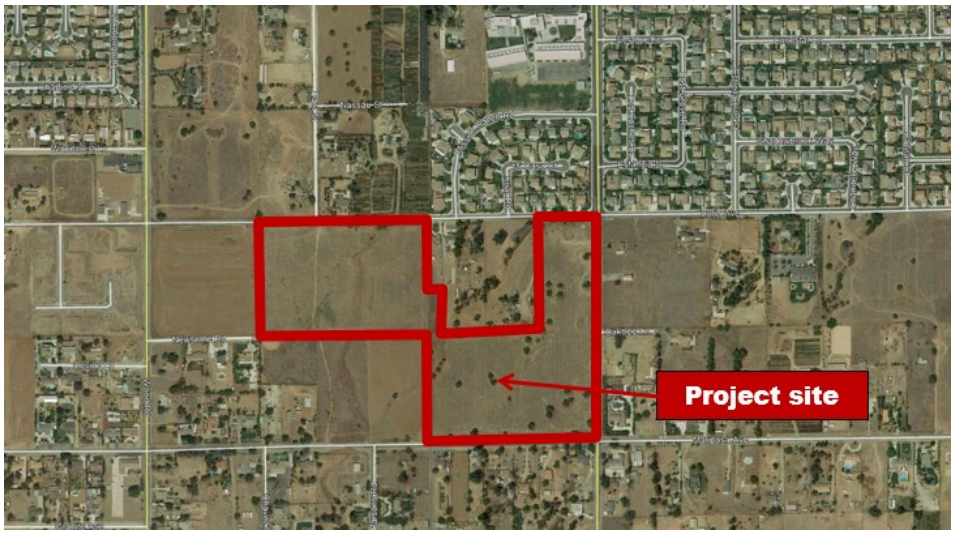
PRELIMINARY HYDROLOGY REPORT

TTM 37731
In the City of Riverside,
County of Riverside, California





PREPARED FOR:

Diversified Pacific
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

January, 2020

PREPARED BY:

KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS

KWC Engineers
1880 Compton Avenue, Suite 100
Corona, CA 92881
Tel: (951) 734-2130
www.kwcengineers.com

Matthew Laninovich PE 85721

JN 2017.1713.1
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Section

1
INTRODUCTION

1.1 PURPOSE OF STUDY

The TTM 37731 project site is located within the City of Riverside, California, southwest corner of Cole and Lurin Avenue. The purpose of this study is to hydrologically model the project's onsite and offsite tributary watersheds and to determine the existing and proposed peak runoffs and volumes in order to analyze stormwater mitigation. The hydrologic analysis was prepared using the Rational Method as specified in the Riverside County Flood Control & Water Conservation District (RCFC&WCD) Hydrology Manual. The flows were used to estimate the proposed above and below ground drainage facilities to support the Cole Avenue project site.

1.2 PROJECT DESCRIPTION

The TTM 37731 project is comprised of approximately 35.8 gross acres of vacant land located southwest of intersection of Cole and Lurin Avenue in the City of Riverside, Riverside County, California. The site is located approximately 1.3 miles south of Van Buren Boulevard and approximately 4.0 miles west of 215 Freeways.
The Cole Avenue project is generally bounded to the east by Cole Avenue, on the south by Mariposa Avenue, on the west by vacant land and north by Lurin Avenue. The immediate surrounding area consists of Low Density Residential (2-6 du/ac) within the City of Riverside.

The project hydrology and storm drain system will be designed in accordance with recent City of Riverside and Riverside County Flood Control and Water Conservation District design requirements. The onsite storm drain pipes, laterals, catch basins, and inlet and outlet structures are to be privately maintained by the proposed Property Owners Association. Other drainage facilities offsite of the project site will be publicly maintained by the City of Riverside.

1.3 STUDY AREA

The project site is located within the Santa Ana River Watershed, the largest watershed in Riverside County. The project site consists of vegetated and otherwise undeveloped land. The site is characterized by generally increasing in elevation from the south and southwest to the north and northeast. Several ravines are present which will convey natural drainage across the project site. The runoff from offsite tributary areas to the site, mainly discharges from west, north and east side of the project site. The existing offsite tributary area from the west side of the project site is 30.24 acres discharging approximately 52.3 cfs (100 year storm event) at node 308. The existing offsite tributary area from the

north and cross from Lurin Avenue side of the project site mainly has been divided into three main tributary areas. The westerly side is 18.49 acres discharging approximately 25.4 cfs (100 year storm event) at node 313. The middle portion is approximately 28.7 acres, discharging approximately 45.5 cfs. (100 year storm event) at node 318 and the easterly portion is 77.58 acres, discharging approximately 120.1 cfs. (100 year storm event) at node 120 west side of the intersection of Cole and Lurin Avenue. The existing offsite tributary area from the east side of the project site is 2.72 acres discharging approximately 5.7 cfs (100 year storm event) at node 115 and 8.85 acres, discharging approximately 16.1 cfs. (100 year storm event) at node 202. There are no existing major drainage improvements on-site. The runoff discharge from this site in the existing condition are in three different locations and are situated at the south of the project site at node 124, 204 and 320. (See Existing Hydrology Map in Appendix D for location of node numbezAll
rs and Appendix E for detail analysis).

1.4 FLOODPLAIN MAPPING

The National Flood Insurance Act (1968) established the National Flood Insurance Program, which is based on the minimal requirements for floodplain management and is designed to minimize flood damage within Special Flood Hazard Areas. The Federal Emergency Management Agency (FEMA) is the agency which administrates the National Flood Insurance Program. Special Flood Hazard Areas (SFHA) are defined as areas that have a 1% chance of flooding within a given year. This is also referred to as the 100-year flood. Flood Insurance Rate Maps (FIRMs) were developed to identify areas of flood hazards within a community.

According to the Flood Insurance Rate Map (FIRM) catalog, there are FIRMs produced by FEMA for the project site:

MAP Number: 06065C0740G

MAP Revised: August 28, 2008.

Appendix H contains the FIRM panels which identifies the flood zones designated for the project area. The project site is located outside the FIRM detailed study limits and is currently within an unmapped Zone X area. Given the existing topography, the potential for flooding within the project site is not likely to occur.

1.5 DESIGN CRITERIA

The following are design criteria for this project, based on the Riverside County Hydrology Manual.

Protection Levels

1. The 100-year flood shall be contained with the street R/W limits.

2. The 10-year flood shall be contained within the Top of Curbs.

3. Initiate a storm drain or channel when either condition is exceeded.

Section

2

HYDROLOGIC DATA AND MODEL DEVELOPMENT

2.1 EXISTING CONDITION MODEL

KWC Engineers has performed a hydrologic analysis for the Cole project site and its tributary watersheds.

The project site is mainly divided into three (3) drainage areas and includes offsite tributary areas. The westerly portion of the site that discharges southerly at node 320, has been divided into thirteen (13) sub-drainage areas and includes the offsite tributary areas ("C-1" through "C-13").The middle drainage area that discharges westerly of the project at node 124 has been divided into seventeen (17) sub-drainage areas ("A-1" through "A-17") and the southeasterly portion that discharges southerly has been divided into two (2) sub-drainage areas ("B-1" and "B-2"). To further describe the existing drainage conditions offsite and onsite. Refer to the Existing Condition Hydrology Key Map in **Appendix D** for locations of the drainage sub-areas, and peak flows at each sub-area. Hydrologic calculations to evaluate surface water runoff associated with the 2-year, 10-year, and 100-year storms were performed for the drainage areas both onsite and offsite tributary area. The Riverside County Rational Method Hydrologic calculations (as described in the RCFC&WCD Hydrology Manual) were performed using the CivilDesign Hydrology / Hydraulics computer program package 2005 Version 7.1 by Bonadiman and Associates, Inc. The existing condition watershed boundaries were delineated using aerial topography. The soil type in this area is Type "BC". Soil type "C" was used for calculating the rational method hydrology analysis. Refer to **Appendix B** Hydrologic Soils Group Map**.** Results of the existing condition hydrologic analysis are summarized in this section **Table 1 below**.

TABLE 1
EXISTING CONDITION PEAK FLOW

Area	Node #	Q_{10} (cfs)	Q_{100} (cfs)
A-1 through A-4	104	25.82	44.34
A-5 through A-7	108	17.25	29.69
A-1 through A-7	109	43.01	73.75
A-8 and A-9	112	10.86	18.05
A-8, A-9 and A-10	113	16.25	28.45
A-11	115	2.82	5.72
A-1 through A-14	120	63.94	111.61
A-1 through A-15	122	68.28	120.33

A-1 through A-17	124	70.34	124.49
B-1	202	7.70	14.54
TRACT 37732 + B3+B4	208	91.65	166.27
TRACT 37732 + B1 THROUGH B8	210	106.18	194.14
C-1, C-2 and C-3	306	20.00	36.40
C-1 through C-4	308	20.91	48.95
C-5, C-6a and C-6b	313	11.99	22.75
C-8 through C-12	318	24.57	42.30
C-1 through C13	320	64.39	119.88

2.2 PROPOSED CONDITION MODEL

Cole and Lurin Avenue project site generally maintain the existing drainage boundaries in the proposed condition. The overall project site including offsite tributary area are mainly divided into three (3) drainage areas.

AREA ONE:

The westerly portion of the offsite tributary area that discharges westerly at node 308, has been divided into four (4) sub-drainage areas ("C-1" through "C-4"). The resulted discharge at node 308 will be routed to node 320 via a proposed concrete channel. The northerly portion of the offsite tributary area within Area One that discharges at nodes 313 and 318 has been divided into eight (8) sub-drainage areas, ("C-5" through "C-12").The resulted discharge at these two points (node 313 and 318) after combining with tributary street flow (subarea "C-6c" and "D-21") will be routed to node 320, without comingling with the project's onsite tributary areas. The resulted discharge from portion of the onsite project subareas "D-1" through "D-7b, also discharges at node 320 via onsite storm drain and water quality system in this drainage area.

AREA TWO:

The northeasterly portion of the offsite tributary area that discharges northeasterly at node 120, has been divided into sixteen (16) sub-drainage areas, ("A-1" through "A-16") and includes subarea "D-8" (portion of the street flow in Cole Avenue). The resulted discharge at node 120 will be routed to node 122 and after passing through a proposed catch basin area downstream of node 122 via a proposed onsite storm drain line at node 123 will be routed toward westerly property line at node 124.

AREA THREE:

The easterly portion of the offsite tributary area that discharges easterly at node 202, has been divided into three (3) sub-drainage areas and includes subarea "D-17" and "D-18" (portion of the street flow in Cole Avenue and Mariposa Avenue)). The resulted discharge at node 202 will be routed to node 204 via a proposed storm drain pipe in Cole and Mariposa Avenue and after intercepting portion of the discharge in Cole and Mariposa Avenue it out lets at node 204.The resulted discharge from portion of the onsite project subareas "D-9" through "D-18, also discharges at node 204 via onsite storm drain and water quality system in this drainage area.

Refer to the Proposed Condition Hydrology Key Map in **Appendix F** for locations of the drainage sub-areas, and peak flows at each sub-area. Hydrologic calculations to evaluate surface water runoff associated with the 2-year, 10-year, and 100-year storms were performed for the drainage areas both onsite and offsite tributary area. The Riverside County Rational Method Hydrologic calculations (as described in the RCFC&WCD Hydrology Manual) were performed using the CivilDesign Hydrology / Hydraulics computer program package 2005 Version 7.1 by Bonadiman and Associates, Inc.

The Proposed condition watershed boundaries were delineated using aerial topography. The soil type in this area is Type "BC". Soil type "C" was used for calculating the rational method hydrology analysis. Refer to **Appendix B,** Hydrologic Soils Group Map**.**

Results of the proposed condition hydrologic models is provided in **Appendix E** and are summarized in this section **Table 2 below**.

TABLE 2
PROPOSED CONDITION PEAK FLOW

Subarea(s)	Node #	Q_{10} (cfs)	Q_{100} (cfs)
C-6c	313.2	0.46	0.73
C-6c and C-5 through C-6c	313.4	12.46	26.12
D-21	318.2	2.04	3.13
D-21 and C-8 through C-12	318.4	26.62	48.64
D-1, D-2 and D-3	404	12.78	22.80
D-1 through D-6	410	6.06	10.86
Drainage area One	320	70.83	125.28
Drainage area Two	124	68.06	119.53
D-9 and D-10	422	3.34	6.00
D-11 and D-12	428	3.08	5.55
D-9 through D-12	430	6.30	11.33
D-13 and D-14	432	*4.07*	7.23
D-15 and D-16	436	*3.15*	5.62
D-13 through D-16	438	12.20	22.15
B-1 and D-17	450	0.79	1.17
B-1, D-17 and D-18	456	3.85	5.71
Drainage Area Three	458	113.59	201.97

Below is the summary comparison between the Existing Condition and Proposed Condition Rational Method 10 and 100-Year Hydrology results. Refer to **Appendix D** and **F** for existing and proposed Hydrology Key Maps.

In Drainage Area One, the proposed 100 year storm event peak flow at node 320 is 5.40 cfs more than the existing peak flow at node 320.

In the Drainage Area two, the proposed 100 year storm event peak flow at node 124 is 4.96 cfs less than the existing peak flow at node 124.

In Drainage Area three, the proposed 100 year storm event peak flow at node 204 is 7.83 cfs more than the existing peak flow at node 210.

TABLE 3 – PEAK FLOW COMPARISON
320(Area One), 124(Area Two), and 204(Area Three-Proposed) =and 210(Area three-Existing)

Drainage Area	Existing Q_{10} (cfs)	Proposed Q_{10} (cfs)	Difference Q_{10} (Prop-Exist)	Existing Q_{100} (cfs)	Proposed Q_{100} (cfs)	Difference Q_{100} (Prop-Exist)
Drainage Area One	64.39	70.83	6.44	119.88	125.28	5.40
Drainage Area Two	70.34	68.06	-2.28	124.49	119.53	-4.96
Drainage Area Three	106.18	113.59	7.41	194.14	201.97	7.83

2.3 ONSITE STORM DRAIN SYSTEM

The onsite storm drain system will be privately owned and maintained by the Property Owners Association. Preliminary onsite drainage facilities will be sized to accommodate the anticipate 100-year runoff. Detailed sizing calculations will be provided in the design review and final engineering process. Mainline pipe sizes are based on the 100-year storm event. Pipes will be designed as reinforced concrete pipe or HDPE while maintaining the HGL below the proposed finish surface, with a roughness coefficient of 0.013 per City standards. Hydraulic calculations will be performed in the Final Engineering phase.
Catch basins and storm drain laterals were placed at locations to keep the 10-year flow below the top of curb and the 100-year flow below the right of way. Catch basins are also placed in various locations within the project site to collect the runoff and convey the storm flows in underground piping to the appropriate discharge points.

2.4 STREET CAPACITY ANALYSIS

Preliminary onsite street capacity for the proposed project was calculated. The street capacity analysis shows that the street sections are sufficient to provide the level of protection required by City of Riverside and RCFC&WCD as previously discussed. Since, the storm drain mainline pipes were sized for the 100-year storm event, the street will only contain local flows until the catch basins intercept the 100-year storm flows**.**

2.5 OUTLET ANALYSIS.

The proposed development will outlet at three (3) locations. Subareas A-1 through A-16 including D-8, D-19 and D-20 at node 124, westerly of the project site. Subareas B-1 and D-9 through D-18 at node 204, southerly of the project site and subareas C-1 through C-12, including D-1 through D-7b at node 320 southwesterly of the project site. Rip rap will be provided at the outlet pipes to dissipate the flow velocities leading into the existing natural surface to minimize erosion.

Section

3
CONCLUSIONS

This preliminary drainage report has evaluated the potential effects of runoff for the proposed project. In addition, this report has addressed the methodology used to analyze the existing and proposed conditions, which was based on the Riverside County Hydrology Manual. This section provides a summary discussion that evaluates the potential effects of the proposed project.

- The proposed project will not significantly alter drainage patterns on the site.
- The Rational Method results illustrates that there is a slight increase in peak flowrate for Drainage Area One and Three and Decrease in Drainage Area Two. Runoff mitigation is proposed for Drainage Area One and Three
- The proposed onsite storm drain mainlines will be privately owned and maintained by the Property Owners Association.
- Preliminary storm drain alignment, catch basins, and discharge points are shown on the hydrology key maps.
- A Final Hydrology & Hydraulics Report will be prepared during final design phase to determine the proposed hydraulic grade lines throughout the storm drain system and catch basin sizing.

All stormwater run-off will be carried via typical street sections and an onsite storm drain system. The computed 10-year storm event is contained below the top of curb and the computed 100-year storm event is contained within the street right-of-way.

Section

4

REFERENCES

- Riverside County Flood Control and Water Conservation District. *Hydrology Manual*. April 1978.

- City of Riverside Standard Plans and Guide lines

Appendix

A
VICINITY MAP

- Vicinity Map
- Location Map
- Latitude and Longitude of project site

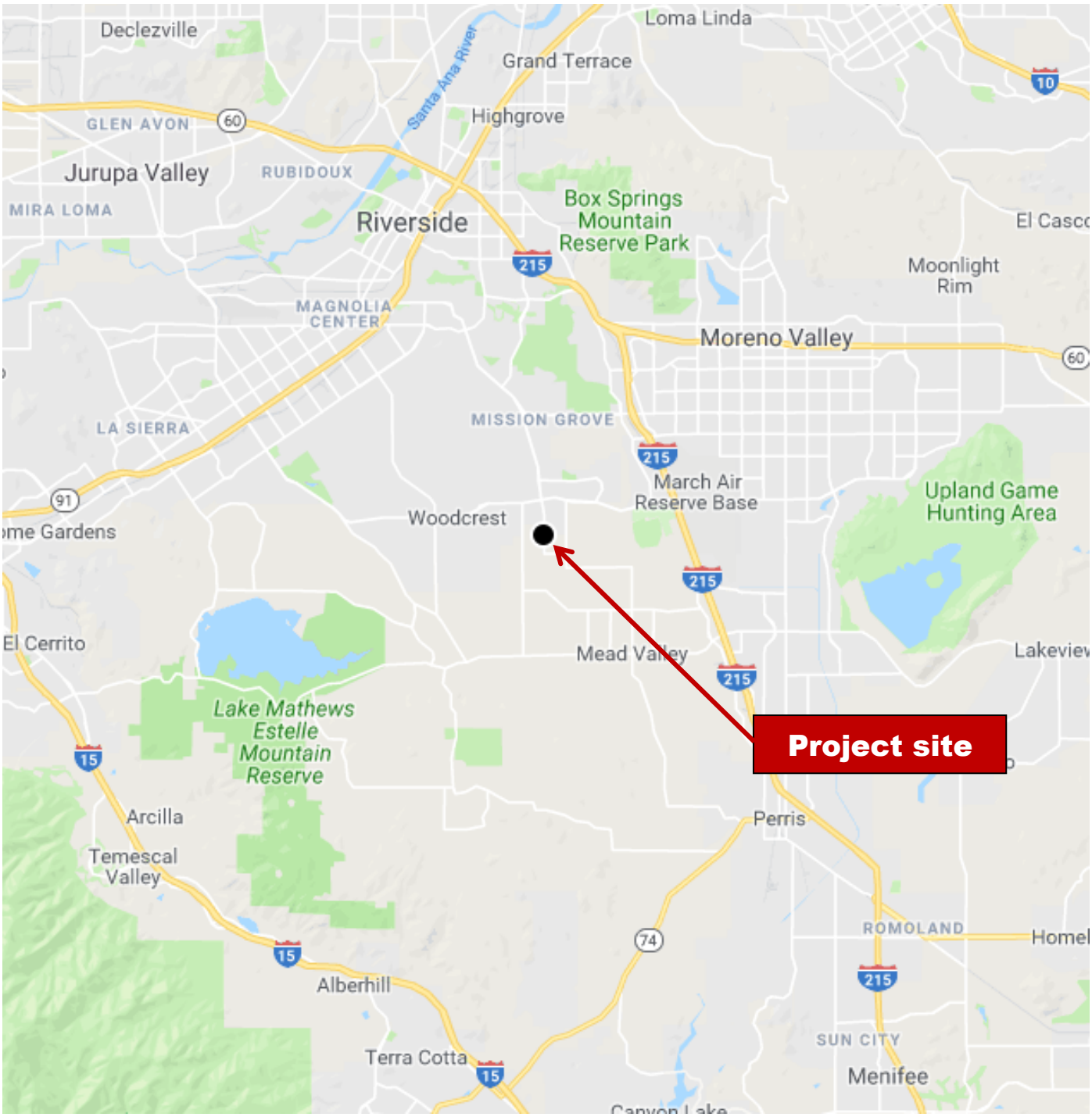


FIGURE 1

DATE 03-07-19 DRAWN BY TONY E
JOB NO. 17.1713-1
SHEET NO. 1
OF 1 SHEET

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VICINITY MAP

COLE AND LURIN AVENUE PROJECT SITE

CITY OF RIVERSIDE, CA

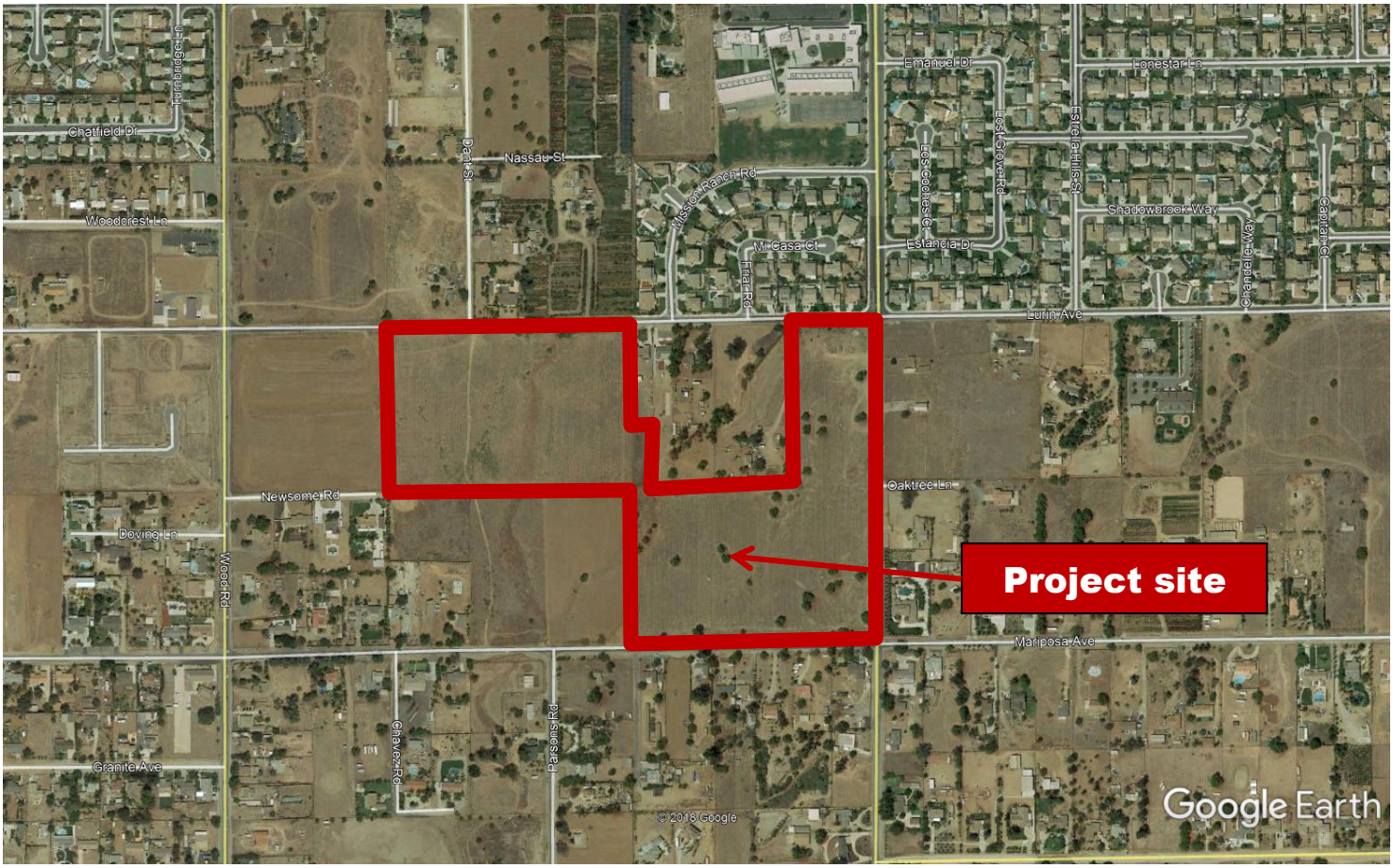


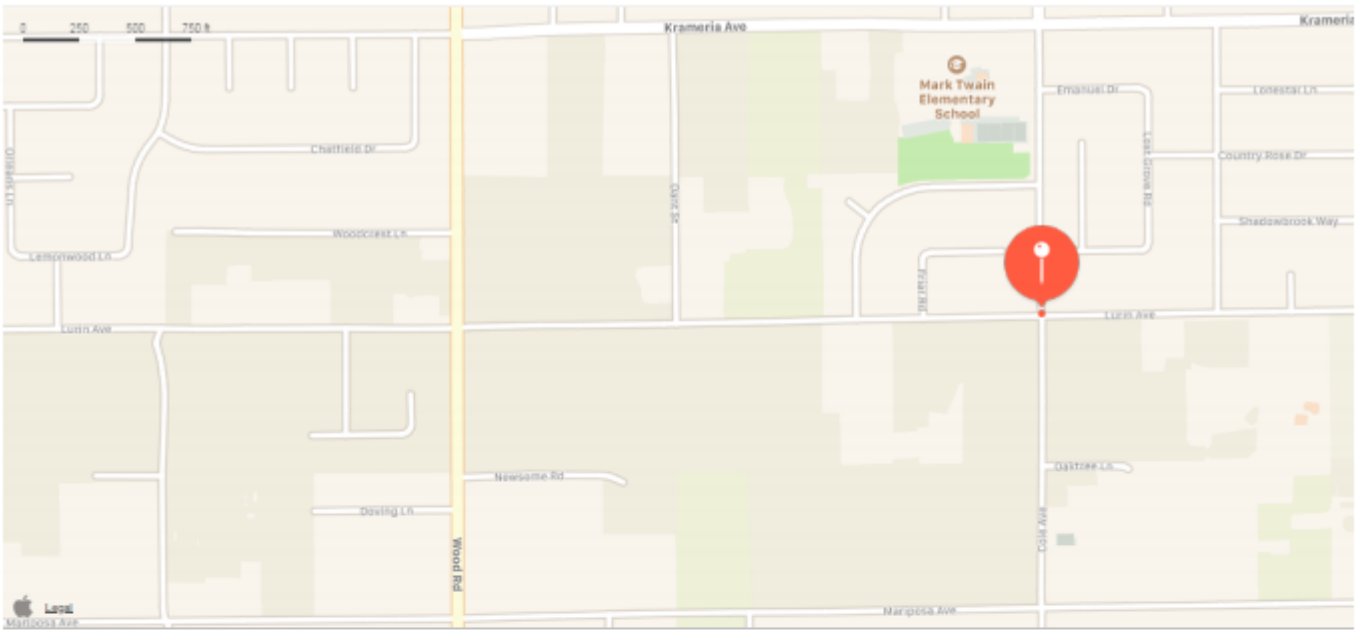
FIGURE 2

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LOCATION MAP
COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, CA

Latitude and Longitude of a Point



Clear / Reset | Remove Last Blue Marker | Center Red Marker

Get the Latitude and Longitude of a Point

When you click on the map, move the marker or enter an address the latitude and longitude coordinates of the point are inserted in the boxes below.

Latitude:	33.876488
Longitude:	-117.322581

	Degrees	Minutes	Seconds
Latitude:	33	52	35.3568
Longitude:	-117	19	21.291

Show Point from Latitude and L

Use this if you know the latitude a
Use: + for *N* Lat or *E* Long - for
Example: +40.689060 -74.04463
Note: Your entry should not have

Decimal Deg. Latitude:

Decimal Deg. Longitude:

Example: **+34 40 50.12** for *34*

Latitude:

Longitude:

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33° 52’35.36” N, -117°19’21” W

DATE 03-07-19
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OF 1 SHEET

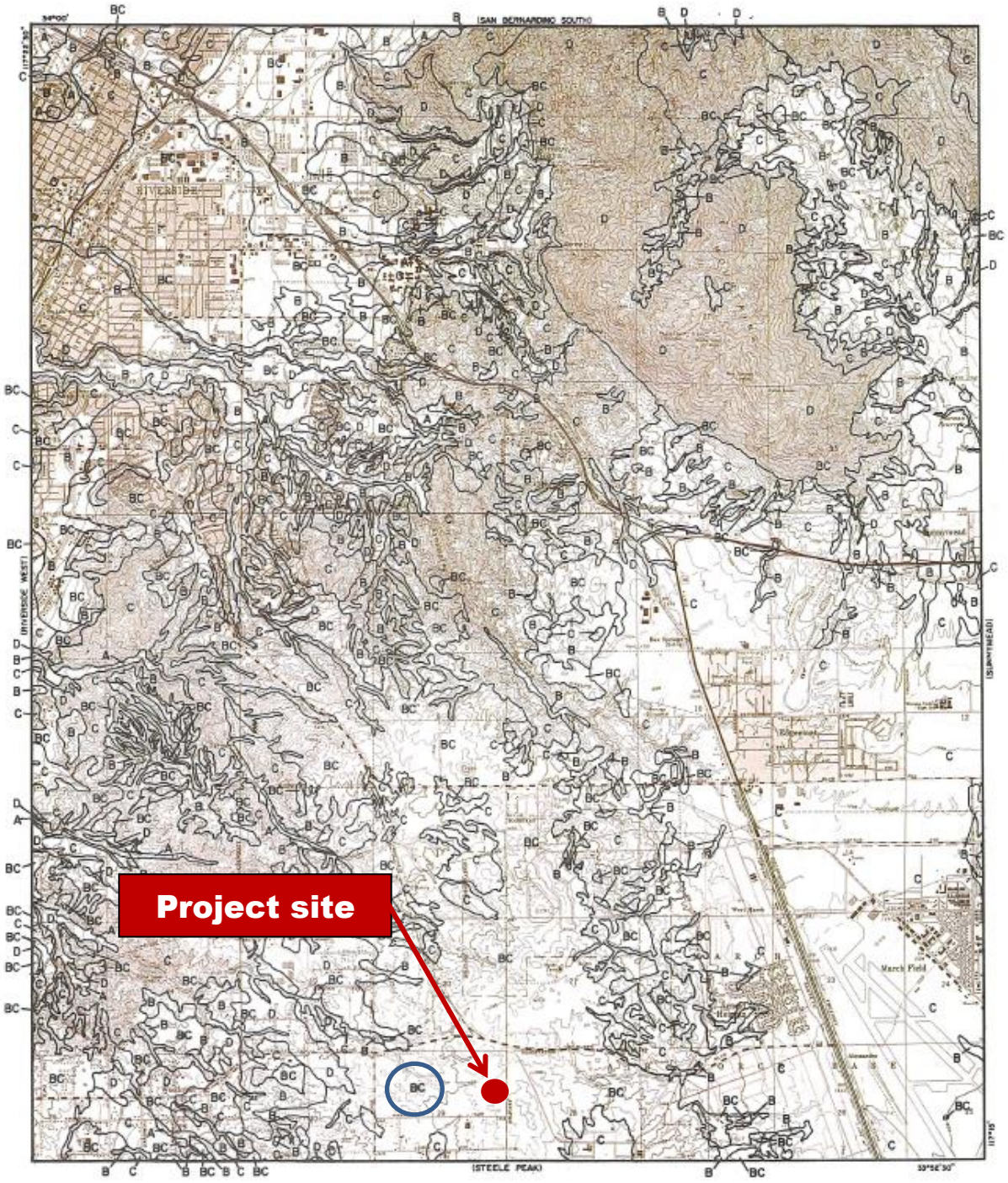
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LATITUDE AND LONGITUDE OF PROJECT
COLE AVE. AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, CA

Appendix

B

HYDROLOGIC CLASSIFICATION OF SOILS & PRECIPITATION MAPS



LEGEND

SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP

FOR

RIVERSIDE–EAST

FIGURE 3

SOIL GROUP BC.

FOR HYDROLOGY CALCULATION, SOIL GROUP "C" WAS USED

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SOIL MAP

COLE AND LURIN AVENUE PROJECT SITE

CITY OF RIVERSIDE, CA

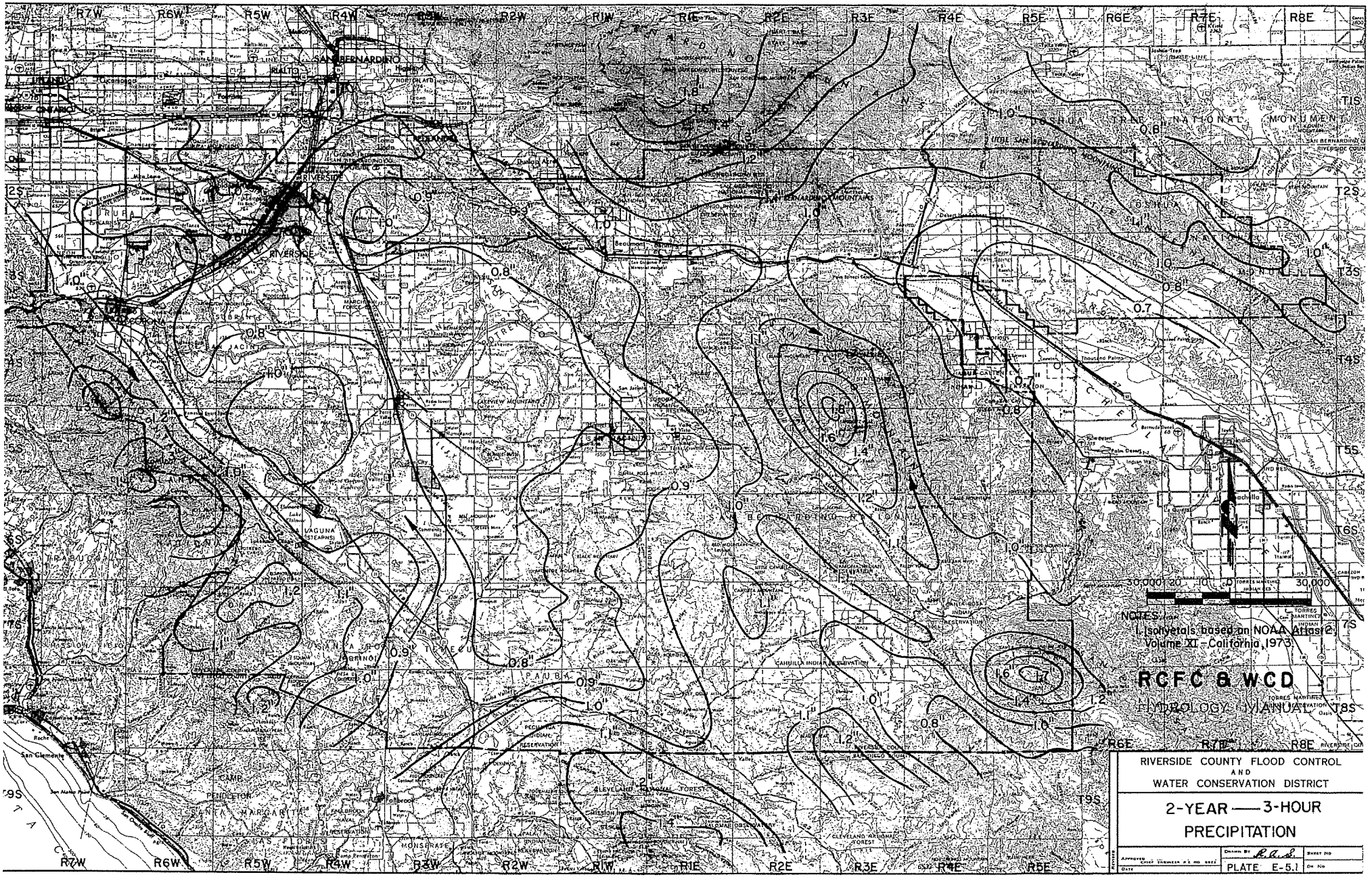
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1

OF 1 SHEET



NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2-YEAR — 3-HOUR PRECIPITATION

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Date	P.A.S.	
	PLATE E-5.1	Dr. No

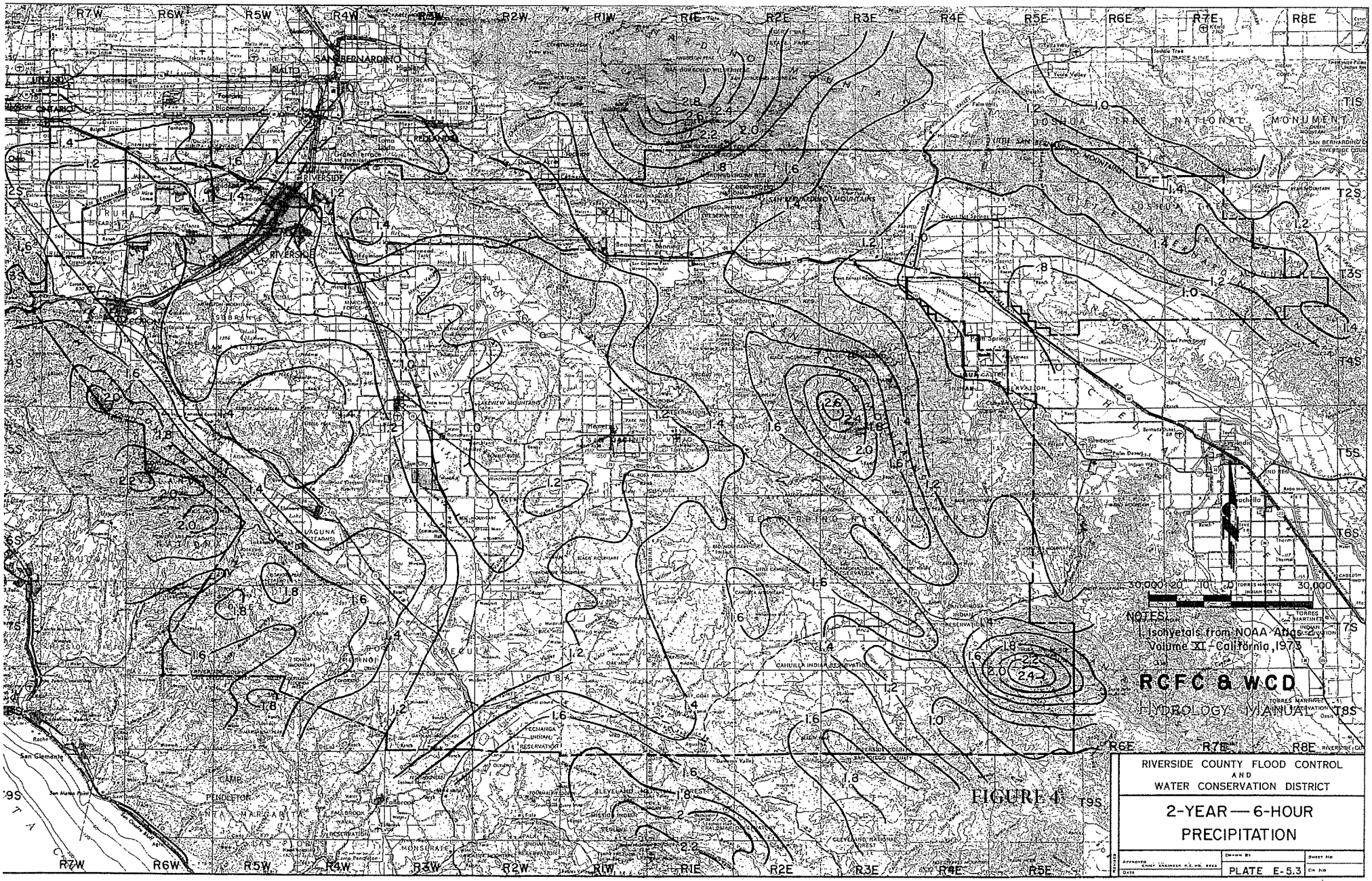
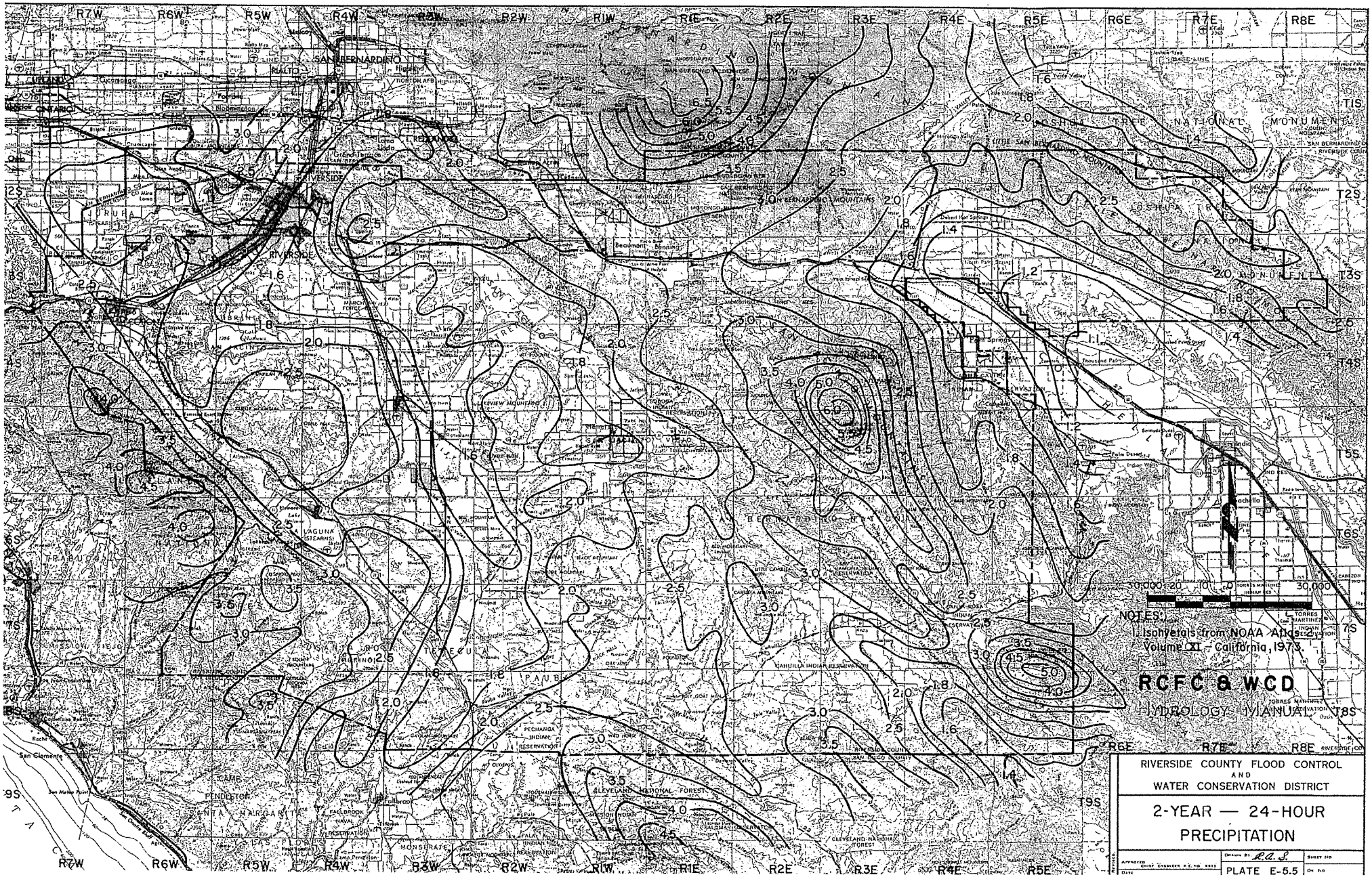
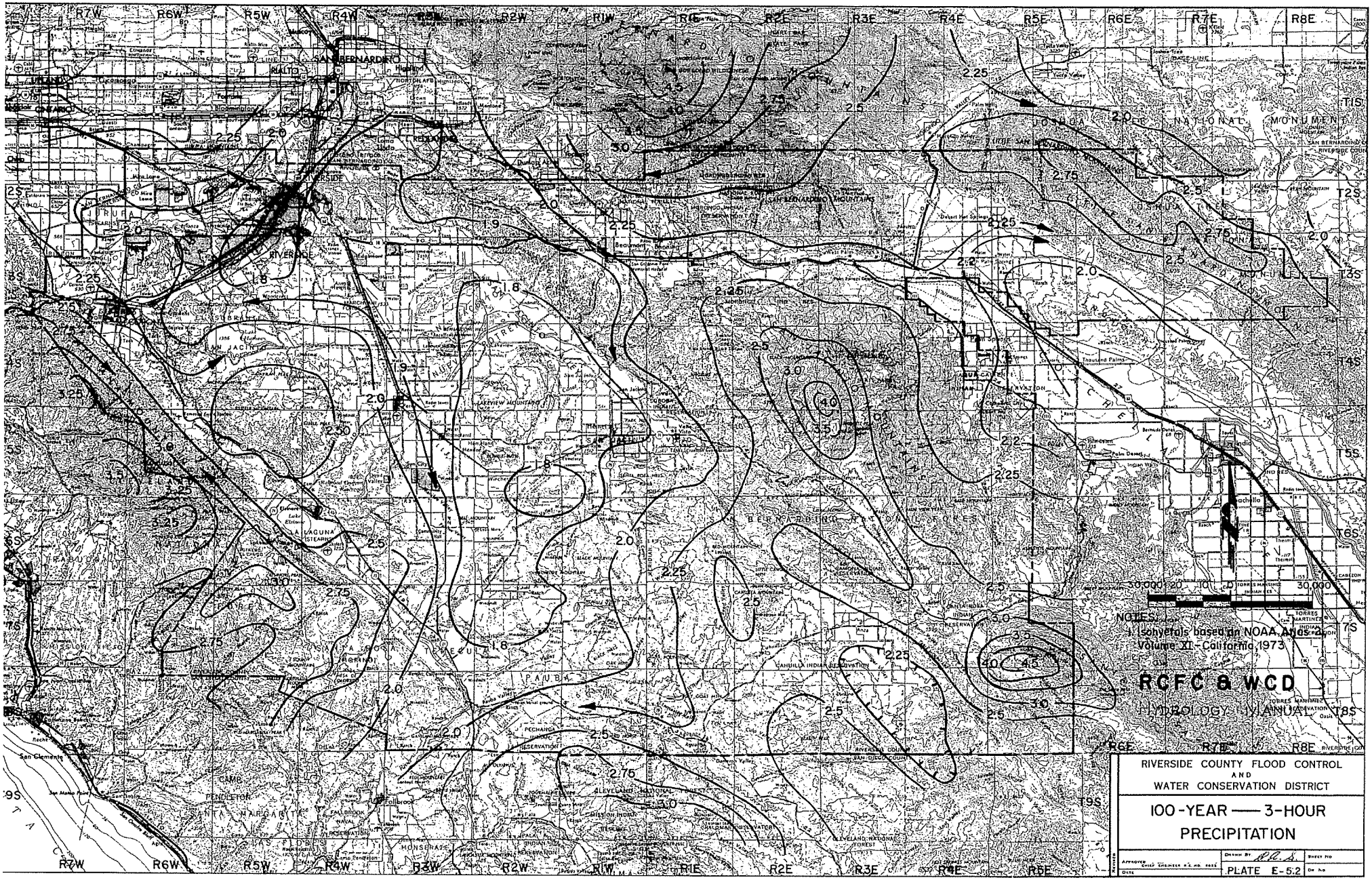
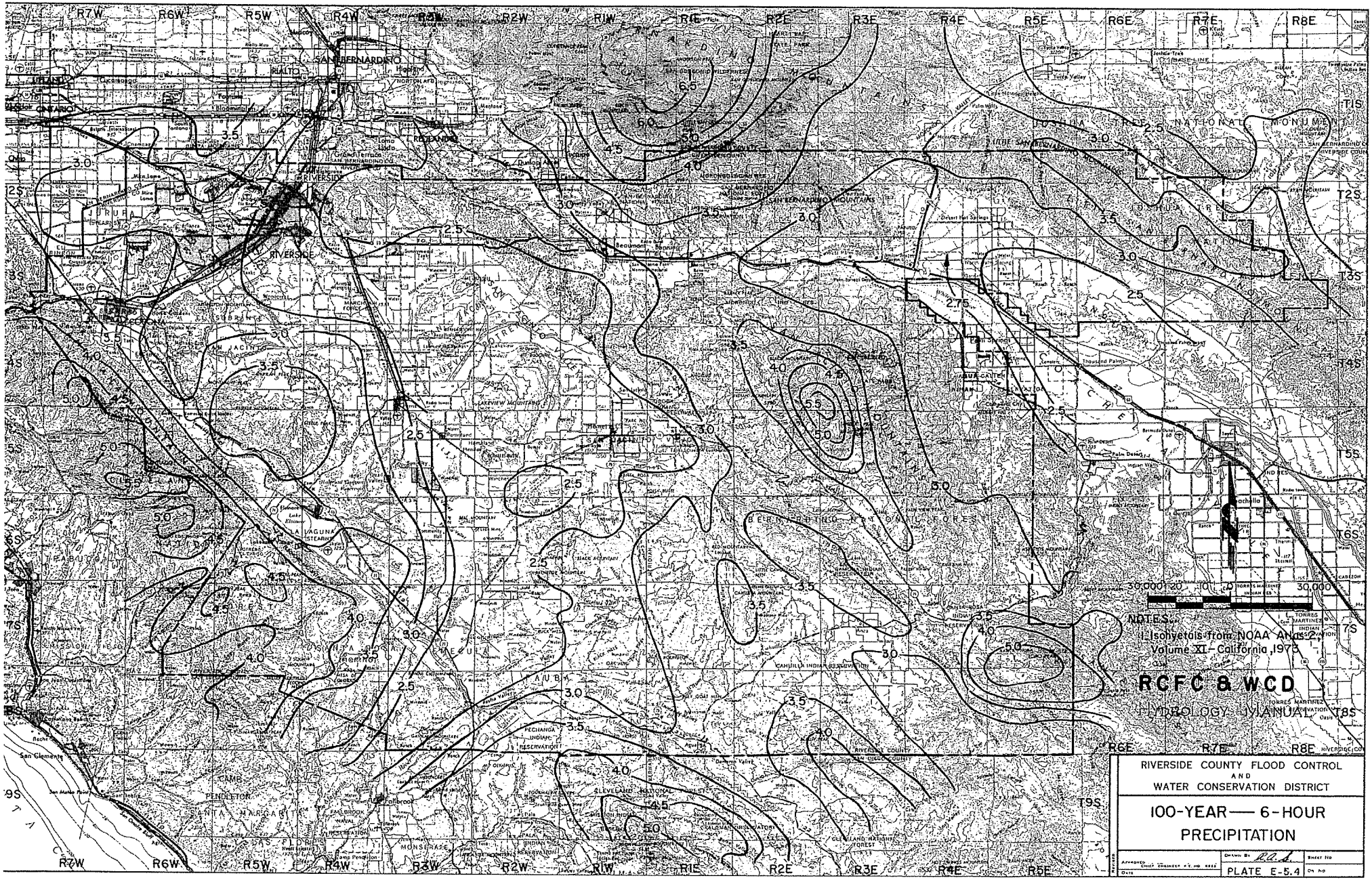
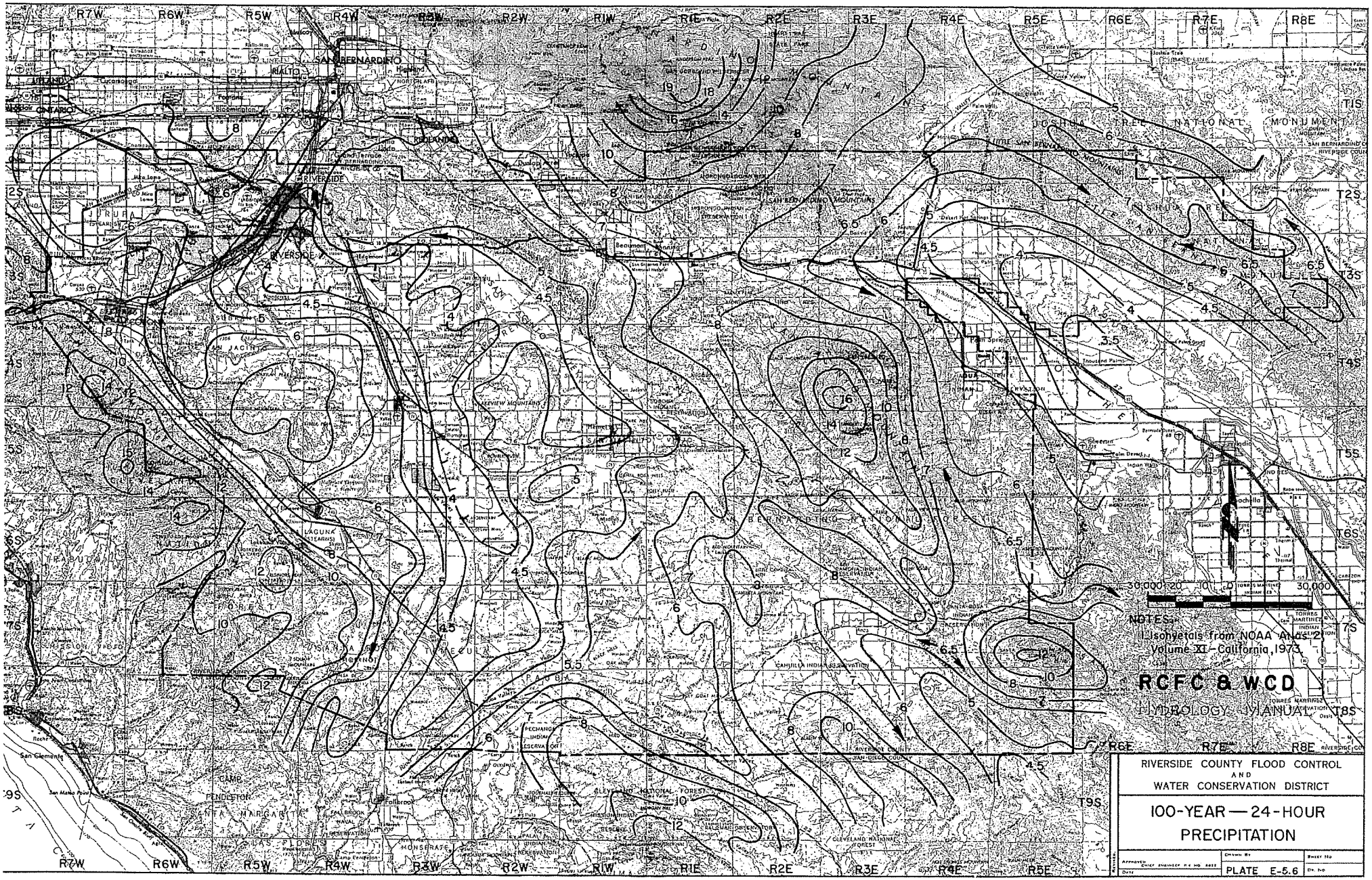

NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 6-HOUR PRECIPITATION
PLATE E-5.3

FIGURE 4


NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.5


NOTES:
1. Isohyetals based on NOAA Atlas 2
Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 3-HOUR
PRECIPITATION
PLATE E-5.2


R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
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R7E
R8E
T1S
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T9S
SAN BERNARDINO MOUNTAINS
SAN JACINTO MOUNTAINS
SAN JACINTO FAULT
SAN JACINTO MOUNTAINS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
JOSHUA TREE NATIONAL MONUMENT
SAN GABRIEL MOUNTAINS
SAN GABRIEL FAULT
SAN JACINTO VALLEY
SAN GORGONIO PASS
SAN GORGONIO MOUNTAIN
SAN JACINTO PEAK
SAN GABRIEL PEAK
SAN GABRIEL RIVER
SANTA ANA RIVER
SANTA MARGARITA RIVER
SAN LUIS REY RIVER
SAN JACINTO RIVER
SAN JACINTO RIVER NORTH FORK
SAN JACINTO RIVER SOUTH FORK
SAN JACINTO RIVER MIDDLE FORK
SAN JACINTO RIVER WEST FORK
SAN JACINTO RIVER EAST FORK


NOTES:
Isohyetals from NOAA Atlas 2
Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.6

RCFC & WCD
HYDROLOGY MANUAL

RAINFALL INTENSITY—INCHES PER HOUR

RIVERSIDE			RIVERSIDE (FOOTHILL AREAS)			RUBIDOUX			SAN JACINTO			SUN CITY		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	2.75	3.92	5	3.14	4.71	5	3.18	4.71	5	2.81	4.16	5	3.25	4.85
6	2.48	3.55	6	2.84	4.26	6	2.87	4.26	6	2.56	3.79	6	2.95	4.40
7	2.28	3.26	7	2.61	3.91	7	2.64	3.91	7	2.37	3.51	7	2.72	4.06
8	2.12	3.03	8	2.42	3.63	8	2.45	3.63	8	2.22	3.29	8	2.53	3.78
9	1.99	2.84	9	2.27	3.41	9	2.30	3.41	9	2.09	3.10	9	2.38	3.55
10	1.88	2.68	10	2.14	3.21	10	2.17	3.21	10	1.98	2.94	10	2.25	3.36
11	1.78	2.54	11	2.03	3.05	11	2.06	3.05	11	1.89	2.80	11	2.14	3.19
12	1.70	2.42	12	1.94	2.91	12	1.96	2.91	12	1.81	2.68	12	2.04	3.05
13	1.62	2.32	13	1.86	2.78	13	1.88	2.78	13	1.74	2.58	13	1.96	2.92
14	1.56	2.23	14	1.78	2.67	14	1.80	2.67	14	1.68	2.48	14	1.88	2.81
15	1.50	2.14	15	1.71	2.57	15	1.74	2.57	15	1.62	2.40	15	1.81	2.71
16	1.45	2.07	16	1.66	2.48	16	1.68	2.48	16	1.57	2.32	16	1.75	2.62
17	1.40	2.00	17	1.60	2.40	17	1.62	2.40	17	1.52	2.25	17	1.70	2.54
18	1.36	1.94	18	1.55	2.33	18	1.57	2.33	18	1.48	2.19	18	1.65	2.46
19	1.32	1.88	19	1.51	2.26	19	1.52	2.26	19	1.44	2.13	19	1.60	2.39
20	1.28	1.83	20	1.46	2.20	20	1.48	2.20	20	1.40	2.08	20	1.56	2.33
22	1.22	1.74	22	1.39	2.08	22	1.41	2.08	22	1.34	1.98	22	1.48	2.21
24	1.16	1.66	24	1.32	1.99	24	1.34	1.99	24	1.28	1.90	24	1.41	2.11
26	1.11	1.58	26	1.27	1.90	26	1.28	1.90	26	1.23	1.82	26	1.36	2.03
28	1.06	1.52	28	1.22	1.82	28	1.23	1.82	28	1.19	1.76	28	1.30	1.95
30	1.02	1.46	30	1.17	1.76	30	1.19	1.76	30	1.15	1.70	30	1.26	1.88
32	.99	1.41	32	1.13	1.70	32	1.14	1.70	32	1.11	1.64	32	1.21	1.81
34	.96	1.37	34	1.09	1.64	34	1.11	1.64	34	1.08	1.59	34	1.18	1.76
36	.93	1.32	36	1.06	1.59	36	1.07	1.59	36	1.05	1.55	36	1.14	1.70
38	.90	1.29	38	1.03	1.54	38	1.04	1.54	38	1.02	1.51	38	1.11	1.66
40	.87	1.25	40	1.00	1.50	40	1.01	1.50	40	.99	1.47	40	1.08	1.61
45	.82	1.17	45	.94	1.41	45	.95	1.41	45	.94	1.39	45	1.01	1.51
50	.77	1.11	50	.88	1.33	50	.90	1.33	50	.89	1.31	50	.96	1.43
55	.73	1.05	55	.84	1.26	55	.85	1.26	55	.85	1.25	55	.91	1.36
60	.70	1.00	60	.80	1.20	60	.81	1.20	60	.81	1.20	60	.87	1.30
65	.67	.96	65	.77	1.15	65	.78	1.15	65	.78	1.15	65	.83	1.25
70	.64	.92	70	.73	1.10	70	.74	1.10	70	.75	1.11	70	.80	1.20
75	.62	.88	75	.71	1.06	75	.72	1.06	75	.72	1.07	75	.77	1.15
80	.60	.85	80	.68	1.02	80	.69	1.02	80	.70	1.04	80	.75	1.12
85	.58	.83	85	.66	.99	85	.67	.99	85	.68	1.01	85	.72	1.08
SLOPE = .550			SLOPE = .550			SLOPE = .550			SLOPE = .540			SLOPE = .530		

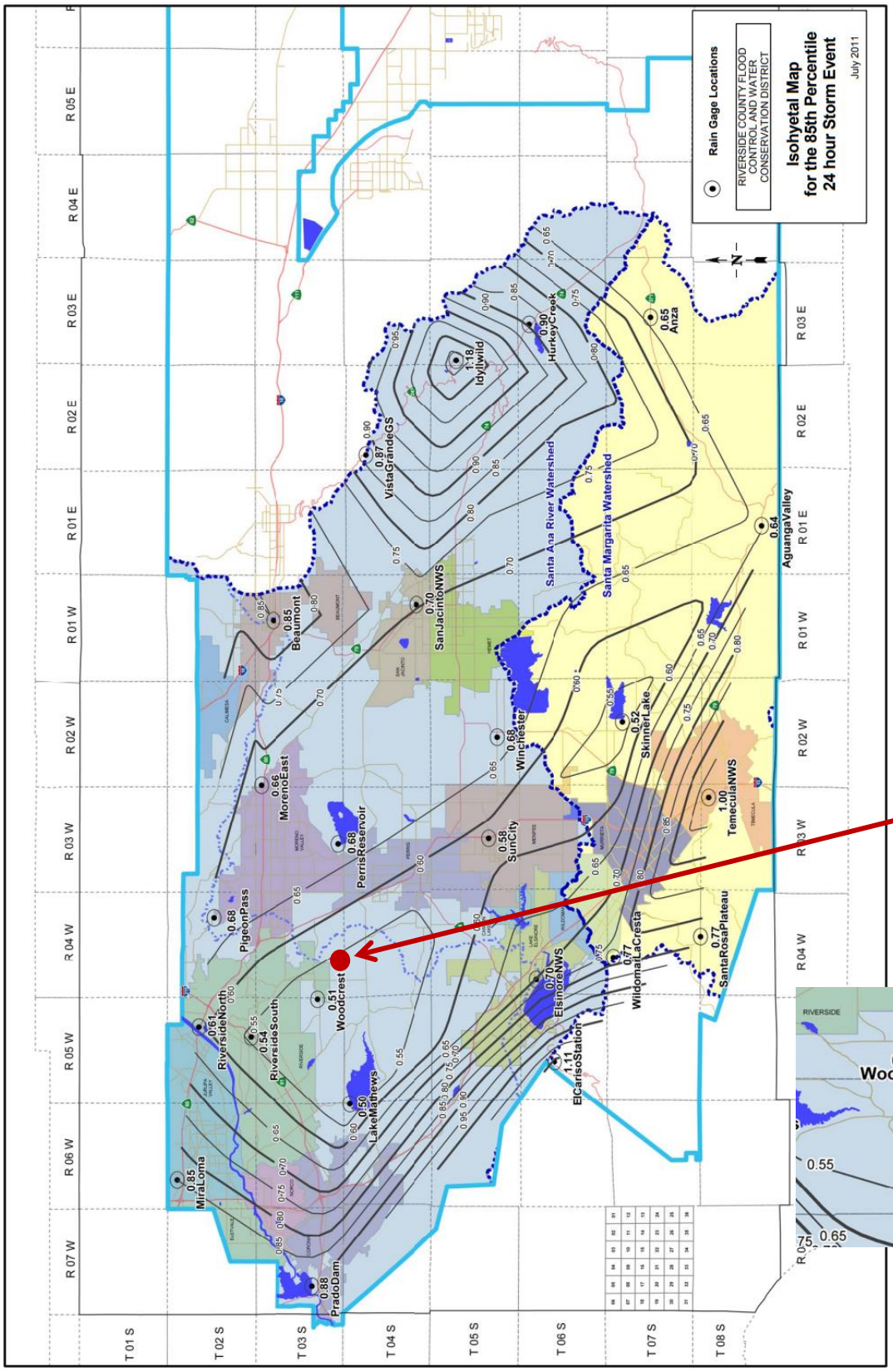
STANDARD INTENSITY – DURATION CURVES DATA

PLATE D-4.1(5 of 6)

DATE	03-07-19
DRAWN BY	TONY E
JOB NO.	17.1713-1
SHEET NO.	1
OF 1 SHEET	

KWC ENGINEERS
CIVIL ENGINEERS ● PLANNERS ● SURVEYORS
1880 COMPTON AVENUE, SUITE 100 ● CORONA, CA. 92881-3370 ● 909-734-2130

RAINFALL INTENSITY TABLE
COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, CA



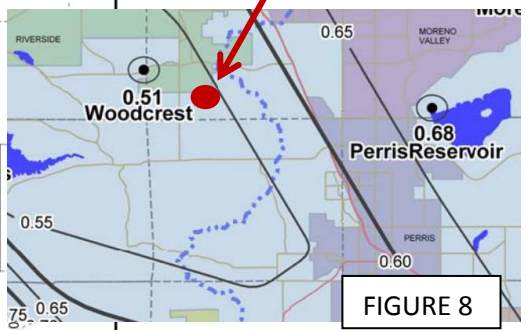


FIGURE 8

85TH PERCENTILE 24 HOUR = 0.54 INCH /HR

DATE 03-07-19	
DRAWN BY TONY E	
JOB NO. 17.1713-1	
SHEET NO. 1	
OF 1 SHEET	

KWC ENGINEERS
CIVIL ENGINEERS ● PLANNERS ● SURVEYORS
1880 COMPTON AVENUE, SUITE 100 ● CORONA, CA. 92881-3370 ● 909-734-2130

ISOHYETAL MAP
COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, CA

Appendix

C

EXISTING CONDITION HYDROLOGY RATIONAL METHOD

2-YEAR EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/08/19 File:E1713Q2.out

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2 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
EXISTING CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.490(In/Hr)
Slope of intensity duration curve = 0.5500

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Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 1.162(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.659
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500

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Initial subarea runoff =      3.422(CFS)
Total initial stream area =        4.470(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.255(CFS)
Depth of flow =   0.196(Ft.), Average velocity =   2.287(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.787(Ft.)
Flow velocity =   2.29(Ft/s)
Travel time =    6.38 min.     TC =   18.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.634
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.926(In/Hr) for a     2.0 year storm
Subarea runoff =      3.527(CFS) for      6.010(Ac.)
Total runoff =      6.949(CFS)    Total area =      10.480(Ac.)
Street flow at end of street =      6.949(CFS)
Half street flow at end of street =      3.475(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   2.450(Ft/s)
Flow width (from curb towards crown)=  11.971(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
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Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      9.359(CFS)
Depth of flow =   0.209(Ft.), Average velocity =   3.626(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.425(Ft.)
Flow velocity =   3.63(Ft/s)
Travel time =    1.86 min.     TC =   20.74  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.880(In/Hr) for a     2.0 year storm
Subarea runoff =      4.700(CFS) for      8.510(Ac.)
Total runoff =     11.649(CFS)   Total area =      18.990(Ac.)
Street flow at end of street =     11.649(CFS)
Half street flow at end of street =      5.825(CFS)
Depth of flow =   0.228(Ft.), Average velocity =   3.826(Ft/s)
Flow width (from curb towards crown)=  12.397(Ft.)


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Process from Point/Station      103.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   880.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     13.618(CFS)
Depth of flow =   0.406(Ft.), Average velocity =   1.543(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.54(Ft/s)
Travel time =    9.50 min.     TC =   30.24  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.606
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.715(In/Hr) for a     2.0 year storm
Subarea runoff =      3.834(CFS) for      8.850(Ac.)
Total runoff =     15.484(CFS)    Total area =      27.840(Ac.)
Street flow at end of street =     15.484(CFS)
Half street flow at end of street =      7.742(CFS)
Depth of flow =   0.426(Ft.), Average velocity =   1.624(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     27.840(Ac.)
Runoff from this stream =     15.484(CFS)
Time of concentration =   30.24 min.
Rainfall intensity =     0.715(In/Hr)


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Process from Point/Station      104.000 to Point/Station      105.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      1.153(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.658
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.904(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      105.000 to Point/Station      106.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  36.000(Ft.)
Distance from crown to crossfall grade break  =  34.000(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 [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
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Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  0.167(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.557(CFS)
Depth of flow =   0.251(Ft.), Average velocity =   2.934(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.856(Ft.)
Flow velocity =   2.93(Ft/s)
Travel time =   10.39 min.     TC =   23.08  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.622
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.829(In/Hr) for a     2.0 year storm
Subarea runoff =      3.253(CFS) for      6.310(Ac.)
Total runoff =      7.158(CFS)   Total area =      11.460(Ac.)
Street flow at end of street =      7.158(CFS)
Half street flow at end of street =      7.158(CFS)
Depth of flow =   0.278(Ft.), Average velocity =   3.123(Ft/s)
Flow width (from curb towards crown)=  15.226(Ft.)


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  36.000(Ft.)
Distance from crown to crossfall grade break  =  34.000(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 [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  0.167(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.068(CFS)
Depth of flow =   0.338(Ft.), Average velocity =   2.448(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.226(Ft.)
Flow velocity =   2.45(Ft/s)
Travel time =    5.62 min.     TC =   28.70  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.609
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
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RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.736(In/Hr) for a     2.0 year storm
Subarea runoff =      1.734(CFS) for      3.870(Ac.)
Total runoff =      8.892(CFS)    Total area =      15.330(Ac.)
Street flow at end of street =      8.892(CFS)
Half street flow at end of street =      8.892(CFS)
Depth of flow =   0.352(Ft.), Average velocity =   2.507(Ft/s)
Flow width (from curb towards crown)=  18.901(Ft.)


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Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     15.330(Ac.)
Runoff from this stream =      8.892(CFS)
Time of concentration =   28.70 min.
Rainfall intensity =     0.736(In/Hr)
Summary of stream data:

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


1       15.484     30.24                 0.715
2        8.892     28.70                 0.736
Largest stream flow has longer time of concentration
Qp =     15.484 + sum of
         Qb         Ia/Ib
          8.892 *    0.972 =      8.640
Qp =     24.123

Total of 2 streams to confluence:
Flow rates before confluence point:
      15.484       8.892
Area of streams before confluence:
       27.840       15.330
Results of confluence:
Total flow rate =     24.123(CFS)
Time of concentration =    30.241 min.
Effective stream area after confluence =     43.170(Ac.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1691.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   265.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  36.000(Ft.)
Distance from crown to crossfall grade break  =  34.000(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 [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  0.167(In.)
 Manning's N in gutter =  0.0150
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 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     24.213(CFS)
Depth of flow =   0.593(Ft.), Average velocity =   2.536(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  30.938(Ft.)
Flow velocity =   2.54(Ft/s)
Travel time =    1.74 min.     TC =   31.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.603
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.693(In/Hr) for a     2.0 year storm
Subarea runoff =      0.134(CFS) for      0.320(Ac.)
Total runoff =     24.257(CFS)   Total area =      43.490(Ac.)
Street flow at end of street =     24.257(CFS)
Half street flow at end of street =     24.257(CFS)
Depth of flow =   0.593(Ft.), Average velocity =   2.538(Ft/s)
Flow width (from curb towards crown)=  30.960(Ft.)


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Process from Point/Station      108.000 to Point/Station      108.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.603
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    31.98 min.
Rainfall intensity =      0.693(In/Hr) for a     2.0 year storm
Subarea runoff =      6.361(CFS) for     15.220(Ac.)
Total runoff =     30.619(CFS)   Total area =      58.710(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    44.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.619(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    30.619(CFS)
Normal flow depth in pipe =   22.34(In.)
Flow top width inside pipe =   26.17(In.)
Critical Depth =   22.62(In.)
Pipe flow velocity =      7.81(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    32.08 min.


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Process from Point/Station      110.000 to Point/Station      110.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.425
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    32.08 min.
Rainfall intensity =      0.692(In/Hr) for a     2.0 year storm
Subarea runoff =      1.942(CFS) for      6.610(Ac.)
Total runoff =     32.561(CFS)   Total area =      65.320(Ac.)


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Process from Point/Station      110.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    32.561(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    32.561(CFS)
Normal flow depth in pipe =   21.33(In.)
Flow top width inside pipe =   27.20(In.)
Critical Depth =   23.32(In.)
Pipe flow velocity =      8.72(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    32.19 min.


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Process from Point/Station      115.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     65.320(Ac.)
Runoff from this stream =     32.561(CFS)
Time of concentration =   32.19 min.
Rainfall intensity =     0.691(In/Hr)


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Process from Point/Station      112.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.233(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.525
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      1.760(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      115.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.760(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.15(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.53 min.     TC =   12.75  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.616
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.149(In/Hr) for a     2.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      1.760(CFS)    Total area =       2.720(Ac.)


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Process from Point/Station      115.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      1.760(CFS)
Time of concentration =   12.75 min.
Rainfall intensity =     1.149(In/Hr)
Summary of stream data:

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


1       32.561     32.19                 0.691
2        1.760     12.75                 1.149
Largest stream flow has longer time of concentration
Qp =     32.561 + sum of
         Qb         Ia/Ib
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         1.760 *    0.601 =      1.057
Qp =     33.618

Total of 2 streams to confluence:
Flow rates before confluence point:
      32.561       1.760
Area of streams before confluence:
       65.320        2.720
Results of confluence:
Total flow rate =     33.618(CFS)
Time of concentration =    32.187 min.
Effective stream area after confluence =     68.040(Ac.)


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Process from Point/Station      115.000 to Point/Station      120.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1687.000(Ft.)
End of natural channel elevation =   1683.000(Ft.)
Length of natural channel  =   355.000(Ft.)
Estimated mean flow rate at midpoint of channel =     34.261(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.69(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0113
Corrected/adjusted channel slope =  0.0113
Travel time =    1.60 min.     TC =   33.79  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.420
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.672(In/Hr) for a     2.0 year storm
Subarea runoff =      0.734(CFS) for      2.600(Ac.)
Total runoff =     34.353(CFS)   Total area =      70.640(Ac.)


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     70.640(Ac.)
Runoff from this stream =     34.353(CFS)
Time of concentration =   33.79 min.
Rainfall intensity =     0.672(In/Hr)


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Process from Point/Station      116.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
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Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.201(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
Subarea runoff =      3.482(CFS) for      5.160(Ac.)
Total runoff =      4.683(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.683(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.683(CFS)
Normal flow depth in pipe =    9.21(In.)
Flow top width inside pipe =   14.60(In.)
Critical Depth =   10.54(In.)
Pipe flow velocity =      5.93(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.32 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MINOR STREAMS ****
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Along Main Stream number: 1 in normal stream number 2
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Stream flow area =      6.940(Ac.)
Runoff from this stream =      4.683(CFS)
Time of concentration =   15.32 min.
Rainfall intensity =     1.039(In/Hr)
Summary of stream data:

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


1       34.353     33.79                 0.672
2        4.683     15.32                 1.039
Largest stream flow has longer time of concentration
Qp =     34.353 + sum of
         Qb         Ia/Ib
          4.683 *    0.647 =      3.032
Qp =     37.384

Total of 2 streams to confluence:
Flow rates before confluence point:
      34.353       4.683
Area of streams before confluence:
       70.640        6.940
Results of confluence:
Total flow rate =     37.384(CFS)
Time of concentration =    33.791 min.
Effective stream area after confluence =     77.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =     39.167(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.91(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    3.55 min.     TC =   37.34  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.492
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.636(In/Hr) for a     2.0 year storm
Subarea runoff =      2.315(CFS) for      7.400(Ac.)
Total runoff =     39.699(CFS)   Total area =      84.980(Ac.)
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Process from Point/Station      122.000 to Point/Station      124.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1673.200(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   336.000(Ft.)
Estimated mean flow rate at midpoint of channel =     40.339(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.95(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0065
Corrected/adjusted channel slope =  0.0065
Travel time =    1.90 min.     TC =   39.24  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.485
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.619(In/Hr) for a     2.0 year storm
Subarea runoff =      0.824(CFS) for      2.740(Ac.)
Total runoff =     40.523(CFS)   Total area =      87.720(Ac.)


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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.485
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    39.24 min.
Rainfall intensity =      0.619(In/Hr) for a     2.0 year storm
Subarea runoff =      0.271(CFS) for      0.900(Ac.)
Total runoff =     40.794(CFS)   Total area =      88.620(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
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TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      1.080(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.501
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      4.784(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1686.500(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =  1078.000(Ft.)
Estimated mean flow rate at midpoint of channel =      7.906(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0144
Corrected/adjusted channel slope =  0.0144
Travel time =    6.36 min.     TC =   20.64  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.563
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.882(In/Hr) for a     2.0 year storm
Subarea runoff =      5.729(CFS) for     11.550(Ac.)
Total runoff =     10.514(CFS)   Total area =      20.400(Ac.)


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Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.563
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
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```
Time of concentration =    20.64 min.
Rainfall intensity =      0.882(In/Hr) for a     2.0 year storm
Subarea runoff =      1.587(CFS) for      3.200(Ac.)
Total runoff =     12.101(CFS)    Total area =      23.600(Ac.)


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      1.218(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.642(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.515(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.76(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    3.22 min.     TC =   14.69  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.601
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.063(In/Hr) for a     2.0 year storm
Subarea runoff =      3.131(CFS) for      4.900(Ac.)
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Total runoff =      3.773(CFS)    Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.058(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.44(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    4.45 min.     TC =   19.14  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.571
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.919(In/Hr) for a     2.0 year storm
Subarea runoff =      8.442(CFS) for     16.080(Ac.)
Total runoff =     12.215(CFS)    Total area =      21.820(Ac.)


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Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.572(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.29(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.94 min.     TC =   22.08  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.555
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.850(In/Hr) for a     2.0 year storm
Subarea runoff =      3.968(CFS) for      8.420(Ac.)
Total runoff =     16.183(CFS)   Total area =      30.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1671.900(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   579.000(Ft.)
Estimated mean flow rate at midpoint of channel =     16.183(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.12(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0016
Corrected/adjusted channel slope =  0.0016
Travel time =    8.64 min.     TC =   30.73  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.515
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.708(In/Hr) for a     2.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =     16.183(CFS)   Total area =      30.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     30.240(Ac.)
Runoff from this stream =     16.183(CFS)
Time of concentration =   30.73 min.
Rainfall intensity =     0.708(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
```

```
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      1.015(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.490
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      3.855(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.672(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.73(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   23.88 min.     TC =   39.85  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.406
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.614(In/Hr) for a     2.0 year storm
Subarea runoff =      1.821(CFS) for      7.310(Ac.)
Total runoff =      5.676(CFS)   Total area =      15.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    39.85 min.
Rainfall intensity =      0.614(In/Hr) for a     2.0 year storm
Subarea runoff =      1.765(CFS) for      3.430(Ac.)
Total runoff =      7.441(CFS)   Total area =      18.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1675.800(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   956.000(Ft.)
Estimated mean flow rate at midpoint of channel =      8.717(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.71(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0050
Corrected/adjusted channel slope =  0.0050
Travel time =    9.31 min.     TC =   49.17  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.458
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.547(In/Hr) for a     2.0 year storm
Subarea runoff =      1.587(CFS) for      6.340(Ac.)
Total runoff =      9.028(CFS)   Total area =      24.830(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.830(Ac.)
Runoff from this stream =      9.028(CFS)
Time of concentration =   49.17 min.
Rainfall intensity =     0.547(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
```

```
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      1.144(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.919(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.657
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      1.144(In/Hr) for a     2.0 year storm
Subarea runoff =      0.722(CFS) for      0.960(Ac.)
Total runoff =      5.641(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      7.262(CFS)
Depth of flow =   0.238(Ft.), Average velocity =   2.210(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.875(Ft.)
Flow velocity =   2.21(Ft/s)
Travel time =   10.66 min.     TC =   23.51  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.621
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      3.072(CFS) for      6.030(Ac.)
Total runoff =      8.713(CFS)   Total area =      12.040(Ac.)
Street flow at end of street =      8.713(CFS)
Half street flow at end of street =      4.356(CFS)
Depth of flow =   0.256(Ft.), Average velocity =   2.311(Ft/s)
Flow width (from curb towards crown)=  13.782(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    23.51 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      2.183(CFS) for      3.150(Ac.)
Total runoff =     10.896(CFS)   Total area =      15.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.453
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    23.51 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      5.005(CFS) for     13.460(Ac.)
Total runoff =     15.901(CFS)   Total area =      28.650(Ac.)


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Process from Point/Station      318.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1676.000(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   724.000(Ft.)
Estimated mean flow rate at midpoint of channel =     18.856(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
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Velocity using mean channel flow =   2.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0069
Corrected/adjusted channel slope =  0.0069
Travel time =    4.92 min.     TC =   28.43  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.436
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.739(In/Hr) for a     2.0 year storm
Subarea runoff =      3.429(CFS) for     10.650(Ac.)
Total runoff =     19.330(CFS)    Total area =      39.300(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     39.300(Ac.)
Runoff from this stream =     19.330(CFS)
Time of concentration =   28.43 min.
Rainfall intensity =     0.739(In/Hr)
Summary of stream data:

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


1       16.183     30.73                 0.708
2        9.028     49.17                 0.547
3       19.330     28.43                 0.739
Largest stream flow has longer or shorter time of concentration
Qp =     19.330 + sum of
         Qa          Tb/Ta
         16.183 *    0.925 =     14.974
         Qa          Tb/Ta
          9.028 *    0.578 =      5.221
Qp =     39.525

Total of 3 streams to confluence:
Flow rates before confluence point:
      16.183       9.028      19.330
Area of streams before confluence:
       30.240       24.830       39.300
Results of confluence:
Total flow rate =     39.525(CFS)
Time of concentration =    28.433 min.
Effective stream area after confluence =     94.370(Ac.)
End of computations, total study area =          206.59 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.715
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Area averaged RI index number = 74.1

10-YEAR EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/13/19 File:E1713Q10.out

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10 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
EXISTING CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.700(In/Hr)
Slope of intensity duration curve = 0.5500

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Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 1.659(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.699
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500

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Initial subarea runoff =      5.182(CFS)
Total initial stream area =        4.470(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.013(CFS)
Depth of flow =   0.233(Ft.), Average velocity =   2.537(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.624(Ft.)
Flow velocity =   2.54(Ft/s)
Travel time =    5.75 min.     TC =   18.25  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.675
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.347(In/Hr) for a    10.0 year storm
Subarea runoff =      5.468(CFS) for      6.010(Ac.)
Total runoff =     10.649(CFS)    Total area =      10.480(Ac.)
Street flow at end of street =     10.649(CFS)
Half street flow at end of street =      5.325(CFS)
Depth of flow =   0.261(Ft.), Average velocity =   2.722(Ft/s)
Flow width (from curb towards crown)=  14.040(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
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Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     16.889(CFS)
Depth of flow =   0.265(Ft.), Average velocity =   4.193(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.243(Ft.)
Flow velocity =   4.19(Ft/s)
Travel time =    1.61 min.     TC =   19.86  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.670
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.286(In/Hr) for a    10.0 year storm
Subarea runoff =     12.339(CFS) for     14.320(Ac.)
Total runoff =     22.989(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     22.989(CFS)
Half street flow at end of street =     11.494(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   4.524(Ft/s)
Flow width (from curb towards crown)=  15.985(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     24.453(CFS)
Depth of flow =   0.587(Ft.), Average velocity =   1.559(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 =    4.33(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.56(Ft/s)
Travel time =    6.31 min.     TC =   26.16  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.653
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.105(In/Hr) for a    10.0 year storm
Subarea runoff =      2.829(CFS) for      3.920(Ac.)
Total runoff =     25.817(CFS)    Total area =      28.720(Ac.)
Street flow at end of street =     25.817(CFS)
Half street flow at end of street =     12.909(CFS)
Depth of flow =   0.602(Ft.), Average velocity =   1.576(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 =    5.10(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1688.200(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =   377.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.817(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    25.817(CFS)
Normal flow depth in pipe =   24.52(In.)
Flow top width inside pipe =   23.19(In.)
Critical Depth =   20.79(In.)
Pipe flow velocity =      6.01(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    27.21 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.720(Ac.)
Runoff from this stream =     25.817(CFS)
Time of concentration =   27.21 min.
Rainfall intensity =     1.081(In/Hr)


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Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      1.646(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.913(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.489(CFS)
Depth of flow =   0.305(Ft.), Average velocity =   3.248(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.212(Ft.)
Flow velocity =   3.25(Ft/s)
Travel time =    9.39 min.     TC =   22.07  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.663
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.213(In/Hr) for a    10.0 year storm
Subarea runoff =      5.080(CFS) for      6.310(Ac.)
Total runoff =     10.992(CFS)   Total area =      11.460(Ac.)
Street flow at end of street =     10.992(CFS)
Half street flow at end of street =     10.992(CFS)
Depth of flow =   0.338(Ft.), Average velocity =   3.462(Ft/s)
Flow width (from curb towards crown)=  17.860(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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
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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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     14.155(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   2.806(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.492(Ft.)
Flow velocity =   2.81(Ft/s)
Travel time =    4.91 min.     TC =   26.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.651
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.086(In/Hr) for a    10.0 year storm
Subarea runoff =      6.254(CFS) for      8.840(Ac.)
Total runoff =     17.246(CFS)   Total area =      20.300(Ac.)
Street flow at end of street =     17.246(CFS)
Half street flow at end of street =     17.246(CFS)
Depth of flow =   0.465(Ft.), Average velocity =   2.947(Ft/s)
Flow width (from curb towards crown)=  24.223(Ft.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.246(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.246(CFS)
Normal flow depth in pipe =   15.68(In.)
Flow top width inside pipe =   22.84(In.)
Critical Depth =   17.96(In.)
Pipe flow velocity =      7.93(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    27.04 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     17.246(CFS)
Time of concentration =   27.04 min.
Rainfall intensity =     1.085(In/Hr)
Summary of stream data:

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


1       25.817     27.21                 1.081
2       17.246     27.04                 1.085
Largest stream flow has longer time of concentration
Qp =     25.817 + sum of
         Qb         Ia/Ib
         17.246 *    0.997 =     17.188
Qp =     43.005

Total of 2 streams to confluence:
Flow rates before confluence point:
      25.817      17.246
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     43.005(CFS)
Time of concentration =    27.210 min.
Effective stream area after confluence =     49.020(Ac.)


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Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    43.005(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    43.005(CFS)
Normal flow depth in pipe =   28.08(In.)
Flow top width inside pipe =   23.51(In.)
Critical Depth =   26.12(In.)
Pipe flow velocity =      7.99(Ft/s)
Travel time through pipe =    1.24 min.
Time of concentration (TC) =    28.45 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     43.005(CFS)
Time of concentration =   28.45 min.
Rainfall intensity =     1.055(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
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Initial area time of concentration =   12.637 min.
Rainfall intensity =      1.649(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.631(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      9.780(CFS)
Depth of flow =   0.311(Ft.), Average velocity =   3.592(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.545(Ft.)
Flow velocity =   3.59(Ft/s)
Travel time =    2.72 min.     TC =   15.36  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.481(In/Hr) for a    10.0 year storm
Subarea runoff =      2.225(CFS) for      2.190(Ac.)
Total runoff =     10.856(CFS)    Total area =       9.690(Ac.)
Street flow at end of street =     10.856(CFS)
Half street flow at end of street =     10.856(CFS)
Depth of flow =   0.325(Ft.), Average velocity =   3.686(Ft/s)
Flow width (from curb towards crown)=  17.205(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.856(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.856(CFS)
Normal flow depth in pipe =   15.70(In.)
Flow top width inside pipe =   22.83(In.)
Critical Depth =   14.18(In.)
Pipe flow velocity =      4.98(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    15.61 min.


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Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.556
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.61 min.
Rainfall intensity =      1.468(In/Hr) for a    10.0 year storm
Subarea runoff =      5.394(CFS) for      6.610(Ac.)
Total runoff =     16.249(CFS)   Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.249(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    16.249(CFS)
Normal flow depth in pipe =   15.84(In.)
Flow top width inside pipe =   22.74(In.)
Critical Depth =   17.44(In.)
Pipe flow velocity =      7.38(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.74 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     16.249(CFS)
Time of concentration =   15.74 min.
Rainfall intensity =     1.461(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
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**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.761(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      2.818(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.818(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.27(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.39 min.     TC =   12.60  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.682
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.651(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      2.818(CFS)    Total area =       2.720(Ac.)


