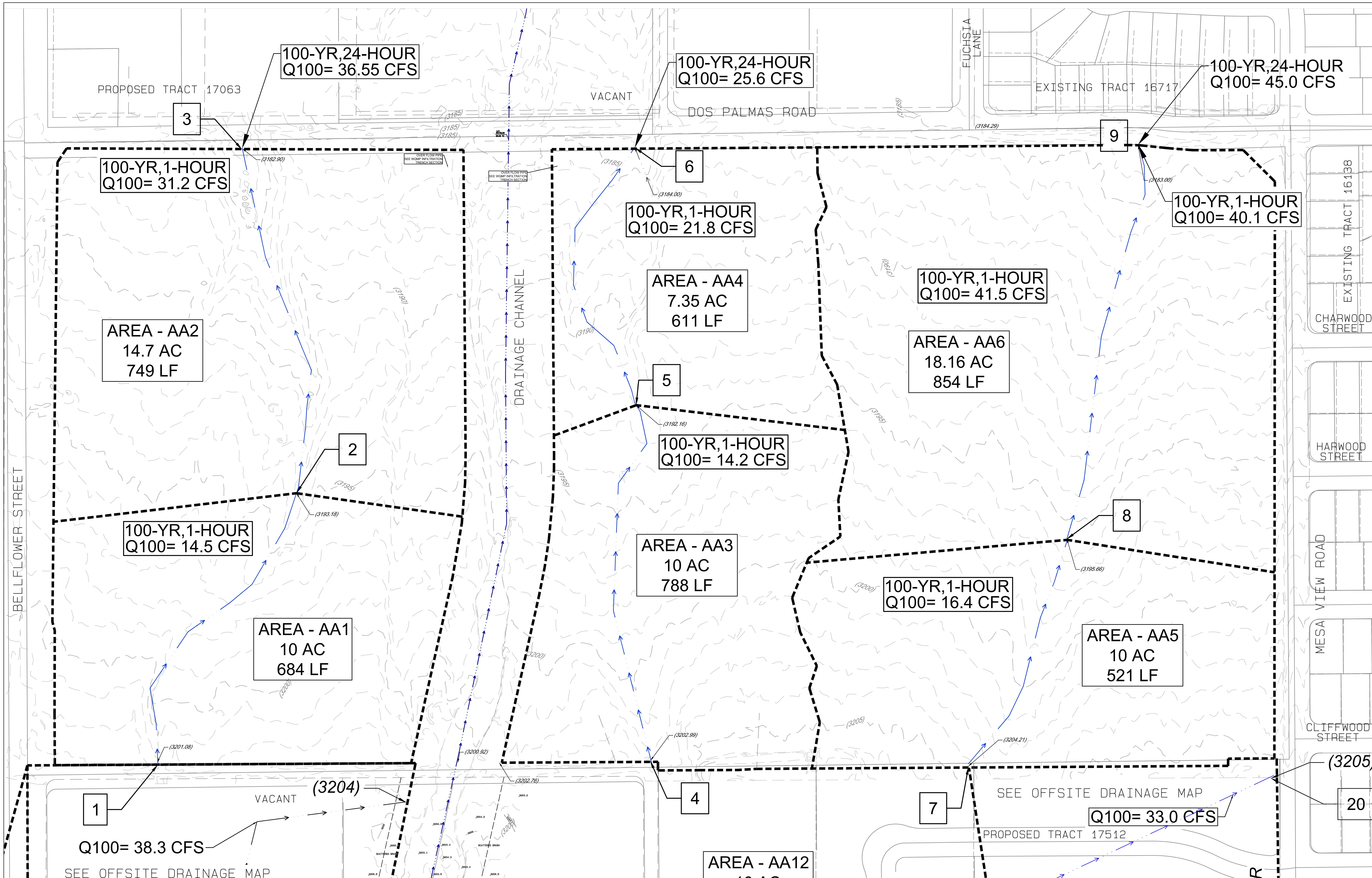
ONSITE PRE-DEVELOPED DRAINAGE MAP

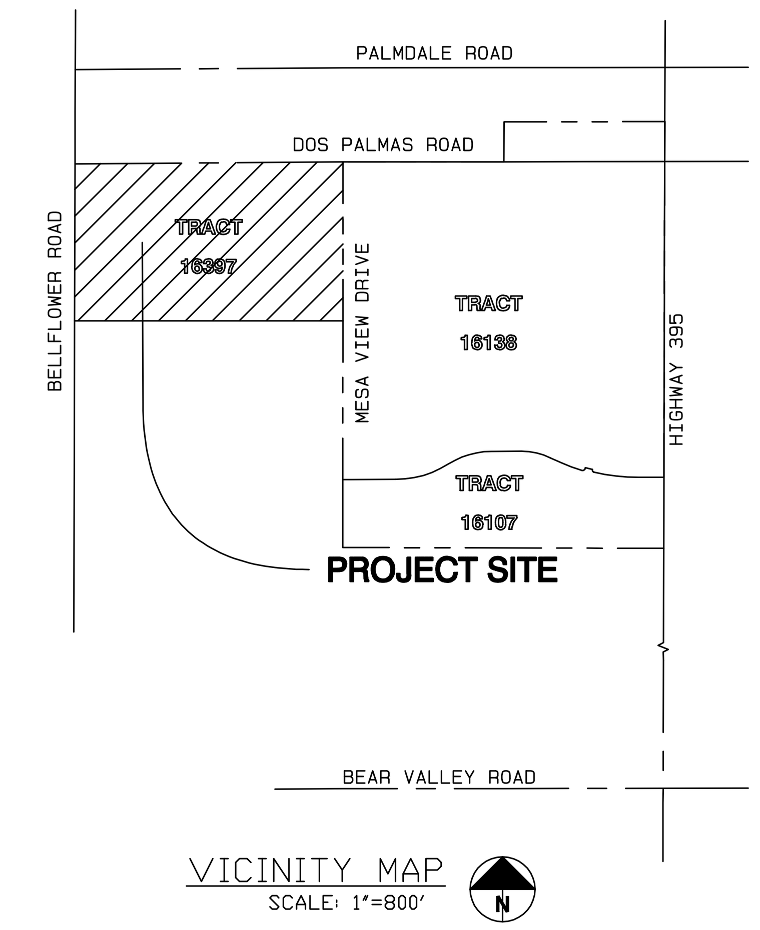
IN THE CITY OF VICTORVILLE,
COUNTY OF SAN BERNARDINO, CALIFORNIA
VESTING TENTATIVE MAP

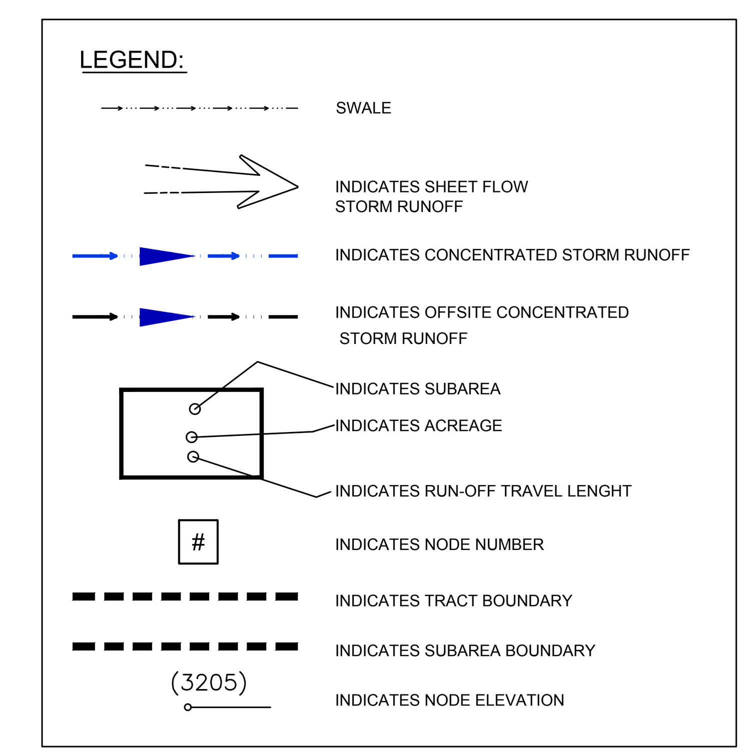
TRACT NO. 16397

BEING A SUBDIVISION OF THE NORTH 1/2 OF THE NORTHWEST 1/4 OF SECTION 28, TOWNSHIP 5N, RANGE 5W, S.B.B. & M.

LUDWIG ENGINEERING DEC, 2017







PLAN

0 100' 200'

N

TR. No. 16397 ONSITE DRAINAGE MAP PRE-DEVELOPED CONDITION DECEMBER 8, 2017

EXHIBIT 3

REGISTERED PROFESSIONAL ENGINEER
JIMMY J. FRY
NO. C040692
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

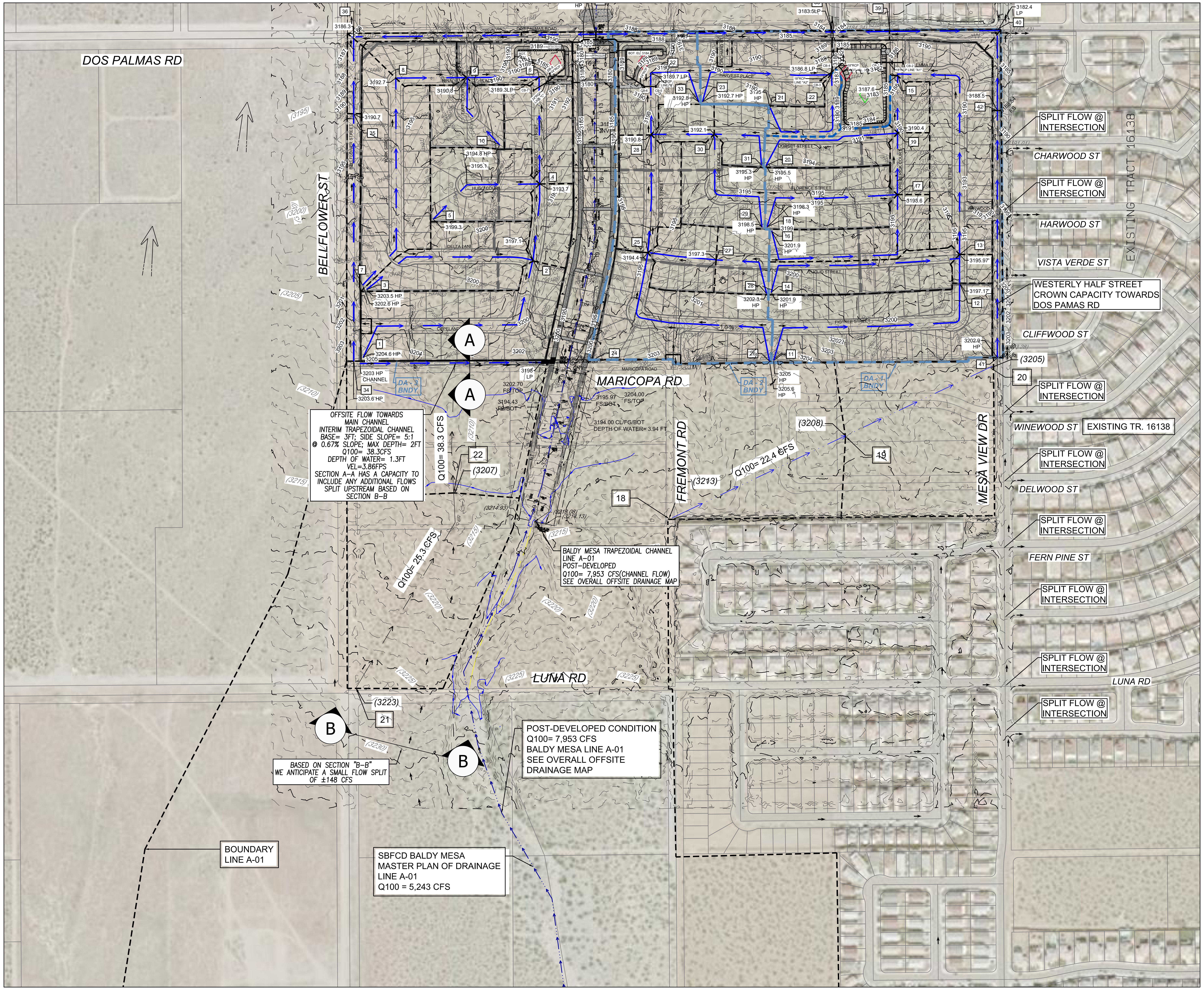
Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning

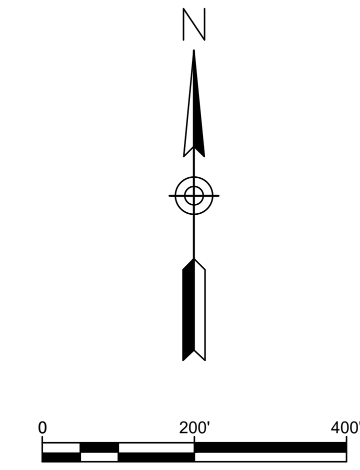
109 East Third Street, San Bernardino, CA 92410, Phone: 909-884-8217, Fax: 909-889-0153
5890 Hwy. 95, Ste. B, Fort Mohave, AZ 86426, Phone: 928-768-1857, Fax: 928-768-7086
15252 Seneca Rd., Victorville, CA 92392, Phone: 760-951-7676, Fax: 760-241-0573
2126 McCulloch Blvd., Ste. 8, Lake Havasu City, AZ 86403, Phone: 928-680-6060, Fax: 928-854-6530

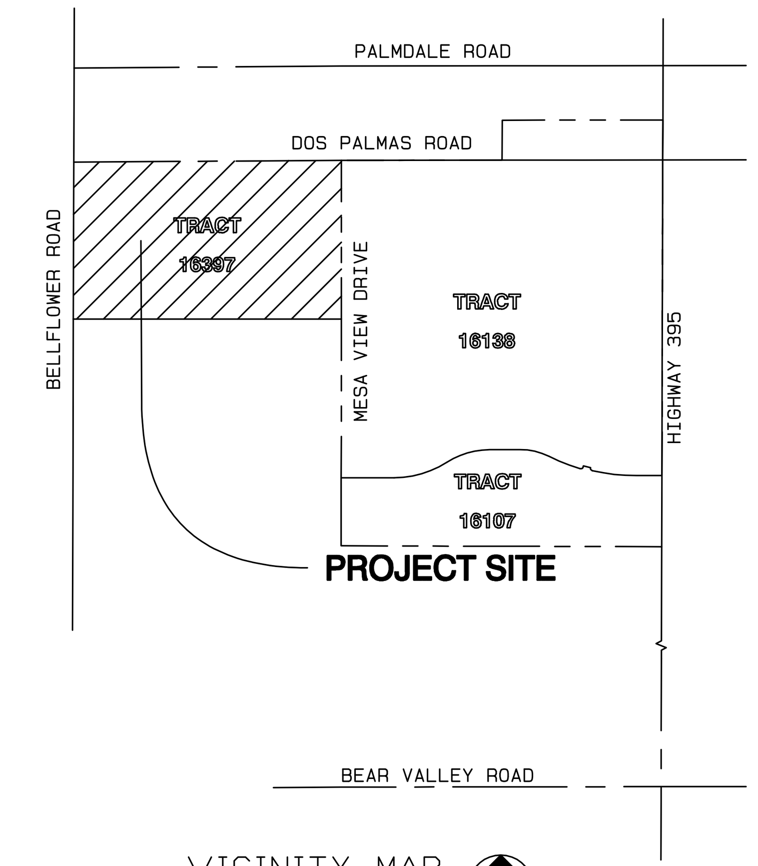
V:\plans\TR. 16397 (RY)\CAD\TT16397_Onsite_Drainage_Map_11-17-2017.dwg 12/8/2017 3:03:01 PM

EXHIBIT 3

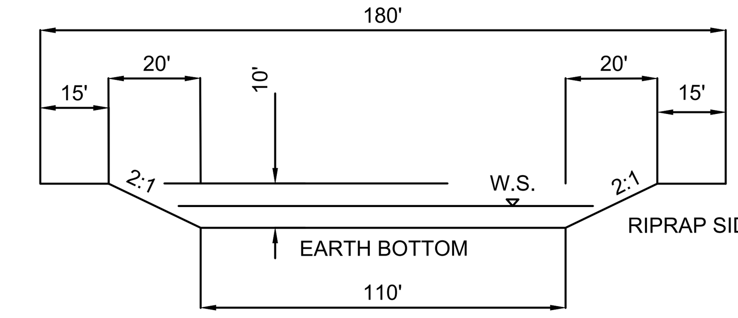
INTERIM OFFSITE EXISTING CONDITION DRAINAGE MAP



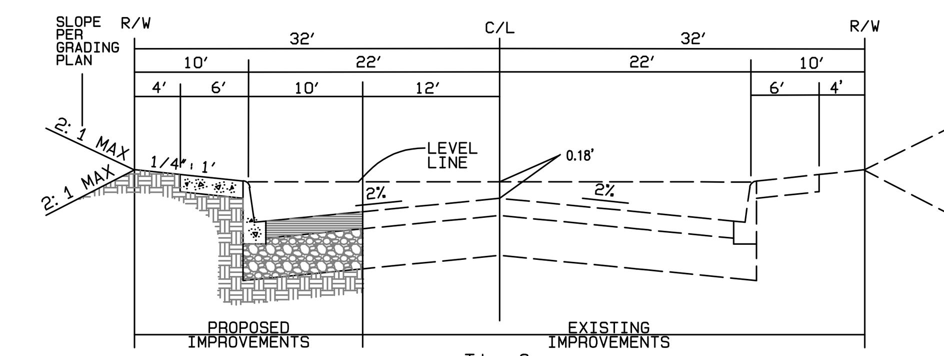




VICINITY MAP
SCALE: 1"=800'



TYPICAL SECTION A-A PROPOSED CHANNEL
N.T.S.



MESA VIEW ROAD
~~TYPICAL SECTION~~ (64' R/W)

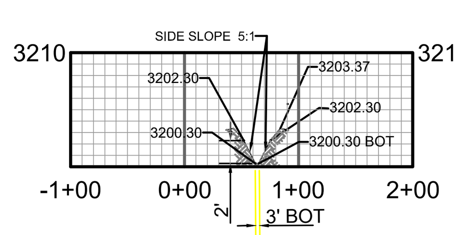
LEGEND:

- SWALE
- INDICATES SHEET FLOW STORM RUNOFF
- INDICATES CONCENTRATED STORM RUNOFF
- INDICATES OFFSITE CONCENTRATED STORM RUNOFF
- INDICATES SUBAREA
- INDICATES ACREAGE
- INDICATES RUN-OFF TRAVEL LENGHT
- INDICATES NODE NUMBER
- INDICATES TRACT BOUNDARY
- INDICATES SUBAREA BOUNDARY
- (3205) INDICATES NODE ELEVATION
- INDICATES DEVELOPED AREAS

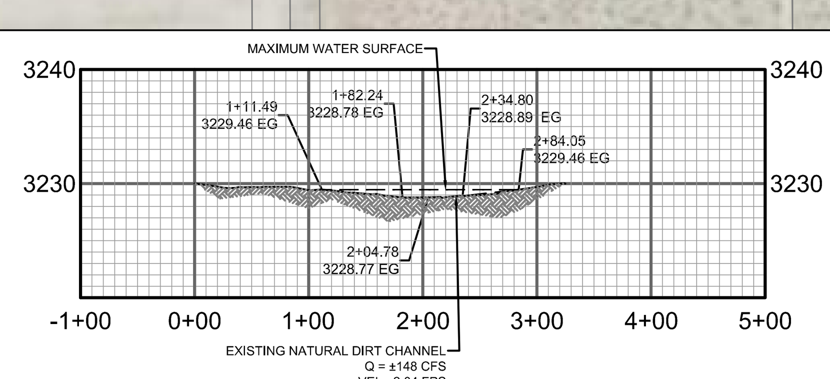
TR. No. 16397
OFFSITE DRAINAGE MAP
CITY OF VICTORVILLE
EXISTING CONDITION
June 11, 2018

EXHIBIT 3

PLOT DATE: July 10, 2018



SECTION "A-A"
N.T.S.



SECTION "B-B"
N.T.S.