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
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Stream flow area =      2.720(Ac.)
Runoff from this stream =      2.818(CFS)
Time of concentration =   12.60 min.
Rainfall intensity =     1.651(In/Hr)
Summary of stream data:

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


1       16.249     15.74                 1.461
2        2.818     12.60                 1.651
Largest stream flow has longer time of concentration
Qp =     16.249 + sum of
         Qb         Ia/Ib
          2.818 *    0.885 =      2.493
Qp =     18.743

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.249       2.818
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     18.743(CFS)
Time of concentration =    15.741 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1687.000(Ft.)
End of natural channel elevation =   1683.000(Ft.)
Length of natural channel  =   355.000(Ft.)
Estimated mean flow rate at midpoint of channel =     20.024(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.18(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0113
Corrected/adjusted channel slope =  0.0113
Travel time =    1.86 min.     TC =   17.60  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.544
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      1.374(In/Hr) for a    10.0 year storm
Subarea runoff =      1.944(CFS) for      2.600(Ac.)
Total runoff =     20.687(CFS)   Total area =      21.620(Ac.)
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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     21.620(Ac.)
Runoff from this stream =     20.687(CFS)
Time of concentration =   17.60 min.
Rainfall intensity =     1.374(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      1.490(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.821(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      1.490(In/Hr) for a    10.0 year storm
Subarea runoff =      5.278(CFS) for      5.160(Ac.)
Total runoff =      7.099(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
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Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.099(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.099(CFS)
Normal flow depth in pipe =   10.55(In.)
Flow top width inside pipe =   17.73(In.)
Critical Depth =   12.39(In.)
Pipe flow velocity =      6.59(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    15.31 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =      7.099(CFS)
Time of concentration =   15.31 min.
Rainfall intensity =     1.484(In/Hr)
Summary of stream data:

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


1       43.005     28.45            1.055
2       20.687     17.60            1.374
3        7.099     15.31            1.484
Largest stream flow has longer time of concentration
Qp =     43.005 + sum of
         Qb         Ia/Ib
         20.687 *    0.768 =     15.884
         Qb         Ia/Ib
          7.099 *    0.711 =      5.049
Qp =     63.938

Total of 3 main streams to confluence:
Flow rates before confluence point:
      43.005      20.687       7.099
Area of streams before confluence:
       49.020       21.620        6.940


Results of confluence:
Total flow rate =     63.938(CFS)
Time of concentration =    28.452 min.
Effective stream area after confluence  =     77.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =     66.987(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
```

```
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.57(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    3.04 min.     TC =   31.49  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.998(In/Hr) for a    10.0 year storm
Subarea runoff =      4.344(CFS) for      7.400(Ac.)
Total runoff =     68.282(CFS)   Total area =      84.980(Ac.)


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Process from Point/Station      122.000 to Point/Station      124.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1673.200(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   336.000(Ft.)
Estimated mean flow rate at midpoint of channel =     69.382(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0065
Corrected/adjusted channel slope =  0.0065
Travel time =    1.63 min.     TC =   33.11  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.583
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.971(In/Hr) for a    10.0 year storm
Subarea runoff =      1.549(CFS) for      2.740(Ac.)
Total runoff =     69.831(CFS)   Total area =      87.720(Ac.)


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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.583
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    33.11 min.
Rainfall intensity =      0.971(In/Hr) for a    10.0 year storm
Subarea runoff =      0.509(CFS) for      0.900(Ac.)
Total runoff =     70.340(CFS)   Total area =      88.620(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      1.541(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.565
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      7.702(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1686.500(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =  1078.000(Ft.)
Estimated mean flow rate at midpoint of channel =     12.728(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.19(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0144
Corrected/adjusted channel slope =  0.0144
Travel time =    5.64 min.     TC =   19.92  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.637
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.284(In/Hr) for a    10.0 year storm
Subarea runoff =      9.451(CFS) for     11.550(Ac.)
Total runoff =     17.153(CFS)   Total area =      20.400(Ac.)


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Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.637
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    19.92 min.
Rainfall intensity =      1.284(In/Hr) for a    10.0 year storm
Subarea runoff =      2.618(CFS) for      3.200(Ac.)
Total runoff =     19.771(CFS)   Total area =      23.600(Ac.)


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      1.739(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.690
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.008(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.949(CFS)
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Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.16(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    2.91 min.     TC =   14.38  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.669
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.535(In/Hr) for a    10.0 year storm
Subarea runoff =      5.037(CFS) for      4.900(Ac.)
Total runoff =      6.045(CFS)   Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.512(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.88(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    3.95 min.     TC =   18.33  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.646
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.344(In/Hr) for a    10.0 year storm
Subarea runoff =     13.956(CFS) for     16.080(Ac.)
Total runoff =     20.001(CFS)   Total area =      21.820(Ac.)


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Process from Point/Station      306.000 to Point/Station      308.000
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**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1690.200(Ft.)
End of natural channel elevation = 1671.900(Ft.)
Length of natural channel = 756.000(Ft.)
Estimated mean flow rate at midpoint of channel = 23.860(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 4.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0242
Corrected/adjusted channel slope = 0.0242
Travel time = 2.58 min. TC = 20.91 min.

Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.632
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 71.60
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.250(In/Hr) for a 10.0 year storm
Subarea runoff = 6.657(CFS) for 8.420(Ac.)
Total runoff = 26.658(CFS) Total area = 30.240(Ac.)

++
Process from Point/Station 308.000 to Point/Station 320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1671.900(Ft.)
End of natural channel elevation = 1671.000(Ft.)
Length of natural channel = 579.000(Ft.)
Estimated mean flow rate at midpoint of channel = 26.658(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 1.28(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0016
Corrected/adjusted channel slope = 0.0016
Travel time = 7.55 min. TC = 28.46 min.

Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.599
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 71.60
Pervious area fraction = 1.000; Impervious fraction = 0.000

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Rainfall intensity =      1.055(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =     26.658(CFS)    Total area =      30.240(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     30.240(Ac.)
Runoff from this stream =     26.658(CFS)
Time of concentration =   28.46 min.
Rainfall intensity =     1.055(In/Hr)


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Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      1.450(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.554
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      6.219(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.152(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   21.24 min.     TC =   37.21  min.


 Adding area flow to channel
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SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.471
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.910(In/Hr) for a    10.0 year storm
Subarea runoff =      3.133(CFS) for      7.310(Ac.)
Total runoff =      9.352(CFS)   Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    37.21 min.
Rainfall intensity =      0.910(In/Hr) for a    10.0 year storm
Subarea runoff =      2.643(CFS) for      3.430(Ac.)
Total runoff =     11.994(CFS)   Total area =      18.490(Ac.)


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Process from Point/Station      313.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1675.800(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   956.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.051(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.93(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0050
Corrected/adjusted channel slope =  0.0050
Travel time =    8.24 min.     TC =   45.46  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.546
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.815(In/Hr) for a    10.0 year storm
Subarea runoff =      2.823(CFS) for      6.340(Ac.)
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Total runoff =     14.817(CFS)    Total area =      24.830(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.830(Ac.)
Runoff from this stream =     14.817(CFS)
Time of concentration =   45.46 min.
Rainfall intensity =     0.815(In/Hr)


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Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.089(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.697
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
Subarea runoff =      1.093(CFS) for      0.960(Ac.)
Total runoff =      8.182(CFS)    Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
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Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     10.633(CFS)
Depth of flow =   0.277(Ft.), Average velocity =   2.428(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.848(Ft.)
Flow velocity =   2.43(Ft/s)
Travel time =    9.70 min.     TC =   22.55  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      4.787(CFS) for      6.030(Ac.)
Total runoff =     12.969(CFS)    Total area =      12.040(Ac.)
Street flow at end of street =     12.969(CFS)
Half street flow at end of street =      6.485(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   2.550(Ft/s)
Flow width (from curb towards crown)=  15.994(Ft.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    22.55 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      3.219(CFS) for      3.150(Ac.)
Total runoff =     16.189(CFS)    Total area =      15.190(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.519
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    22.55 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      8.383(CFS) for     13.460(Ac.)
Total runoff =     24.572(CFS)   Total area =      28.650(Ac.)


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Process from Point/Station      318.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1676.000(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   724.000(Ft.)
Estimated mean flow rate at midpoint of channel =     29.139(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.76(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0069
Corrected/adjusted channel slope =  0.0069
Travel time =    4.37 min.     TC =   26.92  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.502
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      1.088(In/Hr) for a    10.0 year storm
Subarea runoff =      5.816(CFS) for     10.650(Ac.)
Total runoff =     30.388(CFS)   Total area =      39.300(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     39.300(Ac.)
Runoff from this stream =     30.388(CFS)
Time of concentration =   26.92 min.
Rainfall intensity =     1.088(In/Hr)
Summary of stream data:

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


1       26.658     28.46                1.055
2       14.817     45.46                0.815
```

```
3       30.388     26.92                 1.088
Largest stream flow has longer or shorter time of concentration
Qp =     30.388 + sum of
         Qa          Tb/Ta
         26.658 *    0.946 =     25.222
         Qa          Tb/Ta
         14.817 *    0.592 =      8.777
Qp =     64.386

Total of 3 streams to confluence:
Flow rates before confluence point:
      26.658      14.817      30.388
Area of streams before confluence:
       30.240       24.830       39.300
Results of confluence:
Total flow rate =     64.386(CFS)
Time of concentration =    26.925 min.
Effective stream area after confluence =     94.370(Ac.)
End of computations, total study area =          206.59 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.715
Area averaged RI index number =  74.1
```

100-YEAR EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/13/19 File:E1713Q100.out

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100 YEAR STORM EVENT HYDROLOGY ANALISYS
SWC OF COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
EXISTING CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.000(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 2.371(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 84.40
Pervious area fraction = 0.500; Impervious fraction = 0.500

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Initial subarea runoff =      9.088(CFS)
Total initial stream area =        4.470(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     14.189(CFS)
Depth of flow =   0.293(Ft.), Average velocity =   2.921(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.631(Ft.)
Flow velocity =   2.92(Ft/s)
Travel time =    5.00 min.     TC =   17.49  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.970(In/Hr) for a   100.0 year storm
Subarea runoff =     10.063(CFS) for      6.010(Ac.)
Total runoff =     19.151(CFS)   Total area =      10.480(Ac.)
Street flow at end of street =     19.151(CFS)
Half street flow at end of street =      9.575(CFS)
Depth of flow =   0.330(Ft.), Average velocity =   3.146(Ft/s)
Flow width (from curb towards crown)=  17.489(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
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```
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     30.671(CFS)
Depth of flow =   0.337(Ft.), Average velocity =   4.858(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.808(Ft.)
Flow velocity =   4.86(Ft/s)
Travel time =    1.39 min.     TC =   18.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.889(In/Hr) for a   100.0 year storm
Subarea runoff =     22.939(CFS) for     14.320(Ac.)
Total runoff =     42.089(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     42.089(CFS)
Half street flow at end of street =     21.045(CFS)
Depth of flow =   0.374(Ft.), Average velocity =   5.487(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     44.896(CFS)
Depth of flow =   0.743(Ft.), Average velocity =   1.929(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 =   12.17(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.93(Ft/s)
Travel time =    5.10 min.     TC =   23.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.842
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.656(In/Hr) for a   100.0 year storm
Subarea runoff =      5.464(CFS) for      3.920(Ac.)
Total runoff =     47.554(CFS)    Total area =      28.720(Ac.)
Street flow at end of street =     47.554(CFS)
Half street flow at end of street =     23.777(CFS)
Depth of flow =   0.760(Ft.), Average velocity =   1.974(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 =   13.00(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1688.200(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =   377.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    47.554(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    47.554(CFS)
Normal flow depth in pipe =   29.30(In.)
Flow top width inside pipe =   33.72(In.)
Critical Depth =   26.42(In.)
Pipe flow velocity =      7.12(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    24.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.720(Ac.)
Runoff from this stream =     47.554(CFS)
Time of concentration =   24.86 min.
Rainfall intensity =     1.624(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      2.351(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     10.379(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     15.181(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   3.750(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.158(Ft.)
Flow velocity =   3.75(Ft/s)
Travel time =    8.13 min.     TC =   20.82  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.790(In/Hr) for a   100.0 year storm
Subarea runoff =      9.551(CFS) for      6.310(Ac.)
Total runoff =     19.930(CFS)    Total area =      11.460(Ac.)
Street flow at end of street =     19.930(CFS)
Half street flow at end of street =     19.930(CFS)
Depth of flow =   0.427(Ft.), Average velocity =   4.011(Ft/s)
Flow width (from curb towards crown)=  22.324(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     25.946(CFS)
Depth of flow =   0.552(Ft.), Average velocity =   3.162(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    2.58(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  28.557(Ft.)
Flow velocity =   3.16(Ft/s)
Travel time =    4.35 min.     TC =   25.17  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.612(In/Hr) for a   100.0 year storm
Subarea runoff =     11.978(CFS) for      8.840(Ac.)
Total runoff =     31.908(CFS)   Total area =      20.300(Ac.)
Street flow at end of street =     31.908(CFS)
Half street flow at end of street =     31.908(CFS)
Depth of flow =   0.598(Ft.), Average velocity =   3.264(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    4.92(Ft.)
Flow width (from curb towards crown)=  30.900(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    31.908(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    31.908(CFS)
Normal flow depth in pipe =   22.97(In.)
Flow top width inside pipe =   19.25(In.)
Critical Depth =   23.35(In.)
Pipe flow velocity =      8.86(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    25.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     31.908(CFS)
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Time of concentration =   25.23 min.
Rainfall intensity =     1.610(In/Hr)
Summary of stream data:

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


1       47.554     24.86                 1.624
2       31.908     25.23                 1.610
Largest stream flow has longer or shorter time of concentration
Qp =     47.554 + sum of
         Qa          Tb/Ta
         31.908 *    0.985 =     31.444
Qp =     78.998

Total of 2 streams to confluence:
Flow rates before confluence point:
      47.554      31.908
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     78.998(CFS)
Time of concentration =    24.860 min.
Effective stream area after confluence =     49.020(Ac.)


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Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    78.998(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    78.998(CFS)
Normal flow depth in pipe =   34.27(In.)
Flow top width inside pipe =   32.56(In.)
Critical Depth =   33.34(In.)
Pipe flow velocity =      9.40(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    25.91 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     78.998(CFS)
Time of concentration =   25.91 min.
Rainfall intensity =     1.587(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
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Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.637 min.
Rainfall intensity =      2.356(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     15.147(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     17.176(CFS)
Depth of flow =   0.389(Ft.), Average velocity =   4.128(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.433(Ft.)
Flow velocity =   4.13(Ft/s)
Travel time =    2.37 min.     TC =   15.00  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.143(In/Hr) for a   100.0 year storm
Subarea runoff =      4.007(CFS) for      2.190(Ac.)
Total runoff =     19.153(CFS)    Total area =       9.690(Ac.)
Street flow at end of street =     19.153(CFS)
Half street flow at end of street =     19.153(CFS)
Depth of flow =   0.406(Ft.), Average velocity =   4.241(Ft/s)
Flow width (from curb towards crown)=  21.286(Ft.)
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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.153(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.153(CFS)
Normal flow depth in pipe =   21.75(In.)
Flow top width inside pipe =   21.37(In.)
Critical Depth =   18.37(In.)
Pipe flow velocity =      5.58(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    15.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.23 min.
Rainfall intensity =      2.126(In/Hr) for a   100.0 year storm
Subarea runoff =     11.595(CFS) for      6.610(Ac.)
Total runoff =     30.748(CFS)   Total area =      16.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.748(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    30.748(CFS)
Normal flow depth in pipe =   20.44(In.)
Flow top width inside pipe =   27.96(In.)
Critical Depth =   22.66(In.)
Pipe flow velocity =      8.63(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    15.34 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     30.748(CFS)
Time of concentration =   15.34 min.
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Rainfall intensity =     2.117(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      2.516(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.836
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      5.719(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.719(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.50(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.18 min.     TC =   12.39  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.381(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      5.719(CFS)   Total area =       2.720(Ac.)
```

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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      5.719(CFS)
Time of concentration =   12.39 min.
Rainfall intensity =     2.381(In/Hr)
Summary of stream data:

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


1       30.748     15.34                 2.117
2        5.719     12.39                 2.381
Largest stream flow has longer time of concentration
Qp =     30.748 + sum of
         Qb         Ia/Ib
          5.719 *    0.889 =      5.085
Qp =     35.834

Total of 2 streams to confluence:
Flow rates before confluence point:
      30.748       5.719
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     35.834(CFS)
Time of concentration =    15.341 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1687.000(Ft.)
End of natural channel elevation =   1683.000(Ft.)
Length of natural channel  =   355.000(Ft.)
Estimated mean flow rate at midpoint of channel =     38.283(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.81(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0113
Corrected/adjusted channel slope =  0.0113
Travel time =    1.55 min.     TC =   16.90  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.821
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
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```
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      2.008(In/Hr) for a   100.0 year storm
Subarea runoff =      4.287(CFS) for      2.600(Ac.)
Total runoff =     40.121(CFS)    Total area =      21.620(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     21.620(Ac.)
Runoff from this stream =     40.121(CFS)
Time of concentration =   16.90 min.
Rainfall intensity =     2.008(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      2.128(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.233(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      2.128(In/Hr) for a   100.0 year storm
Subarea runoff =      9.371(CFS) for      5.160(Ac.)
Total runoff =     12.604(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.604(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.604(CFS)
Normal flow depth in pipe =   13.73(In.)
Flow top width inside pipe =   19.98(In.)
Critical Depth =   15.86(In.)
Pipe flow velocity =      7.56(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    15.30 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =     12.604(CFS)
Time of concentration =   15.30 min.
Rainfall intensity =     2.121(In/Hr)
Summary of stream data:

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


1       78.998     25.91            1.587
2       40.121     16.90            2.008
3       12.604     15.30            2.121
Largest stream flow has longer time of concentration
Qp =     78.998 + sum of
         Qb         Ia/Ib
         40.121 *    0.790 =     31.710
         Qb         Ia/Ib
         12.604 *    0.748 =      9.431
Qp =    120.139

Total of 3 main streams to confluence:
Flow rates before confluence point:
      78.998      40.121      12.604
Area of streams before confluence:
       49.020       21.620        6.940


Results of confluence:
Total flow rate =    120.139(CFS)
Time of concentration =    25.915 min.
Effective stream area after confluence  =     77.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
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Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =    125.869(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.52(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    2.52 min.     TC =   28.43  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.855
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.508(In/Hr) for a   100.0 year storm
Subarea runoff =      9.543(CFS) for      7.400(Ac.)
Total runoff =    129.682(CFS)   Total area =      84.980(Ac.)


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Process from Point/Station      122.000 to Point/Station      124.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1673.200(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   336.000(Ft.)
Estimated mean flow rate at midpoint of channel =    131.773(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.17(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0065
Corrected/adjusted channel slope =  0.0065
Travel time =    1.34 min.     TC =   29.77  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.470(In/Hr) for a   100.0 year storm
Subarea runoff =      3.441(CFS) for      2.740(Ac.)
Total runoff =    133.122(CFS)   Total area =      87.720(Ac.)
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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    29.77 min.
Rainfall intensity =      1.470(In/Hr) for a   100.0 year storm
Subarea runoff =      1.130(CFS) for      0.900(Ac.)
Total runoff =    134.253(CFS)   Total area =      88.620(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      2.202(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     16.127(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1686.500(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =  1078.000(Ft.)
Estimated mean flow rate at midpoint of channel =     26.650(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0144
Corrected/adjusted channel slope =  0.0144
Travel time =    4.62 min.     TC =   18.91  min.
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```
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.887(In/Hr) for a   100.0 year storm
Subarea runoff =     18.829(CFS) for     11.550(Ac.)
Total runoff =     34.955(CFS)    Total area =      20.400(Ac.)


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Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    18.91 min.
Rainfall intensity =      1.887(In/Hr) for a   100.0 year storm
Subarea runoff =      5.217(CFS) for      3.200(Ac.)
Total runoff =     40.172(CFS)    Total area =      23.600(Ac.)


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      2.484(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.820(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
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Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      7.130(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.78(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    2.53 min.     TC =   14.00  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.226(In/Hr) for a   100.0 year storm
Subarea runoff =      9.480(CFS) for      4.900(Ac.)
Total runoff =     11.301(CFS)   Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =     27.130(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.60(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    3.33 min.     TC =   17.34  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.979(In/Hr) for a   100.0 year storm
Subarea runoff =     27.547(CFS) for     16.080(Ac.)
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Total runoff =     38.847(CFS)    Total area =      21.820(Ac.)


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Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     46.343(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.14 min.     TC =   19.48  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.863
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.857(In/Hr) for a   100.0 year storm
Subarea runoff =     13.496(CFS) for      8.420(Ac.)
Total runoff =     52.343(CFS)    Total area =      30.240(Ac.)


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Process from Point/Station      308.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1671.900(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   579.000(Ft.)
Estimated mean flow rate at midpoint of channel =     52.343(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.55(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0016
Corrected/adjusted channel slope =  0.0016
Travel time =    6.24 min.     TC =   25.72  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.594(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =     52.343(CFS)   Total area =      30.240(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     30.240(Ac.)
Runoff from this stream =     52.343(CFS)
Time of concentration =   25.72 min.
Rainfall intensity =     1.594(In/Hr)


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Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      2.071(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     13.215(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =     19.447(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.00(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
```

```
Corrected/adjusted channel slope =  0.0011
Travel time =   17.46 min.     TC =   33.43  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.791
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      1.379(In/Hr) for a   100.0 year storm
Subarea runoff =      7.975(CFS) for      7.310(Ac.)
Total runoff =     21.190(CFS)   Total area =      15.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    33.43 min.
Rainfall intensity =      1.379(In/Hr) for a   100.0 year storm
Subarea runoff =      4.194(CFS) for      3.430(Ac.)
Total runoff =     25.384(CFS)   Total area =      18.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1675.800(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   956.000(Ft.)
Estimated mean flow rate at midpoint of channel =     29.736(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.37(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0050
Corrected/adjusted channel slope =  0.0050
Travel time =    6.73 min.     TC =   40.16  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.247(In/Hr) for a   100.0 year storm
Subarea runoff =      6.691(CFS) for      6.340(Ac.)
Total runoff =     32.076(CFS)   Total area =      24.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.830(Ac.)
Runoff from this stream =     32.076(CFS)
Time of concentration =   40.16 min.
Rainfall intensity =     1.247(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.505(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
Subarea runoff =      1.920(CFS) for      0.960(Ac.)
Total runoff =     12.425(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     16.962(CFS)
Depth of flow =   0.334(Ft.), Average velocity =   2.724(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.685(Ft.)
Flow velocity =   2.72(Ft/s)
Travel time =    8.64 min.     TC =   21.50  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =      8.958(CFS) for      6.030(Ac.)
Total runoff =     21.382(CFS)   Total area =      12.040(Ac.)
Street flow at end of street =     21.382(CFS)
Half street flow at end of street =     10.691(CFS)
Depth of flow =   0.361(Ft.), Average velocity =   2.966(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    21.50 min.
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =      4.924(CFS) for      3.150(Ac.)
Total runoff =     26.307(CFS)   Total area =      15.190(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.812
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    21.50 min.
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =     19.209(CFS) for     13.460(Ac.)
Total runoff =     45.516(CFS)   Total area =      28.650(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of natural channel elevation =   1676.000(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   724.000(Ft.)
Estimated mean flow rate at midpoint of channel =     53.976(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.29(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0069
Corrected/adjusted channel slope =  0.0069
Travel time =    3.67 min.     TC =   25.17  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.805
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      1.613(In/Hr) for a   100.0 year storm
Subarea runoff =     13.818(CFS) for     10.650(Ac.)
Total runoff =     59.334(CFS)   Total area =      39.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     39.300(Ac.)
Runoff from this stream =     59.334(CFS)
Time of concentration =   25.17 min.
Rainfall intensity =     1.613(In/Hr)
Summary of stream data:
```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	52.343	25.72	1.594
2	32.076	40.16	1.247
3	59.334	25.17	1.613

Largest stream flow has longer or shorter time of concentration
Qp = 59.334 + sum of

Qa		Tb/Ta	
52.343	*	0.979	= 51.226
Qa		Tb/Ta	
32.076	*	0.627	= 20.101

Qp = 130.660

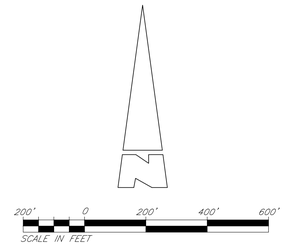
Total of 3 streams to confluence:
Flow rates before confluence point:
52.343 32.076 59.334
Area of streams before confluence:
30.240 24.830 39.300
Results of confluence:
Total flow rate = 130.660(CFS)
Time of concentration = 25.167 min.
Effective stream area after confluence = 94.370(Ac.)
End of computations, total study area = 206.59 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.715
Area averaged RI index number = 74.1

Appendix

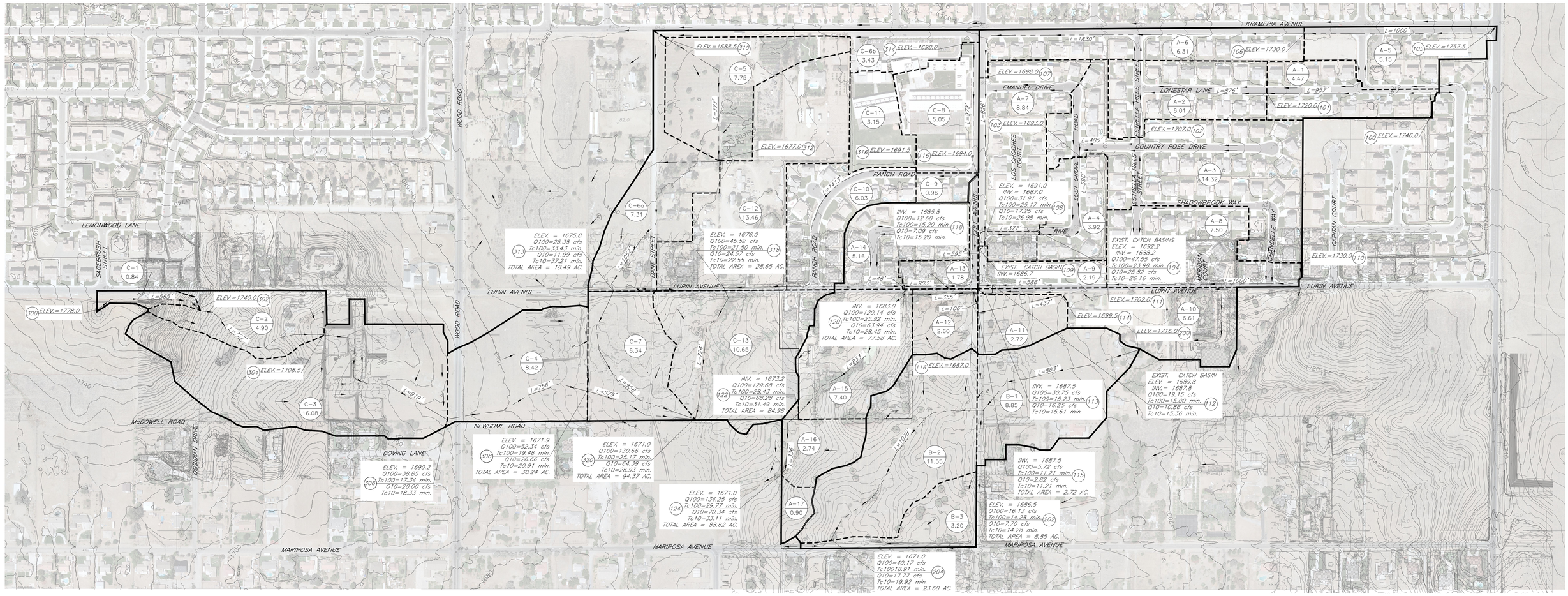
D

EXISTING CONDITION HYDROLOGIC KEY MAP





VICINITY MAP



LEGEND

- MAJOR WATERSHED BOUNDARY
- SUB DRAINAGE AREA BOUNDARY
- FLOW PATH
- DIRECTION OF FLOW
- C17 / 70.21 — DRAINAGE AREA DESIGNATION / ACRES
- 340 — NODE DESIGNATION
- L=300' — LENGTH OF EXISTING FLOW PATH
- Q_{100} — CALCULATED 100-YEAR STORM RUNOFF
- Q_{10} — CALCULATED 10-YEAR STORM RUNOFF

SOIL TYPE "C"

FIGURE 5

EXISTING CONDITION HYDROLOGY KEY MAP

FOR

SWC OF COLE AVE. AND LURIN AVE. PROJECT SITE

CITY OF RIVERSIDE, COUNTY RIVERSIDE

PREPARED BY:
KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA 92881-3370 951-734-2130

SHEET 1 OF 1 SHEETS

Appendix

E

PROPOSED CONDITION HYDROLOGY RATIONAL METHOD

2-YEAR PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/29/19 File:P1713Q2.out

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2 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF LURIN AND COLE AVENUE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
PROPOSED CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.490(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 1.162(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.659
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 3.422(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.500

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.255(CFS)
Depth of flow =   0.196(Ft.), Average velocity =   2.287(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.787(Ft.)
Flow velocity =   2.29(Ft/s)
Travel time =    6.38 min.     TC =   18.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.634
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.926(In/Hr) for a     2.0 year storm
Subarea runoff =      3.527(CFS) for      6.010(Ac.)
Total runoff =      6.949(CFS)   Total area =      10.480(Ac.)
Street flow at end of street =      6.949(CFS)
Half street flow at end of street =      3.475(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   2.450(Ft/s)
Flow width (from curb towards crown)=  11.971(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     11.012(CFS)
Depth of flow =   0.223(Ft.), Average velocity =   3.774(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.140(Ft.)
```

```
Flow velocity =   3.77(Ft/s)
Travel time =    1.79 min.     TC =   20.66  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.881(In/Hr) for a     2.0 year storm
Subarea runoff =      7.927(CFS) for     14.320(Ac.)
Total runoff =     14.876(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     14.876(CFS)
Half street flow at end of street =      7.438(CFS)
Depth of flow =   0.252(Ft.), Average velocity =   4.064(Ft/s)
Flow width (from curb towards crown)=  13.583(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     15.845(CFS)
Depth of flow =   0.475(Ft.), Average velocity =   1.403(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.40(Ft/s)
Travel time =    7.01 min.     TC =   27.68  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.611
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.750(In/Hr) for a     2.0 year storm
Subarea runoff =      1.798(CFS) for      3.920(Ac.)
Total runoff =     16.674(CFS)   Total area =      28.720(Ac.)
Street flow at end of street =     16.674(CFS)
Half street flow at end of street =      8.337(CFS)
Depth of flow =   0.485(Ft.), Average velocity =   1.431(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      109.000
```

**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1688.200(Ft.)
Downstream point/station elevation = 1686.700(Ft.)
Pipe length = 377.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 16.674(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 16.674(CFS)
Normal flow depth in pipe = 19.17(In.)
Flow top width inside pipe = 24.50(In.)
Critical Depth = 17.11(In.)
Pipe flow velocity = 5.52(Ft/s)
Travel time through pipe = 1.14 min.
Time of concentration (TC) = 28.81 min.

++

Process from Point/Station 109.000 to Point/Station 109.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 28.720(Ac.)
Runoff from this stream = 16.674(CFS)
Time of concentration = 28.81 min.
Rainfall intensity = 0.734(In/Hr)

++

Process from Point/Station 105.000 to Point/Station 106.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1757.500(Ft.)
Bottom (of initial area) elevation = 1730.000(Ft.)
Difference in elevation = 27.500(Ft.)
Slope = 0.02750 s(percent)= 2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.682 min.
Rainfall intensity = 1.153(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.658
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 3.904(CFS)
Total initial stream area = 5.150(Ac.)
Pervious area fraction = 0.500

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Process from Point/Station 106.000 to Point/Station 107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1730.000(Ft.)
End of street segment elevation = 1698.000(Ft.)
Length of street segment = 1830.000(Ft.)
Height of curb above gutter flowline = 6.0(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 = 6.500(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

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Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.556(CFS)
Depth of flow =   0.257(Ft.), Average velocity =   2.926(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.834(Ft.)
Flow velocity =   2.93(Ft/s)
Travel time =   10.43 min.     TC =   23.11  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.622
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.829(In/Hr) for a     2.0 year storm
Subarea runoff =      3.250(CFS) for      6.310(Ac.)
Total runoff =      7.155(CFS)   Total area =      11.460(Ac.)
Street flow at end of street =      7.155(CFS)
Half street flow at end of street =      7.155(CFS)
Depth of flow =   0.285(Ft.), Average velocity =   3.114(Ft/s)
Flow width (from curb towards crown)=  15.207(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      9.191(CFS)
Depth of flow =   0.363(Ft.), Average velocity =   2.522(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  19.129(Ft.)
Flow velocity =   2.52(Ft/s)
Travel time =    5.46 min.     TC =   28.57  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.609
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.737(In/Hr) for a     2.0 year storm
Subarea runoff =      3.973(CFS) for      8.840(Ac.)
Total runoff =     11.128(CFS)   Total area =      20.300(Ac.)
Street flow at end of street =     11.128(CFS)
Half street flow at end of street =     11.128(CFS)
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Depth of flow =   0.391(Ft.), Average velocity =   2.644(Ft/s)
Flow width (from curb towards crown)=  20.551(Ft.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.128(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.128(CFS)
Normal flow depth in pipe =   12.97(In.)
Flow top width inside pipe =   20.41(In.)
Critical Depth =   14.91(In.)
Pipe flow velocity =      7.13(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    28.64 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     11.128(CFS)
Time of concentration =   28.64 min.
Rainfall intensity =     0.736(In/Hr)
Summary of stream data:

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


1       16.674     28.81                0.734
2       11.128     28.64                0.736
Largest stream flow has longer time of concentration
Qp =     16.674 + sum of
         Qb         Ia/Ib
         11.128 *    0.997 =     11.090
Qp =     27.765

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.674      11.128
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     27.765(CFS)
Time of concentration =    28.814 min.
Effective stream area after confluence =     49.020(Ac.)


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Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.765(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    27.765(CFS)
Normal flow depth in pipe =   21.42(In.)
Flow top width inside pipe =   27.11(In.)
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Critical Depth =   21.56(In.)
Pipe flow velocity =      7.41(Ft/s)
Travel time through pipe =    1.34 min.
Time of concentration (TC) =    30.15 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     27.765(CFS)
Time of concentration =   30.15 min.
Rainfall intensity =     0.716(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.637 min.
Rainfall intensity =      1.155(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.658
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.699(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      6.451(CFS)
Depth of flow =   0.264(Ft.), Average velocity =   3.242(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.159(Ft.)
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Flow velocity =   3.24(Ft/s)
Travel time =    3.01 min.     TC =   15.65  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.645
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.027(In/Hr) for a     2.0 year storm
Subarea runoff =      1.450(CFS) for      2.190(Ac.)
Total runoff =      7.149(CFS)   Total area =       9.690(Ac.)
Street flow at end of street =      7.149(CFS)
Half street flow at end of street =      7.149(CFS)
Depth of flow =   0.275(Ft.), Average velocity =   3.325(Ft/s)
Flow width (from curb towards crown)=  14.714(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.149(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.149(CFS)
Normal flow depth in pipe =   13.17(In.)
Flow top width inside pipe =   20.31(In.)
Critical Depth =   11.86(In.)
Pipe flow velocity =      4.50(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    15.93 min.


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Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.490
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.93 min.
Rainfall intensity =      1.017(In/Hr) for a     2.0 year storm
Subarea runoff =      3.294(CFS) for      6.610(Ac.)
Total runoff =     10.443(CFS)   Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.443(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.443(CFS)
Normal flow depth in pipe =   13.07(In.)
Flow top width inside pipe =   20.36(In.)
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Critical Depth =   14.45(In.)
Pipe flow velocity =      6.64(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    16.08 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     10.443(CFS)
Time of concentration =   16.08 min.
Rainfall intensity =     1.012(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.233(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.525
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      1.760(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.760(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.15(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.53 min.     TC =   12.75  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.616
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.149(In/Hr) for a     2.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      1.760(CFS)   Total area =       2.720(Ac.)


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      1.760(CFS)
Time of concentration =   12.75 min.
Rainfall intensity =     1.149(In/Hr)
Summary of stream data:

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


1       10.443     16.08                 1.012
2        1.760     12.75                 1.149
Largest stream flow has longer time of concentration
Qp =     10.443 + sum of
         Qb         Ia/Ib
          1.760 *    0.880 =      1.549
Qp =     11.992

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.443       1.760
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     11.992(CFS)
Time of concentration =    16.077 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1687.000(Ft.)
Downstream point elevation =  1683.000(Ft.)
Channel length thru subarea  =   355.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =     12.211(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     12.211(CFS)
Depth of flow =   0.418(Ft.), Average velocity =   5.387(Ft/s)
Channel flow top width =    5.837(Ft.)
Flow Velocity =    5.39(Ft/s)
Travel time  =    1.10 min.
Time of concentration =   17.18 min.

Sub-Channel No. 1 Critical depth =      0.547(Ft.)
  '     '       '     Critical flow top width =      6.094(Ft.)
  '     '       '     Critical flow velocity=    4.025(Ft/s)
  '     '       '     Critical flow area =      3.033(Sq.Ft)
```

```
 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      0.976(In/Hr) for a     2.0 year storm
Subarea runoff =      0.496(CFS) for      0.600(Ac.)
Total runoff =     12.489(CFS)   Total area =      19.620(Ac.)
Depth of flow =   0.424(Ft.), Average velocity =   5.430(Ft/s)

Sub-Channel No. 1 Critical depth =      0.555(Ft.)
  '     '       '     Critical flow top width =      6.109(Ft.)
  '     '       '     Critical flow velocity=    4.053(Ft/s)
  '     '       '     Critical flow area =      3.081(Sq.Ft)



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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.620(Ac.)
Runoff from this stream =     12.489(CFS)
Time of concentration =   17.18 min.
Rainfall intensity =     0.976(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.201(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
Subarea runoff =      3.482(CFS) for      5.160(Ac.)
Total runoff =      4.683(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.683(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.683(CFS)
Normal flow depth in pipe =    9.21(In.)
Flow top width inside pipe =   14.60(In.)
Critical Depth =   10.54(In.)
Pipe flow velocity =      5.93(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.32 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =      4.683(CFS)
Time of concentration =   15.32 min.
Rainfall intensity =     1.039(In/Hr)
Summary of stream data:

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


1       27.765     30.15            0.716
2       12.489     17.18            0.976
3        4.683     15.32            1.039
Largest stream flow has longer time of concentration
Qp =     27.765 + sum of
         Qb         Ia/Ib
         12.489 *    0.734 =      9.164
         Qb         Ia/Ib
          4.683 *    0.689 =      3.228
Qp =     40.156

Total of 3 main streams to confluence:
Flow rates before confluence point:
      27.765      12.489       4.683
Area of streams before confluence:
       49.020       19.620        6.940


Results of confluence:
Total flow rate =     40.156(CFS)
Time of concentration =    30.152 min.
Effective stream area after confluence  =     75.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =     42.122(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.00(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    3.47 min.     TC =   33.63  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.504
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.674(In/Hr) for a     2.0 year storm
Subarea runoff =      2.516(CFS) for      7.400(Ac.)
Total runoff =     42.673(CFS)   Total area =      82.980(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      123.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.600
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    33.63 min.
Rainfall intensity =      0.674(In/Hr) for a     2.0 year storm
Subarea runoff =      0.526(CFS) for      1.300(Ac.)
Total runoff =     43.199(CFS)   Total area =      84.280(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      123.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1673.000(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    43.199(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    43.199(CFS)
Normal flow depth in pipe =   24.94(In.)
Flow top width inside pipe =   22.47(In.)
Critical Depth =   26.32(In.)
Pipe flow velocity =      9.90(Ft/s)
Travel time through pipe =    0.31 min.
Time of concentration (TC) =    33.94 min.
```

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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.600
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    33.94 min.
Rainfall intensity =      0.671(In/Hr) for a     2.0 year storm
Subarea runoff =      0.201(CFS) for      0.500(Ac.)
Total runoff =     43.400(CFS)   Total area =      84.780(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      1.080(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.501
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      4.784(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      452.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1682.500(Ft.)
Downstream point/station elevation =  1679.800(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.784(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.784(CFS)
Normal flow depth in pipe =    6.74(In.)
Flow top width inside pipe =   11.91(In.)
Critical Depth =   10.86(In.)
Pipe flow velocity =     10.53(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    14.37 min.


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Process from Point/Station      450.000 to Point/Station      452.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
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Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    14.37 min.
Rainfall intensity =      1.076(In/Hr) for a     2.0 year storm
Subarea runoff =      0.549(CFS) for      0.600(Ac.)
Total runoff =      5.333(CFS)   Total area =       9.450(Ac.)


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Process from Point/Station      452.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1679.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =  1336.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.333(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.333(CFS)
Normal flow depth in pipe =   10.51(In.)
Flow top width inside pipe =   17.74(In.)
Critical Depth =   10.67(In.)
Pipe flow velocity =      4.98(Ft/s)
Travel time through pipe =    4.47 min.
Time of concentration (TC) =    18.84 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.450(Ac.)
Runoff from this stream =      5.333(CFS)
Time of concentration =   18.84 min.
Rainfall intensity =     0.927(In/Hr)


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Process from Point/Station      454.000 to Point/Station      456.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1682.500(Ft.)
Bottom (of initial area) elevation =  1674.500(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.00800  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.488 min.
Rainfall intensity =      1.162(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.673(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      456.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =  1671.600(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.673(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.673(CFS)
Normal flow depth in pipe =   11.20(In.)
Flow top width inside pipe =   13.04(In.)
Critical Depth =    7.86(In.)
Pipe flow velocity =      2.72(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    12.78 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =      2.673(CFS)
Time of concentration =   12.78 min.
Rainfall intensity =     1.148(In/Hr)
Summary of stream data:

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


1        5.333     18.84                  0.927
2        2.673     12.78                  1.148
Largest stream flow has longer time of concentration
Qp =      5.333 + sum of
         Qb         Ia/Ib
          2.673 *    0.808 =      2.159
Qp =      7.493

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.333       2.673
Area of streams before confluence:
        9.450        2.700
Results of confluence:
Total flow rate =      7.493(CFS)
Time of concentration =    18.844 min.
Effective stream area after confluence =     12.150(Ac.)


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.150(Ac.)
Runoff from this stream =      7.493(CFS)
Time of concentration =   18.84 min.
Rainfall intensity =     0.927(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      420.000 to Point/Station      421.000
**** INITIAL AREA EVALUATION ****
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Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  1687.900(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.00681  s(percent)=       0.68
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.144 min.
Rainfall intensity =      1.009(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.643
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.817(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      421.000 to Point/Station      422.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      2.044(CFS)
Depth of flow =   0.347(Ft.), Average velocity =   0.611(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.61(Ft/s)
Travel time =    5.32 min.     TC =   21.47  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.626
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.863(In/Hr) for a     2.0 year storm
Subarea runoff =      0.378(CFS) for      0.700(Ac.)
Total runoff =      2.195(CFS)    Total area =       3.500(Ac.)
Street flow at end of street =      2.195(CFS)
Half street flow at end of street =      2.195(CFS)
Depth of flow =   0.355(Ft.), Average velocity =   0.628(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      422.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.195(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.195(CFS)
Normal flow depth in pipe =    9.38(In.)
Flow top width inside pipe =    9.92(In.)
Critical Depth =    7.60(In.)
Pipe flow velocity =      3.33(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    21.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.500(Ac.)
Runoff from this stream =      2.195(CFS)
Time of concentration =   21.59 min.
Rainfall intensity =     0.860(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      424.000 to Point/Station      426.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
Initial area flow distance =   908.000(Ft.)
Top (of initial area) elevation =  1687.000(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00584  s(percent)=       0.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.636 min.
Rainfall intensity =      0.993(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.655(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      426.000 to Point/Station      428.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   200.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
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```
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      1.878(CFS)
Depth of flow =   0.339(Ft.), Average velocity =   0.587(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.929(Ft.)
Flow velocity =   0.59(Ft/s)
Travel time =    5.68 min.     TC =   22.32  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.624
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.845(In/Hr) for a     2.0 year storm
Subarea runoff =      0.369(CFS) for      0.700(Ac.)
Total runoff =      2.024(CFS)   Total area =       3.300(Ac.)
Street flow at end of street =      2.024(CFS)
Half street flow at end of street =      2.024(CFS)
Depth of flow =   0.347(Ft.), Average velocity =   0.604(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      428.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.024(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.024(CFS)
Normal flow depth in pipe =    8.54(In.)
Flow top width inside pipe =   14.86(In.)
Critical Depth =    6.80(In.)
Pipe flow velocity =      2.81(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    22.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.300(Ac.)
Runoff from this stream =      2.024(CFS)
Time of concentration =   22.55 min.
Rainfall intensity =     0.840(In/Hr)
Summary of stream data:

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


1        2.195     21.59                 0.860
2        2.024     22.55                 0.840
Largest stream flow has longer or shorter time of concentration
Qp =      2.195 + sum of
         Qa          Tb/Ta
```

```
          2.024 *    0.957 =      1.938
Qp =      4.133

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.195       2.024
Area of streams before confluence:
        3.500        3.300
Results of confluence:
Total flow rate =      4.133(CFS)
Time of concentration =    21.585 min.
Effective stream area after confluence =      6.800(Ac.)


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Process from Point/Station      430.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.500(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   693.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.133(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.133(CFS)
Normal flow depth in pipe =    9.29(In.)
Flow top width inside pipe =   14.57(In.)
Critical Depth =    9.88(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    2.23 min.
Time of concentration (TC) =    23.82 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.800(Ac.)
Runoff from this stream =      4.133(CFS)
Time of concentration =   23.82 min.
Rainfall intensity =     0.815(In/Hr)


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Process from Point/Station      430.000 to Point/Station      432.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   921.000(Ft.)
Top (of initial area) elevation =  1684.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00901  s(percent)=       0.90
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.339 min.
Rainfall intensity =      1.038(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.646
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.543(CFS)
Total initial stream area =        2.300(Ac.)
Pervious area fraction = 0.500
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Process from Point/Station      432.000 to Point/Station      432.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.646
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.34 min.
Rainfall intensity =      1.038(In/Hr) for a     2.0 year storm
Subarea runoff =      1.140(CFS) for      1.700(Ac.)
Total runoff =      2.683(CFS)   Total area =       4.000(Ac.)


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Process from Point/Station      432.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.683(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.683(CFS)
Normal flow depth in pipe =    9.80(In.)
Flow top width inside pipe =    9.29(In.)
Critical Depth =    8.43(In.)
Pipe flow velocity =      3.91(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    15.49 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.000(Ac.)
Runoff from this stream =      2.683(CFS)
Time of concentration =   15.49 min.
Rainfall intensity =     1.033(In/Hr)


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Process from Point/Station      434.000 to Point/Station      436.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  1682.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.00692  s(percent)=       0.69
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.103 min.
Rainfall intensity =      1.011(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.643
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.080(CFS)
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Total initial stream area =        3.200(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      436.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.080(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.080(CFS)
Normal flow depth in pipe =    7.50(In.)
Flow top width inside pipe =   11.62(In.)
Critical Depth =    7.40(In.)
Pipe flow velocity =      4.02(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    16.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      3.200(Ac.)
Runoff from this stream =      2.080(CFS)
Time of concentration =   16.23 min.
Rainfall intensity =     1.007(In/Hr)
Summary of stream data:

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


1        4.133     23.82                0.815
2        2.683     15.49                1.033
3        2.080     16.23                1.007
Largest stream flow has longer time of concentration
Qp =      4.133 + sum of
         Qb         Ia/Ib
          2.683 *    0.789 =      2.118
         Qb         Ia/Ib
          2.080 *    0.810 =      1.684
Qp =      7.935

Total of 3 streams to confluence:
Flow rates before confluence point:
       4.133       2.683       2.080
Area of streams before confluence:
        6.800        4.000        3.200
Results of confluence:
Total flow rate =      7.935(CFS)
Time of concentration =    23.818 min.
Effective stream area after confluence =     14.000(Ac.)


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Process from Point/Station      438.000 to Point/Station      440.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    23.82 min.
Rainfall intensity =      0.815(In/Hr) for a     2.0 year storm
Subarea runoff =      0.455(CFS) for      0.900(Ac.)
Total runoff =      8.390(CFS)    Total area =      14.900(Ac.)


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Process from Point/Station      440.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.390(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.390(CFS)
Normal flow depth in pipe =   14.86(In.)
Flow top width inside pipe =   19.10(In.)
Critical Depth =   12.91(In.)
Pipe flow velocity =      4.61(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    24.10 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     14.900(Ac.)
Runoff from this stream =      8.390(CFS)
Time of concentration =   24.10 min.
Rainfall intensity =     0.810(In/Hr)
Summary of stream data:

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


1        7.493     18.84            0.927
2        8.390     24.10            0.810
Largest stream flow has longer time of concentration
Qp =      8.390 + sum of
         Qb         Ia/Ib
          7.493 *    0.874 =      6.545
Qp =     14.935

Total of 2 main streams to confluence:
Flow rates before confluence point:
       7.493       8.390
Area of streams before confluence:
       12.150       14.900


Results of confluence:
Total flow rate =     14.935(CFS)
Time of concentration =    24.096 min.
Effective stream area after confluence  =     27.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
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```
Upstream point/station elevation =  1671.500(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =    73.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.935(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    14.935(CFS)
Normal flow depth in pipe =   16.20(In.)
Flow top width inside pipe =   22.49(In.)
Critical Depth =   16.71(In.)
Pipe flow velocity =      6.62(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    24.28 min.


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      1.218(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.642(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.515(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.76(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    3.22 min.     TC =   14.69  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.601
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
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Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.063(In/Hr) for a     2.0 year storm
Subarea runoff =      3.131(CFS) for      4.900(Ac.)
Total runoff =      3.773(CFS)   Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.058(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.44(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    4.45 min.     TC =   19.14  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.571
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.919(In/Hr) for a     2.0 year storm
Subarea runoff =      8.442(CFS) for     16.080(Ac.)
Total runoff =     12.215(CFS)   Total area =      21.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.572(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.29(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.94 min.     TC =   22.08  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.555
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.850(In/Hr) for a     2.0 year storm
Subarea runoff =      3.968(CFS) for      8.420(Ac.)
Total runoff =     16.183(CFS)    Total area =      30.240(Ac.)


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Process from Point/Station      308.000 to Point/Station      320.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1671.900(Ft.)
Downstream point elevation =  1668.000(Ft.)
Channel length thru subarea  =   574.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     16.424(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     16.424(CFS)
Depth of flow =   0.634(Ft.), Average velocity =   5.183(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    5.18(Ft/s)
Travel time  =    1.85 min.
Time of concentration =   23.93 min.

Sub-Channel No. 1 Critical depth =      0.695(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    4.724(Ft/s)
  '     '       '     Critical flow area =      3.477(Sq.Ft)

 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.813(In/Hr) for a     2.0 year storm
Subarea runoff =      0.453(CFS) for      0.900(Ac.)
Total runoff =     16.636(CFS)    Total area =      31.140(Ac.)
Depth of flow =   0.639(Ft.), Average velocity =   5.206(Ft/s)

Sub-Channel No. 1 Critical depth =      0.703(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    4.732(Ft/s)
  '     '       '     Critical flow area =      3.516(Sq.Ft)



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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     31.140(Ac.)
Runoff from this stream =     16.636(CFS)
Time of concentration =   23.93 min.
Rainfall intensity =     0.813(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      1.015(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.490
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      3.855(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.672(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.73(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   23.88 min.     TC =   39.85  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.406
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.614(In/Hr) for a     2.0 year storm
Subarea runoff =      1.821(CFS) for      7.310(Ac.)
Total runoff =      5.676(CFS)   Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    39.85 min.
Rainfall intensity =      0.614(In/Hr) for a     2.0 year storm
Subarea runoff =      1.765(CFS) for      3.430(Ac.)
Total runoff =      7.441(CFS)    Total area =      18.490(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1674.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.441(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.441(CFS)
Normal flow depth in pipe =   10.08(In.)
Flow top width inside pipe =   14.09(In.)
Critical Depth =   13.03(In.)
Pipe flow velocity =      8.49(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =    40.06 min.


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Process from Point/Station      313.200 to Point/Station      313.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    40.06 min.
Rainfall intensity =      0.612(In/Hr) for a     2.0 year storm
Subarea runoff =      0.308(CFS) for      0.600(Ac.)
Total runoff =      7.749(CFS)    Total area =      19.090(Ac.)


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Process from Point/Station      313.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   900.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.749(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.749(CFS)
Normal flow depth in pipe =   13.59(In.)
Flow top width inside pipe =   20.07(In.)
Critical Depth =   12.39(In.)
Pipe flow velocity =      4.70(Ft/s)
Travel time through pipe =    3.19 min.
Time of concentration (TC) =    43.25 min.


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
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In Main Stream number: 2
Stream flow area =     19.090(Ac.)
Runoff from this stream =      7.749(CFS)
Time of concentration =   43.25 min.
Rainfall intensity =     0.587(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      1.144(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.919(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.657
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      1.144(In/Hr) for a     2.0 year storm
Subarea runoff =      0.722(CFS) for      0.960(Ac.)
Total runoff =      5.641(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
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 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      7.262(CFS)
Depth of flow =   0.238(Ft.), Average velocity =   2.210(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.875(Ft.)
Flow velocity =   2.21(Ft/s)
Travel time =   10.66 min.     TC =   23.51  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.621
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      3.072(CFS) for      6.030(Ac.)
Total runoff =      8.713(CFS)   Total area =      12.040(Ac.)
Street flow at end of street =      8.713(CFS)
Half street flow at end of street =      4.356(CFS)
Depth of flow =   0.256(Ft.), Average velocity =   2.311(Ft/s)
Flow width (from curb towards crown)=  13.782(Ft.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    23.51 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      2.183(CFS) for      3.150(Ac.)
Total runoff =     10.896(CFS)   Total area =      15.190(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.453
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    23.51 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      5.005(CFS) for     13.460(Ac.)
Total runoff =     15.901(CFS)   Total area =      28.650(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1676.000(Ft.)
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Downstream point/station elevation =  1672.400(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.901(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    15.901(CFS)
Normal flow depth in pipe =    8.20(In.)
Flow top width inside pipe =   14.93(In.)
Critical depth could not be calculated.
Pipe flow velocity =     23.16(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    23.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.200 to Point/Station      318.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    23.52 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      1.385(CFS) for      2.000(Ac.)
Total runoff =     17.286(CFS)   Total area =      30.650(Ac.)


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Process from Point/Station      318.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1672.400(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   823.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.286(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.286(CFS)
Normal flow depth in pipe =   20.81(In.)
Flow top width inside pipe =   16.29(In.)
Critical Depth =   17.98(In.)
Pipe flow velocity =      5.97(Ft/s)
Travel time through pipe =    2.30 min.
Time of concentration (TC) =    25.82 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     30.650(Ac.)
Runoff from this stream =     17.286(CFS)
Time of concentration =   25.82 min.
Rainfall intensity =     0.780(In/Hr)
Summary of stream data:

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


1       16.636     23.93           0.813
2        7.749     43.25           0.587
3       17.286     25.82           0.780
```

```
Largest stream flow has longer or shorter time of concentration
Qp =     17.286 + sum of
         Qb         Ia/Ib
         16.636 *    0.959 =     15.955
         Qa          Tb/Ta
          7.749 *    0.597 =      4.626
Qp =     37.868

Total of 3 main streams to confluence:
Flow rates before confluence point:
      16.636       7.749      17.286
Area of streams before confluence:
       31.140       19.090       30.650


Results of confluence:
Total flow rate =     37.868(CFS)
Time of concentration =    25.821 min.
Effective stream area after confluence  =     80.880(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     80.880(Ac.)
Runoff from this stream =     37.868(CFS)
Time of concentration =   25.82 min.
Rainfall intensity =     0.780(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      400.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   897.000(Ft.)
Top (of initial area) elevation =  1683.000(Ft.)
Bottom (of initial area) elevation =  1674.700(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00925  s(percent)=       0.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.098 min.
Rainfall intensity =      1.047(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.982(CFS)
Total initial stream area =        4.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1674.700(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   126.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
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Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      3.761(CFS)
Depth of flow =   0.309(Ft.), Average velocity =   1.397(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.450(Ft.)
Flow velocity =   1.40(Ft/s)
Travel time =    1.50 min.     TC =   16.60  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.994(In/Hr) for a     2.0 year storm
Subarea runoff =      1.466(CFS) for      2.300(Ac.)
Total runoff =      4.448(CFS)   Total area =       6.700(Ac.)
Street flow at end of street =      4.448(CFS)
Half street flow at end of street =      4.448(CFS)
Depth of flow =   0.331(Ft.), Average velocity =   1.456(Ft/s)
Flow width (from curb towards crown)=  17.517(Ft.)


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Process from Point/Station      404.000 to Point/Station      410.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1670.300(Ft.)
Downstream point/station elevation =  1670.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.448(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.448(CFS)
Normal flow depth in pipe =    9.91(In.)
Flow top width inside pipe =   14.20(In.)
Critical Depth =   10.25(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    16.72 min.


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Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.700(Ac.)
Runoff from this stream =      4.448(CFS)
Time of concentration =   16.72 min.
Rainfall intensity =     0.990(In/Hr)


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Process from Point/Station      406.000 to Point/Station      408.000
**** INITIAL AREA EVALUATION ****
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Initial area flow distance =   612.000(Ft.)
Top (of initial area) elevation =  1685.300(Ft.)
Bottom (of initial area) elevation =  1676.500(Ft.)
Difference in elevation =     8.800(Ft.)
Slope =    0.01438  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.864 min.
Rainfall intensity =      1.196(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.899(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      408.000 to Point/Station      410.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1676.500(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   466.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      2.499(CFS)
Depth of flow =   0.243(Ft.), Average velocity =   1.467(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.108(Ft.)
Flow velocity =   1.47(Ft/s)
Travel time =    5.29 min.     TC =   17.16  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.976(In/Hr) for a     2.0 year storm
Subarea runoff =      1.123(CFS) for      1.800(Ac.)
Total runoff =      3.023(CFS)    Total area =       4.200(Ac.)
Street flow at end of street =      3.023(CFS)
Half street flow at end of street =      3.023(CFS)
Depth of flow =   0.262(Ft.), Average velocity =   1.537(Ft/s)
Flow width (from curb towards crown)=  14.074(Ft.)


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Process from Point/Station      410.000 to Point/Station      410.000
**** SUBAREA FLOW ADDITION ****
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SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.16 min.
Rainfall intensity =      0.976(In/Hr) for a     2.0 year storm
Subarea runoff =      0.936(CFS) for      1.500(Ac.)
Total runoff =      3.959(CFS)    Total area =       5.700(Ac.)


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Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.700(Ac.)
Runoff from this stream =      3.959(CFS)
Time of concentration =   17.16 min.
Rainfall intensity =     0.976(In/Hr)
Summary of stream data:

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


1        4.448     16.72                 0.990
2        3.959     17.16                 0.976
Largest stream flow has longer or shorter time of concentration
Qp =      4.448 + sum of
         Qa          Tb/Ta
          3.959 *    0.975 =      3.859
Qp =      8.306

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.448       3.959
Area of streams before confluence:
        6.700        5.700
Results of confluence:
Total flow rate =      8.306(CFS)
Time of concentration =    16.724 min.
Effective stream area after confluence =     12.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      412.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1670.000(Ft.)
Downstream point/station elevation =  1669.300(Ft.)
Pipe length  =   129.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.306(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.306(CFS)
Normal flow depth in pipe =   13.09(In.)
Flow top width inside pipe =   20.35(In.)
Critical Depth =   12.85(In.)
Pipe flow velocity =      5.27(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    17.13 min.


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Process from Point/Station      412.000 to Point/Station      320.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.13 min.
Rainfall intensity =      0.977(In/Hr) for a     2.0 year storm
Subarea runoff =      0.937(CFS) for      1.500(Ac.)
Total runoff =      9.243(CFS)   Total area =      13.900(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.900(Ac.)
Runoff from this stream =      9.243(CFS)
Time of concentration =   17.13 min.
Rainfall intensity =     0.977(In/Hr)
Summary of stream data:

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


1       37.868     25.82            0.780
2        9.243     17.13            0.977
Largest stream flow has longer time of concentration
Qp =     37.868 + sum of
         Qb         Ia/Ib
          9.243 *    0.798 =      7.376
Qp =     45.244

Total of 2 main streams to confluence:
Flow rates before confluence point:
      37.868       9.243
Area of streams before confluence:
       80.880       13.900


Results of confluence:
Total flow rate =     45.244(CFS)
Time of concentration =    25.821 min.
Effective stream area after confluence  =     94.780(Ac.)
End of computations, total study area =          206.61 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.624
Area averaged RI index number =  72.1
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10-YEAR PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/29/19 File:P1713Q10.out

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10 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF LURIN AND COLE AVENUE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
PROPOSED CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.700(In/Hr)
Slope of intensity duration curve = 0.5500

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Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 1.659(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.699
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 5.182(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.500

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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.013(CFS)
Depth of flow =   0.233(Ft.), Average velocity =   2.537(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.624(Ft.)
Flow velocity =   2.54(Ft/s)
Travel time =    5.75 min.     TC =   18.25  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.675
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.347(In/Hr) for a    10.0 year storm
Subarea runoff =      5.468(CFS) for      6.010(Ac.)
Total runoff =     10.649(CFS)   Total area =      10.480(Ac.)
Street flow at end of street =     10.649(CFS)
Half street flow at end of street =      5.325(CFS)
Depth of flow =   0.261(Ft.), Average velocity =   2.722(Ft/s)
Flow width (from curb towards crown)=  14.040(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     16.889(CFS)
Depth of flow =   0.265(Ft.), Average velocity =   4.193(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.243(Ft.)
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Flow velocity =   4.19(Ft/s)
Travel time =    1.61 min.     TC =   19.86  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.670
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.286(In/Hr) for a    10.0 year storm
Subarea runoff =     12.339(CFS) for     14.320(Ac.)
Total runoff =     22.989(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     22.989(CFS)
Half street flow at end of street =     11.494(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   4.524(Ft/s)
Flow width (from curb towards crown)=  15.985(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     24.453(CFS)
Depth of flow =   0.587(Ft.), Average velocity =   1.559(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 =    4.33(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.56(Ft/s)
Travel time =    6.31 min.     TC =   26.16  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.653
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.105(In/Hr) for a    10.0 year storm
Subarea runoff =      2.829(CFS) for      3.920(Ac.)
Total runoff =     25.817(CFS)   Total area =      28.720(Ac.)
Street flow at end of street =     25.817(CFS)
Half street flow at end of street =     12.909(CFS)
Depth of flow =   0.602(Ft.), Average velocity =   1.576(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 =    5.10(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)
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Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1688.200(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =   377.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.817(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    25.817(CFS)
Normal flow depth in pipe =   24.52(In.)
Flow top width inside pipe =   23.19(In.)
Critical Depth =   20.79(In.)
Pipe flow velocity =      6.01(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    27.21 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.720(Ac.)
Runoff from this stream =     25.817(CFS)
Time of concentration =   27.21 min.
Rainfall intensity =     1.081(In/Hr)


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Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      1.646(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.913(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    6.0(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
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Street flow is on [1] side(s) of the street
Distance from curb to property line  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.489(CFS)
Depth of flow =   0.305(Ft.), Average velocity =   3.248(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.212(Ft.)
Flow velocity =   3.25(Ft/s)
Travel time =    9.39 min.     TC =   22.07  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.663
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.213(In/Hr) for a    10.0 year storm
Subarea runoff =      5.080(CFS) for      6.310(Ac.)
Total runoff =     10.992(CFS)    Total area =      11.460(Ac.)
Street flow at end of street =     10.992(CFS)
Half street flow at end of street =     10.992(CFS)
Depth of flow =   0.338(Ft.), Average velocity =   3.462(Ft/s)
Flow width (from curb towards crown)=  17.860(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     14.155(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   2.806(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.492(Ft.)
Flow velocity =   2.81(Ft/s)
Travel time =    4.91 min.     TC =   26.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.651
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.086(In/Hr) for a    10.0 year storm
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Subarea runoff =      6.254(CFS) for      8.840(Ac.)
Total runoff =     17.246(CFS)   Total area =      20.300(Ac.)
Street flow at end of street =     17.246(CFS)
Half street flow at end of street =     17.246(CFS)
Depth of flow =   0.465(Ft.), Average velocity =   2.947(Ft/s)
Flow width (from curb towards crown)=  24.223(Ft.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.246(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.246(CFS)
Normal flow depth in pipe =   15.68(In.)
Flow top width inside pipe =   22.84(In.)
Critical Depth =   17.96(In.)
Pipe flow velocity =      7.93(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    27.04 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     17.246(CFS)
Time of concentration =   27.04 min.
Rainfall intensity =     1.085(In/Hr)
Summary of stream data:

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


1       25.817     27.21                1.081
2       17.246     27.04                1.085
Largest stream flow has longer time of concentration
Qp =     25.817 + sum of
         Qb         Ia/Ib
         17.246 *    0.997 =     17.188
Qp =     43.005

Total of 2 streams to confluence:
Flow rates before confluence point:
      25.817      17.246
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     43.005(CFS)
Time of concentration =    27.210 min.
Effective stream area after confluence =     49.020(Ac.)


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Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    43.005(CFS)
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Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    43.005(CFS)
Normal flow depth in pipe =   28.08(In.)
Flow top width inside pipe =   23.51(In.)
Critical Depth =   26.12(In.)
Pipe flow velocity =      7.99(Ft/s)
Travel time through pipe =    1.24 min.
Time of concentration (TC) =    28.45 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     43.005(CFS)
Time of concentration =   28.45 min.
Rainfall intensity =     1.055(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.637 min.
Rainfall intensity =      1.649(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.631(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
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Estimated mean flow rate at midpoint of street =      9.780(CFS)
Depth of flow =   0.311(Ft.), Average velocity =   3.592(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.545(Ft.)
Flow velocity =   3.59(Ft/s)
Travel time =    2.72 min.     TC =   15.36  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.481(In/Hr) for a    10.0 year storm
Subarea runoff =      2.225(CFS) for      2.190(Ac.)
Total runoff =     10.856(CFS)   Total area =       9.690(Ac.)
Street flow at end of street =     10.856(CFS)
Half street flow at end of street =     10.856(CFS)
Depth of flow =   0.325(Ft.), Average velocity =   3.686(Ft/s)
Flow width (from curb towards crown)=  17.205(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.856(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.856(CFS)
Normal flow depth in pipe =   15.70(In.)
Flow top width inside pipe =   22.83(In.)
Critical Depth =   14.18(In.)
Pipe flow velocity =      4.98(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    15.61 min.


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Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.556
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.61 min.
Rainfall intensity =      1.468(In/Hr) for a    10.0 year storm
Subarea runoff =      5.394(CFS) for      6.610(Ac.)
Total runoff =     16.249(CFS)   Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.249(CFS)
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Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    16.249(CFS)
Normal flow depth in pipe =   15.84(In.)
Flow top width inside pipe =   22.74(In.)
Critical Depth =   17.44(In.)
Pipe flow velocity =      7.38(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.74 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     16.249(CFS)
Time of concentration =   15.74 min.
Rainfall intensity =     1.461(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.761(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      2.818(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.818(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.27(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.39 min.     TC =   12.60  min.


 Adding area flow to channel
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UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.682
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.651(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      2.818(CFS)   Total area =       2.720(Ac.)


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      2.818(CFS)
Time of concentration =   12.60 min.
Rainfall intensity =     1.651(In/Hr)
Summary of stream data:

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


1       16.249     15.74                 1.461
2        2.818     12.60                 1.651
Largest stream flow has longer time of concentration
Qp =     16.249 + sum of
         Qb         Ia/Ib
          2.818 *    0.885 =      2.493
Qp =     18.743

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.249       2.818
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     18.743(CFS)
Time of concentration =    15.741 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1687.000(Ft.)
Downstream point elevation =  1683.000(Ft.)
Channel length thru subarea  =   355.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =     19.073(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     19.073(CFS)
Depth of flow =   0.546(Ft.), Average velocity =   6.294(Ft/s)
Channel flow top width =    6.093(Ft.)
Flow Velocity =    6.29(Ft/s)
Travel time  =    0.94 min.
Time of concentration =   16.68 min.

Sub-Channel No. 1 Critical depth =      0.727(Ft.)
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  '     '       '     Critical flow top width =      6.453(Ft.)
  '     '       '     Critical flow velocity=    4.584(Ft/s)
  '     '       '     Critical flow area =      4.161(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.415(In/Hr) for a    10.0 year storm
Subarea runoff =      0.727(CFS) for      0.600(Ac.)
Total runoff =     19.470(CFS)   Total area =      19.620(Ac.)
Depth of flow =   0.553(Ft.), Average velocity =   6.338(Ft/s)

Sub-Channel No. 1 Critical depth =      0.734(Ft.)
  '     '       '     Critical flow top width =      6.469(Ft.)
  '     '       '     Critical flow velocity=    4.623(Ft/s)
  '     '       '     Critical flow area =      4.211(Sq.Ft)



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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.620(Ac.)
Runoff from this stream =     19.470(CFS)
Time of concentration =   16.68 min.
Rainfall intensity =     1.415(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      1.490(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.821(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
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Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      1.490(In/Hr) for a    10.0 year storm
Subarea runoff =      5.278(CFS) for      5.160(Ac.)
Total runoff =      7.099(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.099(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.099(CFS)
Normal flow depth in pipe =   10.55(In.)
Flow top width inside pipe =   17.73(In.)
Critical Depth =   12.39(In.)
Pipe flow velocity =      6.59(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    15.31 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =      7.099(CFS)
Time of concentration =   15.31 min.
Rainfall intensity =     1.484(In/Hr)
Summary of stream data:

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


1       43.005     28.45           1.055
2       19.470     16.68           1.415
3        7.099     15.31           1.484
Largest stream flow has longer time of concentration
Qp =     43.005 + sum of
         Qb         Ia/Ib
         19.470 *    0.746 =     14.515
         Qb         Ia/Ib
          7.099 *    0.711 =      5.049
Qp =     62.569

Total of 3 main streams to confluence:
Flow rates before confluence point:
      43.005      19.470       7.099
Area of streams before confluence:
       49.020       19.620        6.940


Results of confluence:
Total flow rate =     62.569(CFS)
Time of concentration =    28.452 min.
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Effective stream area after confluence  =     75.580(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =     65.632(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.54(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    3.06 min.     TC =   31.51  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.998(In/Hr) for a    10.0 year storm
Subarea runoff =      4.342(CFS) for      7.400(Ac.)
Total runoff =     66.911(CFS)   Total area =      82.980(Ac.)


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Process from Point/Station      122.000 to Point/Station      123.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.642
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    31.51 min.
Rainfall intensity =      0.998(In/Hr) for a    10.0 year storm
Subarea runoff =      0.832(CFS) for      1.300(Ac.)
Total runoff =     67.743(CFS)   Total area =      84.280(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      123.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1673.000(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    67.743(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    67.743(CFS)
Normal flow depth in pipe =   28.78(In.)
Flow top width inside pipe =   28.83(In.)
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Critical Depth =   31.53(In.)
Pipe flow velocity =     11.18(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    31.78 min.


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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    31.78 min.
Rainfall intensity =      0.993(In/Hr) for a    10.0 year storm
Subarea runoff =      0.318(CFS) for      0.500(Ac.)
Total runoff =     68.061(CFS)   Total area =      84.780(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      1.541(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.565
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      7.702(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      452.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1682.500(Ft.)
Downstream point/station elevation =  1679.800(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.702(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     7.702(CFS)
Normal flow depth in pipe =    9.59(In.)
Flow top width inside pipe =    9.62(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.45(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.36 min.


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Process from Point/Station      450.000 to Point/Station      452.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    14.36 min.
Rainfall intensity =      1.537(In/Hr) for a    10.0 year storm
Subarea runoff =      0.791(CFS) for      0.600(Ac.)
Total runoff =      8.493(CFS)   Total area =       9.450(Ac.)


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Process from Point/Station      452.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1679.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =  1336.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.493(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.493(CFS)
Normal flow depth in pipe =   12.70(In.)
Flow top width inside pipe =   20.53(In.)
Critical Depth =   12.98(In.)
Pipe flow velocity =      5.58(Ft/s)
Travel time through pipe =    3.99 min.
Time of concentration (TC) =    18.35 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.450(Ac.)
Runoff from this stream =      8.493(CFS)
Time of concentration =   18.35 min.
Rainfall intensity =     1.343(In/Hr)


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Process from Point/Station      454.000 to Point/Station      456.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1682.500(Ft.)
Bottom (of initial area) elevation =  1674.500(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.00800  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.488 min.
Rainfall intensity =      1.660(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.852(CFS)
Total initial stream area =        2.700(Ac.)
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Pervious area fraction = 0.100


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Process from Point/Station      456.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1671.600(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.852(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     3.852(CFS)
Normal flow depth in pipe =   12.21(In.)
Flow top width inside pipe =   16.82(In.)
Critical Depth =    9.01(In.)
Pipe flow velocity =      3.02(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    12.75 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =      3.852(CFS)
Time of concentration =   12.75 min.
Rainfall intensity =     1.641(In/Hr)
Summary of stream data:

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


1        8.493     18.35                 1.343
2        3.852     12.75                 1.641
Largest stream flow has longer time of concentration
Qp =      8.493 + sum of
         Qb         Ia/Ib
          3.852 *    0.819 =      3.154
Qp =     11.647

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.493       3.852
Area of streams before confluence:
        9.450        2.700
Results of confluence:
Total flow rate =     11.647(CFS)
Time of concentration =    18.352 min.
Effective stream area after confluence =     12.150(Ac.)


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.150(Ac.)
Runoff from this stream =     11.647(CFS)
Time of concentration =   18.35 min.
Rainfall intensity =     1.343(In/Hr)
Program is now starting with Main Stream No. 2
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Process from Point/Station      420.000 to Point/Station      421.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  1687.900(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.00681  s(percent)=       0.68
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.144 min.
Rainfall intensity =      1.441(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.683
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.755(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      421.000 to Point/Station      422.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      3.074(CFS)
Depth of flow =   0.399(Ft.), Average velocity =   0.718(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.72(Ft/s)
Travel time =    4.52 min.     TC =   20.67  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.668
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.258(In/Hr) for a    10.0 year storm
Subarea runoff =      0.588(CFS) for      0.700(Ac.)
Total runoff =      3.343(CFS)    Total area =       3.500(Ac.)
Street flow at end of street =      3.343(CFS)
Half street flow at end of street =      3.343(CFS)
Depth of flow =   0.411(Ft.), Average velocity =   0.743(Ft/s)
Note:  depth of flow exceeds top of street crown.
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Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      422.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.343(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.343(CFS)
Normal flow depth in pipe =   10.17(In.)
Flow top width inside pipe =   14.02(In.)
Critical Depth =    8.85(In.)
Pipe flow velocity =      3.78(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    20.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.500(Ac.)
Runoff from this stream =      3.343(CFS)
Time of concentration =   20.77 min.
Rainfall intensity =     1.254(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      424.000 to Point/Station      426.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   908.000(Ft.)
Top (of initial area) elevation =  1687.000(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00584  s(percent)=       0.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.636 min.
Rainfall intensity =      1.417(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.681
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.510(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      426.000 to Point/Station      428.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   200.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
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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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      2.822(CFS)
Depth of flow =   0.389(Ft.), Average velocity =   0.689(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.69(Ft/s)
Travel time =    4.84 min.     TC =   21.47  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.665
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.232(In/Hr) for a    10.0 year storm
Subarea runoff =      0.574(CFS) for      0.700(Ac.)
Total runoff =      3.083(CFS)    Total area =       3.300(Ac.)
Street flow at end of street =      3.083(CFS)
Half street flow at end of street =      3.083(CFS)
Depth of flow =   0.401(Ft.), Average velocity =   0.714(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      428.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.083(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.083(CFS)
Normal flow depth in pipe =   11.58(In.)
Flow top width inside pipe =   12.59(In.)
Critical Depth =    8.47(In.)
Pipe flow velocity =      3.03(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    21.69 min.


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Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.300(Ac.)
Runoff from this stream =      3.083(CFS)
Time of concentration =   21.69 min.
Rainfall intensity =     1.225(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1        3.343     20.77                1.254
2        3.083     21.69                1.225
Largest stream flow has longer or shorter time of concentration
Qp =      3.343 + sum of
         Qa          Tb/Ta
          3.083 *    0.958 =      2.953
Qp =      6.296

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.343       3.083
Area of streams before confluence:
        3.500        3.300
Results of confluence:
Total flow rate =      6.296(CFS)
Time of concentration =    20.774 min.
Effective stream area after confluence =      6.800(Ac.)


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Process from Point/Station      430.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.500(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   693.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.296(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.296(CFS)
Normal flow depth in pipe =   10.69(In.)
Flow top width inside pipe =   17.68(In.)
Critical Depth =   11.63(In.)
Pipe flow velocity =      5.76(Ft/s)
Travel time through pipe =    2.00 min.
Time of concentration (TC) =    22.78 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.800(Ac.)
Runoff from this stream =      6.296(CFS)
Time of concentration =   22.78 min.
Rainfall intensity =     1.192(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      432.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   921.000(Ft.)
Top (of initial area) elevation =  1684.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00901  s(percent)=       0.90
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.339 min.
Rainfall intensity =      1.482(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
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Initial subarea runoff =      2.338(CFS)
Total initial stream area =        2.300(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      432.000 to Point/Station      432.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.34 min.
Rainfall intensity =      1.482(In/Hr) for a    10.0 year storm
Subarea runoff =      1.728(CFS) for      1.700(Ac.)
Total runoff =      4.067(CFS)   Total area =       4.000(Ac.)


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Process from Point/Station      432.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.067(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.067(CFS)
Normal flow depth in pipe =   10.45(In.)
Flow top width inside pipe =   13.79(In.)
Critical Depth =    9.79(In.)
Pipe flow velocity =      4.45(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.47 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.000(Ac.)
Runoff from this stream =      4.067(CFS)
Time of concentration =   15.47 min.
Rainfall intensity =     1.475(In/Hr)


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Process from Point/Station      434.000 to Point/Station      436.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  1682.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.00692  s(percent)=       0.69
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.103 min.
Rainfall intensity =      1.443(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.683
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.154(CFS)
Total initial stream area =        3.200(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      436.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.154(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.154(CFS)
Normal flow depth in pipe =    8.36(In.)
Flow top width inside pipe =   14.90(In.)
Critical Depth =    8.58(In.)
Pipe flow velocity =      4.49(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    16.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      3.200(Ac.)
Runoff from this stream =      3.154(CFS)
Time of concentration =   16.21 min.
Rainfall intensity =     1.438(In/Hr)
Summary of stream data:

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


1        6.296     22.78                1.192
2        4.067     15.47                1.475
3        3.154     16.21                1.438
Largest stream flow has longer time of concentration
Qp =      6.296 + sum of
         Qb         Ia/Ib
          4.067 *    0.808 =      3.287
         Qb         Ia/Ib
          3.154 *    0.829 =      2.616
Qp =     12.200

Total of 3 streams to confluence:
Flow rates before confluence point:
       6.296       4.067       3.154
Area of streams before confluence:
        6.800        4.000        3.200
Results of confluence:
Total flow rate =     12.200(CFS)
Time of concentration =    22.779 min.
Effective stream area after confluence =     14.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      440.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    22.78 min.
Rainfall intensity =      1.192(In/Hr) for a    10.0 year storm
Subarea runoff =      0.710(CFS) for      0.900(Ac.)
Total runoff =     12.910(CFS)    Total area =      14.900(Ac.)


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Process from Point/Station      440.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.910(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.910(CFS)
Normal flow depth in pipe =   18.05(In.)
Flow top width inside pipe =   20.73(In.)
Critical Depth =   15.51(In.)
Pipe flow velocity =      5.10(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    23.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     14.900(Ac.)
Runoff from this stream =     12.910(CFS)
Time of concentration =   23.03 min.
Rainfall intensity =     1.185(In/Hr)
Summary of stream data:

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


1       11.647     18.35           1.343
2       12.910     23.03           1.185
Largest stream flow has longer time of concentration
Qp =     12.910 + sum of
         Qb         Ia/Ib
         11.647 *    0.883 =     10.279
Qp =     23.189

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.647      12.910
Area of streams before confluence:
       12.150       14.900


Results of confluence:
Total flow rate =     23.189(CFS)
Time of concentration =    23.031 min.
Effective stream area after confluence  =     27.050(Ac.)
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Process from Point/Station      458.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.500(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =    73.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.189(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    23.189(CFS)
Normal flow depth in pipe =   20.11(In.)
Flow top width inside pipe =   23.54(In.)
Critical Depth =   20.23(In.)
Pipe flow velocity =      7.30(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    23.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      1.739(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.690
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.008(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.949(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.16(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    2.91 min.     TC =   14.38  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.669
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.535(In/Hr) for a    10.0 year storm
Subarea runoff =      5.037(CFS) for      4.900(Ac.)
Total runoff =      6.045(CFS)    Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.512(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.88(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    3.95 min.     TC =   18.33  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.646
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.344(In/Hr) for a    10.0 year storm
Subarea runoff =     13.956(CFS) for     16.080(Ac.)
Total runoff =     20.001(CFS)    Total area =      21.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     23.860(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.58 min.     TC =   20.91  min.


 Adding area flow to channel
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UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.632
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.250(In/Hr) for a    10.0 year storm
Subarea runoff =      6.657(CFS) for      8.420(Ac.)
Total runoff =     26.658(CFS)   Total area =      30.240(Ac.)


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Process from Point/Station      308.000 to Point/Station      320.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1671.900(Ft.)
Downstream point elevation =  1668.000(Ft.)
Channel length thru subarea  =   574.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     27.054(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     27.054(CFS)
Depth of flow =   0.882(Ft.), Average velocity =   6.138(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    6.14(Ft/s)
Travel time  =    1.56 min.
Time of concentration =   22.46 min.

Sub-Channel No. 1 Critical depth =      0.969(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    5.585(Ft/s)
  '     '       '     Critical flow area =      4.844(Sq.Ft)

 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.202(In/Hr) for a    10.0 year storm
Subarea runoff =      0.716(CFS) for      0.900(Ac.)
Total runoff =     27.374(CFS)   Total area =      31.140(Ac.)
Depth of flow =   0.888(Ft.), Average velocity =   6.162(Ft/s)

Sub-Channel No. 1 Critical depth =      0.977(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    5.606(Ft/s)
  '     '       '     Critical flow area =      4.883(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     31.140(Ac.)
Runoff from this stream =     27.374(CFS)
Time of concentration =   22.46 min.
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Rainfall intensity =     1.202(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      1.450(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.554
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      6.219(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.152(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   21.24 min.     TC =   37.21  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.471
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.910(In/Hr) for a    10.0 year storm
Subarea runoff =      3.133(CFS) for      7.310(Ac.)
Total runoff =      9.352(CFS)    Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    37.21 min.
Rainfall intensity =      0.910(In/Hr) for a    10.0 year storm
Subarea runoff =      2.643(CFS) for      3.430(Ac.)
Total runoff =     11.994(CFS)    Total area =      18.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      313.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1674.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.994(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.994(CFS)
Normal flow depth in pipe =   12.01(In.)
Flow top width inside pipe =   16.96(In.)
Critical Depth =   15.76(In.)
Pipe flow velocity =      9.57(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    37.39 min.


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Process from Point/Station      313.200 to Point/Station      313.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    37.39 min.
Rainfall intensity =      0.908(In/Hr) for a    10.0 year storm
Subarea runoff =      0.461(CFS) for      0.600(Ac.)
Total runoff =     12.455(CFS)    Total area =      19.090(Ac.)


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Process from Point/Station      313.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   900.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.455(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.455(CFS)
Normal flow depth in pipe =   16.95(In.)
Flow top width inside pipe =   21.87(In.)
Critical Depth =   15.23(In.)
Pipe flow velocity =      5.25(Ft/s)
Travel time through pipe =    2.86 min.
Time of concentration (TC) =    40.25 min.
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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.090(Ac.)
Runoff from this stream =     12.455(CFS)
Time of concentration =   40.25 min.
Rainfall intensity =     0.872(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.089(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.697
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
Subarea runoff =      1.093(CFS) for      0.960(Ac.)
Total runoff =      8.182(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
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Street flow is on [2] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     10.633(CFS)
Depth of flow =   0.277(Ft.), Average velocity =   2.428(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.848(Ft.)
Flow velocity =   2.43(Ft/s)
Travel time =    9.70 min.     TC =   22.55  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      4.787(CFS) for      6.030(Ac.)
Total runoff =     12.969(CFS)   Total area =      12.040(Ac.)
Street flow at end of street =     12.969(CFS)
Half street flow at end of street =      6.485(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   2.550(Ft/s)
Flow width (from curb towards crown)=  15.994(Ft.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    22.55 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      3.219(CFS) for      3.150(Ac.)
Total runoff =     16.189(CFS)   Total area =      15.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.519
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    22.55 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      8.383(CFS) for     13.460(Ac.)
Total runoff =     24.572(CFS)   Total area =      28.650(Ac.)
```

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Process from Point/Station      318.000 to Point/Station      318.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1676.000(Ft.)
Downstream point/station elevation =  1672.400(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.572(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    24.572(CFS)
Normal flow depth in pipe =   11.09(In.)
Flow top width inside pipe =   13.17(In.)
Critical depth could not be calculated.
Pipe flow velocity =     25.26(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    22.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.200 to Point/Station      318.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    22.57 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      2.043(CFS) for      2.000(Ac.)
Total runoff =     26.616(CFS)   Total area =      30.650(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1672.400(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   823.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.616(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    26.616(CFS)
Normal flow depth in pipe =   21.98(In.)
Flow top width inside pipe =   26.55(In.)
Critical Depth =   21.12(In.)
Pipe flow velocity =      6.90(Ft/s)
Travel time through pipe =    1.99 min.
Time of concentration (TC) =    24.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     30.650(Ac.)
Runoff from this stream =     26.616(CFS)
Time of concentration =   24.55 min.
Rainfall intensity =     1.144(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1       27.374     22.46            1.202
2       12.455     40.25            0.872
3       26.616     24.55            1.144
Largest stream flow has longer or shorter time of concentration
Qp =     27.374 + sum of
         Qa          Tb/Ta
         12.455 *    0.558 =      6.951
         Qa          Tb/Ta
         26.616 *    0.915 =     24.350
Qp =     58.675

Total of 3 main streams to confluence:
Flow rates before confluence point:
      27.374      12.455      26.616
Area of streams before confluence:
       31.140       19.090       30.650


Results of confluence:
Total flow rate =     58.675(CFS)
Time of concentration =    22.464 min.
Effective stream area after confluence  =     80.880(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     80.880(Ac.)
Runoff from this stream =     58.675(CFS)
Time of concentration =   22.46 min.
Rainfall intensity =     1.202(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      400.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   897.000(Ft.)
Top (of initial area) elevation =  1683.000(Ft.)
Bottom (of initial area) elevation =  1674.700(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00925  s(percent)=       0.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.098 min.
Rainfall intensity =      1.495(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.519(CFS)
Total initial stream area =        4.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
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Top of street segment elevation =  1674.700(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   126.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.670(CFS)
Depth of flow =   0.360(Ft.), Average velocity =   1.587(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.59(Ft/s)
Travel time =    1.32 min.     TC =   16.42  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.682
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.428(In/Hr) for a    10.0 year storm
Subarea runoff =      2.239(CFS) for      2.300(Ac.)
Total runoff =      6.758(CFS)   Total area =       6.700(Ac.)
Street flow at end of street =      6.758(CFS)
Half street flow at end of street =      6.758(CFS)
Depth of flow =   0.382(Ft.), Average velocity =   1.701(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      404.000 to Point/Station      410.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1670.300(Ft.)
Downstream point/station elevation =  1670.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.758(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.758(CFS)
Normal flow depth in pipe =   11.36(In.)
Flow top width inside pipe =   17.37(In.)
Critical Depth =   12.08(In.)
Pipe flow velocity =      5.76(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    16.53 min.


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Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.700(Ac.)
Runoff from this stream =      6.758(CFS)
Time of concentration =   16.53 min.
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Rainfall intensity =     1.422(In/Hr)


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Process from Point/Station      406.000 to Point/Station      408.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   612.000(Ft.)
Top (of initial area) elevation =  1685.300(Ft.)
Bottom (of initial area) elevation =  1676.500(Ft.)
Difference in elevation =     8.800(Ft.)
Slope =    0.01438  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.864 min.
Rainfall intensity =      1.707(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.702
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.875(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      408.000 to Point/Station      410.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1676.500(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   466.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      3.770(CFS)
Depth of flow =   0.286(Ft.), Average velocity =   1.624(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.287(Ft.)
Flow velocity =   1.62(Ft/s)
Travel time =    4.78 min.     TC =   16.65  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.681
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.417(In/Hr) for a    10.0 year storm
Subarea runoff =      1.737(CFS) for      1.800(Ac.)
Total runoff =      4.612(CFS)   Total area =       4.200(Ac.)
Street flow at end of street =      4.612(CFS)
Half street flow at end of street =      4.612(CFS)
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Depth of flow =   0.310(Ft.), Average velocity =   1.706(Ft/s)
Flow width (from curb towards crown)=  16.485(Ft.)


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Process from Point/Station      410.000 to Point/Station      410.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.681
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    16.65 min.
Rainfall intensity =      1.417(In/Hr) for a    10.0 year storm
Subarea runoff =      1.447(CFS) for      1.500(Ac.)
Total runoff =      6.059(CFS)   Total area =       5.700(Ac.)


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Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.700(Ac.)
Runoff from this stream =      6.059(CFS)
Time of concentration =   16.65 min.
Rainfall intensity =     1.417(In/Hr)
Summary of stream data:

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


1        6.758     16.53                1.422
2        6.059     16.65                1.417
Largest stream flow has longer or shorter time of concentration
Qp =      6.758 + sum of
         Qa          Tb/Ta
          6.059 *    0.993 =      6.017
Qp =     12.775

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.758       6.059
Area of streams before confluence:
        6.700        5.700
Results of confluence:
Total flow rate =     12.775(CFS)
Time of concentration =    16.532 min.
Effective stream area after confluence =     12.400(Ac.)