REGISTERED PROFESSIONAL ENGINEER
JIMMY J. FRY
NO. C040692
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

REV.	DESCRIPTION	DATE	BY

Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning
109 East Third Street, San Bernardino, CA 92410, Phone: 909-884-8217, Fax: 909-889-0153
5890 Hwy. 95, Ste. B, Fort Mohave, AZ 86426, Phone: 928-768-1857, Fax: 928-768-7086
15252 Seneca Rd., Victorville, CA 92392, Phone: 760-951-7676, Fax: 760-241-0573
2126 McCulloch Blvd., Ste. 8, Lake Havasu City, AZ 86403, Phone: 928-680-6060, Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397
OFFSITE EXISTING CONDITION

CLIENT:
R.Y. PROPERTIES
####

DESIGNED BY:	DRAWN BY:	CHECKED BY:
JC	LC	JF

SCALE 1" : 200'

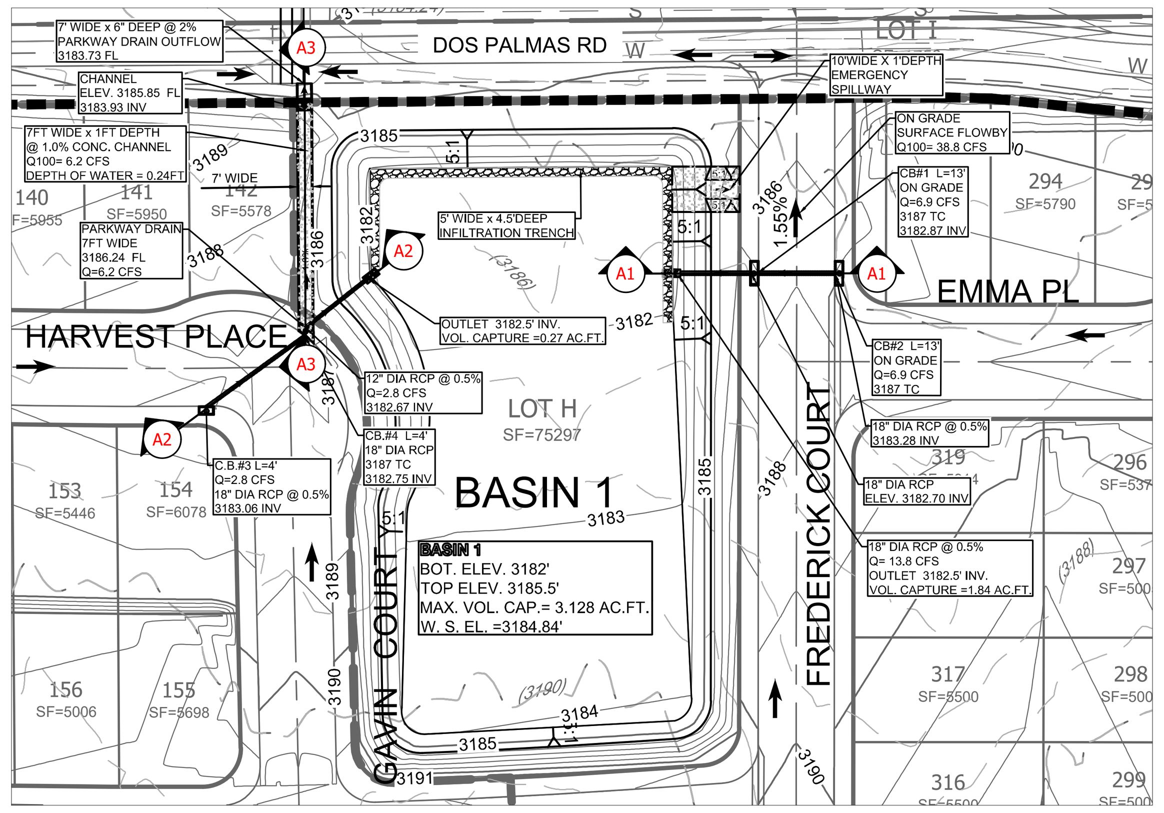
SHEET 3 OF 4

D-1

PLOT STYLE: NCS US Standard.stb PROJECT LOCATION & NAME: V:\plans\TR. 16397 (RY)\CAD\TT16397_Onsite_Drainage_Map_06-11-2018.dwg PLOT TIME: Tuesday, July 10, 2018 9:05:36 AM LAYOUT: 24 X 36_Offsite Pre-dev

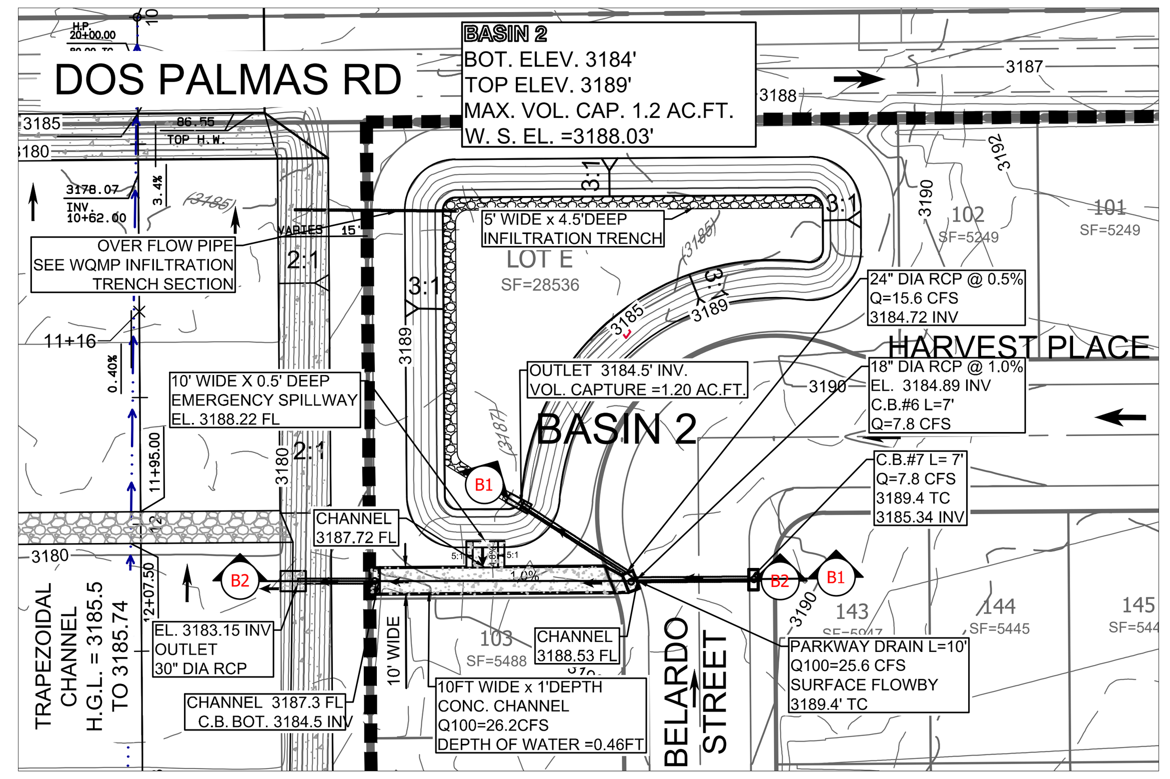
EXHIBIT 4

BASIN 1, 2 & 3 PLAN AND PROFILE



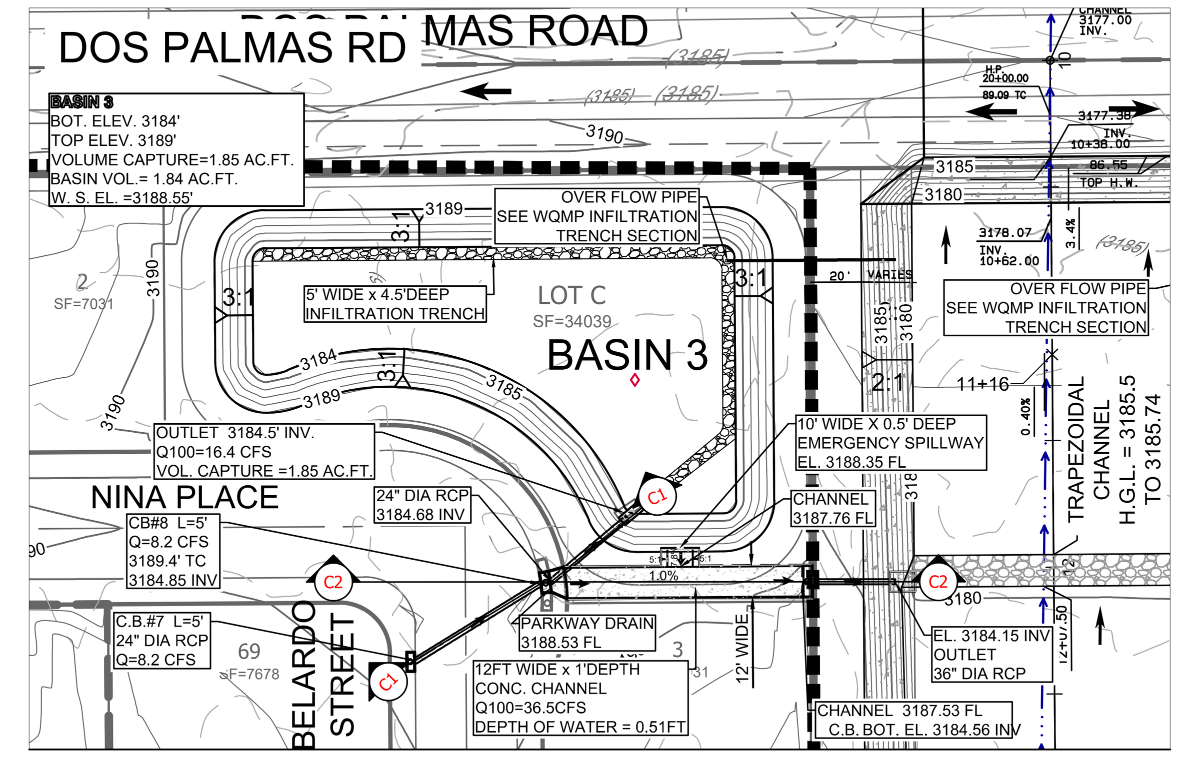
BASIN 1 PLAN

BASIN 1 STAGE STORAGE TABLE						
ELEV	AREA (sq. ft.)	DEPTH (ft)	AREA (ac. ft.)	VOLUME (ac. ft.)	COML. VOL. (ac. ft.)	VOLUME VOL. (cu. ft.)
3,182.000	15,704.55	N/A	0.361			
				0.2062	0.2062	8984
3,182.500	20,231.71	1.000	0.464			
				0.2789	0.4851	21132
3,183.000	28,361.82	1.000	0.651			
				0.3769	0.8621	37552
3,183.500	37,315.50	1.000	0.857			
				0.4831	1.3452	58597
3,184.000	46,866.83	1.000	1.076			
				0.5607	1.9059	83020
3,184.500	50,821.92	1.000	1.167			
				0.5973	2.5031	109037
3,185.000	53,248.30	1.000	1.222			
				0.6254	3.1285	136278
3,185.500	55,715.44	1.000	1.279	TOTAL VOLUME		136,278
VOLUME CAPTURE = 2.11 AC.FT. WATER SURFACE ELEVATION =3184.84'						



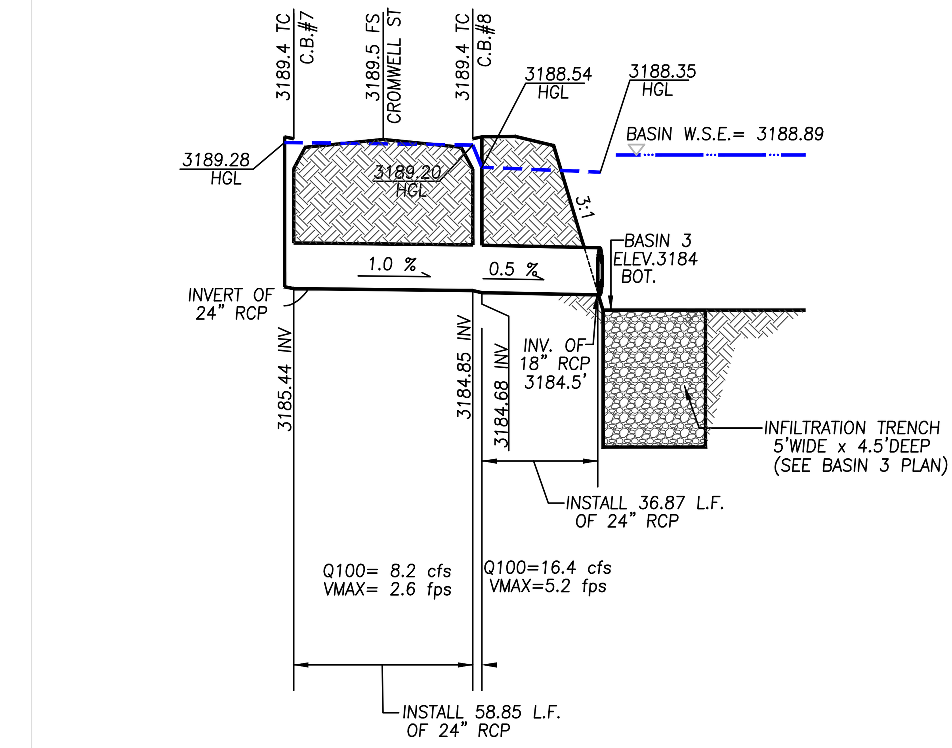
BASIN 2 PLAN

BASIN 2 STAGE STORAGE TABLE						
ELEV	AREA (sq. ft.)	DEPTH (ft)	AREA (ac. ft.)	VOLUME (ac. ft.)	COML. VOL. (ac. ft.)	VOLUME VOL. (cu. ft.)
3,184.000	8869.3	N/A	0.204			
				0.2209	0.2209	9623
3,185.000	10,377.5	1.000	0.238			
				0.2562	0.4771	20783
3,186.000	11,941.91	1.000	0.274			
				0.2928	0.7699	33536
3,187.000	13,562.89	1.000	0.311			
				0.3306	1.1005	47937
3,188.000	15,240.56	1.000	0.350			
				0.3698	1.4703	64045
3,189.000	16,974.90	1.000	0.390			
				TOTAL VOLUME		64,045
VOLUME CAPTURE = 1.2 AC.FT. WATER SURFACE ELEVATION =3188.03'						



BASIN 3 PLAN

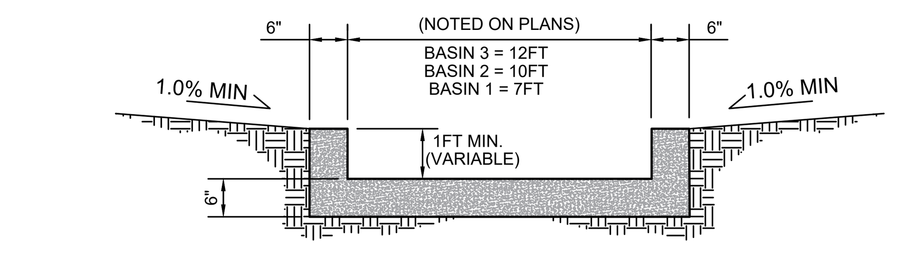
BASIN 3 STAGE STORAGE TABLE						
ELEV	AREA (sq. ft.)	DEPTH (ft)	AREA (ac. ft.)	VOLUME (ac. ft.)	COML. VOL. (ac. ft.)	VOLUME VOL. (cu. ft.)
3,184.000	12,149.42	N/A	0.279			
				0.2978	0.2978	12972
3,185.000	13,794.24	1.000	0.317			
				0.3362	0.6340	27619
3,186.000	15,499.78	1.000	0.356			
				0.3761	1.0101	44002
3,187.000	17,266.72	1.000	0.396			
				0.4173	1.4275	62180
3,188.000	19,089.76	1.000	0.438			
				0.481	1.8871	82201
3,189.000	20,950.88	1.000	0.481			
				TOTAL VOLUME		82,201
VOLUME CAPTURE = 1.84 AC.FT. WATER SURFACE ELEVATION =3188.89'						



SECTION "C1-C1"

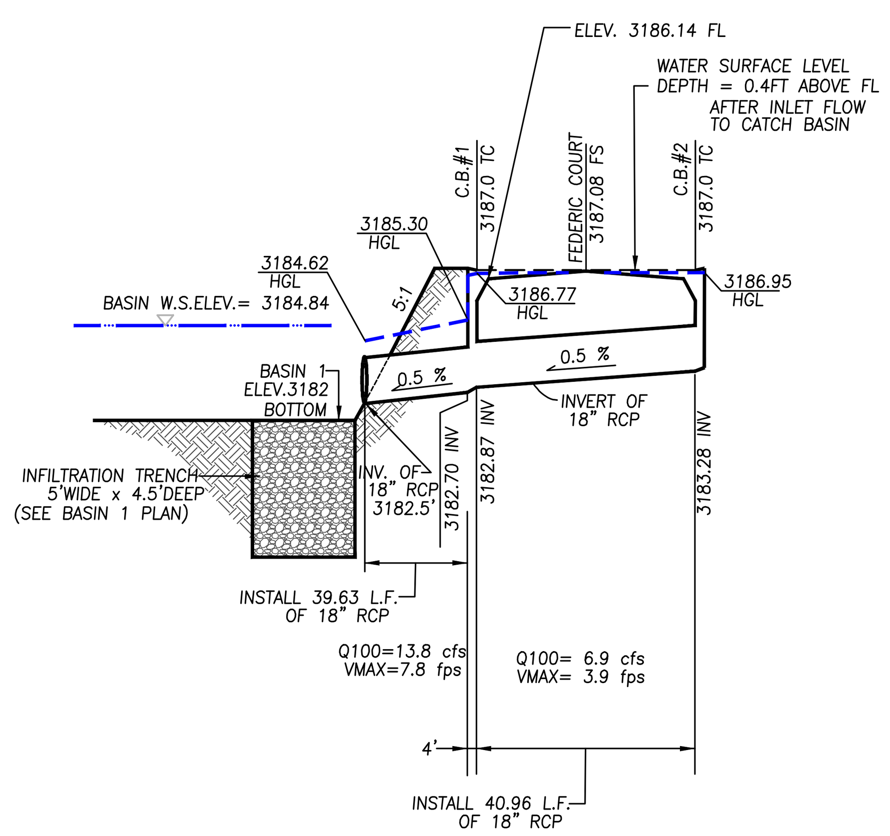
BASIN 3 LINE "C1"

N.T.S.



FLOWBY CONCRETE CHANNEL

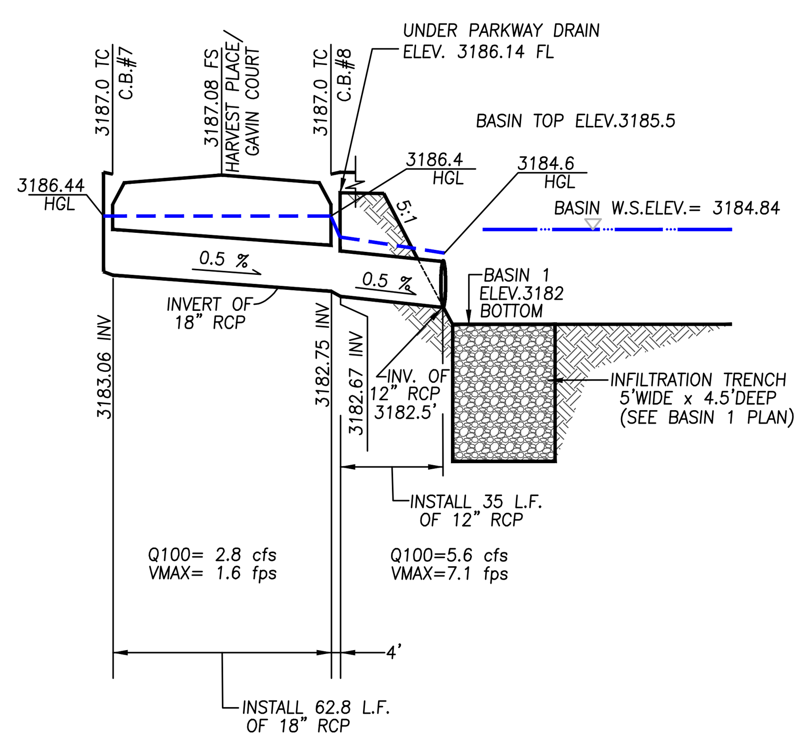
NOT TO SCALE



SECTION "A1-A1"

BASIN 1 LINE "A1"

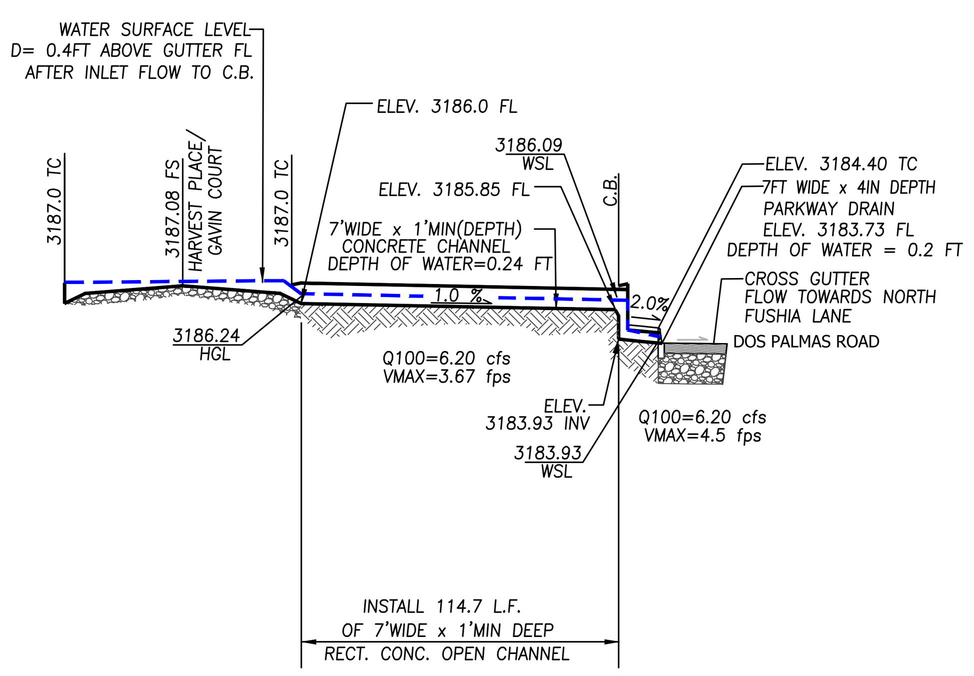
N.T.S.