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Process from Point/Station      410.000 to Point/Station      412.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1670.000(Ft.)
Downstream point/station elevation =  1669.300(Ft.)
Pipe length  =   129.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.775(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.775(CFS)
Normal flow depth in pipe =   15.75(In.)
Flow top width inside pipe =   22.80(In.)
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Critical Depth =   15.43(In.)
Pipe flow velocity =      5.85(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =    16.90 min.


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Process from Point/Station      412.000 to Point/Station      320.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.680
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    16.90 min.
Rainfall intensity =      1.405(In/Hr) for a    10.0 year storm
Subarea runoff =      1.433(CFS) for      1.500(Ac.)
Total runoff =     14.208(CFS)    Total area =      13.900(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.900(Ac.)
Runoff from this stream =     14.208(CFS)
Time of concentration =   16.90 min.
Rainfall intensity =     1.405(In/Hr)
Summary of stream data:

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


1       58.675     22.46           1.202
2       14.208     16.90           1.405
Largest stream flow has longer time of concentration
Qp =     58.675 + sum of
         Qb         Ia/Ib
         14.208 *    0.855 =     12.149
Qp =     70.825

Total of 2 main streams to confluence:
Flow rates before confluence point:
      58.675      14.208
Area of streams before confluence:
       80.880       13.900


Results of confluence:
Total flow rate =     70.825(CFS)
Time of concentration =    22.464 min.
Effective stream area after confluence  =     94.780(Ac.)
End of computations, total study area =          206.61 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.624
Area averaged RI index number =  72.1
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100-YEAR PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/29/19 File:P1713Q100.out

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100 YEAR STOIRM EVENT HYDROLOGY ANALYSIS
SWC OF LURIN AND COLE AVENUE
CITY OF RIVERSIDE, RIVERSIDE COUNTY
PROPOSED CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.000(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 2.371(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 84.40
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 9.088(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.500

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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     14.189(CFS)
Depth of flow =   0.293(Ft.), Average velocity =   2.921(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.631(Ft.)
Flow velocity =   2.92(Ft/s)
Travel time =    5.00 min.     TC =   17.49  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.970(In/Hr) for a   100.0 year storm
Subarea runoff =     10.063(CFS) for      6.010(Ac.)
Total runoff =     19.151(CFS)   Total area =      10.480(Ac.)
Street flow at end of street =     19.151(CFS)
Half street flow at end of street =      9.575(CFS)
Depth of flow =   0.330(Ft.), Average velocity =   3.146(Ft/s)
Flow width (from curb towards crown)=  17.489(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     30.671(CFS)
Depth of flow =   0.337(Ft.), Average velocity =   4.858(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.808(Ft.)
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Flow velocity =   4.86(Ft/s)
Travel time =    1.39 min.     TC =   18.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.889(In/Hr) for a   100.0 year storm
Subarea runoff =     22.939(CFS) for     14.320(Ac.)
Total runoff =     42.089(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     42.089(CFS)
Half street flow at end of street =     21.045(CFS)
Depth of flow =   0.374(Ft.), Average velocity =   5.487(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     44.896(CFS)
Depth of flow =   0.743(Ft.), Average velocity =   1.929(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 =   12.17(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.93(Ft/s)
Travel time =    5.10 min.     TC =   23.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.842
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.656(In/Hr) for a   100.0 year storm
Subarea runoff =      5.464(CFS) for      3.920(Ac.)
Total runoff =     47.554(CFS)   Total area =      28.720(Ac.)
Street flow at end of street =     47.554(CFS)
Half street flow at end of street =     23.777(CFS)
Depth of flow =   0.760(Ft.), Average velocity =   1.974(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 =   13.00(Ft.)
```

```
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1688.200(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =   377.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    47.554(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    47.554(CFS)
Normal flow depth in pipe =   29.30(In.)
Flow top width inside pipe =   33.72(In.)
Critical Depth =   26.42(In.)
Pipe flow velocity =      7.12(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    24.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.720(Ac.)
Runoff from this stream =     47.554(CFS)
Time of concentration =   24.86 min.
Rainfall intensity =     1.624(In/Hr)


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Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      2.351(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     10.379(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    6.0(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
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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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     15.181(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   3.750(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.158(Ft.)
Flow velocity =   3.75(Ft/s)
Travel time =    8.13 min.     TC =   20.82  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.790(In/Hr) for a   100.0 year storm
Subarea runoff =      9.551(CFS) for      6.310(Ac.)
Total runoff =     19.930(CFS)    Total area =      11.460(Ac.)
Street flow at end of street =     19.930(CFS)
Half street flow at end of street =     19.930(CFS)
Depth of flow =   0.427(Ft.), Average velocity =   4.011(Ft/s)
Flow width (from curb towards crown)=  22.324(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     25.946(CFS)
Depth of flow =   0.552(Ft.), Average velocity =   3.162(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    2.58(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  28.557(Ft.)
Flow velocity =   3.16(Ft/s)
Travel time =    4.35 min.     TC =   25.17  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
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RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.612(In/Hr) for a   100.0 year storm
Subarea runoff =     11.978(CFS) for      8.840(Ac.)
Total runoff =     31.908(CFS)    Total area =      20.300(Ac.)
Street flow at end of street =     31.908(CFS)
Half street flow at end of street =     31.908(CFS)
Depth of flow =   0.598(Ft.), Average velocity =   3.264(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    4.92(Ft.)
Flow width (from curb towards crown)=  30.900(Ft.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    31.908(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    31.908(CFS)
Normal flow depth in pipe =   22.97(In.)
Flow top width inside pipe =   19.25(In.)
Critical Depth =   23.35(In.)
Pipe flow velocity =      8.86(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    25.23 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     31.908(CFS)
Time of concentration =   25.23 min.
Rainfall intensity =     1.610(In/Hr)
Summary of stream data:

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


1       47.554     24.86                1.624
2       31.908     25.23                1.610
Largest stream flow has longer or shorter time of concentration
Qp =     47.554 + sum of
         Qa          Tb/Ta
         31.908 *    0.985 =     31.444
Qp =     78.998

Total of 2 streams to confluence:
Flow rates before confluence point:
      47.554      31.908
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     78.998(CFS)
Time of concentration =    24.860 min.
Effective stream area after confluence =     49.020(Ac.)


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Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
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Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    78.998(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    78.998(CFS)
Normal flow depth in pipe =   34.27(In.)
Flow top width inside pipe =   32.56(In.)
Critical Depth =   33.34(In.)
Pipe flow velocity =      9.40(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    25.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     78.998(CFS)
Time of concentration =   25.91 min.
Rainfall intensity =     1.587(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.637 min.
Rainfall intensity =      2.356(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     15.147(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
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Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     17.176(CFS)
Depth of flow =   0.389(Ft.), Average velocity =   4.128(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.433(Ft.)
Flow velocity =   4.13(Ft/s)
Travel time =    2.37 min.     TC =   15.00  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.143(In/Hr) for a   100.0 year storm
Subarea runoff =      4.007(CFS) for      2.190(Ac.)
Total runoff =     19.153(CFS)    Total area =       9.690(Ac.)
Street flow at end of street =     19.153(CFS)
Half street flow at end of street =     19.153(CFS)
Depth of flow =   0.406(Ft.), Average velocity =   4.241(Ft/s)
Flow width (from curb towards crown)=  21.286(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.153(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.153(CFS)
Normal flow depth in pipe =   21.75(In.)
Flow top width inside pipe =   21.37(In.)
Critical Depth =   18.37(In.)
Pipe flow velocity =      5.58(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    15.23 min.


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Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.23 min.
Rainfall intensity =      2.126(In/Hr) for a   100.0 year storm
Subarea runoff =     11.595(CFS) for      6.610(Ac.)
Total runoff =     30.748(CFS)    Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
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Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.748(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    30.748(CFS)
Normal flow depth in pipe =   20.44(In.)
Flow top width inside pipe =   27.96(In.)
Critical Depth =   22.66(In.)
Pipe flow velocity =      8.63(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    15.34 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
_______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     30.748(CFS)
Time of concentration =   15.34 min.
Rainfall intensity =     2.117(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****
_______________________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      2.516(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.836
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      5.719(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_______________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.719(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.50(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
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Corrected/adjusted channel slope =  0.0047
Travel time =    1.18 min.     TC =   12.39  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.381(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      5.719(CFS)   Total area =       2.720(Ac.)


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      5.719(CFS)
Time of concentration =   12.39 min.
Rainfall intensity =     2.381(In/Hr)
Summary of stream data:

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


1       30.748     15.34                2.117
2        5.719     12.39                2.381
Largest stream flow has longer time of concentration
Qp =     30.748 + sum of
         Qb         Ia/Ib
          5.719 *    0.889 =      5.085
Qp =     35.834

Total of 2 streams to confluence:
Flow rates before confluence point:
      30.748       5.719
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     35.834(CFS)
Time of concentration =    15.341 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1687.000(Ft.)
Downstream point elevation =  1683.000(Ft.)
Channel length thru subarea  =   355.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =     36.399(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     36.399(CFS)
Depth of flow =   0.803(Ft.), Average velocity =   7.815(Ft/s)
Channel flow top width =    6.605(Ft.)
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Flow Velocity =    7.81(Ft/s)
Travel time  =    0.76 min.
Time of concentration =   16.10 min.

Sub-Channel No. 1 Critical depth =      1.094(Ft.)
  '     '       '     Critical flow top width =      7.188(Ft.)
  '     '       '     Critical flow velocity=    5.461(Ft/s)
  '     '       '     Critical flow area =      6.665(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.062(In/Hr) for a   100.0 year storm
Subarea runoff =      1.101(CFS) for      0.600(Ac.)
Total runoff =     36.935(CFS)   Total area =      19.620(Ac.)
Depth of flow =   0.810(Ft.), Average velocity =   7.852(Ft/s)

Sub-Channel No. 1 Critical depth =      1.109(Ft.)
  '     '       '     Critical flow top width =      7.219(Ft.)
  '     '       '     Critical flow velocity=    5.450(Ft/s)
  '     '       '     Critical flow area =      6.778(Sq.Ft)



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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.620(Ac.)
Runoff from this stream =     36.935(CFS)
Time of concentration =   16.10 min.
Rainfall intensity =     2.062(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      2.128(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.233(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500
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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      2.128(In/Hr) for a   100.0 year storm
Subarea runoff =      9.371(CFS) for      5.160(Ac.)
Total runoff =     12.604(CFS)   Total area =       6.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.604(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.604(CFS)
Normal flow depth in pipe =   13.73(In.)
Flow top width inside pipe =   19.98(In.)
Critical Depth =   15.86(In.)
Pipe flow velocity =      7.56(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    15.30 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =     12.604(CFS)
Time of concentration =   15.30 min.
Rainfall intensity =     2.121(In/Hr)
Summary of stream data:

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


1       78.998     25.91           1.587
2       36.935     16.10           2.062
3       12.604     15.30           2.121
Largest stream flow has longer time of concentration
Qp =     78.998 + sum of
         Qb         Ia/Ib
         36.935 *    0.770 =     28.426
         Qb         Ia/Ib
         12.604 *    0.748 =      9.431
Qp =    116.856

Total of 3 main streams to confluence:
Flow rates before confluence point:
      78.998      36.935      12.604
Area of streams before confluence:
       49.020       19.620        6.940
```

```
Results of confluence:
Total flow rate =    116.856(CFS)
Time of concentration =    25.915 min.
Effective stream area after confluence  =     75.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =    122.576(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.47(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    2.54 min.     TC =   28.45  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.855
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.507(In/Hr) for a   100.0 year storm
Subarea runoff =      9.539(CFS) for      7.400(Ac.)
Total runoff =    126.394(CFS)   Total area =      82.980(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      123.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    28.45 min.
Rainfall intensity =      1.507(In/Hr) for a   100.0 year storm
Subarea runoff =      1.640(CFS) for      1.300(Ac.)
Total runoff =    128.034(CFS)   Total area =      84.280(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      123.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1673.000(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
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```
No. of pipes = 1  Required pipe flow  =   128.034(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =   128.034(CFS)
Normal flow depth in pipe =   37.69(In.)
Flow top width inside pipe =   33.20(In.)
Critical Depth =   40.46(In.)
Pipe flow velocity =     12.97(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    28.69 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    28.69 min.
Rainfall intensity =      1.501(In/Hr) for a   100.0 year storm
Subarea runoff =      0.628(CFS) for      0.500(Ac.)
Total runoff =    128.662(CFS)   Total area =      84.780(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      2.202(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     16.127(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      452.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1682.500(Ft.)
Downstream point/station elevation =  1679.800(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.127(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    16.127(CFS)
Normal flow depth in pipe =   11.02(In.)
Flow top width inside pipe =   17.54(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.22(Ft/s)
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Travel time through pipe =    0.06 min.
Time of concentration (TC) =    14.35 min.


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Process from Point/Station      450.000 to Point/Station      452.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    14.35 min.
Rainfall intensity =      2.197(In/Hr) for a   100.0 year storm
Subarea runoff =      1.174(CFS) for      0.600(Ac.)
Total runoff =     17.301(CFS)    Total area =       9.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      452.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1679.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =  1336.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.301(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.301(CFS)
Normal flow depth in pipe =   19.05(In.)
Flow top width inside pipe =   19.41(In.)
Critical Depth =   17.98(In.)
Pipe flow velocity =      6.47(Ft/s)
Travel time through pipe =    3.44 min.
Time of concentration (TC) =    17.79 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.450(Ac.)
Runoff from this stream =     17.301(CFS)
Time of concentration =   17.79 min.
Rainfall intensity =     1.951(In/Hr)


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Process from Point/Station      454.000 to Point/Station      456.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1682.500(Ft.)
Bottom (of initial area) elevation =  1674.500(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.00800  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.488 min.
Rainfall intensity =      2.371(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.892
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.707(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      456.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1671.600(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.707(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     5.707(CFS)
Normal flow depth in pipe =   14.06(In.)
Flow top width inside pipe =   19.75(In.)
Critical Depth =   10.55(In.)
Pipe flow velocity =      3.33(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    12.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =      5.707(CFS)
Time of concentration =   12.73 min.
Rainfall intensity =     2.346(In/Hr)
Summary of stream data:

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


1       17.301     17.79                 1.951
2        5.707     12.73                 2.346
Largest stream flow has longer time of concentration
Qp =     17.301 + sum of
         Qb         Ia/Ib
          5.707 *    0.832 =      4.747
Qp =     22.048

Total of 2 streams to confluence:
Flow rates before confluence point:
      17.301       5.707
Area of streams before confluence:
        9.450        2.700
Results of confluence:
Total flow rate =     22.048(CFS)
Time of concentration =    17.792 min.
Effective stream area after confluence =     12.150(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.150(Ac.)
Runoff from this stream =     22.048(CFS)
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Time of concentration =   17.79 min.
Rainfall intensity =     1.951(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      420.000 to Point/Station      421.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  1687.900(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.00681  s(percent)=       0.68
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.144 min.
Rainfall intensity =      2.059(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.910(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      421.000 to Point/Station      422.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.491(CFS)
Depth of flow =   0.498(Ft.), Average velocity =   0.904(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.90(Ft/s)
Travel time =    3.59 min.     TC =   19.74  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.843(In/Hr) for a   100.0 year storm
Subarea runoff =      1.093(CFS) for      0.700(Ac.)
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```
Total runoff =      6.003(CFS)    Total area =       3.500(Ac.)
Street flow at end of street =      6.003(CFS)
Half street flow at end of street =      6.003(CFS)
Depth of flow =   0.523(Ft.), Average velocity =   0.919(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 =    1.16(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      422.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.003(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.003(CFS)
Normal flow depth in pipe =   13.17(In.)
Flow top width inside pipe =   15.95(In.)
Critical Depth =   11.35(In.)
Pipe flow velocity =      4.33(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    19.83 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.500(Ac.)
Runoff from this stream =      6.003(CFS)
Time of concentration =   19.83 min.
Rainfall intensity =     1.838(In/Hr)


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Process from Point/Station      424.000 to Point/Station      426.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   908.000(Ft.)
Top (of initial area) elevation =  1687.000(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00584  s(percent)=       0.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.636 min.
Rainfall intensity =      2.025(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.481(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      426.000 to Point/Station      428.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
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Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   200.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.050(CFS)
Depth of flow =   0.484(Ft.), Average velocity =   0.868(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.87(Ft/s)
Travel time =    3.84 min.     TC =   20.48  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.806(In/Hr) for a   100.0 year storm
Subarea runoff =      1.070(CFS) for      0.700(Ac.)
Total runoff =      5.551(CFS)   Total area =       3.300(Ac.)
Street flow at end of street =      5.551(CFS)
Half street flow at end of street =      5.551(CFS)
Depth of flow =   0.505(Ft.), Average velocity =   0.898(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 =    0.23(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      428.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.551(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     5.551(CFS)
Normal flow depth in pipe =   12.84(In.)
Flow top width inside pipe =   20.47(In.)
Critical Depth =   10.39(In.)
Pipe flow velocity =      3.60(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    20.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.300(Ac.)
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Runoff from this stream =      5.551(CFS)
Time of concentration =   20.66 min.
Rainfall intensity =     1.798(In/Hr)
Summary of stream data:

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


1        6.003     19.83                1.838
2        5.551     20.66                1.798
Largest stream flow has longer or shorter time of concentration
Qp =      6.003 + sum of
         Qa          Tb/Ta
          5.551 *    0.960 =      5.329
Qp =     11.332

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.003       5.551
Area of streams before confluence:
        3.500        3.300
Results of confluence:
Total flow rate =     11.332(CFS)
Time of concentration =    19.830 min.
Effective stream area after confluence =      6.800(Ac.)


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Process from Point/Station      430.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.500(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   693.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.332(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.332(CFS)
Normal flow depth in pipe =   14.06(In.)
Flow top width inside pipe =   19.75(In.)
Critical Depth =   15.04(In.)
Pipe flow velocity =      6.62(Ft/s)
Travel time through pipe =    1.74 min.
Time of concentration (TC) =    21.57 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.800(Ac.)
Runoff from this stream =     11.332(CFS)
Time of concentration =   21.57 min.
Rainfall intensity =     1.755(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      432.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   921.000(Ft.)
Top (of initial area) elevation =  1684.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00901  s(percent)=       0.90
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.339 min.
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Rainfall intensity =      2.117(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.154(CFS)
Total initial stream area =        2.300(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      432.000 to Point/Station      432.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.34 min.
Rainfall intensity =      2.117(In/Hr) for a   100.0 year storm
Subarea runoff =      3.071(CFS) for      1.700(Ac.)
Total runoff =      7.225(CFS)   Total area =       4.000(Ac.)


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Process from Point/Station      432.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.225(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.225(CFS)
Normal flow depth in pipe =   13.48(In.)
Flow top width inside pipe =   15.62(In.)
Critical Depth =   12.49(In.)
Pipe flow velocity =      5.09(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    15.45 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.000(Ac.)
Runoff from this stream =      7.225(CFS)
Time of concentration =   15.45 min.
Rainfall intensity =     2.109(In/Hr)


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Process from Point/Station      434.000 to Point/Station      436.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  1682.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
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Difference in elevation =     6.300(Ft.)
Slope =    0.00692  s(percent)=       0.69
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.103 min.
Rainfall intensity =      2.062(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.620(CFS)
Total initial stream area =        3.200(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      436.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.620(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.620(CFS)
Normal flow depth in pipe =   13.50(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =   11.52(In.)
Pipe flow velocity =      4.83(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    16.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      3.200(Ac.)
Runoff from this stream =      5.620(CFS)
Time of concentration =   16.21 min.
Rainfall intensity =     2.054(In/Hr)
Summary of stream data:

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


1       11.332     21.57                1.755
2        7.225     15.45                2.109
3        5.620     16.21                2.054
Largest stream flow has longer time of concentration
Qp =     11.332 + sum of
         Qb         Ia/Ib
          7.225 *    0.832 =      6.014
         Qb         Ia/Ib
          5.620 *    0.854 =      4.802
Qp =     22.148

Total of 3 streams to confluence:
Flow rates before confluence point:
      11.332       7.225       5.620
Area of streams before confluence:
        6.800        4.000        3.200
Results of confluence:
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Total flow rate =     22.148(CFS)
Time of concentration =    21.574 min.
Effective stream area after confluence =     14.000(Ac.)


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Process from Point/Station      438.000 to Point/Station      440.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    21.57 min.
Rainfall intensity =      1.755(In/Hr) for a   100.0 year storm
Subarea runoff =      1.334(CFS) for      0.900(Ac.)
Total runoff =     23.482(CFS)   Total area =      14.900(Ac.)


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Process from Point/Station      440.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.482(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    23.482(CFS)
Normal flow depth in pipe =   22.59(In.)
Flow top width inside pipe =   25.87(In.)
Critical Depth =   19.80(In.)
Pipe flow velocity =      5.92(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    21.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     14.900(Ac.)
Runoff from this stream =     23.482(CFS)
Time of concentration =   21.79 min.
Rainfall intensity =     1.746(In/Hr)
Summary of stream data:

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


1       22.048     17.79           1.951
2       23.482     21.79           1.746
Largest stream flow has longer time of concentration
Qp =     23.482 + sum of
         Qb         Ia/Ib
         22.048 *    0.894 =     19.721
Qp =     43.203

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.048      23.482
```

```
Area of streams before confluence:
       12.150       14.900


Results of confluence:
Total flow rate =     43.203(CFS)
Time of concentration =    21.791 min.
Effective stream area after confluence  =     27.050(Ac.)


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Process from Point/Station      458.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1671.500(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =    73.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    43.203(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    43.203(CFS)
Normal flow depth in pipe =   26.67(In.)
Flow top width inside pipe =   25.98(In.)
Critical Depth =   26.17(In.)
Pipe flow velocity =      8.40(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    21.94 min.


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      2.484(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.820(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      7.130(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.78(Ft/s)

Correction to map slope used on extremely rugged channels with
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drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    2.53 min.     TC =   14.00  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.226(In/Hr) for a   100.0 year storm
Subarea runoff =      9.480(CFS) for      4.900(Ac.)
Total runoff =     11.301(CFS)   Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =     27.130(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.60(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    3.33 min.     TC =   17.34  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.979(In/Hr) for a   100.0 year storm
Subarea runoff =     27.547(CFS) for     16.080(Ac.)
Total runoff =     38.847(CFS)   Total area =      21.820(Ac.)


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Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     46.343(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.89(Ft/s)
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Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.14 min.     TC =   19.48  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.863
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.857(In/Hr) for a   100.0 year storm
Subarea runoff =     13.496(CFS) for      8.420(Ac.)
Total runoff =     52.343(CFS)   Total area =      30.240(Ac.)


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Process from Point/Station      308.000 to Point/Station      320.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1671.900(Ft.)
Downstream point elevation =  1668.000(Ft.)
Channel length thru subarea  =   574.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     53.074(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     53.074(CFS)
Depth of flow =   1.398(Ft.), Average velocity =   7.593(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    7.59(Ft/s)
Travel time  =    1.26 min.
Time of concentration =   20.74 min.

Sub-Channel No. 1 Critical depth =      1.516(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    7.003(Ft/s)
  '     '       '     Critical flow area =      7.578(Sq.Ft)

 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.794(In/Hr) for a   100.0 year storm
Subarea runoff =      1.365(CFS) for      0.900(Ac.)
Total runoff =     53.709(CFS)   Total area =      31.140(Ac.)
Depth of flow =   1.410(Ft.), Average velocity =   7.620(Ft/s)

Sub-Channel No. 1 Critical depth =      1.531(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    7.015(Ft/s)
  '     '       '     Critical flow area =      7.656(Sq.Ft)
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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     31.140(Ac.)
Runoff from this stream =     53.709(CFS)
Time of concentration =   20.74 min.
Rainfall intensity =     1.794(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      2.071(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     13.215(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =     19.447(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.00(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   17.46 min.     TC =   33.43  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.791
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
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Rainfall intensity =      1.379(In/Hr) for a   100.0 year storm
Subarea runoff =      7.975(CFS) for      7.310(Ac.)
Total runoff =     21.190(CFS)    Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    33.43 min.
Rainfall intensity =      1.379(In/Hr) for a   100.0 year storm
Subarea runoff =      4.194(CFS) for      3.430(Ac.)
Total runoff =     25.384(CFS)    Total area =      18.490(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1674.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.384(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    25.384(CFS)
Normal flow depth in pipe =   15.82(In.)
Flow top width inside pipe =   22.75(In.)
Critical Depth =   21.24(In.)
Pipe flow velocity =     11.56(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    33.58 min.


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Process from Point/Station      313.200 to Point/Station      313.400
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    33.58 min.
Rainfall intensity =      1.376(In/Hr) for a   100.0 year storm
Subarea runoff =      0.732(CFS) for      0.600(Ac.)
Total runoff =     26.116(CFS)    Total area =      19.090(Ac.)


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Process from Point/Station      313.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   900.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.116(CFS)
Nearest computed pipe diameter  =     30.00(In.)
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Calculated individual pipe flow  =    26.116(CFS)
Normal flow depth in pipe =   24.05(In.)
Flow top width inside pipe =   23.93(In.)
Critical Depth =   20.91(In.)
Pipe flow velocity =      6.19(Ft/s)
Travel time through pipe =    2.42 min.
Time of concentration (TC) =    36.00 min.


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.090(Ac.)
Runoff from this stream =     26.116(CFS)
Time of concentration =   36.00 min.
Rainfall intensity =     1.324(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.505(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
Subarea runoff =      1.920(CFS) for      0.960(Ac.)
Total runoff =     12.425(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
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Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     16.962(CFS)
Depth of flow =   0.334(Ft.), Average velocity =   2.724(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.685(Ft.)
Flow velocity =   2.72(Ft/s)
Travel time =    8.64 min.     TC =   21.50  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =      8.958(CFS) for      6.030(Ac.)
Total runoff =     21.382(CFS)    Total area =      12.040(Ac.)
Street flow at end of street =     21.382(CFS)
Half street flow at end of street =     10.691(CFS)
Depth of flow =   0.361(Ft.), Average velocity =   2.966(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    21.50 min.
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =      4.924(CFS) for      3.150(Ac.)
Total runoff =     26.307(CFS)    Total area =      15.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.812
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    21.50 min.
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =     19.209(CFS) for     13.460(Ac.)
Total runoff =     45.516(CFS)    Total area =      28.650(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1676.000(Ft.)
Downstream point/station elevation =  1672.400(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    45.516(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    45.516(CFS)
Normal flow depth in pipe =   12.66(In.)
Flow top width inside pipe =   20.55(In.)
Critical depth could not be calculated.
Pipe flow velocity =     30.02(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    21.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.200 to Point/Station      318.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    21.51 min.
Rainfall intensity =      1.758(In/Hr) for a   100.0 year storm
Subarea runoff =      3.126(CFS) for      2.000(Ac.)
Total runoff =     48.642(CFS)    Total area =      30.650(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1672.400(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   823.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    48.642(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    48.642(CFS)
Normal flow depth in pipe =   29.44(In.)
Flow top width inside pipe =   27.80(In.)
Critical Depth =   27.25(In.)
Pipe flow velocity =      7.87(Ft/s)
Travel time through pipe =    1.74 min.
Time of concentration (TC) =    23.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
```

```
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     30.650(Ac.)
Runoff from this stream =     48.642(CFS)
Time of concentration =   23.25 min.
Rainfall intensity =     1.684(In/Hr)
Summary of stream data:

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


1       53.709     20.74           1.794
2       26.116     36.00           1.324
3       48.642     23.25           1.684
Largest stream flow has longer or shorter time of concentration
Qp =     53.709 + sum of
         Qa          Tb/Ta
         26.116 *    0.576 =     15.041
         Qa          Tb/Ta
         48.642 *    0.892 =     43.376
Qp =    112.126

Total of 3 main streams to confluence:
Flow rates before confluence point:
      53.709      26.116      48.642
Area of streams before confluence:
       31.140       19.090       30.650


Results of confluence:
Total flow rate =    112.126(CFS)
Time of concentration =    20.735 min.
Effective stream area after confluence  =     80.880(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     80.880(Ac.)
Runoff from this stream =    112.126(CFS)
Time of concentration =   20.74 min.
Rainfall intensity =     1.794(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   897.000(Ft.)
Top (of initial area) elevation =  1683.000(Ft.)
Bottom (of initial area) elevation =  1674.700(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00925  s(percent)=       0.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.098 min.
Rainfall intensity =      2.136(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
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```
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.021(CFS)
Total initial stream area =        4.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1674.700(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   126.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     10.077(CFS)
Depth of flow =   0.442(Ft.), Average velocity =   1.994(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.99(Ft/s)
Travel time =    1.05 min.     TC =   16.15  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.058(In/Hr) for a   100.0 year storm
Subarea runoff =      4.033(CFS) for      2.300(Ac.)
Total runoff =     12.053(CFS)    Total area =       6.700(Ac.)
Street flow at end of street =     12.053(CFS)
Half street flow at end of street =     12.053(CFS)
Depth of flow =   0.474(Ft.), Average velocity =   2.141(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      410.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1670.300(Ft.)
Downstream point/station elevation =  1670.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.053(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.053(CFS)
Normal flow depth in pipe =   14.95(In.)
Flow top width inside pipe =   19.02(In.)
Critical Depth =   15.54(In.)
Pipe flow velocity =      6.58(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    16.25 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.700(Ac.)
Runoff from this stream =     12.053(CFS)
Time of concentration =   16.25 min.
Rainfall intensity =     2.051(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      408.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   612.000(Ft.)
Top (of initial area) elevation =  1685.300(Ft.)
Bottom (of initial area) elevation =  1676.500(Ft.)
Difference in elevation =     8.800(Ft.)
Slope =    0.01438  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.864 min.
Rainfall intensity =      2.439(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.026(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      410.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1676.500(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   466.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      6.654(CFS)
Depth of flow =   0.355(Ft.), Average velocity =   1.906(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.91(Ft/s)
Travel time =    4.08 min.     TC =   15.94  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
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```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.073(In/Hr) for a   100.0 year storm
Subarea runoff =      3.180(CFS) for      1.800(Ac.)
Total runoff =      8.206(CFS)    Total area =       4.200(Ac.)
Street flow at end of street =      8.206(CFS)
Half street flow at end of street =      8.206(CFS)
Depth of flow =   0.381(Ft.), Average velocity =   2.071(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.94 min.
Rainfall intensity =      2.073(In/Hr) for a   100.0 year storm
Subarea runoff =      2.650(CFS) for      1.500(Ac.)
Total runoff =     10.856(CFS)    Total area =       5.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.700(Ac.)
Runoff from this stream =     10.856(CFS)
Time of concentration =   15.94 min.
Rainfall intensity =     2.073(In/Hr)
Summary of stream data:

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


1       12.053     16.25                2.051
2       10.856     15.94                2.073
Largest stream flow has longer time of concentration
Qp =     12.053 + sum of
         Qb         Ia/Ib
         10.856 *    0.990 =     10.742
Qp =     22.795

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.053      10.856
Area of streams before confluence:
        6.700        5.700
Results of confluence:
Total flow rate =     22.795(CFS)
Time of concentration =    16.247 min.
Effective stream area after confluence =     12.400(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      412.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1670.000(Ft.)
Downstream point/station elevation =  1669.300(Ft.)
Pipe length  =   129.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.795(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    22.795(CFS)
Normal flow depth in pipe =   22.13(In.)
Flow top width inside pipe =   20.77(In.)
Critical Depth =   20.06(In.)
Pipe flow velocity =      6.54(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =    16.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      412.000 to Point/Station      320.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    16.58 min.
Rainfall intensity =      2.029(In/Hr) for a   100.0 year storm
Subarea runoff =      2.591(CFS) for      1.500(Ac.)
Total runoff =     25.386(CFS)    Total area =      13.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.900(Ac.)
Runoff from this stream =     25.386(CFS)
Time of concentration =   16.58 min.
Rainfall intensity =     2.029(In/Hr)
Summary of stream data:

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


1      112.126     20.74           1.794
2       25.386     16.58           2.029
Largest stream flow has longer time of concentration
Qp =    112.126 + sum of
         Qb         Ia/Ib
         25.386 *    0.884 =     22.445
Qp =    134.571

Total of 2 main streams to confluence:
Flow rates before confluence point:
     112.126      25.386
Area of streams before confluence:
       80.880       13.900


Results of confluence:
```

Total flow rate = 134.571(CFS)
Time of concentration = 20.735 min.
Effective stream area after confluence = 94.780(Ac.)
End of computations, total study area = 206.61 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.624
Area averaged RI index number = 72.1

Appendix

F

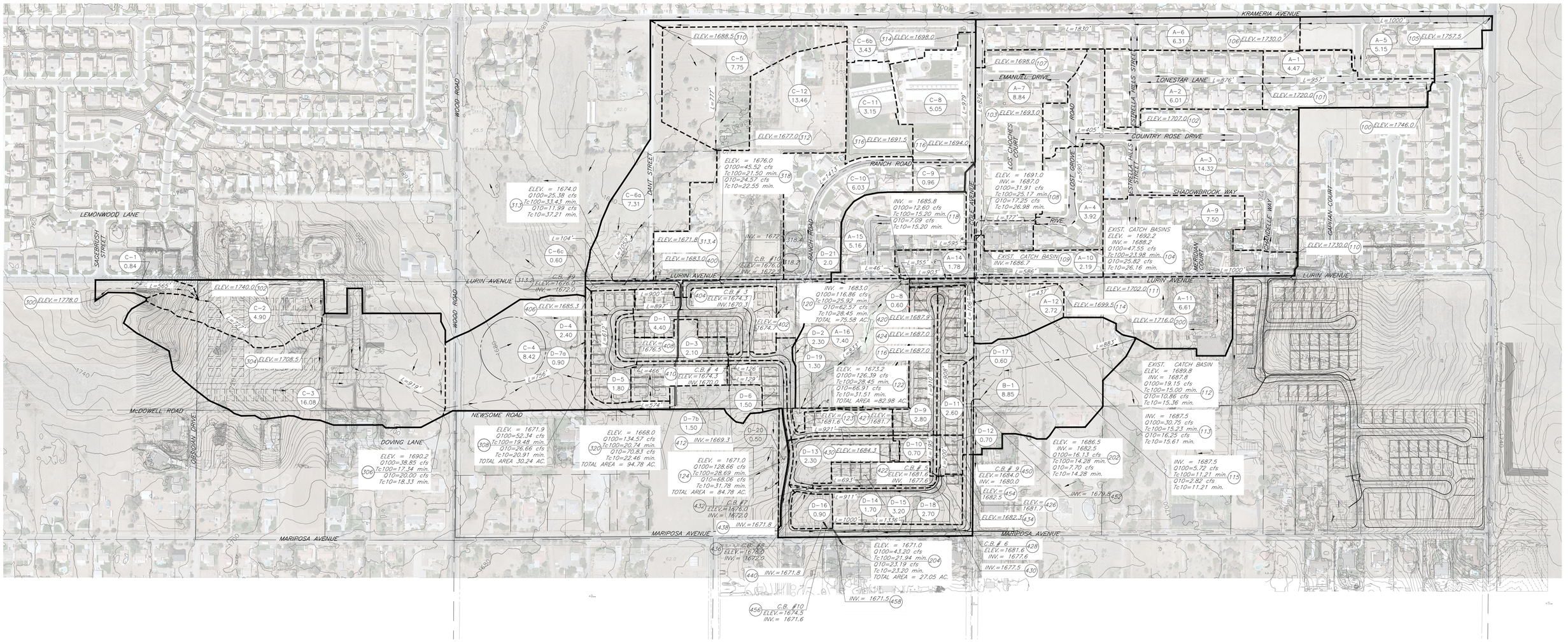
PROPOSED CONDITION HYDROLOGIC KEY MAP

200' 0 200' 400' 600'

SCALE IN FEET



VICINITY MAP


KRAMERIA AVENUE
LEMONWOOD LANE
SAGEBRUSH STREET
WOOD ROAD
DANT STREET
RANCH ROAD
COLE AVENUE
LURIN AVENUE
EMANUEL DRIVE
LONESTAR LANE
COUNTRY ROSE DRIVE
SHADOWBROOK WAY
ESTRELLA HILLS STREET
LOST GROVE ROAD
LOS CHICHES ROAD
MERIDIAN COURT
CAPTAIN COURT
McDOWELL ROAD
OBSIDIAN DRIVE
DOVING LANE
NEWSOME ROAD
MARIPOSA AVENUE
ELEV.=1778.0
ELEV.=1740.0
ELEV.=1708.5
ELEV.=1688.5
ELEV.=1698.0
ELEV.=1677.0
ELEV.=1691.5
ELEV.=1694.0
ELEV.=1698.0
ELEV.=1693.0
ELEV.=1707.0
ELEV.=1730.0
ELEV.=1720.0
ELEV.=1746.0
ELEV.=1757.5
ELEV.=1671.8
ELEV.=1683.0
ELEV.=1685.3
ELEV.=1687.9
ELEV.=1687.0
ELEV.=1684.3
ELEV.=1702.0
ELEV.=1699.5
ELEV.=1716.0
ELEV.=1686.5
ELEV.=1681.7
ELEV.=1682.3
ELEV.=1677.5
ELEV.=1681.6
ELEV.=1682.5
ELEV.=1684.0
ELEV.=1681.7
ELEV.=1681.6
ELEV.=1677.6
ELEV.=1674.5
ELEV.=1671.9 Q100=52.34 cfs Tc100=19.48 min. Q10=26.66 cfs Tc10=20.91 min. TOTAL AREA 30.24 AC.
ELEV.=1668.0 Q100=134.57 cfs Tc100=20.74 min. Q10=70.83 cfs Tc10=22.46 min. TOTAL AREA = 94.78 AC.
ELEV.=1671.0 Q100=128.66 cfs Tc100=28.69 min. Q10=68.06 cfs Tc10=31.78 min. TOTAL AREA = 84.78 AC.
ELEV.=1673.2 Q100=126.39 cfs Tc100=28.45 min. Q10=66.91 cfs Tc10=31.51 min. TOTAL AREA =82.98 AC.
ELEV.=1671.0 Q100=43.20 cfs Tc100=21.94 min. Q10=23.19 cfs Tc10=23.20 min. TOTAL AREA = 27.05 AC.
ELEV.=1690.2 Q100=38.85 cfs Tc100=17.34 min. Q10=20.00 cfs Tc10=18.33 min.
ELEV.=1676.0 Q100=45.52 cfs Tc100=21.50 min. Q10=24.57 cfs Tc10=22.55 min.
ELEV.=1674.0 Q100=25.38 cfs Tc100=33.43 min. Q10=11.99 cfs Tc10=37.21 min.
INV.=1685.8 Q100=12.60 cfs Tc100=15.20 min. Q10=7.09 cfs Tc10=15.20 min.
INV.=1683.0 Q100=116.86 cfs Tc100=25.92 min. Q10=62.57 cfs Tc10=28.45 min. TOTAL =75.58 AC.
ELEV.=1691.0 INV.=1687.0 Q100=31.91 cfs Tc100=25.17 min. Q10=17.25 cfs Tc10=26.98 min.
EXIST. CATCH BASINS ELEV. = 1692.2 INV.= 1688.2 Q100=47.55 cfs Tc100=23.98 min. Q10=25.82 cfs Tc10=26.16 min.
EXIST. CATCH BASIN INV.=1686.7
EXIST. CATCH BASIN ELEV. = 1689.8 INV.= 1687.8 Q100=19.15 cfs Tc100=15.00 min. Q10=10.86 cfs Tc10=15.36 min.
INV. = 1687.5 Q100=30.75 cfs Tc100=15.23 min. Q10=16.25 cfs Tc10=15.61 min.
INV. = 1687.5 Q100=5.72 cfs Tc100=11.21 min. Q10=2.82 cfs Tc10=11.21 min.
ELEV.=1686.5 INV.= 1682.5 Q100=16.13 cfs Tc100=14.28 min. Q10=7.70 cfs Tc10=14.28 min.
C.B. # 1 ELEV.=1676.0 INV.= 1672.3
C.B. #2 ELEV.=1676.0 INV.= 1672.0
C.B. # 3 ELEV.=1674.3 INV.1670.3
C.B. # 4 ELEV.=1674.3 INV.1670.0
C.B. # 5 ELEV.=1681.6 INV. 1677.6
C.B. # 6 ELEV.=1681.6 INV.= 1677.6
C.B. # 7 ELEV.=1676.0 INV.= 1672.0
C.B. #8 ELEV.=1676.0 INV.= 1672.0
C.B. #9 ELEV.=1684.0 INV.= 1680.0
C.B. #10 ELEV.=1674.5 INV.= 1671.6
INV.=1671.8
INV.=1671.5
INV.=1679.8
C-1 0.84
C-2 4.90
C-3 16.08
C-4 8.42
C-5 7.75
C-6a 7.31
C-6b 3.43
C-6c 0.60
C-8 5.05
C-9 0.96
C-10 6.03
C-11 3.15
C-12 13.46
D-1 4.40
D-2 2.30
D-3 2.10
D-4 2.40
D-5 1.80
D-6 1.50
D-7a 0.90
D-7b 1.50
D-8 0.60
D-9 2.80
D-10 0.70
D-11 2.60
D-12 0.70
D-13 2.30
D-14 1.70
D-15 3.20
D-16 0.90
D-17 0.60
D-18 2.70
D-19 1.30
D-20 0.50
D-21 2.0
A-1 4.47
A-2 6.01
A-3 14.32
A-4 3.92
A-5 5.15
A-6 6.31
A-7 8.84
A-9 7.50
A-10 2.19
A-11 6.61
A-12 2.72
A-14 1.78
A-15 5.16
A-16 7.40
B-1 8.85
L=565'
L=1830'
L=1000'
L=876'
L=957'
L=405'
L=777'
L=979'
L=826'
L=1743'
L=1253'
L=104'
L=595'
L=355'
L=903'
L=46'
L=900'
L=897'
L=437'
L=583'
L=617'
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L=129'
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L=921'
L=693'
L=911'
L=1336'
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Appendix

G

MISCELLANEOUS SIZING AND HYDRAULIC CALCULATIONS

Appendix

H

FEMA FIRM PANELS

NOTES TO USERS

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

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

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

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

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

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

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

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

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

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

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

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

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



FIGURE 7

LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
2776000mN	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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

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

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0740G

FIRM
FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 740 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RIVERSIDE COUNTY	060245	0740	G
RIVERSIDE, CITY OF	060260	0740	G

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

MAP NUMBER
06065C0740G

EFFECTIVE DATE
AUGUST 28, 2008

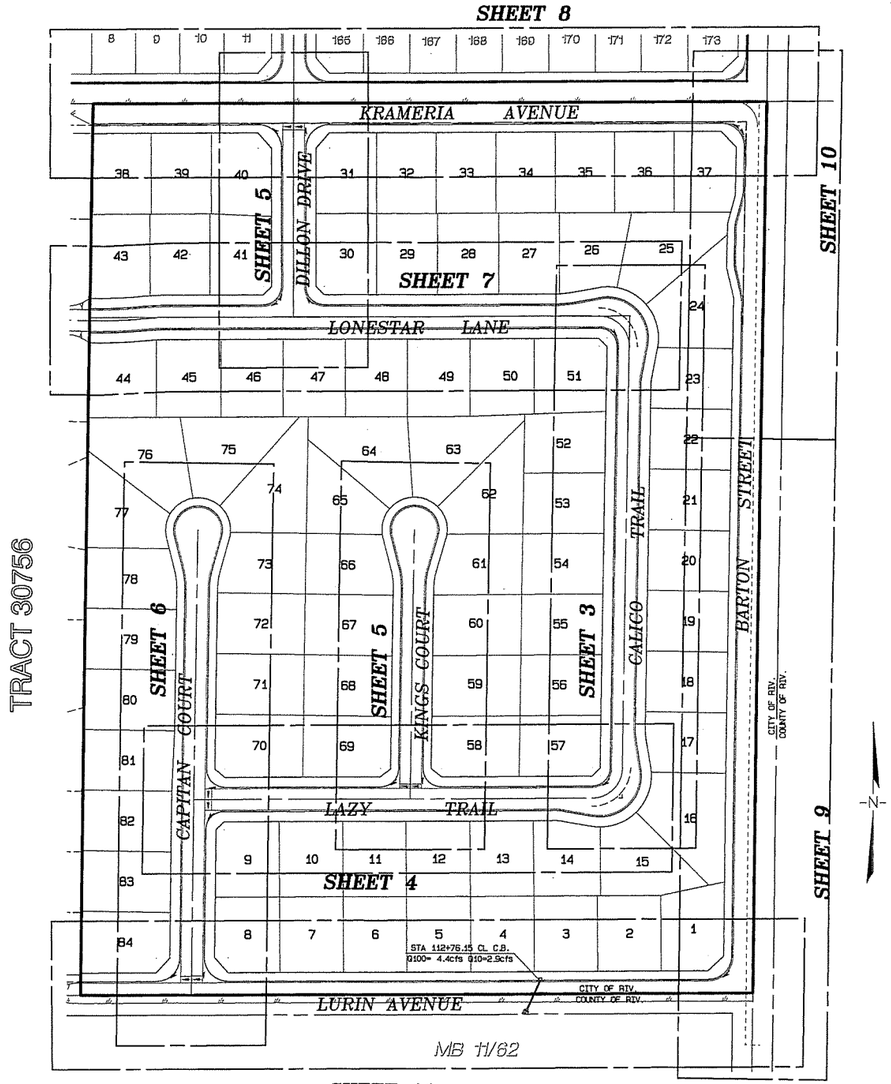
Federal Emergency Management Agency

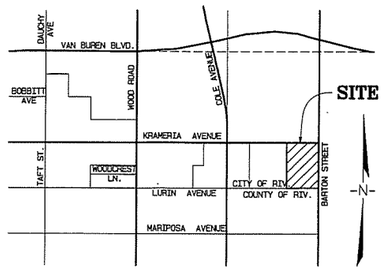
Appendix

I

REFREENCE IMPROVEMENT PLANS

TRACT 31236-1





VICINITY MAP N.T.S.

SECTION 29, T3S R4W

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER OR CONTRACTOR TO APPLY TO THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT, PERMIT SECTION, FOR AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE, AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT. ADDITIONAL STUDIES AND/OR PERMITS MAY BE REQUIRED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITTEE MUST INFORM COUNTY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO BEGINING OF CONSTRUCTION. PHONE: (909) 955-6885
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR DEVELOPER TO INSTALL AND MAINTAIN ALL CONSTRUCTION, REGULATORY, GUIDE AND WARNING SIGNS WITHIN THE PROJECT LIMITS AND ITS SURROUNDINGS TO PROVIDE SAFE PASSAGE FOR THE TRAVELING PUBLIC AND WORKERS UNTIL THE FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT BY THE COUNTY.
   A TRAFFIC CONTROL PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO OBTAINING AN ENCROACHMENT PERMIT.
4. ALL STREET SECTIONS ARE TENTATIVE. ADDITIONAL SOILS TESTS SHALL BE TAKEN BY THE COUNTY AFTER ROUGH GRADING TO DETERMINE THE EXACT STREET SECTION REQUIREMENTS. USE STANDARD NO. 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
5. ASPHALTIC EMULSION (FOG SEAL) SHALL BE APPLIED NOT LESS THAN 14 DAYS FOLLOWING PLACEMENT OF THE ASPHALT SURFACING. FOG SEAL AND PAINT BINDER SHALL BE APPLIED AT A RATE OF 0.05 AND 0.03 GALLON PER SQUARE YARD RESPECTIVELY. ASPHALTIC EMULSION SHALL CONFORM TO SECTION 37, 39, AND 94 OF THE STATE STANDARD SPECIFICATIONS.
6. THE DEVELOPER SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ADDITIONAL SIGNS AND MARKINGS NOT INCLUDED IN THE SIGNING AND STRIPING PLAN WITHIN THE PROJECT AREAS, OR ON ROADWAYS ADJACENT TO THE PROJECT BOUNDARIES, UPON THE REQUEST OF THE DIRECTOR OF TRANSPORTATION OR HIS DESIGNEE TO IMPROVE TRAFFIC SAFETY ON THE ROADS UNDER THE JURISDICTION OF THE DEVELOPER.

QUANTITIES

(WITHIN COUNTY RIGHT-OF-WAY ONLY)

(18)	CONSTRUCT 0.33' A.C. OVER 0.50' A.B. CL II.	12,300 SF	262 TON/228 CY
(14)	REMOVE EXISTING A.C. PAVEMENT	12,300 SF	

NOTICE TO CONTRACTOR

ACCORDING TO INFORMATION PROVIDED BY UNDERGROUND SERVICE ALERT (U.S.A.) DATED SEPTEMBER 2, 2003, THE FOLLOWING ORGANIZATIONS ARE U.S.A. MEMBERS WITHIN THE PROJECT AREA:

UTI FOR CHARTER COMMUNICATIONS
SBC / PACIFIC BELL
SOUTHERN CALIFORNIA GAS COMPANY
UTI FOR VERIZON - PERRIS
UTI FOR SC EDISON
WESTERN MUNICIPAL WATER DISTRICT
ADELPHIA - RIVERSIDE
UTI FOR CITY OF RIVERSIDE - ELECTRIC
CITY OF RIVERSIDE - TRAFFIC ENGINEERING
MARCH JOINT POWERS AUTHORITY

THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES (UTILITY PIPES, STRUCTURES, ETC.) SHOWN ON THESE PLANS (MAIN LINES ONLY - NO SERVICE LATERALS) WERE ASCERTAINED BY A REVIEW OF RECORDS PROVIDED BY THESE MEMBER AGENCIES AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT ALL UTILITIES SHOWN ON THESE PLANS AND/OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

CALL UNDERGROUND SERVICE ALERT (U.S.A.) 1-800-227-2600 AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION.

THE QUANTITY ESTIMATE SHOWN HEREON IS FOR THE USE OF GOVERNING AGENCIES IN DETERMINING BOND AMOUNTS AND/OR FEES AND IS NOT TO BE USED FOR BID PURPOSES.

STREET NAME AND TRAFFIC SIGN SCHEDULE

	NAME	BLOCK NO.
(A)	R-1 (STOP SIGN - 30")	
(B)	DILLON DRIVE,	9400
(C)	LONESTAR LANE	19800
	LONESTAR LANE,	19900
(D)	CALICO TRAIL	9400
	CALICO TRAIL,	9500
(E)	LAZY TRAIL	19800
	LAZY TRAIL,	19800
(F)	KINGS COURT	9500
	LAZY TRAIL,	19800
	CAPITAN COURT	9500
(G)	CAPITAN COURT,	9500
	LURIN AVENUE	19800
(H)	BARTON STREET,	9500
	LURIN AVENUE	19900
(I)	KRAMERIA AVENUE,	19800
(J)	DILLON DRIVE	9400
	BARTON STREET,	9400
	KRAMERIA AVENUE	19900

INSTALL SIGNS PER C/R STD. 662, C/R STD. 662A AND STD. 666

LEGEND, ABBREVIATIONS

BC — BEGIN CURVE
BCR — BEGIN CURB RETURN
EC — END CURVE
ECR — END CURB RETURN
FL — FLOWLINE
GB — GRADE BREAK
HP — HIGH POINT
LP — LOW POINT
TC — TOP OF CURB
UNO — UNLESS NOTED OTHERWISE

— A.C. PAVEMENT OVERLAY

— EXISTING A.C. PAVEMENT REMOVAL

STREET INDEX

	SHT NO.
TITLE SHEET	1
TYP. STREET SECTIONS & DETAILS	2
STREET PLAN & PROFILE	3-11
STORM DRAIN PLAN & PROFILE	10

GENERAL NOTES

1. NO PERSON SHALL PERFORM ANY CONSTRUCTION ACTIVITY OR INSTALL ANY OBJECTS WITHIN THE PUBLIC RIGHTS-OF-WAY OR EASEMENTS OF THE CITY OF RIVERSIDE WITHOUT A VALID CONSTRUCTION PERMIT OR A STREET OPENING PERMIT OR AN ENCROACHMENT PERMIT ISSUED BY THE CITY'S PUBLIC WORKS DEPARTMENT.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAR THE RIGHT-OF-WAY IN ACCORDANCE WITH THE PROVISIONS OF LAW AS IT AFFECTS EACH UTILITY INCLUDING IRRIGATION LINES AND APPURTENANCES AND AT NO COST TO THE CITY.
3. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF RIVERSIDE DEPARTMENT OF PUBLIC WORKS, STANDARD DRAWINGS, ITS SUPPLEMENTAL NOTES AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION.
4. THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.
5. THE DEVELOPER SHALL BE RESPONSIBLE FOR PRESERVING OR RE-ESTABLISHING AND REFERENCING SURVEY MONUMENTS DESTROYED, DISTURBED OR BURIED AS A RESULT OF CONSTRUCTION SHOWN HEREON.
6. ALL FLAGGED ELEVATIONS SHALL BE STAKED IN THE FIELD BY THE PRIVATE ENGINEER.
7. WHERE NEW PAVEMENT IS TO JOIN THE EXISTING PAVEMENT, THE EDGE OF THE EXISTING PAVEMENT SHALL BE TRIMMED IN A SMOOTH AND STRAIGHT LINE. CONSTRUCT MATCH-UP PAVING AS SHOWN ON THE PLANS AND OVERLAY PAVING AS DIRECTED IN THE FIELD TO PRODUCE A SMOOTH SECTION.
8. THE SUBDIVIDER SHALL ARRANGE FOR A SOIL TEST TO BE MADE BY A SOILS ENGINEER AFTER THE STREETS HAVE BEEN PREPARED TO ROUGH GRADE AND PRIOR TO CURB AND GUTTER CONSTRUCTION. DEPTH OF BASE MATERIAL AND A.C. PAVING SHALL BE DETERMINED BY THE CITY OF RIVERSIDE DESIGN STANDARDS AND TEST PROCEDURES.
9. ON ALL AREAS WITHIN PUBLIC RIGHT-OF-WAY WHERE THE FILL IS ONE (1) FOOT OR GREATER, A LETTER WILL BE REQUIRED FROM THE SOILS ENGINEER, CERTIFYING THE COMPACTION OF THE FILL BELOW SUBGRADE, PRIOR TO ISSUANCE OF THE CONSTRUCTION PERMIT/CUT SHEETS.
10. ALL TRAFFIC SIGNS SHALL BE INSTALLED PRIOR TO OPENING THE STREETS TO TRAFFIC.
11. ANY TRAFFIC CONTROL STRIPING OBLITERATED AND/OR BADLY WORN DURING CONSTRUCTION SHALL BE RESTORED BY THE CONTRACTOR WITHIN FIVE DAYS AFTER NOTIFICATION FROM THE CITY INSPECTORS.
12. FINAL STRIPING FOR TRAFFIC CONTROL AND/OR PAVEMENT MARKING TO BE THE RESPONSIBILITY OF THE CONTRACTOR.
13. THE CONTRACTOR SHALL CALL IN A LOCATION REQUEST TO UNDERGROUND SERVICE ALERT (USA). PHONE # 1-800-227-2600, TWO WORKING DAYS BEFORE DIGGING. NO CONSTRUCTION PERMIT WILL BE ISSUED BY THE PUBLIC WORKS DEPARTMENT INVOLVING EXCAVATION FOR UNDERGROUND FACILITIES UNLESS THE APPLICANT HAS BEEN PROVIDED AN INQUIRY IDENTIFICATION NUMBER BY U.S.A.
14. THE CONTRACTOR SHALL COORDINATE TRENCHING FOR CABLE TELEVISION WITH OTHER TRENCHING WITHIN THE SUBDIVISION.
15. CONSTRUCT DRIVEWAY APPROACHES PER STANDARD DRAWING 302. EXACT SIZE AND LOCATION TO BE STAKED BY THE PRIVATE ENGINEER PRIOR TO CONSTRUCTION OF THE CURB AND GUTTER.
16. IN PAVEMENT OVERLAY AREAS, ANY DISTRESSED EXISTING PAVEMENT SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE INSPECTOR PRIOR TO OVERLAYING WITH A.C. PAVING.
17. SEE PUBLIC LANDSCAPE PLAN NO. R-3777-L AS PREPARED BY HERMANN & ASSOCIATES FOR LANDSCAPE IMPROVEMENTS ALONG BARTON STREET.
18. BEFORE THE RIP-RAP AT OUTLET OF ANY DRAINAGE STRUCTURE IS ACCEPTED BY THE CITY, IT SHALL BE TESTED UNDER FLOWS AS CLOSE AS POSSIBLE TO DESIGN CONDITIONS WITH WATER OBTAINED FROM FIRE HYDRANTS IN THE IMMEDIATE AREA.

CONSTRUCTION NOTES

⚠ 1	CONSTRUCT 0.35' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R. 10594 R=40	
1a	CONSTRUCT 0.35' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R.700013, R=30, SEE RIV. COUNTY GENERAL NOTES 4	
1b	CONSTRUCT_____A.C. PAVING OVER_____CRUSHED AGGREGATE BASE PER S.R._____, R=_____	
1c	CONSTRUCT 0.25' A.C. OVER NATIVE	
2	CONSTRUCT TYPE 1 CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. NO. 200	
3	CONSTRUCT CURB SIDEWALK PER CITY OF RIVERSIDE STD. NO. 325	
4	CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220	
5	CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304	
6	CONSTRUCT CATCH BASIN PER CITY OF RIVERSIDE STD. NO. 405	
7	CONSTRUCT 18" RCP (D-2000)	
8	CONSTRUCT FLARED END SECTION (CONNECTION TO RCP) PER DETAIL ON SHEET 2	
9	SAW CUT AND MATCH TO EXISTING PAVEMENT	
10	CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)	
11	CONSTRUCT BUS STOP TURNOUT 8" CONCRETE WITH REINFORCEMENT (WITH #3 BARS @ 18" O.C.), SEE DETAIL ON SHEET 2	
12	A.C OVERLAY, VARIABLE THICKNESS (0.1' MIN.)	
13	CONSTRUCT WHEELCHAIR RAMP, TYPE VII, PER CITY OF RIVERSIDE STD. NO. 304	
14	REMOVE EXISTING A.C. PAVEMENT	

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE.

MS 3936, I.P. 040011

NOTE:

WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY

NO BONDING WITH RIVERSIDE COUNTY WILL BE REQUIRED, HOWEVER, THE COUNTY WILL INSPECT PORTION OF CONSTRUCTION WITHIN UNINCORPORATED AREA.

APPROVED FOR CONSTRUCTION WITHIN THE COUNTY OF RIVERSIDE ONLY. (SHEETS 1, 2, 10 & 11)

SEAL—COUNTY

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:

KHALED A. OTHMAN, P.E. DATE 7/15/04

RECOMMENDED: WILL DOAN DATE 7/15/04

INDEX MAP

SCALE: 1" = 100'

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

REVIEW BY:
WESTERN MUNICIPAL WATER DISTRICT
FOR NON-INTERFERENCE COMPLIANCE
SHEET 1 THROUGH 11
CIVIL ENGINEER RCE 45212
DATE: 6/15/04

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — MARK W. WEBB — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED [signature] DATE 6-2-04
R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
1	ADD PAVEMENT SECTION	RJZ	4-17-06

DESIGNED BY: MAW CHECKED BY: LM

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	APPROVED BY	DATE
PRINCIPAL ENGINEER		8/25/04
PARK DEPARTMENT		8/25/04
TRAFFIC DIVISION	[signature]	8/25/04
STREET SERVICES		8/25/04
PLANNING DEPT.		8/25/04

APPROVED BY [signature] CITY ENGINEER DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361
INDEX SHEET

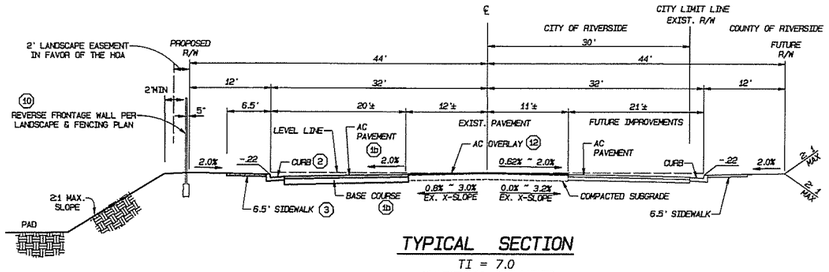
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ACCOUNT NO. 03-0340
DRAWING NUMBER **R-3777**
SHEET 1 OF 11
PW03-0473

FILE: G:\2003\03-0340\03034Opro PLOT DATE: 5/28/2004

Pc - 4405-S

INDEXED 9/9/04 LH

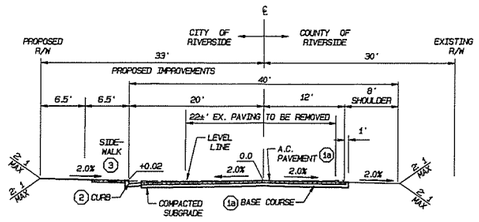


TYPICAL SECTION

TI = 7.0

BARTON STREET

NTS

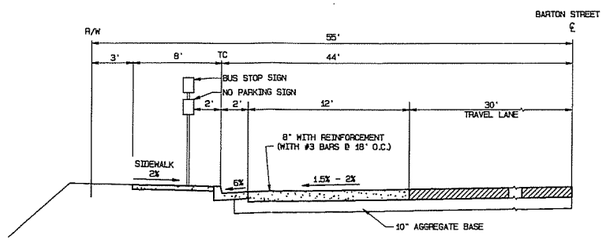


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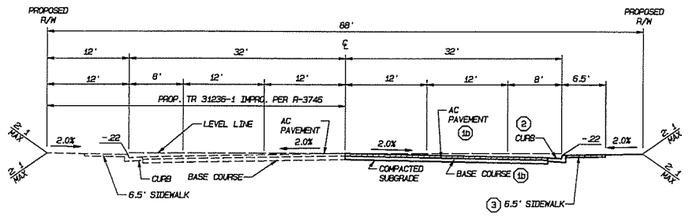
LURIN AVENUE – 105+97.18 TO 115+90.80

NTS



DETAIL "B"
BUS STOP TURNOUT

NOT TO SCALE

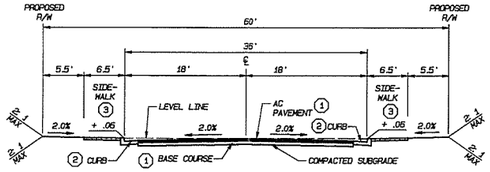


TYPICAL SECTION

TI = 7.0

KRAMERIA AVENUE

NTS

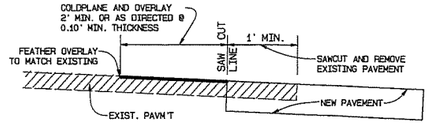


TYPICAL SECTION

TI = 5.0

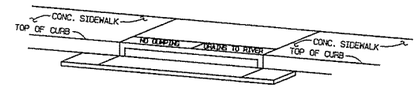
KINGS COURT & CAPITAN COURT – 13+01.98 TO 16+90.07

NTS



PAVEMENT JOIN DETAIL

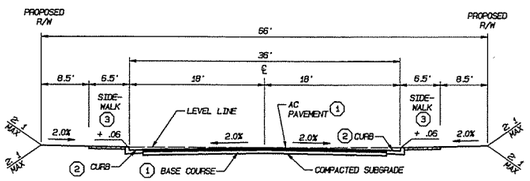
NTS



CATCH BASIN STENCILING DETAIL

N.T.S.

Ⓐ STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING DRAINS TO RIVER"
Ⓑ PLACE BOTH STENCILS CENTERED WITHIN THE CATCH BASIN OPENING AND WITHIN THE TOP OF THE CURB.
Ⓒ SPRAY BOTH STENCILS WITH WHITE PAINT.
Ⓓ REMOVE STENCILS WHEN PAINT IS DRY

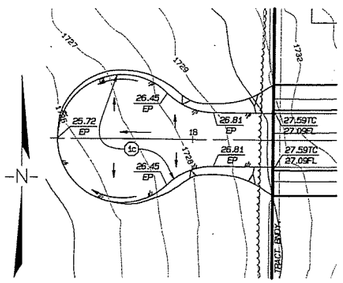


TYPICAL SECTION

TI= 5.0

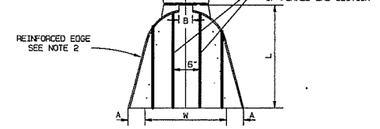
LONESTAR LANE, DILLON DRIVE, CALICO TRAIL, LAZY TRAIL & CAPITAN COURT – 10+00.00 TO 13+01.98

NTS

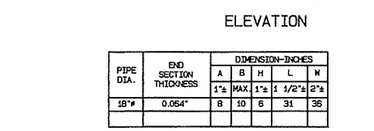


TEMPORAY FIRE ACCESS BULB DETAIL
LONESTAR LANE

SCALE: 1" 40'



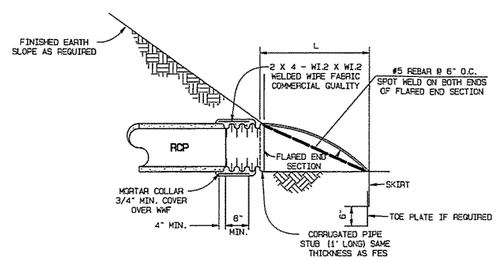
PLAN



ELEVATION

PIPE DIA.	END SECTION THICKNESS	DIMENSION-INCHES				
		A	B	H	L	W
		1"±	MAX	1"±	1 1/2"±	2"±
18"ø	0.054"	8	10	6	31	36

EQUIVALENT PLASTIC FES TO MEET AASHTO M-294 AND ASTM D-1248 SPECIFICATIONS



NOTES

1. ALL 3-PIECE BODIES TO HAVE 0.109" THICK SIDES AND 0.138" THICK CENTER PANELS, WIDTH OF CENTER PANELS TO BE GREATER THAN 20% OF THE PIPE PERIPHERY. MUTIPLE PANEL BODIES TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY RIVETS OR BOLTS.
2. REINFORCED EDGES TO BE SUPPLEMENTED WITH STIFFENER ANGLES FOR THE 60" THRU 84" ROUND, 77" X 52" AND 83" X 57" PIPE-ARCH SIZES. THE ANGLES WILL BE 2" X 2" X 1/4" FOR THE 60" THRU 72" ROUND, 77" X 52" AND 83" X 57" PIPE-ARCH SIZES AND 2" X 2 1/2"
3. ANGLES REINFORCEMENT SHALL BE PLACED UNDER THE CENTER PANEL SEAMS ON THE 77" X 52" AND 83" X 57" PIPE-ARCH SIZES.
4. TOE PLATE TO BE AVAILABLE AS AN ACCESSARY WHEN SPECIFIED.
5. END OF PIPE TO BE FINISHED WITH ANNULAR CORRUGATIONS TO CONFORM FLARED END SECTION SO THAT MINIMAL LEAKAGE RESULTS FROM THE CONNECTION. OTHER DESIGNS MAY BE USED WITH APPROVAL OF THE ENGINEER.
6. FOR 18" THRU 24" HELICAL END SECTION CONNECTION, A UNIVERSAL COUPLING BAND ATTACHED TO THE METAL END SECTION BY RIVETS, BOLTS OR ONE INCH LONG SHOP TACK WELDS SPACED AT SAME INTERVALS AS DIMPLES MAY BE USED IN PLACE OF THE 112" STUB SEE ST

FLARED END SECTION CONNECTION TO RCP

NOT TO SCALE

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE

MS 3936, I.P. 040011

FILE: G:\2003\03-0340\030340.dgn PLOT DATE: 5/28/2004

PC-4405

SEAL–COUNTY

REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN NO. 33950 EXP. 6-30-05 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:
KHALED A. OTHMAN, P.E. DATE 7/19/04
RECOMMENDED: WILLDAN DATE 7/15/04

DIGALERT

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

SEAL–ENGINEER

REGISTERED PROFESSIONAL ENGINEER ALBERT A. WEBB NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY _____ DATE 10-2-04
R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
1	ADD PAVEMENT SECTION	RVZ	10-7-05

DESIGNED BY: MAW CHECKED BY: LM

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		

APPROVED BY _____ CITY ENGINEER
DATE 8/25/04

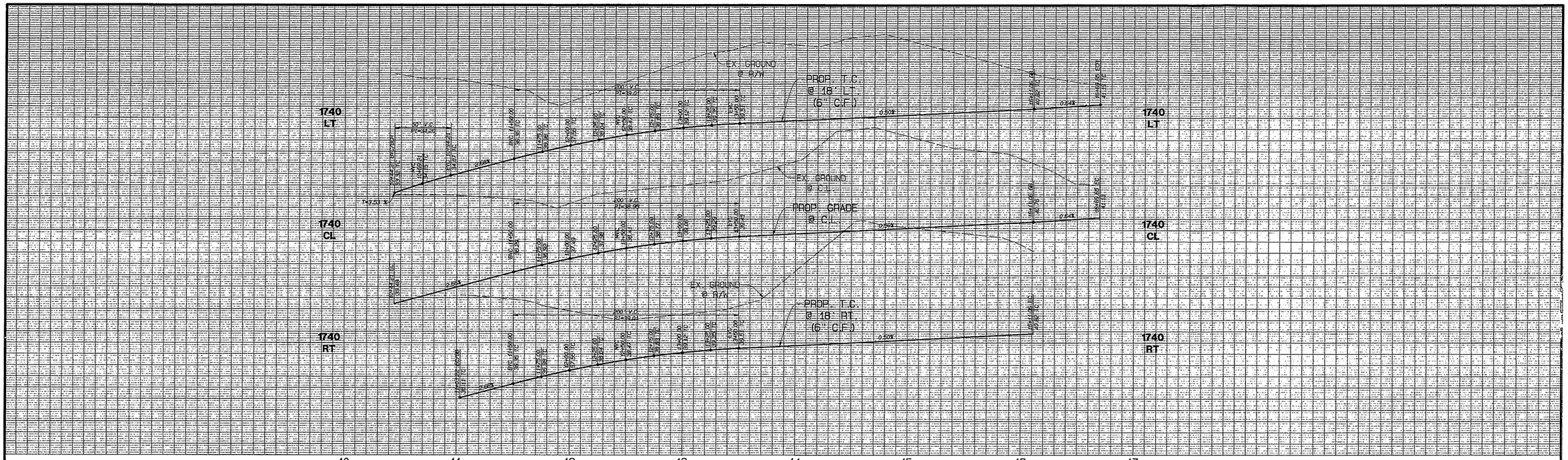
STREET IMPROVEMENT PLANS

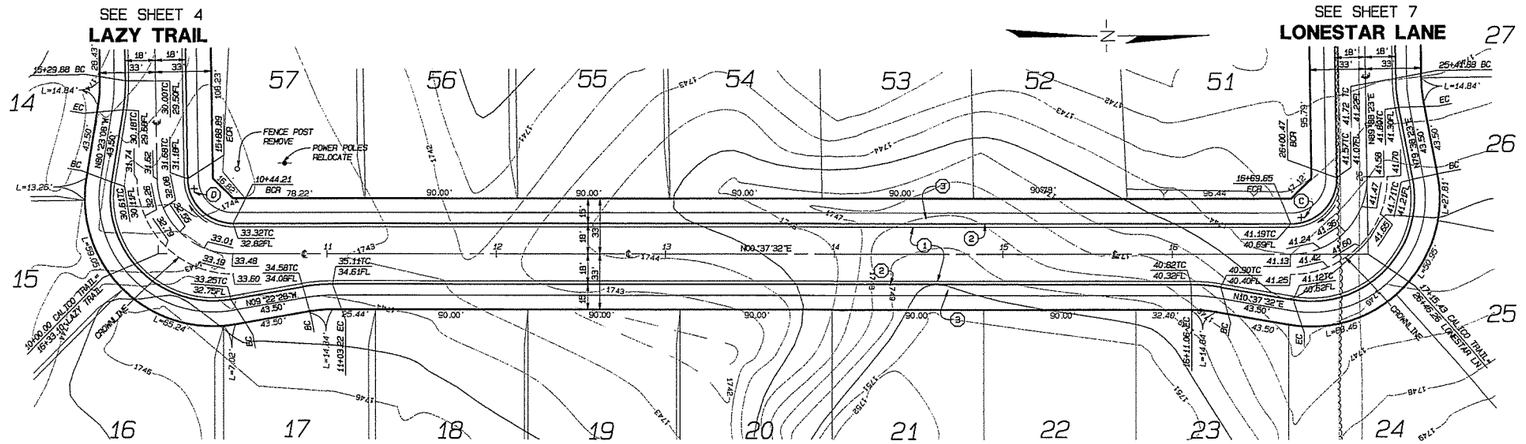
TRACT NO. 31361
SECTIONS & DETAILS

SCALE: AS SHOWN

ACCOUNT NO. 03-0340
DRAWING NUMBER
R-3777
SHEET 2 OF 11
PW03-0473

INDEXED 09/09/04 LH





CONSTRUCTION NOTES

1. CONSTRUCT 0.35' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R. 16.39 R= 40
2. CONSTRUCT TYPE 1 CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
5. CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304

⚠ CALICO TRAIL

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — HUA LIN McCAFFREY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY _____ DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	BY	DATE	APPR.
⚠1	ADD PAVEMENT SECTION	RJZ	10-7-05	

DESIGNED BY: MAW CHECKED BY: LM

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

	APPROVED BY	BY	DATE
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION			
STREET SERVICES			

APPROVED BY _____ CITY ENGINEER

DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361

CALICO TRAIL

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

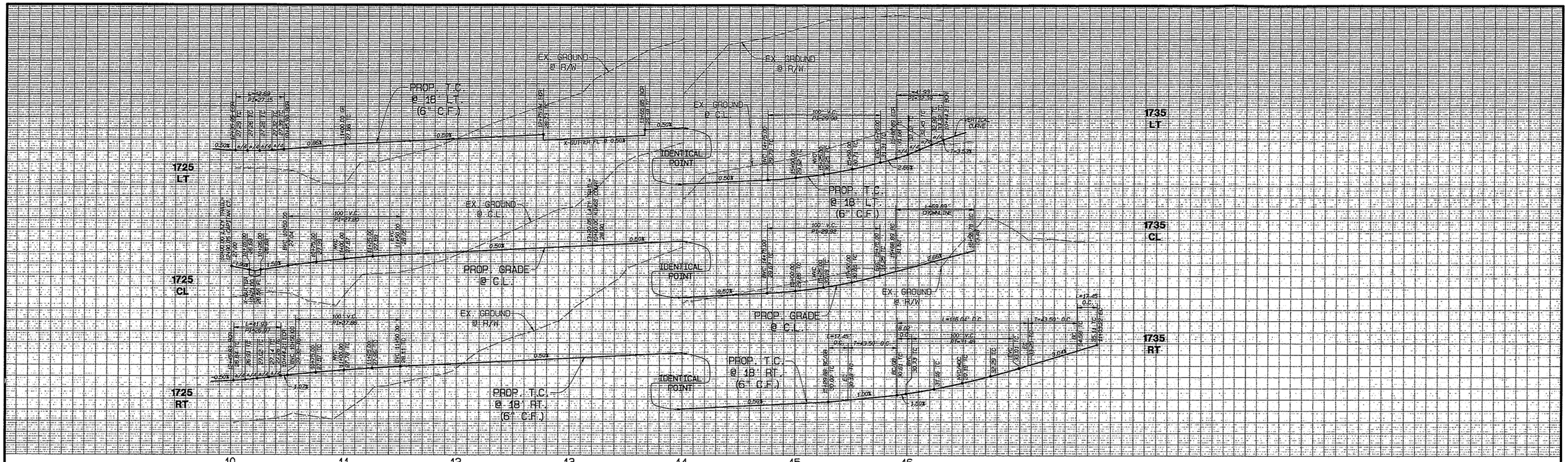
SHEET 3 OF 11

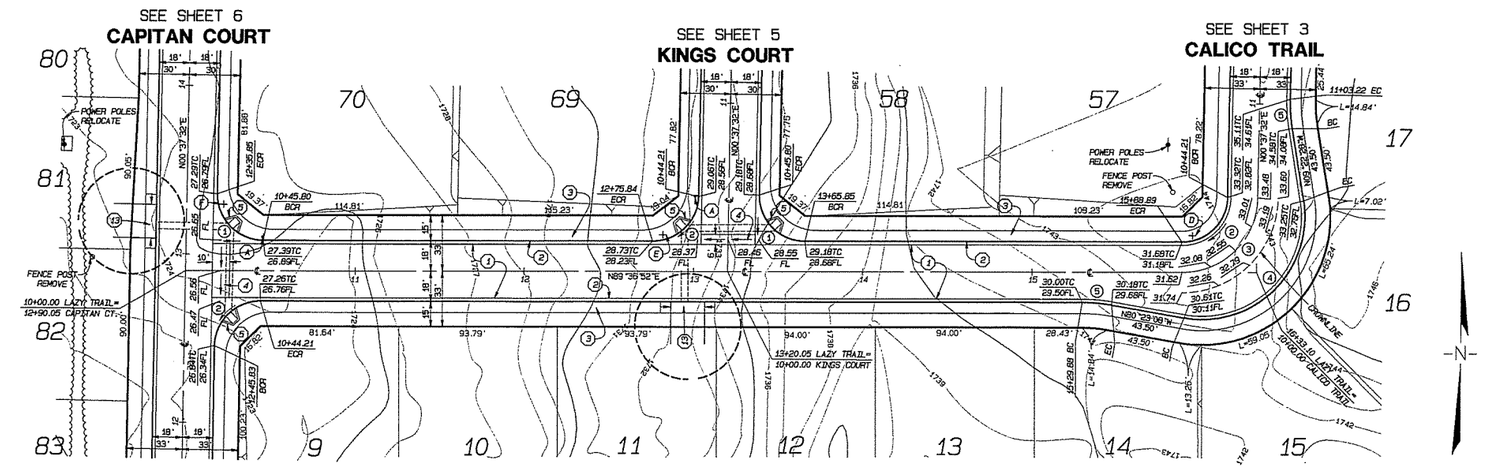
PW03-0473

FILE: G:\2003\03-0340\03030340.dgn PLOT DATE: 5/28/2004

PC - 440S - S

INDEXED 09/09/04 LH





CONSTRUCTION NOTES

1. CONSTRUCT 0.35' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R. 1653 R=40
2. CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
4. CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
5. CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304
13. CONSTRUCT WHEELCHAIR RAMP, TYPE VII, PER CITY OF RIVERSIDE STD. NO. 304

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	27.00'	42.69'	91°00'40"	27.48'
2	27.00'	41.93'	88°59'20"	26.53'
3	45.00'	69.89'	88°59'20"	44.21'
4	61.00'	116.04'	108°59'20"	86.50'
5	100.00'	17.45'	10°00'00"	8.75'

⚠ LAZY TRAIL

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

REGISTERED PROFESSIONAL ENGINEER — HUA LIN McCAFFREY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

APPROVED BY [signature] DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
⚠ 1	ADD PAVEMENT SECTION	RRZ	10-7-04

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

	APPROVED BY	BY	DATE
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION			
STREET SERVICES			

APPROVED BY [signature] CITY ENGINEER

DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361

LAZY TRAIL

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

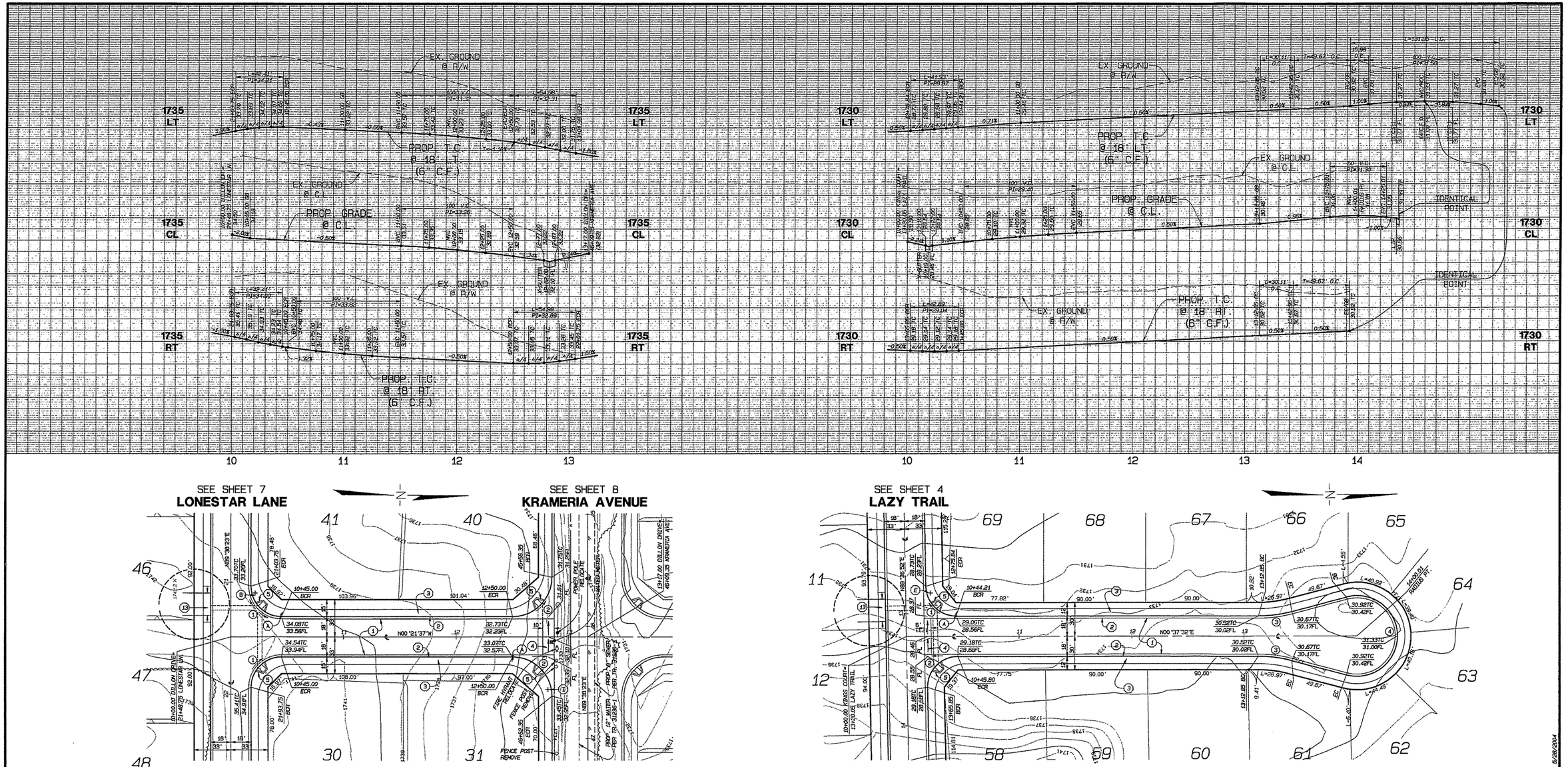
SHEET 4 OF 11

PW03-0473

FILE: G:\2003\03-0340\03340.prn PLOT DATE: 5/28/2004

PC - 4405 - 5

INDEXED 09/09/04 HH



DILLON DRIVE

⚠ KINGS COURT

CONSTRUCTION NOTES

⚠ (1) CONSTRUCT 0.25 A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.P. 116 R= 40

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325

(4) CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304

(10) CONSTRUCT WHEELCHAIR RAMP, TYPE VII, PER CITY OF RIVERSIDE STD. NO. 304

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	27.00'	42.41'	90°00'00"	27.00'
2	35.00'	54.98'	90°00'00"	35.00'

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	27.00'	41.33'	88°59'20"	26.53'
2	27.00'	42.89'	91°00'40"	27.48'
3	115.00'	30.11'	15°00'00"	15.14'
4	35.00'	131.95'	210°00'00"	

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

REGISTERED PROFESSIONAL ENGINEER — ALAN LIN MCCAFFREY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED BY [signature] DATE 6-2-04
R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
⚠	ADD PAVEMENT SECTION	RJZ	10-17-05

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		

APPROVED BY [signature] CITY ENGINEER
DATE 8/25/04

STREET IMPROVEMENT PLANS
TRACT NO. 31361
DILLON DRIVE & KINGS COURT

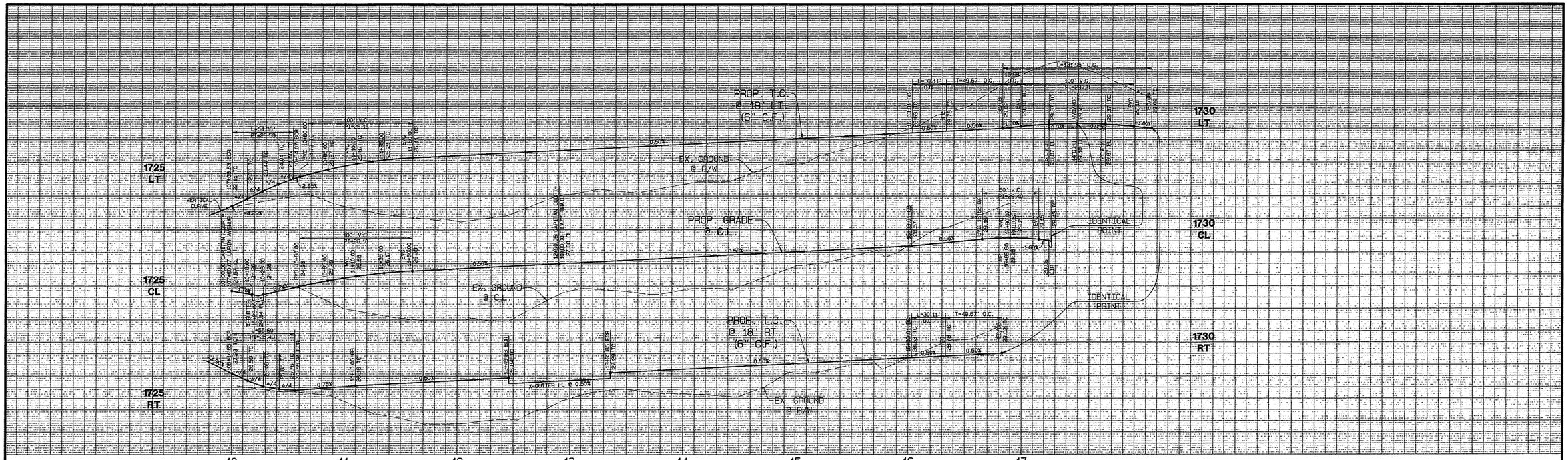
ACCOUNT NO. 03-0340
DRAWING NUMBER
R-3777
SHEET 5 OF 11

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'
PW03-0473

FILE: G:\2003\03-0340\03034pro.pro PLOT DATE: 11/28/2004

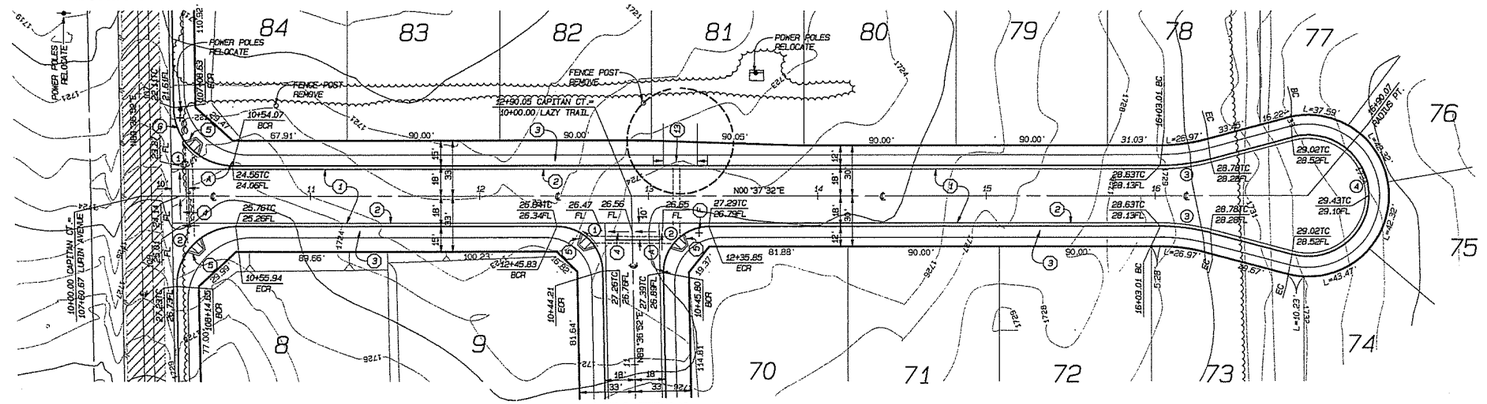
PC - 4405 - S

INDEXED 09/09/04 GH



SEE SHEET 7

LURIN AVENUE



SEE SHEET 4

⚠ CAPITAN COURT

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	35.00'	54.36'	88°59'20"	34.39'
2	35.00'	55.60'	91°00'40"	35.62'
3	115.00'	30.11'	15°00'00"	15.14'
4	36.00'	131.95'	210°00'00"	

CONSTRUCTION NOTES

⚠ (1) CONSTRUCT 0.25' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R. 1a,5a R=40

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"). PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK. PER CITY OF RIVERSIDE STD. NO. 325

(4) CONSTRUCT CROSS GUTTER. PER CITY OF RIVERSIDE STD. NO. 220

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1. PER CITY OF RIVERSIDE STD. NO. 304

(10) CONSTRUCT WHEELCHAIR RAMP, TYPE VII. PER CITY OF RIVERSIDE STD. NO. 304

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — MARTIN MCCRAY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY _____ DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	BY	APPR.	DATE
⚠	ADD PAVEMENT SECTION	RFZ		10-17-06

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

	BY	DATE
APPROVED BY		
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		

APPROVED BY _____ CITY ENGINEER DATE 3/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361

CAPITAN COURT

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

SHEET 6 OF 11

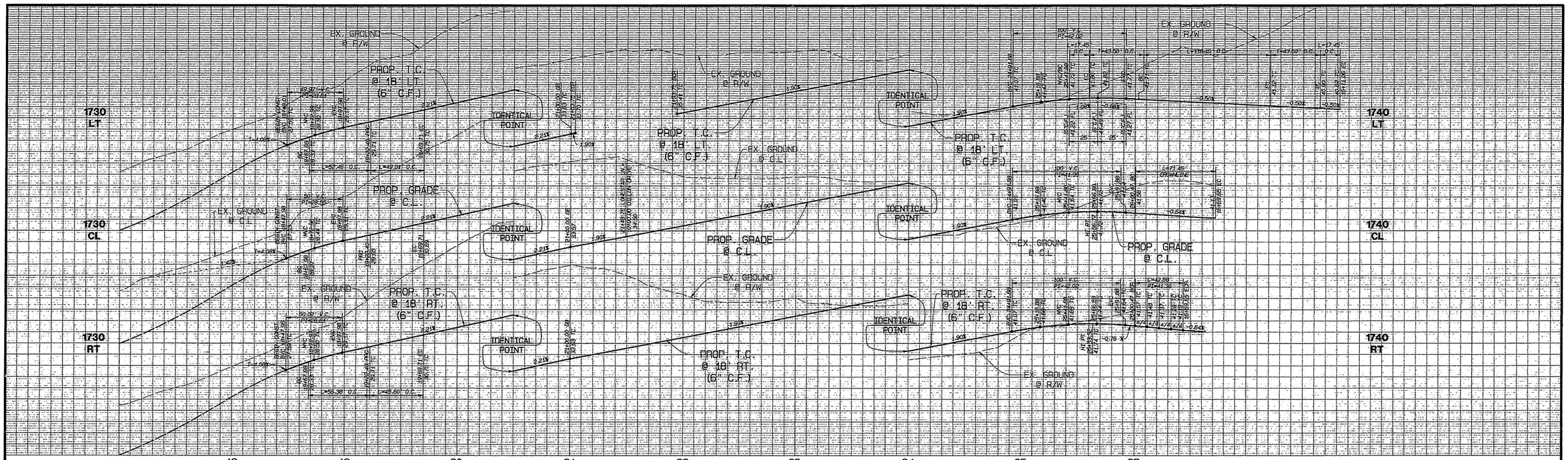
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PW03-0473

INDEXED 09/09/04 LH

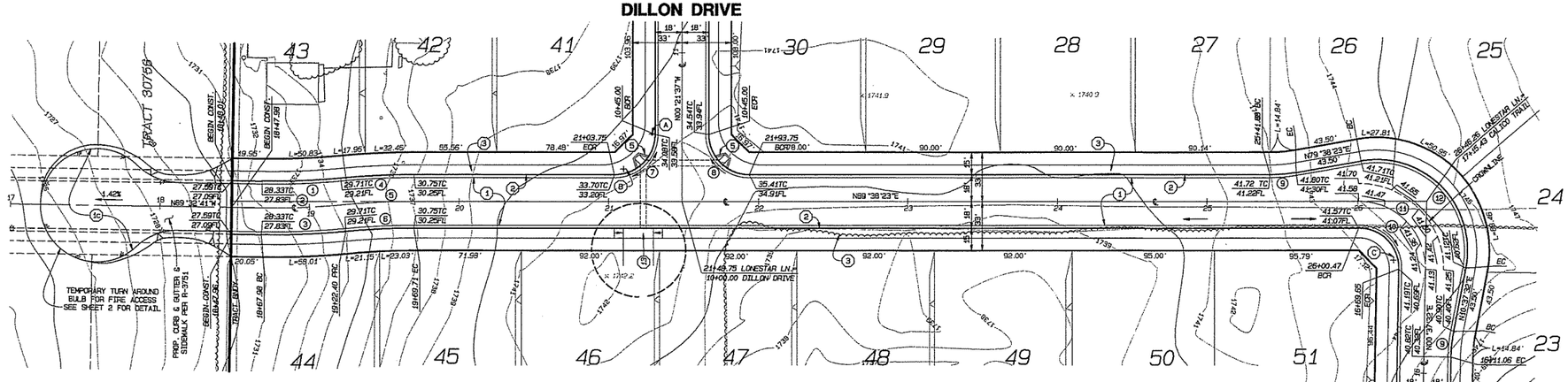
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PC - 440 S



SEE SHEET 5

DILLON DRIVE



CONSTRUCTION NOTES

1. CONSTRUCT 0.25' A.C. PAVING OVER 0.56' CRUSHED AGGREGATE BASE PER S.R. 1995 R-40
1c. CONSTRUCT 0.25' A.C. OVER NATIVE
2. CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
5. CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304
19. CONSTRUCT WHEELCHAIR RAMP, TYPE VII, PER CITY OF RIVERSIDE STD. NO. 304

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	482.00'	52.46'	6°14'11"	26.26'
2	500.00'	54.42'	6°14'11"	27.24'
3	518.00'	56.38'	6°14'11"	28.22'
4	518.00'	49.01'	5°25'14"	24.52'
5	500.00'	47.30'	5°25'14"	23.67'
6	482.00'	45.60'	5°25'14"	22.82'
7	27.00'	42.41'	90°00'00"	27.00'
8	27.00'	42.41'	90°00'00"	27.00'
9	100.00'	17.45'	10°00'00"	8.75'
10	27.00'	42.89'	90°59'09"	27.47'
11	45.00'	71.46'	90°59'09"	45.78'
12	61.00'	118.16'	110°59'09"	88.73'

LONESTAR LANE

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — JOHN LIN MCCARTHY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY [signature] DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
1	ADD PAVEMENT SECTION	RLC	10-17-04

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

	APPROVED BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		

APPROVED BY [signature] CITY ENGINEER

DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361

LONESTAR LANE

STA. 18+47.98 TO STA. 26+46.26

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

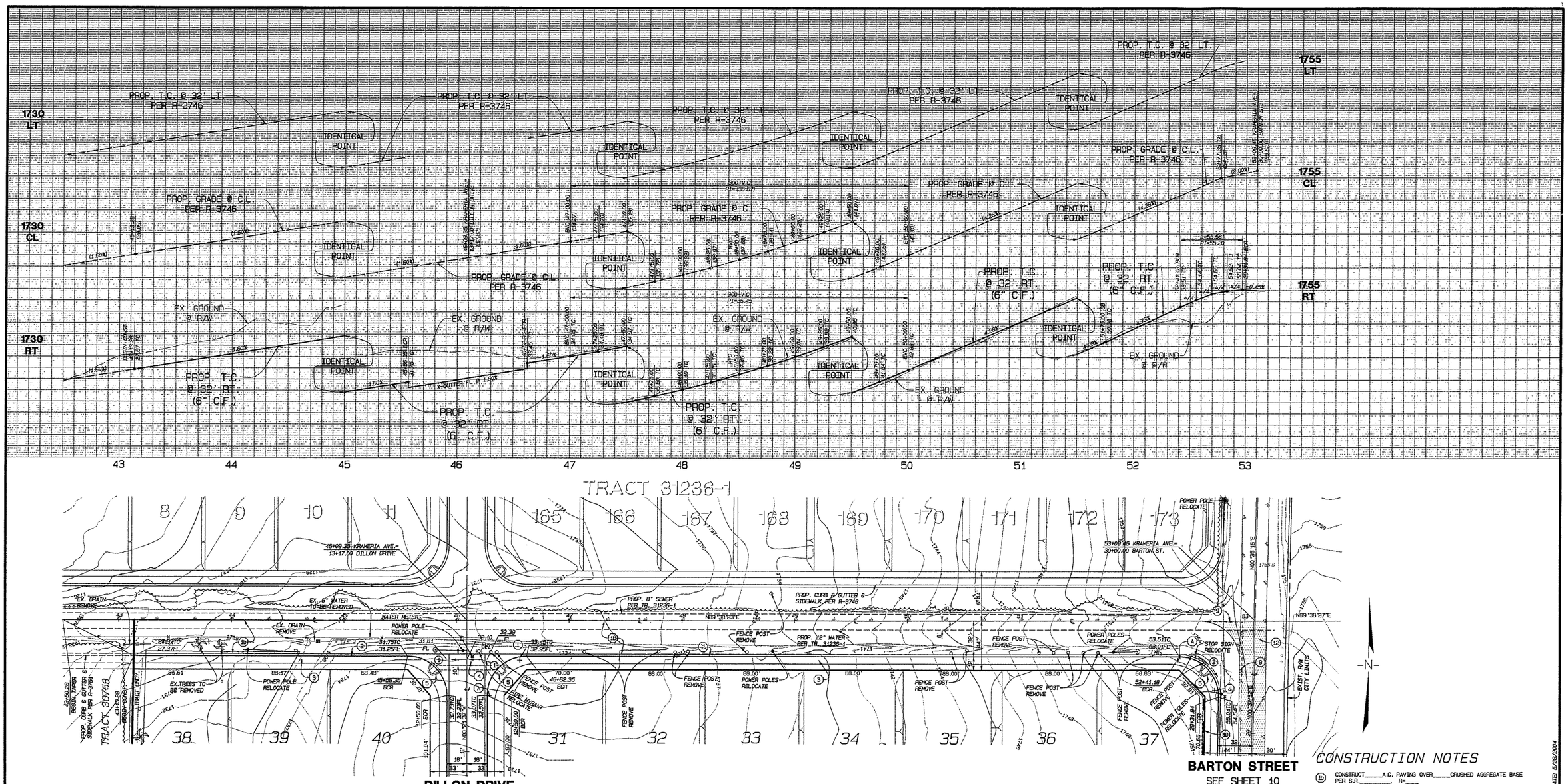
SHEET 7 OF 11

PW03-0473

FILE: G:\2003\03-0340\03340.dgn PLOT DATE: 5/28/2004

Pc - 4405-5

INDEXED 09/09/04 LH



CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	35.00'	54.98'	90°00'00"	35.00'
2	35.00'	55.58'	90°59'09"	35.51'

CONSTRUCTION NOTES

(1b) CONSTRUCT_____A.C. PAVING OVER_____CRUSHED AGGREGATE BASE PER S.R._____, R=____

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325

(4) CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304

(9) SAW CUT AND MATCH TO EXISTING PAVEMENT

(10) CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)

(12) A.C OVERLAY, VARIALBE THICKNESS (0.1' MIN.)

KRAMERIA AVENUE

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — LEE A. MARTIN — No. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY [signature] DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		
PLANNING DEPT.		

APPROVED BY [signature] CITY ENGINEER DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361
KRAMERIA AVENUE
STA. 43+13.28 TO STA. 53+09.46

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

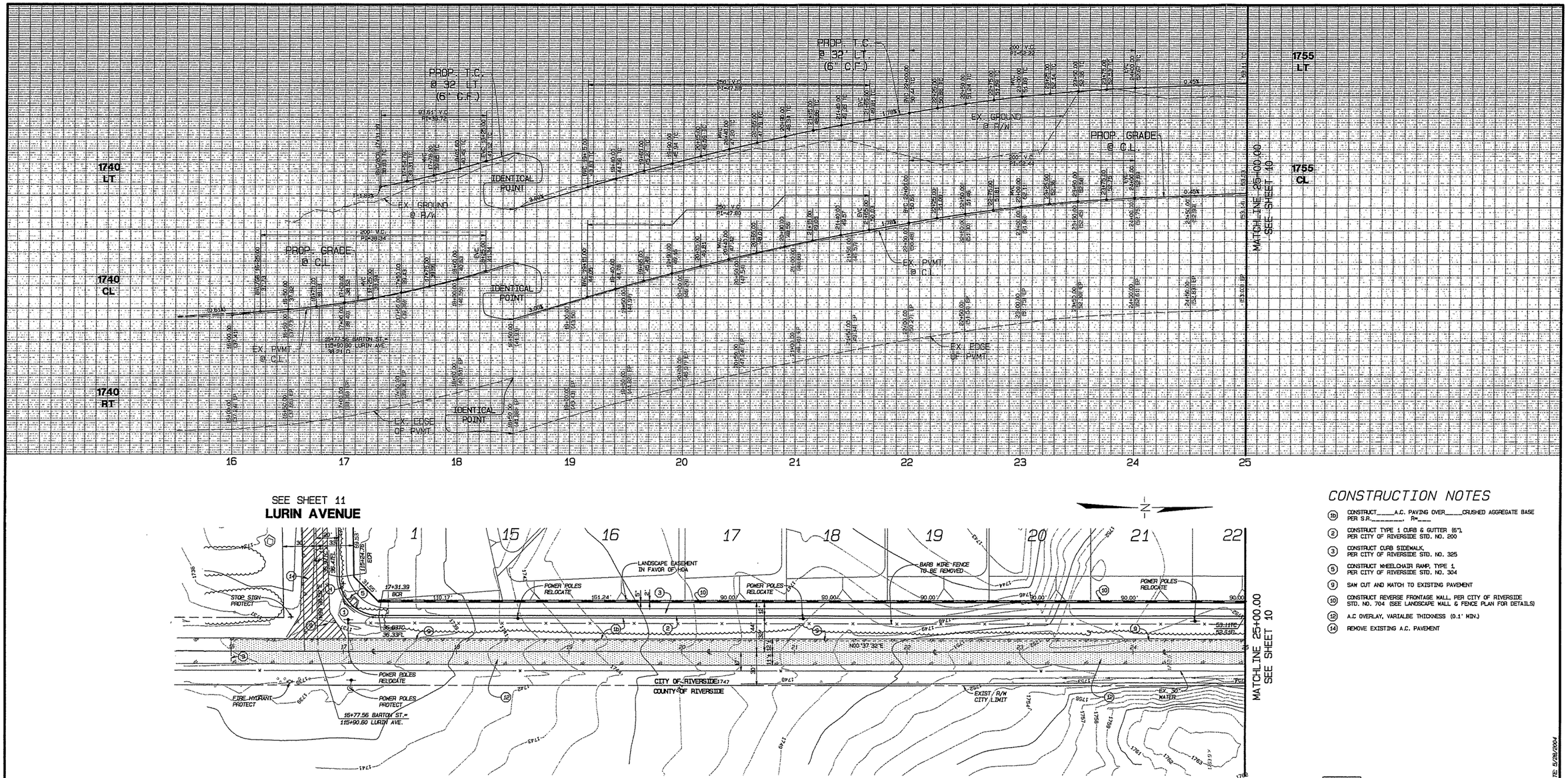
SHEET 8 OF 11

PW03-0473

FILE: G:\2003\03-0340\03340.prp PLOT DATE: 5/28/2004

PC - 440 S - S

INDEXED 09/09/04 LH



CONSTRUCTION NOTES

(19) CONSTRUCT_____A.C. PAVING OVER_____CRUSHED AGGREGATE BASE PER S.R._____, R=____

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304

(9) SAW CUT AND MATCH TO EXISTING PAVEMENT

(10) CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)

(12) A.C OVERLAY, VARIALBE THICKNESS (0.1' MIN.)

(14) REMOVE EXISTING A.C. PAVEMENT

— A.C. PAVEMENT OVERLAY

— EXISTING A.C. PAVEMENT REMOVAL

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	35.00'	54.36'	88°59'20"	34.39'

DIGALERT

DIAL BEFORE YOU DIG — TOLL FREE — TWO WORKING DAYS BEFORE YOU DIG

A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT 1-800-227-2600

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS

CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED BY _____ DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	BY	DATE
APPROVED BY		
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		
PLANNING DEPT.		

APPROVED BY _____ CITY ENGINEER

DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361
BARTON STREET
STA. 16+00.00 TO STA. 25+00.00

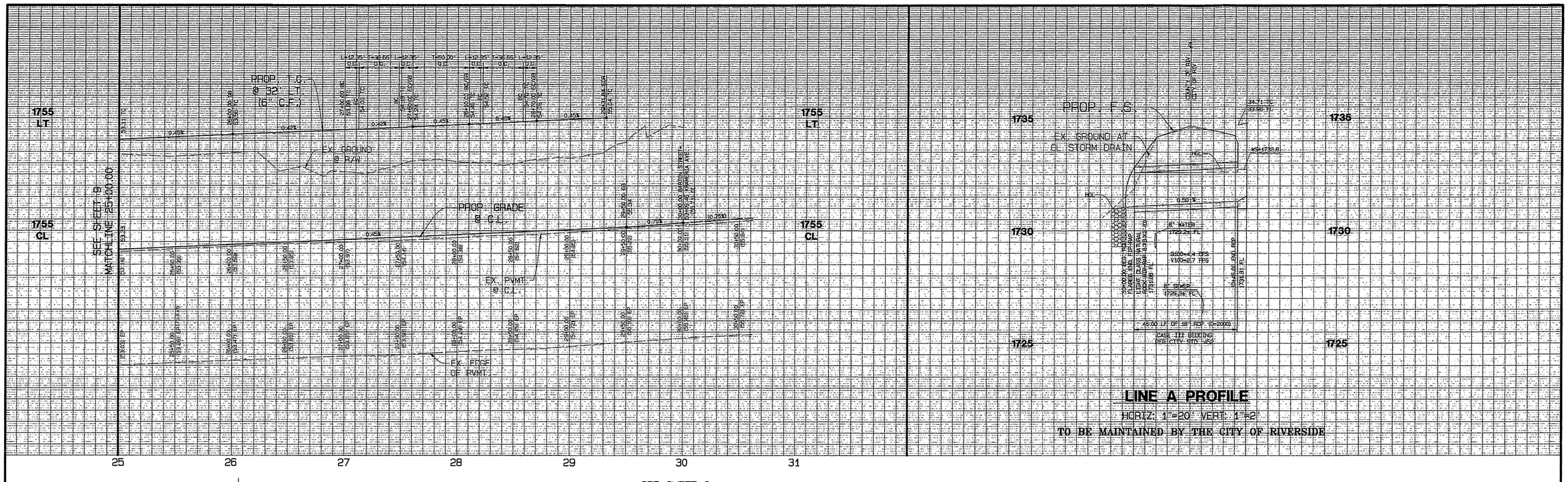
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340
DRAWING NUMBER
R-3777
SHEET 9 OF 11
PW03-0473

FILE: G:\2003\03-0340\03034Opro PLOT DATE: 5/28/2004

Pc - 446 - S

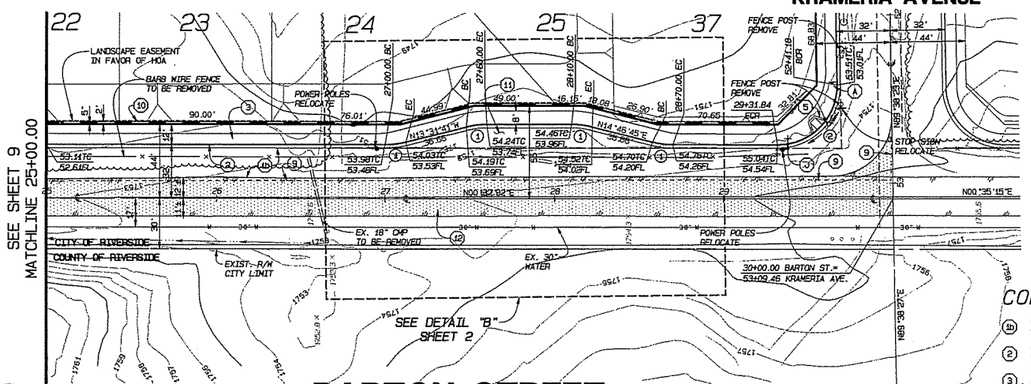
INDEXED 09/09/04 GH



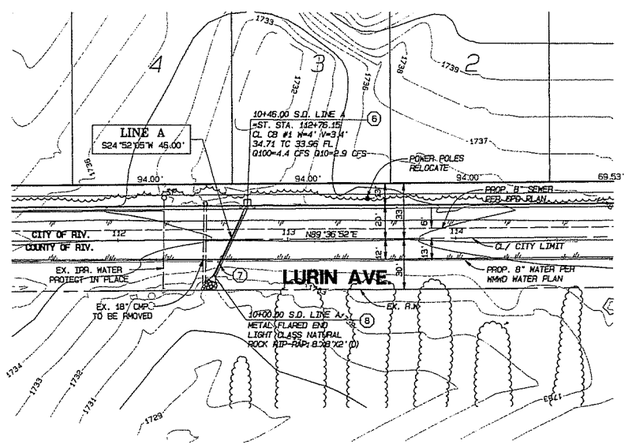
LINE A PROFILE

HORIZ. 1"=20' VERT. 1"=2'

TO BE MAINTAINED BY THE CITY OF RIVERSIDE



BARTON STREET



STORM DRAIN LINE A

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	50.00'	12.36'	14°09'13"	6.21'
2	35.00'	55.56'	90°59'09"	35.61'

CONSTRUCTION NOTES

(10) CONSTRUCT_____A.C. PAVING OVER_____CRUSHED AGGREGATE BASE PER S.R._____, R#_____

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304

(6) CONSTRUCT CATCH BASIN PER CITY OF RIVERSIDE STD. NO. 405

(7) CONSTRUCT 18" RCP (D-2000)

(8) CONSTRUCT METAL FLARED END SECTION PER DETAIL ON SHEET 2

(9) SAW CUT AND MATCH TO EXISTING PAVEMENT

(10) CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)

(11) CONSTRUCT BUS STOP TURNOUT 8" CONCRETE WITH REINFORCEMENT (WITH #3 BARS @ 18" O.C.), SEE DETAIL ON SHEET 2

(12) A.C OVERLAY, VARIALBE THICKNESS (0.1' MIN.)

— A.C. PAVEMENT OVERLAY

— EXISTING A.C. PAVEMENT REMOVAL

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE

MS 3936, I.P. 040011

SEAL–COUNTY

REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN NO. 33950 EXP. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:

KHALED A. OTHMAN, P.E. — DATE 7/19/04

RECOMMENDED: WILLDAN — DATE 7/15/04

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

BENCH MARK: SEAL–COUNTY

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

SEAL–ENGINEER

REGISTERED PROFESSIONAL ENGINEER MARK A. WEDDINGTON NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED BY _____ DATE 6-2-04
R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK | REVISIONS | APPR. | DATE

DESIGNED BY: MAW CHECKED BY: L.M.

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	APPROVED BY	BY	DATE
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION			
STREET SERVICES			
PLANNING DEPT.			

APPROVED BY _____ CITY ENGINEER DATE 8/25/04

STREET IMPROVEMENT PLANS

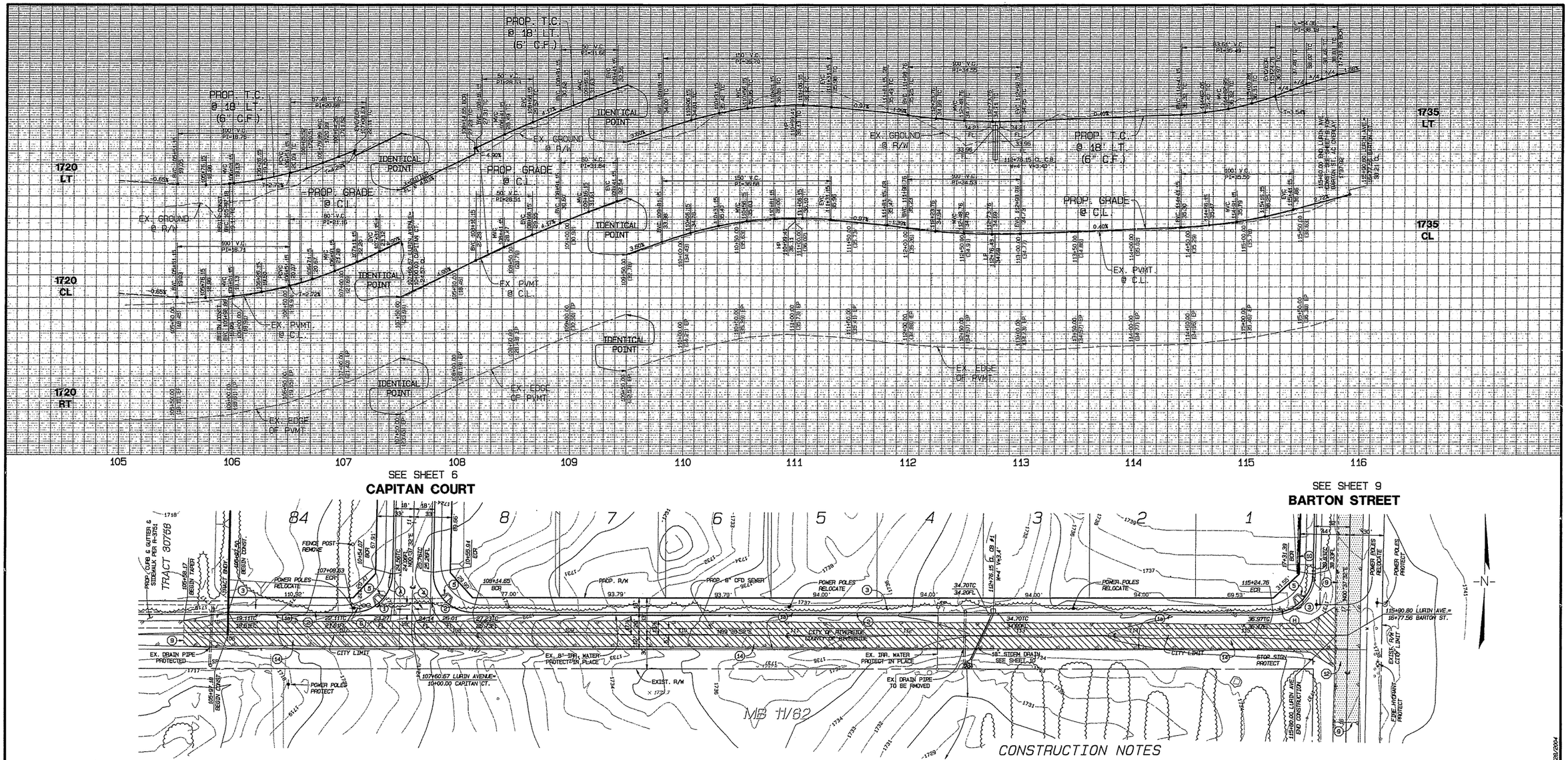
TRACT NO. 31361
BARTON STREET
STA. 25+00.00 TO STA. 30+00.00

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340
DRAWING NUMBER
R-3777
SHEET 10 OF 11
PW03-0473

FILE: G:\2003\03-0340\02PAD\Pc - 4405 - S PLOT DATE: 8/26/2004

INDEXED 09/09/04 GH



CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	35.00'	54.36'	88°59'20"	34.39'
2	35.00'	55.50'	91°00'40"	35.62'
3	35.00'	54.36'	88°59'20"	34.39'

CONSTRUCTION NOTES

(1a) CONSTRUCT 0.33' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.P.700013, R=30, ALSO SEE COUNTY GENERAL NOTES 4
(2) CONSTRUCT TYPE 1 CURB & GUTTER (6") PER CITY OF RIV. STD. NO. 200
(3) CONSTRUCT CURB SIDEWALK PER CITY OF RIV. STD. NO. 325
(4) CONSTRUCT CROSS GUTTER PER CITY OF RIVERSIDE STD. NO. 220
(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1 PER CITY OF RIV. STD. NO. 304
(9) SAW CUT AND MATCH TO EXISTING PAVEMENT PER JOIN DETAIL ON SHEET 2
(10) CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)
(12) A.C OVERLAY, VARIABLE THICKNESS (0.1' MIN.)
(14) REMOVE EXISTING A.C. PAVEMENT

A.C. PAVEMENT OVERLAY
EXISTING A.C. PAVEMENT REMOVAL

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE

LURIN AVENUE

MS 3936, I.P. 040011

SEAL—COUNTY

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:
KHALED A. OTHMAN, P.E. DATE 7/19/04
RECOMMENDED: WILLDAN DATE 7/15/04

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

SEAL—ENGINEER

ALBERT A. WEBB ASSOCIATES ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED BY [signature] DATE 6-2-04
R.C.E. NO. 49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE	APPROVED BY
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION			CITY ENGINEER
STREET SERVICES			
PLANNING DEPT.			DATE

STREET IMPROVEMENT PLANS
TRACT NO. 31361
LURIN AVENUE

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

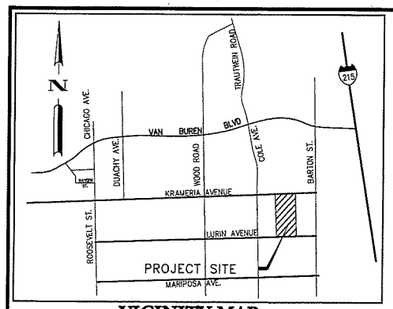
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DRAWING NUMBER R-3777
SHEET 11 OF 11
PW03-0473

FILE: G:\2003\03-0340\03340.dgn PLOT DATE: 5/28/2004

PC - 440 S - S

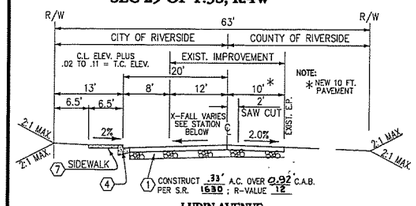
INDEXED 09/09/04 GH

STREET IMPROVEMENT PLANS
TRACT NO. 30756
CITY OF RIVERSIDE, CALIFORNIA



VICINITY MAP

SEC 29 OF T.3S, R.4W

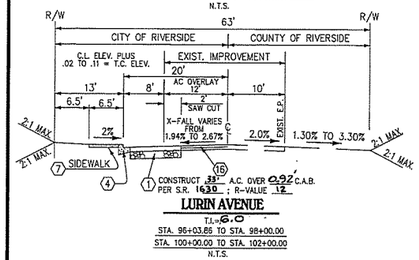


LURIN AVENUE

T.I.=6.0

STA. 95+03.86 TO STA. 98+03.86 @ 2.0%
STA. 98+00.00 TO STA. 100+00.00 @ 1.97 TO 2.69%
STA. 102+00.00 TO STA. 107+00.00 @ 1.97% *

N.T.S.

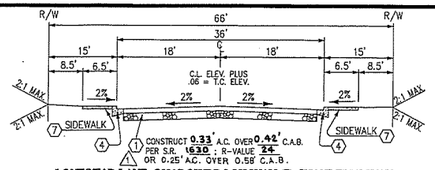


LURIN AVENUE

T.I.=6.0

STA. 95+03.86 TO STA. 98+00.00
STA. 100+00.00 TO STA. 102+00.00

N.T.S.

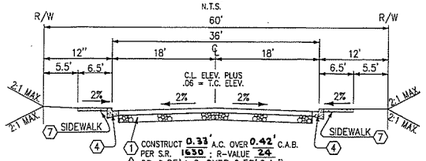


LONESTAR LANE, SHADOWBROOK WAY & CHANDELLE WAY
ESTRELLA HILLS ST. & COUNTRY ROSE DRIVE

COUNTRY ROSE DRIVE= STA. 8+53.00 TO 10+00.00

T.I.=5.0

N.T.S.

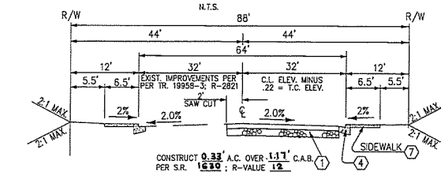


COUNTRY ROSE DRIVE
MERIDIANA COURT

COUNTRY ROSE DR. STA. 10+00.00 TO STA.15+89.63

T.I.=5.0

N.T.S.

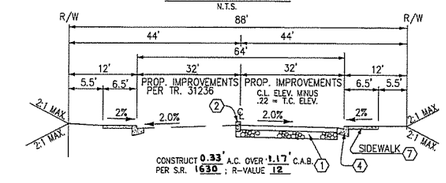


KRAMERIA AVENUE

T.I.=7.0

STA. 33+18.53 TO STA. 38+29.65

N.T.S.



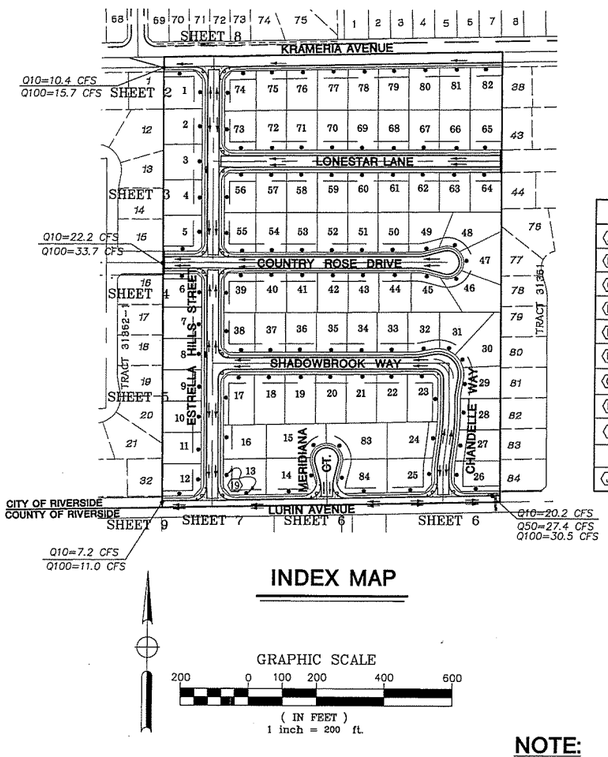
KRAMERIA AVENUE

T.I.=7.0

STA. 38+29.65 TO STA. 43+14.29

N.T.S.

TYPICAL STREET SECTION



INDEX MAP

GRAPHIC SCALE

200 0 100 200 400 600

(IN FEET)
1 inch = 200 ft.

STREET SIGN SCHEDULE

(A)	KRAMERIA AVENUE ESTRELLA HILLS STREET	19600 9400
(B)	LONESTAR LANE ESTRELLA HILLS STREET	19600 9400
(C)	COUNTRY ROSE DRIVE ESTRELLA HILLS STREET	19600 9500
(D)	COUNTRY ROSE DRIVE ESTRELLA HILLS STREET	19600 9500
(E)	SHADOWBROOK WAY ESTRELLA HILLS STREET	19600 9500
(F)	CHANDELLE WAY LURIN AVENUE	9500 19700
(G)	MERIDIANA COURT LURIN AVENUE	9500 19600
(H)	SHADOWBROOK WAY CHANDELLE WAY	19600 9500
(I)	LURIN AVENUE ESTRELLA HILLS STREET	19600 9500
(J)	R-1 (STOP SIGN – 30")	8

INSTALL SIGNS PER CITY OF RIVERSIDE STANDARDS 662, 662A & 666

GENERAL NOTES

1. NO PERSON SHALL PERFORM ANY CONSTRUCTION ACTIVITY OR INSTALL ANY OBJECTS WITHIN THE PUBLIC RIGHT-OF-WAY OR EASEMENTS OF THE CITY OF RIVERSIDE WITHOUT A VALID CONSTRUCTION PERMIT OR A STREET OPENING PERMIT OR AN ENCROACHMENT PERMIT ISSUED BY THE CITY'S PUBLIC WORKS DEPARTMENT.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAR THE RIGHT-OF-WAY IN ACCORDANCE WITH THE PROVISIONS OF LAW AS IT AFFECTS EACH UTILITY INCLUDING IRRIGATION LINES AND APPURTENANCES AND AT NO COST TO THE CITY.
3. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF RIVERSIDE DEPARTMENT OF PUBLIC WORKS, STANDARD DRAWINGS, ITS SUPPLEMENTAL NOTES AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION.
4. THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.
5. THE DEVELOPER SHALL BE RESPONSIBLE FOR PRESERVING OR REESTABLISHING AND REFERENCING SURVEY MONUMENT DESTROYED, DISTURBED OR BURIED AS A RESULT OF CONSTRUCTION SHOWN HEREON.
6. ALL FLAGGED ELEVATIONS SHALL BE STAKED IN THE FIELD BY THE PRIVATE ENGINEER.
7. WHERE NEW PAVEMENT IS TO JOIN THE EXISTING PAVEMENT, THE EDGE OF THE EXISTING PAVEMENT SHALL BE TRIMMED IN A SMOOTH AND STRAIGHT LINE. CONSTRUCT MATCH-UP PAVING AS SHOWN ON THE PLANS AND OVERLAY PAVING AS DIRECTED IN THE FIELD TO PRODUCE A SMOOTH SECTION.
8. THE SUBDIVIDER SHALL ARRANGE FOR A SOIL TEST TO BE MADE BY A SOILS ENGINEER AFTER THE STREET HAVE BEEN PREPARED TO ROUGH GRADE AND PRIOR TO CURB AND GUTTER CONSTRUCTION. DEPTH OF BASE MATERIAL AND A.C. PAVING SHALL BE DETERMINED BY THE CITY OF RIVERSIDE DESIGN STANDARDS AND TEST PROCEDURES.
9. ON ALL AREAS WITHIN PUBLIC RIGHT-OF-WAY WHERE THE FILL IS ONE (1) FOOT OR GREATER, A LETTER WILL BE REQUIRED FROM THE SOILS ENGINEER, CERTIFYING THE COMPACTION OF THE FILL BELOW SUBGRADE, PRIOR TO ISSUANCE OF THE CONSTRUCTION PERMIT/CUT SHEETS.
10. ALL TRAFFIC SIGNS SHALL BE INSTALLED PRIOR TO OPENING THE STREETS TO TRAFFIC.
11. ANY TRAFFIC CONTROL STRIPING OBLITERATED AND/OR BADLY WORN DURING CONSTRUCTION SHALL BE RESTORED BY THE CONTRACTOR WITHIN FIVE DAYS AFTER NOTIFICATION FROM THE CITY INSPECTORS.
12. FINAL STRIPING FOR TRAFFIC CONTROL AND/OR PAVEMENT MARKING TO BE THE RESPONSIBILITY OF THE CONTRACTOR.
13. THE CONTRACTOR SHALL CALL IN A LOCATION REQUEST TO UNDERGROUND SERVICE ALERT (USA), PHONE # 1-800-227-2600, TWO WORKING DAYS BEFORE DIGGING. NO CONSTRUCTION PERMIT WILL BE ISSUED BY THE PUBLIC WORKS DEPARTMENT INVOLVING EXCAVATION FOR UNDERGROUND FACILITIES UNLESS THE APPLICANT HAS BEEN PROVIDED AN INQUIRY IDENTIFICATION NUMBER BY U.S.A.
14. THE CONTRACTOR SHALL COORDINATE TRENCHING FOR CABLE TELEVISION WITH OTHER TRENCHING WITHIN THE SUBDIVISION.
15. CONSTRUCT DRIVEWAY APPROACHES PER STANDARD DWG. 302. EXACT SIZE AND LOCATION TO BE STAKED BY THE PRIVATE ENGINEER PRIOR TO CONSTRUCTION OF THE CURB AND GUTTER.
16. BEFORE THE RIPRAP AT THE OUTLET OF ANY DRAINAGE STRUCTURE IS ACCEPTED BY THE CITY, IT SHALL BE UNDER FLOWS AS CLOSE AS POSSIBLE TO DESIGN CONDITIONS WITH WATER OBTAINED FROM THE FIRE HYDRANTS IN THE IMMEDIATE AREA.

COUNTY GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER OR CONTRACTOR TO APPLY TO THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT, PERMIT SECTION, FOR AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE; AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT. ADDITIONAL STUDIES AND/OR PERMITS MAY BE REQUIRED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITEE MUST INFORM COUNTY OF CONSTRUCTION AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.
   PHONE: (909) 955-6885
3. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE RIVERSIDE COUNTY TRANSPORTATION DEPT. IMPROVEMENT STANDARDS AND SPECIFICATIONS, LATEST EDITION, COUNTY ORDINANCE NO. 461 AND SUBSEQUENT AMENDMENTS.
4. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO NOTIFY THE ENGINEER TO INSTALL STREET CENTERLINE MONUMENTS AS REQUIRED BY RIVERSIDE COUNTY ORDINANCE NO. 461.
5. ALL UNDERGROUND FACILITIES, WITH LATERALS, SHALL BE IN PLACE PRIOR TO PAVING THE STREET INCLUDING, BUT NOT LIMITED TO THE FOLLOWING: SEWER, WATER, ELECTRIC, GAS STORM DRAINS.
6. ASPHALTIC EMULSION (FOG SEAL) SHALL BE APPLIED NOT LESS THAN FOURTEEN DAYS FOLLOWING PLACEMENT OF THE ASPHALT SURFACING. FOG SEAL AND PAINT BINDER SHALL BE APPLIED AT A RATE OF 0.05 & 0.03 GALLON PER SQUARE YARD RESPECTIVELY. ASPHALTIC EMULSION SHALL CONFORM TO SECTION 37, 39 AND 94 OF THE STATE STANDARD SPECIFICATIONS.
7. AS DETERMINED BY THE TRANSPORTATION DIRECTOR, THE DEVELOPER IS RESPONSIBLE AS A MINIMUM FOR ROAD IMPROVEMENTS TO CENTERLINE, AND MAY BE REQUIRED TO RECONSTRUCT EXISTING PAVEMENT, INCLUDING BASE, AND MATCHING OVERLAY REQUIRED TO MEET THE STRUCTURAL STANDARDS FOR THE CURRENT ASSIGNED TRAFFIC INDEX."
8. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR DEVELOPER TO INSTALL AND MAINTAIN ALL CONSTRUCTION, REGULATORY, GUIDE AND WARNINGS SIGNS WITHIN THE PROJECT LIMITS AND ITS SURROUNDINGS TO PROVIDE SAFE PASSAGE FOR THE TRAVELING PUBLIC AND WORKERS UNTIL THE FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT BY THE COUNTY.
   A TRAFFIC CONTROL PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO OBTAINING AN ENCROACHMENT PERMIT.
9. ALL STREET SECTIONS ARE TENTATIVE. ADDITIONAL SOIL TESTS SHALL BE TAKEN BY THE COUNTY AFTER ROUGH GRADING TO DETERMINE THE EXACT STREET SECTION REQUIREMENTS. USE STANDARD NO. 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
10. STREET LIGHTS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED STREET LIGHTING PLAN PER CITY OF RIVERSIDE APPROVED STREET LIGHTING PLAN.

CONSTRUCTION NOTES & QUANTITY ESTIMATE

NO.	ITEMS	QUANTITY	UNIT
(1)	CONSTRUCT PAVING SECTION PER TYPICAL SECTION	98,204	SF
(2)	INSTALL REDWOOD HEADER	485	LF
(3)	CONSTRUCT 2' WIDE, 20' LONG @ 2 1/2" THICK AC DRAINAGE APRON	8.4	SF
(4)	CONSTRUCT TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DWG. NO 200	9,302	LF
(5)	CONSTRUCT CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=PER PLAN)	6,721	SF
(6)	CONSTRUCT ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304,TYPE PER PLAN	19	EA
(7)	CONSTRUCT SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325	48,672	SF
(8)	INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662A/662 AS APPLIES	9	EA
(9)	CONSTRUCT A.C. BERM, TYPE I, PER CITY OF RIVERSIDE STD. NO. 250	110	LF
(10)	INSTALL STOP SIGN (R-1)	8	EA
(11)	CONSTRUCT BARRICADE PER CITY OF RIVERSIDE STD. NO. 180	132	LF
(12)	CONSTRUCT TYPE II CURB & GUTTER (8") PER CITY OF RIVERSIDE STD. DWG. NO 200	68	LF
(13)	INSTALL RIP-RAP (SIZES AS PER PLAN)	27	TON
(14)	CONSTRUCT CATCH BASIN PER CITY OF RIVERSIDE STD. DWG. NO.405	1	EA
(15)	CONSTRUCT REINFORCED CONCRETE BOX CULVERT NO.1 PER DETAIL ON SHEET 8	46	LF
(16)	CONSTRUCT A.C. OVERLAY	4,841	SF
(18)	CONSTRUCT DRIVEWAY APPROACH PER CITY OF RIVERSIDE STD. DWG. NO. 302	84	EA
(19)	PLANT TREES PER CITY OF RIVERSIDE PARK & RECREATION DEPT. STD.	101	EA
	INSTALL RESIDENTIAL LIGHTING (SEE STREET LIGHT PLAN)		

CONSTRUCTION NOTES & QUANTITY ESTIMATE (COUNTY)

NO.	ITEMS	QUANTITY	UNIT
(1)	CONSTRUCT PAVING SECTION PER TYPICAL SECTION	4,560	SF
(13)	INSTALL RIP-RAP (SIZES AS PER PLAN)	1	CY
(14)	CONSTRUCT CATCH BASIN PER CITY OF RIVERSIDE STD. DWG. NO.405	1	EA
(15)	CONSTRUCT REINFORCED CONCRETE BOX CULVERT NO.1 PER DETAIL ON SHEET 8	20	LF
	EXCAVATE & FILL	25	CY
	IMPORT & FILL	5	CY
	SAWCUT	300	LF

NOTE:

1. APPROXIMATE TREE LOCATION. NO STREET TREES SHALL BE PLANTED WITHIN 10 FEET OF DRIVEWAYS OR CORNER CUTBACKS.
2. QUANTITIES SHOWN HEREON ARE FOR PERMIT AND / OR BONDING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING. CONTRACTOR SHALL DETERMINE HIS OWN QUANTITIES AND BID TO COMPLETE THE PROJECT.
3. SEE CITY OF RIVERSIDE UTILITY APPROVED DRAWING FOR QUANTITY AND LOCATIONS OF REQUIRED STREET LIGHTS.

LEGEND:

● --- STREET TREES

▨ --- OVERLAY

▭ --- NEW PAVEMENT

INDEX OF SHEETS:

SHEET NO(S).	DESCRIPTION
1	TITLE SHEET
2 TO 7	PLAN & PROFILE
8 TO 9	PLAN & PROFILE, DETAIL & STORM DRAIN

DATE PREPARED: DECEMBER 2003
RIV. CO. NUMBER MS3939, IP040014
CITY BUSINESS TAX CERTIFICATE NO. 113295 EXP.08-30-2004

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

REVIEWED BY: SHEETS 1-9
WESTERN MUNICIPAL WATER DISTRICT
FOR NON-INTERFERENCE COMPLIANCE
CIVIL ENGINEER RCE 46212
DATE: 6/21/04

SEAL: REGISTERED PROFESSIONAL ENGINEER — KHALED A. OTHMAN — No. 33950 — Exp. 6-30-05 — CIVIL — STATE OF CALIFORNIA

APPROVED FOR CONSTRUCTION WITHIN THE COUNTY OF RIVERSIDE ONLY
COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: DATE 7/19/04
KHALED A. OTHMAN R.C.E. 33950
RECOMMENDED: WILLDAN DATE 7/15/04

ENGINEERS NOTE:

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE NEGLIGENCE OF THE OWNER OR ENGINEER.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A DILIGENT SEARCH OF AVAILABLE RECORDS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT ALL THE UTILITIES SHOWN AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES.

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN & ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

DATE	BY	MARK	REVISIONS:	APPR	DATE
8/7/04	HJH/GH	1	STRUCTURAL SECTION (OPTION) PER S.R. 1630	RVZ	8-23-04
	ENGINEER			CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:
PRINCIPAL ENGINEER		8/19/04
PARK DEPARTMENT	—	—
TRAFFIC DIVISION		8/9/04
STREET SERVICES		8/24/04

APPROVED BY: CITY ENGINEER 8/6/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HJK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41749 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780

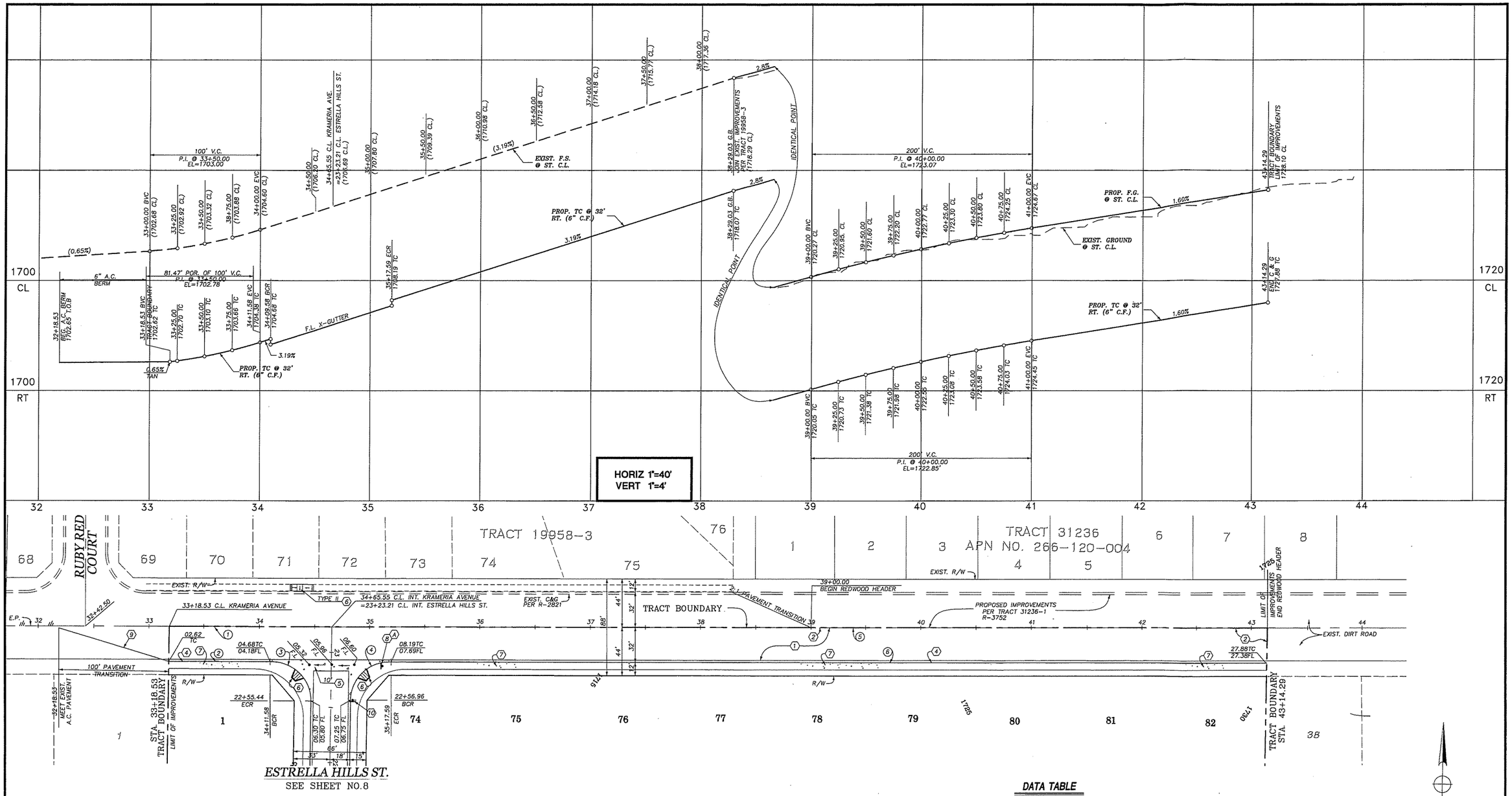
PREPARED BY: ROBERT T. FEDERIGHI R.C.E. NO. 30000 DATE 6/21/04

BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5' DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

STREET IMPROVEMENT PLANS
RIV. CO. MS3939, IP040014
TRACT NO. 30756
TITLE SHEET

ACCOUNT NO. ____
DRAWING NUMBER R- 3751
SHEET 1 OF 9
SCALE:
PW03-0357

As-Built-2/19/07 INDEXED 8-17-04 GH



CONSTRUCTION NOTES:

1. CONST. PAVING SECTION PER TYPICAL SECTION
2. INSTALL REDWOOD HEADER
4. CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
5. CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220
6. CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
7. CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
8. INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662A
9. CONSTRUCT A.C. BERM, TYPE I, PER CITY OF RIVERSIDE STD. NO. 250
10. INSTALL STOP SIGN (R-1)

DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
1	N88°54'01"E		147.02'	
2	N88°54'01"E		91.51'	
3	Δ=90°49'19"	35.00'	55.48'	35.51'
4	Δ=89°10'41"	35.00'	54.48'	34.50'
5	N88°54'01"E		995.76'	
6	N88°54'01"E		794.18'	

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

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227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK
ENGINEER		

REVISIONS:

APPR	DATE
CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:
PRINCIPAL ENGINEER	PH	8/9/04
PARK DEPARTMENT	—	—
TRAFFIC DIVISION	JE	8/9/04
STREET SERVICES	KEG	7/27/04

APPROVED BY:
CITY ENGINEER
8/9/04
DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY:
ROBERT T. FEDERIGHI
R.C.E. NO. 30000
DATE 6/21/04

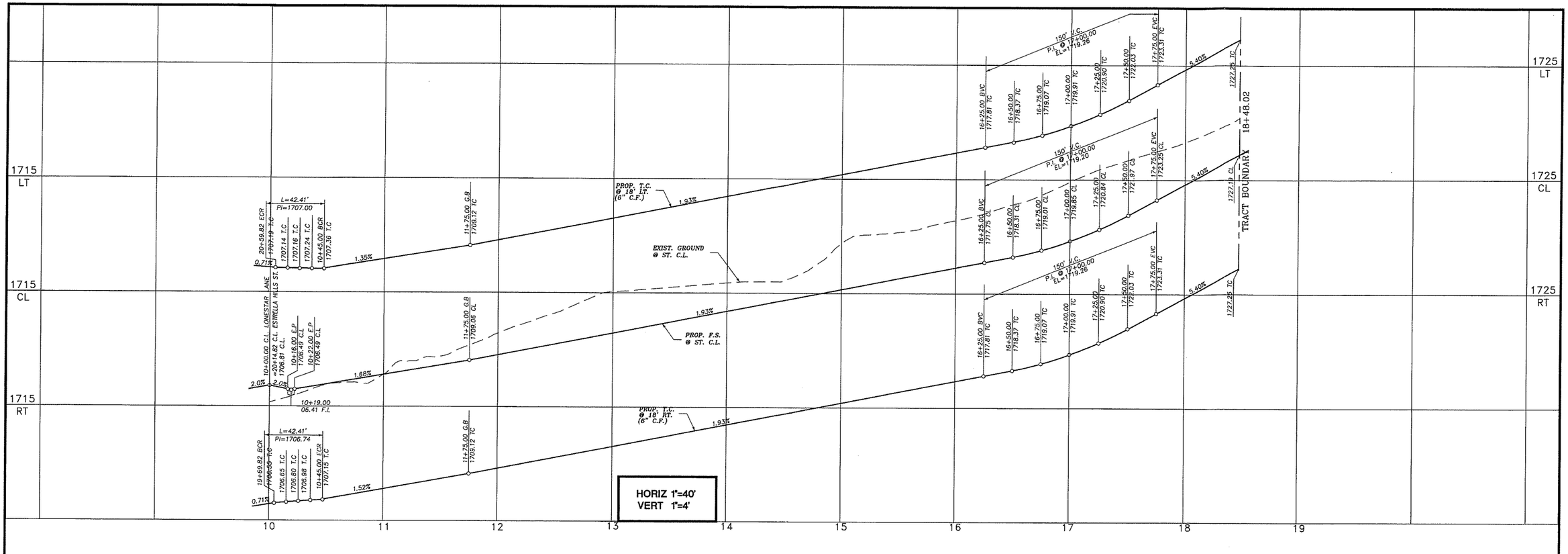
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CITY OF RIVERSIDE
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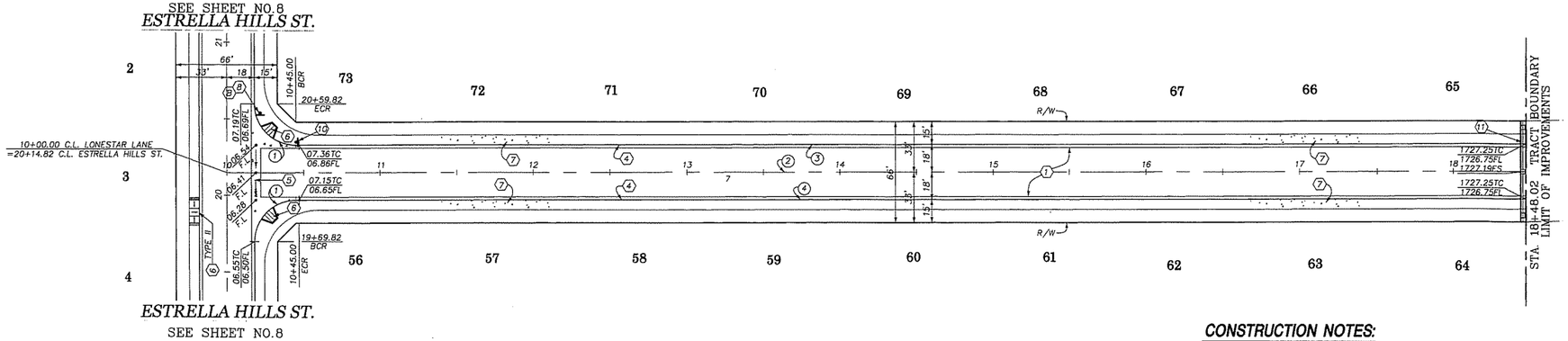
STREET IMPROVEMENT PLANS
TRACT NO. 30756
KRAMERIA AVENUE
STA. 33+18.53 TO STA. 43+14.29
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 2 OF 9
PW03-0357

SHT_2.dwg 6-19-04 1:41:45 pm EST

INDEXED 8-17-04 GH





DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	Δ=90°00'00"	27.00'	42.41'	27.00'
(2)	N89°43'20"E		848.02'	
(3)	N89°43'20"E		803.02'	
(4)	N89°43'20"E		803.02'	

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
(10) INSTALL STOP SIGN (R-1)
(11) CONSTRUCT BARRICADE PER CITY OF RIVERSIDE STD. NO. 180

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

LONESTAR LANE

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NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER		8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	CITY ENGINEER 8/9/04 DATE
STREET SERVICES		7/22/04	

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780

PREPARED BY: ROBERT T. FEDERIGHI — R.C.E. NO. 30000 — DATE 12/21/04

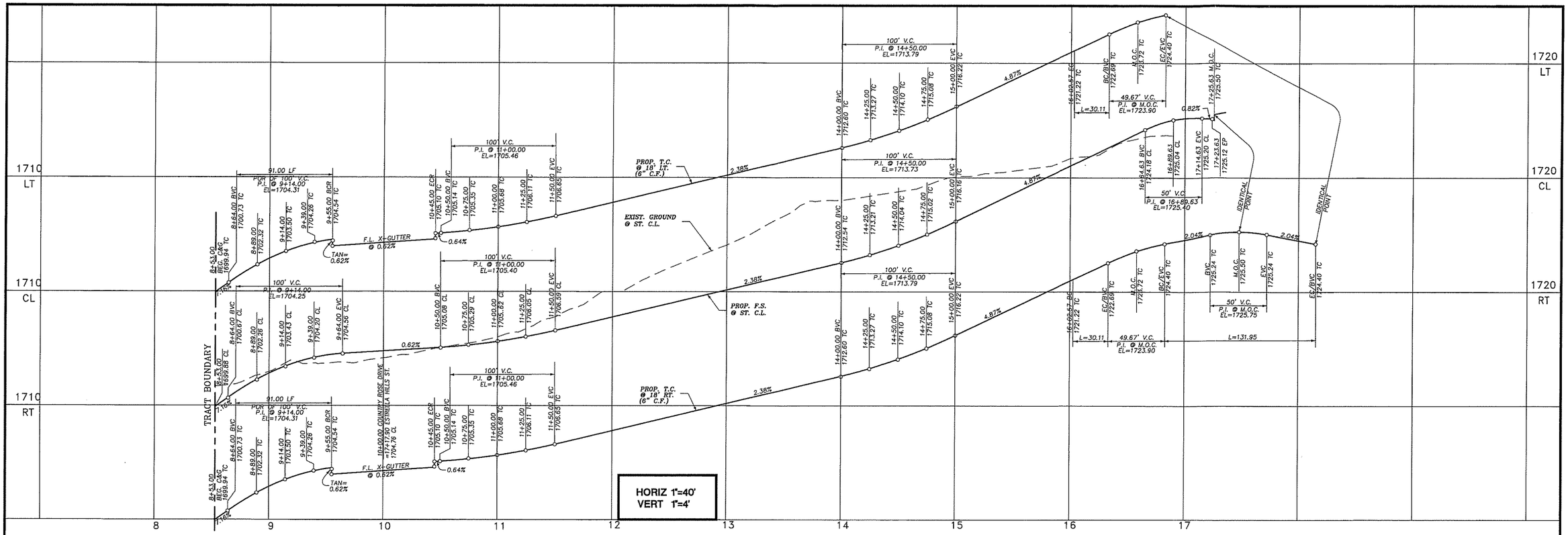
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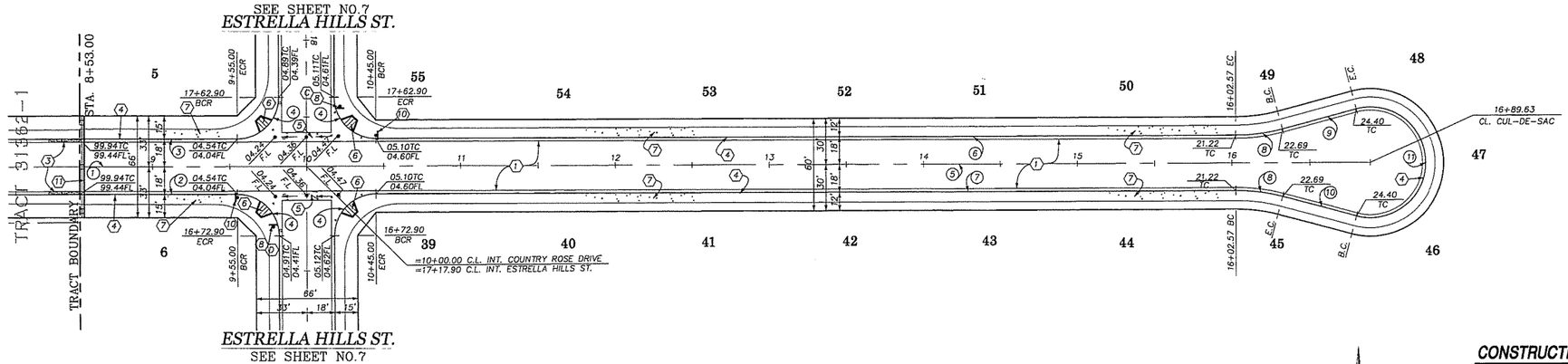
STREET IMPROVEMENT PLANS
TRACT NO. 30756
LONESTAR LANE
STA. 10+00.00 TO STA. 18+48.02
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 3 OF 9
PW03-0357

INDEXED 8-17-04 KH

SHT_3.dwg 6-19-04 1:52:20 pm EST





DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	N89°43'20"E		147.00'	
(2)	N89°43'20"E		102.00'	
(3)	N89°43'20"E		102.00'	
(4)	Δ=90°00'00"	27.00'	42.41'	27.00'
(5)	N18°43'20"E		689.63'	
(6)	N18°43'20"E		557.57'	
(7)	N18°43'20"E		557.57'	
(8)	Δ=15°00'00"	115.00'	30.11'	15.14'
(9)	N74°43'20"E		49.67'	
(10)	N75°16'40"W		49.67'	
(11)	Δ=210°00'00"	36.00'	131.95'	134.35

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(3) CONST. 2' WIDE, 20' LONG, 2-1/2" THICK AC DRAINAGE APRONS @ END OF C&G
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO. 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
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COUNTRY ROSE DRIVE

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

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TWO WORKING DAYS BEFORE YOU DIG

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER	DA	8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	CITY ENGINEER
STREET SERVICES		7/21/04	8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HJ CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY: ROBERT T. FEDERIGHI
R.C.E. NO. 30000 DATE 6/21/04

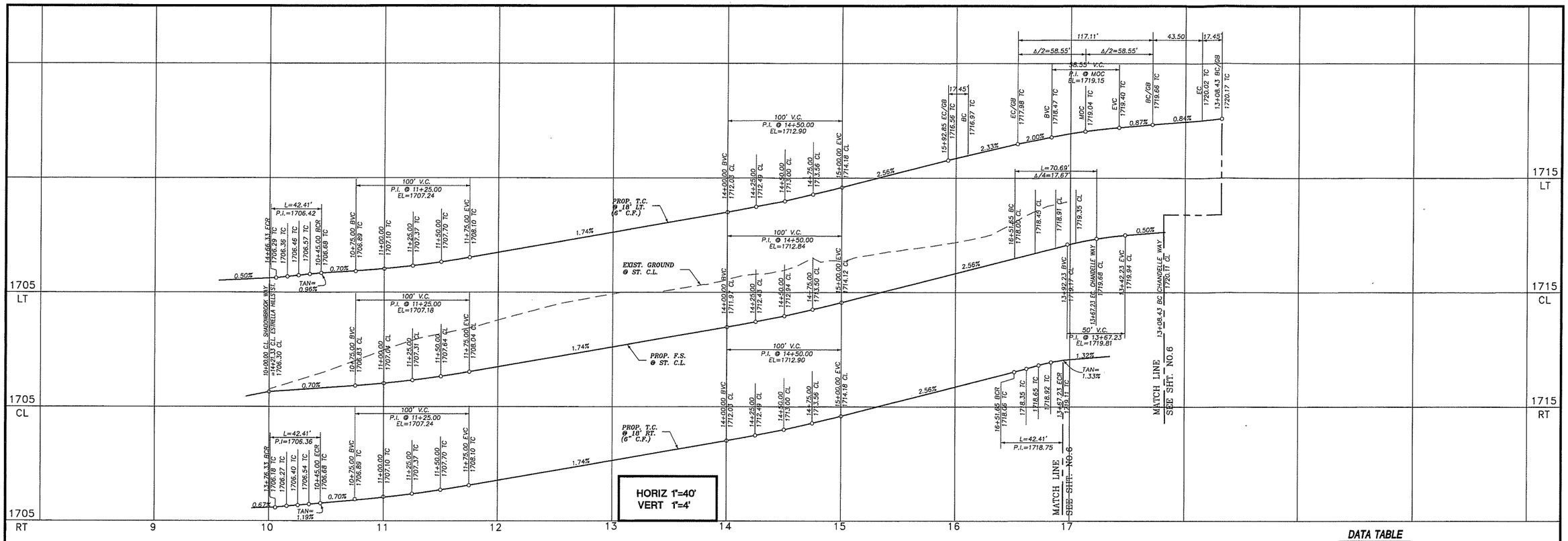
BENCHMARK:
CITY OF RIVERSIDE
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STREET IMPROVEMENT PLANS
TRACT NO. 30756
COUNTRY ROSE DRIVE
STA. 8+53.00 TO STA. 16+89.63
SCALE: HORIZ.: 1'=40' VERT.: 1'=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 4 OF 9
PW03-0357

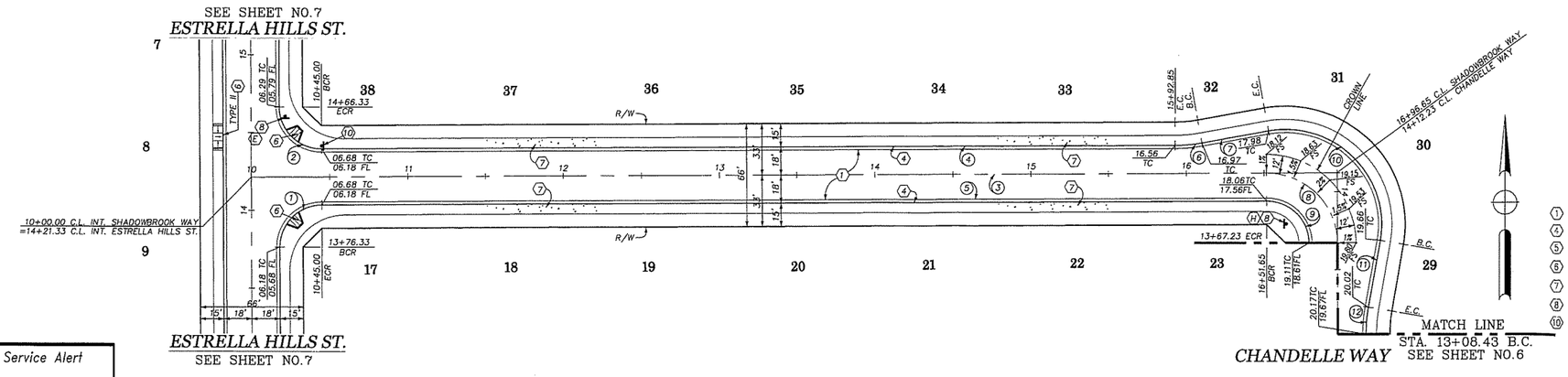
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INDEXED 8-17-04 fH



DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	Δ=90°00'00"	27.00'	42.41'	27.00'
(2)	Δ=90°00'00"	27.00'	42.41'	27.00'
(3)	N89°43'20"E		651.65'	
(4)	N89°43'20"E		547.85'	
(5)	N89°43'20"E		606.65'	
(6)	Δ=10°00'00"	100.00'	17.45'	8.75'
(7)	N79°43'20"E		43.50'	
(8)	Δ=90°00'00"	45.00'	70.69'	45.00'
(9)	Δ=90°00'00"	27.00'	42.41'	27.00'
(10)	Δ=110°00'00"	61.00'	117.11'	87.12'
(11)	N09°43'20"E		43.50'	
(12)	Δ=10°00'00"	100.00'	17.45'	8.75'



SHADOWBROOK WAY

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
(10) INSTALL STOP SIGN (R-1)

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER		8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	
			CITY ENGINEER
STREET SERVICES		7/12/04	8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HJK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780

PREPARED BY: ROBERT T. FEDERIGHI
R.C.E. NO. 30000
DATE 6/21/04

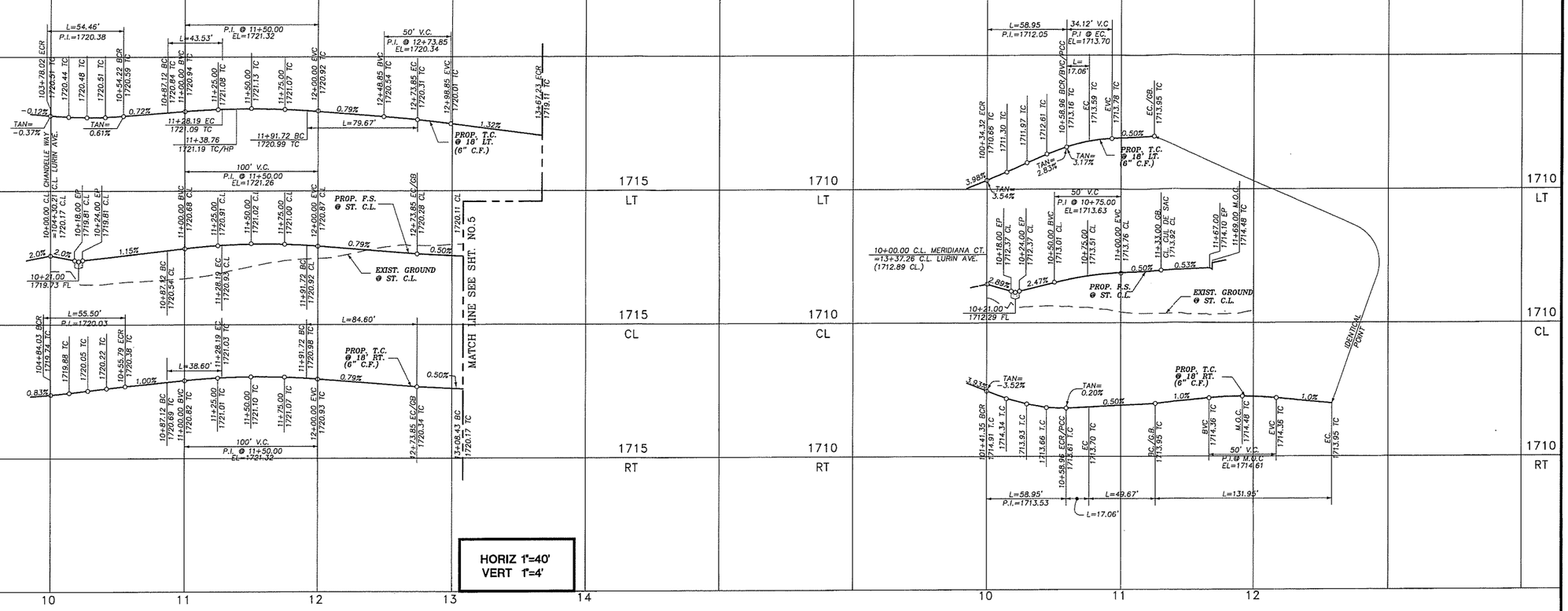
BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

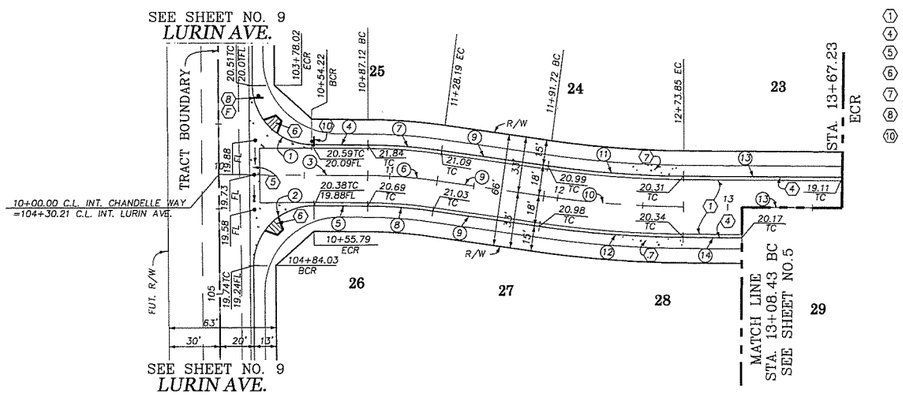
STREET IMPROVEMENT PLANS
TRACT NO. 30756
SHADOWBROOK WAY
STA. 10+00.00 TO STA. 16+96.65
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 5 OF 9
PW03-0357

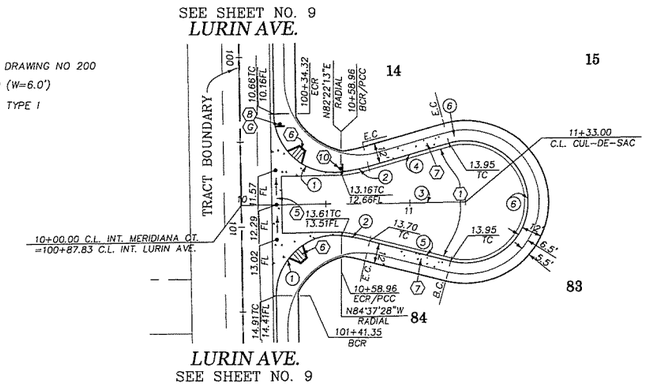
SHT_5.dwg 6-19-04 2:00:12 pm EST

INDEXED 8-17-04 4/11





CHANDELLE WAY



MERIDIANA COURT

CONSTRUCTION NOTES:

1. CONST. PAVING SECTION PER TYPICAL SECTION
4. CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
5. CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
6. CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
7. CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
8. INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
10. INSTALL STOP SIGN (R-1)

DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
1	Δ=89°09'03"	35.00'	54.46'	34.49'
2	Δ=90°50'57"	35.00'	55.50'	35.52'
3	N00°16'40"W		87.12'	
4	N00°16'40"W		32.90'	
5	N00°16'40"W		31.33'	
6	Δ=07°50'35"	300.00'	41.07'	20.57'
7	Δ=07°50'35"	318.00'	43.53'	21.80'
8	Δ=07°50'35"	282.00'	38.60'	19.33'
9	N07°33'55"E		63.53'	
10	Δ=07°50'35"	600.00'	82.13'	41.13'
11	Δ=07°50'35"	582.00'	79.67'	39.90'
12	Δ=07°50'35"	618.00'	84.60'	42.36'
13	N00°16'40"W		93.38'	
14	N00°16'40"W		34.58'	

DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
1	Δ=96°30'10"	35.00'	58.95'	39.22'
2	Δ=08°29'50"	115.00'	17.06'	8.54'
3	N01°07'37"W		133.00'	