SECTION "A2-A2"

BASIN 1 LINE "A2"

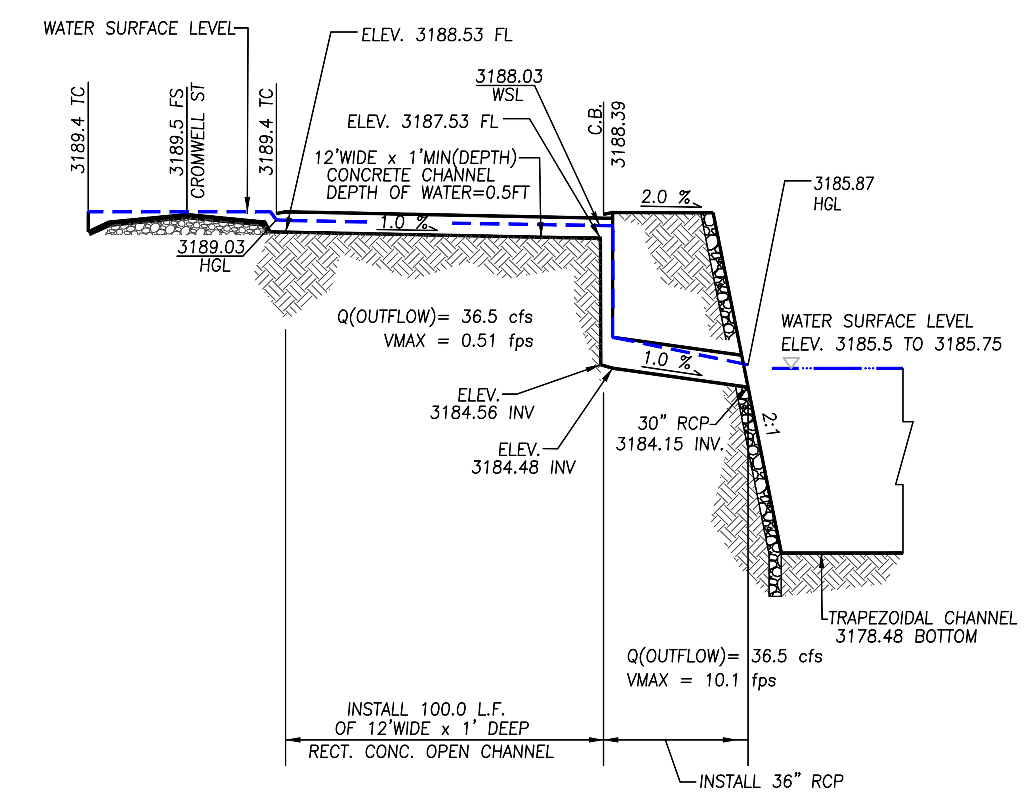
N.T.S.



SECTION "A3-A3"

BASIN 1 PARKWAY DRAIN

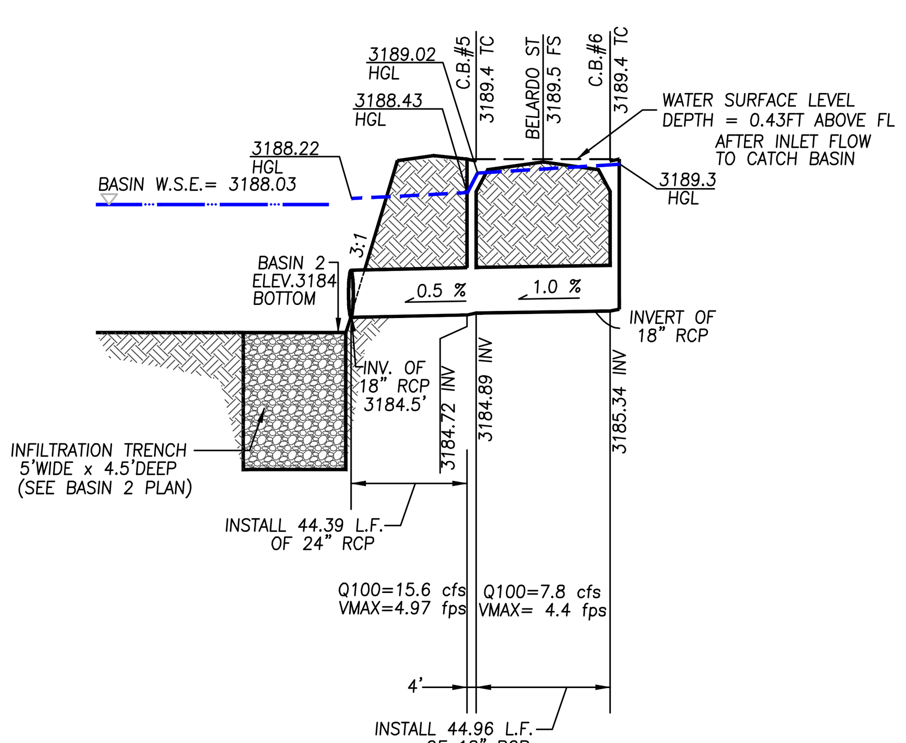
N.T.S.



SECTION "C2-C2"

BASIN 3 PARKWAY DRAIN

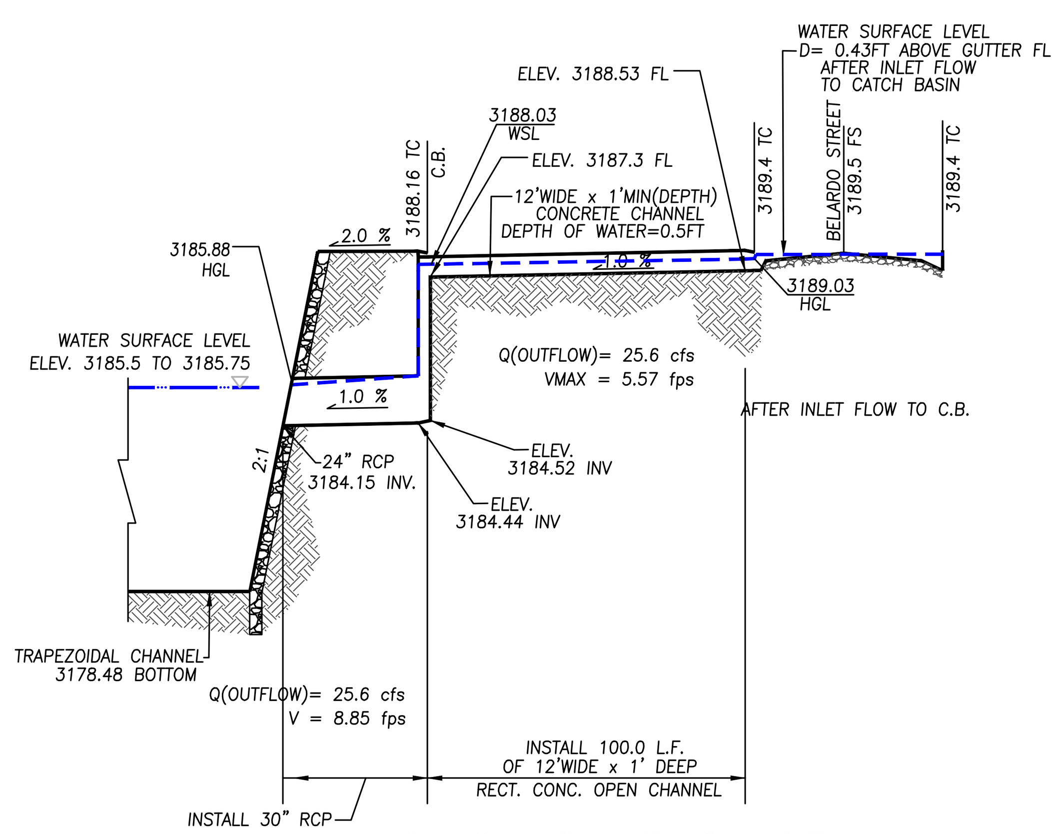
N.T.S.



SECTION "B1-B1"

BASIN 2 LINE "B1"

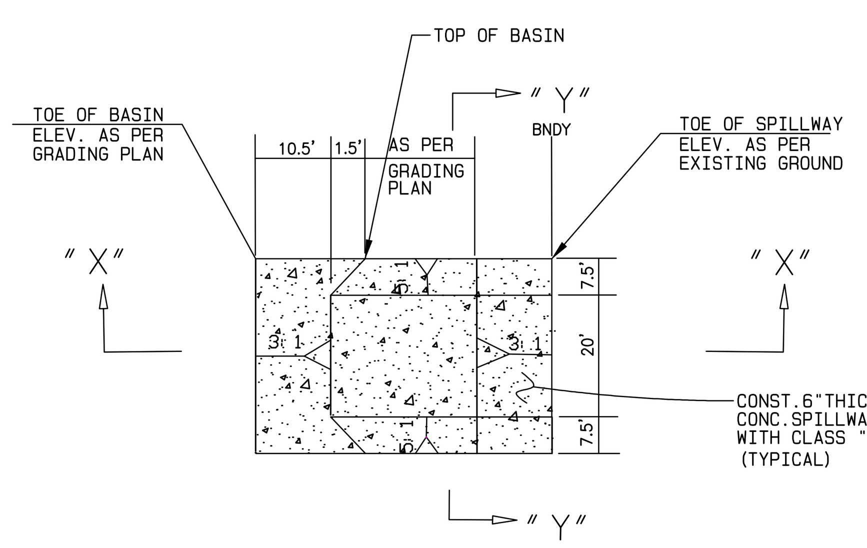
N.T.S.



SECTION "B2-B2"

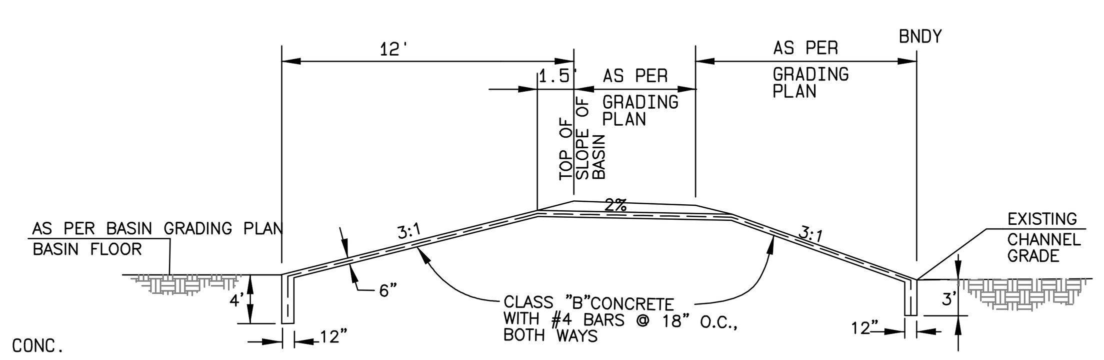
BASIN 2 PARKWAY DRAIN

N.T.S.