4	N16°07'37"W		49.67'	
5	N13°52'23"W		49.67'	
6	Δ=210°00'05"	36.00'	131.95'	

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	
STREET SERVICES	KBS	7/28/04	CITY ENGINEER 8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER ROBERT T. FEDERIGHI No. 30000 Exp. 9-30-05 CIVIL STATE OF CALIFORNIA

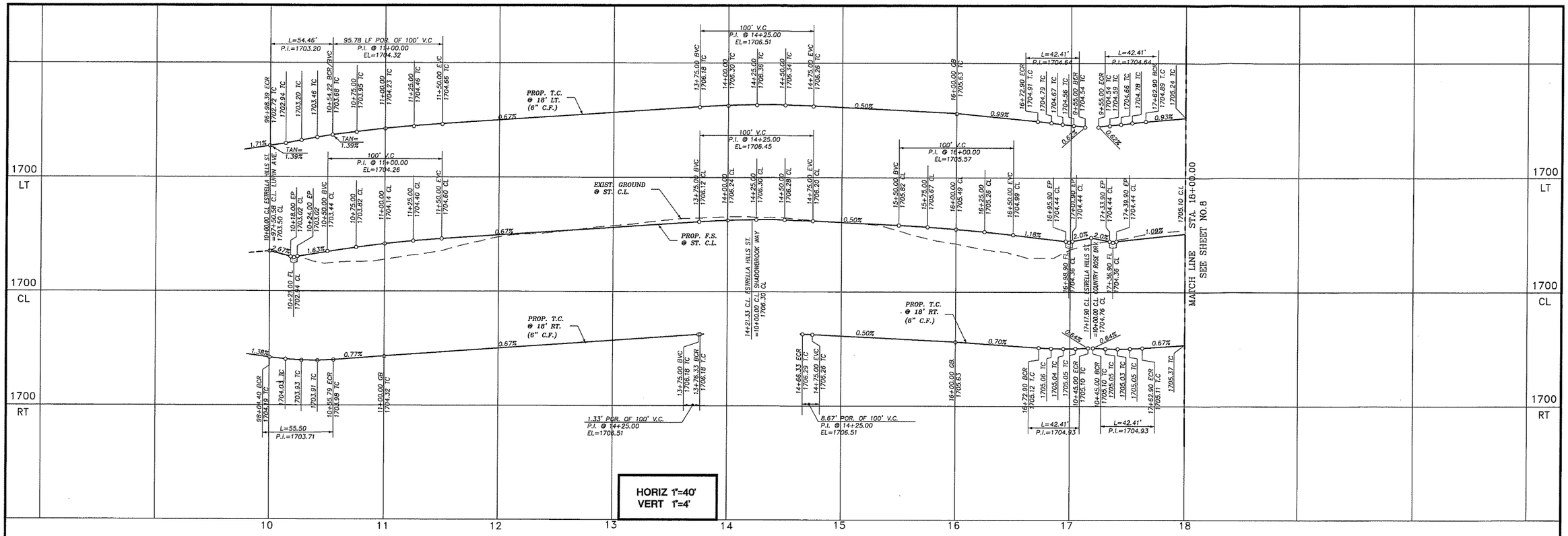
HK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY: Robert T. Federighi
ROBERT T. FEDERIGHI R.C.E. NO. 30000 DATE 6/21/04

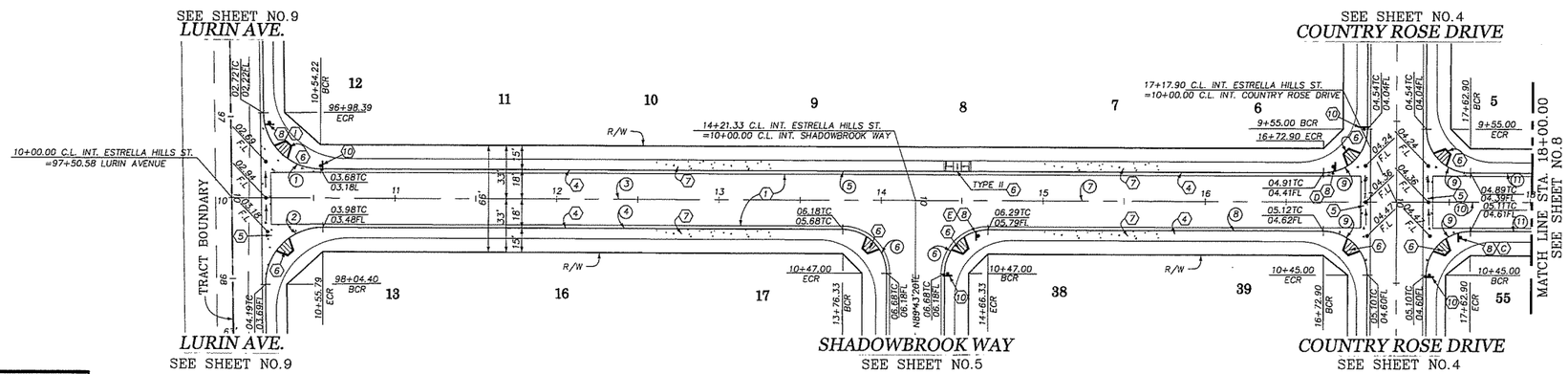
BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

STREET IMPROVEMENT PLANS
TRACT NO. 30756
CHANDELLE WAY
STA. 10+00.00 TO STA. 13+67.23
MERIDIANA COURT
STA. 10+00.00 TO STA. 11+33.00
SCALE: HORIZ.: 1'=40' VERT.: 1'=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 6 OF 9
PW03-0357

INDEXED 8-17-04 FH





DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	Δ=89°09'03"	35.00'	54.46'	34.49'
(2)	Δ=90°50'57"	35.00'	55.50'	35.52'
(3)	N00°16'40"W		320.54'	
(4)	N00°16'40"W		618.68'	
(5)	N00°16'40"W		624.59'	
(6)	Δ=90°00'00"	27.00'	42.41'	27.00'
(7)	N00°16'40"W		296.57'	
(8)	N00°16'40"W		204.57'	
(9)	Δ=90°00'00"	27.00'	42.41'	27.00'
(10)	N00°16'40"W		82.10'	
(11)	N00°16'40"W		35.10'	

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
(10) INSTALL STOP SIGN (R-1)

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

ESTRELLA HILLS STREET

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	CITY ENGINEER
STREET SERVICES		7/22/04	DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780

PREPARED BY: Robert T. Federighi
ROBERT T. FEDERIGHI
R.C.E. NO. 30000
DATE 6/21/04

BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

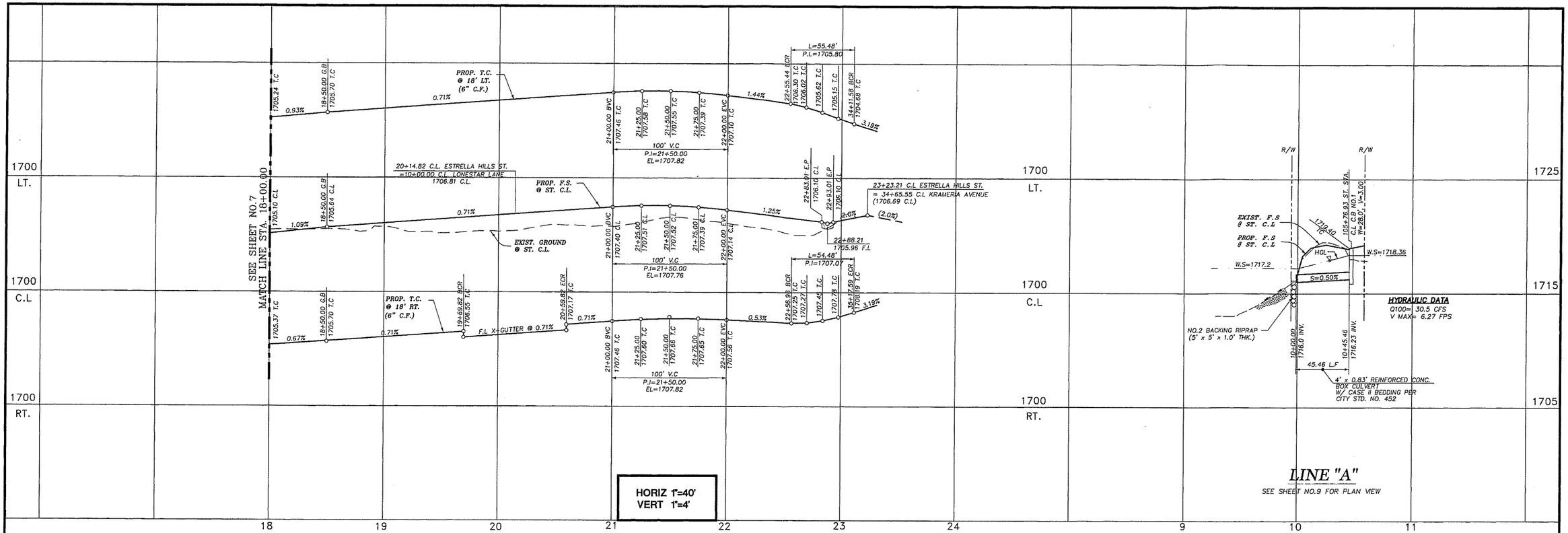
STREET IMPROVEMENT PLANS
TRACT NO. 30756
ESTRELLA HILLS STREET
STA. 10+00.00 TO STA. 18+00.00

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 7 OF 9
PW03-0357

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

SHT_7.dwg 6-19-04 2:15:36 pm EST

INDEXED 8-17-04 GH



LINE "A"

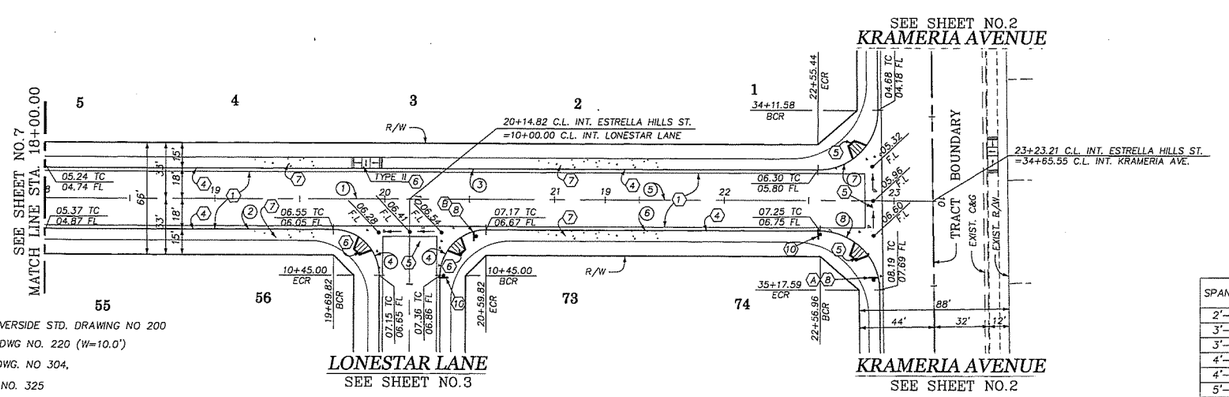
SEE SHEET NO.9 FOR PLAN VIEW

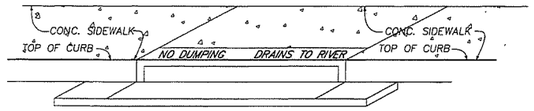
DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	N00°16'40"W		214.82'	
(2)	N00°16'40"W		169.82'	
(3)	N00°16'40"W		455.41'	
(4)	Δ=90°00'00"	27.00'	42.41'	27.00'
(5)	N00°16'40"W		308.39'	
(6)	N00°16'40"W		197.17'	
(7)	Δ=90°49'19"	35.00'	55.48'	35.51'
(8)	Δ=89°10'41"	35.00'	54.48'	34.50'

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=10.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304,
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662A/662 AS APPLICABLE
(10) INSTALL STOP SIGN (R-1)





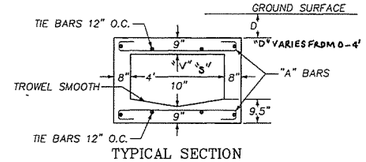
CATCH BASIN STENCILING DETAIL

N.T.S.
(SEE SHEET 9 OF 9)

(A) STENCILS TO HAVE 2" LETTERS AS FOLLOWS: NO DUMPING, DRAINS TO RIVER
(B) PLACE BOTH STENCILS CENTERED WITHIN THE CATCH BASIN OPENING AND WITHIN THE TOP OF CURB
(C) SPRAY BOTH STENCILS WITH WHITE PAINT
(D) REMOVE STENCILS WHEN PAINT IS DRY.

STANDARD REINFORCING

SPAN (S)	A-BARS			
	SIZE	CTR'S	L	LENGTH
2'-6"	#5	7 1/2"	3'-8"	5'-3"
3'-0"	#5	6 1/2"	4'-2"	5'-9"
3'-6"	#5	6"	4'-8"	6'-3"
4'-0"	#5	5 1/2"	5'-2"	6'-9"
4'-6"	#5	5"	5'-8"	7'-3"
5'-0"	#5	5"	6'-2"	7'-9"
5'-6"	#5	4 1/2"	6'-8"	8'-3"
6'-0"	#5	4"	7'-2"	8'-9"



TYPICAL SECTION

CITY OF RANCHO CUCAMONGA
REINFORCED CONCRETE BOX CULVERT NO. 1
STANDARD # 314

N.T.S.
SEE SHEET 9 OF 9

1. ALL BARS SHALL BE ROUND AND DEFORMED AND SHALL BE LAPPED 20 DIAMETERS AT ALL SPLICES.
2. TIE BARS TO BE #5.
3. DIMENSIONS "S" AND "V" ARE SPECIFIED ON PLAN.
4. BARS SHALL BE COVERED AT ALL PARTS WITH 1" OF CONCRETE UNLESS OTHERWISE SPECIFIED HEREON.
5. FORM SURFACE (SF PER FT) = S+4V+2.92 ("S" IN FEET, "V" IN INCHES)
6. CONCRETE SHALL BE CLASS B, MINIMUM 3250 PSI

RIV. CO. NUMBER MS3939, IP040014

QUANTITIES PER 10FT. LENGTH

SPAN (S)	CONCRETE CY FOR VARYING DEPTHS (V)								STEEL POUNDS
	8"	9"	10"	11"	12"	14"	16"	18"	
2'-6"	2.48	2.52	2.56	2.60	2.64	2.72	2.80	2.88	270
3'-0"	2.76	2.80	2.84	2.88	2.92	3.00	3.08	3.16	332
3'-6"	3.05	3.09	3.13	3.17	3.21	3.29	3.37	3.45	378
4'-0"	3.32	3.36	3.40	3.44	3.48	3.56	3.64	3.73	435
4'-6"	3.60	3.64	3.68	3.72	3.76	3.84	3.92	4.01	503
5'-0"	3.88	3.92	3.96	4.00	4.04	4.12	4.20	4.28	550
5'-6"	4.16	4.20	4.24	4.28	4.32	4.40	4.48	4.56	611
6'-0"	4.44	4.48	4.52	4.56	4.60	4.68	4.76	4.84	733

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

SEAL: REGISTERED PROFESSIONAL ENGINEER — KHALED A. OTHMAN — No. 33950 — Exp. 6-30-08 — CIVIL — STATE OF CALIFORNIA

APPROVED FOR CONSTRUCTION WITHIN THE COUNTY OF RIVERSIDE ONLY
COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:
KHALED A. OTHMAN R.C.E. 33950 — DATE 7/19/04
RECOMMENDED: WILLDAN — DATE 7/15/04

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK
ENGINEER		

REVISIONS:

APPR	DATE
CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER	DH	8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	
STREET SERVICES	KBW	7/26/04	CITY ENGINEER 8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY: ROBERT T. FEDERIGHI — R.C.E. NO. 30000 — DATE 6/21/04

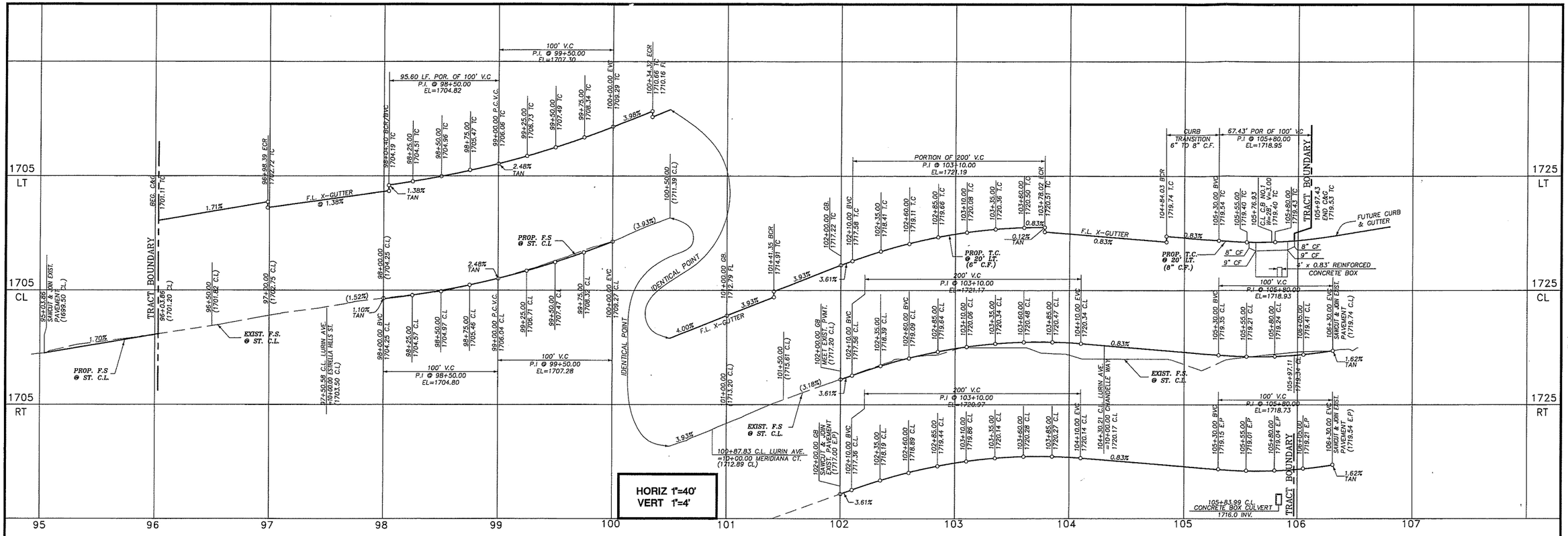
BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

STREET IMPROVEMENT PLANS
RIV. CO. MS3939, IP040014
TRACT NO. 30756
ESTRELLA HILLS STREET
STA. 18+00.00 TO STA. 23+23.21
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 8 OF 9
PW03-0357

SHT_8.dwg 6-19-04 2:16:19 pm EST

INDEXED 8-17-04 GH



SEE SHEET NO.7

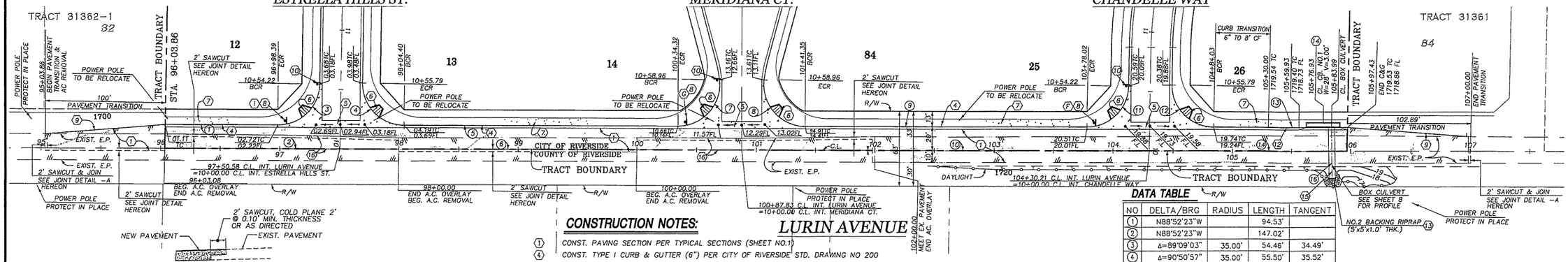
ESTRELLA HILLS ST.

SEE SHEET NO.6

MERIDIANA CT.

SEE SHEET NO.6

CHANDELLE WAY



LURIN AVENUE

JOINT DETAIL – A
N.T.S.

JOINT DETAIL
N.T.S.

CONSTRUCTION NOTES:

1. CONST. PAVING SECTION PER TYPICAL SECTIONS (SHEET NO.1)
4. CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
5. CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
6. CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
7. CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
8. INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
9. CONSTRUCT A.C. BERM, TYPE I, PER CITY OF RIVERSIDE STD. NO. 250
10. INSTALL STOP SIGN (R-1)
12. CONST. TYPE II CURB & GUTTER (8") PER CITY OF RIVERSIDE STD. DRAWING NO 200
13. INSTALL RIPRAP (SIZES AS PER PLAN)
14. CONSTRUCT CATCH BASIN, PER CITY OF RIVERSIDE STD. DWG. NO.405
15. CONSTRUCT REINFORCED CONCRETE NO.1 PER CITY OF RANCHO CUCAMONGA STD. # 314; S=4.00' – V=0.83'
16. CONSTRUCT A.C. OVERLAY

DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
1	N88°52'23"W		94.53'	
2	N88°52'23"W		147.02'	
3	Δ=89°09'03"	35.00'	54.46'	34.49'
4	Δ=90°50'57"	35.00'	55.50'	35.52'
5	N88°52'23"E		229.92'	
6	N88°52'23"E		337.26'	
7	Δ=96°30'10"	35.00'	58.95'	39.22'
8	Δ=96°30'10"	35.00'	58.95'	39.92'
9	N88°52'23"E		236.68'	
10	N88°52'23"E		342.38'	
11	Δ=89°09'03"	35.00'	54.46'	34.49'
12	Δ=90°50'57"	35.00'	55.50'	35.52'
13	N88°52'23"E		113.40'	
14	N88°52'23"E		166.89'	
15	N02°04'16"W		44.45'	

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
16	N02°04'48"E		45.46'	

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

RIV. CO. NUMBER MS3939, IP040014

Underground Service Alert
Call: TOLL FREE
1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

SEAL: REGISTERED PROFESSIONAL ENGINEER — KHALED A. OTHMAN — No. 33950 — Exp. 6-30-06 — CIVIL — STATE OF CALIFORNIA

APPROVED FOR CONSTRUCTION WITHIN THE COUNTY OF RIVERSIDE ONLY

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: _____ DATE 7/19/04
KHALED A. OTHMAN, R.C.E. 33950
RECOMMENDED: WILLDAN DATE 7/15/04

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN & ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER	PH	8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	
STREET SERVICES		7/16/04	CITY ENGINEER 8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY: _____ R.C.E. NO. 30000
ROBERT T. FEDERIGHI DATE 6/21/04

BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

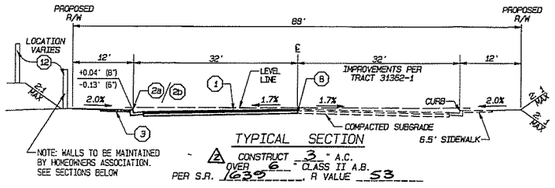
STREET IMPROVEMENT PLANS
RIV. CO. MS3939, IP040014
TRACT NO. 30756
LURIN AVENUE
STA. 95+03.86 TO STA. 107+00.00

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 9 OF 9
PW03-0357

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

SHT_9.dwg 6-19-04 2:36:03 pm EST

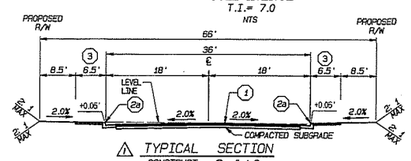
INDEXED 8-17-04 FH



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 6" CLASS II A.B.
PER S.R. 1633, R VALUE 53

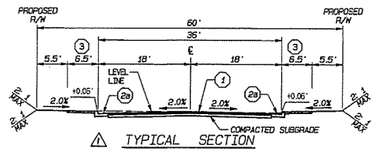
COLE AVENUE
T.I.= 7.0
NTS



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 6" CLASS II A.B.
PER S.R. 1637, R VALUE 40

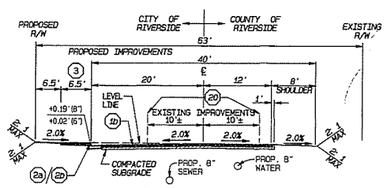
MISSION RANCH ROAD
STA. 10+00.00 TO 15+48.78
T.I.= 5.0
NTS



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 6" CLASS II A.B.
PER S.R. 1637, R VALUE 40

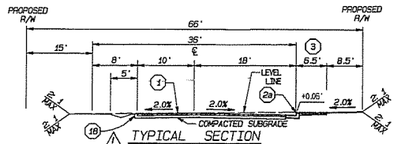
LOS AMIGOS COURT
FRIAR ROAD, MI CASA COURT
T.I.= 5.0
NTS



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 0.25' OVER 0.50' CLASS II A.B. (SEE COUNTY NOTE NO. 4)
PER S.R. 1639, R VALUE 45

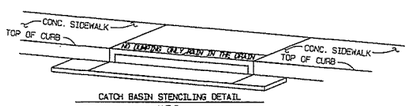
LURIN AVENUE
T.I.= 6.0
NTS



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 6" CLASS II A.B.
PER S.R. 1637, R VALUE 40

MISSION RANCH ROAD
STA. 15+48.78 TO 22+28.26
T.I.= 5.0
NTS



CATCH BASIN STENCILING DETAIL
N.T.S.

(A) STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING" "ONLY RAIN IN THE DRAIN"
(B) PLACE BOTH STENCILS CENTERED WITHIN THE CATCH BASIN OPENING AND WITHIN THE TOP OF THE CURB.
(C) SPRAY BOTH STENCILS WITH WHITE PAINT.
(D) REMOVE STENCILS WHEN PAINT IS DRY

NOTICE TO CONTRACTOR

ACCORDING TO INFORMATION PROVIDED BY UNDERGROUND SERVICE ALERT (U.S.A.) DATED SEPTEMBER 2, 2003, THE FOLLOWING ORGANIZATIONS ARE U.S.A. MEMBERS WITHIN THE PROJECT AREA:

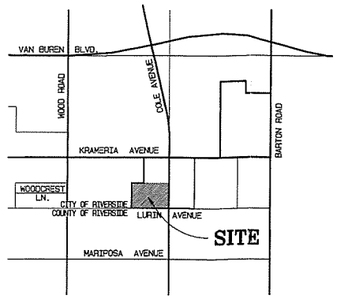
UTI FOR CHARTER COMMUNICATIONS
SBC / PACIFIC BELL
SOUTHERN CALIFORNIA GAS COMPANY
UTI FOR VERIZON - PERRIS
UTI FOR SC EDISON
WESTERN MUNICIPAL WATER DISTRICT
ABELPHIA - RIVERSIDE
UTI FOR CITY OF RIVERSIDE - ELECTRIC
CITY OF RIVERSIDE - TRAFFIC ENGINEERING
MARCH JOINT POWERS AUTHORITY

THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES (UTILITY PIPES, STRUCTURES, ETC.) SHOWN ON THESE PLANS (MAIN LINES ONLY - NO SERVICE LATERALS) WERE ASCERTAINED BY A REVIEW OF RECORDS PROVIDED BY THESE MEMBER AGENCIES AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT ALL UTILITIES SHOWN ON THESE PLANS AND/OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

CALL UNDERGROUND SERVICE ALERT (U.S.A.) 1-800-227-2600 AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION.

THE QUANTITY ESTIMATE FILED IN THE CITY IS FOR THE USE OF GOVERNING AGENCIES IN DETERMINING BOND AMOUNTS AND/OR FEES AND IS NOT TO BE USED FOR BID PURPOSES.



VICINITY MAP

N.T.S.

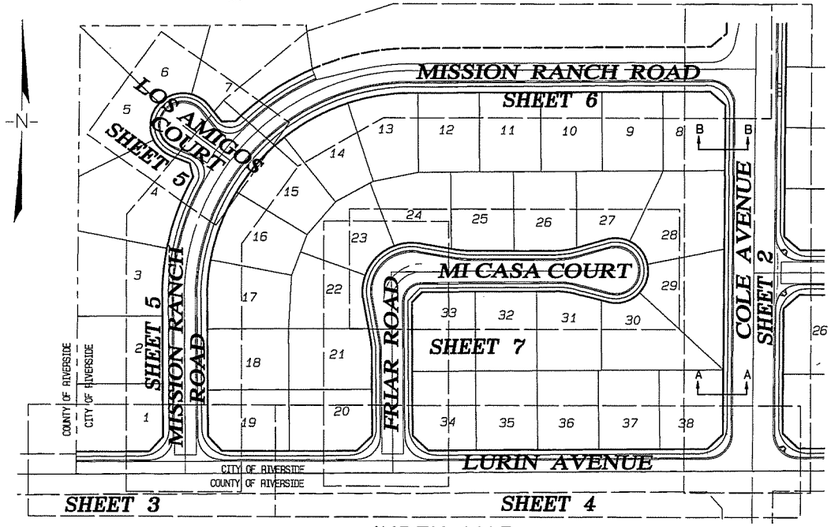
GENERAL NOTES

1. NO PERSON SHALL PERFORM ANY CONSTRUCTION ACTIVITY OR INSTALL ANY OBJECTS WITHIN THE PUBLIC RIGHTS-OF-WAY OR EASEMENTS OF THE CITY OF RIVERSIDE WITHOUT A VALID CONSTRUCTION PERMIT OR A STREET OPENING PERMIT OR AN ENCROACHMENT PERMIT ISSUED BY THE CITY'S PUBLIC WORKS DEPARTMENT.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAR THE RIGHT-OF-WAY IN ACCORDANCE WITH THE PROVISIONS OF LAW AS IT AFFECTS EACH UTILITY INCLUDING IRRIGATION LINES AND APPURTENANCES AND AT NO COST TO THE CITY.
3. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF RIVERSIDE DEPARTMENT OF PUBLIC WORKS, STANDARD DRAWINGS, ITS SUPPLEMENTAL NOTES AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION.
4. THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.
5. THE DEVELOPER SHALL BE RESPONSIBLE FOR PRESERVING OR RE-ESTABLISHING AND REFERENCING SURVEY MONUMENTS DESTROYED, DISTURBED OR BURIED AS A RESULT OF CONSTRUCTION SHOWN HEREON.
6. ALL FLAGGED ELEVATIONS SHALL BE STAKED IN THE FIELD BY THE PRIVATE ENGINEER.
7. WHERE NEW PAVEMENT IS TO JOIN THE EXISTING PAVEMENT, THE EDGE OF THE EXISTING PAVEMENT SHALL BE TRIMMED IN A SMOOTH AND STRAIGHT LINE. CONSTRUCT MATCH-UP PAVING AS SHOWN ON THE PLANS AND OVERLAY PAVING AS DIRECTED IN THE FIELD TO PRODUCE A SMOOTH SECTION.
8. THE SUBDIVIDER SHALL ARRANGE FOR A SOIL TEST TO BE MADE BY A SOILS ENGINEER AFTER THE STREETS HAVE BEEN PREPARED TO ROUGH GRADE AND PRIOR TO CURB AND GUTTER CONSTRUCTION. DEPTH OF BASE MATERIAL AND A.C. PAVING SHALL BE DETERMINED BY THE CITY OF RIVERSIDE DESIGN STANDARDS AND TEST PROCEDURES.
9. ON ALL AREAS WITHIN PUBLIC RIGHT-OF-WAY WHERE THE FILL IS ONE (1) FOOT OR GREATER, A LETTER WILL BE REQUIRED FROM THE SOILS ENGINEER, CERTIFYING THE COMPACTION OF THE FILL BELOW SUBGRADE, PRIOR TO ISSUANCE OF THE CONSTRUCTION PERMIT/CUT SHEETS.
10. ALL TRAFFIC SIGNS SHALL BE INSTALLED PRIOR TO OPENING THE STREETS TO TRAFFIC.
11. ANY TRAFFIC CONTROL STRIPING OBLITERATED AND/OR BADLY WORN DURING CONSTRUCTION SHALL BE RESTORED BY THE CONTRACTOR WITHIN FIVE DAYS AFTER NOTIFICATION FROM THE CITY INSPECTORS.
12. FINAL STRIPING FOR TRAFFIC CONTROL AND/OR PAVEMENT MARKING TO BE THE RESPONSIBILITY OF THE DEVELOPER.
13. THE CONTRACTOR SHALL CALL IN A LOCATION REQUEST TO UNDERGROUND SERVICE ALERT (USA), PHONE # 1-800-227-2600, TWO NORMAL DAYS BEFORE DIGGING. NO CONSTRUCTION PERMIT WILL BE ISSUED BY THE PUBLIC WORKS DEPARTMENT INVOLVING EXCAVATION FOR UNDERGROUND FACILITIES UNLESS THE APPLICANT HAS BEEN PROVIDED AN INQUIRY IDENTIFICATION NUMBER BY U.S.A.
14. THE CONTRACTOR SHALL COORDINATE TRENCHING FOR CABLE TELEVISION WITH OTHER TRENCHING WITHIN THE SUBDIVISION.
15. CONSTRUCT DRIVEWAY APPROACHES PER STANDARD DRAWING 302. EXACT SIZE AND LOCATION TO BE STAKED BY THE PRIVATE ENGINEER PRIOR TO CONSTRUCTION OF THE CURB AND GUTTER.
16. IN PAVEMENT OVERLAY AREAS, ANY DISTRESSED EXISTING PAVEMENT SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE INSPECTOR PRIOR TO OVERLAYING WITH A.C. PAVING.
17. SEE PUBLIC LANDSCAPE PLAN NO. R-3790-L AS PREPARED BY HERMANN & ASSOCIATES FOR LANDSCAPE IMPROVEMENTS ALONG COLE AVENUE.
18. QUANTITIES SHOWN ARE FOR INFORMATION ONLY AND THE CITY OF RIVERSIDE IS NOT RESPONSIBLE FOR THEIR ACCURACY..

STREET NAME AND TRAFFIC SIGN SCHEDULE

	NAME	BLOCK NO.
(A)	R-1 (STOP SIGN - 30")	
(B)	COLE AVENUE	9500
	LURIN AVENUE	19400
(C)	COLE AVENUE	9500
	MISSION RANCH RD.	19400
(D)	LURIN AVENUE	19400
	FRIAR ROAD	9500
(E)	LURIN AVENUE	19300
	MISSION RANCH RD.	9500
(F)	MISSION RANCH RD.	19300
	LOS AMIGOS COURT	9500
(G)	FRIAR ROAD	9500
	MI CASA COURT	19400

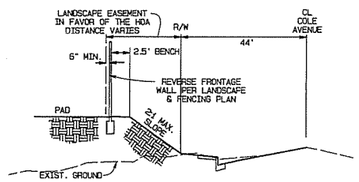
INSTALL SIGNS PER C/R STD. 662; C/R STD. 662A AND STD. 666.



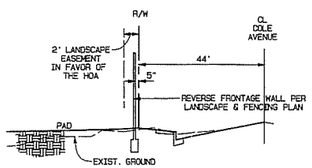
INDEX MAP

SCALE: 1" = 100'

GRAPHIC SCALE 1"=100'
0 100 200 300



SECTION B-B
N.T.S. FOR LOT 8



SECTION A-A
N.T.S. FOR LOTS 28, 29, & 38

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

NOTE: APPROVED FOR CONSTRUCTION WITHIN UNINCORPORATED AREA OF RIVERSIDE COUNTY ONLY.

CONSTRUCTION NOTES

		QUANTITIES (WITHIN COUNTY RIGHT-OF-WAY ONLY)
(1)	CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION	
(1b)	CONSTRUCT 4" A.C. PAVING OVER 6" CLASS II AGGREGATE BASE, PER TYPICAL SECTION	13,388 S.F.
(2a)	CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200	
(2b)	CONSTRUCT TYPE 1 CURB & GUTTER, 8" C.F., PER CITY OF RIVERSIDE STD. NO. 200	
(3)	CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325	
(4)	CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220	
(5a)	CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304	
(5b)	CONSTRUCT MID BLOCK WHEELCHAIR RAMP, TYPE II-A, PER CITY OF RIVERSIDE STD. NO. 304	
(5c)	CONSTRUCT WHEELCHAIR RAMP, TYPE VII W/ CURB SIDE SW, PER CITY OF RIVERSIDE STD. NO. 304	
(6)	CONSTRUCT STREET NAME SIGN, PER CITY OF RIVERSIDE STD. NO. 662 OR 662A	
(7)	CONSTRUCT BARRICADE, WITH 2 x 4 HEADER, PER CITY OF RIVERSIDE STD. NO. 180	
(8)	REMOVE 2 x 4 REDWOOD HEADER AND JOIN EXISTING PAVEMENT	
(9)	INSTALL CLASS I, TYPE F DELINEATORS PER CALTRANS STD. PLAN A73C (20' O.C. TYP.)	
(10)	PROTECT IN PLACE	
(11)	TO BE RELOCATED BY OTHERS	
(12)	CONSTRUCT BLOCK WALL PER CITY STD. 704, OR APPROVED DESIGNS (SEE PLAN FOR HEIGHT (6)) TYPE / COLOR OF BLOCK: 6"x8"x16" SPLIT FACE, "TAN", MORTAR COLOR: "TAN" SIZE/ TYPE / COLOR CAP: 4"x16"x16" BEVELED CAP, "NATURAL GREY". THIS WALL REQUIRES A PERMIT AND INSPECTION FROM THE PUBLIC WORKS ENGINEERING DIVISION.	
(13)	SAWCUT MINIMUM 1' AND JOIN EXISTING PAVEMENT PER DETAIL ON SHEET 3	25 L.F.
(14)	CONSTRUCT CATCH BASIN (N=21) PER CITY OF RIVERSIDE STD. NO. 405	
(15)	CONSTRUCT REINF. CONC. DBL. BOX CULVERT NO. 2 PER CITY OF RANCHO CUCAMONGA STD. PLAN 315 - DETAIL AS SHOWN ON SHEET 4; "S"= 6'-0", "V"= 0'-8"	17 C.Y
(16)	INSTALL LIGHT CLASS NATURAL ROCK RIP-RAP W/ 6" FILTER (DIMENSION PER PLAN)	30 C.Y
(17)	INSTALL 3.5'X1' CUTOFF WALL (DIMENSION PER PLAN)	4 C.Y
(18)	CONSTRUCT 2 x 4 REDWOOD HEADER ALONG EDGE OF PAVEMENT	
(19)	CONSTRUCT STEEL GUARD RAIL PER CITY OF RIVERSIDE STD. DWG. NO. 650	25 L.F.
(20)	REMOVE EXISTING PAVEMENT	13,388 S.F.
(21)	CONSTRUCT 12" PARKWAY DRAIN PER A.P.W.A. STD. PLAN 151	
	ROADWAY EXCAVATION	248 C.Y
	ASPHALT EMULSION	0.5 TON

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER OR CONTRACTOR TO APPLY TO THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT, PERMIT SECTION, FOR AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE; AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT. ADDITIONAL STUDIES AND/OR PERMITS MAY BE REQUIRED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITTEE MUST INFORM COUNTY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION. PHONE: (909) 955-6985
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR DEVELOPER TO INSTALL AND MAINTAIN ALL CONSTRUCTION, REGULATORY, GUIDE AND WARNING SIGNS WITHIN THE PROJECT LIMITS AND ITS SURROUNDINGS TO PROVIDE SAFE PASSAGE FOR THE TRAVELING PUBLIC AND WORKERS UNTIL THE FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT BY THE COUNTY. A TRAFFIC CONTROL PLAN SHALL BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO OBTAINING AN ENCROACHMENT PERMIT.
4. ALL STREET SECTIONS ARE TENTATIVE. ADDITIONAL SOILS TESTS SHALL BE TAKEN BY THE COUNTY AFTER ROUGH GRADING TO DETERMINE THE EXACT STREET SECTION REQUIREMENTS. USE STANDARD NO. 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
5. ASPHALTIC EMULSION (FOG SEAL)SHALL BE APPLIED NOT LESS THAN 14 DAYS FOLLOWING PLACEMENT OF THE ASPHALT SURFACING. FOG SEAL AND PAINT BINDER SHALL BE APPLIED AT A RATE OF 0.05 AND 0.03 GALLON PER SQUARE YARD RESPECTIVELY. ASPHALTIC EMULSION SHALL CONFORM TO SECTION 37, 39, AND 94 OF THE STATE STANDARD SPECIFICATIONS.
6. THE DEVELOPER SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ADDITIONAL SIGNS AND MARKINGS NOT INCLUDED IN THE SIGNING AND STRIPING PLAN WITHIN THE PROJECT AREAS, OR ON ROADWAYS ADJACENT TO THE PROJECT BOUNDARIES, UPON THE REQUEST OF THE DIRECTOR OF TRANSPORTATION OR HIS DESIGNEE TO IMPROVE TRAFFIC SAFETY ON THE ROADS UNDER THE JURISDICTION OF THE DEVELOPER.

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE.

RIV. CO. # MS 3938 I.P. 040013

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

REVIEW BY:
WESTERN MUNICIPAL WATER DISTRICT
FOR NON-INTERFERENCE COMPLIANCE
SHEET 1 THROUGH 7
CIVIL ENGINEER RCE 46212
DATE: 6/18/04

SEAL-COUNTY
REGISTERED PROFESSIONAL ENGINEER RAILED A. OTHMAN No. 33650 EXP. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: DATE 7/20/04
KHALED A. OTHMAN, P.E.
R.C.E. 33650 EXP. 6-30-06
RECOMMENDED: WILL DAN DATE 7/20/04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFREY No. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY: DATE 6-14-04
R.C.E. NO. 49405

MARK	REVISIONS	APPR.	DATE
1	ADDED PAVING SECTIONS	RJR	12-3-04
2	ADD INTERIOR STREET SECTIONS 10/6/04	RJR	10/21/04

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	APPROVED BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		8/16/04
TRAFFIC DIVISION		8/17/04
STREET SERVICES		8/3/04
PLANNING DEPT.		8/17/04

APPROVED BY: CITY ENGINEER
DATE 8/26/04

STREET IMPROVEMENT PLANS

TRACT NO. 31362
INCLUDES RIV. CO. TRANS. DEPT. MS # 3938
INDEX SHEET

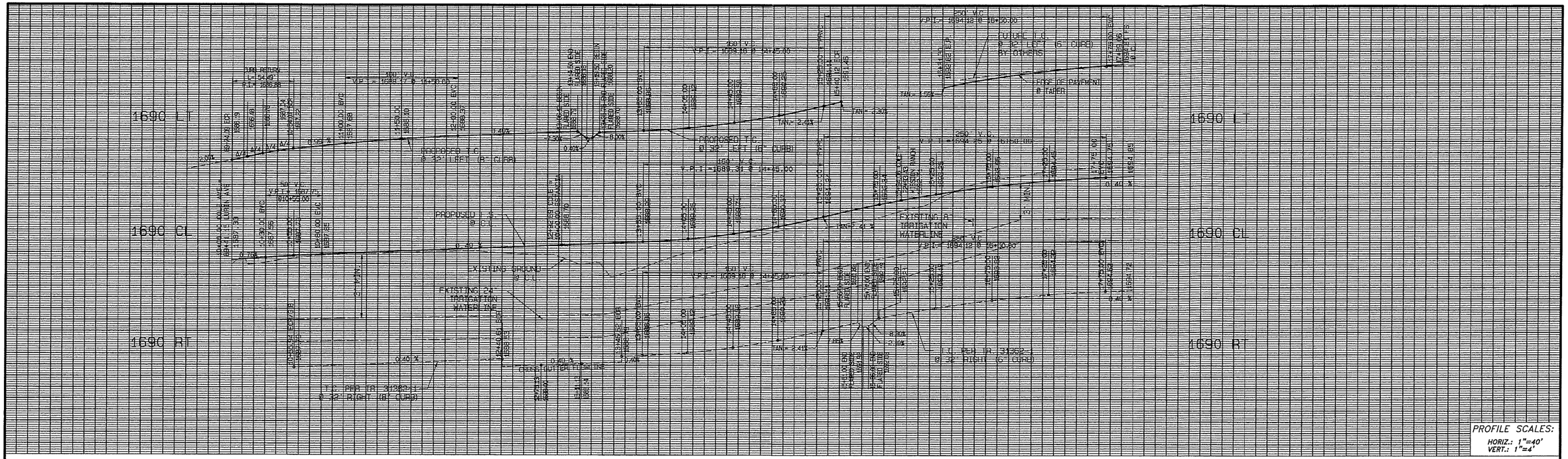
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DRAWING NUMBER
R-3790
SHEET 1 OF 7
PW 03-0504

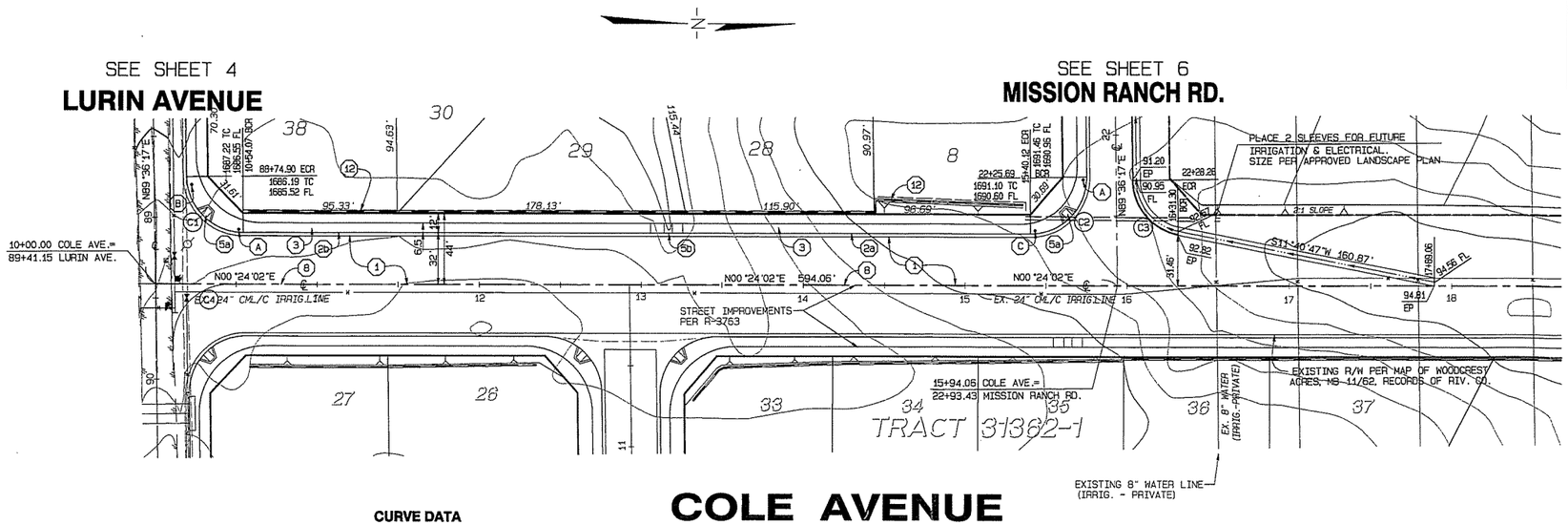
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Pc 4404 S2



NOTE:
PRIVATE WATER LINES ARE SHOWN BASED ON BEST AVAILABLE INFORMATION. NO PUBLIC RECORDS HAVE BEEN FOUND TO DETERMINE OWNERSHIP, OR RIGHTS THERETO. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR ANY CHANGES TO, OR REMOVAL OF, ANY PRIVATE WATER LINES.



CONSTRUCTION NOTES

1. CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION
2a. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F. , PER CITY OF RIVERSIDE STD. NO. 200
2b. CONSTRUCT TYPE 1 CURB & GUTTER, 8" C.F. , PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
5a. CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304
5b. CONSTRUCT MID BLOCK WHEELCHAIR RAMP, TYPE II-A, PER CITY OF RIVERSIDE STD. NO. 304
8. REMOVE 2 x 4 REDWOOD HEADER AND JOIN EXISTING PAVEMENT
12. CONSTRUCT BLOCK WALL PER CITY STD. 704, OR APPROVED DESIGNS

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C1	89°12'15"	35.00'	54.49'	34.53'
C2	90°47'45"	35.00'	55.45'	35.49'
C3	77°55'30"	35.00'	47.60'	28.30'
C4	88°45'15"	35.00'	54.21'	34.24'

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK:
CITY OF RIVERSIDE BENCH MARK GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.
ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFREY NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY _____ DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		8/25/04
PARK DEPARTMENT		8/25/04
TRAFFIC DIVISION		8/25/04
STREET SERVICES		8/25/04
PLANNING DEPT.		8/25/04

APPROVED BY _____ CITY ENGINEER
DATE 8/26/04

STREET IMPROVEMENT PLANS
TRACT NO. 31362
COLE AVENUE

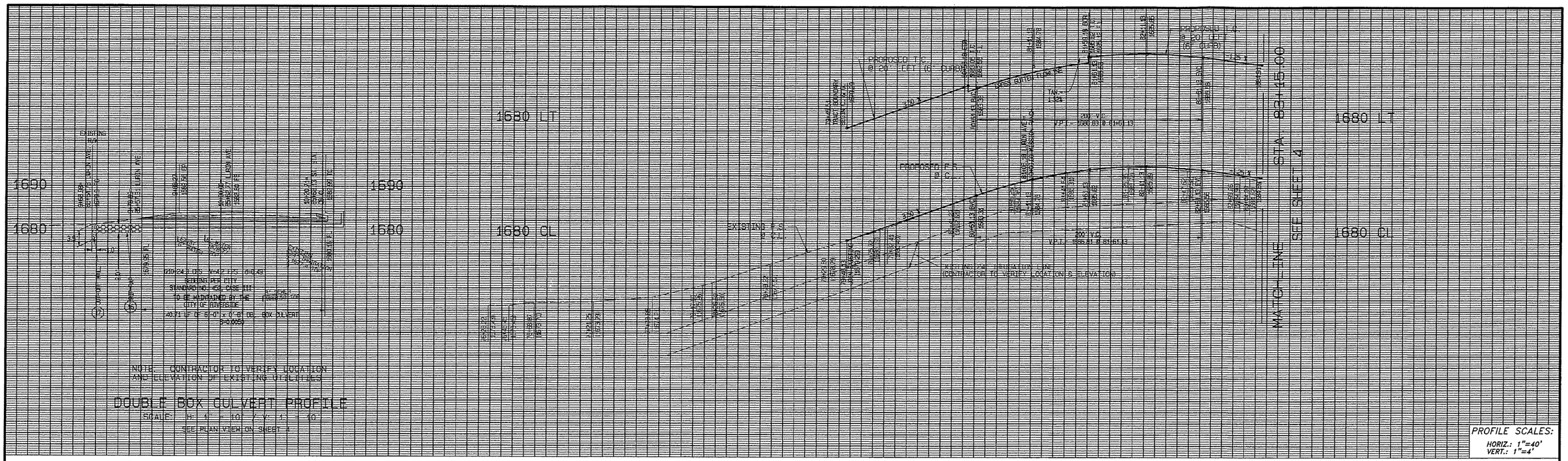
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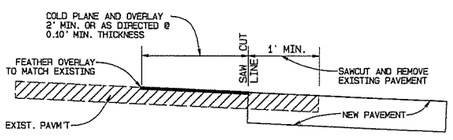
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DRAWING NUMBER
R-3790
SHEET 2 OF 7
PW 03-00504

FILE: G:\2003\03-0269\Streets\03-0269-Str.prn PLOT DATE: 6/14/2004

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INDEXED 9-08-04 LH



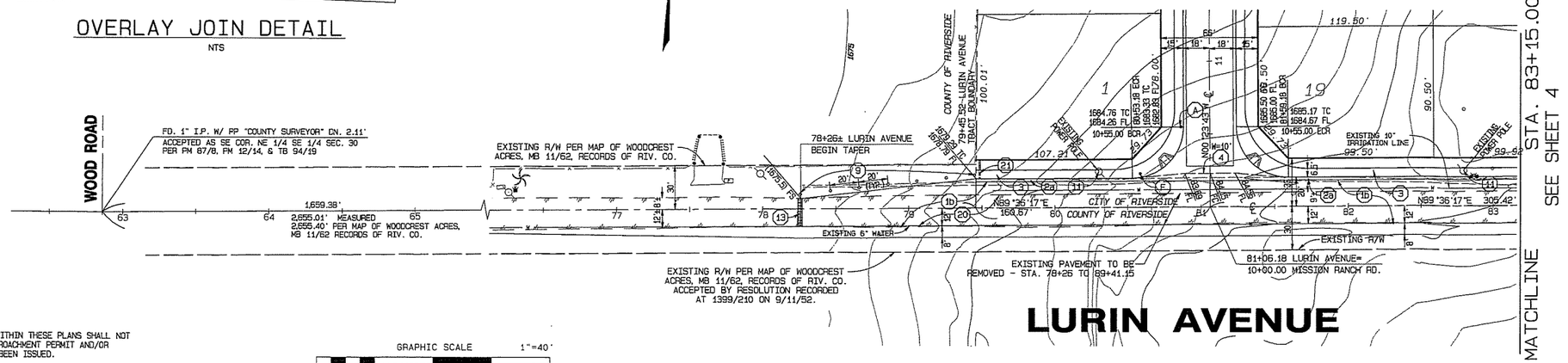


OVERLAY JOIN DETAIL

NTS

SEE SHEET 5

MISSION RANCH RD.



LURIN AVENUE

CONSTRUCTION NOTES

15. CONSTRUCT 0.33' A.C. PAVING OVER 0.50' CLASS II AGGREGATE BASE, PER TYPICAL SECTION
28. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
4. CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
9. INSTALL CLASS I, TYPE F DELINEATORS PER CALTRANS STD. PLAN A73C
11. TO BE RELOCATED BY OTHERS
12. CONSTRUCT BLOCK WALL PER CITY STD. 704, OR APPROVED DESIGNS
13. SAWCUT MIN. 1' AND JOIN EXISTING PAVEMENT PER DETAIL ON THIS SHEET
16. INSTALL LIGHT CLASS NATURAL ROCK RIP-RAP W/ 6" FILTER
17. INSTALL 3.5'X1' CUTOFF WALL (DIMENSION PER PLAN)
20. REMOVE EXISTING PAVEMENT
21. CONSTRUCT 12" PARKWAY DRAIN PER A.P.W.A. STD. PLAN 151

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

NOTE: APPROVED FOR CONSTRUCTION WITHIN UNINCORPORATED AREA OF RIVERSIDE COUNTY ONLY.

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE.

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BENCH MARK:
CITY OF RIVERSIDE BENCH MARK GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.
ELEVATION: 1757.219

SEAL—COUNTY
REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN NO. 33859 EXP. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: [signature] DATE 7/28/04
KHALED A. OTHMAN, P.E. R.C.E. 33859 EXP. 6-30-06
RECOMMENDED: WILLDAN [signature] DATE 7/20/04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFREY NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY [signature] DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		8/26/04
PARK DEPARTMENT		8/26/04
TRAFFIC DIVISION		8/26/04
STREET SERVICES		8/26/04

APPROVED BY [signature] CITY ENGINEER
DATE 8/26/04

STREET IMPROVEMENT PLANS

TRACT NO. 31362
INCLUDES RIV. CO. TRANS. DEPT. MS # 3938
LURIN AVENUE

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

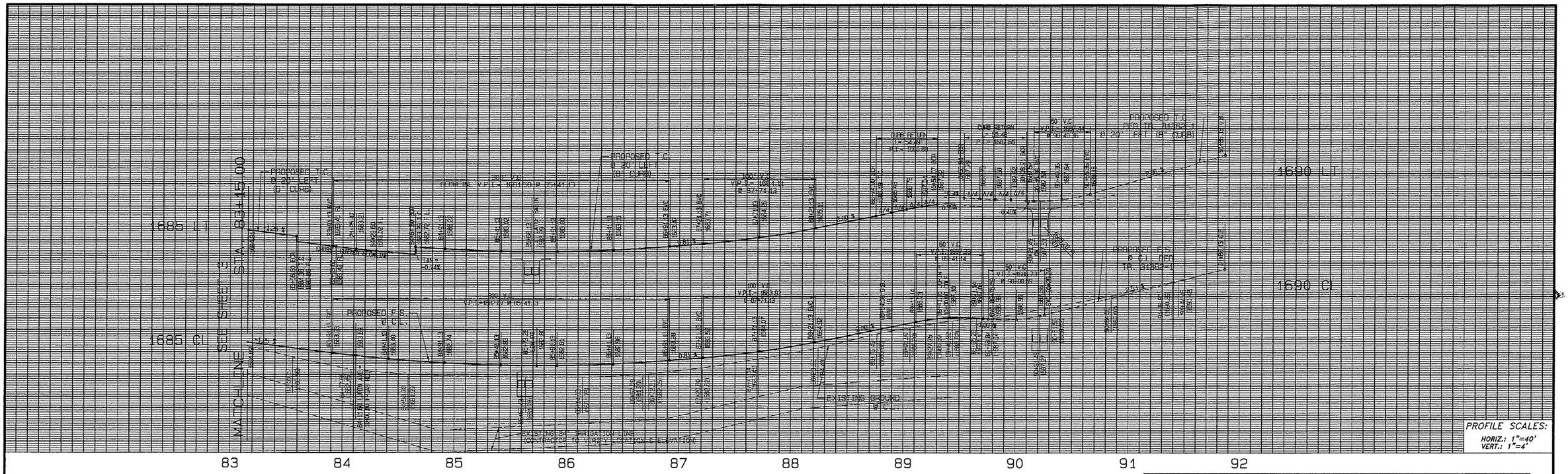
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DRAWING NUMBER
R-3790
SHEET 3 OF 7
PW 03-00504

RIV. CO. # MS 3938 I.P. 040013

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INDEXED 9-08-04 GH

FILE: G:\2003\03-0269\Streets\03-0269-Sht-pmp PLOT DATE: 6/14/2004



NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

NOTE: APPROVED FOR CONSTRUCTION WITHIN UNINCORPORATED AREA OF RIVERSIDE COUNTY ONLY.

PROFILE SCALES:
HORIZ.: 1"=40'
VERT.: 1"=4'

GENERAL NOTES

1. ALL BARS SHALL BE ROUND AND DEFORMED, AND SHALL BE LAPPED 20 DIAMETERS AT ALL SPLICES.
2. TIE BARS TO BE #5
3. DIMENSIONS "S" AND "V" ARE SPECIFIED ON PLAN
4. BARS SHALL BE COVERED AT ALL PARTS WITH 1" OF CONCRETE UNLESS OTHERWISE SPECIFIED HEREON.
5. FORM SURFACE (SF PER FT.) = 2'S' + 0.5'V' + 2.833 ('S' IN FT., 'V' IN INCHES)
6. "D" VARIES FROM 0'-4'
7. CONCRETE SHALL BE CLASS B, MINIMUM 3250PSI

STANDARD REINFORCING

SPAN (S)	A BARS SIZE	A BARS SPACING	A BARS LENGTH	B BARS SIZE	B BARS SPACING	B BARS "a"	B BARS LENGTH
3' 6"	# 5	14"	8' 10"	# 5	14"	22"	10' 8 1/2"
4' 0"	# 5	12"	9' 10"	# 5	12"	24"	11' 8 1/2"
4' 6"	# 5	11"	10' 10"	# 5	11"	26"	12' 8 1/2"
5' 0"	# 5	10"	11' 10"	# 5	10"	28"	13' 8 1/2"
5' 6"	# 5	10"	12' 10"	# 5	10"	30"	14' 8 1/2"
6' 0"	# 5	10"	13' 10"	# 5	10"	32"	15' 8 1/2"

QUANTITIES PER 10 FT. LENGTH

SPAN (S)	CONCRETE (CY) FOR VARYING DEPTHS 8"	9"	10"	12"	14"	16"	18"	STEEL POUNDS
3' 6"	5.54	5.60	5.66	5.79	5.91	6.03	6.15	742
4' 0"	6.11	6.17	6.23	6.36	6.48	6.60	6.73	845
4' 6"	6.67	6.73	6.79	6.92	7.04	7.16	7.29	998
5' 0"	7.23	7.29	7.35	7.48	7.60	7.72	7.85	1,118
5' 6"	7.80	7.85	7.92	8.05	8.17	8.29	8.42	1231
6' 0"	8.36	8.42	8.48	8.64	8.73	8.85	8.98	1,303

CITY OF RANCHO CUCAMONGA
REINFORCED CONCRETE BOX CULVERT NO. 2
STANDARD PLAN NO. 315

CONSTRUCTION NOTES

(1b) CONSTRUCT 0.33' A.C. PAVING OVER 0.50' CLASS II AGGREGATE BASE, PER TYPICAL SECTION
(2a) CONSTRUCT TYPE 1 CURB & GUTTER 6" C.F. PER CITY OF RIVERSIDE STD. NO. 200
(2b) CONSTRUCT TYPE 1 CURB & GUTTER, 8" C.F. , PER CITY OF RIVERSIDE STD. NO. 200
(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
(4) CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
(11) TO BE RELOCATED BY OTHERS
(13) SAWCUT MIN. 1' AND JOIN EXISTING PAVEMENT PER DETAIL ON SHEET 3
(14) CONSTRUCT CATCH BASIN (W=21') PER CITY OF RIVERSIDE STD. NO. 405
(15) CONSTRUCT REINF. CONC. DBL. BOX CULVERT NO. 2 PER CITY OF RANCHO CUCAMONGA STD. PLAN 315 - DETAIL AS SHOWN ON THIS SHEET: "S"= 6'-0", "V"= 0'-8"
(16) INSTALL 2' LIGHT CLASS NATURAL ROCK RIP-RAP W/ 6" FILTER (DIMENSION PER PLAN)
(17) INSTALL 3.5'X1' CUTOFF WALL (DIMENSION PER PLAN)
(19) CONSTRUCT STEEL GUARD RAIL PER CITY OF RIVERSIDE STD. DWG. NO. 650
(20) REMOVE EXISTING PAVEMENT

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE.

RIV. CO. # MS 3938 I.P. 040013

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BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

REGISTERED PROFESSIONAL ENGINEER KHALED A. DIWAN NO. 33950 EXP. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: _____ DATE 7/20/04
KHALED A. DIWAN, P.E.
R.C.E. 33950 EXP. 6-30-06
RECOMMENDED: WILLDAN _____ DATE 7/20/04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFREY NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY _____ DATE 6-14-04
R.C.E. NO. C49405
DESIGNED BY: J.M. CHECKED BY: L.M.

MARK	REVISIONS	APPR.	DATE

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		
PLANNING DEPT.		

APPROVED BY _____ CITY ENGINEER
DATE 8/25/04

STREET IMPROVEMENT PLANS
TRACT NO. 31362
INCLUDES RIV. CO. TRANS. DEPT. MS # 3938
LURIN AVENUE
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 4 OF 7
PW 03-00504

PC 44 of 52

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FILE: G:\2003\03-0269\Streets\03-0269-Storm PLOT DATE: 6/14/2004

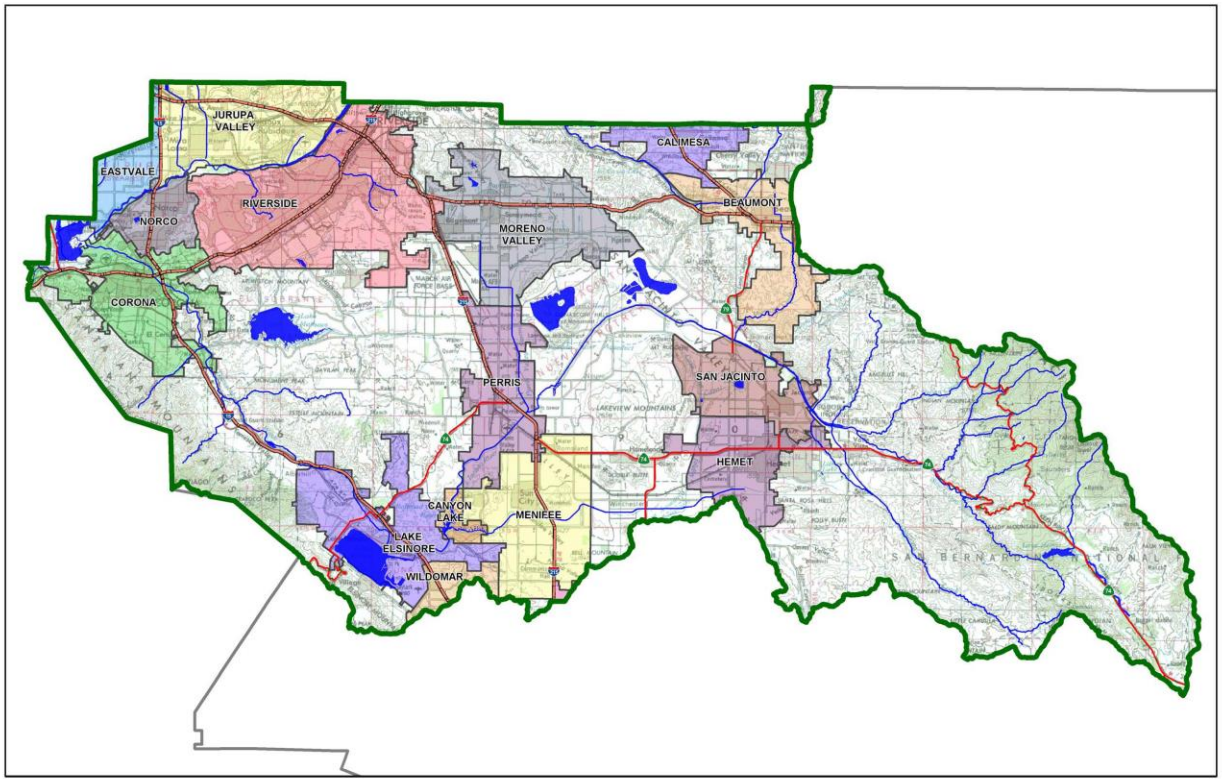
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Tentative Tract Map 37731

Development No: PW20-0034

Design Review/Case No: DR-P20-0387



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 01/09/20

Revision Date(s): TBD

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016

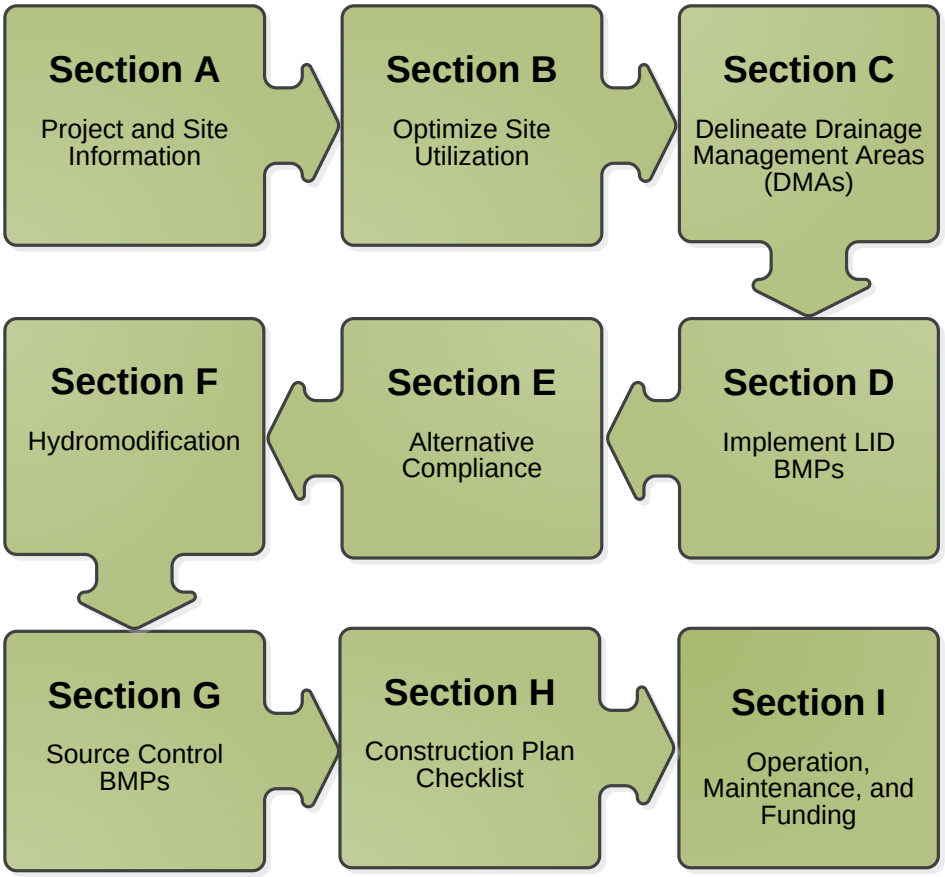
Contact Information:

Prepared for:
Lurin Land, LLC
10621 Civic Center Drive
Rancho Cucamonga, CA 91730
Nolan C. Leggio
(909) 373-2628

Prepared by:
KWC Engineers
1880 Compton Ave., Suite 100
Corona, CA 92881
Matthew Laninovich, P.E.
(951) 734-2130 x241

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Lurin Land, LLC by KWC Engineers for the Lurin project.

This WQMP is intended to comply with the requirements of City of Riverside for Storm Water Quality Ordinance, number 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the City of Riverside Water Quality Ordinance (Municipal Code Section14.12.315).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Nolan C. Leggio	
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Matthew Laninovich	Project Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Single Family Residential
Planning Area:	4
Community Name:	Lurin
Development Name:	Tentative Tract Map 37731
PROJECT LOCATION	
Latitude & Longitude (DMS): 33° 52'30''N, 117° 19'20''W	
Project Watershed and Sub-Watershed: Santa Ana; Santa Ana River, Reach 3	
Gross Acres: 32.6	
APN(s): 266-140-021, 266-140-022, 266-140-029, 266-140-030, 266-140-049, 266-140-050	
Map Book and Page No.: N/A	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Single Family Residential
Proposed or Potential SIC Code(s)	1521
Area of Impervious Project Footprint (SF)	0
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	500,911
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☒ Y ☐ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	-
Are there any natural hydrologic features on the project site?	☒ Y ☐ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	C and D
What is the Water Quality Design Storm Depth for the project?	0.54

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
TEMESCAL CREEK, REACH 1	NONE	REC1, REC2, WARM, WILD	N/A
SANTA ANA RIVER, REACH 3	PATHOGENS	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	16 MILES

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☒ Y	☐ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☒ Y	☐ N
US Army Corps of Engineers, CWA Section 404 Permit	☒ Y	☐ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☒ Y	☐ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)*		
City of Riverside Conditional Use Permit	☐ Y	☒ N
City of Riverside Design Review	☐ Y	☒ N
City of Riverside Building Permit	☒ Y	☐ N
City of Riverside Grading Permit	☒ Y	☐ N
City of Riverside Construction Permit	☐ Y	☒ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The existing drainage pattern of the site were identified and preserved. In the existing condition the site has a highpoint at the entrance point on Street J at the Northeast potion of our site by Cole Avenue. From that point, the site drains to the Southwest towards Mariposa Avenue. On the middle of Street G there is a localized high point that splits flow to go Southwest and Southeast towards Mariposa Avenue. Furthermore, on Street C by Lot I, the site contains another high point that splits flow to go North and South. Finally, at the entrance of Street A by Lurin Avenue there is a localized high point that diverts the flow South. Our proposed conditions retain the existing conditions by placing ridges at the existing high points throughout the site and have the streets sheet flow the water in the same drainage pattern as existing until the runoff water hits a catch basin that diverts water into our WQMP Basins.

Did you identify and protect existing vegetation? If so, how? If not, why?

The project site is surrounded by residential tracts to the North, South, West, and a vacant lot to the East. Within the site we have vegetated lush that is comprised of grass, shrubs, and trees. The vegetation on building grounds will be removed. The existing vegetation and drainage patterns that will be protected are identified in the WQMP Site Plan.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

The site consists of Fallbrook sandy loam and fine sandy loam soil consistent with soil type C and D. The infiltration rate of the site is not determined but will be done prior to final engineering design. Assuming the previous soil type present on site from NRCS soils report, the site should be able to infiltrate, therefore, we proposed infiltration basins to treat the water thus protecting natural infiltration capacity.

Did you identify and minimize impervious area? If so, how? If not, why?

The impervious area has been minimized in relation to the size of the site and the relative density of the development. The site design proposes public roadways, residential lots, landscaped slopes, and natural open space. The proposed roadway widths are designed to meet City of Riverside Standards.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, roof runoff has been designed to drain into pervious landscape areas with each residential lot prior to discharge onto streets or connection to proposed on-site storm drain systems. The 2-yr storm runoff from development will be collected and conveyed to proposed WQMP treatment areas for treatment prior to discharge or connection to proposed on-site storm drain system.

Section C: Delineate Drainage Management Areas (DMAs)

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1][2]	Area (Sq. Ft.)	DMA Type
DMA 1A	Roofs, Concrete/Asphalt, Landscaping	816,750 sf	Type D
DMA 2A	Roofs, Concrete/Asphalt, Landscaping	601,128 sf	Type D

[1]Reference Table 2-1 in the WQMP Guidance Document to populate this column
[2]If multi-surface provide back-up

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
N/A			

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
N/A						

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Impervious fraction [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]
N/A							

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA 1A	Bio-Retention Basin 1A
DMA 2A	Infiltration Basin 2A

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: 1A		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

☒ None of the above.

Harvest and Use BMPs need not be assessed for the site.

Irrigation Use Feasibility

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape:

Type of Landscaping (Conservation Design or Active Turf):

Step 2: *Total Area of Impervious Surfaces:*

Step 3: *Enter your EIATIA factor*:

Step 4: *Minimum required irrigated area*:

Step 5:

Minimum required irrigated area (Step 4)	**Available Irrigated Landscape (Step 1)**
N/A	N/A

Toilet Use Feasibility

Step 1: *Projected Number of Daily Toilet Users:*

Project Type: Residential

Step 2: *Total Area of Impervious Surfaces: ___ (Acres)*

Step 3: *Enter your TUTIA factor:*

Step 4: *Minimum number of toilet users:*

Step 5:

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
N/A	N/A

Other Non-Potable Use Feasibility

Step 1: *Average Daily Demand: ___ (gpd)*

Step 2: *Total Area of Impervious Surfaces:*

Step 3: *Enter the factor from Table 2-4:*

Step 4: *Minimum required use: ___ (gpd)*

Step 5:

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
N/A	N/A

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4.

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5.

D.4 Feasibility Assessment Summaries

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA 1A	☐	☐	☒	☐	☐
DMA 2A	☒	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

D.5 LID BMP Sizing

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Bio-Retention 1A*		
1A	[A]		[B]	[C]	[A] x [C]			
Roofs	*204,000*	*Roofs*	*1*	*0.89*	*181,968*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Dwy	*14,960*	*Concrete or Asphalt*	*1*	*0.892*	*13,344*			
Street	*191,325*	*Concrete or Asphalt*	*1*	*0.892*	*170,662*			
Open	*0*	*Natural (D Soil)*	*0.4*	*0.279712*	*0*			
Landscape	*406,465*	*Omamental Landscaping*	*0.1*	*0.110458*	*44,897*			
	A_T = 816,750				Σ= 410,872	0.54	18,498	***18,764***

[B], [C] are obtained from Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A of the WQMP Guidance Document
[G] is obtained from LID BMP design procedure sheet, placed in Appendix 6

Table D.4 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Infiltration Basin 2A*		
2A	[A]		[B]	[C]	[A] x [C]			
Roofs	*127,200*	*Roofs*	*1*	*0.89*	*113,462*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Dwy	*9,328*	*Concrete or Asphalt*	*1*	*0.892*	*8,321*			
Street	*137,698*	*Concrete or Asphalt*	*1*	*0.892*	*122,827*			
Open	*0*	*Natural (D Soil)*	*0.4*	*0.279712*	*0*			
Landscape	*326,902*	*Omamental Landscaping*	*0.1*	*0.110458*	*36,109*			
	A_T = 601,128				Σ= 280,719	0.54	12,632	***38,536***

[B], [C] are obtained from Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A of the WQMP Guidance Document

[G] is obtained from LID BMP design procedure sheet, placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	-	-	-
Volume (Cubic Feet)	-	-	-

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

N/A

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

The Project meets condition “c” as shown on Appendix 7.

Section G: Source Control BMPs

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site Storm Drain Inlets	• Mark all inlets with the words "Only Rain-Down the Storm Drain" or similar. Catch Basin Markers shall be per local agency requirements	• Maintain and periodically repaint or replace inlet markings. • Provide Stormwater pollution prevention information to new site owners, lessees, or operators. • See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com • Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
Landscape/ Outdoor Pesticide Use	Final landscape plans will accomplish all of the following: • Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. • Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. • Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. • Consider using pest-resistant plants, especially adjacent to hardscape. • To insure successful establishment, select plants	• Maintain landscaping using minimum or no pesticides. • See applicable operational BMPs in "What you should know for…..landscape and Gardening" at http://rcflood.org/stormwater/ • Provide IPM information to new owners, lessees and operators.

	appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	

Section H: Construction Plan Checklist

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
DMA 1A	Bio-Retention Basin	Sheet 2	33° 52’ 29” N , -117° 19’ 39” W
DMA 2A	Infiltration Basin	Sheet 3	33° 52’ 23” N , -117° 19’ 31” W

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Maintenance Mechanism: Privately maintained by developed HOA

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

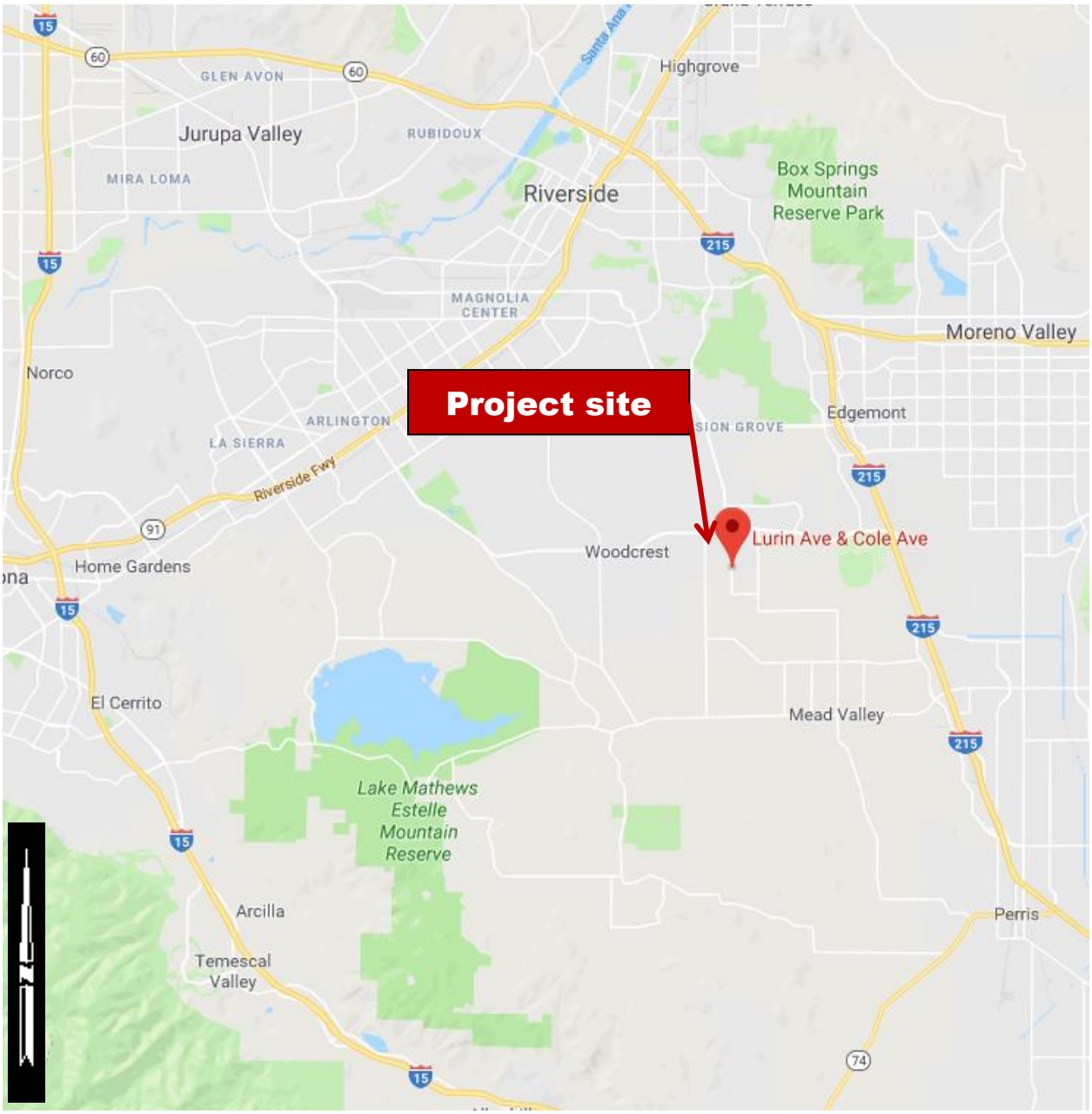
☒ Y ☐ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

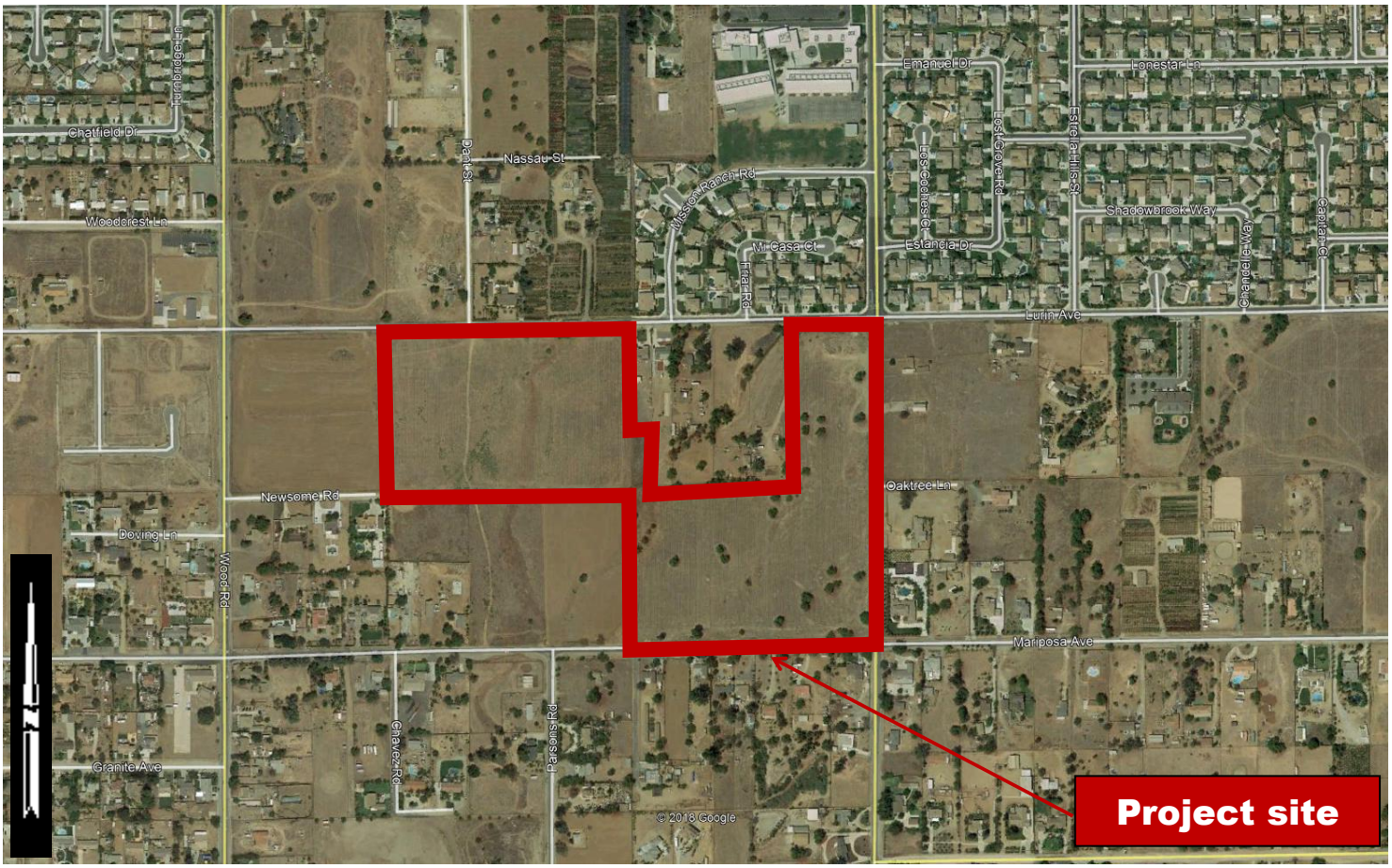
Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

VICINITY MAP



LOCATION MAP



LATITUDE AND LONGITUDE OF THE PROJECT



Clear / Reset | Remove Last Blue Marker | Center Red Marker

Get the Latitude and Longitude of a Point

When you click on the map, move the marker or enter an address the latitude and longitude coordinates of the point are inserted in the boxes below.

Latitude:	33.876503
Longitude:	-117.322581

	Degrees	Minutes	Seconds
Latitude:	33	52	35.4102
Longitude:	-117	19	21.291

Show Point from Latitude and L

Use this if you know the latitude a
Use: + for *N* Lat or *E* Long - for
Example: +40.689060 -74.04463
Note: Your entry should not have

Decimal Deg. Latitude:

Decimal Deg. Longitude:

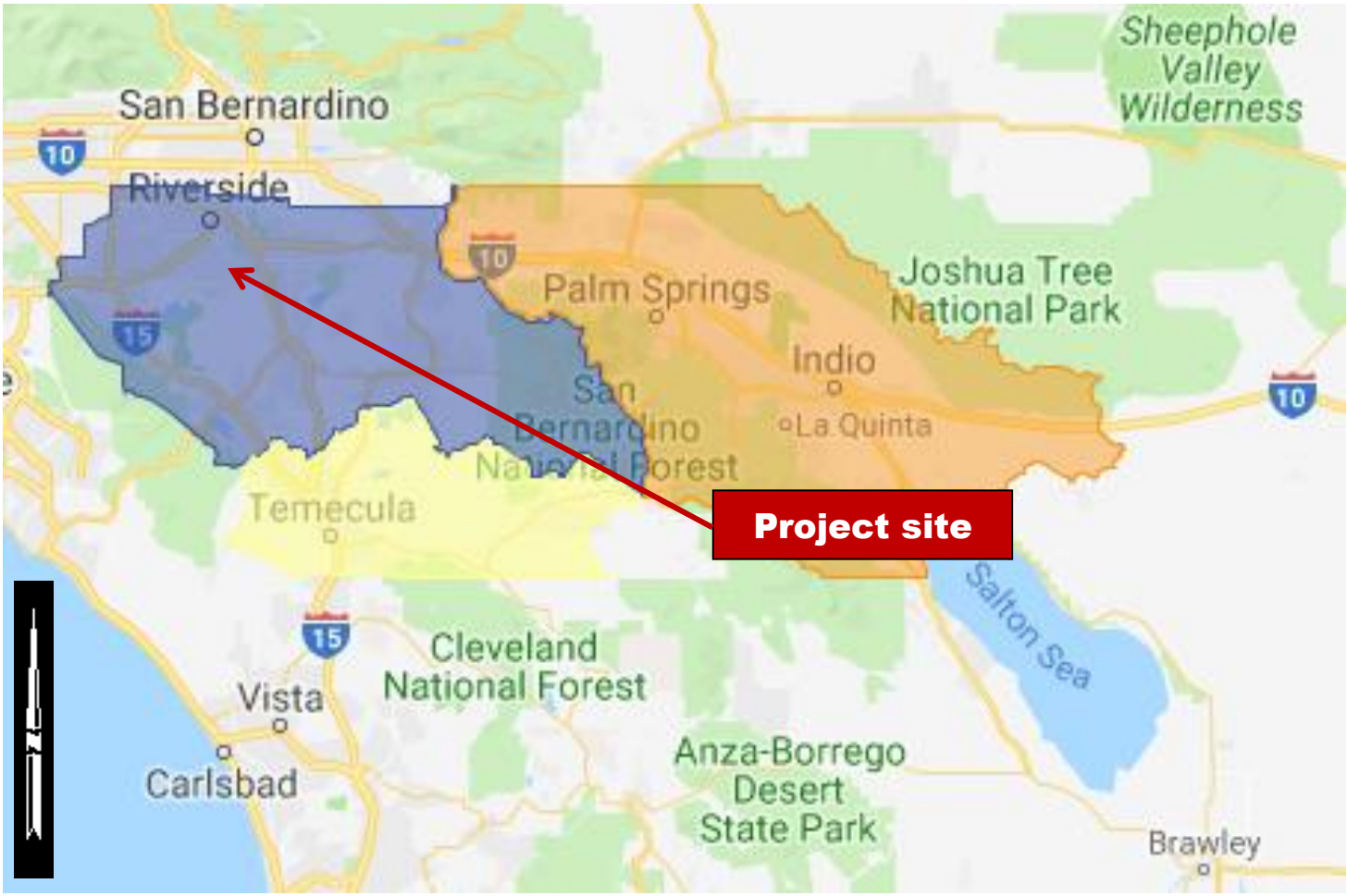
Example: **+34 40 50.12** for *34*

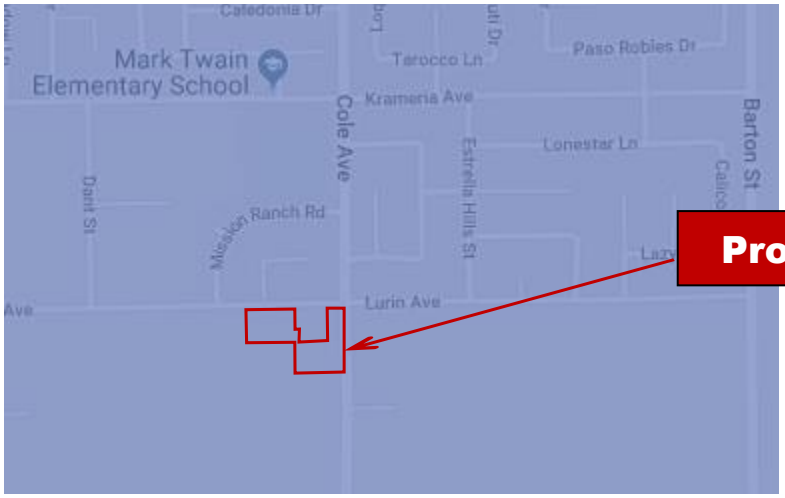
Latitude:

Longitude:

33° 52’ 235.4” N,
-117° 19’ 21.3” W

WATERSHED MAP





Riverside Watershed Map

Santa Ana River Watershed

Santa Margarita River Watershed

Whitewater River Watershed

RECEIVING WATERS MAP

Lake Evans

Santa Ana River, Reach 3

Anza Park Drain

La Sierra Channel

Temescal Creek, Reach 1

Arlington Channel

Mockingbird Reservoir

Sycamore Creek

Lake Matthews

Main St

215 Fwy

3rd St

University Ave

14th St

RCC

60/215 Fwy

UCR

Chicago Ave

Jurupa Ave

Central Ave

Arlington Ave

Madison St

Magnolia Ave

91 Fwy

La Sierra Ave

Tyler St

La Sierra Univ

Victoria Ave

Adams St

Washington St

Trautwein Rd

Van Buren Blvd

60 Fwy

Sycamore Canyon Park

Alessandro Blvd

215 Fwy

SITE

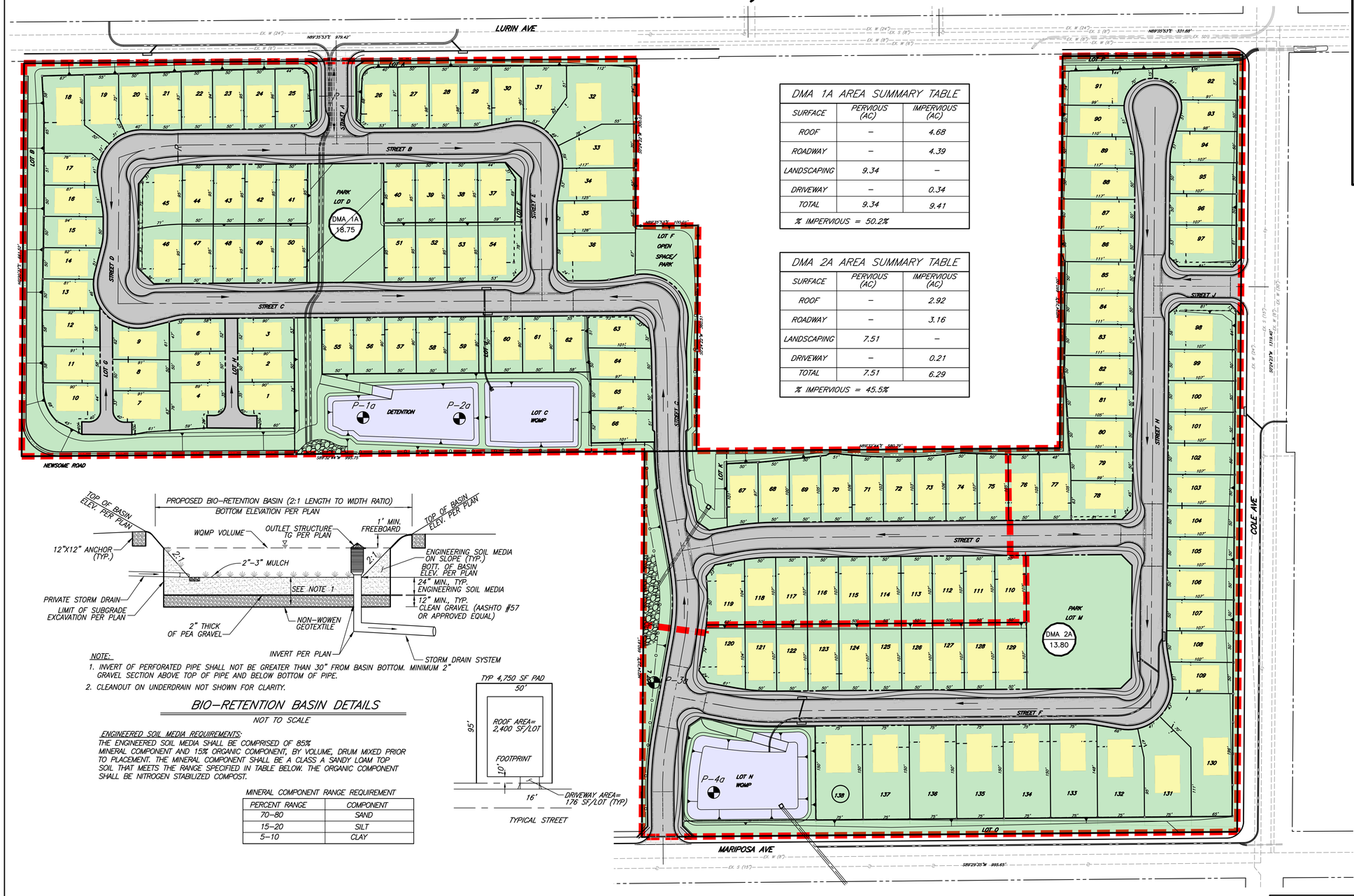
N

LEGEND

- Lake Evans to Santa Ana River, Reach 3
- Tequesquite Arroyo (Sycamore Creek) to Santa Ana River, Reach 3
- Anza Park Drain to Santa Ana River, Reach 3
- Santa Ana River, Reach 3
- Mockingbird Reservoir to Temescal Creek, Reach 1 to Santa Ana River, Reach 3 - via Arlington Channel
- Temescal Creek, Reach 1 to Santa Ana River, Reach 3 - via Arlington Channel
- Temescal Creek, Reach 1 to Santa Ana River, Reach 3 - via La Sierra Channel to Arlington Channel
- Outside City Limits
- San Jacinto Watershed

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SITE PLAN FOR
PRELIMINARY WATER QUALITY MANAGEMENT PLAN
RIVERSIDE, CALIFORNIA



DMA 1A AREA SUMMARY TABLE		
SURFACE	PERVIOUS (AC)	IMPERVIOUS (AC)
ROOF	–	4.68
ROADWAY	–	4.39
LANDSCAPING	9.34	–
DRIVEWAY	–	0.34
TOTAL	9.34	9.41
% IMPERVIOUS = 50.2%		

DMA 2A AREA SUMMARY TABLE		
SURFACE	PERVIOUS (AC)	IMPERVIOUS (AC)
ROOF	–	2.92
ROADWAY	–	3.16
LANDSCAPING	7.51	–
DRIVEWAY	–	0.21
TOTAL	7.51	6.29
% IMPERVIOUS = 45.5%		

NOTE:

1. INVERT OF PERFORATED PIPE SHALL NOT BE GREATER THAN 30" FROM BASIN BOTTOM. MINIMUM 2" GRAVEL SECTION ABOVE TOP OF PIPE AND BELOW BOTTOM OF PIPE.
2. CLEANOUT ON UNDERDRAIN NOT SHOWN FOR CLARITY.

BIO-RETENTION BASIN DETAILS

NOT TO SCALE

ENGINEERED SOIL MEDIA REQUIREMENTS:

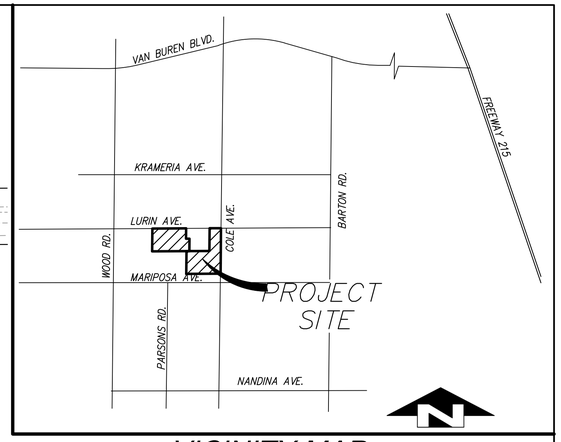
THE ENGINEERED SOIL MEDIA SHALL BE COMPRISED OF 85% MINERAL COMPONENT AND 15% ORGANIC COMPONENT, BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT. THE MINERAL COMPONENT SHALL BE A CLASS A SANDY LOAM TOP SOIL THAT MEETS THE RANGE SPECIFIED IN TABLE BELOW. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST.

MINERAL COMPONENT RANGE REQUIREMENT

PERCENT RANGE	COMPONENT
70–80	SAND
15–20	SILT
5–10	CLAY

TYPICAL STREET

DMA ID	DMA TRIBUTARY AREA (sq.ft.)	IMPERVIOUS PERCENTAGE (%)	DESIGN CAPTURE VOLUME (DCV)	VOLUME PROVIDED
1A	816,750	50.2	18,489 CU.FT.	18,764 CU.FT.
2A	601,128	45.5	12,632 CU.FT.	38,536 CU.FT.
TOTAL	1,417,878	–	31,121 CU.FT.	57,300 CU.FT.



VICINITY MAP

LEGEND

- PROPOSED WQMP BASINS
- ROOF AREA
- ROADWAY AREA
- SIDEWALK / PATIO AREA
- LANDSCAPING AREA
- DMA 1A / 3.31 — DMA NUMBER / TRIBUTARY AREA (ACRES)
- WQMP BASIN TRIBUTARY AREA BOUNDARY
- PROPOSED >18" HDPE STORM DRAIN
- PROPOSED <18" PVC STORM DRAIN
- —R— RIDGE LINE
- AD/GI AREA DRAIN/GATE INLET
- RD/DS ROOF DRAIN/DOWNSPOUT
- FLOW DIRECTION
- EXISTING STORM DRAIN
- EXISTING U.G. BMP
- PERCOLATION TEST LOCATION

80' 0 80' 160' 240'

SCALE IN FEET

Underground Service Alert

CALL BEFORE YOU DIG

Call: TOLL FREE

811

TWO WORKING DAYS BEFORE YOU DIG

CITY OF RIVERSIDE

PRELIMINARY WQMP SITE PLAN

COLE PROJECT
TENTATIVE TRACT MAP NO. 37731

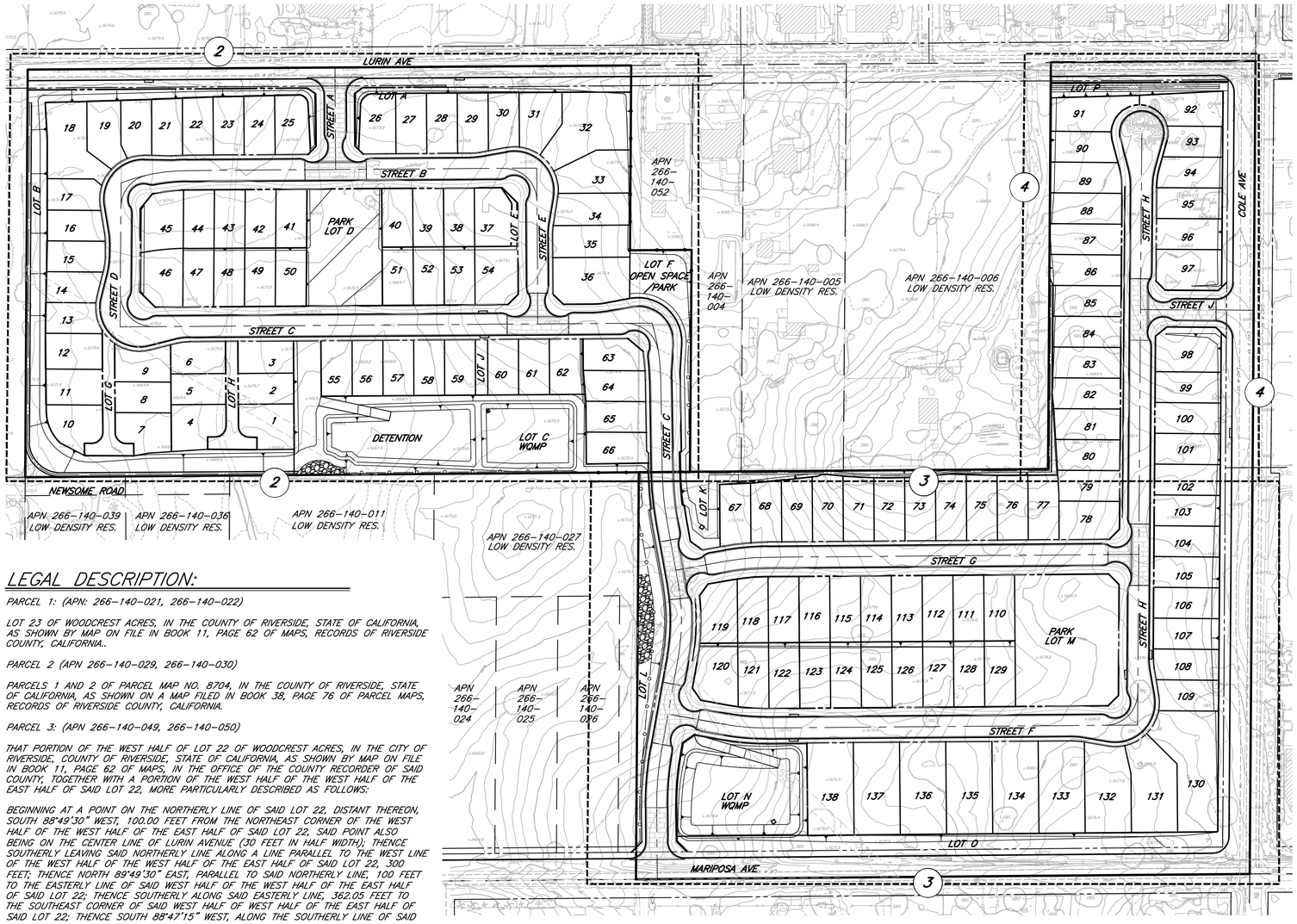
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HC	KWC ENGINEERS CIVIL ENGINEERS • PLANNERS • SURVEYORS 1880 COMPTON AVENUE, SUITE 100 CORONA, CA. 92881-3370 951-734-2130	
DRAWN: HC		SHEET: 1 OF 1
CHECKED: TMC	R.C.E. NO 79048 DATE ____ FILE NO ____	DRAWING NO. JN17.1713

R:\17\1713\PRELIM\REPORTS\PRELIM WQMP\1713 Prelim Site Plan.dwg 06/22/2020 11:21

Appendix 2: Construction Plans

Preliminary Grading and Drainage Plans

PRELIMINARY GRADING PLAN



PROJECT SCOPE OF WORK:

1. TOTAL PROJECT GROSS ACREAGE IS 35.80 AC.

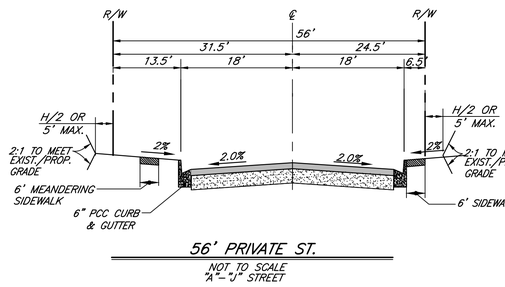
ACREAGE SUMMARY

ITEM	AGREAGE	PERCENT
A. LOT GROSS AREA	18.31	51%
B. DRAINAGE (WQMP BASIN)	2.43	7%
C. SLOPES	2.55	7%
D. PARKS	1.66	5%
E. DRIVEWAY	0.23	1%
F. ROW TO ROW	10.62	29%

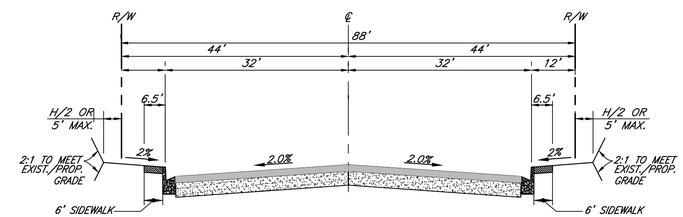
2. EXISTING GENERAL PLAN DESIGNATION: LDR– LOW DENSITY RESIDENTIAL (3–6 DU/AC)
3. EXISTING ZONING: R–1–13000
4. PROPOSED ZONING: RESIDENTIAL
5. PROPOSED NO. OF DWELLING UNITS: 138 LOTS.
6. PROPOSED PROJECT DENSITY: 3.86 DU/AC.
7. MINIMUM LOT SIZE: 4,235 SQ. FT.
8. AVERAGE LOT SIZE: 5,781 SQ. FT.
9. ZONING OF SURROUNDING PROPERTY: R–1
10. AVERAGE NATURAL SLOPE OF SITE: 0.53%

EARTHWORK QUANTITIES:

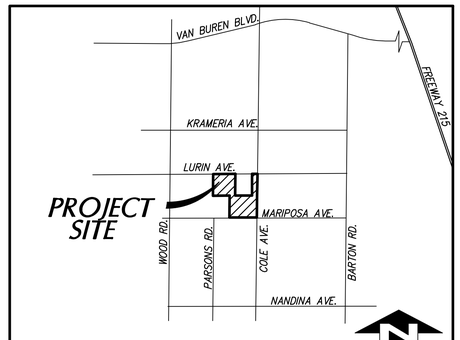
CUT: 14,089 CY FILL: 266,000 CY NET: 251,911 CY (F)
THE QUANTITY SHOWN ABOVE IS FOR DISCUSSION PURPOSES ONLY.



56' PRIVATE ST.
NOT TO SCALE
"A"– "J" STREET



88' ARTERIAL ST.
NOT TO SCALE
COLE AVE., MARIPOSA AVE.



VICINITY MAP

ENGINEER:

KWC ENGINEERS
1880 COMPTON AVENUE
CORONA, CA. 92881–3370
(951) 734–2130
CONTACT: MATTHEW LANINOVICH, P.E.

OWNER/DEVELOPER:

LURIN LAND, LLC
10621 CIVIC CENTER DRIVE
RANCHO CUCAMONGA, CA 91730
CONTACT: NOLAN LEGGIO

PROPERTY OWNERSHIP INFO:

APNS: 266–140–029, 266–140–030, 266–140–049, 266–140–050, 266–140–022, 266–140–021

UTILITY NOTES:

SEWER & WATER:	WESTERN MUNICIPAL WATER DISTRICT
GAS:	SOCAL GAS
ELECTRICITY:	SOUTHERN CALIFORNIA EDISON
SCHOOL DISTRICT:	RIVERSIDE UNIFIED SCHOOL DISTRICT

LEGAL DESCRIPTION:

PARCEL 1: (APN: 266–140–021, 266–140–022)

LOT 23 OF WOODCREST ACRES, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 11, PAGE 62 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA..

PARCEL 2 (APN 266–140–029, 266–140–030)

PARCELS 1 AND 2 OF PARCEL MAP NO. 8704, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN ON A MAP FILED IN BOOK 38, PAGE 76 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

PARCEL 3: (APN 266–140–049, 266–140–050)

THAT PORTION OF THE WEST HALF OF LOT 22 OF WOODCREST ACRES, IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 11, PAGE 62 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, TOGETHER WITH A PORTION OF THE WEST HALF OF THE WEST HALF OF THE EAST HALF OF SAID LOT 22, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTHERLY LINE OF SAID LOT 22, DISTANT THEREON, SOUTH 88°49'30" WEST, 100.00 FEET FROM THE NORTHEAST CORNER OF THE WEST HALF OF THE WEST HALF OF THE EAST HALF OF SAID LOT 22, SAID POINT ALSO BEING ON THE CENTER LINE OF LURIN AVENUE (30 FEET IN HALF WIDTH); THENCE SOUTHERLY LEAVING SAID NORTHERLY LINE ALONG A LINE PARALLEL TO THE WEST LINE OF THE WEST HALF OF THE WEST HALF OF THE EAST HALF OF SAID LOT 22, 300 FEET; THENCE NORTH 89°49'30" EAST, PARALLEL TO SAID NORTHERLY LINE, 100 FEET TO THE EASTERLY LINE OF SAID WEST HALF OF THE WEST HALF OF THE EAST HALF OF SAID LOT 22; THENCE SOUTHERLY ALONG SAID EASTERLY LINE, 362.05 FEET TO THE SOUTHEAST CORNER OF SAID WEST HALF OF WEST HALF OF THE EAST HALF OF SAID LOT 22; THENCE SOUTH 88°47'15" WEST, ALONG THE SOUTHERLY LINE OF SAID LOT 22, 414.95 FEET TO THE SOUTHWEST CORNER OF SAID LOT 22; THENCE NORTH 00°17'00" WEST, ALONG THE WESTERLY LINE OF SAID LOT 22, 662.09 FEET TO THE NORTHWEST CORNER THEROF, SAID POINT ALSO BEING ON THE CENTER LINE OF SAID LURIN AVENUE; THENCE ALONG SAID NORTHERLY LINE, NORTH 88°49'30" EAST, 314.90 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM THE NORTHERLY 33 FEET OF ABOVE DESCRIBED PARCEL.

SAID LAND IS DESCRIBED AND DELINEATED AS LOT A ON THAT CERTAIN "CERTIFICATE OF COMPLIANCE FOR LOT LINE ADJUSTMENT RECORDED DECEMBER 23, 2016 AS INSTRUMENT NO, 2016–0575044 OF OFFICIAL RECORDS.

STATEMENT OF PREPARER

I HEREBY STATE THAT THIS MAP WAS PREPARED UNDER MY SUPERVISION AND THAT THE OWNER OF RECORD HAS KNOWLEDGE OF AND CONSENTS TO THE FILING OF THIS MAP.

_____ DATE _____
MATTHEW L. LANINOVICH, P.E.

REGISTERED PROFESSIONAL ENGINEER
MATTHEW L. LANINOVICH
C 85721
CIVIL
STATE OF CALIFORNIA

BASIS OF BEARINGS:

THE BASIS OF BEARINGS SHOWN HEREON ARE BASED ON THE CITY OF CORONA GPS MONUMENTS NO. 1183 OAK DAM (N: 2254579.060, E: 6152363.939 AND NO. 3039 LINDSON 2 1953 (N: 2249760.701, E: 6154840.535), BEING N 27°12'10" W.

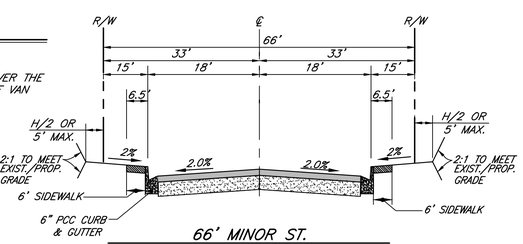
BENCHMARK:

CITY OF RIVERSIDE DESIGNATION: E8–G3

P.K. NAIL AND CITY ENGINEER TAG IN THE TOP OF THE SIDEWALK OVER THE EASTERLY WALL OF A CATCH BASIN ALONG THE SOUTHERLY CURB OF VAN BUREN BLVD AND 700 FEET EASTERLY OF WOOD ROAD.

ELEV: 1644.96' (NAD 88)

100' 0 100' 200' 300'
SCALE IN FEET



66' MINOR ST.
NOT TO SCALE
LURIN AVE

PROJECT NOTES:

1. ALL IMPROVEMENTS SHALL BE PER SCHEDULE "A" SUBDIVISION ORDINANCE 460.
2. THOMAS BROS. GUIDE (2007) PAGE 746 E4 & E5
3. ALL CUT SLOPES WILL BE 2:1 RATIO AND FILL SLOPES 2:1, UNLESS OTHERWISE NOTED
4. SETBACKS OF SLOPES SHALL CONFORM TO CBC 2016
5. LOT DIMENSIONS SHOWN HEREON INCLUDE DIMENSIONS TO STREET R/W
6. ALL WATER QUALITY FOR THIS TRACT IS BEING MITIGATED BY ON–SITE BMPS BIO–RETENTION BASINS
7. THIS TENTATIVE TRACT MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER
8. PROPERTY IS NOT LOCATED IN A FLOODPLAIN.
9. PROPERTY IS NOT LOCATED IN A LIQUEFACTION ZONE.
10. PROPERTY IS NOT LOCATED IN A SUBSIDENCE AREA.
11. PROPERTY CONTAINS NO KNOWN WELLS.
12. PROPERTY IS NOT IN A FAULT ZONE OR ON A FAULT LINE.
13. THE PROJECT IS LOCATED WITHIN COMPATIBILITY ZONE D OF THE MARCH AIR RESERVE BASE/INLAND PORT AIRPORT COMPATIBILITY PLAN.
14. SETBACKS TO ALL SITE BOUNDARIES WILL COMPLY WITH THE 2016 CBC.

TTM DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
04/15/20 BY: MLL
DATE OF THIS PLOT
04/15/20

TENTATIVE TRACT MAP NO. 37731
GRADING PLAN
CITY OF RIVERSIDE

PREPARED FOR:
LURIN LAND, LLC
10621 CIVIC CENTER DRIVE
RANCHO CUCAMONGA, CA 91730

PREPARED BY:
KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA. 92881–3370 951–734–2130

SHEET 1 OF 4 SHEETS

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LEGEND:

- PROPOSED WATER
- PROPOSED SEWER
- PROPOSED STORM DRAIN
- EXISTING WATER
- EXISTING EASEMENT
- EXISTING SEWER
- EXISTING RECLAIMED WATER
- EXISTING STORM DRAIN
- BUILDING SETBACK LINE (BSL)
- 1200 = EXISTING CONTOUR ELEVATION
- 1200 = PROPOSED SURFACE ELEVATION
- 1378.3 = PROPOSED PAD ELEVATION
- ELEV. = ELEVATION
- FG = FINISH GRADE
- FL = FLOWLINE
- FS = FINISHED SURFACE
- D.G. = DECOMPOSED GRANITE
- L= = LENGTH
- W= = WIDTH
- MIN. = MINIMUM
- PL = PROPERTY LINE
- R/W = RIGHT OF WAY
- GB = GRADE BREAK
- SW = SIDEWALK
- TC = TOP OF CURB
- 45 = LOT NUMBER
- 6.0' HIGH TAN CMU WALL, SPLIT FACE ONE SIDE WITH DECORATIVE CAP
- 5.5' HIGH TAN CMU WALL, SPLIT FACE ONE SIDE WITH DECORATIVE CAP
- TOE OF SLOPE
- TOP OF SLOPE
- DAYLIGHT LINE
- ENHANCED PAVEMENT
- ENHANCED PAVEMENT

SCALE IN FEET: 40' 0 40' 80' 120'

TENTATIVE TRACT MAP NO. 37731
GRADING PLAN
CITY OF RIVERSIDE

PREPARED FOR:

LURIN LAND, LLC
10621 CIVIC CENTER DRIVE
RANCHO CUCAMONGA, CA 91730

PREPARED BY:

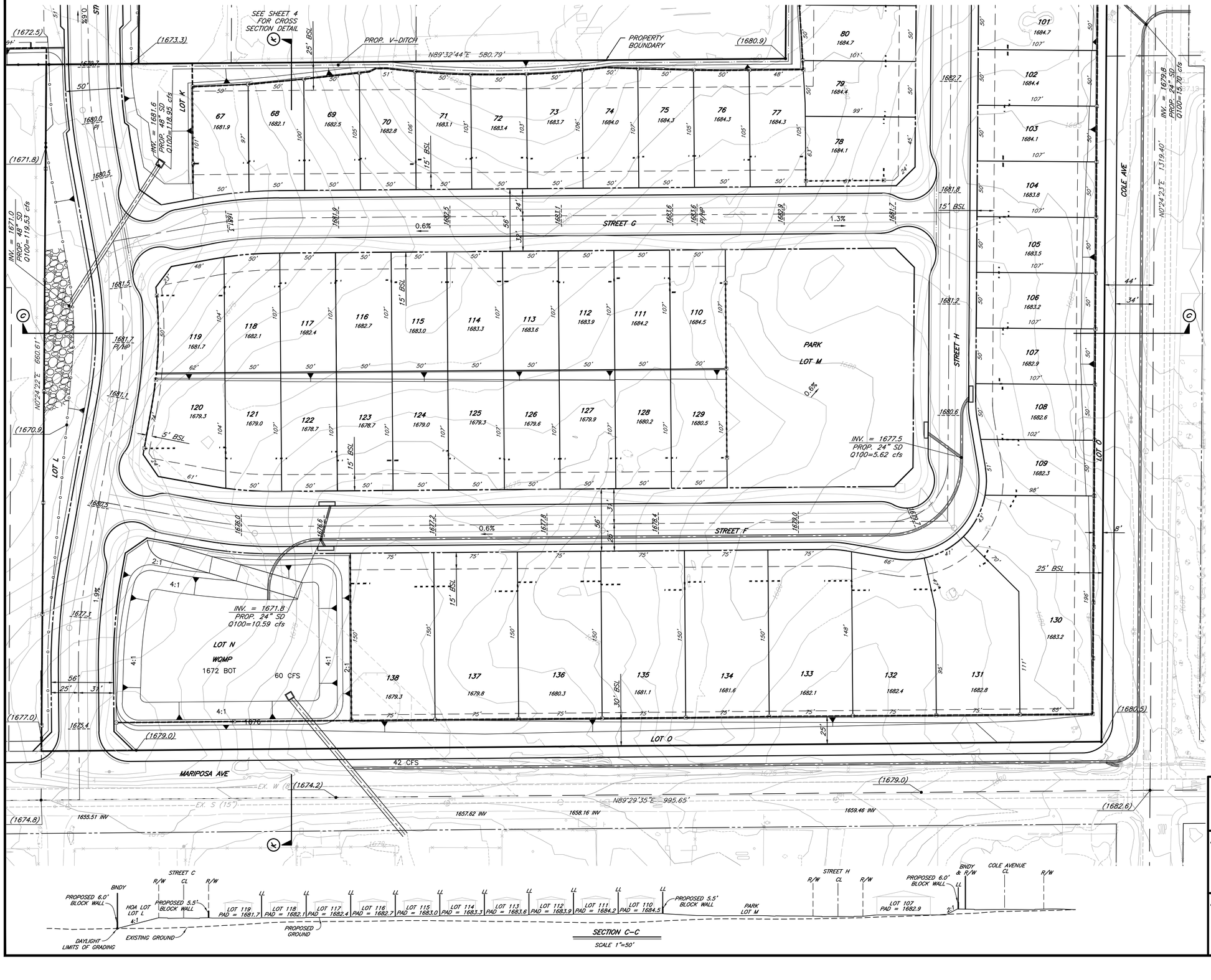
KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA. 92881-3370 951-734-2130

SHEET 2 OF 4 SHEETS

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SECTION A-A

SCALE 1"=50'



SECTION C–C

SCALE 1"=50'

SCALE IN FEET

TENTATIVE TRACT MAP NO. 37731
GRADING PLAN
CITY OF RIVERSIDE

PREPARED FOR:

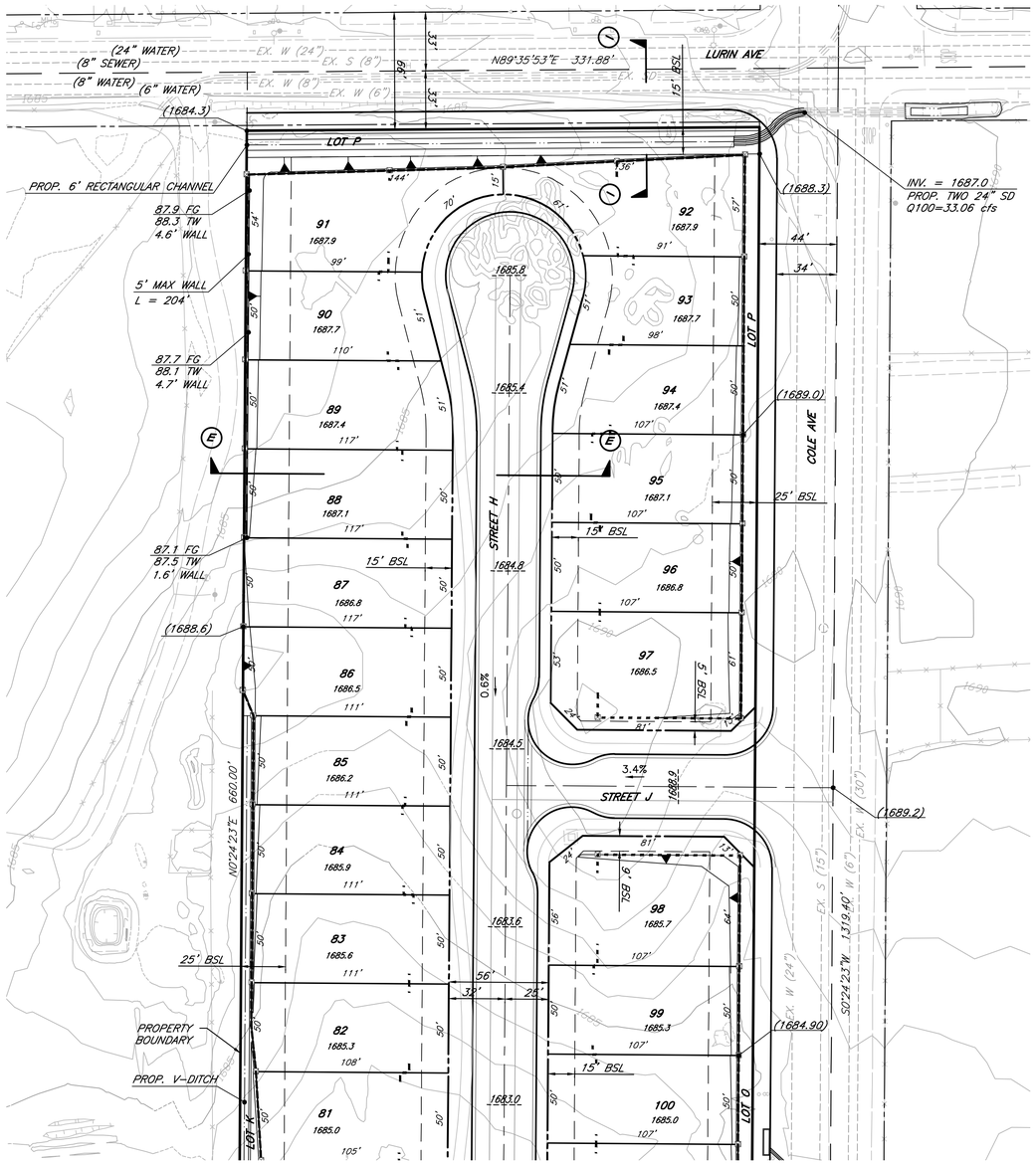
LURIN LAND, LLC
10621 CIVIC CENTER DRIVE