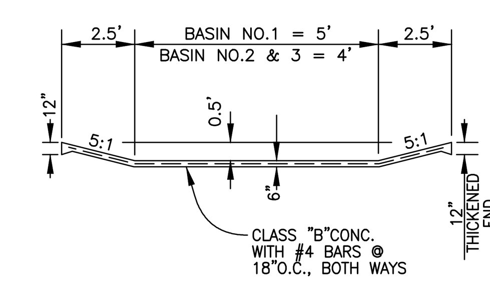
PLAN VIEW
TYPICAL BASIN SPILLWAY

N. T. S.



TYPICAL SECTION X-X

N. T. S.



TYPICAL SECTION Y-Y

N. T. S.

EXHIBIT 4

REGISTERED PROFESSIONAL ENGINEER
JIMMY J. FRY
NO. C040692
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

REV.	DESCRIPTION	DATE	BY

Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning
109 East Third Street, San Bernardino, CA 92410, Phone: 909-884-8217, Fax: 909-889-0153
5890 Hwy. 95, Ste. B, Fort Mohave, AZ 86426, Phone: 928-768-1857, Fax: 928-768-7086
15252 Seneca Rd., Victorville, CA 92392, Phone: 760-951-7676, Fax: 760-241-0573
2126 McCulloch Blvd., Ste. 8, Lake Havasu City, AZ 86403, Phone: 928-680-6060, Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397
ONSITE BASIN 1, 2 & 3 PLAN & PROFILE

CLIENT: R.Y. PROPERTIES

SCALE: AS SHOWN

SHEET 4 OF 6

DESIGNED BY:	DRAWN BY:	CHECKED BY:	
JC	LC	JF	D-1

PLOT STYLE: NCS US Standard.stb PROJECT LOCATION & NAME: V:\plans\TR 16397 (RY)\CAD\TT16397_Onsite_Drainage_Map_11-17-2017.dwg PLOT TIME: Friday, December 15, 2017 3:08:33 PM LAYOUT: 24 X 36_Basin Details

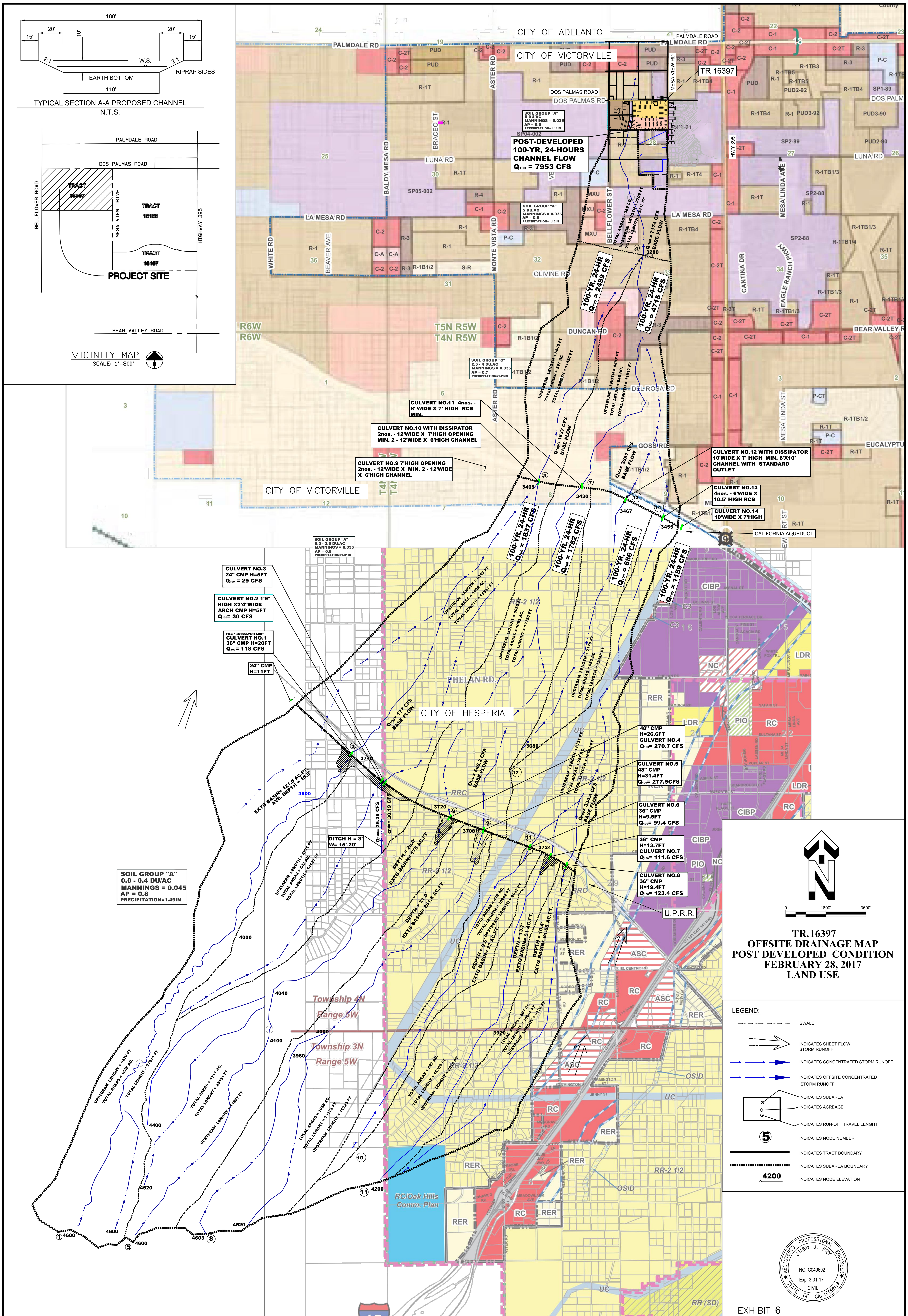
EXHIBIT 5

OVERALL OFFSITE DRAINAGE MAP


TYPICAL SECTION A-A PROPOSED CHANNEL
N.T.S.
180'
15'
20'
10'
W.S.
2:1
EARTH BOTTOM
110'
RIPRAP SIDES
PALMDALE ROAD
DOS PALMAS ROAD
BELLFLOWER ROAD
TRACT 16397
MESA VIEW DRIVE
TRACT 16136
TRACT 16107
HIGHWAY 395
PROJECT SITE
BEAR VALLEY ROAD
VICINITY MAP
SCALE: 1"=800'
TR 16397
PALMDALE ROAD
DOS PALMAS ROAD
MESA VIEW RD
HWY 395
BALDY MESA LINE A-01
MASTER PLAN OF DRAINAGE
Q100=5243 CFS
SOIL GROUP "A"
5 DU/AC
MANNINGS = 0.025
AP = 0.6
PRECIPITATION=1.11IN
POST-DEVELOPED
100-YR, 24-HOURS
CHANNEL FLOW
Q100 = 7953 CFS
BALDY MESA LINE A-01
MASTER PLAN OF DRAINAGE
Q100=5166 CFS
LINE A-01
Q100=3624 CFS
100-YR, 24-HR
Q100 = 2459 CFS
100-YR, 24-HR
Q100 = 4715 CFS
BALDY MESA MPD
LINE A-03
Q100=2632 CFS
LINE A-01
Q100=1834 CFS
LINE A-02
Q100=2545 CFS
SOIL GROUP "C"
2.5 - 4 DU/AC
MANNINGS = 0.035
AP = 0.7
PRECIPITATION=1.23IN
LINE A-01-01
Q25= 304 CFS
LINE A-01
Q100=1830 CFS
CULVERT NO.11 4nos. - 8' WIDE X 7' HIGH RCB MIN.
CULVERT NO.10 WITH DISSIPATOR 2nos. - 12'WIDE X 7'HIGH OPENING MIN. 2 - 12'WIDE X 6'HIGH CHANNEL
CULVERT NO.9 7'HIGH OPENING 2nos. - 12'WIDE X MIN. 2 - 12'WIDE X 6'HIGH CHANNEL
CULVERT NO.12 WITH DISSIPATOR 10'WIDE X 7' HIGH MIN. 6'X10' CHANNEL WITH STANDARD OUTLET
CULVERT NO.13 4nos. - 6'WIDE X 10.5' HIGH RCB
CULVERT NO.14 10'WIDE X 7'HIGH
CALIFORNIA AQUEDUCT
BALDY MESA MPD
LINE A-03
Q100=1066 CFS
100-YR, 24-HR
Q100 = 1837 CFS
100-YR, 24-HR
Q100 = 1752 CFS
100-YR, 24-HR
Q100 = 686 CFS
100-YR, 24-HR
Q100 = 1159 CFS
SOIL GROUP "A"
0.0 - 2.5 DU/AC
MANNINGS = 0.035
AP = 0.8
PRECIPITATION=1.31IN
BALDY MESA MPD
LINE A-04
Q100=2067 CFS
BALDY MESA MPD
LINE A-03
Q100=1066 CFS
LINE A-05
Q100=783 CFS
LINE A-04
Q100=1354 CFS
CULVERT NO.3
24" CMP H=5FT
Q100 = 29 CFS
CULVERT NO.2 1'9" HIGH X2'4"WIDE ARCH CMP H=5FT
Q100 = 30 CFS
CULVERT NO.1
36" CMP H=20FT
Q100 = 118 CFS
24" CMP
H=11FT
48" CMP
H=26.6FT
CULVERT NO.4
Q100 = 270.7 CFS
CULVERT NO.5
48" CMP
H=31.4FT
Q100 = 277.5CFS
CULVERT NO.6
36" CMP
H=9.5FT
Q100 = 99.4 CFS
36" CMP
H=13.7FT
CULVERT NO.7
Q100 = 111.6 CFS
CULVERT NO.8
36" CMP
H=19.4FT
Q100 = 123.4 CFS
U.P.R.R.
BALDY MESA MPD
LINE A-05-01
Q100=326
BALDY MESA MPD
LINE A-03-01
Q25=341 CFS
DITCH H = 3'
W= 15'-20'
SOIL GROUP "A"
0.0 - 0.4 DU/AC
MANNINGS = 0.045
AP = 0.8
PRECIPITATION=1.49IN
BALDY MESA
Cajon Summit
TR.16397
OFFSITE DRAINAGE MAP
POST DEVELOPED CONDITION
FEBRUARY 28, 2017
LEGEND:
SWALE
INDICATES SHEET FLOW STORM RUNOFF
INDICATES CONCENTRATED STORM RUNOFF
INDICATES OFFSITE CONCENTRATED STORM RUNOFF
INDICATES SUBAREA
INDICATES ACREAGE
INDICATES RUN-OFF TRAVEL LENGHT
INDICATES NODE NUMBER
INDICATES TRACT BOUNDARY
INDICATES SUBAREA BOUNDARY
4200
INDICATES NODE ELEVATION
REGISTERED PROFESSIONAL ENGINEER
JIMMY J. FRY
NO. C040692
Exp. 3-31-17
CIVIL
STATE OF CALIFORNIA
EXHIBIT 5
REV.
DESCRIPTION
DATE
BY
Ludwig Engineering ASSOCIATES, INC.
Civil Engineering • Surveying • Planning
CITY OF VICTORVILLE
TR. 16397 POST -DEVELOPED
OFFSITE DRAINAGE MAP LINE A-01 BALDY MESA
CLIENT:
R.Y. PROPERTIES
FEBRUARY 28, 2017
DESIGNED BY: JC
DRAWN BY: LC
CHECKED BY: JF
SCALE
1 " = 1,800'
SHEET 5 OF 6
D-1
PLOT STYLE: 1
628