RANCHO CUCAMONGA, CA 91730

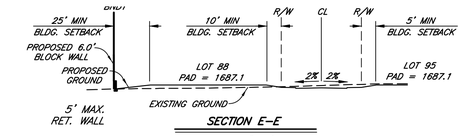
PREPARED BY:

KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA. 92881–3370 951–734–2130

SHEET 3 OF 4 SHEETS

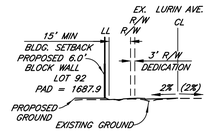
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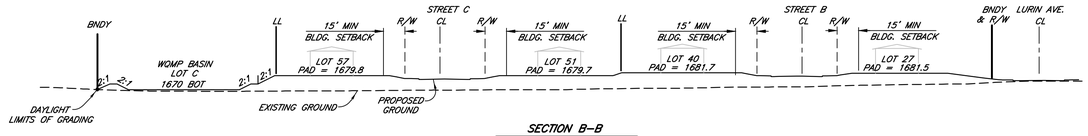
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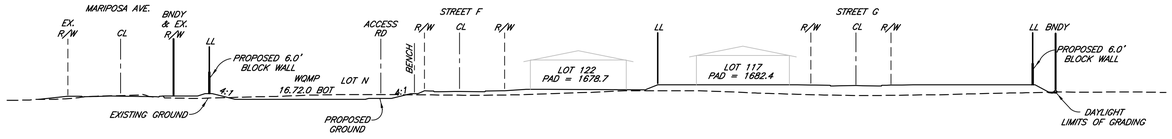
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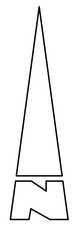
SECTION B–B

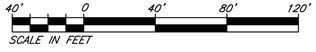
SCALE 1"=50'



SECTION K–K

SCALE 1"=50'





SCALE IN FEET

TENTATIVE TRACT MAP NO. 37731
GRADING PLAN
CITY OF RIVERSIDE

PREPARED FOR:

LURIN LAND, LLC
10621 CIVIC CENTER DRIVE
RANCHO CUCAMONGA, CA 91730

PREPARED BY:

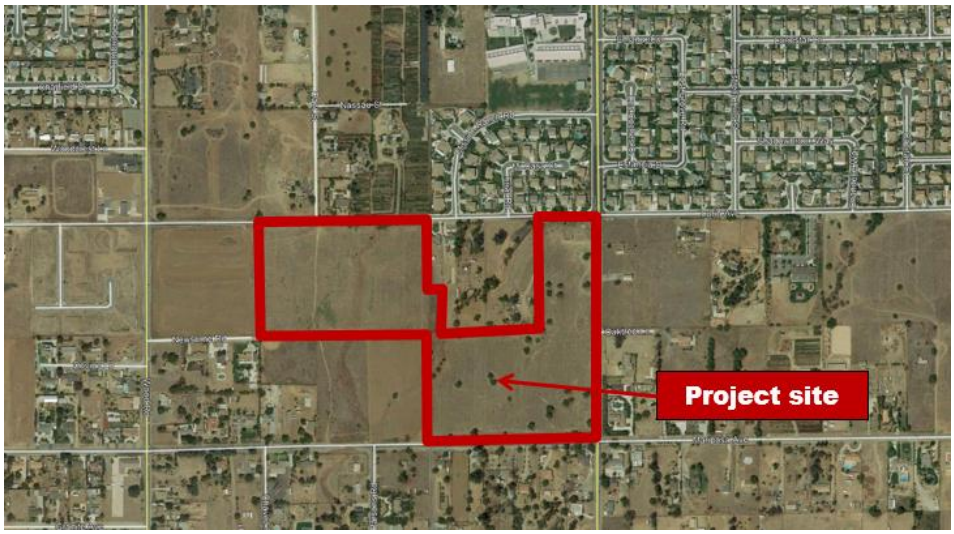
KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA. 92881-3370 951-734-2130

SHEET 4 OF 4 SHEETS

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PRELIMINARY HYDROLOGY REPORT

Tentative Tract Map 37731
16661 Cole Avenue
Riverside, California





PREPARED FOR:

Diversified Pacific
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

January, 2020

PREPARED BY:

KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS

KWC Engineers
1880 Compton Avenue, Suite 100
Corona, CA 92881
Tel: (951) 734-2130
www.kwcengineers.com

Matthew Laninovich PE 85721

JN 2017.1713.1
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Appendix B: Hydrologic Classification of Soils & Precipitation Maps

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Appendix D: Existing Condition Hydrology Key Map

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Appendix H: FEMA FIRM panels

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Section

1
INTRODUCTION

1.1 PURPOSE OF STUDY

The TTM 37731 project site is located within the City of Riverside, California, southwest corner of Cole and Lurin Avenue. The purpose of this study is to hydrologically model the project's onsite and offsite tributary watersheds and to determine the pre-development and post-development peak runoffs and volumes in order to analyze stormwater mitigation. The hydrologic analysis was prepared using the Rational Method as specified in the Riverside County Flood Control & Water Conservation District (RCFC&WCD) Hydrology Manual. The flows were used to estimate the proposed above and below ground drainage facilities to support the Cole Avenue project site.

1.2 PROJECT DESCRIPTION

The TTM 37731 project is comprised of approximately 35.8 gross acres of vacant land located southwest of intersection of Cole and Lurin Avenue in the City of Riverside, Riverside County, California. The site is located approximately 1.3 miles south of Van Buren Boulevard and approximately 4.0 miles west of 215 Freeways.
The Cole Avenue project is generally bounded to the east by Cole Avenue, on the south by Mariposa Avenue, on the west by vacant land and north by Lurin Avenue. The immediate surrounding area consists of Low Density Residential (2-6 du/ac) within the City of Riverside.

The project hydrology and storm drain system will be designed in accordance with recent City of Riverside and Riverside County Flood Control and Water Conservation District design requirements. The onsite storm drain pipes, laterals, catch basins, and inlet and outlet structures are to be privately maintained by the proposed Property Owners Association. Other drainage facilities offsite of the project site will be publicly maintained by the City of Riverside.

1.3 STUDY AREA

The project site is located within the Santa Ana River Watershed, the largest watershed in Riverside County. The project site consists of vegetated and otherwise undeveloped land. The site is characterized by generally increasing in elevation from the south and southwest to the north and northeast. Several ravines are present which will convey natural drainage across the project site. The runoff from offsite tributary areas to the site, mainly discharges from west, north and east side of the project site. The existing offsite tributary area from the west side of the project site is 30.24 acres discharging approximately 52.3 cfs (100 year storm event) at node 308. The existing offsite tributary area from the

north and cross from Lurin Avenue side of the project site mainly has been divided into three main tributary areas. The westerly side is 18.49 acres discharging approximately 25.4 cfs (100 year storm event) at node 313. The middle portion is approximately 28.7 acres, discharging approximately 45.5 cfs. (100 year storm event) at node 318 and the easterly portion is 77.58 acres, discharging approximately 120.1 cfs. (100 year storm event) at node 120 west side of the intersection of Cole and Lurin Avenue. The existing offsite tributary area from the east side of the project site is 2.72 acres discharging approximately 5.7 cfs (100 year storm event) at node 115 and 8.85 acres, discharging approximately 16.1 cfs. (100 year storm event) at node 202. There are no existing major drainage improvements on-site. The runoff discharge from this site in the existing condition are in three different locations and are situated at the south of the project site at node 124, 204 and 320. (See Existing Hydrology Map in Appendix D for location of node numbezAll
rs and Appendix E for detail analysis).

1.4 FLOODPLAIN MAPPING

The National Flood Insurance Act (1968) established the National Flood Insurance Program, which is based on the minimal requirements for floodplain management and is designed to minimize flood damage within Special Flood Hazard Areas. The Federal Emergency Management Agency (FEMA) is the agency which administrates the National Flood Insurance Program. Special Flood Hazard Areas (SFHA) are defined as areas that have a 1% chance of flooding within a given year. This is also referred to as the 100-year flood. Flood Insurance Rate Maps (FIRMs) were developed to identify areas of flood hazards within a community.

According to the Flood Insurance Rate Map (FIRM) catalog, there are FIRMs produced by FEMA for the project site:

MAP Number: 06065C0740G

MAP Revised: August 28, 2008.

Appendix H contains the FIRM panels which identifies the flood zones designated for the project area. The project site is located outside the FIRM detailed study limits and is currently within an unmapped Zone X area. Given the existing topography, the potential for flooding within the project site is not likely to occur.

1.5 DESIGN CRITERIA

The following are design criteria for this project, based on the Riverside County Hydrology Manual.

Protection Levels

1. The 100-year flood shall be contained with the street R/W limits.

2. The 10-year flood shall be contained within the Top of Curbs.

3. Initiate a storm drain or channel when either condition is exceeded.

Section

2

HYDROLOGIC DATA AND MODEL DEVELOPMENT

2.1 PRE-DEVELOPMENT MODEL

KWC Engineers has performed a hydrologic analysis for the Cole project site and its tributary watersheds.

The project site is mainly divided into three (3) drainage areas and includes offsite tributary areas. The westerly portion of the site that discharges southerly at node 320, has been divided into thirteen (13) sub-drainage areas and includes the offsite tributary areas ("C-1" through "C-13").The middle drainage area that discharges westerly of the project at node 124 has been divided into seventeen (17) sub-drainage areas ("A-1" through "A-17") and the southeasterly portion that discharges southerly has been divided into two (2) sub-drainage areas ("B-1" and "B-2"). To further describe the existing drainage conditions offsite and onsite. Refer to the Existing Condition Hydrology Key Map in **Appendix D** for locations of the drainage sub-areas, and peak flows at each sub-area. Hydrologic calculations to evaluate surface water runoff associated with the 2-year, 10-year, and 100-year storms were performed for the drainage areas both onsite and offsite tributary area. The Riverside County Rational Method Hydrologic calculations (as described in the RCFC&WCD Hydrology Manual) were performed using the CivilDesign Hydrology / Hydraulics computer program package 2005 Version 7.1 by Bonadiman and Associates, Inc. The existing condition watershed boundaries were delineated using aerial topography. The soil type in this area is Type "BC". Soil type "C" was used for calculating the rational method hydrology analysis. Refer to **Appendix B** Hydrologic Soils Group Map**.** Results of the existing condition hydrologic analysis are summarized in this section **Table 1 below**.

TABLE 1
PRE-DEVELOPMENT CONDITION PEAK FLOW

Area	Node #	Q_{10} (cfs)	Q_{100} (cfs)
A-1 through A-4	104	25.82	44.34
A-5 through A-7	108	17.25	29.69
A-1 through A-7	109	43.01	73.75
A-8 and A-9	112	10.86	18.05
A-8, A-9 and A-10	113	16.25	28.45
A-11	115	2.82	5.72
A-1 through A-14	120	63.94	111.61
A-1 through A-15	122	68.28	120.33

A-1 through A-17	124	70.34	124.49
B-1	202	7.70	14.54
TRACT 37732 + B3+B4	208	91.65	166.27
TRACT 37732 + B1 THROUGH B8	210	106.18	194.14
C-1, C-2 and C-3	306	20.00	36.40
C-1 through C-4	308	20.91	48.95
C-5, C-6a and C-6b	313	11.99	22.75
C-8 through C-12	318	24.57	42.30
C-1 through C13	320	64.39	119.88

2.2 POST-DEVELOPMENT MODEL

Cole and Lurin Avenue project site generally maintain the existing drainage boundaries in the proposed condition. The overall project site including offsite tributary area are mainly divided into three (3) drainage areas.

AREA ONE:

The westerly portion of the offsite tributary area that discharges westerly at node 308, has been divided into four (4) sub-drainage areas ("C-1" through "C-4"). The resulted discharge at node 308 will be routed to node 320 via a proposed concrete channel. The northerly portion of the offsite tributary area within Area One that discharges at nodes 313 and 318 has been divided into eight (8) sub-drainage areas, ("C-5" through "C-12").The resulted discharge at these two points (node 313 and 318) after combining with tributary street flow (subarea "C-6c" and "D-21") will be routed to node 320, without comingling with the project's onsite tributary areas. The resulted discharge from portion of the onsite project subareas "D-1" through "D-7b, also discharges at node 320 via onsite storm drain and water quality system in this drainage area.

AREA TWO:

The northeasterly portion of the offsite tributary area that discharges northeasterly at node 120, has been divided into sixteen (16) sub-drainage areas, ("A-1" through "A-16") and includes subarea "D-8" (portion of the street flow in Cole Avenue). The resulted discharge at node 120 will be routed to node 122 and after passing through a proposed catch basin area downstream of node 122 via a proposed onsite storm drain line at node 123 will be routed toward westerly property line at node 124.

AREA THREE:

The easterly portion of the offsite tributary area that discharges easterly at node 202, has been divided into three (3) sub-drainage areas and includes subarea "D-17" and "D-18" (portion of the street flow in Cole Avenue and Mariposa Avenue)). The resulted discharge at node 202 will be routed to node 204 via a proposed storm drain pipe in Cole and Mariposa Avenue and after intercepting portion of the discharge in Cole and Mariposa Avenue it out lets at node 204.The resulted discharge from portion of the onsite project subareas "D-9" through "D-18, also discharges at node 204 via onsite storm drain and water quality system in this drainage area.

Refer to the Post-Development Condition Hydrology Key Map in **Appendix F** for locations of the drainage sub-areas, and peak flows at each sub-area. Hydrologic calculations to evaluate surface water runoff associated with the 2-year, 10-year, and 100-year storms were performed for the drainage areas both onsite and offsite tributary area. The Riverside County Rational Method Hydrologic calculations (as described in the RCFC&WCD Hydrology Manual) were performed using the CivilDesign Hydrology / Hydraulics computer program package 2005 Version 7.1 by Bonadiman and Associates, Inc.

The Post-Development condition watershed boundaries were delineated using aerial topography. The soil type in this area is Type "BC". Soil type "C" was used for calculating the rational method hydrology analysis. Refer to **Appendix B,** Hydrologic Soils Group Map**.**

Results of the post-development condition hydrologic models is provided in **Appendix E** and are summarized in this section **Table 2 below**.

TABLE 2
POST-DEVELOPMENT CONDITION PEAK FLOW

Subarea(s)	Node #	Q_{10} (cfs)	Q_{100} (cfs)
C-6c	313.2	0.46	0.73
C-6c and C-5 through C-6c	313.4	12.46	26.12
D-21	318.2	2.04	3.13
D-21 and C-8 through C-12	318.4	26.62	48.64
D-1, D-2 and D-3	404	12.78	22.80
D-1 through D-6	410	6.06	10.86
Drainage area One	320	70.83	125.28
Drainage area Two	124	68.06	119.53
D-9 and D-10	422	3.34	6.00
D-11 and D-12	428	3.08	5.55
D-9 through D-12	430	6.30	11.33
D-13 and D-14	432	*4.07*	7.23
D-15 and D-16	436	*3.15*	5.62
D-13 through D-16	438	12.20	22.15
B-1 and D-17	450	0.79	1.17
B-1, D-17 and D-18	456	3.85	5.71
Drainage Area Three	458	113.59	201.97

Below is the summary comparison between the Existing Condition and Proposed Condition Rational Method 10 and 100-Year Hydrology results. Refer to **Appendix D** and **F** for pre-development and post-development Hydrology Key Maps.

In Drainage Area One, the proposed 100 year storm event peak flow at node 320 is 5.40 cfs more than the existing peak flow at node 320.

In the Drainage Area two, the proposed 100 year storm event peak flow at node 124 is 4.96 cfs less than the existing peak flow at node 124.

In Drainage Area three, the proposed 100 year storm event peak flow at node 204 is 7.83 cfs more than the existing peak flow at node 210.

TABLE 3 – PEAK FLOW COMPARISON
320(Area One), 124(Area Two), and 204(Area Three-Proposed) =and 210(Area three-Existing)

Drainage Area	Pre-Development Q_{10} (cfs)	Post-Development Q_{10} (cfs)	Difference Q_{10} (Prop-Exist)	Pre-Dev. Q_{100} (cfs)	Post-Dev. Q_{100} (cfs)	Difference Q_{100} (Prop-Exist)
Drainage Area A	64.39	70.83	6.44	119.88	125.28	5.40
Drainage Area B	70.34	68.06	-2.28	124.49	119.53	-4.96
Drainage Area C	106.18	113.59	7.41	194.14	201.97	7.83

2.3 HCOC REQUIREMENTS

The rational method analysis provided Q_{100} on the post-development condition that is insignificantly higher than or lower than the pre-development condition so no unit hydrograph is required since detention is not required onsite for the Q_{100} storm event. However, the site does not qualify for any Hydrologic Condition of Concern exemptions as shown on Section F of the WQMP Template; therefore, unit hydrographs for the $Q_{2\ 24\ Hour}$ was done to satisfy the condition set on section F.2 section "c". The site is broken into two DMA areas B and C that correlates to WQMP DMA areas 2A and 1A respectively. A summary of the results for the unit hydrographs are shown on **Table 4** below. The unit hydrograph figures and calculations are shown on **Appendix I** for reference.

TABLE 4 – Q2 24 HOUR UNIT HYDROGRAPH SUMMARY

Drainage Area	Pre-Development UH Flowrate (cfs)	Post-Development UH Flowrate (cfs)	Difference $Q_{2\ 24\ UH}$ Flowrate (Prop-Exist)	Pre-Dev. $Q_{2\ 24\ UH}$ Runoff Volume (acre-feet)	Post Dev. $Q_{2\ 24\ UH}$ Runoff Volume (acre-feet)	Difference $Q_{2\ 24\ UH}$ Runoff Volume (acre-feet)
DMA B	0.583	1.489	0.78	0.4	0.9	0.5
DMA C	0.413	2.093	1.68	0.3	1.3	1.0

Table 4 above shows a major increase in peak flowrate for both DMA B and C, therefore, the WQMP basins will need to detain the difference in runoff volume to satisfy the HCOC requirements.

DMA B correlates to the Area and WQMP Basin shown on the WQMP Site Plan as DMA 2A. As shown above, the difference in runoff volume for DMA B is 0.5 acre-feet which equals to 21,780 cf. This is the required volume to detain in order to meet HCOC requirements. The WQMP Basin 2A is sized to hold 38,536 cf which is enough to meet HCOC requirements.

DMA C correlates to the Area shown on the WQMP Site Plan as DMA 1A. As shown above, the difference in runoff volume for DMA B is 1.0 acre-feet which equals to 43,560 cf. This is the required volume to detain in order to meet HCOC requirements. The Detention Basin on DMA 1A is sized to hold 52,076 cf which is enough to meet HCOC requirements

2.4 ONSITE STORM DRAIN SYSTEM

The onsite storm drain system will be privately owned and maintained by the Property Owners Association. Preliminary onsite drainage facilities will be sized to accommodate the anticipate 100-year runoff. Detailed sizing calculations will be provided in the design review and final engineering process. Mainline pipe sizes are based on the 100-year storm event. Pipes will be designed as reinforced concrete pipe or HDPE while maintaining the HGL below the proposed finish surface, with a roughness coefficient of 0.013 per City standards. Hydraulic calculations will be performed in the Final Engineering phase.

Catch basins and storm drain laterals were placed at locations to keep the 10-year flow below the top of curb and the 100-year flow below the right of way. Catch basins are also placed in various locations within the project site to collect the runoff and convey the storm flows in underground piping to the appropriate discharge points.

2.5 STREET CAPACITY ANALYSIS

Preliminary onsite street capacity for the proposed project was calculated. The street capacity analysis shows that the street sections are sufficient to provide the level of protection required by City of Riverside and RCFC&WCD as previously discussed. Since, the storm drain mainline pipes were sized for the 100-year storm event, the street will only contain local flows until the catch basins intercept the 100-year storm flows**.**

2.6 OUTLET ANALYSIS.

The proposed development will outlet at three (3) locations. Subareas A-1 through A-16 including D-8, D-19 and D-20 at node 124, westerly of the project site. Subareas B-1 and D-9 through D-18 at node 204, southerly of the project site and subareas C-1 through C-12, including D-1 through D-7b at node 320 southwesterly of the project site. Rip rap will be provided at the outlet pipes to dissipate the flow velocities leading into the existing natural surface to minimize erosion.

Section

3
CONCLUSIONS

This preliminary drainage report has evaluated the potential effects of runoff for the proposed project. In addition, this report has addressed the methodology used to analyze the existing and proposed conditions, which was based on the Riverside County Hydrology Manual. This section provides a summary discussion that evaluates the potential effects of the proposed project.

- The proposed project will not significantly alter drainage patterns on the site.
- The Rational Method results illustrates that there is a slight increase in peak flowrate for Drainage Area One and Three and Decrease in Drainage Area Two. Runoff mitigation is proposed for Drainage Area One and Three
- The proposed onsite storm drain mainlines will be privately owned and maintained by the Property Owners Association.
- Preliminary storm drain alignment, catch basins, and discharge points are shown on the hydrology key maps.
- A Final Hydrology & Hydraulics Report will be prepared during final design phase to determine the proposed hydraulic grade lines throughout the storm drain system and catch basin sizing.

All stormwater run-off will be carried via typical street sections and an onsite storm drain system. The computed 10-year storm event is contained below the top of curb and the computed 100-year storm event is contained within the street right-of-way.

Section

4

REFERENCES

- Riverside County Flood Control and Water Conservation District. *Hydrology Manual*. April 1978.

- City of Riverside Standard Plans and Guide lines

Appendix

A
VICINITY MAP

- Vicinity Map
- Location Map
- Latitude and Longitude of project site

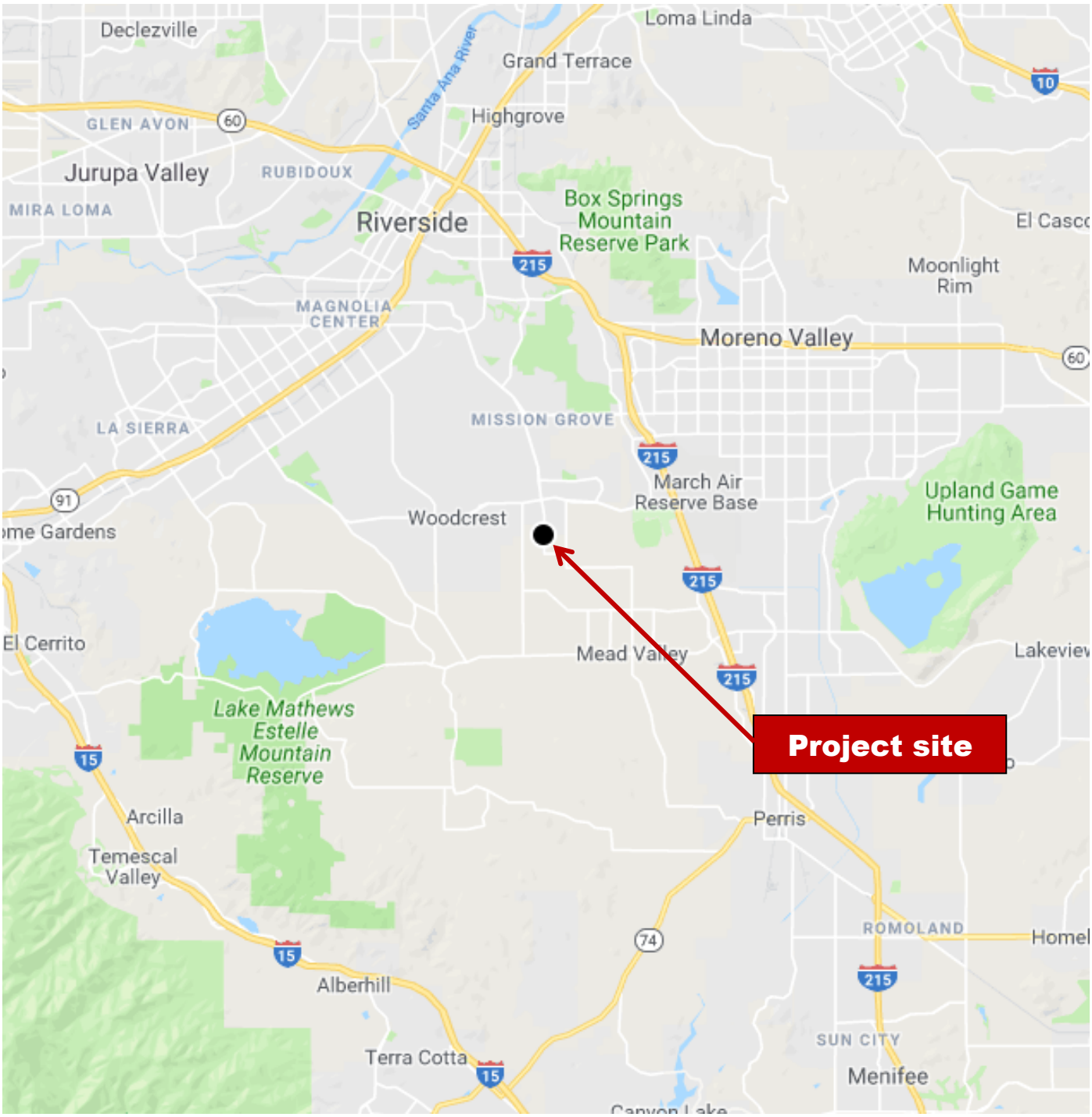


FIGURE 1

DATE 03-07-19 DRAWN BY TONY E
JOB NO. 17.1713-1
SHEET NO. 1
OF 1 SHEET

KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 • CORONA, CA. 92881-3370 • 909-734-2130

VICINITY MAP

COLE AND LURIN AVENUE PROJECT SITE

CITY OF RIVERSIDE, CA

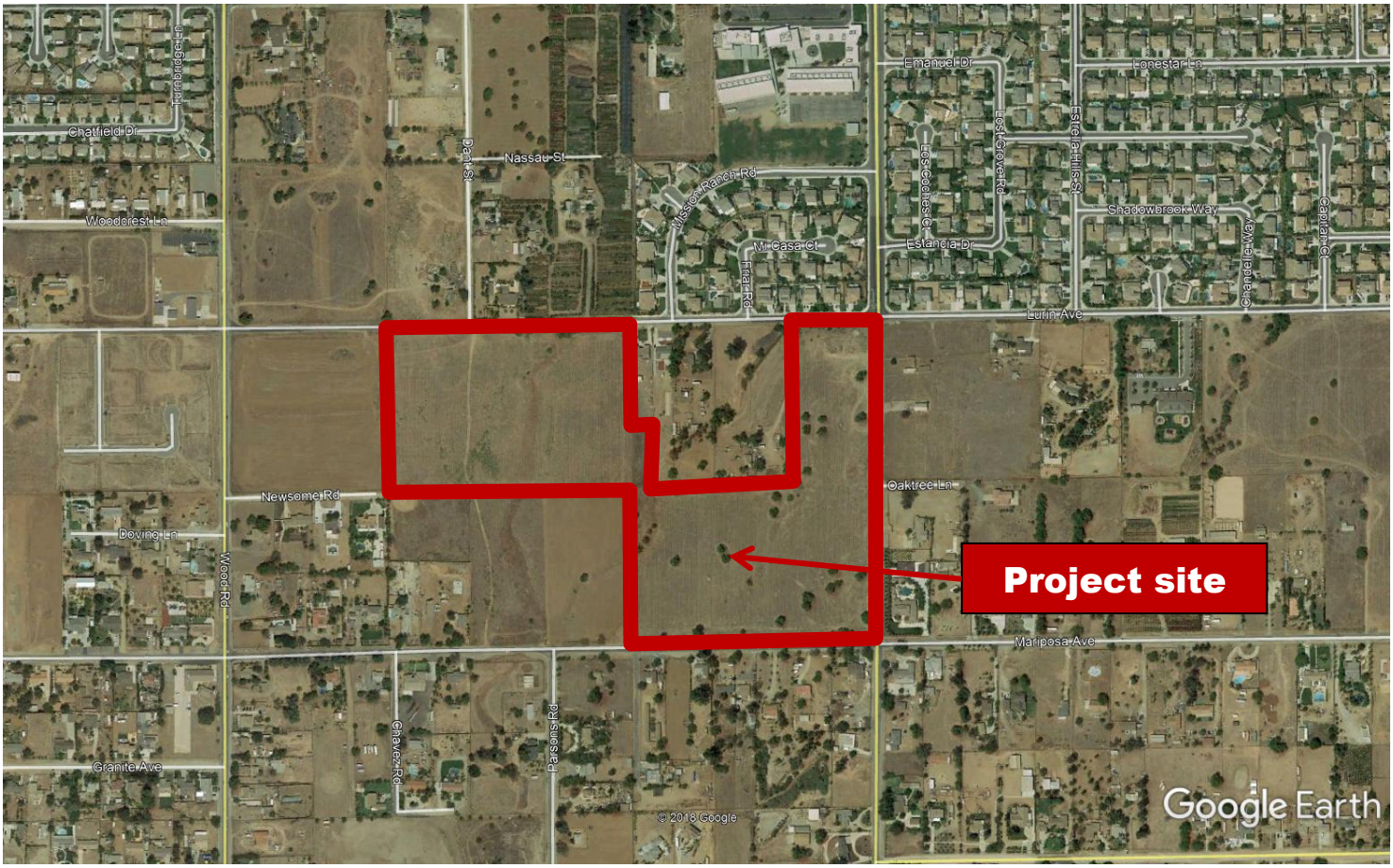


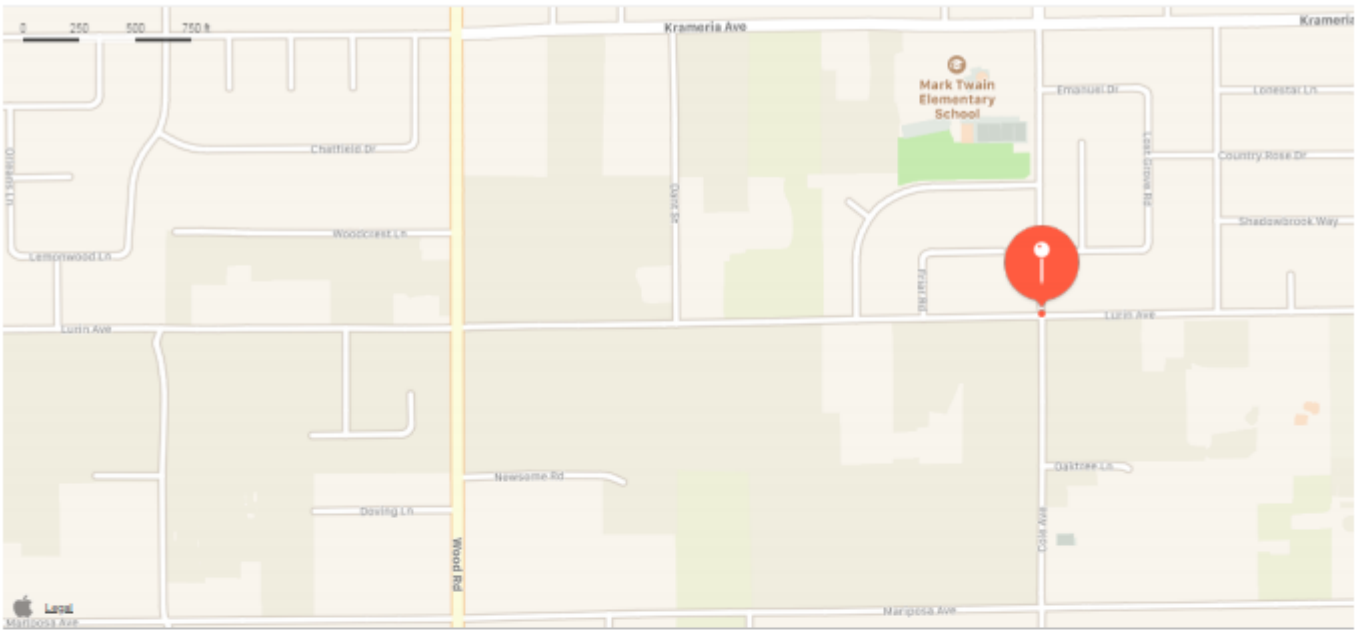
FIGURE 2

DATE	03-07-19
DRAWN BY	TONY E
JOB NO.	17.1713-1
SHEET NO.	1
OF 1 SHEET	

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LOCATION MAP
COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, CA

Latitude and Longitude of a Point



Clear / Reset | Remove Last Blue Marker | Center Red Marker

Get the Latitude and Longitude of a Point

When you click on the map, move the marker or enter an address the latitude and longitude coordinates of the point are inserted in the boxes below.

Latitude:	33.876488
Longitude:	-117.322581

	Degrees	Minutes	Seconds
Latitude:	33	52	35.3568
Longitude:	-117	19	21.291

Show Point from Latitude and L

Use this if you know the latitude a
Use: + for *N* Lat or *E* Long - for
Example: +40.689060 -74.04463
Note: Your entry should not have

Decimal Deg. Latitude:

Decimal Deg. Longitude:

Example: **+34 40 50.12** for *34*

Latitude:

Longitude:

© getLatLong.net 2018 | Credits and Disclaimers | Privacy Policy

33° 52’35.36” N, -117°19’21” W

DATE 03-07-19
DRAWN BY TONY E
JOB NO. 17.1713-1
SHEET NO. 1
OF 1 SHEET

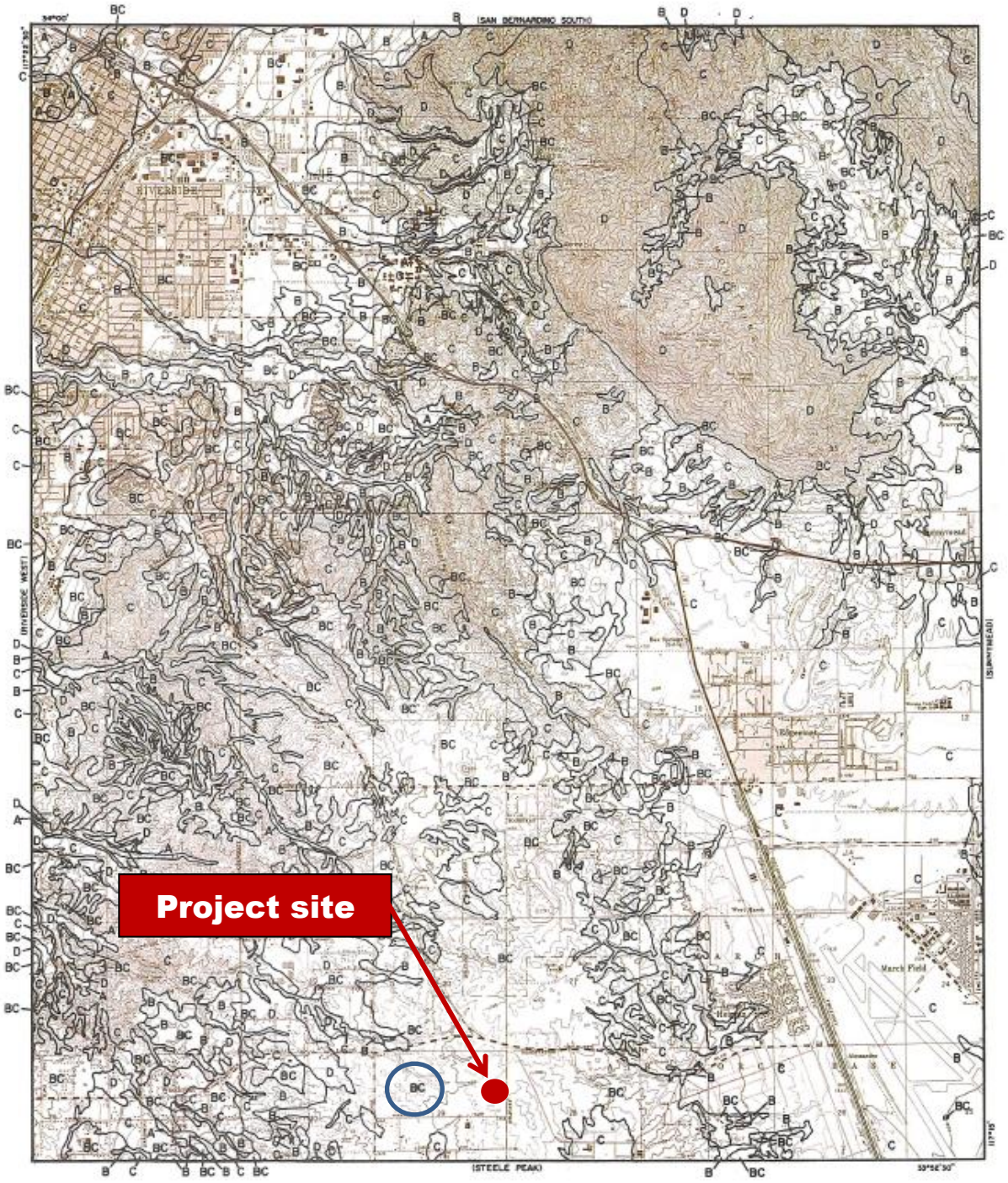
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LATITUDE AND LONGITUDE OF PROJECT
COLE AVE. AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, CA

Appendix

B

HYDROLOGIC CLASSIFICATION OF SOILS & PRECIPITATION MAPS



LEGEND

SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP

FOR

RIVERSIDE–EAST

FIGURE 3

SOIL GROUP BC.

FOR HYDROLOGY CALCULATION, SOIL GROUP "C" WAS USED

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SOIL MAP

COLE AND LURIN AVENUE PROJECT SITE

CITY OF RIVERSIDE, CA

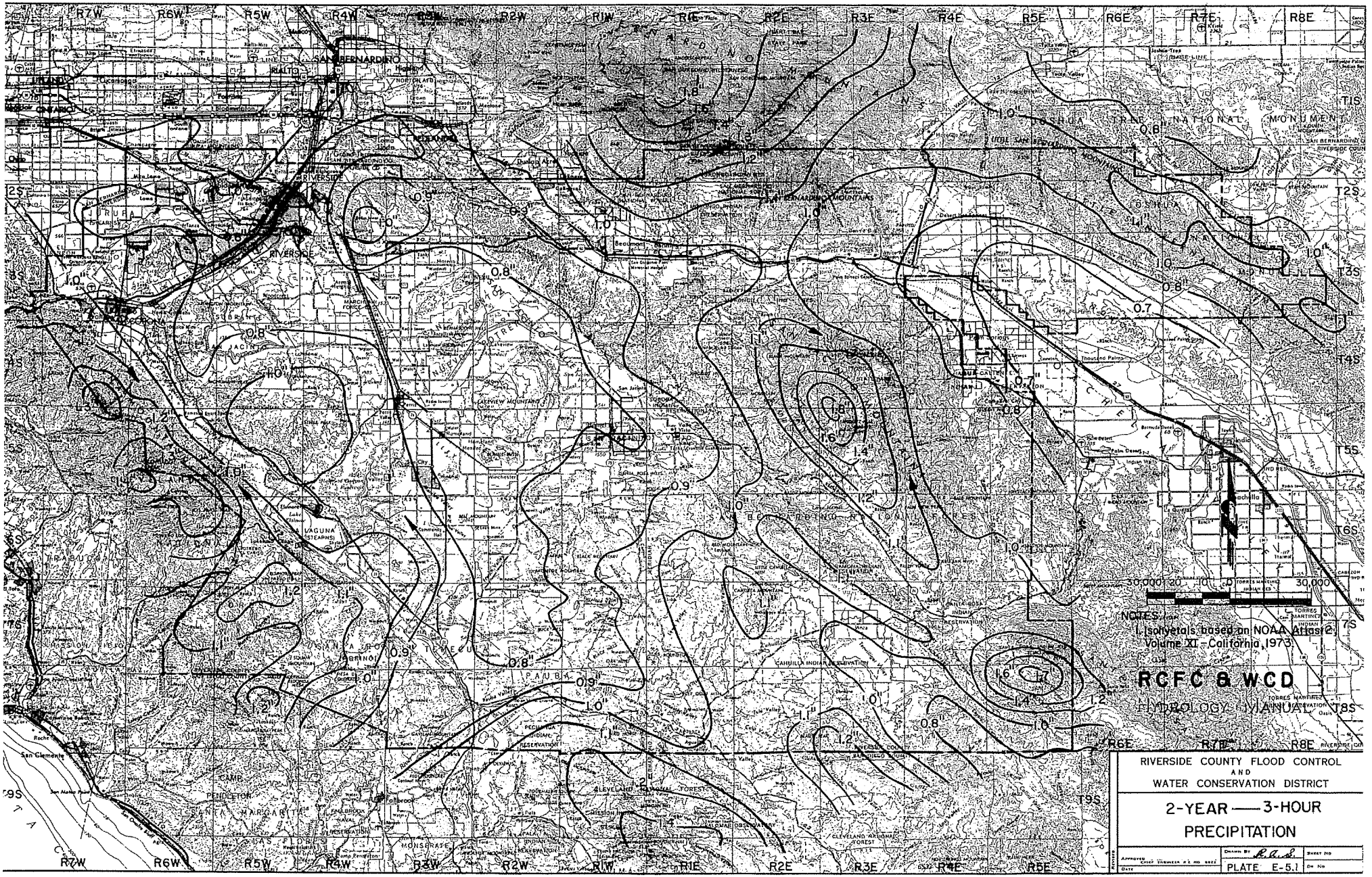
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03-07-19

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TONY E

JOB NO.
17.1713-1

SHEET NO.
1

OF 1 SHEET



NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2-YEAR — 3-HOUR PRECIPITATION

Approved	Drawn By	Sheet No
Date	P.A.S.	
	PLATE E-5.1	Dr. No

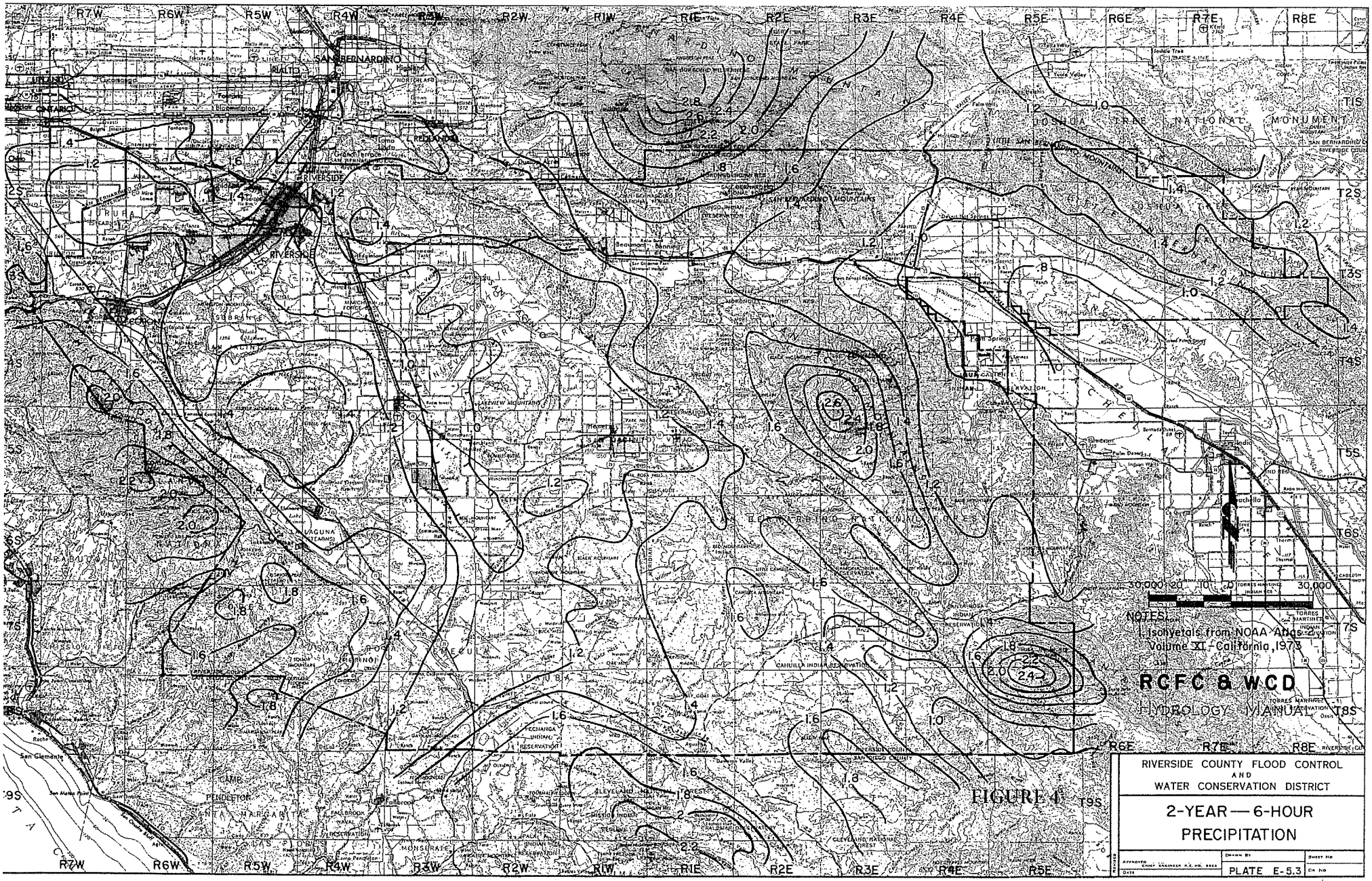
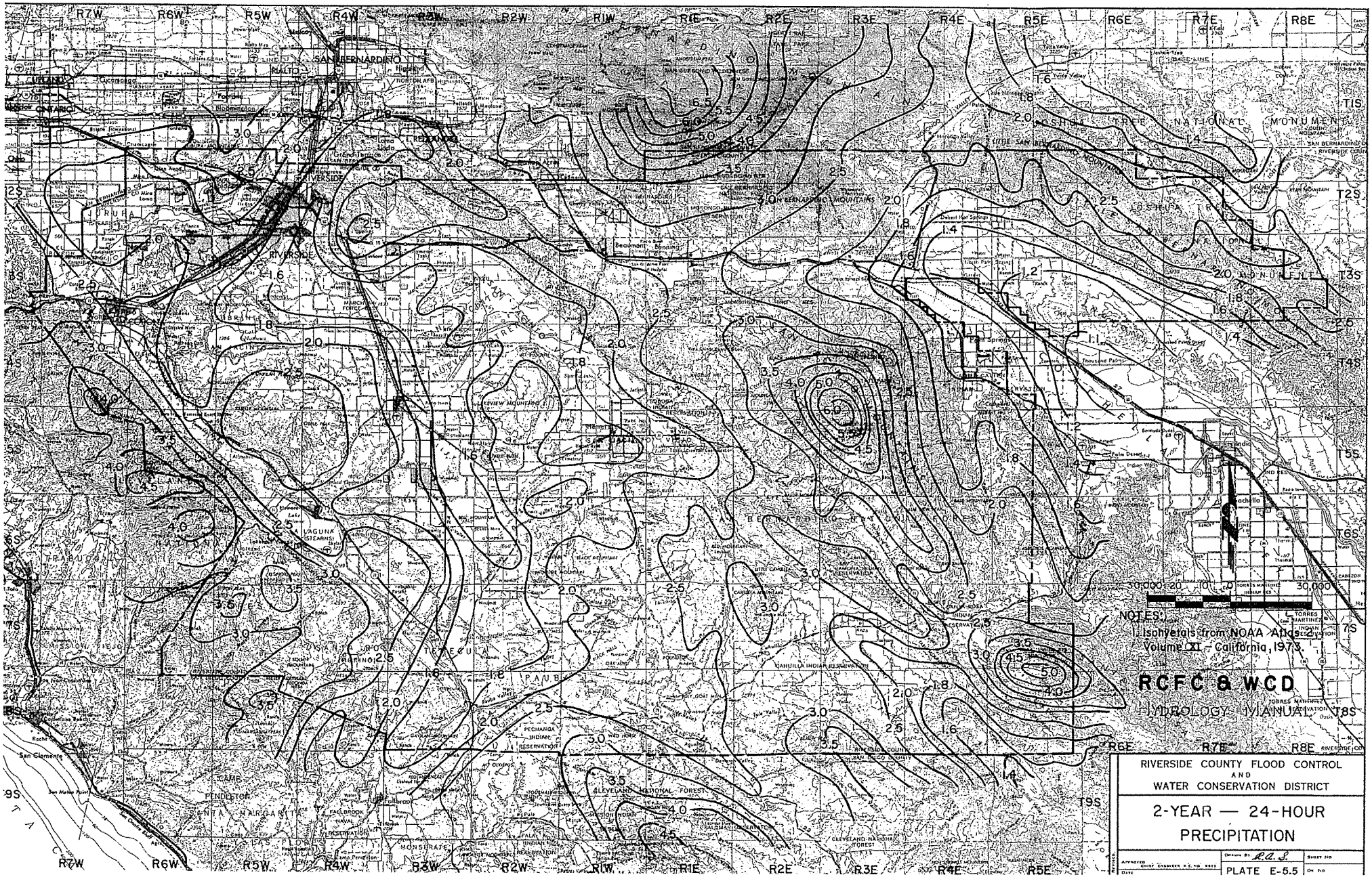
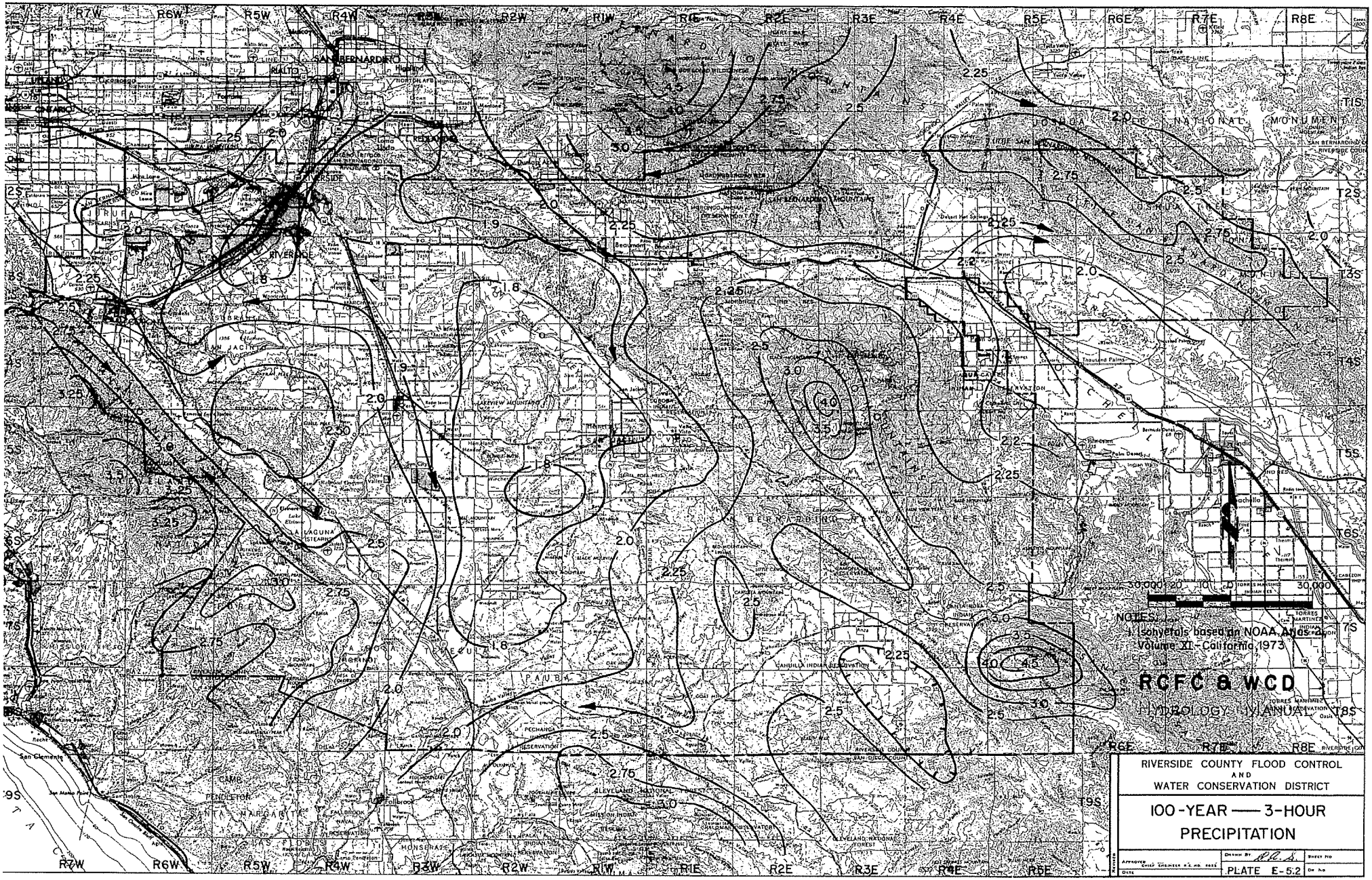
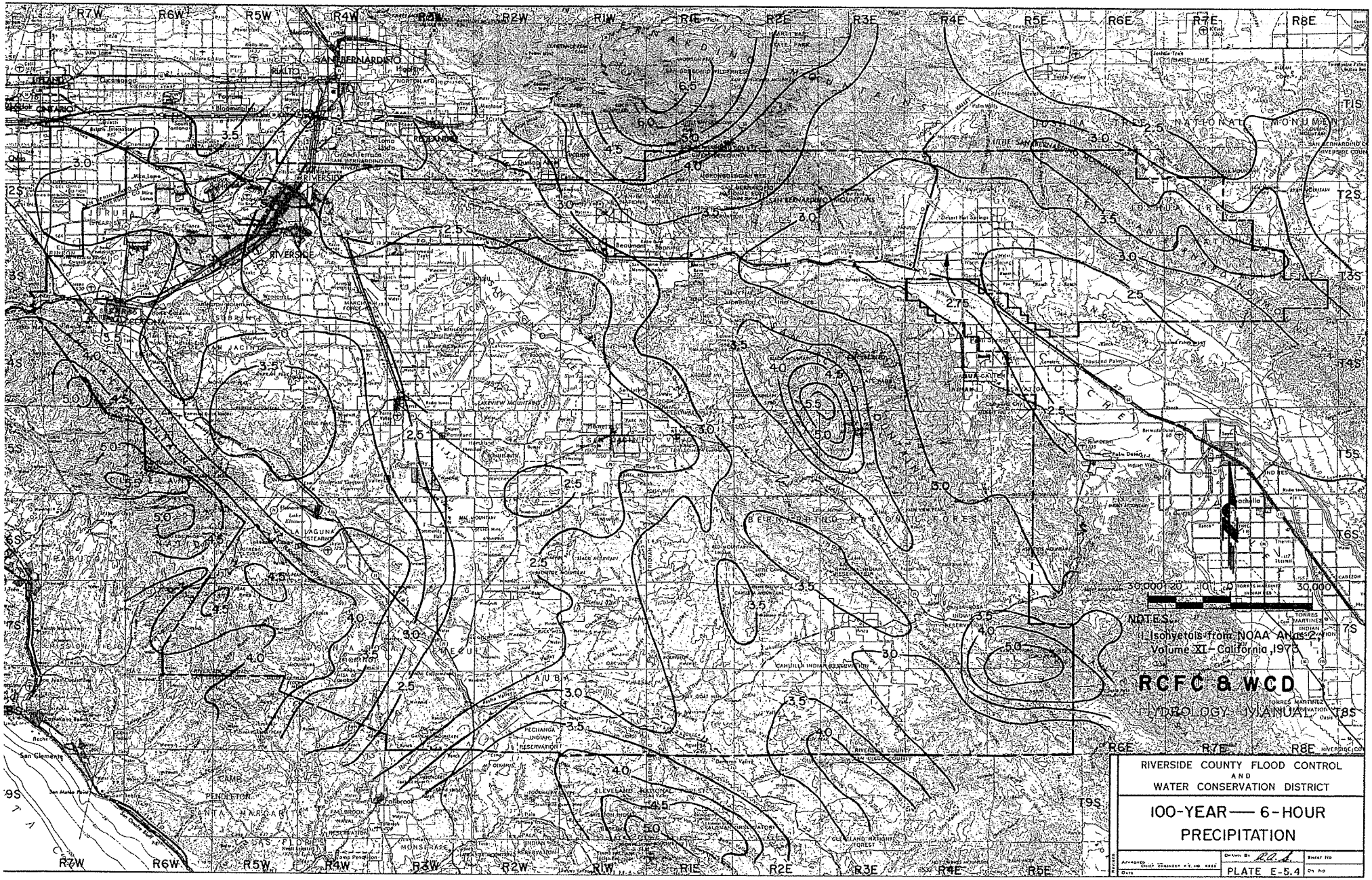
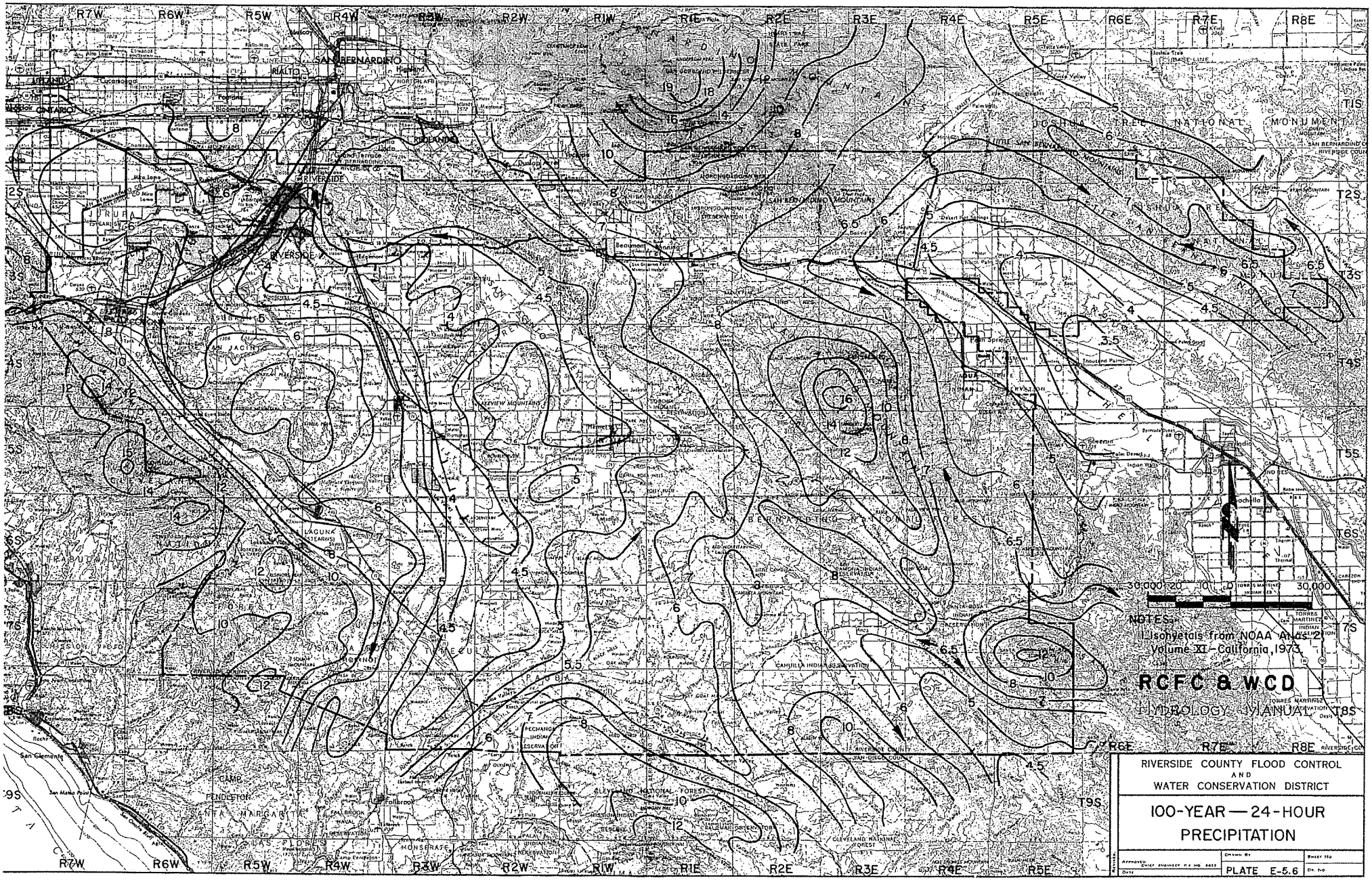

NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 6-HOUR PRECIPITATION
PLATE E-5.3

FIGURE 4


NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.5


NOTES:
1. Isohyetals based on NOAA Atlas 2
Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 3-HOUR
PRECIPITATION
PLATE E-5.2


R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO MOUNTAINS
SAN JACINTO MOUNTAINS
SAN JACINTO FAULT
SAN JACINTO MOUNTAINS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
JOSHUA TREE NATIONAL MONUMENT
SAN GABRIEL MOUNTAINS
SAN GABRIEL FAULT
SAN JACINTO VALLEY
SAN GORGONIO PASS
SAN GORGONIO MOUNTAIN
SAN JACINTO PEAK
SAN GABRIEL PEAK
SAN GABRIEL RIVER
SANTA ANA RIVER
SANTA MARGARITA RIVER
SAN LUIS REY RIVER
SAN JACINTO RIVER
SAN JACINTO RIVER NORTH FORK
SAN JACINTO RIVER SOUTH FORK
SAN JACINTO RIVER MIDDLE FORK
SAN JACINTO RIVER WEST FORK
SAN JACINTO RIVER EAST FORK


NOTES:
Isohyetals from NOAA Atlas 2
Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.6

RCFC & WCD
HYDROLOGY MANUAL

RAINFALL INTENSITY—INCHES PER HOUR

RIVERSIDE			RIVERSIDE (FOOTHILL AREAS)			RUBIDOUX			SAN JACINTO			SUN CITY		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	2.75	3.92	5	3.14	4.71	5	3.18	4.71	5	2.81	4.16	5	3.25	4.85
6	2.48	3.55	6	2.84	4.26	6	2.87	4.26	6	2.56	3.79	6	2.95	4.40
7	2.28	3.26	7	2.61	3.91	7	2.64	3.91	7	2.37	3.51	7	2.72	4.06
8	2.12	3.03	8	2.42	3.63	8	2.45	3.63	8	2.22	3.29	8	2.53	3.78
9	1.99	2.84	9	2.27	3.41	9	2.30	3.41	9	2.09	3.10	9	2.38	3.55
10	1.88	2.68	10	2.14	3.21	10	2.17	3.21	10	1.98	2.94	10	2.25	3.36
11	1.78	2.54	11	2.03	3.05	11	2.06	3.05	11	1.89	2.80	11	2.14	3.19
12	1.70	2.42	12	1.94	2.91	12	1.96	2.91	12	1.81	2.68	12	2.04	3.05
13	1.62	2.32	13	1.86	2.78	13	1.88	2.78	13	1.74	2.58	13	1.96	2.92
14	1.56	2.23	14	1.78	2.67	14	1.80	2.67	14	1.68	2.48	14	1.88	2.81
15	1.50	2.14	15	1.71	2.57	15	1.74	2.57	15	1.62	2.40	15	1.81	2.71
16	1.45	2.07	16	1.66	2.48	16	1.68	2.48	16	1.57	2.32	16	1.75	2.62
17	1.40	2.00	17	1.60	2.40	17	1.62	2.40	17	1.52	2.25	17	1.70	2.54
18	1.36	1.94	18	1.55	2.33	18	1.57	2.33	18	1.48	2.19	18	1.65	2.46
19	1.32	1.88	19	1.51	2.26	19	1.52	2.26	19	1.44	2.13	19	1.60	2.39
20	1.28	1.83	20	1.46	2.20	20	1.48	2.20	20	1.40	2.08	20	1.56	2.33
22	1.22	1.74	22	1.39	2.08	22	1.41	2.08	22	1.34	1.98	22	1.48	2.21
24	1.16	1.66	24	1.32	1.99	24	1.34	1.99	24	1.28	1.90	24	1.41	2.11
26	1.11	1.58	26	1.27	1.90	26	1.28	1.90	26	1.23	1.82	26	1.36	2.03
28	1.06	1.52	28	1.22	1.82	28	1.23	1.82	28	1.19	1.76	28	1.30	1.95
30	1.02	1.46	30	1.17	1.76	30	1.19	1.76	30	1.15	1.70	30	1.26	1.88
32	.99	1.41	32	1.13	1.70	32	1.14	1.70	32	1.11	1.64	32	1.21	1.81
34	.96	1.37	34	1.09	1.64	34	1.11	1.64	34	1.08	1.59	34	1.18	1.76
36	.93	1.32	36	1.06	1.59	36	1.07	1.59	36	1.05	1.55	36	1.14	1.70
38	.90	1.29	38	1.03	1.54	38	1.04	1.54	38	1.02	1.51	38	1.11	1.66
40	.87	1.25	40	1.00	1.50	40	1.01	1.50	40	.99	1.47	40	1.08	1.61
45	.82	1.17	45	.94	1.41	45	.95	1.41	45	.94	1.39	45	1.01	1.51
50	.77	1.11	50	.88	1.33	50	.90	1.33	50	.89	1.31	50	.96	1.43
55	.73	1.05	55	.84	1.26	55	.85	1.26	55	.85	1.25	55	.91	1.36
60	.70	1.00	60	.80	1.20	60	.81	1.20	60	.81	1.20	60	.87	1.30
65	.67	.96	65	.77	1.15	65	.78	1.15	65	.78	1.15	65	.83	1.25
70	.64	.92	70	.73	1.10	70	.74	1.10	70	.75	1.11	70	.80	1.20
75	.62	.88	75	.71	1.06	75	.72	1.06	75	.72	1.07	75	.77	1.15
80	.60	.85	80	.68	1.02	80	.69	1.02	80	.70	1.04	80	.75	1.12
85	.58	.83	85	.66	.99	85	.67	.99	85	.68	1.01	85	.72	1.08
SLOPE = .550			SLOPE = .550			SLOPE = .550			SLOPE = .540			SLOPE = .530		

STANDARD INTENSITY – DURATION CURVES DATA

PLATE D-4.1(5 of 6)

DATE	03-07-19
DRAWN BY	TONY E
JOB NO.	17.1713-1
SHEET NO.	1
OF 1 SHEET	

KWC ENGINEERS
CIVIL ENGINEERS ● PLANNERS ● SURVEYORS
1880 COMPTON AVENUE, SUITE 100 ● CORONA, CA. 92881-3370 ● 909-734-2130

RAINFALL INTENSITY TABLE
COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, CA

Appendix

C

EXISTING CONDITION HYDROLOGY RATIONAL METHOD

2-YEAR EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/08/19 File:E1713Q2.out

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2 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
EXISTING CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.490(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 1.162(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.659
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500

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Initial subarea runoff =      3.422(CFS)
Total initial stream area =        4.470(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.255(CFS)
Depth of flow =   0.196(Ft.), Average velocity =   2.287(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.787(Ft.)
Flow velocity =   2.29(Ft/s)
Travel time =    6.38 min.     TC =   18.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.634
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.926(In/Hr) for a     2.0 year storm
Subarea runoff =      3.527(CFS) for      6.010(Ac.)
Total runoff =      6.949(CFS)    Total area =      10.480(Ac.)
Street flow at end of street =      6.949(CFS)
Half street flow at end of street =      3.475(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   2.450(Ft/s)
Flow width (from curb towards crown)=  11.971(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
```

```
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      9.359(CFS)
Depth of flow =   0.209(Ft.), Average velocity =   3.626(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.425(Ft.)
Flow velocity =   3.63(Ft/s)
Travel time =    1.86 min.     TC =   20.74  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.880(In/Hr) for a     2.0 year storm
Subarea runoff =      4.700(CFS) for      8.510(Ac.)
Total runoff =     11.649(CFS)   Total area =      18.990(Ac.)
Street flow at end of street =     11.649(CFS)
Half street flow at end of street =      5.825(CFS)
Depth of flow =   0.228(Ft.), Average velocity =   3.826(Ft/s)
Flow width (from curb towards crown)=  12.397(Ft.)


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Process from Point/Station      103.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   880.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     13.618(CFS)
Depth of flow =   0.406(Ft.), Average velocity =   1.543(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.54(Ft/s)
Travel time =    9.50 min.     TC =   30.24  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.606
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.715(In/Hr) for a     2.0 year storm
Subarea runoff =      3.834(CFS) for      8.850(Ac.)
Total runoff =     15.484(CFS)    Total area =      27.840(Ac.)
Street flow at end of street =     15.484(CFS)
Half street flow at end of street =      7.742(CFS)
Depth of flow =   0.426(Ft.), Average velocity =   1.624(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     27.840(Ac.)
Runoff from this stream =     15.484(CFS)
Time of concentration =   30.24 min.
Rainfall intensity =     0.715(In/Hr)


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Process from Point/Station      104.000 to Point/Station      105.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      1.153(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.658
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.904(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  36.000(Ft.)
Distance from crown to crossfall grade break  =  34.000(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 [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
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```
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  0.167(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.557(CFS)
Depth of flow =   0.251(Ft.), Average velocity =   2.934(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.856(Ft.)
Flow velocity =   2.93(Ft/s)
Travel time =   10.39 min.     TC =   23.08  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.622
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.829(In/Hr) for a     2.0 year storm
Subarea runoff =      3.253(CFS) for      6.310(Ac.)
Total runoff =      7.158(CFS)   Total area =      11.460(Ac.)
Street flow at end of street =      7.158(CFS)
Half street flow at end of street =      7.158(CFS)
Depth of flow =   0.278(Ft.), Average velocity =   3.123(Ft/s)
Flow width (from curb towards crown)=  15.226(Ft.)


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  36.000(Ft.)
Distance from crown to crossfall grade break  =  34.000(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 [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  0.167(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.068(CFS)
Depth of flow =   0.338(Ft.), Average velocity =   2.448(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.226(Ft.)
Flow velocity =   2.45(Ft/s)
Travel time =    5.62 min.     TC =   28.70  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.609
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
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RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.736(In/Hr) for a     2.0 year storm
Subarea runoff =      1.734(CFS) for      3.870(Ac.)
Total runoff =      8.892(CFS)    Total area =      15.330(Ac.)
Street flow at end of street =      8.892(CFS)
Half street flow at end of street =      8.892(CFS)
Depth of flow =   0.352(Ft.), Average velocity =   2.507(Ft/s)
Flow width (from curb towards crown)=  18.901(Ft.)


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Process from Point/Station      107.000 to Point/Station      107.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     15.330(Ac.)
Runoff from this stream =      8.892(CFS)
Time of concentration =   28.70 min.
Rainfall intensity =     0.736(In/Hr)
Summary of stream data:

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


1       15.484     30.24                 0.715
2        8.892     28.70                 0.736
Largest stream flow has longer time of concentration
Qp =     15.484 + sum of
         Qb         Ia/Ib
          8.892 *    0.972 =      8.640
Qp =     24.123

Total of 2 streams to confluence:
Flow rates before confluence point:
      15.484       8.892
Area of streams before confluence:
       27.840       15.330
Results of confluence:
Total flow rate =     24.123(CFS)
Time of concentration =    30.241 min.
Effective stream area after confluence =     43.170(Ac.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1691.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   265.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  36.000(Ft.)
Distance from crown to crossfall grade break  =  34.000(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 [1] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  0.167(In.)
 Manning's N in gutter =  0.0150
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 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     24.213(CFS)
Depth of flow =   0.593(Ft.), Average velocity =   2.536(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  30.938(Ft.)
Flow velocity =   2.54(Ft/s)
Travel time =    1.74 min.     TC =   31.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.603
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.693(In/Hr) for a     2.0 year storm
Subarea runoff =      0.134(CFS) for      0.320(Ac.)
Total runoff =     24.257(CFS)   Total area =      43.490(Ac.)
Street flow at end of street =     24.257(CFS)
Half street flow at end of street =     24.257(CFS)
Depth of flow =   0.593(Ft.), Average velocity =   2.538(Ft/s)
Flow width (from curb towards crown)=  30.960(Ft.)


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Process from Point/Station      108.000 to Point/Station      108.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.603
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    31.98 min.
Rainfall intensity =      0.693(In/Hr) for a     2.0 year storm
Subarea runoff =      6.361(CFS) for     15.220(Ac.)
Total runoff =     30.619(CFS)   Total area =      58.710(Ac.)


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Process from Point/Station      108.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    44.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.619(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    30.619(CFS)
Normal flow depth in pipe =   22.34(In.)
Flow top width inside pipe =   26.17(In.)
Critical Depth =   22.62(In.)
Pipe flow velocity =      7.81(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    32.08 min.


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Process from Point/Station      110.000 to Point/Station      110.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.425
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    32.08 min.
Rainfall intensity =      0.692(In/Hr) for a     2.0 year storm
Subarea runoff =      1.942(CFS) for      6.610(Ac.)
Total runoff =     32.561(CFS)   Total area =      65.320(Ac.)


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Process from Point/Station      110.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    32.561(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    32.561(CFS)
Normal flow depth in pipe =   21.33(In.)
Flow top width inside pipe =   27.20(In.)
Critical Depth =   23.32(In.)
Pipe flow velocity =      8.72(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    32.19 min.


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Process from Point/Station      115.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     65.320(Ac.)
Runoff from this stream =     32.561(CFS)
Time of concentration =   32.19 min.
Rainfall intensity =     0.691(In/Hr)


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Process from Point/Station      112.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.233(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.525
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      1.760(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      115.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.760(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.15(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.53 min.     TC =   12.75  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.616
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.149(In/Hr) for a     2.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      1.760(CFS)    Total area =       2.720(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      1.760(CFS)
Time of concentration =   12.75 min.
Rainfall intensity =     1.149(In/Hr)
Summary of stream data:

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


1       32.561     32.19                 0.691
2        1.760     12.75                 1.149
Largest stream flow has longer time of concentration
Qp =     32.561 + sum of
         Qb         Ia/Ib
```

```
         1.760 *    0.601 =      1.057
Qp =     33.618

Total of 2 streams to confluence:
Flow rates before confluence point:
      32.561       1.760
Area of streams before confluence:
       65.320        2.720
Results of confluence:
Total flow rate =     33.618(CFS)
Time of concentration =    32.187 min.
Effective stream area after confluence =     68.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      120.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1687.000(Ft.)
End of natural channel elevation =   1683.000(Ft.)
Length of natural channel  =   355.000(Ft.)
Estimated mean flow rate at midpoint of channel =     34.261(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.69(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0113
Corrected/adjusted channel slope =  0.0113
Travel time =    1.60 min.     TC =   33.79  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.420
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.672(In/Hr) for a     2.0 year storm
Subarea runoff =      0.734(CFS) for      2.600(Ac.)
Total runoff =     34.353(CFS)   Total area =      70.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     70.640(Ac.)
Runoff from this stream =     34.353(CFS)
Time of concentration =   33.79 min.
Rainfall intensity =     0.672(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
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```
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.201(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
Subarea runoff =      3.482(CFS) for      5.160(Ac.)
Total runoff =      4.683(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.683(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.683(CFS)
Normal flow depth in pipe =    9.21(In.)
Flow top width inside pipe =   14.60(In.)
Critical Depth =   10.54(In.)
Pipe flow velocity =      5.93(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.32 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
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Stream flow area =      6.940(Ac.)
Runoff from this stream =      4.683(CFS)
Time of concentration =   15.32 min.
Rainfall intensity =     1.039(In/Hr)
Summary of stream data:

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


1       34.353     33.79                 0.672
2        4.683     15.32                 1.039
Largest stream flow has longer time of concentration
Qp =     34.353 + sum of
         Qb         Ia/Ib
          4.683 *    0.647 =      3.032
Qp =     37.384

Total of 2 streams to confluence:
Flow rates before confluence point:
      34.353       4.683
Area of streams before confluence:
       70.640        6.940
Results of confluence:
Total flow rate =     37.384(CFS)
Time of concentration =    33.791 min.
Effective stream area after confluence =     77.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =     39.167(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.91(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    3.55 min.     TC =   37.34  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.492
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.636(In/Hr) for a     2.0 year storm
Subarea runoff =      2.315(CFS) for      7.400(Ac.)
Total runoff =     39.699(CFS)   Total area =      84.980(Ac.)
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Process from Point/Station      122.000 to Point/Station      124.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1673.200(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   336.000(Ft.)
Estimated mean flow rate at midpoint of channel =     40.339(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.95(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0065
Corrected/adjusted channel slope =  0.0065
Travel time =    1.90 min.     TC =   39.24  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.485
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.619(In/Hr) for a     2.0 year storm
Subarea runoff =      0.824(CFS) for      2.740(Ac.)
Total runoff =     40.523(CFS)   Total area =      87.720(Ac.)


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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.485
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    39.24 min.
Rainfall intensity =      0.619(In/Hr) for a     2.0 year storm
Subarea runoff =      0.271(CFS) for      0.900(Ac.)
Total runoff =     40.794(CFS)   Total area =      88.620(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
```

```
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      1.080(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.501
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      4.784(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1686.500(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =  1078.000(Ft.)
Estimated mean flow rate at midpoint of channel =      7.906(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0144
Corrected/adjusted channel slope =  0.0144
Travel time =    6.36 min.     TC =   20.64  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.563
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.882(In/Hr) for a     2.0 year storm
Subarea runoff =      5.729(CFS) for     11.550(Ac.)
Total runoff =     10.514(CFS)   Total area =      20.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.563
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
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```
Time of concentration =    20.64 min.
Rainfall intensity =      0.882(In/Hr) for a     2.0 year storm
Subarea runoff =      1.587(CFS) for      3.200(Ac.)
Total runoff =     12.101(CFS)    Total area =      23.600(Ac.)


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      1.218(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.642(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.515(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.76(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    3.22 min.     TC =   14.69  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.601
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.063(In/Hr) for a     2.0 year storm
Subarea runoff =      3.131(CFS) for      4.900(Ac.)
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Total runoff =      3.773(CFS)    Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.058(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.44(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    4.45 min.     TC =   19.14  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.571
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.919(In/Hr) for a     2.0 year storm
Subarea runoff =      8.442(CFS) for     16.080(Ac.)
Total runoff =     12.215(CFS)    Total area =      21.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.572(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.29(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.94 min.     TC =   22.08  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.555
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.850(In/Hr) for a     2.0 year storm
Subarea runoff =      3.968(CFS) for      8.420(Ac.)
Total runoff =     16.183(CFS)   Total area =      30.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1671.900(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   579.000(Ft.)
Estimated mean flow rate at midpoint of channel =     16.183(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.12(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0016
Corrected/adjusted channel slope =  0.0016
Travel time =    8.64 min.     TC =   30.73  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.515
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.708(In/Hr) for a     2.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =     16.183(CFS)   Total area =      30.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     30.240(Ac.)
Runoff from this stream =     16.183(CFS)
Time of concentration =   30.73 min.
Rainfall intensity =     0.708(In/Hr)


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Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
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Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      1.015(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.490
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      3.855(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.672(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.73(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   23.88 min.     TC =   39.85  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.406
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.614(In/Hr) for a     2.0 year storm
Subarea runoff =      1.821(CFS) for      7.310(Ac.)
Total runoff =      5.676(CFS)   Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
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RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    39.85 min.
Rainfall intensity =      0.614(In/Hr) for a     2.0 year storm
Subarea runoff =      1.765(CFS) for      3.430(Ac.)
Total runoff =      7.441(CFS)   Total area =      18.490(Ac.)


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Process from Point/Station      313.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1675.800(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   956.000(Ft.)
Estimated mean flow rate at midpoint of channel =      8.717(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.71(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0050
Corrected/adjusted channel slope =  0.0050
Travel time =    9.31 min.     TC =   49.17  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.458
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.547(In/Hr) for a     2.0 year storm
Subarea runoff =      1.587(CFS) for      6.340(Ac.)
Total runoff =      9.028(CFS)   Total area =      24.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.830(Ac.)
Runoff from this stream =      9.028(CFS)
Time of concentration =   49.17 min.
Rainfall intensity =     0.547(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
```

```
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      1.144(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.919(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.657
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      1.144(In/Hr) for a     2.0 year storm
Subarea runoff =      0.722(CFS) for      0.960(Ac.)
Total runoff =      5.641(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      7.262(CFS)
Depth of flow =   0.238(Ft.), Average velocity =   2.210(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.875(Ft.)
Flow velocity =   2.21(Ft/s)
Travel time =   10.66 min.     TC =   23.51  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.621
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      3.072(CFS) for      6.030(Ac.)
Total runoff =      8.713(CFS)   Total area =      12.040(Ac.)
Street flow at end of street =      8.713(CFS)
Half street flow at end of street =      4.356(CFS)
Depth of flow =   0.256(Ft.), Average velocity =   2.311(Ft/s)
Flow width (from curb towards crown)=  13.782(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    23.51 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      2.183(CFS) for      3.150(Ac.)
Total runoff =     10.896(CFS)   Total area =      15.190(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.453
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    23.51 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      5.005(CFS) for     13.460(Ac.)
Total runoff =     15.901(CFS)   Total area =      28.650(Ac.)


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Process from Point/Station      318.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1676.000(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   724.000(Ft.)
Estimated mean flow rate at midpoint of channel =     18.856(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
```

```
Velocity using mean channel flow =   2.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0069
Corrected/adjusted channel slope =  0.0069
Travel time =    4.92 min.     TC =   28.43  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.436
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.739(In/Hr) for a     2.0 year storm
Subarea runoff =      3.429(CFS) for     10.650(Ac.)
Total runoff =     19.330(CFS)    Total area =      39.300(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     39.300(Ac.)
Runoff from this stream =     19.330(CFS)
Time of concentration =   28.43 min.
Rainfall intensity =     0.739(In/Hr)
Summary of stream data:

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


1       16.183     30.73                 0.708
2        9.028     49.17                 0.547
3       19.330     28.43                 0.739
Largest stream flow has longer or shorter time of concentration
Qp =     19.330 + sum of
         Qa          Tb/Ta
         16.183 *    0.925 =     14.974
         Qa          Tb/Ta
          9.028 *    0.578 =      5.221
Qp =     39.525

Total of 3 streams to confluence:
Flow rates before confluence point:
      16.183       9.028      19.330
Area of streams before confluence:
       30.240       24.830       39.300
Results of confluence:
Total flow rate =     39.525(CFS)
Time of concentration =    28.433 min.
Effective stream area after confluence =     94.370(Ac.)
End of computations, total study area =          206.59 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.715
```

Area averaged RI index number = 74.1

10-YEAR EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/13/19 File:E1713Q10.out

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10 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
EXISTING CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.700(In/Hr)
Slope of intensity duration curve = 0.5500

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Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 1.659(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.699
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500

```
Initial subarea runoff =      5.182(CFS)
Total initial stream area =        4.470(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.013(CFS)
Depth of flow =   0.233(Ft.), Average velocity =   2.537(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.624(Ft.)
Flow velocity =   2.54(Ft/s)
Travel time =    5.75 min.     TC =   18.25  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.675
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.347(In/Hr) for a    10.0 year storm
Subarea runoff =      5.468(CFS) for      6.010(Ac.)
Total runoff =     10.649(CFS)    Total area =      10.480(Ac.)
Street flow at end of street =     10.649(CFS)
Half street flow at end of street =      5.325(CFS)
Depth of flow =   0.261(Ft.), Average velocity =   2.722(Ft/s)
Flow width (from curb towards crown)=  14.040(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
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```
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     16.889(CFS)
Depth of flow =   0.265(Ft.), Average velocity =   4.193(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.243(Ft.)
Flow velocity =   4.19(Ft/s)
Travel time =    1.61 min.     TC =   19.86  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.670
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.286(In/Hr) for a    10.0 year storm
Subarea runoff =     12.339(CFS) for     14.320(Ac.)
Total runoff =     22.989(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     22.989(CFS)
Half street flow at end of street =     11.494(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   4.524(Ft/s)
Flow width (from curb towards crown)=  15.985(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     24.453(CFS)
Depth of flow =   0.587(Ft.), Average velocity =   1.559(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 =    4.33(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.56(Ft/s)
Travel time =    6.31 min.     TC =   26.16  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.653
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.105(In/Hr) for a    10.0 year storm
Subarea runoff =      2.829(CFS) for      3.920(Ac.)
Total runoff =     25.817(CFS)    Total area =      28.720(Ac.)
Street flow at end of street =     25.817(CFS)
Half street flow at end of street =     12.909(CFS)
Depth of flow =   0.602(Ft.), Average velocity =   1.576(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 =    5.10(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1688.200(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =   377.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.817(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    25.817(CFS)
Normal flow depth in pipe =   24.52(In.)
Flow top width inside pipe =   23.19(In.)
Critical Depth =   20.79(In.)
Pipe flow velocity =      6.01(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    27.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.720(Ac.)
Runoff from this stream =     25.817(CFS)
Time of concentration =   27.21 min.
Rainfall intensity =     1.081(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      1.646(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.913(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.489(CFS)
Depth of flow =   0.305(Ft.), Average velocity =   3.248(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.212(Ft.)
Flow velocity =   3.25(Ft/s)
Travel time =    9.39 min.     TC =   22.07  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.663
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.213(In/Hr) for a    10.0 year storm
Subarea runoff =      5.080(CFS) for      6.310(Ac.)
Total runoff =     10.992(CFS)   Total area =      11.460(Ac.)
Street flow at end of street =     10.992(CFS)
Half street flow at end of street =     10.992(CFS)
Depth of flow =   0.338(Ft.), Average velocity =   3.462(Ft/s)
Flow width (from curb towards crown)=  17.860(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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
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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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     14.155(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   2.806(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.492(Ft.)
Flow velocity =   2.81(Ft/s)
Travel time =    4.91 min.     TC =   26.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.651
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.086(In/Hr) for a    10.0 year storm
Subarea runoff =      6.254(CFS) for      8.840(Ac.)
Total runoff =     17.246(CFS)   Total area =      20.300(Ac.)
Street flow at end of street =     17.246(CFS)
Half street flow at end of street =     17.246(CFS)
Depth of flow =   0.465(Ft.), Average velocity =   2.947(Ft/s)
Flow width (from curb towards crown)=  24.223(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.246(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.246(CFS)
Normal flow depth in pipe =   15.68(In.)
Flow top width inside pipe =   22.84(In.)
Critical Depth =   17.96(In.)
Pipe flow velocity =      7.93(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    27.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     17.246(CFS)
Time of concentration =   27.04 min.
Rainfall intensity =     1.085(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
```

```
 No.       (CFS)       (min)                 (In/Hr)


1       25.817     27.21                 1.081
2       17.246     27.04                 1.085
Largest stream flow has longer time of concentration
Qp =     25.817 + sum of
         Qb         Ia/Ib
         17.246 *    0.997 =     17.188
Qp =     43.005

Total of 2 streams to confluence:
Flow rates before confluence point:
      25.817      17.246
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     43.005(CFS)
Time of concentration =    27.210 min.
Effective stream area after confluence =     49.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    43.005(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    43.005(CFS)
Normal flow depth in pipe =   28.08(In.)
Flow top width inside pipe =   23.51(In.)
Critical Depth =   26.12(In.)
Pipe flow velocity =      7.99(Ft/s)
Travel time through pipe =    1.24 min.
Time of concentration (TC) =    28.45 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     43.005(CFS)
Time of concentration =   28.45 min.
Rainfall intensity =     1.055(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =   12.637 min.
Rainfall intensity =      1.649(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.631(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      9.780(CFS)
Depth of flow =   0.311(Ft.), Average velocity =   3.592(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.545(Ft.)
Flow velocity =   3.59(Ft/s)
Travel time =    2.72 min.     TC =   15.36  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.481(In/Hr) for a    10.0 year storm
Subarea runoff =      2.225(CFS) for      2.190(Ac.)
Total runoff =     10.856(CFS)    Total area =       9.690(Ac.)
Street flow at end of street =     10.856(CFS)
Half street flow at end of street =     10.856(CFS)
Depth of flow =   0.325(Ft.), Average velocity =   3.686(Ft/s)
Flow width (from curb towards crown)=  17.205(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.856(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.856(CFS)
Normal flow depth in pipe =   15.70(In.)
Flow top width inside pipe =   22.83(In.)
Critical Depth =   14.18(In.)
Pipe flow velocity =      4.98(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    15.61 min.


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Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.556
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.61 min.
Rainfall intensity =      1.468(In/Hr) for a    10.0 year storm
Subarea runoff =      5.394(CFS) for      6.610(Ac.)
Total runoff =     16.249(CFS)   Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.249(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    16.249(CFS)
Normal flow depth in pipe =   15.84(In.)
Flow top width inside pipe =   22.74(In.)
Critical Depth =   17.44(In.)
Pipe flow velocity =      7.38(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.74 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     16.249(CFS)
Time of concentration =   15.74 min.
Rainfall intensity =     1.461(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
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**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.761(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      2.818(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.818(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.27(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.39 min.     TC =   12.60  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.682
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.651(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      2.818(CFS)    Total area =       2.720(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
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```
Stream flow area =      2.720(Ac.)
Runoff from this stream =      2.818(CFS)
Time of concentration =   12.60 min.
Rainfall intensity =     1.651(In/Hr)
Summary of stream data:

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


1       16.249     15.74                 1.461
2        2.818     12.60                 1.651
Largest stream flow has longer time of concentration
Qp =     16.249 + sum of
         Qb         Ia/Ib
          2.818 *    0.885 =      2.493
Qp =     18.743

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.249       2.818
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     18.743(CFS)
Time of concentration =    15.741 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1687.000(Ft.)
End of natural channel elevation =   1683.000(Ft.)
Length of natural channel  =   355.000(Ft.)
Estimated mean flow rate at midpoint of channel =     20.024(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.18(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0113
Corrected/adjusted channel slope =  0.0113
Travel time =    1.86 min.     TC =   17.60  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.544
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      1.374(In/Hr) for a    10.0 year storm
Subarea runoff =      1.944(CFS) for      2.600(Ac.)
Total runoff =     20.687(CFS)   Total area =      21.620(Ac.)
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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     21.620(Ac.)
Runoff from this stream =     20.687(CFS)
Time of concentration =   17.60 min.
Rainfall intensity =     1.374(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      1.490(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.821(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      1.490(In/Hr) for a    10.0 year storm
Subarea runoff =      5.278(CFS) for      5.160(Ac.)
Total runoff =      7.099(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
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```
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.099(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.099(CFS)
Normal flow depth in pipe =   10.55(In.)
Flow top width inside pipe =   17.73(In.)
Critical Depth =   12.39(In.)
Pipe flow velocity =      6.59(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    15.31 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =      7.099(CFS)
Time of concentration =   15.31 min.
Rainfall intensity =     1.484(In/Hr)
Summary of stream data:

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


1       43.005     28.45            1.055
2       20.687     17.60            1.374
3        7.099     15.31            1.484
Largest stream flow has longer time of concentration
Qp =     43.005 + sum of
         Qb         Ia/Ib
         20.687 *    0.768 =     15.884
         Qb         Ia/Ib
          7.099 *    0.711 =      5.049
Qp =     63.938

Total of 3 main streams to confluence:
Flow rates before confluence point:
      43.005      20.687       7.099
Area of streams before confluence:
       49.020       21.620        6.940


Results of confluence:
Total flow rate =     63.938(CFS)
Time of concentration =    28.452 min.
Effective stream area after confluence  =     77.580(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =     66.987(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
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```
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.57(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    3.04 min.     TC =   31.49  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.998(In/Hr) for a    10.0 year storm
Subarea runoff =      4.344(CFS) for      7.400(Ac.)
Total runoff =     68.282(CFS)   Total area =      84.980(Ac.)


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Process from Point/Station      122.000 to Point/Station      124.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1673.200(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   336.000(Ft.)
Estimated mean flow rate at midpoint of channel =     69.382(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0065
Corrected/adjusted channel slope =  0.0065
Travel time =    1.63 min.     TC =   33.11  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.583
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.971(In/Hr) for a    10.0 year storm
Subarea runoff =      1.549(CFS) for      2.740(Ac.)
Total runoff =     69.831(CFS)   Total area =      87.720(Ac.)


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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.583
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    33.11 min.
Rainfall intensity =      0.971(In/Hr) for a    10.0 year storm
Subarea runoff =      0.509(CFS) for      0.900(Ac.)
Total runoff =     70.340(CFS)   Total area =      88.620(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      1.541(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.565
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      7.702(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1686.500(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =  1078.000(Ft.)
Estimated mean flow rate at midpoint of channel =     12.728(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.19(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0144
Corrected/adjusted channel slope =  0.0144
Travel time =    5.64 min.     TC =   19.92  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.637
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.284(In/Hr) for a    10.0 year storm
Subarea runoff =      9.451(CFS) for     11.550(Ac.)
Total runoff =     17.153(CFS)   Total area =      20.400(Ac.)


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Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.637
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    19.92 min.
Rainfall intensity =      1.284(In/Hr) for a    10.0 year storm
Subarea runoff =      2.618(CFS) for      3.200(Ac.)
Total runoff =     19.771(CFS)   Total area =      23.600(Ac.)


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      1.739(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.690
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.008(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.949(CFS)
```

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.16(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    2.91 min.     TC =   14.38  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.669
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.535(In/Hr) for a    10.0 year storm
Subarea runoff =      5.037(CFS) for      4.900(Ac.)
Total runoff =      6.045(CFS)   Total area =       5.740(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.512(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.88(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    3.95 min.     TC =   18.33  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.646
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.344(In/Hr) for a    10.0 year storm
Subarea runoff =     13.956(CFS) for     16.080(Ac.)
Total runoff =     20.001(CFS)   Total area =      21.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      308.000
```

**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1690.200(Ft.)
End of natural channel elevation = 1671.900(Ft.)
Length of natural channel = 756.000(Ft.)
Estimated mean flow rate at midpoint of channel = 23.860(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 4.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0242
Corrected/adjusted channel slope = 0.0242
Travel time = 2.58 min. TC = 20.91 min.

Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.632
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 71.60
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.250(In/Hr) for a 10.0 year storm
Subarea runoff = 6.657(CFS) for 8.420(Ac.)
Total runoff = 26.658(CFS) Total area = 30.240(Ac.)

++
Process from Point/Station 308.000 to Point/Station 320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1671.900(Ft.)
End of natural channel elevation = 1671.000(Ft.)
Length of natural channel = 579.000(Ft.)
Estimated mean flow rate at midpoint of channel = 26.658(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 1.28(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0016
Corrected/adjusted channel slope = 0.0016
Travel time = 7.55 min. TC = 28.46 min.

Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.599
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 71.60
Pervious area fraction = 1.000; Impervious fraction = 0.000

```
Rainfall intensity =      1.055(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =     26.658(CFS)    Total area =      30.240(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     30.240(Ac.)
Runoff from this stream =     26.658(CFS)
Time of concentration =   28.46 min.
Rainfall intensity =     1.055(In/Hr)


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Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      1.450(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.554
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      6.219(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.152(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   21.24 min.     TC =   37.21  min.


 Adding area flow to channel
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SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.471
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.910(In/Hr) for a    10.0 year storm
Subarea runoff =      3.133(CFS) for      7.310(Ac.)
Total runoff =      9.352(CFS)   Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    37.21 min.
Rainfall intensity =      0.910(In/Hr) for a    10.0 year storm
Subarea runoff =      2.643(CFS) for      3.430(Ac.)
Total runoff =     11.994(CFS)   Total area =      18.490(Ac.)


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Process from Point/Station      313.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1675.800(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   956.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.051(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.93(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0050
Corrected/adjusted channel slope =  0.0050
Travel time =    8.24 min.     TC =   45.46  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.546
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.815(In/Hr) for a    10.0 year storm
Subarea runoff =      2.823(CFS) for      6.340(Ac.)
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Total runoff =     14.817(CFS)    Total area =      24.830(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.830(Ac.)
Runoff from this stream =     14.817(CFS)
Time of concentration =   45.46 min.
Rainfall intensity =     0.815(In/Hr)


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Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.089(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.697
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
Subarea runoff =      1.093(CFS) for      0.960(Ac.)
Total runoff =      8.182(CFS)    Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
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Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     10.633(CFS)
Depth of flow =   0.277(Ft.), Average velocity =   2.428(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.848(Ft.)
Flow velocity =   2.43(Ft/s)
Travel time =    9.70 min.     TC =   22.55  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      4.787(CFS) for      6.030(Ac.)
Total runoff =     12.969(CFS)    Total area =      12.040(Ac.)
Street flow at end of street =     12.969(CFS)
Half street flow at end of street =      6.485(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   2.550(Ft/s)
Flow width (from curb towards crown)=  15.994(Ft.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    22.55 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      3.219(CFS) for      3.150(Ac.)
Total runoff =     16.189(CFS)    Total area =      15.190(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.519
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    22.55 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      8.383(CFS) for     13.460(Ac.)
Total runoff =     24.572(CFS)   Total area =      28.650(Ac.)


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Process from Point/Station      318.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1676.000(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   724.000(Ft.)
Estimated mean flow rate at midpoint of channel =     29.139(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.76(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0069
Corrected/adjusted channel slope =  0.0069
Travel time =    4.37 min.     TC =   26.92  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.502
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      1.088(In/Hr) for a    10.0 year storm
Subarea runoff =      5.816(CFS) for     10.650(Ac.)
Total runoff =     30.388(CFS)   Total area =      39.300(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     39.300(Ac.)
Runoff from this stream =     30.388(CFS)
Time of concentration =   26.92 min.
Rainfall intensity =     1.088(In/Hr)
Summary of stream data:

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


1       26.658     28.46                1.055
2       14.817     45.46                0.815
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3       30.388     26.92                 1.088
Largest stream flow has longer or shorter time of concentration
Qp =     30.388 + sum of
         Qa          Tb/Ta
         26.658 *    0.946 =     25.222
         Qa          Tb/Ta
         14.817 *    0.592 =      8.777
Qp =     64.386

Total of 3 streams to confluence:
Flow rates before confluence point:
      26.658      14.817      30.388
Area of streams before confluence:
       30.240       24.830       39.300
Results of confluence:
Total flow rate =     64.386(CFS)
Time of concentration =    26.925 min.
Effective stream area after confluence =     94.370(Ac.)
End of computations, total study area =          206.59 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.715
Area averaged RI index number =  74.1
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100-YEAR EXISTING CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/13/19 File:E1713Q100.out

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100 YEAR STORM EVENT HYDROLOGY ANALISYS
SWC OF COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
EXISTING CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.000(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 2.371(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 84.40
Pervious area fraction = 0.500; Impervious fraction = 0.500

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Initial subarea runoff =      9.088(CFS)
Total initial stream area =        4.470(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     14.189(CFS)
Depth of flow =   0.293(Ft.), Average velocity =   2.921(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.631(Ft.)
Flow velocity =   2.92(Ft/s)
Travel time =    5.00 min.     TC =   17.49  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.970(In/Hr) for a   100.0 year storm
Subarea runoff =     10.063(CFS) for      6.010(Ac.)
Total runoff =     19.151(CFS)   Total area =      10.480(Ac.)
Street flow at end of street =     19.151(CFS)
Half street flow at end of street =      9.575(CFS)
Depth of flow =   0.330(Ft.), Average velocity =   3.146(Ft/s)
Flow width (from curb towards crown)=  17.489(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
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Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     30.671(CFS)
Depth of flow =   0.337(Ft.), Average velocity =   4.858(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.808(Ft.)
Flow velocity =   4.86(Ft/s)
Travel time =    1.39 min.     TC =   18.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.889(In/Hr) for a   100.0 year storm
Subarea runoff =     22.939(CFS) for     14.320(Ac.)
Total runoff =     42.089(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     42.089(CFS)
Half street flow at end of street =     21.045(CFS)
Depth of flow =   0.374(Ft.), Average velocity =   5.487(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     44.896(CFS)
Depth of flow =   0.743(Ft.), Average velocity =   1.929(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 =   12.17(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.93(Ft/s)
Travel time =    5.10 min.     TC =   23.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.842
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.656(In/Hr) for a   100.0 year storm
Subarea runoff =      5.464(CFS) for      3.920(Ac.)
Total runoff =     47.554(CFS)    Total area =      28.720(Ac.)
Street flow at end of street =     47.554(CFS)
Half street flow at end of street =     23.777(CFS)
Depth of flow =   0.760(Ft.), Average velocity =   1.974(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 =   13.00(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1688.200(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =   377.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    47.554(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    47.554(CFS)
Normal flow depth in pipe =   29.30(In.)
Flow top width inside pipe =   33.72(In.)
Critical Depth =   26.42(In.)
Pipe flow velocity =      7.12(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    24.86 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.720(Ac.)
Runoff from this stream =     47.554(CFS)
Time of concentration =   24.86 min.
Rainfall intensity =     1.624(In/Hr)


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Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      2.351(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     10.379(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     15.181(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   3.750(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.158(Ft.)
Flow velocity =   3.75(Ft/s)
Travel time =    8.13 min.     TC =   20.82  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.790(In/Hr) for a   100.0 year storm
Subarea runoff =      9.551(CFS) for      6.310(Ac.)
Total runoff =     19.930(CFS)    Total area =      11.460(Ac.)
Street flow at end of street =     19.930(CFS)
Half street flow at end of street =     19.930(CFS)
Depth of flow =   0.427(Ft.), Average velocity =   4.011(Ft/s)
Flow width (from curb towards crown)=  22.324(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.500(Ft.)
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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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     25.946(CFS)
Depth of flow =   0.552(Ft.), Average velocity =   3.162(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    2.58(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  28.557(Ft.)
Flow velocity =   3.16(Ft/s)
Travel time =    4.35 min.     TC =   25.17  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.612(In/Hr) for a   100.0 year storm
Subarea runoff =     11.978(CFS) for      8.840(Ac.)
Total runoff =     31.908(CFS)   Total area =      20.300(Ac.)
Street flow at end of street =     31.908(CFS)
Half street flow at end of street =     31.908(CFS)
Depth of flow =   0.598(Ft.), Average velocity =   3.264(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    4.92(Ft.)
Flow width (from curb towards crown)=  30.900(Ft.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    31.908(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    31.908(CFS)
Normal flow depth in pipe =   22.97(In.)
Flow top width inside pipe =   19.25(In.)
Critical Depth =   23.35(In.)
Pipe flow velocity =      8.86(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    25.23 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     31.908(CFS)
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Time of concentration =   25.23 min.
Rainfall intensity =     1.610(In/Hr)
Summary of stream data:

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


1       47.554     24.86                 1.624
2       31.908     25.23                 1.610
Largest stream flow has longer or shorter time of concentration
Qp =     47.554 + sum of
         Qa          Tb/Ta
         31.908 *    0.985 =     31.444
Qp =     78.998

Total of 2 streams to confluence:
Flow rates before confluence point:
      47.554      31.908
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     78.998(CFS)
Time of concentration =    24.860 min.
Effective stream area after confluence =     49.020(Ac.)


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Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    78.998(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    78.998(CFS)
Normal flow depth in pipe =   34.27(In.)
Flow top width inside pipe =   32.56(In.)
Critical Depth =   33.34(In.)
Pipe flow velocity =      9.40(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    25.91 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     78.998(CFS)
Time of concentration =   25.91 min.
Rainfall intensity =     1.587(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
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Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.637 min.
Rainfall intensity =      2.356(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     15.147(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     17.176(CFS)
Depth of flow =   0.389(Ft.), Average velocity =   4.128(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.433(Ft.)
Flow velocity =   4.13(Ft/s)
Travel time =    2.37 min.     TC =   15.00  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.143(In/Hr) for a   100.0 year storm
Subarea runoff =      4.007(CFS) for      2.190(Ac.)
Total runoff =     19.153(CFS)    Total area =       9.690(Ac.)
Street flow at end of street =     19.153(CFS)
Half street flow at end of street =     19.153(CFS)
Depth of flow =   0.406(Ft.), Average velocity =   4.241(Ft/s)
Flow width (from curb towards crown)=  21.286(Ft.)
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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.153(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.153(CFS)
Normal flow depth in pipe =   21.75(In.)
Flow top width inside pipe =   21.37(In.)
Critical Depth =   18.37(In.)
Pipe flow velocity =      5.58(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    15.23 min.


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Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.23 min.
Rainfall intensity =      2.126(In/Hr) for a   100.0 year storm
Subarea runoff =     11.595(CFS) for      6.610(Ac.)
Total runoff =     30.748(CFS)   Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.748(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    30.748(CFS)
Normal flow depth in pipe =   20.44(In.)
Flow top width inside pipe =   27.96(In.)
Critical Depth =   22.66(In.)
Pipe flow velocity =      8.63(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    15.34 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     30.748(CFS)
Time of concentration =   15.34 min.
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Rainfall intensity =     2.117(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      2.516(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.836
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      5.719(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.719(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.50(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.18 min.     TC =   12.39  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.381(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      5.719(CFS)   Total area =       2.720(Ac.)
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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      5.719(CFS)
Time of concentration =   12.39 min.
Rainfall intensity =     2.381(In/Hr)
Summary of stream data:

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


1       30.748     15.34                 2.117
2        5.719     12.39                 2.381
Largest stream flow has longer time of concentration
Qp =     30.748 + sum of
         Qb         Ia/Ib
          5.719 *    0.889 =      5.085
Qp =     35.834

Total of 2 streams to confluence:
Flow rates before confluence point:
      30.748       5.719
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     35.834(CFS)
Time of concentration =    15.341 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1687.000(Ft.)
End of natural channel elevation =   1683.000(Ft.)
Length of natural channel  =   355.000(Ft.)
Estimated mean flow rate at midpoint of channel =     38.283(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.81(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0113
Corrected/adjusted channel slope =  0.0113
Travel time =    1.55 min.     TC =   16.90  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.821
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
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Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      2.008(In/Hr) for a   100.0 year storm
Subarea runoff =      4.287(CFS) for      2.600(Ac.)
Total runoff =     40.121(CFS)    Total area =      21.620(Ac.)


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     21.620(Ac.)
Runoff from this stream =     40.121(CFS)
Time of concentration =   16.90 min.
Rainfall intensity =     2.008(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      2.128(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.233(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      2.128(In/Hr) for a   100.0 year storm
Subarea runoff =      9.371(CFS) for      5.160(Ac.)
Total runoff =     12.604(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.604(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.604(CFS)
Normal flow depth in pipe =   13.73(In.)
Flow top width inside pipe =   19.98(In.)
Critical Depth =   15.86(In.)
Pipe flow velocity =      7.56(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    15.30 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =     12.604(CFS)
Time of concentration =   15.30 min.
Rainfall intensity =     2.121(In/Hr)
Summary of stream data:

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


1       78.998     25.91            1.587
2       40.121     16.90            2.008
3       12.604     15.30            2.121
Largest stream flow has longer time of concentration
Qp =     78.998 + sum of
         Qb         Ia/Ib
         40.121 *    0.790 =     31.710
         Qb         Ia/Ib
         12.604 *    0.748 =      9.431
Qp =    120.139

Total of 3 main streams to confluence:
Flow rates before confluence point:
      78.998      40.121      12.604
Area of streams before confluence:
       49.020       21.620        6.940


Results of confluence:
Total flow rate =    120.139(CFS)
Time of concentration =    25.915 min.
Effective stream area after confluence  =     77.580(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
```

```
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =    125.869(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.52(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    2.52 min.     TC =   28.43  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.855
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.508(In/Hr) for a   100.0 year storm
Subarea runoff =      9.543(CFS) for      7.400(Ac.)
Total runoff =    129.682(CFS)   Total area =      84.980(Ac.)


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Process from Point/Station      122.000 to Point/Station      124.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1673.200(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   336.000(Ft.)
Estimated mean flow rate at midpoint of channel =    131.773(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.17(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0065
Corrected/adjusted channel slope =  0.0065
Travel time =    1.34 min.     TC =   29.77  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.470(In/Hr) for a   100.0 year storm
Subarea runoff =      3.441(CFS) for      2.740(Ac.)
Total runoff =    133.122(CFS)   Total area =      87.720(Ac.)
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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    29.77 min.
Rainfall intensity =      1.470(In/Hr) for a   100.0 year storm
Subarea runoff =      1.130(CFS) for      0.900(Ac.)
Total runoff =    134.253(CFS)   Total area =      88.620(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      2.202(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     16.127(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1686.500(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =  1078.000(Ft.)
Estimated mean flow rate at midpoint of channel =     26.650(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0144
Corrected/adjusted channel slope =  0.0144
Travel time =    4.62 min.     TC =   18.91  min.
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 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.887(In/Hr) for a   100.0 year storm
Subarea runoff =     18.829(CFS) for     11.550(Ac.)
Total runoff =     34.955(CFS)    Total area =      20.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    18.91 min.
Rainfall intensity =      1.887(In/Hr) for a   100.0 year storm
Subarea runoff =      5.217(CFS) for      3.200(Ac.)
Total runoff =     40.172(CFS)    Total area =      23.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      2.484(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.820(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
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Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      7.130(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.78(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    2.53 min.     TC =   14.00  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.226(In/Hr) for a   100.0 year storm
Subarea runoff =      9.480(CFS) for      4.900(Ac.)
Total runoff =     11.301(CFS)   Total area =       5.740(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =     27.130(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.60(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    3.33 min.     TC =   17.34  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.979(In/Hr) for a   100.0 year storm
Subarea runoff =     27.547(CFS) for     16.080(Ac.)
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Total runoff =     38.847(CFS)    Total area =      21.820(Ac.)


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Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     46.343(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.14 min.     TC =   19.48  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.863
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.857(In/Hr) for a   100.0 year storm
Subarea runoff =     13.496(CFS) for      8.420(Ac.)
Total runoff =     52.343(CFS)    Total area =      30.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1671.900(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   579.000(Ft.)
Estimated mean flow rate at midpoint of channel =     52.343(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.55(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0016
Corrected/adjusted channel slope =  0.0016
Travel time =    6.24 min.     TC =   25.72  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.594(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =     52.343(CFS)   Total area =      30.240(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     30.240(Ac.)
Runoff from this stream =     52.343(CFS)
Time of concentration =   25.72 min.
Rainfall intensity =     1.594(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      2.071(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     13.215(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =     19.447(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.00(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
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Corrected/adjusted channel slope =  0.0011
Travel time =   17.46 min.     TC =   33.43  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.791
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      1.379(In/Hr) for a   100.0 year storm
Subarea runoff =      7.975(CFS) for      7.310(Ac.)
Total runoff =     21.190(CFS)   Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    33.43 min.
Rainfall intensity =      1.379(In/Hr) for a   100.0 year storm
Subarea runoff =      4.194(CFS) for      3.430(Ac.)
Total runoff =     25.384(CFS)   Total area =      18.490(Ac.)


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Process from Point/Station      313.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1675.800(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   956.000(Ft.)
Estimated mean flow rate at midpoint of channel =     29.736(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.37(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0050
Corrected/adjusted channel slope =  0.0050
Travel time =    6.73 min.     TC =   40.16  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.247(In/Hr) for a   100.0 year storm
Subarea runoff =      6.691(CFS) for      6.340(Ac.)
Total runoff =     32.076(CFS)   Total area =      24.830(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.830(Ac.)
Runoff from this stream =     32.076(CFS)
Time of concentration =   40.16 min.
Rainfall intensity =     1.247(In/Hr)


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Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.505(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
Subarea runoff =      1.920(CFS) for      0.960(Ac.)
Total runoff =     12.425(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     16.962(CFS)
Depth of flow =   0.334(Ft.), Average velocity =   2.724(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.685(Ft.)
Flow velocity =   2.72(Ft/s)
Travel time =    8.64 min.     TC =   21.50  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =      8.958(CFS) for      6.030(Ac.)
Total runoff =     21.382(CFS)   Total area =      12.040(Ac.)
Street flow at end of street =     21.382(CFS)
Half street flow at end of street =     10.691(CFS)
Depth of flow =   0.361(Ft.), Average velocity =   2.966(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    21.50 min.
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =      4.924(CFS) for      3.150(Ac.)
Total runoff =     26.307(CFS)   Total area =      15.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.812
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    21.50 min.
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =     19.209(CFS) for     13.460(Ac.)
Total runoff =     45.516(CFS)   Total area =      28.650(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      320.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of natural channel elevation =   1676.000(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =   724.000(Ft.)
Estimated mean flow rate at midpoint of channel =     53.976(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.29(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0069
Corrected/adjusted channel slope =  0.0069
Travel time =    3.67 min.     TC =   25.17  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.805
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      1.613(In/Hr) for a   100.0 year storm
Subarea runoff =     13.818(CFS) for     10.650(Ac.)
Total runoff =     59.334(CFS)   Total area =      39.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     39.300(Ac.)
Runoff from this stream =     59.334(CFS)
Time of concentration =   25.17 min.
Rainfall intensity =     1.613(In/Hr)
Summary of stream data:
```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	52.343	25.72	1.594
2	32.076	40.16	1.247
3	59.334	25.17	1.613

Largest stream flow has longer or shorter time of concentration
Qp = 59.334 + sum of

Qa		Tb/Ta	
52.343	*	0.979	= 51.226
Qa		Tb/Ta	
32.076	*	0.627	= 20.101

Qp = 130.660

Total of 3 streams to confluence:
Flow rates before confluence point:
52.343 32.076 59.334
Area of streams before confluence:
30.240 24.830 39.300
Results of confluence:
Total flow rate = 130.660(CFS)
Time of concentration = 25.167 min.
Effective stream area after confluence = 94.370(Ac.)
End of computations, total study area = 206.59 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.715
Area averaged RI index number = 74.1

Appendix

D

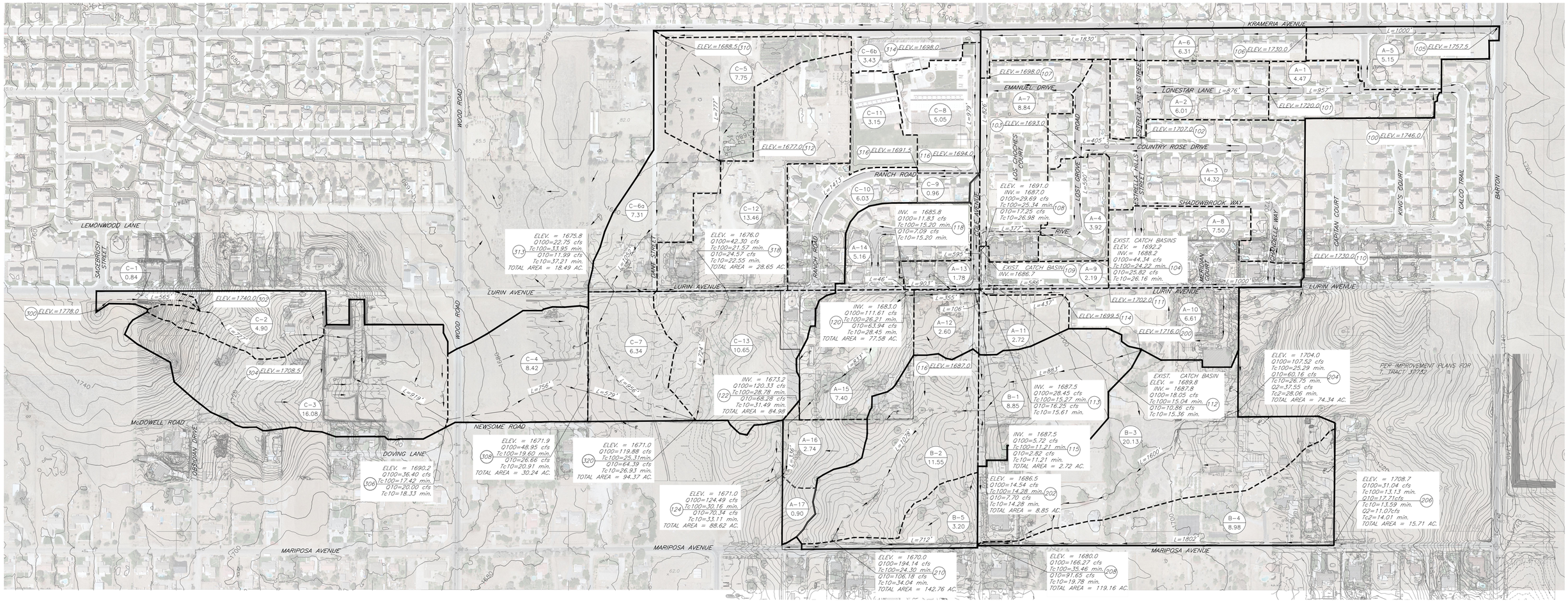
EXISTING CONDITION HYDROLOGIC KEY MAP

200' 0 200' 400' 600'

SCALE IN FEET



VICINITY MAP



LEGEND

- MAJOR WATERSHED BOUNDARY
- SUB DRAINAGE AREA BOUNDARY
- FLOW PATH
- DIRECTION OF FLOW
- C17 / 70.21 — DRAINAGE AREA DESIGNATION / ACRES
- (340) — NODE DESIGNATION
- L=300' — LENGTH OF EXISTING FLOW PATH
- Q_{100} — CALCULATED 100-YEAR STORM RUNOFF
- Q_{10} — CALCULATED 10-YEAR STORM RUNOFF

SOIL TYPE "C"

FIGURE 5

PRE-DEVELOPMENT CONDITION HYDROLOGY KEY MAP

FOR

16661 COLE AVENUE
TENTATIVE TRACT MAP NO. 37731

RIVERSIDE, CALIFORNIA

PREPARED BY:

KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA 92881-3370 951-734-2130

SHEET 1 OF 1 SHEETS

JN 17.1713 R:\17\1713\PRELIM\REPORTS\HYDRO\1713 HYDPRE.DWG, JULY 8, 2019

Appendix

E

PROPOSED CONDITION HYDROLOGY RATIONAL METHOD

2-YEAR PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/29/19 File:P1713Q2.out

---

2 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF LURIN AND COLE AVENUE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
PROPOSED CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.490(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 1.162(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.659
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 3.422(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.500

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.255(CFS)
Depth of flow =   0.196(Ft.), Average velocity =   2.287(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.787(Ft.)
Flow velocity =   2.29(Ft/s)
Travel time =    6.38 min.     TC =   18.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.634
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.926(In/Hr) for a     2.0 year storm
Subarea runoff =      3.527(CFS) for      6.010(Ac.)
Total runoff =      6.949(CFS)   Total area =      10.480(Ac.)
Street flow at end of street =      6.949(CFS)
Half street flow at end of street =      3.475(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   2.450(Ft/s)
Flow width (from curb towards crown)=  11.971(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     11.012(CFS)
Depth of flow =   0.223(Ft.), Average velocity =   3.774(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.140(Ft.)
```

```
Flow velocity =   3.77(Ft/s)
Travel time =    1.79 min.     TC =   20.66  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.881(In/Hr) for a     2.0 year storm
Subarea runoff =      7.927(CFS) for     14.320(Ac.)
Total runoff =     14.876(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     14.876(CFS)
Half street flow at end of street =      7.438(CFS)
Depth of flow =   0.252(Ft.), Average velocity =   4.064(Ft/s)
Flow width (from curb towards crown)=  13.583(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     15.845(CFS)
Depth of flow =   0.475(Ft.), Average velocity =   1.403(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.40(Ft/s)
Travel time =    7.01 min.     TC =   27.68  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.611
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.750(In/Hr) for a     2.0 year storm
Subarea runoff =      1.798(CFS) for      3.920(Ac.)
Total runoff =     16.674(CFS)   Total area =      28.720(Ac.)
Street flow at end of street =     16.674(CFS)
Half street flow at end of street =      8.337(CFS)
Depth of flow =   0.485(Ft.), Average velocity =   1.431(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      109.000
```

**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1688.200(Ft.)
Downstream point/station elevation = 1686.700(Ft.)
Pipe length = 377.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 16.674(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 16.674(CFS)
Normal flow depth in pipe = 19.17(In.)
Flow top width inside pipe = 24.50(In.)
Critical Depth = 17.11(In.)
Pipe flow velocity = 5.52(Ft/s)
Travel time through pipe = 1.14 min.
Time of concentration (TC) = 28.81 min.

++

Process from Point/Station 109.000 to Point/Station 109.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 28.720(Ac.)
Runoff from this stream = 16.674(CFS)
Time of concentration = 28.81 min.
Rainfall intensity = 0.734(In/Hr)

++

Process from Point/Station 105.000 to Point/Station 106.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1757.500(Ft.)
Bottom (of initial area) elevation = 1730.000(Ft.)
Difference in elevation = 27.500(Ft.)
Slope = 0.02750 s(percent)= 2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.682 min.
Rainfall intensity = 1.153(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.658
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 3.904(CFS)
Total initial stream area = 5.150(Ac.)
Pervious area fraction = 0.500

++

Process from Point/Station 106.000 to Point/Station 107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1730.000(Ft.)
End of street segment elevation = 1698.000(Ft.)
Length of street segment = 1830.000(Ft.)
Height of curb above gutter flowline = 6.0(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 = 6.500(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

```
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.556(CFS)
Depth of flow =   0.257(Ft.), Average velocity =   2.926(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.834(Ft.)
Flow velocity =   2.93(Ft/s)
Travel time =   10.43 min.     TC =   23.11  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.622
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.829(In/Hr) for a     2.0 year storm
Subarea runoff =      3.250(CFS) for      6.310(Ac.)
Total runoff =      7.155(CFS)   Total area =      11.460(Ac.)
Street flow at end of street =      7.155(CFS)
Half street flow at end of street =      7.155(CFS)
Depth of flow =   0.285(Ft.), Average velocity =   3.114(Ft/s)
Flow width (from curb towards crown)=  15.207(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      9.191(CFS)
Depth of flow =   0.363(Ft.), Average velocity =   2.522(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  19.129(Ft.)
Flow velocity =   2.52(Ft/s)
Travel time =    5.46 min.     TC =   28.57  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.609
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.737(In/Hr) for a     2.0 year storm
Subarea runoff =      3.973(CFS) for      8.840(Ac.)
Total runoff =     11.128(CFS)   Total area =      20.300(Ac.)
Street flow at end of street =     11.128(CFS)
Half street flow at end of street =     11.128(CFS)
```

```
Depth of flow =   0.391(Ft.), Average velocity =   2.644(Ft/s)
Flow width (from curb towards crown)=  20.551(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.128(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.128(CFS)
Normal flow depth in pipe =   12.97(In.)
Flow top width inside pipe =   20.41(In.)
Critical Depth =   14.91(In.)
Pipe flow velocity =      7.13(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    28.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     11.128(CFS)
Time of concentration =   28.64 min.
Rainfall intensity =     0.736(In/Hr)
Summary of stream data:

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


1       16.674     28.81                0.734
2       11.128     28.64                0.736
Largest stream flow has longer time of concentration
Qp =     16.674 + sum of
         Qb         Ia/Ib
         11.128 *    0.997 =     11.090
Qp =     27.765

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.674      11.128
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     27.765(CFS)
Time of concentration =    28.814 min.
Effective stream area after confluence =     49.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.765(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    27.765(CFS)
Normal flow depth in pipe =   21.42(In.)
Flow top width inside pipe =   27.11(In.)
```

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Critical Depth =   21.56(In.)
Pipe flow velocity =      7.41(Ft/s)
Travel time through pipe =    1.34 min.
Time of concentration (TC) =    30.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     27.765(CFS)
Time of concentration =   30.15 min.
Rainfall intensity =     0.716(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.637 min.
Rainfall intensity =      1.155(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.658
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.699(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      6.451(CFS)
Depth of flow =   0.264(Ft.), Average velocity =   3.242(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.159(Ft.)
```

```
Flow velocity =   3.24(Ft/s)
Travel time =    3.01 min.     TC =   15.65  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.645
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.027(In/Hr) for a     2.0 year storm
Subarea runoff =      1.450(CFS) for      2.190(Ac.)
Total runoff =      7.149(CFS)   Total area =       9.690(Ac.)
Street flow at end of street =      7.149(CFS)
Half street flow at end of street =      7.149(CFS)
Depth of flow =   0.275(Ft.), Average velocity =   3.325(Ft/s)
Flow width (from curb towards crown)=  14.714(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.149(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.149(CFS)
Normal flow depth in pipe =   13.17(In.)
Flow top width inside pipe =   20.31(In.)
Critical Depth =   11.86(In.)
Pipe flow velocity =      4.50(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    15.93 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.490
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.93 min.
Rainfall intensity =      1.017(In/Hr) for a     2.0 year storm
Subarea runoff =      3.294(CFS) for      6.610(Ac.)
Total runoff =     10.443(CFS)   Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.443(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.443(CFS)
Normal flow depth in pipe =   13.07(In.)
Flow top width inside pipe =   20.36(In.)
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Critical Depth =   14.45(In.)
Pipe flow velocity =      6.64(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    16.08 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     10.443(CFS)
Time of concentration =   16.08 min.
Rainfall intensity =     1.012(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.233(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.525
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      1.760(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.760(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.15(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.53 min.     TC =   12.75  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.616
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.149(In/Hr) for a     2.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      1.760(CFS)   Total area =       2.720(Ac.)


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      1.760(CFS)
Time of concentration =   12.75 min.
Rainfall intensity =     1.149(In/Hr)
Summary of stream data:

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


1       10.443     16.08                 1.012
2        1.760     12.75                 1.149
Largest stream flow has longer time of concentration
Qp =     10.443 + sum of
         Qb         Ia/Ib
          1.760 *    0.880 =      1.549
Qp =     11.992

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.443       1.760
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     11.992(CFS)
Time of concentration =    16.077 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1687.000(Ft.)
Downstream point elevation =  1683.000(Ft.)
Channel length thru subarea  =   355.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =     12.211(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     12.211(CFS)
Depth of flow =   0.418(Ft.), Average velocity =   5.387(Ft/s)
Channel flow top width =    5.837(Ft.)
Flow Velocity =    5.39(Ft/s)
Travel time  =    1.10 min.
Time of concentration =   17.18 min.

Sub-Channel No. 1 Critical depth =      0.547(Ft.)
  '     '       '     Critical flow top width =      6.094(Ft.)
  '     '       '     Critical flow velocity=    4.025(Ft/s)
  '     '       '     Critical flow area =      3.033(Sq.Ft)
```

```
 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      0.976(In/Hr) for a     2.0 year storm
Subarea runoff =      0.496(CFS) for      0.600(Ac.)
Total runoff =     12.489(CFS)   Total area =      19.620(Ac.)
Depth of flow =   0.424(Ft.), Average velocity =   5.430(Ft/s)

Sub-Channel No. 1 Critical depth =      0.555(Ft.)
  '     '       '     Critical flow top width =      6.109(Ft.)
  '     '       '     Critical flow velocity=    4.053(Ft/s)
  '     '       '     Critical flow area =      3.081(Sq.Ft)



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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.620(Ac.)
Runoff from this stream =     12.489(CFS)
Time of concentration =   17.18 min.
Rainfall intensity =     0.976(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.201(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
Subarea runoff =      3.482(CFS) for      5.160(Ac.)
Total runoff =      4.683(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.683(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.683(CFS)
Normal flow depth in pipe =    9.21(In.)
Flow top width inside pipe =   14.60(In.)
Critical Depth =   10.54(In.)
Pipe flow velocity =      5.93(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.32 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =      4.683(CFS)
Time of concentration =   15.32 min.
Rainfall intensity =     1.039(In/Hr)
Summary of stream data:

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


1       27.765     30.15            0.716
2       12.489     17.18            0.976
3        4.683     15.32            1.039
Largest stream flow has longer time of concentration
Qp =     27.765 + sum of
         Qb         Ia/Ib
         12.489 *    0.734 =      9.164
         Qb         Ia/Ib
          4.683 *    0.689 =      3.228
Qp =     40.156

Total of 3 main streams to confluence:
Flow rates before confluence point:
      27.765      12.489       4.683
Area of streams before confluence:
       49.020       19.620        6.940


Results of confluence:
Total flow rate =     40.156(CFS)
Time of concentration =    30.152 min.
Effective stream area after confluence  =     75.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =     42.122(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.00(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    3.47 min.     TC =   33.63  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.504
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.674(In/Hr) for a     2.0 year storm
Subarea runoff =      2.516(CFS) for      7.400(Ac.)
Total runoff =     42.673(CFS)   Total area =      82.980(Ac.)


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Process from Point/Station      122.000 to Point/Station      123.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.600
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    33.63 min.
Rainfall intensity =      0.674(In/Hr) for a     2.0 year storm
Subarea runoff =      0.526(CFS) for      1.300(Ac.)
Total runoff =     43.199(CFS)   Total area =      84.280(Ac.)


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Process from Point/Station      123.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1673.000(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    43.199(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    43.199(CFS)
Normal flow depth in pipe =   24.94(In.)
Flow top width inside pipe =   22.47(In.)
Critical Depth =   26.32(In.)
Pipe flow velocity =      9.90(Ft/s)
Travel time through pipe =    0.31 min.
Time of concentration (TC) =    33.94 min.
```

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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.600
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    33.94 min.
Rainfall intensity =      0.671(In/Hr) for a     2.0 year storm
Subarea runoff =      0.201(CFS) for      0.500(Ac.)
Total runoff =     43.400(CFS)   Total area =      84.780(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      1.080(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.501
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      4.784(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      452.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1682.500(Ft.)
Downstream point/station elevation =  1679.800(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.784(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.784(CFS)
Normal flow depth in pipe =    6.74(In.)
Flow top width inside pipe =   11.91(In.)
Critical Depth =   10.86(In.)
Pipe flow velocity =     10.53(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    14.37 min.


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Process from Point/Station      450.000 to Point/Station      452.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
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Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    14.37 min.
Rainfall intensity =      1.076(In/Hr) for a     2.0 year storm
Subarea runoff =      0.549(CFS) for      0.600(Ac.)
Total runoff =      5.333(CFS)   Total area =       9.450(Ac.)


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Process from Point/Station      452.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1679.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =  1336.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.333(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.333(CFS)
Normal flow depth in pipe =   10.51(In.)
Flow top width inside pipe =   17.74(In.)
Critical Depth =   10.67(In.)
Pipe flow velocity =      4.98(Ft/s)
Travel time through pipe =    4.47 min.
Time of concentration (TC) =    18.84 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.450(Ac.)
Runoff from this stream =      5.333(CFS)
Time of concentration =   18.84 min.
Rainfall intensity =     0.927(In/Hr)


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Process from Point/Station      454.000 to Point/Station      456.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1682.500(Ft.)
Bottom (of initial area) elevation =  1674.500(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.00800  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.488 min.
Rainfall intensity =      1.162(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.673(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      456.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =  1671.600(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.673(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.673(CFS)
Normal flow depth in pipe =   11.20(In.)
Flow top width inside pipe =   13.04(In.)
Critical Depth =    7.86(In.)
Pipe flow velocity =      2.72(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    12.78 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =      2.673(CFS)
Time of concentration =   12.78 min.
Rainfall intensity =     1.148(In/Hr)
Summary of stream data:

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


1        5.333     18.84                  0.927
2        2.673     12.78                  1.148
Largest stream flow has longer time of concentration
Qp =      5.333 + sum of
         Qb         Ia/Ib
          2.673 *    0.808 =      2.159
Qp =      7.493

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.333       2.673
Area of streams before confluence:
        9.450        2.700
Results of confluence:
Total flow rate =      7.493(CFS)
Time of concentration =    18.844 min.
Effective stream area after confluence =     12.150(Ac.)


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.150(Ac.)
Runoff from this stream =      7.493(CFS)
Time of concentration =   18.84 min.
Rainfall intensity =     0.927(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      420.000 to Point/Station      421.000
**** INITIAL AREA EVALUATION ****
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Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  1687.900(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.00681  s(percent)=       0.68
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.144 min.
Rainfall intensity =      1.009(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.643
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.817(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      421.000 to Point/Station      422.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      2.044(CFS)
Depth of flow =   0.347(Ft.), Average velocity =   0.611(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.61(Ft/s)
Travel time =    5.32 min.     TC =   21.47  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.626
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.863(In/Hr) for a     2.0 year storm
Subarea runoff =      0.378(CFS) for      0.700(Ac.)
Total runoff =      2.195(CFS)    Total area =       3.500(Ac.)
Street flow at end of street =      2.195(CFS)
Half street flow at end of street =      2.195(CFS)
Depth of flow =   0.355(Ft.), Average velocity =   0.628(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      422.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.195(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.195(CFS)
Normal flow depth in pipe =    9.38(In.)
Flow top width inside pipe =    9.92(In.)
Critical Depth =    7.60(In.)
Pipe flow velocity =      3.33(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    21.59 min.


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Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.500(Ac.)
Runoff from this stream =      2.195(CFS)
Time of concentration =   21.59 min.
Rainfall intensity =     0.860(In/Hr)


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Process from Point/Station      424.000 to Point/Station      426.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
Initial area flow distance =   908.000(Ft.)
Top (of initial area) elevation =  1687.000(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00584  s(percent)=       0.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.636 min.
Rainfall intensity =      0.993(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.655(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      426.000 to Point/Station      428.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   200.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
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```
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      1.878(CFS)
Depth of flow =   0.339(Ft.), Average velocity =   0.587(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.929(Ft.)
Flow velocity =   0.59(Ft/s)
Travel time =    5.68 min.     TC =   22.32  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.624
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.845(In/Hr) for a     2.0 year storm
Subarea runoff =      0.369(CFS) for      0.700(Ac.)
Total runoff =      2.024(CFS)   Total area =       3.300(Ac.)
Street flow at end of street =      2.024(CFS)
Half street flow at end of street =      2.024(CFS)
Depth of flow =   0.347(Ft.), Average velocity =   0.604(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      428.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.024(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.024(CFS)
Normal flow depth in pipe =    8.54(In.)
Flow top width inside pipe =   14.86(In.)
Critical Depth =    6.80(In.)
Pipe flow velocity =      2.81(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    22.55 min.


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Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.300(Ac.)
Runoff from this stream =      2.024(CFS)
Time of concentration =   22.55 min.
Rainfall intensity =     0.840(In/Hr)
Summary of stream data:

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


1        2.195     21.59                 0.860
2        2.024     22.55                 0.840
Largest stream flow has longer or shorter time of concentration
Qp =      2.195 + sum of
         Qa          Tb/Ta
```

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          2.024 *    0.957 =      1.938
Qp =      4.133

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.195       2.024
Area of streams before confluence:
        3.500        3.300
Results of confluence:
Total flow rate =      4.133(CFS)
Time of concentration =    21.585 min.
Effective stream area after confluence =      6.800(Ac.)


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Process from Point/Station      430.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.500(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   693.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.133(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.133(CFS)
Normal flow depth in pipe =    9.29(In.)
Flow top width inside pipe =   14.57(In.)
Critical Depth =    9.88(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    2.23 min.
Time of concentration (TC) =    23.82 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.800(Ac.)
Runoff from this stream =      4.133(CFS)
Time of concentration =   23.82 min.
Rainfall intensity =     0.815(In/Hr)


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Process from Point/Station      430.000 to Point/Station      432.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   921.000(Ft.)
Top (of initial area) elevation =  1684.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00901  s(percent)=       0.90
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.339 min.
Rainfall intensity =      1.038(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.646
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.543(CFS)
Total initial stream area =        2.300(Ac.)
Pervious area fraction = 0.500
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Process from Point/Station      432.000 to Point/Station      432.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.646
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.34 min.
Rainfall intensity =      1.038(In/Hr) for a     2.0 year storm
Subarea runoff =      1.140(CFS) for      1.700(Ac.)
Total runoff =      2.683(CFS)   Total area =       4.000(Ac.)


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Process from Point/Station      432.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.683(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.683(CFS)
Normal flow depth in pipe =    9.80(In.)
Flow top width inside pipe =    9.29(In.)
Critical Depth =    8.43(In.)
Pipe flow velocity =      3.91(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    15.49 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.000(Ac.)
Runoff from this stream =      2.683(CFS)
Time of concentration =   15.49 min.
Rainfall intensity =     1.033(In/Hr)


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Process from Point/Station      434.000 to Point/Station      436.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  1682.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.00692  s(percent)=       0.69
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.103 min.
Rainfall intensity =      1.011(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.643
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.080(CFS)
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Total initial stream area =        3.200(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      436.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.080(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.080(CFS)
Normal flow depth in pipe =    7.50(In.)
Flow top width inside pipe =   11.62(In.)
Critical Depth =    7.40(In.)
Pipe flow velocity =      4.02(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    16.23 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      3.200(Ac.)
Runoff from this stream =      2.080(CFS)
Time of concentration =   16.23 min.
Rainfall intensity =     1.007(In/Hr)
Summary of stream data:

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


1        4.133     23.82                0.815
2        2.683     15.49                1.033
3        2.080     16.23                1.007
Largest stream flow has longer time of concentration
Qp =      4.133 + sum of
         Qb         Ia/Ib
          2.683 *    0.789 =      2.118
         Qb         Ia/Ib
          2.080 *    0.810 =      1.684
Qp =      7.935

Total of 3 streams to confluence:
Flow rates before confluence point:
       4.133       2.683       2.080
Area of streams before confluence:
        6.800        4.000        3.200
Results of confluence:
Total flow rate =      7.935(CFS)
Time of concentration =    23.818 min.
Effective stream area after confluence =     14.000(Ac.)


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Process from Point/Station      438.000 to Point/Station      440.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    23.82 min.
Rainfall intensity =      0.815(In/Hr) for a     2.0 year storm
Subarea runoff =      0.455(CFS) for      0.900(Ac.)
Total runoff =      8.390(CFS)    Total area =      14.900(Ac.)


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Process from Point/Station      440.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.390(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.390(CFS)
Normal flow depth in pipe =   14.86(In.)
Flow top width inside pipe =   19.10(In.)
Critical Depth =   12.91(In.)
Pipe flow velocity =      4.61(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    24.10 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     14.900(Ac.)
Runoff from this stream =      8.390(CFS)
Time of concentration =   24.10 min.
Rainfall intensity =     0.810(In/Hr)
Summary of stream data:

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


1        7.493     18.84            0.927
2        8.390     24.10            0.810
Largest stream flow has longer time of concentration
Qp =      8.390 + sum of
         Qb         Ia/Ib
          7.493 *    0.874 =      6.545
Qp =     14.935

Total of 2 main streams to confluence:
Flow rates before confluence point:
       7.493       8.390
Area of streams before confluence:
       12.150       14.900


Results of confluence:
Total flow rate =     14.935(CFS)
Time of concentration =    24.096 min.
Effective stream area after confluence  =     27.050(Ac.)


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Process from Point/Station      458.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
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Upstream point/station elevation =  1671.500(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =    73.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.935(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    14.935(CFS)
Normal flow depth in pipe =   16.20(In.)
Flow top width inside pipe =   22.49(In.)
Critical Depth =   16.71(In.)
Pipe flow velocity =      6.62(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    24.28 min.


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      1.218(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.628
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.642(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.515(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.76(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    3.22 min.     TC =   14.69  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.601
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
```

```
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.063(In/Hr) for a     2.0 year storm
Subarea runoff =      3.131(CFS) for      4.900(Ac.)
Total runoff =      3.773(CFS)   Total area =       5.740(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.058(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.44(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    4.45 min.     TC =   19.14  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.571
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.919(In/Hr) for a     2.0 year storm
Subarea runoff =      8.442(CFS) for     16.080(Ac.)
Total runoff =     12.215(CFS)   Total area =      21.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.572(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.29(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.94 min.     TC =   22.08  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.555
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.850(In/Hr) for a     2.0 year storm
Subarea runoff =      3.968(CFS) for      8.420(Ac.)
Total runoff =     16.183(CFS)    Total area =      30.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      320.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1671.900(Ft.)
Downstream point elevation =  1668.000(Ft.)
Channel length thru subarea  =   574.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     16.424(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     16.424(CFS)
Depth of flow =   0.634(Ft.), Average velocity =   5.183(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    5.18(Ft/s)
Travel time  =    1.85 min.
Time of concentration =   23.93 min.

Sub-Channel No. 1 Critical depth =      0.695(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    4.724(Ft/s)
  '     '       '     Critical flow area =      3.477(Sq.Ft)

 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.813(In/Hr) for a     2.0 year storm
Subarea runoff =      0.453(CFS) for      0.900(Ac.)
Total runoff =     16.636(CFS)    Total area =      31.140(Ac.)
Depth of flow =   0.639(Ft.), Average velocity =   5.206(Ft/s)

Sub-Channel No. 1 Critical depth =      0.703(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    4.732(Ft/s)
  '     '       '     Critical flow area =      3.516(Sq.Ft)



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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     31.140(Ac.)
Runoff from this stream =     16.636(CFS)
Time of concentration =   23.93 min.
Rainfall intensity =     0.813(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      1.015(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.490
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      3.855(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.672(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.73(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   23.88 min.     TC =   39.85  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.406
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.614(In/Hr) for a     2.0 year storm
Subarea runoff =      1.821(CFS) for      7.310(Ac.)
Total runoff =      5.676(CFS)   Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
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```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    39.85 min.
Rainfall intensity =      0.614(In/Hr) for a     2.0 year storm
Subarea runoff =      1.765(CFS) for      3.430(Ac.)
Total runoff =      7.441(CFS)    Total area =      18.490(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1674.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.441(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.441(CFS)
Normal flow depth in pipe =   10.08(In.)
Flow top width inside pipe =   14.09(In.)
Critical Depth =   13.03(In.)
Pipe flow velocity =      8.49(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =    40.06 min.


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Process from Point/Station      313.200 to Point/Station      313.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.838
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    40.06 min.
Rainfall intensity =      0.612(In/Hr) for a     2.0 year storm
Subarea runoff =      0.308(CFS) for      0.600(Ac.)
Total runoff =      7.749(CFS)    Total area =      19.090(Ac.)


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Process from Point/Station      313.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   900.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.749(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.749(CFS)
Normal flow depth in pipe =   13.59(In.)
Flow top width inside pipe =   20.07(In.)
Critical Depth =   12.39(In.)
Pipe flow velocity =      4.70(Ft/s)
Travel time through pipe =    3.19 min.
Time of concentration (TC) =    43.25 min.


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
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```
In Main Stream number: 2
Stream flow area =     19.090(Ac.)
Runoff from this stream =      7.749(CFS)
Time of concentration =   43.25 min.
Rainfall intensity =     0.587(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      1.144(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.919(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.657
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      1.144(In/Hr) for a     2.0 year storm
Subarea runoff =      0.722(CFS) for      0.960(Ac.)
Total runoff =      5.641(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
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```
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      7.262(CFS)
Depth of flow =   0.238(Ft.), Average velocity =   2.210(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.875(Ft.)
Flow velocity =   2.21(Ft/s)
Travel time =   10.66 min.     TC =   23.51  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.621
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      3.072(CFS) for      6.030(Ac.)
Total runoff =      8.713(CFS)   Total area =      12.040(Ac.)
Street flow at end of street =      8.713(CFS)
Half street flow at end of street =      4.356(CFS)
Depth of flow =   0.256(Ft.), Average velocity =   2.311(Ft/s)
Flow width (from curb towards crown)=  13.782(Ft.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    23.51 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      2.183(CFS) for      3.150(Ac.)
Total runoff =     10.896(CFS)   Total area =      15.190(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.453
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    23.51 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      5.005(CFS) for     13.460(Ac.)
Total runoff =     15.901(CFS)   Total area =      28.650(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1676.000(Ft.)
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Downstream point/station elevation =  1672.400(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.901(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    15.901(CFS)
Normal flow depth in pipe =    8.20(In.)
Flow top width inside pipe =   14.93(In.)
Critical depth could not be calculated.
Pipe flow velocity =     23.16(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    23.52 min.


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Process from Point/Station      318.200 to Point/Station      318.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    23.52 min.
Rainfall intensity =      0.821(In/Hr) for a     2.0 year storm
Subarea runoff =      1.385(CFS) for      2.000(Ac.)
Total runoff =     17.286(CFS)   Total area =      30.650(Ac.)


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Process from Point/Station      318.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1672.400(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   823.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.286(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.286(CFS)
Normal flow depth in pipe =   20.81(In.)
Flow top width inside pipe =   16.29(In.)
Critical Depth =   17.98(In.)
Pipe flow velocity =      5.97(Ft/s)
Travel time through pipe =    2.30 min.
Time of concentration (TC) =    25.82 min.


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     30.650(Ac.)
Runoff from this stream =     17.286(CFS)
Time of concentration =   25.82 min.
Rainfall intensity =     0.780(In/Hr)
Summary of stream data:

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


1       16.636     23.93           0.813
2        7.749     43.25           0.587
3       17.286     25.82           0.780
```

```
Largest stream flow has longer or shorter time of concentration
Qp =     17.286 + sum of
         Qb         Ia/Ib
         16.636 *    0.959 =     15.955
         Qa          Tb/Ta
          7.749 *    0.597 =      4.626
Qp =     37.868

Total of 3 main streams to confluence:
Flow rates before confluence point:
      16.636       7.749      17.286
Area of streams before confluence:
       31.140       19.090       30.650


Results of confluence:
Total flow rate =     37.868(CFS)
Time of concentration =    25.821 min.
Effective stream area after confluence  =     80.880(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     80.880(Ac.)
Runoff from this stream =     37.868(CFS)
Time of concentration =   25.82 min.
Rainfall intensity =     0.780(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   897.000(Ft.)
Top (of initial area) elevation =  1683.000(Ft.)
Bottom (of initial area) elevation =  1674.700(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00925  s(percent)=       0.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.098 min.
Rainfall intensity =      1.047(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.982(CFS)
Total initial stream area =        4.400(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      402.000 to Point/Station      404.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1674.700(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   126.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
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Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      3.761(CFS)
Depth of flow =   0.309(Ft.), Average velocity =   1.397(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.450(Ft.)
Flow velocity =   1.40(Ft/s)
Travel time =    1.50 min.     TC =   16.60  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.994(In/Hr) for a     2.0 year storm
Subarea runoff =      1.466(CFS) for      2.300(Ac.)
Total runoff =      4.448(CFS)   Total area =       6.700(Ac.)
Street flow at end of street =      4.448(CFS)
Half street flow at end of street =      4.448(CFS)
Depth of flow =   0.331(Ft.), Average velocity =   1.456(Ft/s)
Flow width (from curb towards crown)=  17.517(Ft.)


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Process from Point/Station      404.000 to Point/Station      410.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1670.300(Ft.)
Downstream point/station elevation =  1670.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.448(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.448(CFS)
Normal flow depth in pipe =    9.91(In.)
Flow top width inside pipe =   14.20(In.)
Critical Depth =   10.25(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    16.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.700(Ac.)
Runoff from this stream =      4.448(CFS)
Time of concentration =   16.72 min.
Rainfall intensity =     0.990(In/Hr)


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Process from Point/Station      406.000 to Point/Station      408.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
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Initial area flow distance =   612.000(Ft.)
Top (of initial area) elevation =  1685.300(Ft.)
Bottom (of initial area) elevation =  1676.500(Ft.)
Difference in elevation =     8.800(Ft.)
Slope =    0.01438  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.864 min.
Rainfall intensity =      1.196(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.899(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      408.000 to Point/Station      410.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1676.500(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   466.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      2.499(CFS)
Depth of flow =   0.243(Ft.), Average velocity =   1.467(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.108(Ft.)
Flow velocity =   1.47(Ft/s)
Travel time =    5.29 min.     TC =   17.16  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.976(In/Hr) for a     2.0 year storm
Subarea runoff =      1.123(CFS) for      1.800(Ac.)
Total runoff =      3.023(CFS)    Total area =       4.200(Ac.)
Street flow at end of street =      3.023(CFS)
Half street flow at end of street =      3.023(CFS)
Depth of flow =   0.262(Ft.), Average velocity =   1.537(Ft/s)
Flow width (from curb towards crown)=  14.074(Ft.)


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Process from Point/Station      410.000 to Point/Station      410.000
**** SUBAREA FLOW ADDITION ****
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SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.16 min.
Rainfall intensity =      0.976(In/Hr) for a     2.0 year storm
Subarea runoff =      0.936(CFS) for      1.500(Ac.)
Total runoff =      3.959(CFS)    Total area =       5.700(Ac.)


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Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.700(Ac.)
Runoff from this stream =      3.959(CFS)
Time of concentration =   17.16 min.
Rainfall intensity =     0.976(In/Hr)
Summary of stream data:

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


1        4.448     16.72                 0.990
2        3.959     17.16                 0.976
Largest stream flow has longer or shorter time of concentration
Qp =      4.448 + sum of
         Qa          Tb/Ta
          3.959 *    0.975 =      3.859
Qp =      8.306

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.448       3.959
Area of streams before confluence:
        6.700        5.700
Results of confluence:
Total flow rate =      8.306(CFS)
Time of concentration =    16.724 min.
Effective stream area after confluence =     12.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      412.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1670.000(Ft.)
Downstream point/station elevation =  1669.300(Ft.)
Pipe length  =   129.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.306(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.306(CFS)
Normal flow depth in pipe =   13.09(In.)
Flow top width inside pipe =   20.35(In.)
Critical Depth =   12.85(In.)
Pipe flow velocity =      5.27(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    17.13 min.


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Process from Point/Station      412.000 to Point/Station      320.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.13 min.
Rainfall intensity =      0.977(In/Hr) for a     2.0 year storm
Subarea runoff =      0.937(CFS) for      1.500(Ac.)
Total runoff =      9.243(CFS)   Total area =      13.900(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.900(Ac.)
Runoff from this stream =      9.243(CFS)
Time of concentration =   17.13 min.
Rainfall intensity =     0.977(In/Hr)
Summary of stream data:

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


1       37.868     25.82            0.780
2        9.243     17.13            0.977
Largest stream flow has longer time of concentration
Qp =     37.868 + sum of
         Qb         Ia/Ib
          9.243 *    0.798 =      7.376
Qp =     45.244

Total of 2 main streams to confluence:
Flow rates before confluence point:
      37.868       9.243
Area of streams before confluence:
       80.880       13.900


Results of confluence:
Total flow rate =     45.244(CFS)
Time of concentration =    25.821 min.
Effective stream area after confluence  =     94.780(Ac.)
End of computations, total study area =          206.61 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.624
Area averaged RI index number =  72.1
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10-YEAR PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/29/19 File:P1713Q10.out

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10 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF LURIN AND COLE AVENUE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
PROPOSED CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.700(In/Hr)
Slope of intensity duration curve = 0.5500

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Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 1.659(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.699
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 5.182(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.500

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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.013(CFS)
Depth of flow =   0.233(Ft.), Average velocity =   2.537(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.624(Ft.)
Flow velocity =   2.54(Ft/s)
Travel time =    5.75 min.     TC =   18.25  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.675
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.347(In/Hr) for a    10.0 year storm
Subarea runoff =      5.468(CFS) for      6.010(Ac.)
Total runoff =     10.649(CFS)   Total area =      10.480(Ac.)
Street flow at end of street =     10.649(CFS)
Half street flow at end of street =      5.325(CFS)
Depth of flow =   0.261(Ft.), Average velocity =   2.722(Ft/s)
Flow width (from curb towards crown)=  14.040(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     16.889(CFS)
Depth of flow =   0.265(Ft.), Average velocity =   4.193(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.243(Ft.)
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Flow velocity =   4.19(Ft/s)
Travel time =    1.61 min.     TC =   19.86  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.670
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.286(In/Hr) for a    10.0 year storm
Subarea runoff =     12.339(CFS) for     14.320(Ac.)
Total runoff =     22.989(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     22.989(CFS)
Half street flow at end of street =     11.494(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   4.524(Ft/s)
Flow width (from curb towards crown)=  15.985(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     24.453(CFS)
Depth of flow =   0.587(Ft.), Average velocity =   1.559(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 =    4.33(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.56(Ft/s)
Travel time =    6.31 min.     TC =   26.16  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.653
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.105(In/Hr) for a    10.0 year storm
Subarea runoff =      2.829(CFS) for      3.920(Ac.)
Total runoff =     25.817(CFS)   Total area =      28.720(Ac.)
Street flow at end of street =     25.817(CFS)
Half street flow at end of street =     12.909(CFS)
Depth of flow =   0.602(Ft.), Average velocity =   1.576(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 =    5.10(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)
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Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1688.200(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =   377.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.817(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    25.817(CFS)
Normal flow depth in pipe =   24.52(In.)
Flow top width inside pipe =   23.19(In.)
Critical Depth =   20.79(In.)
Pipe flow velocity =      6.01(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    27.21 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.720(Ac.)
Runoff from this stream =     25.817(CFS)
Time of concentration =   27.21 min.
Rainfall intensity =     1.081(In/Hr)


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Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      1.646(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.913(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    6.0(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
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Street flow is on [1] side(s) of the street
Distance from curb to property line  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      8.489(CFS)
Depth of flow =   0.305(Ft.), Average velocity =   3.248(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.212(Ft.)
Flow velocity =   3.25(Ft/s)
Travel time =    9.39 min.     TC =   22.07  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.663
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.213(In/Hr) for a    10.0 year storm
Subarea runoff =      5.080(CFS) for      6.310(Ac.)
Total runoff =     10.992(CFS)    Total area =      11.460(Ac.)
Street flow at end of street =     10.992(CFS)
Half street flow at end of street =     10.992(CFS)
Depth of flow =   0.338(Ft.), Average velocity =   3.462(Ft/s)
Flow width (from curb towards crown)=  17.860(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     14.155(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   2.806(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.492(Ft.)
Flow velocity =   2.81(Ft/s)
Travel time =    4.91 min.     TC =   26.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.651
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.086(In/Hr) for a    10.0 year storm
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Subarea runoff =      6.254(CFS) for      8.840(Ac.)
Total runoff =     17.246(CFS)   Total area =      20.300(Ac.)
Street flow at end of street =     17.246(CFS)
Half street flow at end of street =     17.246(CFS)
Depth of flow =   0.465(Ft.), Average velocity =   2.947(Ft/s)
Flow width (from curb towards crown)=  24.223(Ft.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.246(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.246(CFS)
Normal flow depth in pipe =   15.68(In.)
Flow top width inside pipe =   22.84(In.)
Critical Depth =   17.96(In.)
Pipe flow velocity =      7.93(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    27.04 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     17.246(CFS)
Time of concentration =   27.04 min.
Rainfall intensity =     1.085(In/Hr)
Summary of stream data:

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


1       25.817     27.21                1.081
2       17.246     27.04                1.085
Largest stream flow has longer time of concentration
Qp =     25.817 + sum of
         Qb         Ia/Ib
         17.246 *    0.997 =     17.188
Qp =     43.005

Total of 2 streams to confluence:
Flow rates before confluence point:
      25.817      17.246
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     43.005(CFS)
Time of concentration =    27.210 min.
Effective stream area after confluence =     49.020(Ac.)


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Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    43.005(CFS)
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Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    43.005(CFS)
Normal flow depth in pipe =   28.08(In.)
Flow top width inside pipe =   23.51(In.)
Critical Depth =   26.12(In.)
Pipe flow velocity =      7.99(Ft/s)
Travel time through pipe =    1.24 min.
Time of concentration (TC) =    28.45 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     43.005(CFS)
Time of concentration =   28.45 min.
Rainfall intensity =     1.055(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.637 min.
Rainfall intensity =      1.649(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.631(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
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Estimated mean flow rate at midpoint of street =      9.780(CFS)
Depth of flow =   0.311(Ft.), Average velocity =   3.592(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.545(Ft.)
Flow velocity =   3.59(Ft/s)
Travel time =    2.72 min.     TC =   15.36  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.481(In/Hr) for a    10.0 year storm
Subarea runoff =      2.225(CFS) for      2.190(Ac.)
Total runoff =     10.856(CFS)   Total area =       9.690(Ac.)
Street flow at end of street =     10.856(CFS)
Half street flow at end of street =     10.856(CFS)
Depth of flow =   0.325(Ft.), Average velocity =   3.686(Ft/s)
Flow width (from curb towards crown)=  17.205(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.856(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.856(CFS)
Normal flow depth in pipe =   15.70(In.)
Flow top width inside pipe =   22.83(In.)
Critical Depth =   14.18(In.)
Pipe flow velocity =      4.98(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    15.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.556
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.61 min.
Rainfall intensity =      1.468(In/Hr) for a    10.0 year storm
Subarea runoff =      5.394(CFS) for      6.610(Ac.)
Total runoff =     16.249(CFS)   Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.249(CFS)
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Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    16.249(CFS)
Normal flow depth in pipe =   15.84(In.)
Flow top width inside pipe =   22.74(In.)
Critical Depth =   17.44(In.)
Pipe flow velocity =      7.38(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.74 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     16.249(CFS)
Time of concentration =   15.74 min.
Rainfall intensity =     1.461(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.761(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      2.818(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.818(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.27(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
Corrected/adjusted channel slope =  0.0047
Travel time =    1.39 min.     TC =   12.60  min.


 Adding area flow to channel
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UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.682
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.651(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      2.818(CFS)   Total area =       2.720(Ac.)


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      2.818(CFS)
Time of concentration =   12.60 min.
Rainfall intensity =     1.651(In/Hr)
Summary of stream data:

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


1       16.249     15.74                 1.461
2        2.818     12.60                 1.651
Largest stream flow has longer time of concentration
Qp =     16.249 + sum of
         Qb         Ia/Ib
          2.818 *    0.885 =      2.493
Qp =     18.743

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.249       2.818
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     18.743(CFS)
Time of concentration =    15.741 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1687.000(Ft.)
Downstream point elevation =  1683.000(Ft.)
Channel length thru subarea  =   355.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =     19.073(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     19.073(CFS)
Depth of flow =   0.546(Ft.), Average velocity =   6.294(Ft/s)
Channel flow top width =    6.093(Ft.)
Flow Velocity =    6.29(Ft/s)
Travel time  =    0.94 min.
Time of concentration =   16.68 min.