EXHIBIT 6

OVERALL OFFSITE DRAINAGE MAP WITH LAND USE



REV.	DESCRIPTION	DATE	BY

Ludwig Engineering Associates, Inc.
Civil Engineering • Surveying • Planning

109 East Third Street, San Bernardino, CA 92410, Phone: 909-884-8217, Fax: 909-889-0153
5890 Hwy. 95, Ste. B, Fort Mohave, AZ 86426, Phone: 928-768-1857, Fax: 928-768-7086
15252 Seneca Rd., Victorville, CA 92392, Phone: 760-951-7676, Fax: 760-241-0573
2126 McCulloch Blvd., Ste. B, Lake Havasu City, AZ 86403, Phone: 928-680-6060, Fax: 928-854-6530

CITY OF VICTORVILLE
TR. 16397 POST -DEVELOPED
OFFSITE DRAINAGE MAP LINE A-01 BALDY MESA

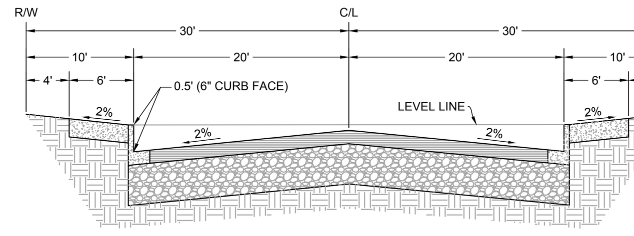
CLIENT:
R.Y. PROPERTIES
FEBRUARY 28, 2017

SCALE 1 " = 1,800'
SHEET 6 OF 6

DESIGNED BY:	DRAWN BY:	CHECKED BY:	
JC	LC	JF	D-1

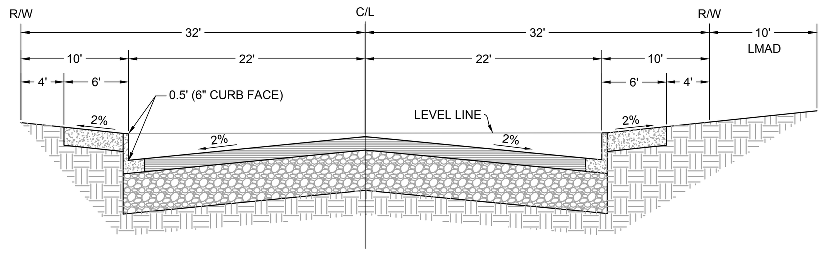
PROJECT LOCATION & NAME: V:\plans\TR 16397 (RY)\CAD\TT 16397_Offsite_Drainage_Map.dwg PLOT TIME: Thursday, March 02, 2017 4:47:52 PM LAYOUT: 24x36 BALDY MESA LINE A-01_Land Use

PLOT STYLE: 1



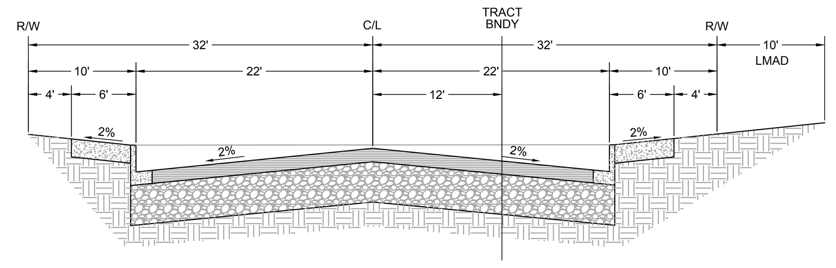
LOCAL STREET TYPICAL SECTION (60' R/W)

SCALES - H: 1" = 10' V: 1" = 2'



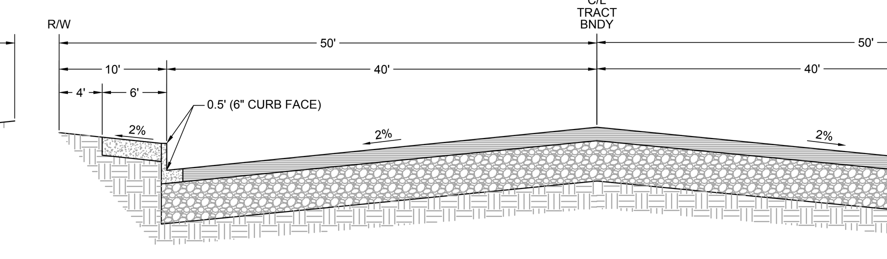
MESA VIEW TYPICAL SECTION (64' R/W)

SCALES - H: 1" = 10' V: 1" = 2'



DOS PALMAS TYPICAL SECTION (64' R/W)

SCALES - H: 1" = 10' V: 1" = 2'



BELLFLOWER STREET TYPICAL SECTION (100' R/W)

SCALES - H: 1" = 10' V: 1" = 2'

IN THE CITY OF VICTORVILLE
COUNTY OF SAN BERNARDINO, CALIFORNIA

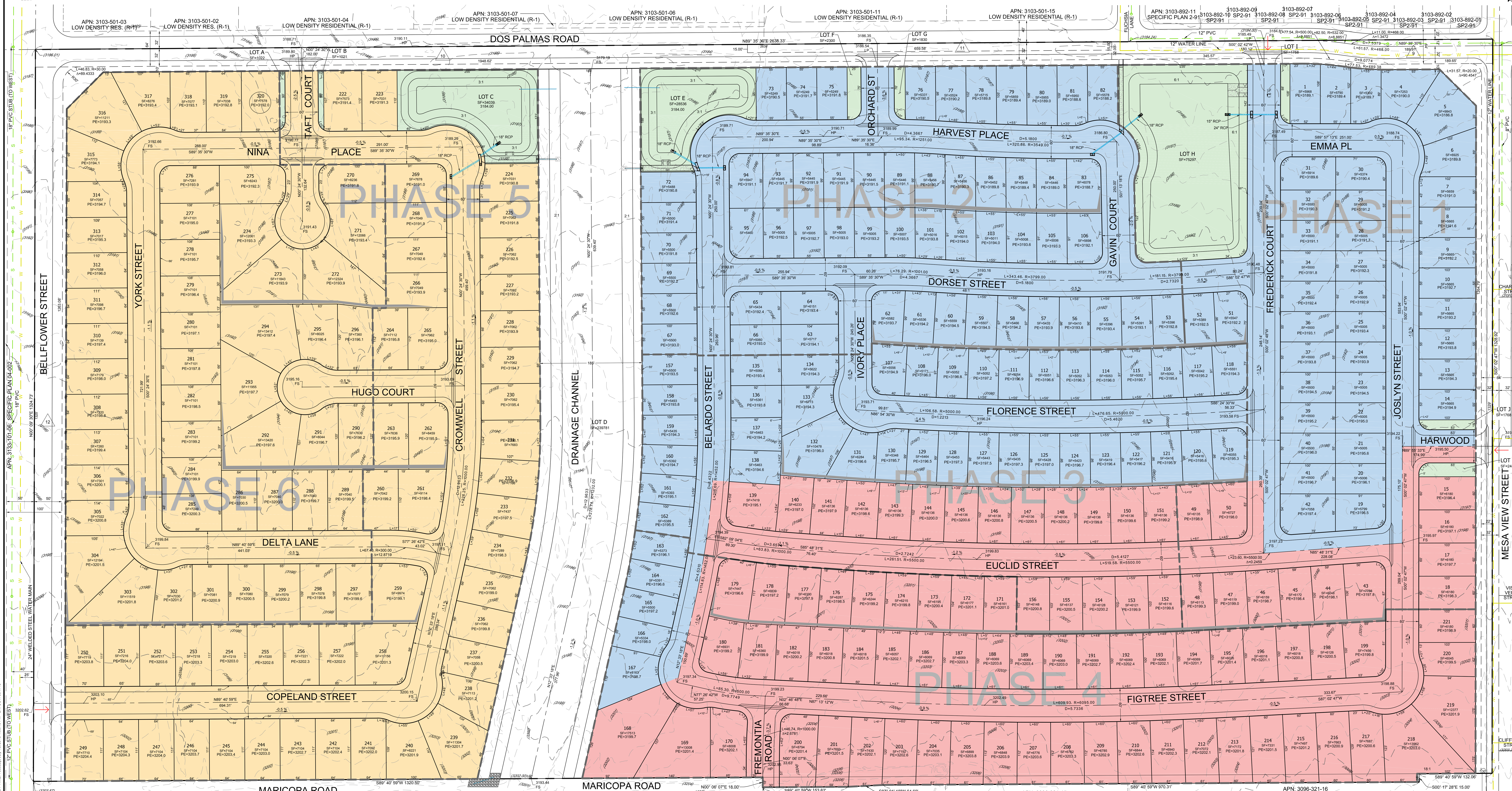
TENTATIVE TRACT MAP NO. 16397

THE NORTH 1/2 AND A PORTION OF THE S 1/2 OF THE NW 1/4 OF SECTION 28, T5N, R5W, SBM, IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND APPROVED BY THE SURVEYOR GENERAL

LEGEND

(720)	EXIST. CONTOURS
(723.36)	EXIST. ELEVATIONS
724.95 FS	PROP. ELEVATIONS
	FIRE ACCESS TO SITE
	PROP. CATCH BASIN
FS	FINISHED SURFACE
PE	PAD ELEVATION
GB	GRADE BREAK
HP	HIGH POINT
LP	LOW POINT
	EX. SEWER LINE
	EX. WATER LINE
	PROP. REINFORCED CONCRETE PIPE
	PROP. PHASE BOUNDARY
	LMAD DEDICATION
	PA-1 MED. LOW RESIDENTIAL (MLR)
	PA-2 LOW RESIDENTIAL (LR)
	PA-3 VERY LOW RESIDENTIAL (VLR)

CUT/FILL VOLUMES		
CUT	FILL	NET
154,317 CY	172,198 CY	17,781 CY (FILL)



VICINITY MAP

SCALE: N.T.S.

APPLICANT/OWNER:

R.Y. PROPERTIES, INC.
212 SOUTH PALM AVENUE, SUITE 200
ALHAMBRA, CA 91801
PHONE : (626) 282-3100

ENGINEER:

LUDWIG ENGINEERING ASSOCIATES, INC.
109 E. 3RD ST
SAN BERNARDINO, CA 92410
PHONE: (909) 884-8217

ASSESSOR'S PARCEL NUMBER:

3096-311-02-0-000

LEGAL DESCRIPTION:

TENTATIVE TRACT NO. 16397, BEING A SUBDIVISION OF THE FOLLOWING:
PARCEL "A" OF LOT LINE ADJUSTMENT NO. ADM07-00073, RECORDED SEPTEMBER 30, 2009 AS INSTRUMENT NO. 2009-0430324 OF OFFICIAL RECORDS, DESCRIBED AS FOLLOWS:
THE NORTH ONE-HALF AND A PORTION OF THE SOUTH ONE-HALF OF THE NORTHWEST ONE-QUARTER OF SECTION 28, TOWNSHIP 5 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTH QUARTER CORNER OF SAID SECTION 28; THENCE SOUTH OO° 02' 06" WEST, 1,328.90 FEET TO A POINT ON THE SOUTHERLY LINE OF SAID NORTH ONE-HALF OF THE NORTHWEST ONE-QUARTER OF SECTION 28; THENCE SOUTH 89° 40' 28" WEST ALONG SAID SOUTHERLY LINE, 135.82 FEET; THENCE SOUTH 00° 17' 59" EAST TO A POINT ON A LINE PARALLEL AND DISTANT 15.00 FEET SOUTHERLY FROM SAID SOUTHERLY LINE, 15.00 FEET; THENCE
SOUTH 89° 40' 28" WEST ALONG SAID PARALLEL LINE, 995.55 FEET; THENCE
SOUTH 87° 00 '47" WEST, 64.61 FEET; THENCE
SOUTH 89° 40' 28" WEST, 153.71 FEET TO THE WEST LINE OF THE NORTHWEST ONE-QUARTER OF THE SOUTHEAST ONE-QUARTER OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 28; THENCE NORTH 00° 05' 31" EAST ALONG SAID WEST LINE, 18.00 FEET TO A POINT ON SAID SOUTHERLY LINE; THENCE
SOUTH 89° 40' 28" WEST ALONG SAID SOUTHERLY LINE, 1,320.49 FEET TO THE SOUTHWEST CORNER OF SAID NORTH ONE-HALF OF THE NORTHWEST ONE-QUARTER OF SECTION 28; THENCE NORTH 00° 08' 56" EAST ALONG THE WESTERLY LINE OF SAID NORTH ONE-HALF OF THE NORTHWEST ONE-QUARTER OF SECTION 28, 1,324.72 FEET TO THE NORTHWEST CORNER OF SAID SECTION 28; THENCE NORTH 89° 35' 00" EAST ALONG SAID NORTHERLY LINE, 2,638.38 FEET TO THE POINT OF BEGINNING.

GENERAL PLAN:

EXISTING GENERAL PLAN: VISTA VERDE SPECIFIC PLAN
PROPOSED GENERAL PLAN: VISTA VERDE SPECIFIC PLAN

ZONING:

EXISTING ZONING: VISTA VERDE SPECIFIC PLAN
PROPOSED ZONING: VISTA VERDE SPECIFIC PLAN

BENCHMARK:

BRASS CAP IN THE TOP OF CURB AT THE SOUTHEAST BCR OF EAGLE RANCH PARKWAY AND BEDROCK ROAD.

ELEVATION: 3260.438

LETTERED LOT USAGE	
LETTER	USAGE
A	LMAD
B	LMAD
C	BASIN #3
D	DRAINAGE CHANNEL
E	BASIN #2
F	LMAD
G	LMAD
H	BASIN #1
I	LMAD
J	LMAD
K	LMAD

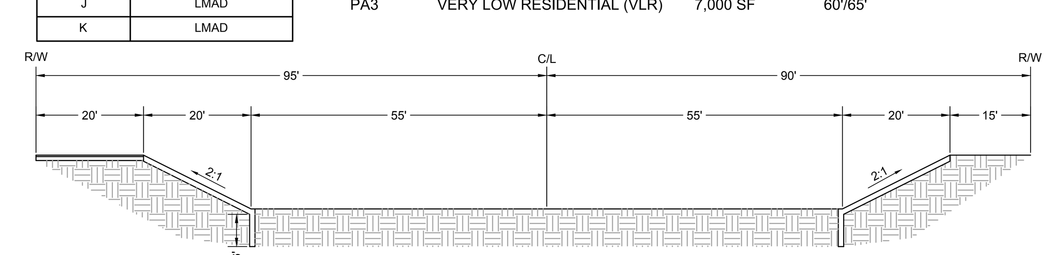
DEVELOPMENT STANDARDS:

GROSS ACREAGE:	80.75 AC
NET ACREAGE:	75.55 AC
TOTAL NUMBERED LOTS:	320 LOTS
TOTAL LETTERED LOTS:	11 LOTS
UNITS PER ACRE:	3.95
AVERAGE LOT SIZE:	6,660 SF
LINEAL FEET NEW STREETS:	13,195'

BUILDING SETBACKS:
18' - FRONT
15' - REAR
10' - STREET SIDE YARD
5' - SIDE YARD

LOT MINIMUM DIMENSIONS:

	CATEGORY	AREA	WIDTH (INTERIOR/CORNER)	DEPTH	NO. LOTS
PA1	MEDIUM LOW RESIDENTIAL (MLR)	5,000 SF	50'/55'	90'	137
PA2	LOW RESIDENTIAL (LR)	6,000 SF	55'/60'	95'	84
PA3	VERY LOW RESIDENTIAL (VLR)	7,000 SF	60'/65'	100'	99



DRAINAGE CHANNEL TYPICAL SECTION

SCALES - H&V: 1" = 20'

UTILITY COMPANIES:

ELECTRIC:
SOUTHERN CALIFORNIA EDISON
P.O. BOX 1498
VICTORVILLE, CA 92393
(800) 655-4555

WATER:
VICTORVILLE WATER DISTRICT
P.O. BOX 5001
VICTORVILLE, CA 92393
(760) 955-5001

SEWER/REFUSE:
CITY OF VICTORVILLE
14343 CIVIC DRIVE
VICTORVILLE, CA 92392
(760) 955-5001

TELEPHONE:
FRONTIER COMMUNICATIONS
(855) 504-4913

NATURAL GAS:
SOUTHWEST GAS COMPANY
14950 CIRCLE DRIVE
VICTORVILLE, CA 92392
(877) 860-6020

TV:
CHARTER COMMUNICATIONS
12180 RIDGECREST RD #102
VICTORVILLE, CA 92392
(866) 499-8080

FIRE PROTECTION:
SAN BERNARDINO COUNTY FIRE
157 W. 5TH ST, 2ND FLOOR
SAN BERNARDINO, CA 92415
(909) 387-5974

GENERAL NOTES:

- EXISTING JOSHUA TREES TO BE RELOCATED PER CITY OF VICTORVILLE REQUIREMENTS
- BLOCK WALLS TO BE CONSTRUCTED BETWEEN LOTS, PER CITY STANDARD
- BASIS OF BEARINGS: THE BASIS OF ALL BEARINGS SHOWN HEREON WERE TAKEN FROM THE NORTH LINE OF THE N.W. 1/4 OF SECTION 28, T.5N., R.5W., S.B.M. AS SHOWN ON TRACT NO. 16107-1 RECORDED IN MAP BOOK 287, PAGES 28-32. BEARING BEING N 89°35'30" E
- CONTOURS BASED ON AERIAL SURVEY BY DIGITAL MAPPING INC, DATED 11/12/05

EASEMENT NOTES

9 — AN OFFER OF DEDICATION FOR STREETS, HIGHWAYS, SEWER, DRAINAGE, PUBLIC UTILITIES, AND PUBLIC ACCESS PURPOSES AND INCIDENTAL PURPOSES, RECORDED FEBRUARY 5, 2004 AS INSTRUMENT NO. 2004-0090567 OF OFFICIAL RECORDS.
TO: CITY OF VICTORVILLE

10 — AN OFFER OF DEDICATION FOR STREETS, HIGHWAYS, SEWER, DRAINAGE, PUBLIC UTILITIES, AND PUBLIC ACCESS PURPOSES AND INCIDENTAL PURPOSES, RECORDED APRIL 23, 2004 AS INSTRUMENT NO. 2004-0282936 OF OFFICIAL RECORDS.
TO: CITY OF VICTORVILLE

11 — AN OFFER OF DEDICATION FOR STREETS, HIGHWAYS, SEWER, DRAINAGE, PUBLIC UTILITIES, AND PUBLIC ACCESS PURPOSES AND INCIDENTAL PURPOSES, RECORDED JANUARY 26, 2005 AS INSTRUMENT NO. 2005-0061546 OF OFFICIAL RECORDS.
TO: CITY OF VICTORVILLE

12 — AN OFFER OF DEDICATION FOR STREETS, HIGHWAYS, SEWER, DRAINAGE, PUBLIC UTILITIES, AND PUBLIC ACCESS PURPOSES AND INCIDENTAL PURPOSES, RECORDED OCTOBER 31, 2006 AS INSTRUMENT NO. 2006-0741678 OF OFFICIAL RECORDS.
TO: CITY OF VICTORVILLE

XX — INDICATES PLOTTED EASEMENT PER TITLE REPORT NO. NHSC-2740314 (29), FROM FIRST AMERICAN TITLE COMPANY, DATED MAY 8, 2017

REGISTERED PROFESSIONAL ENGINEER
JIMMY J. FRY
NO. C040692
Exp. 3-31-17
CIVIL
STATE OF CALIFORNIA

PLOT DATE: July 10, 2018

CITY CASE NO. (to be assigned at plan submittal)

CITY OF VICTORVILLE ENGINEERING DEPARTMENT
14343 Civic Drive, Victorville, CA 92392 (760) 955-5000

Approved By:

Brian W. Gengler, RCE C44730
City Engineer

DATE

REV.	DESCRIPTION	DATE	BY

Ludwig Engineering Associates, Inc.
Civil Engineering • Surveying • Planning
109 East Third Street, San Bernardino, CA 92410, Phone: 909-884-8217, Fax: 909-889-0153
5890 Hwy. 95, Ste. B, Fort Mohave, AZ 86426, Phone: 928-768-1857, Fax: 928-768-7086
15252 Seneca Rd., Victorville, CA 92392, Phone: 760-951-7676, Fax: 760-241-0573
2126 McCulloch Blvd., Ste. 8, Lake Havasu City, AZ 86403, Phone: 928-680-6060, Fax: 928-854-6530

CITY OF VICTORVILLE
TENTATIVE TRACT 16397
TENTATIVE TRACT MAP

CLIENT:
RY PROPERTIES
212 SOUTH PALM AVE | ALHAMBRA, CA 91801

DESIGNED BY:	DRAWN BY:	CHECKED BY:
JEC	JEC	SS

SCALE 1" = 60'

SHEET 1 OF 1

C-1