Sub-Channel No. 1 Critical depth =      0.727(Ft.)
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  '     '       '     Critical flow top width =      6.453(Ft.)
  '     '       '     Critical flow velocity=    4.584(Ft/s)
  '     '       '     Critical flow area =      4.161(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.415(In/Hr) for a    10.0 year storm
Subarea runoff =      0.727(CFS) for      0.600(Ac.)
Total runoff =     19.470(CFS)   Total area =      19.620(Ac.)
Depth of flow =   0.553(Ft.), Average velocity =   6.338(Ft/s)

Sub-Channel No. 1 Critical depth =      0.734(Ft.)
  '     '       '     Critical flow top width =      6.469(Ft.)
  '     '       '     Critical flow velocity=    4.623(Ft/s)
  '     '       '     Critical flow area =      4.211(Sq.Ft)



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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.620(Ac.)
Runoff from this stream =     19.470(CFS)
Time of concentration =   16.68 min.
Rainfall intensity =     1.415(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      1.490(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.821(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
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Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      1.490(In/Hr) for a    10.0 year storm
Subarea runoff =      5.278(CFS) for      5.160(Ac.)
Total runoff =      7.099(CFS)    Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.099(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.099(CFS)
Normal flow depth in pipe =   10.55(In.)
Flow top width inside pipe =   17.73(In.)
Critical Depth =   12.39(In.)
Pipe flow velocity =      6.59(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    15.31 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =      7.099(CFS)
Time of concentration =   15.31 min.
Rainfall intensity =     1.484(In/Hr)
Summary of stream data:

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


1       43.005     28.45           1.055
2       19.470     16.68           1.415
3        7.099     15.31           1.484
Largest stream flow has longer time of concentration
Qp =     43.005 + sum of
         Qb         Ia/Ib
         19.470 *    0.746 =     14.515
         Qb         Ia/Ib
          7.099 *    0.711 =      5.049
Qp =     62.569

Total of 3 main streams to confluence:
Flow rates before confluence point:
      43.005      19.470       7.099
Area of streams before confluence:
       49.020       19.620        6.940


Results of confluence:
Total flow rate =     62.569(CFS)
Time of concentration =    28.452 min.
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Effective stream area after confluence  =     75.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =     65.632(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.54(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    3.06 min.     TC =   31.51  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.998(In/Hr) for a    10.0 year storm
Subarea runoff =      4.342(CFS) for      7.400(Ac.)
Total runoff =     66.911(CFS)   Total area =      82.980(Ac.)


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Process from Point/Station      122.000 to Point/Station      123.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.642
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    31.51 min.
Rainfall intensity =      0.998(In/Hr) for a    10.0 year storm
Subarea runoff =      0.832(CFS) for      1.300(Ac.)
Total runoff =     67.743(CFS)   Total area =      84.280(Ac.)


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Process from Point/Station      123.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1673.000(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    67.743(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    67.743(CFS)
Normal flow depth in pipe =   28.78(In.)
Flow top width inside pipe =   28.83(In.)
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Critical Depth =   31.53(In.)
Pipe flow velocity =     11.18(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    31.78 min.


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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    31.78 min.
Rainfall intensity =      0.993(In/Hr) for a    10.0 year storm
Subarea runoff =      0.318(CFS) for      0.500(Ac.)
Total runoff =     68.061(CFS)   Total area =      84.780(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      1.541(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.565
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      7.702(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      452.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1682.500(Ft.)
Downstream point/station elevation =  1679.800(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.702(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     7.702(CFS)
Normal flow depth in pipe =    9.59(In.)
Flow top width inside pipe =    9.62(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.45(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.36 min.


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Process from Point/Station      450.000 to Point/Station      452.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    14.36 min.
Rainfall intensity =      1.537(In/Hr) for a    10.0 year storm
Subarea runoff =      0.791(CFS) for      0.600(Ac.)
Total runoff =      8.493(CFS)   Total area =       9.450(Ac.)


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Process from Point/Station      452.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1679.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =  1336.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.493(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.493(CFS)
Normal flow depth in pipe =   12.70(In.)
Flow top width inside pipe =   20.53(In.)
Critical Depth =   12.98(In.)
Pipe flow velocity =      5.58(Ft/s)
Travel time through pipe =    3.99 min.
Time of concentration (TC) =    18.35 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.450(Ac.)
Runoff from this stream =      8.493(CFS)
Time of concentration =   18.35 min.
Rainfall intensity =     1.343(In/Hr)


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Process from Point/Station      454.000 to Point/Station      456.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1682.500(Ft.)
Bottom (of initial area) elevation =  1674.500(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.00800  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.488 min.
Rainfall intensity =      1.660(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.852(CFS)
Total initial stream area =        2.700(Ac.)
```

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Pervious area fraction = 0.100


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Process from Point/Station      456.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1671.600(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.852(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     3.852(CFS)
Normal flow depth in pipe =   12.21(In.)
Flow top width inside pipe =   16.82(In.)
Critical Depth =    9.01(In.)
Pipe flow velocity =      3.02(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    12.75 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =      3.852(CFS)
Time of concentration =   12.75 min.
Rainfall intensity =     1.641(In/Hr)
Summary of stream data:

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


1        8.493     18.35                 1.343
2        3.852     12.75                 1.641
Largest stream flow has longer time of concentration
Qp =      8.493 + sum of
         Qb         Ia/Ib
          3.852 *    0.819 =      3.154
Qp =     11.647

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.493       3.852
Area of streams before confluence:
        9.450        2.700
Results of confluence:
Total flow rate =     11.647(CFS)
Time of concentration =    18.352 min.
Effective stream area after confluence =     12.150(Ac.)


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.150(Ac.)
Runoff from this stream =     11.647(CFS)
Time of concentration =   18.35 min.
Rainfall intensity =     1.343(In/Hr)
Program is now starting with Main Stream No. 2
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Process from Point/Station      420.000 to Point/Station      421.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  1687.900(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.00681  s(percent)=       0.68
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.144 min.
Rainfall intensity =      1.441(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.683
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.755(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      421.000 to Point/Station      422.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      3.074(CFS)
Depth of flow =   0.399(Ft.), Average velocity =   0.718(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.72(Ft/s)
Travel time =    4.52 min.     TC =   20.67  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.668
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.258(In/Hr) for a    10.0 year storm
Subarea runoff =      0.588(CFS) for      0.700(Ac.)
Total runoff =      3.343(CFS)    Total area =       3.500(Ac.)
Street flow at end of street =      3.343(CFS)
Half street flow at end of street =      3.343(CFS)
Depth of flow =   0.411(Ft.), Average velocity =   0.743(Ft/s)
Note:  depth of flow exceeds top of street crown.
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Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      422.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.343(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.343(CFS)
Normal flow depth in pipe =   10.17(In.)
Flow top width inside pipe =   14.02(In.)
Critical Depth =    8.85(In.)
Pipe flow velocity =      3.78(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    20.77 min.


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Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.500(Ac.)
Runoff from this stream =      3.343(CFS)
Time of concentration =   20.77 min.
Rainfall intensity =     1.254(In/Hr)


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Process from Point/Station      424.000 to Point/Station      426.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   908.000(Ft.)
Top (of initial area) elevation =  1687.000(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00584  s(percent)=       0.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.636 min.
Rainfall intensity =      1.417(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.681
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.510(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      426.000 to Point/Station      428.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   200.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
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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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      2.822(CFS)
Depth of flow =   0.389(Ft.), Average velocity =   0.689(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.69(Ft/s)
Travel time =    4.84 min.     TC =   21.47  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.665
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.232(In/Hr) for a    10.0 year storm
Subarea runoff =      0.574(CFS) for      0.700(Ac.)
Total runoff =      3.083(CFS)    Total area =       3.300(Ac.)
Street flow at end of street =      3.083(CFS)
Half street flow at end of street =      3.083(CFS)
Depth of flow =   0.401(Ft.), Average velocity =   0.714(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      428.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.083(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.083(CFS)
Normal flow depth in pipe =   11.58(In.)
Flow top width inside pipe =   12.59(In.)
Critical Depth =    8.47(In.)
Pipe flow velocity =      3.03(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    21.69 min.


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Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.300(Ac.)
Runoff from this stream =      3.083(CFS)
Time of concentration =   21.69 min.
Rainfall intensity =     1.225(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1        3.343     20.77                1.254
2        3.083     21.69                1.225
Largest stream flow has longer or shorter time of concentration
Qp =      3.343 + sum of
         Qa          Tb/Ta
          3.083 *    0.958 =      2.953
Qp =      6.296

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.343       3.083
Area of streams before confluence:
        3.500        3.300
Results of confluence:
Total flow rate =      6.296(CFS)
Time of concentration =    20.774 min.
Effective stream area after confluence =      6.800(Ac.)


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Process from Point/Station      430.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.500(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   693.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.296(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.296(CFS)
Normal flow depth in pipe =   10.69(In.)
Flow top width inside pipe =   17.68(In.)
Critical Depth =   11.63(In.)
Pipe flow velocity =      5.76(Ft/s)
Travel time through pipe =    2.00 min.
Time of concentration (TC) =    22.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.800(Ac.)
Runoff from this stream =      6.296(CFS)
Time of concentration =   22.78 min.
Rainfall intensity =     1.192(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      432.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   921.000(Ft.)
Top (of initial area) elevation =  1684.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00901  s(percent)=       0.90
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.339 min.
Rainfall intensity =      1.482(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
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Initial subarea runoff =      2.338(CFS)
Total initial stream area =        2.300(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      432.000 to Point/Station      432.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.34 min.
Rainfall intensity =      1.482(In/Hr) for a    10.0 year storm
Subarea runoff =      1.728(CFS) for      1.700(Ac.)
Total runoff =      4.067(CFS)   Total area =       4.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      432.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.067(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.067(CFS)
Normal flow depth in pipe =   10.45(In.)
Flow top width inside pipe =   13.79(In.)
Critical Depth =    9.79(In.)
Pipe flow velocity =      4.45(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    15.47 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.000(Ac.)
Runoff from this stream =      4.067(CFS)
Time of concentration =   15.47 min.
Rainfall intensity =     1.475(In/Hr)


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Process from Point/Station      434.000 to Point/Station      436.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  1682.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.00692  s(percent)=       0.69
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.103 min.
Rainfall intensity =      1.443(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.683
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.154(CFS)
Total initial stream area =        3.200(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      436.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.154(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.154(CFS)
Normal flow depth in pipe =    8.36(In.)
Flow top width inside pipe =   14.90(In.)
Critical Depth =    8.58(In.)
Pipe flow velocity =      4.49(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    16.21 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      3.200(Ac.)
Runoff from this stream =      3.154(CFS)
Time of concentration =   16.21 min.
Rainfall intensity =     1.438(In/Hr)
Summary of stream data:

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


1        6.296     22.78                1.192
2        4.067     15.47                1.475
3        3.154     16.21                1.438
Largest stream flow has longer time of concentration
Qp =      6.296 + sum of
         Qb         Ia/Ib
          4.067 *    0.808 =      3.287
         Qb         Ia/Ib
          3.154 *    0.829 =      2.616
Qp =     12.200

Total of 3 streams to confluence:
Flow rates before confluence point:
       6.296       4.067       3.154
Area of streams before confluence:
        6.800        4.000        3.200
Results of confluence:
Total flow rate =     12.200(CFS)
Time of concentration =    22.779 min.
Effective stream area after confluence =     14.000(Ac.)


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Process from Point/Station      438.000 to Point/Station      440.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    22.78 min.
Rainfall intensity =      1.192(In/Hr) for a    10.0 year storm
Subarea runoff =      0.710(CFS) for      0.900(Ac.)
Total runoff =     12.910(CFS)    Total area =      14.900(Ac.)


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Process from Point/Station      440.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.910(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.910(CFS)
Normal flow depth in pipe =   18.05(In.)
Flow top width inside pipe =   20.73(In.)
Critical Depth =   15.51(In.)
Pipe flow velocity =      5.10(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    23.03 min.


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     14.900(Ac.)
Runoff from this stream =     12.910(CFS)
Time of concentration =   23.03 min.
Rainfall intensity =     1.185(In/Hr)
Summary of stream data:

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


1       11.647     18.35           1.343
2       12.910     23.03           1.185
Largest stream flow has longer time of concentration
Qp =     12.910 + sum of
         Qb         Ia/Ib
         11.647 *    0.883 =     10.279
Qp =     23.189

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.647      12.910
Area of streams before confluence:
       12.150       14.900


Results of confluence:
Total flow rate =     23.189(CFS)
Time of concentration =    23.031 min.
Effective stream area after confluence  =     27.050(Ac.)
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Process from Point/Station      458.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.500(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =    73.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.189(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    23.189(CFS)
Normal flow depth in pipe =   20.11(In.)
Flow top width inside pipe =   23.54(In.)
Critical Depth =   20.23(In.)
Pipe flow velocity =      7.30(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    23.20 min.


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Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      1.739(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.690
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.008(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.949(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.16(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    2.91 min.     TC =   14.38  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.669
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```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.535(In/Hr) for a    10.0 year storm
Subarea runoff =      5.037(CFS) for      4.900(Ac.)
Total runoff =      6.045(CFS)    Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.512(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.88(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    3.95 min.     TC =   18.33  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.646
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.344(In/Hr) for a    10.0 year storm
Subarea runoff =     13.956(CFS) for     16.080(Ac.)
Total runoff =     20.001(CFS)    Total area =      21.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     23.860(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.58 min.     TC =   20.91  min.


 Adding area flow to channel
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```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.632
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.250(In/Hr) for a    10.0 year storm
Subarea runoff =      6.657(CFS) for      8.420(Ac.)
Total runoff =     26.658(CFS)   Total area =      30.240(Ac.)


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Process from Point/Station      308.000 to Point/Station      320.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1671.900(Ft.)
Downstream point elevation =  1668.000(Ft.)
Channel length thru subarea  =   574.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     27.054(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     27.054(CFS)
Depth of flow =   0.882(Ft.), Average velocity =   6.138(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    6.14(Ft/s)
Travel time  =    1.56 min.
Time of concentration =   22.46 min.

Sub-Channel No. 1 Critical depth =      0.969(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    5.585(Ft/s)
  '     '       '     Critical flow area =      4.844(Sq.Ft)

 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.202(In/Hr) for a    10.0 year storm
Subarea runoff =      0.716(CFS) for      0.900(Ac.)
Total runoff =     27.374(CFS)   Total area =      31.140(Ac.)
Depth of flow =   0.888(Ft.), Average velocity =   6.162(Ft/s)

Sub-Channel No. 1 Critical depth =      0.977(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    5.606(Ft/s)
  '     '       '     Critical flow area =      4.883(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     31.140(Ac.)
Runoff from this stream =     27.374(CFS)
Time of concentration =   22.46 min.
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Rainfall intensity =     1.202(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      1.450(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.554
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      6.219(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.152(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   21.24 min.     TC =   37.21  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.471
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      0.910(In/Hr) for a    10.0 year storm
Subarea runoff =      3.133(CFS) for      7.310(Ac.)
Total runoff =      9.352(CFS)    Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    37.21 min.
Rainfall intensity =      0.910(In/Hr) for a    10.0 year storm
Subarea runoff =      2.643(CFS) for      3.430(Ac.)
Total runoff =     11.994(CFS)    Total area =      18.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      313.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1674.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.994(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.994(CFS)
Normal flow depth in pipe =   12.01(In.)
Flow top width inside pipe =   16.96(In.)
Critical Depth =   15.76(In.)
Pipe flow velocity =      9.57(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    37.39 min.


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Process from Point/Station      313.200 to Point/Station      313.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    37.39 min.
Rainfall intensity =      0.908(In/Hr) for a    10.0 year storm
Subarea runoff =      0.461(CFS) for      0.600(Ac.)
Total runoff =     12.455(CFS)    Total area =      19.090(Ac.)


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Process from Point/Station      313.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   900.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.455(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.455(CFS)
Normal flow depth in pipe =   16.95(In.)
Flow top width inside pipe =   21.87(In.)
Critical Depth =   15.23(In.)
Pipe flow velocity =      5.25(Ft/s)
Travel time through pipe =    2.86 min.
Time of concentration (TC) =    40.25 min.
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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.090(Ac.)
Runoff from this stream =     12.455(CFS)
Time of concentration =   40.25 min.
Rainfall intensity =     0.872(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.089(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.697
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
Subarea runoff =      1.093(CFS) for      0.960(Ac.)
Total runoff =      8.182(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
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Street flow is on [2] side(s) of the street
Distance from curb to property line  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     10.633(CFS)
Depth of flow =   0.277(Ft.), Average velocity =   2.428(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.848(Ft.)
Flow velocity =   2.43(Ft/s)
Travel time =    9.70 min.     TC =   22.55  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      4.787(CFS) for      6.030(Ac.)
Total runoff =     12.969(CFS)   Total area =      12.040(Ac.)
Street flow at end of street =     12.969(CFS)
Half street flow at end of street =      6.485(CFS)
Depth of flow =   0.300(Ft.), Average velocity =   2.550(Ft/s)
Flow width (from curb towards crown)=  15.994(Ft.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    22.55 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      3.219(CFS) for      3.150(Ac.)
Total runoff =     16.189(CFS)   Total area =      15.190(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.519
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    22.55 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      8.383(CFS) for     13.460(Ac.)
Total runoff =     24.572(CFS)   Total area =      28.650(Ac.)
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Process from Point/Station      318.000 to Point/Station      318.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1676.000(Ft.)
Downstream point/station elevation =  1672.400(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.572(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    24.572(CFS)
Normal flow depth in pipe =   11.09(In.)
Flow top width inside pipe =   13.17(In.)
Critical depth could not be calculated.
Pipe flow velocity =     25.26(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    22.57 min.


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Process from Point/Station      318.200 to Point/Station      318.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    22.57 min.
Rainfall intensity =      1.199(In/Hr) for a    10.0 year storm
Subarea runoff =      2.043(CFS) for      2.000(Ac.)
Total runoff =     26.616(CFS)   Total area =      30.650(Ac.)


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Process from Point/Station      318.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1672.400(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   823.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.616(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    26.616(CFS)
Normal flow depth in pipe =   21.98(In.)
Flow top width inside pipe =   26.55(In.)
Critical Depth =   21.12(In.)
Pipe flow velocity =      6.90(Ft/s)
Travel time through pipe =    1.99 min.
Time of concentration (TC) =    24.55 min.


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     30.650(Ac.)
Runoff from this stream =     26.616(CFS)
Time of concentration =   24.55 min.
Rainfall intensity =     1.144(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
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```
1       27.374     22.46            1.202
2       12.455     40.25            0.872
3       26.616     24.55            1.144
Largest stream flow has longer or shorter time of concentration
Qp =     27.374 + sum of
         Qa          Tb/Ta
         12.455 *    0.558 =      6.951
         Qa          Tb/Ta
         26.616 *    0.915 =     24.350
Qp =     58.675

Total of 3 main streams to confluence:
Flow rates before confluence point:
      27.374      12.455      26.616
Area of streams before confluence:
       31.140       19.090       30.650


Results of confluence:
Total flow rate =     58.675(CFS)
Time of concentration =    22.464 min.
Effective stream area after confluence  =     80.880(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     80.880(Ac.)
Runoff from this stream =     58.675(CFS)
Time of concentration =   22.46 min.
Rainfall intensity =     1.202(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   897.000(Ft.)
Top (of initial area) elevation =  1683.000(Ft.)
Bottom (of initial area) elevation =  1674.700(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00925  s(percent)=       0.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.098 min.
Rainfall intensity =      1.495(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.687
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.519(CFS)
Total initial stream area =        4.400(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      402.000 to Point/Station      404.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
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Top of street segment elevation =  1674.700(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   126.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.670(CFS)
Depth of flow =   0.360(Ft.), Average velocity =   1.587(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.59(Ft/s)
Travel time =    1.32 min.     TC =   16.42  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.682
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.428(In/Hr) for a    10.0 year storm
Subarea runoff =      2.239(CFS) for      2.300(Ac.)
Total runoff =      6.758(CFS)   Total area =       6.700(Ac.)
Street flow at end of street =      6.758(CFS)
Half street flow at end of street =      6.758(CFS)
Depth of flow =   0.382(Ft.), Average velocity =   1.701(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      410.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1670.300(Ft.)
Downstream point/station elevation =  1670.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.758(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.758(CFS)
Normal flow depth in pipe =   11.36(In.)
Flow top width inside pipe =   17.37(In.)
Critical Depth =   12.08(In.)
Pipe flow velocity =      5.76(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    16.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.700(Ac.)
Runoff from this stream =      6.758(CFS)
Time of concentration =   16.53 min.
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Rainfall intensity =     1.422(In/Hr)


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Process from Point/Station      406.000 to Point/Station      408.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   612.000(Ft.)
Top (of initial area) elevation =  1685.300(Ft.)
Bottom (of initial area) elevation =  1676.500(Ft.)
Difference in elevation =     8.800(Ft.)
Slope =    0.01438  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.864 min.
Rainfall intensity =      1.707(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.702
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.875(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      408.000 to Point/Station      410.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1676.500(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   466.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      3.770(CFS)
Depth of flow =   0.286(Ft.), Average velocity =   1.624(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.287(Ft.)
Flow velocity =   1.62(Ft/s)
Travel time =    4.78 min.     TC =   16.65  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.681
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.417(In/Hr) for a    10.0 year storm
Subarea runoff =      1.737(CFS) for      1.800(Ac.)
Total runoff =      4.612(CFS)   Total area =       4.200(Ac.)
Street flow at end of street =      4.612(CFS)
Half street flow at end of street =      4.612(CFS)
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Depth of flow =   0.310(Ft.), Average velocity =   1.706(Ft/s)
Flow width (from curb towards crown)=  16.485(Ft.)


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Process from Point/Station      410.000 to Point/Station      410.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.681
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    16.65 min.
Rainfall intensity =      1.417(In/Hr) for a    10.0 year storm
Subarea runoff =      1.447(CFS) for      1.500(Ac.)
Total runoff =      6.059(CFS)   Total area =       5.700(Ac.)


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Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.700(Ac.)
Runoff from this stream =      6.059(CFS)
Time of concentration =   16.65 min.
Rainfall intensity =     1.417(In/Hr)
Summary of stream data:

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


1        6.758     16.53                1.422
2        6.059     16.65                1.417
Largest stream flow has longer or shorter time of concentration
Qp =      6.758 + sum of
         Qa          Tb/Ta
          6.059 *    0.993 =      6.017
Qp =     12.775

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.758       6.059
Area of streams before confluence:
        6.700        5.700
Results of confluence:
Total flow rate =     12.775(CFS)
Time of concentration =    16.532 min.
Effective stream area after confluence =     12.400(Ac.)


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Process from Point/Station      410.000 to Point/Station      412.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1670.000(Ft.)
Downstream point/station elevation =  1669.300(Ft.)
Pipe length  =   129.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.775(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.775(CFS)
Normal flow depth in pipe =   15.75(In.)
Flow top width inside pipe =   22.80(In.)
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Critical Depth =   15.43(In.)
Pipe flow velocity =      5.85(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =    16.90 min.


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Process from Point/Station      412.000 to Point/Station      320.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.680
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    16.90 min.
Rainfall intensity =      1.405(In/Hr) for a    10.0 year storm
Subarea runoff =      1.433(CFS) for      1.500(Ac.)
Total runoff =     14.208(CFS)    Total area =      13.900(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.900(Ac.)
Runoff from this stream =     14.208(CFS)
Time of concentration =   16.90 min.
Rainfall intensity =     1.405(In/Hr)
Summary of stream data:

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


1       58.675     22.46           1.202
2       14.208     16.90           1.405
Largest stream flow has longer time of concentration
Qp =     58.675 + sum of
         Qb         Ia/Ib
         14.208 *    0.855 =     12.149
Qp =     70.825

Total of 2 main streams to confluence:
Flow rates before confluence point:
      58.675      14.208
Area of streams before confluence:
       80.880       13.900


Results of confluence:
Total flow rate =     70.825(CFS)
Time of concentration =    22.464 min.
Effective stream area after confluence  =     94.780(Ac.)
End of computations, total study area =          206.61 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.624
Area averaged RI index number =  72.1
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100-YEAR PROPOSED CONDITION

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 03/29/19 File:P1713Q100.out

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100 YEAR STOIRM EVENT HYDROLOGY ANALYSIS
SWC OF LURIN AND COLE AVENUE
CITY OF RIVERSIDE, RIVERSIDE COUNTY
PROPOSED CONDITION

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.000(In/Hr)
Slope of intensity duration curve = 0.5500

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Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 1746.000(Ft.)
Bottom (of initial area) elevation = 1720.000(Ft.)
Difference in elevation = 26.000(Ft.)
Slope = 0.02717 s(percent)= 2.72
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.492 min.
Rainfall intensity = 2.371(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 84.40
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 9.088(CFS)
Total initial stream area = 4.470(Ac.)
Pervious area fraction = 0.500

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Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1720.000(Ft.)
End of street segment elevation =  1707.000(Ft.)
Length of street segment  =   876.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     14.189(CFS)
Depth of flow =   0.293(Ft.), Average velocity =   2.921(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.631(Ft.)
Flow velocity =   2.92(Ft/s)
Travel time =    5.00 min.     TC =   17.49  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.970(In/Hr) for a   100.0 year storm
Subarea runoff =     10.063(CFS) for      6.010(Ac.)
Total runoff =     19.151(CFS)   Total area =      10.480(Ac.)
Street flow at end of street =     19.151(CFS)
Half street flow at end of street =      9.575(CFS)
Depth of flow =   0.330(Ft.), Average velocity =   3.146(Ft/s)
Flow width (from curb towards crown)=  17.489(Ft.)


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Process from Point/Station      102.000 to Point/Station      103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1707.000(Ft.)
End of street segment elevation =  1693.000(Ft.)
Length of street segment  =   405.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     30.671(CFS)
Depth of flow =   0.337(Ft.), Average velocity =   4.858(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.808(Ft.)
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Flow velocity =   4.86(Ft/s)
Travel time =    1.39 min.     TC =   18.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.889(In/Hr) for a   100.0 year storm
Subarea runoff =     22.939(CFS) for     14.320(Ac.)
Total runoff =     42.089(CFS)   Total area =      24.800(Ac.)
Street flow at end of street =     42.089(CFS)
Half street flow at end of street =     21.045(CFS)
Depth of flow =   0.374(Ft.), Average velocity =   5.487(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1693.000(Ft.)
End of street segment elevation =  1692.200(Ft.)
Length of street segment  =   590.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     44.896(CFS)
Depth of flow =   0.743(Ft.), Average velocity =   1.929(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 =   12.17(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.93(Ft/s)
Travel time =    5.10 min.     TC =   23.98  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.842
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.656(In/Hr) for a   100.0 year storm
Subarea runoff =      5.464(CFS) for      3.920(Ac.)
Total runoff =     47.554(CFS)   Total area =      28.720(Ac.)
Street flow at end of street =     47.554(CFS)
Half street flow at end of street =     23.777(CFS)
Depth of flow =   0.760(Ft.), Average velocity =   1.974(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 =   13.00(Ft.)
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Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1688.200(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =   377.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    47.554(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    47.554(CFS)
Normal flow depth in pipe =   29.30(In.)
Flow top width inside pipe =   33.72(In.)
Critical Depth =   26.42(In.)
Pipe flow velocity =      7.12(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    24.86 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     28.720(Ac.)
Runoff from this stream =     47.554(CFS)
Time of concentration =   24.86 min.
Rainfall intensity =     1.624(In/Hr)


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Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1757.500(Ft.)
Bottom (of initial area) elevation =  1730.000(Ft.)
Difference in elevation =    27.500(Ft.)
Slope =    0.02750  s(percent)=       2.75
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.682 min.
Rainfall intensity =      2.351(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     10.379(CFS)
Total initial stream area =        5.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1730.000(Ft.)
End of street segment elevation =  1698.000(Ft.)
Length of street segment  =  1830.000(Ft.)
Height of curb above gutter flowline  =    6.0(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
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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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     15.181(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   3.750(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.158(Ft.)
Flow velocity =   3.75(Ft/s)
Travel time =    8.13 min.     TC =   20.82  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.790(In/Hr) for a   100.0 year storm
Subarea runoff =      9.551(CFS) for      6.310(Ac.)
Total runoff =     19.930(CFS)    Total area =      11.460(Ac.)
Street flow at end of street =     19.930(CFS)
Half street flow at end of street =     19.930(CFS)
Depth of flow =   0.427(Ft.), Average velocity =   4.011(Ft/s)
Flow width (from curb towards crown)=  22.324(Ft.)


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Process from Point/Station      107.000 to Point/Station      108.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1698.000(Ft.)
End of street segment elevation =  1691.000(Ft.)
Length of street segment  =   826.000(Ft.)
Height of curb above gutter flowline  =    6.0(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     25.946(CFS)
Depth of flow =   0.552(Ft.), Average velocity =   3.162(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    2.58(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  28.557(Ft.)
Flow velocity =   3.16(Ft/s)
Travel time =    4.35 min.     TC =   25.17  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.612(In/Hr) for a   100.0 year storm
Subarea runoff =     11.978(CFS) for      8.840(Ac.)
Total runoff =     31.908(CFS)    Total area =      20.300(Ac.)
Street flow at end of street =     31.908(CFS)
Half street flow at end of street =     31.908(CFS)
Depth of flow =   0.598(Ft.), Average velocity =   3.264(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    4.92(Ft.)
Flow width (from curb towards crown)=  30.900(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.000(Ft.)
Downstream point/station elevation =  1686.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    31.908(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    31.908(CFS)
Normal flow depth in pipe =   22.97(In.)
Flow top width inside pipe =   19.25(In.)
Critical Depth =   23.35(In.)
Pipe flow velocity =      8.86(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    25.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.300(Ac.)
Runoff from this stream =     31.908(CFS)
Time of concentration =   25.23 min.
Rainfall intensity =     1.610(In/Hr)
Summary of stream data:

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


1       47.554     24.86                1.624
2       31.908     25.23                1.610
Largest stream flow has longer or shorter time of concentration
Qp =     47.554 + sum of
         Qa          Tb/Ta
         31.908 *    0.985 =     31.444
Qp =     78.998

Total of 2 streams to confluence:
Flow rates before confluence point:
      47.554      31.908
Area of streams before confluence:
       28.720       20.300
Results of confluence:
Total flow rate =     78.998(CFS)
Time of concentration =    24.860 min.
Effective stream area after confluence =     49.020(Ac.)


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Process from Point/Station      109.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =  1686.700(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =   595.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    78.998(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    78.998(CFS)
Normal flow depth in pipe =   34.27(In.)
Flow top width inside pipe =   32.56(In.)
Critical Depth =   33.34(In.)
Pipe flow velocity =      9.40(Ft/s)
Travel time through pipe =    1.05 min.
Time of concentration (TC) =    25.91 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     49.020(Ac.)
Runoff from this stream =     78.998(CFS)
Time of concentration =   25.91 min.
Rainfall intensity =     1.587(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1730.000(Ft.)
Bottom (of initial area) elevation =  1702.000(Ft.)
Difference in elevation =    28.000(Ft.)
Slope =    0.02800  s(percent)=       2.80
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.637 min.
Rainfall intensity =      2.356(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     15.147(CFS)
Total initial stream area =        7.500(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      111.000 to Point/Station      112.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1702.000(Ft.)
End of street segment elevation =  1689.800(Ft.)
Length of street segment  =   586.000(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
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Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     17.176(CFS)
Depth of flow =   0.389(Ft.), Average velocity =   4.128(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.433(Ft.)
Flow velocity =   4.13(Ft/s)
Travel time =    2.37 min.     TC =   15.00  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.143(In/Hr) for a   100.0 year storm
Subarea runoff =      4.007(CFS) for      2.190(Ac.)
Total runoff =     19.153(CFS)    Total area =       9.690(Ac.)
Street flow at end of street =     19.153(CFS)
Half street flow at end of street =     19.153(CFS)
Depth of flow =   0.406(Ft.), Average velocity =   4.241(Ft/s)
Flow width (from curb towards crown)=  21.286(Ft.)


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Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1687.800(Ft.)
Downstream point/station elevation =  1687.500(Ft.)
Pipe length  =    76.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.153(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.153(CFS)
Normal flow depth in pipe =   21.75(In.)
Flow top width inside pipe =   21.37(In.)
Critical Depth =   18.37(In.)
Pipe flow velocity =      5.58(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    15.23 min.


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Process from Point/Station      113.000 to Point/Station      113.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    15.23 min.
Rainfall intensity =      2.126(In/Hr) for a   100.0 year storm
Subarea runoff =     11.595(CFS) for      6.610(Ac.)
Total runoff =     30.748(CFS)    Total area =      16.300(Ac.)


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Process from Point/Station      113.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
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Upstream point/station elevation =  1687.500(Ft.)
Downstream point/station elevation =  1687.000(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.748(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    30.748(CFS)
Normal flow depth in pipe =   20.44(In.)
Flow top width inside pipe =   27.96(In.)
Critical Depth =   22.66(In.)
Pipe flow velocity =      8.63(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    15.34 min.


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
_______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     16.300(Ac.)
Runoff from this stream =     30.748(CFS)
Time of concentration =   15.34 min.
Rainfall intensity =     2.117(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** INITIAL AREA EVALUATION ****
_______________________________________________________________________________
Initial area flow distance =   437.000(Ft.)
Top (of initial area) elevation =  1699.500(Ft.)
Bottom (of initial area) elevation =  1687.500(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.02746  s(percent)=       2.75
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      2.516(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.836
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      5.719(CFS)
Total initial stream area =        2.720(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      115.000 to Point/Station      116.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_______________________________________________________________________________
Top of natural channel elevation =   1687.500(Ft.)
End of natural channel elevation =   1687.000(Ft.)
Length of natural channel  =   106.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.719(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.50(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0047
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Corrected/adjusted channel slope =  0.0047
Travel time =    1.18 min.     TC =   12.39  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.381(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      5.719(CFS)   Total area =       2.720(Ac.)


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Process from Point/Station      116.000 to Point/Station      116.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.720(Ac.)
Runoff from this stream =      5.719(CFS)
Time of concentration =   12.39 min.
Rainfall intensity =     2.381(In/Hr)
Summary of stream data:

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


1       30.748     15.34                2.117
2        5.719     12.39                2.381
Largest stream flow has longer time of concentration
Qp =     30.748 + sum of
         Qb         Ia/Ib
          5.719 *    0.889 =      5.085
Qp =     35.834

Total of 2 streams to confluence:
Flow rates before confluence point:
      30.748       5.719
Area of streams before confluence:
       16.300        2.720
Results of confluence:
Total flow rate =     35.834(CFS)
Time of concentration =    15.341 min.
Effective stream area after confluence =     19.020(Ac.)


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Process from Point/Station      116.000 to Point/Station      120.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1687.000(Ft.)
Downstream point elevation =  1683.000(Ft.)
Channel length thru subarea  =   355.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =     36.399(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     36.399(CFS)
Depth of flow =   0.803(Ft.), Average velocity =   7.815(Ft/s)
Channel flow top width =    6.605(Ft.)
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Flow Velocity =    7.81(Ft/s)
Travel time  =    0.76 min.
Time of concentration =   16.10 min.

Sub-Channel No. 1 Critical depth =      1.094(Ft.)
  '     '       '     Critical flow top width =      7.188(Ft.)
  '     '       '     Critical flow velocity=    5.461(Ft/s)
  '     '       '     Critical flow area =      6.665(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.062(In/Hr) for a   100.0 year storm
Subarea runoff =      1.101(CFS) for      0.600(Ac.)
Total runoff =     36.935(CFS)   Total area =      19.620(Ac.)
Depth of flow =   0.810(Ft.), Average velocity =   7.852(Ft/s)

Sub-Channel No. 1 Critical depth =      1.109(Ft.)
  '     '       '     Critical flow top width =      7.219(Ft.)
  '     '       '     Critical flow velocity=    5.450(Ft/s)
  '     '       '     Critical flow area =      6.778(Sq.Ft)



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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.620(Ac.)
Runoff from this stream =     36.935(CFS)
Time of concentration =   16.10 min.
Rainfall intensity =     2.062(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   903.000(Ft.)
Top (of initial area) elevation =  1694.000(Ft.)
Bottom (of initial area) elevation =  1685.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.00908  s(percent)=       0.91
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.195 min.
Rainfall intensity =      2.128(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.233(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.500
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Process from Point/Station      118.000 to Point/Station      118.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.20 min.
Rainfall intensity =      2.128(In/Hr) for a   100.0 year storm
Subarea runoff =      9.371(CFS) for      5.160(Ac.)
Total runoff =     12.604(CFS)   Total area =       6.940(Ac.)


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Process from Point/Station      118.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1683.500(Ft.)
Downstream point/station elevation =  1683.000(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.604(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.604(CFS)
Normal flow depth in pipe =   13.73(In.)
Flow top width inside pipe =   19.98(In.)
Critical Depth =   15.86(In.)
Pipe flow velocity =      7.56(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    15.30 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      6.940(Ac.)
Runoff from this stream =     12.604(CFS)
Time of concentration =   15.30 min.
Rainfall intensity =     2.121(In/Hr)
Summary of stream data:

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


1       78.998     25.91           1.587
2       36.935     16.10           2.062
3       12.604     15.30           2.121
Largest stream flow has longer time of concentration
Qp =     78.998 + sum of
         Qb         Ia/Ib
         36.935 *    0.770 =     28.426
         Qb         Ia/Ib
         12.604 *    0.748 =      9.431
Qp =    116.856

Total of 3 main streams to confluence:
Flow rates before confluence point:
      78.998      36.935      12.604
Area of streams before confluence:
       49.020       19.620        6.940
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Results of confluence:
Total flow rate =    116.856(CFS)
Time of concentration =    25.915 min.
Effective stream area after confluence  =     75.580(Ac.)


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Process from Point/Station      120.000 to Point/Station      122.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1683.000(Ft.)
End of natural channel elevation =   1673.200(Ft.)
Length of natural channel  =   833.000(Ft.)
Estimated mean flow rate at midpoint of channel =    122.576(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.47(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0118
Corrected/adjusted channel slope =  0.0118
Travel time =    2.54 min.     TC =   28.45  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.855
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.507(In/Hr) for a   100.0 year storm
Subarea runoff =      9.539(CFS) for      7.400(Ac.)
Total runoff =    126.394(CFS)   Total area =      82.980(Ac.)


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Process from Point/Station      122.000 to Point/Station      123.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    28.45 min.
Rainfall intensity =      1.507(In/Hr) for a   100.0 year storm
Subarea runoff =      1.640(CFS) for      1.300(Ac.)
Total runoff =    128.034(CFS)   Total area =      84.280(Ac.)


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Process from Point/Station      123.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1673.000(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =   185.00(Ft.)   Manning's N = 0.013
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No. of pipes = 1  Required pipe flow  =   128.034(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =   128.034(CFS)
Normal flow depth in pipe =   37.69(In.)
Flow top width inside pipe =   33.20(In.)
Critical Depth =   40.46(In.)
Pipe flow velocity =     12.97(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    28.69 min.


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Process from Point/Station      124.000 to Point/Station      124.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    28.69 min.
Rainfall intensity =      1.501(In/Hr) for a   100.0 year storm
Subarea runoff =      0.628(CFS) for      0.500(Ac.)
Total runoff =    128.662(CFS)   Total area =      84.780(Ac.)


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Process from Point/Station      200.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   883.000(Ft.)
Top (of initial area) elevation =  1716.000(Ft.)
Bottom (of initial area) elevation =  1686.500(Ft.)
Difference in elevation =    29.500(Ft.)
Slope =    0.03341  s(percent)=       3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.284 min.
Rainfall intensity =      2.202(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     16.127(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      452.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1682.500(Ft.)
Downstream point/station elevation =  1679.800(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.127(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    16.127(CFS)
Normal flow depth in pipe =   11.02(In.)
Flow top width inside pipe =   17.54(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.22(Ft/s)
```

```
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    14.35 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      450.000 to Point/Station      452.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    14.35 min.
Rainfall intensity =      2.197(In/Hr) for a   100.0 year storm
Subarea runoff =      1.174(CFS) for      0.600(Ac.)
Total runoff =     17.301(CFS)    Total area =       9.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      452.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1679.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =  1336.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.301(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    17.301(CFS)
Normal flow depth in pipe =   19.05(In.)
Flow top width inside pipe =   19.41(In.)
Critical Depth =   17.98(In.)
Pipe flow velocity =      6.47(Ft/s)
Travel time through pipe =    3.44 min.
Time of concentration (TC) =    17.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.450(Ac.)
Runoff from this stream =     17.301(CFS)
Time of concentration =   17.79 min.
Rainfall intensity =     1.951(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      454.000 to Point/Station      456.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1682.500(Ft.)
Bottom (of initial area) elevation =  1674.500(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.00800  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.488 min.
Rainfall intensity =      2.371(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.892
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.707(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      456.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1671.600(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.707(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     5.707(CFS)
Normal flow depth in pipe =   14.06(In.)
Flow top width inside pipe =   19.75(In.)
Critical Depth =   10.55(In.)
Pipe flow velocity =      3.33(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    12.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =      5.707(CFS)
Time of concentration =   12.73 min.
Rainfall intensity =     2.346(In/Hr)
Summary of stream data:

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


1       17.301     17.79                 1.951
2        5.707     12.73                 2.346
Largest stream flow has longer time of concentration
Qp =     17.301 + sum of
         Qb         Ia/Ib
          5.707 *    0.832 =      4.747
Qp =     22.048

Total of 2 streams to confluence:
Flow rates before confluence point:
      17.301       5.707
Area of streams before confluence:
        9.450        2.700
Results of confluence:
Total flow rate =     22.048(CFS)
Time of concentration =    17.792 min.
Effective stream area after confluence =     12.150(Ac.)


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Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.150(Ac.)
Runoff from this stream =     22.048(CFS)
```

```
Time of concentration =   17.79 min.
Rainfall intensity =     1.951(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      420.000 to Point/Station      421.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =  1687.900(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.00681  s(percent)=       0.68
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.144 min.
Rainfall intensity =      2.059(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.910(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      421.000 to Point/Station      422.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.491(CFS)
Depth of flow =   0.498(Ft.), Average velocity =   0.904(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.90(Ft/s)
Travel time =    3.59 min.     TC =   19.74  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.843(In/Hr) for a   100.0 year storm
Subarea runoff =      1.093(CFS) for      0.700(Ac.)
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Total runoff =      6.003(CFS)    Total area =       3.500(Ac.)
Street flow at end of street =      6.003(CFS)
Half street flow at end of street =      6.003(CFS)
Depth of flow =   0.523(Ft.), Average velocity =   0.919(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 =    1.16(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      422.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.003(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.003(CFS)
Normal flow depth in pipe =   13.17(In.)
Flow top width inside pipe =   15.95(In.)
Critical Depth =   11.35(In.)
Pipe flow velocity =      4.33(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    19.83 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.500(Ac.)
Runoff from this stream =      6.003(CFS)
Time of concentration =   19.83 min.
Rainfall intensity =     1.838(In/Hr)


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Process from Point/Station      424.000 to Point/Station      426.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   908.000(Ft.)
Top (of initial area) elevation =  1687.000(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00584  s(percent)=       0.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.636 min.
Rainfall intensity =      2.025(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.481(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      426.000 to Point/Station      428.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
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Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   200.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      5.050(CFS)
Depth of flow =   0.484(Ft.), Average velocity =   0.868(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.87(Ft/s)
Travel time =    3.84 min.     TC =   20.48  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.806(In/Hr) for a   100.0 year storm
Subarea runoff =      1.070(CFS) for      0.700(Ac.)
Total runoff =      5.551(CFS)   Total area =       3.300(Ac.)
Street flow at end of street =      5.551(CFS)
Half street flow at end of street =      5.551(CFS)
Depth of flow =   0.505(Ft.), Average velocity =   0.898(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 =    0.23(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      428.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.551(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     5.551(CFS)
Normal flow depth in pipe =   12.84(In.)
Flow top width inside pipe =   20.47(In.)
Critical Depth =   10.39(In.)
Pipe flow velocity =      3.60(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    20.66 min.


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Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.300(Ac.)
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Runoff from this stream =      5.551(CFS)
Time of concentration =   20.66 min.
Rainfall intensity =     1.798(In/Hr)
Summary of stream data:

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


1        6.003     19.83                1.838
2        5.551     20.66                1.798
Largest stream flow has longer or shorter time of concentration
Qp =      6.003 + sum of
         Qa          Tb/Ta
          5.551 *    0.960 =      5.329
Qp =     11.332

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.003       5.551
Area of streams before confluence:
        3.500        3.300
Results of confluence:
Total flow rate =     11.332(CFS)
Time of concentration =    19.830 min.
Effective stream area after confluence =      6.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.500(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   693.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.332(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.332(CFS)
Normal flow depth in pipe =   14.06(In.)
Flow top width inside pipe =   19.75(In.)
Critical Depth =   15.04(In.)
Pipe flow velocity =      6.62(Ft/s)
Travel time through pipe =    1.74 min.
Time of concentration (TC) =    21.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.800(Ac.)
Runoff from this stream =     11.332(CFS)
Time of concentration =   21.57 min.
Rainfall intensity =     1.755(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      432.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   921.000(Ft.)
Top (of initial area) elevation =  1684.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00901  s(percent)=       0.90
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.339 min.
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```
Rainfall intensity =      2.117(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.154(CFS)
Total initial stream area =        2.300(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      432.000 to Point/Station      432.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.34 min.
Rainfall intensity =      2.117(In/Hr) for a   100.0 year storm
Subarea runoff =      3.071(CFS) for      1.700(Ac.)
Total runoff =      7.225(CFS)   Total area =       4.000(Ac.)


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Process from Point/Station      432.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.225(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.225(CFS)
Normal flow depth in pipe =   13.48(In.)
Flow top width inside pipe =   15.62(In.)
Critical Depth =   12.49(In.)
Pipe flow velocity =      5.09(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    15.45 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.000(Ac.)
Runoff from this stream =      7.225(CFS)
Time of concentration =   15.45 min.
Rainfall intensity =     2.109(In/Hr)


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Process from Point/Station      434.000 to Point/Station      436.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  1682.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
```

```
Difference in elevation =     6.300(Ft.)
Slope =    0.00692  s(percent)=       0.69
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.103 min.
Rainfall intensity =      2.062(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.620(CFS)
Total initial stream area =        3.200(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      436.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.620(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.620(CFS)
Normal flow depth in pipe =   13.50(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =   11.52(In.)
Pipe flow velocity =      4.83(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    16.21 min.


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Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      3.200(Ac.)
Runoff from this stream =      5.620(CFS)
Time of concentration =   16.21 min.
Rainfall intensity =     2.054(In/Hr)
Summary of stream data:

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


1       11.332     21.57                1.755
2        7.225     15.45                2.109
3        5.620     16.21                2.054
Largest stream flow has longer time of concentration
Qp =     11.332 + sum of
         Qb         Ia/Ib
          7.225 *    0.832 =      6.014
         Qb         Ia/Ib
          5.620 *    0.854 =      4.802
Qp =     22.148

Total of 3 streams to confluence:
Flow rates before confluence point:
      11.332       7.225       5.620
Area of streams before confluence:
        6.800        4.000        3.200
Results of confluence:
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```
Total flow rate =     22.148(CFS)
Time of concentration =    21.574 min.
Effective stream area after confluence =     14.000(Ac.)


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Process from Point/Station      438.000 to Point/Station      440.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    21.57 min.
Rainfall intensity =      1.755(In/Hr) for a   100.0 year storm
Subarea runoff =      1.334(CFS) for      0.900(Ac.)
Total runoff =     23.482(CFS)   Total area =      14.900(Ac.)


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Process from Point/Station      440.000 to Point/Station      458.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1671.500(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.482(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    23.482(CFS)
Normal flow depth in pipe =   22.59(In.)
Flow top width inside pipe =   25.87(In.)
Critical Depth =   19.80(In.)
Pipe flow velocity =      5.92(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    21.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      458.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     14.900(Ac.)
Runoff from this stream =     23.482(CFS)
Time of concentration =   21.79 min.
Rainfall intensity =     1.746(In/Hr)
Summary of stream data:

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


1       22.048     17.79           1.951
2       23.482     21.79           1.746
Largest stream flow has longer time of concentration
Qp =     23.482 + sum of
         Qb         Ia/Ib
         22.048 *    0.894 =     19.721
Qp =     43.203

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.048      23.482
```

```
Area of streams before confluence:
       12.150       14.900


Results of confluence:
Total flow rate =     43.203(CFS)
Time of concentration =    21.791 min.
Effective stream area after confluence  =     27.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      458.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1671.500(Ft.)
Downstream point/station elevation =  1671.000(Ft.)
Pipe length  =    73.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    43.203(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    43.203(CFS)
Normal flow depth in pipe =   26.67(In.)
Flow top width inside pipe =   25.98(In.)
Critical Depth =   26.17(In.)
Pipe flow velocity =      8.40(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    21.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =  1778.000(Ft.)
Bottom (of initial area) elevation =  1740.000(Ft.)
Difference in elevation =    38.000(Ft.)
Slope =    0.06726  s(percent)=       6.73
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.470 min.
Rainfall intensity =      2.484(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.820(CFS)
Total initial stream area =        0.840(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1740.000(Ft.)
End of natural channel elevation =   1708.500(Ft.)
Length of natural channel  =   727.000(Ft.)
Estimated mean flow rate at midpoint of channel =      7.130(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.78(Ft/s)

Correction to map slope used on extremely rugged channels with
```

```
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0433
Corrected/adjusted channel slope =  0.0433
Travel time =    2.53 min.     TC =   14.00  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.226(In/Hr) for a   100.0 year storm
Subarea runoff =      9.480(CFS) for      4.900(Ac.)
Total runoff =     11.301(CFS)   Total area =       5.740(Ac.)


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Process from Point/Station      304.000 to Point/Station      306.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1708.500(Ft.)
End of natural channel elevation =   1690.200(Ft.)
Length of natural channel  =   919.000(Ft.)
Estimated mean flow rate at midpoint of channel =     27.130(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.60(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0199
Corrected/adjusted channel slope =  0.0199
Travel time =    3.33 min.     TC =   17.34  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.979(In/Hr) for a   100.0 year storm
Subarea runoff =     27.547(CFS) for     16.080(Ac.)
Total runoff =     38.847(CFS)   Total area =      21.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      308.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1690.200(Ft.)
End of natural channel elevation =   1671.900(Ft.)
Length of natural channel  =   756.000(Ft.)
Estimated mean flow rate at midpoint of channel =     46.343(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.89(Ft/s)
```

```
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0242
Corrected/adjusted channel slope =  0.0242
Travel time =    2.14 min.     TC =   19.48  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.863
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.857(In/Hr) for a   100.0 year storm
Subarea runoff =     13.496(CFS) for      8.420(Ac.)
Total runoff =     52.343(CFS)   Total area =      30.240(Ac.)


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Process from Point/Station      308.000 to Point/Station      320.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1671.900(Ft.)
Downstream point elevation =  1668.000(Ft.)
Channel length thru subarea  =   574.000(Ft.)
Channel base width  =    5.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     53.074(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =     53.074(CFS)
Depth of flow =   1.398(Ft.), Average velocity =   7.593(Ft/s)
Channel flow top width =    5.000(Ft.)
Flow Velocity =    7.59(Ft/s)
Travel time  =    1.26 min.
Time of concentration =   20.74 min.

Sub-Channel No. 1 Critical depth =      1.516(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    7.003(Ft/s)
  '     '       '     Critical flow area =      7.578(Sq.Ft)

 Adding area flow to channel
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.794(In/Hr) for a   100.0 year storm
Subarea runoff =      1.365(CFS) for      0.900(Ac.)
Total runoff =     53.709(CFS)   Total area =      31.140(Ac.)
Depth of flow =   1.410(Ft.), Average velocity =   7.620(Ft/s)

Sub-Channel No. 1 Critical depth =      1.531(Ft.)
  '     '       '     Critical flow top width =      5.000(Ft.)
  '     '       '     Critical flow velocity=    7.015(Ft/s)
  '     '       '     Critical flow area =      7.656(Sq.Ft)
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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     31.140(Ac.)
Runoff from this stream =     53.709(CFS)
Time of concentration =   20.74 min.
Rainfall intensity =     1.794(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      312.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   777.000(Ft.)
Top (of initial area) elevation =  1688.500(Ft.)
Bottom (of initial area) elevation =  1677.000(Ft.)
Difference in elevation =    11.500(Ft.)
Slope =    0.01480  s(percent)=       1.48
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.972 min.
Rainfall intensity =      2.071(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =     13.215(CFS)
Total initial stream area =        7.750(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      312.000 to Point/Station      313.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of natural channel elevation =   1677.000(Ft.)
End of natural channel elevation =   1675.800(Ft.)
Length of natural channel  =  1052.000(Ft.)
Estimated mean flow rate at midpoint of channel =     19.447(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.00(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0011
Corrected/adjusted channel slope =  0.0011
Travel time =   17.46 min.     TC =   33.43  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.791
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
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Rainfall intensity =      1.379(In/Hr) for a   100.0 year storm
Subarea runoff =      7.975(CFS) for      7.310(Ac.)
Total runoff =     21.190(CFS)    Total area =      15.060(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    33.43 min.
Rainfall intensity =      1.379(In/Hr) for a   100.0 year storm
Subarea runoff =      4.194(CFS) for      3.430(Ac.)
Total runoff =     25.384(CFS)    Total area =      18.490(Ac.)


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Process from Point/Station      313.000 to Point/Station      313.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1674.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.384(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    25.384(CFS)
Normal flow depth in pipe =   15.82(In.)
Flow top width inside pipe =   22.75(In.)
Critical Depth =   21.24(In.)
Pipe flow velocity =     11.56(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    33.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.200 to Point/Station      313.400
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    33.58 min.
Rainfall intensity =      1.376(In/Hr) for a   100.0 year storm
Subarea runoff =      0.732(CFS) for      0.600(Ac.)
Total runoff =     26.116(CFS)    Total area =      19.090(Ac.)


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Process from Point/Station      313.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =  1671.800(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   900.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.116(CFS)
Nearest computed pipe diameter  =     30.00(In.)
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Calculated individual pipe flow  =    26.116(CFS)
Normal flow depth in pipe =   24.05(In.)
Flow top width inside pipe =   23.93(In.)
Critical Depth =   20.91(In.)
Pipe flow velocity =      6.19(Ft/s)
Travel time through pipe =    2.42 min.
Time of concentration (TC) =    36.00 min.


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.090(Ac.)
Runoff from this stream =     26.116(CFS)
Time of concentration =   36.00 min.
Rainfall intensity =     1.324(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      314.000 to Point/Station      316.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   979.000(Ft.)
Top (of initial area) elevation =  1698.000(Ft.)
Bottom (of initial area) elevation =  1691.500(Ft.)
Difference in elevation =     6.500(Ft.)
Slope =    0.00664  s(percent)=       0.66
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.853 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.505(CFS)
Total initial stream area =        5.050(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    12.85 min.
Rainfall intensity =      2.334(In/Hr) for a   100.0 year storm
Subarea runoff =      1.920(CFS) for      0.960(Ac.)
Total runoff =     12.425(CFS)   Total area =       6.010(Ac.)


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Process from Point/Station      316.000 to Point/Station      318.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
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Top of street segment elevation =  1691.500(Ft.)
End of street segment elevation =  1676.000(Ft.)
Length of street segment  =  1413.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   5.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     16.962(CFS)
Depth of flow =   0.334(Ft.), Average velocity =   2.724(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.685(Ft.)
Flow velocity =   2.72(Ft/s)
Travel time =    8.64 min.     TC =   21.50  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =      8.958(CFS) for      6.030(Ac.)
Total runoff =     21.382(CFS)    Total area =      12.040(Ac.)
Street flow at end of street =     21.382(CFS)
Half street flow at end of street =     10.691(CFS)
Depth of flow =   0.361(Ft.), Average velocity =   2.966(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    21.50 min.
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =      4.924(CFS) for      3.150(Ac.)
Total runoff =     26.307(CFS)    Total area =      15.190(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.812
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Time of concentration =    21.50 min.
Rainfall intensity =      1.759(In/Hr) for a   100.0 year storm
Subarea runoff =     19.209(CFS) for     13.460(Ac.)
Total runoff =     45.516(CFS)    Total area =      28.650(Ac.)


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Process from Point/Station      318.000 to Point/Station      318.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1676.000(Ft.)
Downstream point/station elevation =  1672.400(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    45.516(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    45.516(CFS)
Normal flow depth in pipe =   12.66(In.)
Flow top width inside pipe =   20.55(In.)
Critical depth could not be calculated.
Pipe flow velocity =     30.02(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    21.51 min.


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Process from Point/Station      318.200 to Point/Station      318.400
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    21.51 min.
Rainfall intensity =      1.758(In/Hr) for a   100.0 year storm
Subarea runoff =      3.126(CFS) for      2.000(Ac.)
Total runoff =     48.642(CFS)    Total area =      30.650(Ac.)


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Process from Point/Station      318.400 to Point/Station      320.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1672.400(Ft.)
Downstream point/station elevation =  1668.000(Ft.)
Pipe length  =   823.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    48.642(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    48.642(CFS)
Normal flow depth in pipe =   29.44(In.)
Flow top width inside pipe =   27.80(In.)
Critical Depth =   27.25(In.)
Pipe flow velocity =      7.87(Ft/s)
Travel time through pipe =    1.74 min.
Time of concentration (TC) =    23.25 min.


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
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The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =     30.650(Ac.)
Runoff from this stream =     48.642(CFS)
Time of concentration =   23.25 min.
Rainfall intensity =     1.684(In/Hr)
Summary of stream data:

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


1       53.709     20.74           1.794
2       26.116     36.00           1.324
3       48.642     23.25           1.684
Largest stream flow has longer or shorter time of concentration
Qp =     53.709 + sum of
         Qa          Tb/Ta
         26.116 *    0.576 =     15.041
         Qa          Tb/Ta
         48.642 *    0.892 =     43.376
Qp =    112.126

Total of 3 main streams to confluence:
Flow rates before confluence point:
      53.709      26.116      48.642
Area of streams before confluence:
       31.140       19.090       30.650


Results of confluence:
Total flow rate =    112.126(CFS)
Time of concentration =    20.735 min.
Effective stream area after confluence  =     80.880(Ac.)


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Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     80.880(Ac.)
Runoff from this stream =    112.126(CFS)
Time of concentration =   20.74 min.
Rainfall intensity =     1.794(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   897.000(Ft.)
Top (of initial area) elevation =  1683.000(Ft.)
Bottom (of initial area) elevation =  1674.700(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00925  s(percent)=       0.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.098 min.
Rainfall intensity =      2.136(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
```

```
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.021(CFS)
Total initial stream area =        4.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1674.700(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   126.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =     10.077(CFS)
Depth of flow =   0.442(Ft.), Average velocity =   1.994(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.99(Ft/s)
Travel time =    1.05 min.     TC =   16.15  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.058(In/Hr) for a   100.0 year storm
Subarea runoff =      4.033(CFS) for      2.300(Ac.)
Total runoff =     12.053(CFS)    Total area =       6.700(Ac.)
Street flow at end of street =     12.053(CFS)
Half street flow at end of street =     12.053(CFS)
Depth of flow =   0.474(Ft.), Average velocity =   2.141(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      410.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1670.300(Ft.)
Downstream point/station elevation =  1670.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.053(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.053(CFS)
Normal flow depth in pipe =   14.95(In.)
Flow top width inside pipe =   19.02(In.)
Critical Depth =   15.54(In.)
Pipe flow velocity =      6.58(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    16.25 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.700(Ac.)
Runoff from this stream =     12.053(CFS)
Time of concentration =   16.25 min.
Rainfall intensity =     2.051(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      408.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   612.000(Ft.)
Top (of initial area) elevation =  1685.300(Ft.)
Bottom (of initial area) elevation =  1676.500(Ft.)
Difference in elevation =     8.800(Ft.)
Slope =    0.01438  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.864 min.
Rainfall intensity =      2.439(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.026(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      410.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1676.500(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   466.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      6.654(CFS)
Depth of flow =   0.355(Ft.), Average velocity =   1.906(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   1.91(Ft/s)
Travel time =    4.08 min.     TC =   15.94  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.073(In/Hr) for a   100.0 year storm
Subarea runoff =      3.180(CFS) for      1.800(Ac.)
Total runoff =      8.206(CFS)    Total area =       4.200(Ac.)
Street flow at end of street =      8.206(CFS)
Half street flow at end of street =      8.206(CFS)
Depth of flow =   0.381(Ft.), Average velocity =   2.071(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.94 min.
Rainfall intensity =      2.073(In/Hr) for a   100.0 year storm
Subarea runoff =      2.650(CFS) for      1.500(Ac.)
Total runoff =     10.856(CFS)    Total area =       5.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.700(Ac.)
Runoff from this stream =     10.856(CFS)
Time of concentration =   15.94 min.
Rainfall intensity =     2.073(In/Hr)
Summary of stream data:

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


1       12.053     16.25                2.051
2       10.856     15.94                2.073
Largest stream flow has longer time of concentration
Qp =     12.053 + sum of
         Qb         Ia/Ib
         10.856 *    0.990 =     10.742
Qp =     22.795

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.053      10.856
Area of streams before confluence:
        6.700        5.700
Results of confluence:
Total flow rate =     22.795(CFS)
Time of concentration =    16.247 min.
Effective stream area after confluence =     12.400(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      412.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1670.000(Ft.)
Downstream point/station elevation =  1669.300(Ft.)
Pipe length  =   129.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.795(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    22.795(CFS)
Normal flow depth in pipe =   22.13(In.)
Flow top width inside pipe =   20.77(In.)
Critical Depth =   20.06(In.)
Pipe flow velocity =      6.54(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =    16.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      412.000 to Point/Station      320.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.851
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    16.58 min.
Rainfall intensity =      2.029(In/Hr) for a   100.0 year storm
Subarea runoff =      2.591(CFS) for      1.500(Ac.)
Total runoff =     25.386(CFS)    Total area =      13.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      320.000 to Point/Station      320.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.900(Ac.)
Runoff from this stream =     25.386(CFS)
Time of concentration =   16.58 min.
Rainfall intensity =     2.029(In/Hr)
Summary of stream data:

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


1      112.126     20.74           1.794
2       25.386     16.58           2.029
Largest stream flow has longer time of concentration
Qp =    112.126 + sum of
         Qb         Ia/Ib
         25.386 *    0.884 =     22.445
Qp =    134.571

Total of 2 main streams to confluence:
Flow rates before confluence point:
     112.126      25.386
Area of streams before confluence:
       80.880       13.900


Results of confluence:
```

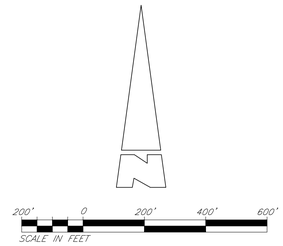
Total flow rate = 134.571(CFS)
Time of concentration = 20.735 min.
Effective stream area after confluence = 94.780(Ac.)
End of computations, total study area = 206.61 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.624
Area averaged RI index number = 72.1

Appendix

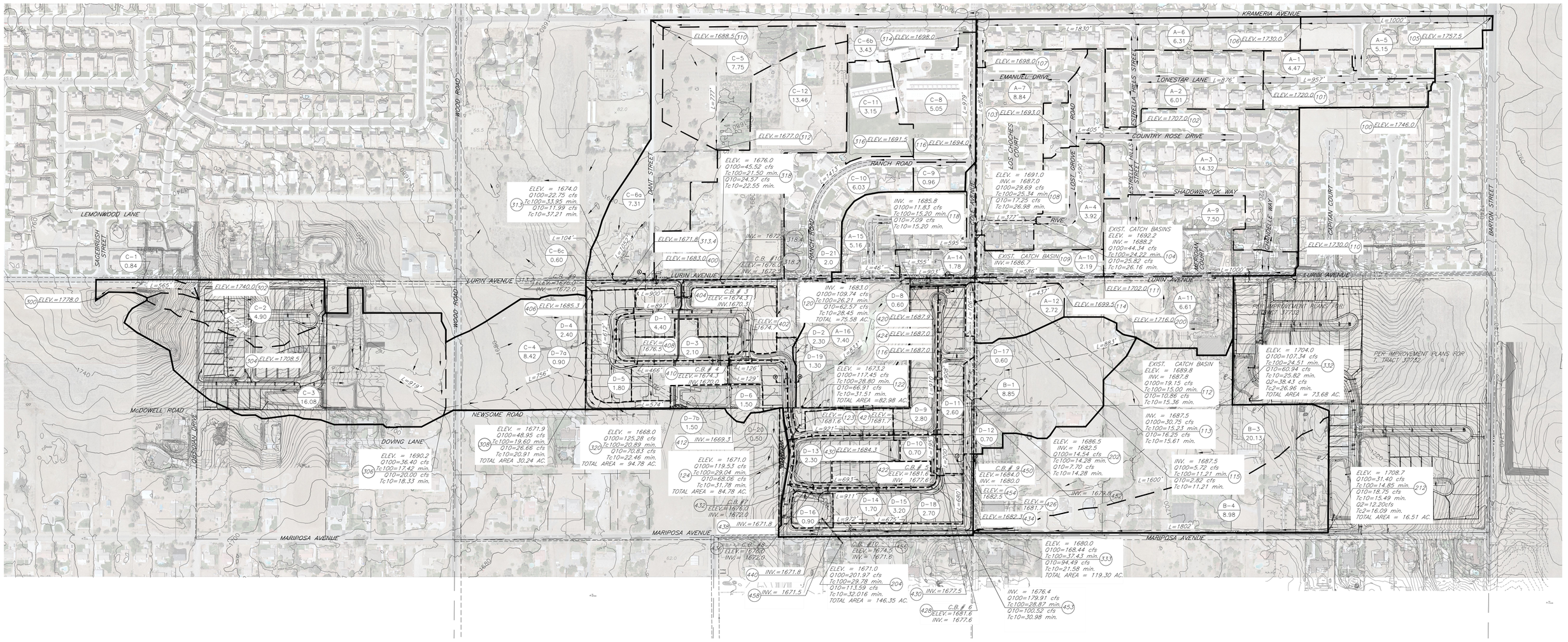
F

PROPOSED CONDITION HYDROLOGIC KEY MAP





VICINITY MAP



LEGEND

- MAJOR WATERSHED BOUNDARY
- SUB DRAINAGE AREA BOUNDARY
- OFFSITE SUB DRAINAGE AREA BOUNDARY
- FLOW PATH
- DIRECTION OF FLOW
- C17 / 70.21 — DRAINAGE AREA DESIGNATION / ACRES
- 340 — NODE DESIGNATION
- L=300' — LENGTH OF EXISTING FLOW PATH
- Q_{100} — CALCULATED 100-YEAR STORM RUNOFF
- Q_{10} — CALCULATED 10-YEAR STORM RUNOFF
- RUN-ON NODE LOCATIONS

SOIL TYPE "C"

ONSITE HYDROLOGY RESULT DATA SUMMARY TABLE

NODE #	Q10 cfs	Tc10 min.	Q100 cfs	Tc100 min.	CATCH BASIN CONDITION	DOWNSTREAM CONDITION
313.2	0.46	5.00	0.71	5.00	C.B.#1-SUMP	STORM DRAIN
313.4	12.46	37.39	23.47	34.10	–	STORM DRAIN
318.2	2.04	5.00	3.08	5.00	C.B.#2-SUMP	STORM DRAIN
318.4	26.62	22.57	45.38	21.58	–	STORM DRAIN
404	6.76	16.42	11.31	16.18	C.B.#3-SUMP	STORM DRAIN
410	6.06	16.65	10.20	16.04	C.B.#4-SUMP	STORM DRAIN
Σ 410	12.78	16.53	21.42	16.04	–	BASIN
422	3.34	20.67	5.62	19.83	C.B.#5-FLOWBY	STORM DRAIN
428	3.08	21.47	5.19	20.58	C.B.#6-FLOWBY	STORM DRAIN
430	6.30	20.77	10.60	20.77	–	STORM DRAIN
432	4.07	15.34	6.78	15.34	C.B.#7-SUMP	STORM DRAIN
436	3.15	16.10	5.27	16.10	C.B.#8-SUMP	STORM DRAIN
438	12.20	22.78	1.24	5.00	–	BASIN
440	12.91	22.78	21.95	21.69	–	STORM DRAIN
450	0.79	14.36	1.16	5.00	C.B.#9-SUMP	STORM DRAIN
456	3.85	12.49	5.70	12.28	C.B.#10-SUMP	STORM DRAIN

FIGURE 6

POST-DEVELOPMENT CONDITION HYDROLOGY KEY MAP

FOR

16661 COLE AVENUE
TENTATIVE TRACT MAP NO. 37731

RIVERSIDE, CALIFORNIA

PREPARED BY:
KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA 92881-3370 951-734-2130

SHEET 1 OF 1 SHEETS

July 9, 2019

JN 17-173.1 R:\17\173\PREMAP\HYDRO\173 HYDROLOGY.DWG

Appendix

G

MISCELLANEOUS SIZING AND HYDRAULIC CALCULATIONS

Appendix

H

FEMA FIRM PANELS

NOTES TO USERS

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

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

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

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

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

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

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

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

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

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

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

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

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



FIGURE 7

LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
2776000mN	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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

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

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0740G

FIRM
FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 740 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RIVERSIDE COUNTY	060245	0740	G
RIVERSIDE, CITY OF	060260	0740	G

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

MAP NUMBER
06065C0740G

EFFECTIVE DATE
AUGUST 28, 2008

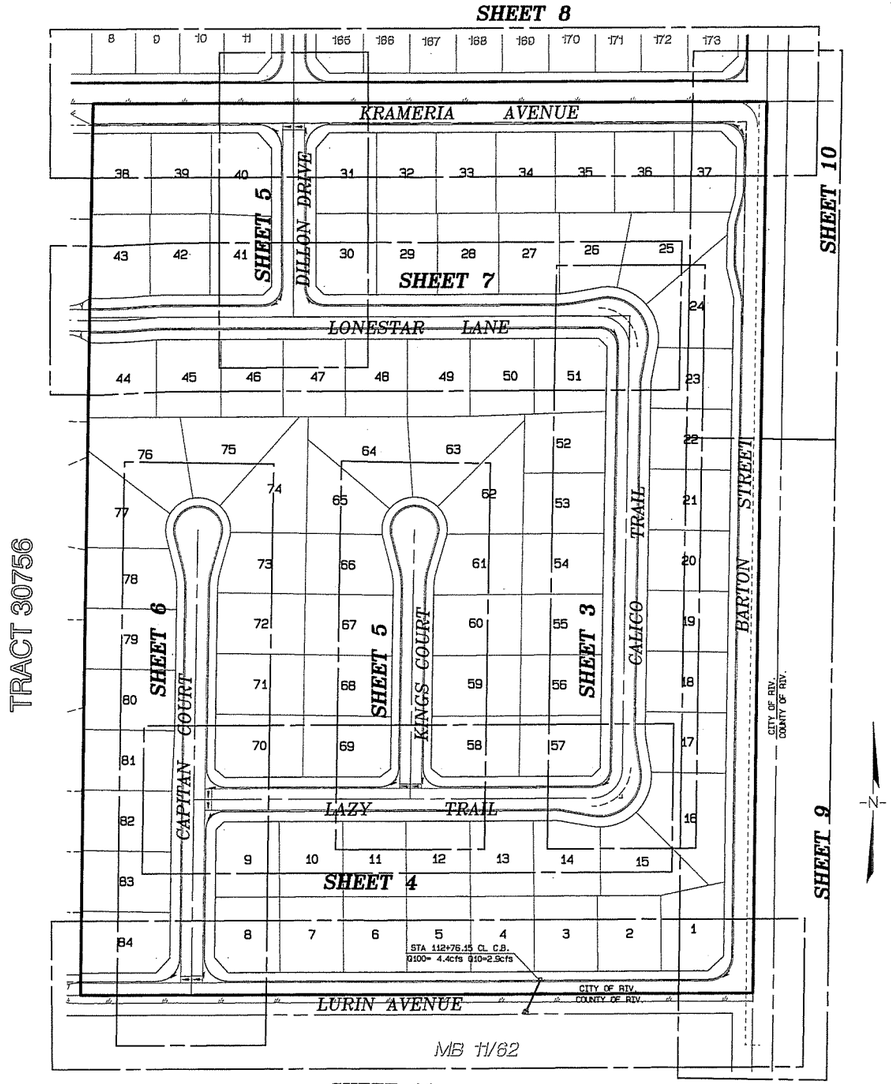
Federal Emergency Management Agency

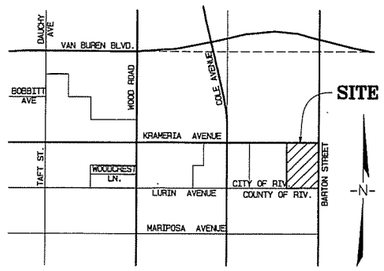
Appendix

I

REFREENCE IMPROVEMENT PLANS

TRACT 31236-1





VICINITY MAP N.T.S.

SECTION 29, T3S R4W

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER OR CONTRACTOR TO APPLY TO THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT, PERMIT SECTION, FOR AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE, AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT. ADDITIONAL STUDIES AND/OR PERMITS MAY BE REQUIRED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITTEE MUST INFORM COUNTY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO BEGINING OF CONSTRUCTION. PHONE: (909) 955-6885
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR DEVELOPER TO INSTALL AND MAINTAIN ALL CONSTRUCTION, REGULATORY, GUIDE AND WARNING SIGNS WITHIN THE PROJECT LIMITS AND ITS SURROUNDINGS TO PROVIDE SAFE PASSAGE FOR THE TRAVELING PUBLIC AND WORKERS UNTIL THE FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT BY THE COUNTY.
   A TRAFFIC CONTROL PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO OBTAINING AN ENCROACHMENT PERMIT.
4. ALL STREET SECTIONS ARE TENTATIVE. ADDITIONAL SOILS TESTS SHALL BE TAKEN BY THE COUNTY AFTER ROUGH GRADING TO DETERMINE THE EXACT STREET SECTION REQUIREMENTS. USE STANDARD NO. 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
5. ASPHALTIC EMULSION (FOG SEAL) SHALL BE APPLIED NOT LESS THAN 14 DAYS FOLLOWING PLACEMENT OF THE ASPHALT SURFACING. FOG SEAL AND PAINT BINDER SHALL BE APPLIED AT A RATE OF 0.05 AND 0.03 GALLON PER SQUARE YARD RESPECTIVELY. ASPHALTIC EMULSION SHALL CONFORM TO SECTION 37, 39, AND 94 OF THE STATE STANDARD SPECIFICATIONS.
6. THE DEVELOPER SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ADDITIONAL SIGNS AND MARKINGS NOT INCLUDED IN THE SIGNING AND STRIPING PLAN WITHIN THE PROJECT AREAS, OR ON ROADWAYS ADJACENT TO THE PROJECT BOUNDARIES, UPON THE REQUEST OF THE DIRECTOR OF TRANSPORTATION OR HIS DESIGNEE TO IMPROVE TRAFFIC SAFETY ON THE ROADS UNDER THE JURISDICTION OF THE DEVELOPER.

QUANTITIES

(WITHIN COUNTY RIGHT-OF-WAY ONLY)

(18)	CONSTRUCT 0.33' A.C. OVER 0.50' A.B. CL II.	12,300 SF	262 TON/228 CY
(14)	REMOVE EXISTING A.C. PAVEMENT	12,300 SF	

NOTICE TO CONTRACTOR

ACCORDING TO INFORMATION PROVIDED BY UNDERGROUND SERVICE ALERT (U.S.A.) DATED SEPTEMBER 2, 2003, THE FOLLOWING ORGANIZATIONS ARE U.S.A. MEMBERS WITHIN THE PROJECT AREA:

UTI FOR CHARTER COMMUNICATIONS
SBC / PACIFIC BELL
SOUTHERN CALIFORNIA GAS COMPANY
UTI FOR VERIZON - PERRIS
UTI FOR SC EDISON
WESTERN MUNICIPAL WATER DISTRICT
ADELPHIA - RIVERSIDE
UTI FOR CITY OF RIVERSIDE - ELECTRIC
CITY OF RIVERSIDE - TRAFFIC ENGINEERING
MARCH JOINT POWERS AUTHORITY

THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES (UTILITY PIPES, STRUCTURES, ETC.) SHOWN ON THESE PLANS (MAIN LINES ONLY - NO SERVICE LATERALS) WERE ASCERTAINED BY A REVIEW OF RECORDS PROVIDED BY THESE MEMBER AGENCIES AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT ALL UTILITIES SHOWN ON THESE PLANS AND/OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

CALL UNDERGROUND SERVICE ALERT (U.S.A.) 1-800-227-2600 AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION.

THE QUANTITY ESTIMATE SHOWN HEREON IS FOR THE USE OF GOVERNING AGENCIES IN DETERMINING BOND AMOUNTS AND/OR FEES AND IS NOT TO BE USED FOR BID PURPOSES.

STREET NAME AND TRAFFIC SIGN SCHEDULE

	NAME	BLOCK NO.
(A)	R-1 (STOP SIGN - 30")	
(B)	DILLON DRIVE,	9400
(C)	LONESTAR LANE	19800
	LONESTAR LANE,	19900
(D)	CALICO TRAIL	9400
	CALICO TRAIL,	9500
(E)	LAZY TRAIL	19800
	LAZY TRAIL,	19800
(F)	KINGS COURT	9500
	LAZY TRAIL,	19800
	CAPITAN COURT	9500
(G)	CAPITAN COURT,	9500
	LURIN AVENUE	19800
(H)	BARTON STREET,	9500
	LURIN AVENUE	19900
(I)	KRAMERIA AVENUE,	19800
(J)	DILLON DRIVE	9400
	BARTON STREET,	9400
	KRAMERIA AVENUE	19900

INSTALL SIGNS PER C/R STD. 662, C/R STD. 662A AND STD. 666

LEGEND, ABBREVIATIONS

BC — BEGIN CURVE
BCR — BEGIN CURB RETURN
EC — END CURVE
ECR — END CURB RETURN
FL — FLOWLINE
GB — GRADE BREAK
HP — HIGH POINT
LP — LOW POINT
TC — TOP OF CURB
UNO — UNLESS NOTED OTHERWISE

— A.C. PAVEMENT OVERLAY

— EXISTING A.C. PAVEMENT REMOVAL

STREET INDEX

	SHT NO.
TITLE SHEET	1
TYP. STREET SECTIONS & DETAILS	2
STREET PLAN & PROFILE	3-11
STORM DRAIN PLAN & PROFILE	10

GENERAL NOTES

1. NO PERSON SHALL PERFORM ANY CONSTRUCTION ACTIVITY OR INSTALL ANY OBJECTS WITHIN THE PUBLIC RIGHTS-OF-WAY OR EASEMENTS OF THE CITY OF RIVERSIDE WITHOUT A VALID CONSTRUCTION PERMIT OR A STREET OPENING PERMIT OR AN ENCROACHMENT PERMIT ISSUED BY THE CITY'S PUBLIC WORKS DEPARTMENT.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAR THE RIGHT-OF-WAY IN ACCORDANCE WITH THE PROVISIONS OF LAW AS IT AFFECTS EACH UTILITY INCLUDING IRRIGATION LINES AND APPURTENANCES AND AT NO COST TO THE CITY.
3. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF RIVERSIDE DEPARTMENT OF PUBLIC WORKS, STANDARD DRAWINGS, ITS SUPPLEMENTAL NOTES AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION.
4. THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.
5. THE DEVELOPER SHALL BE RESPONSIBLE FOR PRESERVING OR RE-ESTABLISHING AND REFERENCING SURVEY MONUMENTS DESTROYED, DISTURBED OR BURIED AS A RESULT OF CONSTRUCTION SHOWN HEREON.
6. ALL FLAGGED ELEVATIONS SHALL BE STAKED IN THE FIELD BY THE PRIVATE ENGINEER.
7. WHERE NEW PAVEMENT IS TO JOIN THE EXISTING PAVEMENT, THE EDGE OF THE EXISTING PAVEMENT SHALL BE TRIMMED IN A SMOOTH AND STRAIGHT LINE. CONSTRUCT MATCH-UP PAVING AS SHOWN ON THE PLANS AND OVERLAY PAVING AS DIRECTED IN THE FIELD TO PRODUCE A SMOOTH SECTION.
8. THE SUBDIVIDER SHALL ARRANGE FOR A SOIL TEST TO BE MADE BY A SOILS ENGINEER AFTER THE STREETS HAVE BEEN PREPARED TO ROUGH GRADE AND PRIOR TO CURB AND GUTTER CONSTRUCTION. DEPTH OF BASE MATERIAL AND A.C. PAVING SHALL BE DETERMINED BY THE CITY OF RIVERSIDE DESIGN STANDARDS AND TEST PROCEDURES.
9. ON ALL AREAS WITHIN PUBLIC RIGHT-OF-WAY WHERE THE FILL IS ONE (1) FOOT OR GREATER, A LETTER WILL BE REQUIRED FROM THE SOILS ENGINEER, CERTIFYING THE COMPACTION OF THE FILL BELOW SUBGRADE, PRIOR TO ISSUANCE OF THE CONSTRUCTION PERMIT/CUT SHEETS.
10. ALL TRAFFIC SIGNS SHALL BE INSTALLED PRIOR TO OPENING THE STREETS TO TRAFFIC.
11. ANY TRAFFIC CONTROL STRIPING OBLITERATED AND/OR BADLY WORN DURING CONSTRUCTION SHALL BE RESTORED BY THE CONTRACTOR WITHIN FIVE DAYS AFTER NOTIFICATION FROM THE CITY INSPECTORS.
12. FINAL STRIPING FOR TRAFFIC CONTROL AND/OR PAVEMENT MARKING TO BE THE RESPONSIBILITY OF THE CONTRACTOR.
13. THE CONTRACTOR SHALL CALL IN A LOCATION REQUEST TO UNDERGROUND SERVICE ALERT (USA). PHONE # 1-800-227-2600, TWO WORKING DAYS BEFORE DIGGING. NO CONSTRUCTION PERMIT WILL BE ISSUED BY THE PUBLIC WORKS DEPARTMENT INVOLVING EXCAVATION FOR UNDERGROUND FACILITIES UNLESS THE APPLICANT HAS BEEN PROVIDED AN INQUIRY IDENTIFICATION NUMBER BY U.S.A.
14. THE CONTRACTOR SHALL COORDINATE TRENCHING FOR CABLE TELEVISION WITH OTHER TRENCHING WITHIN THE SUBDIVISION.
15. CONSTRUCT DRIVEWAY APPROACHES PER STANDARD DRAWING 302. EXACT SIZE AND LOCATION TO BE STAKED BY THE PRIVATE ENGINEER PRIOR TO CONSTRUCTION OF THE CURB AND GUTTER.
16. IN PAVEMENT OVERLAY AREAS, ANY DISTRESSED EXISTING PAVEMENT SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE INSPECTOR PRIOR TO OVERLAYING WITH A.C. PAVING.
17. SEE PUBLIC LANDSCAPE PLAN NO. R-3777-L AS PREPARED BY HERMANN & ASSOCIATES FOR LANDSCAPE IMPROVEMENTS ALONG BARTON STREET.
18. BEFORE THE RIP-RAP AT OUTLET OF ANY DRAINAGE STRUCTURE IS ACCEPTED BY THE CITY, IT SHALL BE TESTED UNDER FLOWS AS CLOSE AS POSSIBLE TO DESIGN CONDITIONS WITH WATER OBTAINED FROM FIRE HYDRANTS IN THE IMMEDIATE AREA.

CONSTRUCTION NOTES

⚠ 1	CONSTRUCT 0.35' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R. 10594 R=40	
1a	CONSTRUCT 0.35' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R.700013, R=30, SEE RIV. COUNTY GENERAL NOTES 4	
1b	CONSTRUCT_____A.C. PAVING OVER_____CRUSHED AGGREGATE BASE PER S.R._____, R=_____	
1c	CONSTRUCT 0.25' A.C. OVER NATIVE	
2	CONSTRUCT TYPE 1 CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. NO. 200	
3	CONSTRUCT CURB SIDEWALK PER CITY OF RIVERSIDE STD. NO. 325	
4	CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220	
5	CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304	
6	CONSTRUCT CATCH BASIN PER CITY OF RIVERSIDE STD. NO. 405	
7	CONSTRUCT 18" RCP (D-2000)	
8	CONSTRUCT FLARED END SECTION (CONNECTION TO RCP) PER DETAIL ON SHEET 2	
9	SAW CUT AND MATCH TO EXISTING PAVEMENT	
10	CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)	
11	CONSTRUCT BUS STOP TURNOUT 8" CONCRETE WITH REINFORCEMENT (WITH #3 BARS @ 18" O.C.), SEE DETAIL ON SHEET 2	
12	A.C OVERLAY, VARIABLE THICKNESS (0.1' MIN.)	
13	CONSTRUCT WHEELCHAIR RAMP, TYPE VII, PER CITY OF RIVERSIDE STD. NO. 304	
14	REMOVE EXISTING A.C. PAVEMENT	

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE.

MS 3936, I.P. 040011

NOTE:

WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY

NO BONDING WITH RIVERSIDE COUNTY WILL BE REQUIRED, HOWEVER, THE COUNTY WILL INSPECT PORTION OF CONSTRUCTION WITHIN UNINCORPORATED AREA.

APPROVED FOR CONSTRUCTION WITHIN THE COUNTY OF RIVERSIDE ONLY. (SHEETS 1, 2, 10 & 11)

SEAL—COUNTY

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:

KHALED A. OTHMAN, P.E. DATE 7/15/04

RECOMMENDED: WILL DOAN DATE 7/15/04

INDEX MAP

SCALE: 1" = 100'

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

REVIEW BY:
WESTERN MUNICIPAL WATER DISTRICT
FOR NON-INTERFERENCE COMPLIANCE
SHEET 1 THROUGH 11
CIVIL ENGINEER RCE 45212
DATE: 6/15/04

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — MARK W. WEBB — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED [signature] DATE 6-2-04
R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
1	ADD PAVEMENT SECTION	RJZ	4-17-06

DESIGNED BY: MAW CHECKED BY: LM

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	APPROVED BY	DATE
PRINCIPAL ENGINEER		8/25/04
PARK DEPARTMENT		8/25/04
TRAFFIC DIVISION	[signature]	8/25/04
STREET SERVICES		8/25/04
PLANNING DEPT.		8/25/04

APPROVED BY [signature] CITY ENGINEER DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361
INDEX SHEET

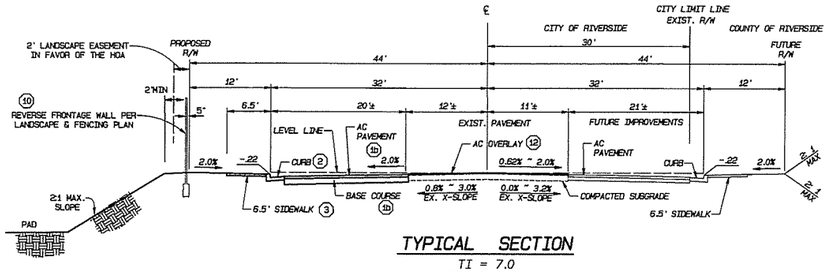
SCALE: AS SHOWN

ACCOUNT NO. 03-0340
DRAWING NUMBER **R-3777**
SHEET 1 OF 11
PW03-0473

FILE: G:\2003\03-0340\03034Opro PLOT DATE: 5/28/2004

Pc - 4405-S

INDEXED 9/9/04 LH

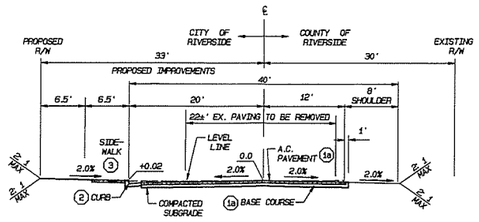


TYPICAL SECTION

TI = 7.0

BARTON STREET

NTS

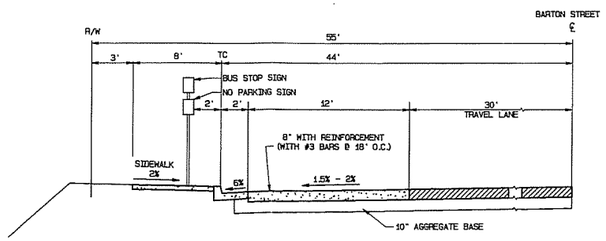


TYPICAL SECTION

TI = ~~7.0~~ 5.0, R=30

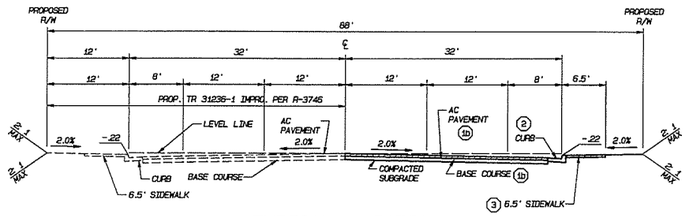
LURIN AVENUE – 105+97.18 TO 115+90.80

NTS



DETAIL "B"
BUS STOP TURNOUT

NOT TO SCALE

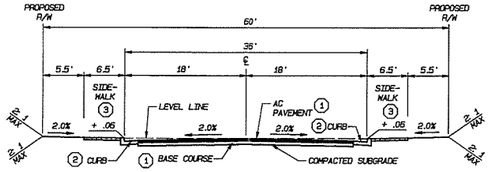


TYPICAL SECTION

TI = 7.0

KRAMERIA AVENUE

NTS

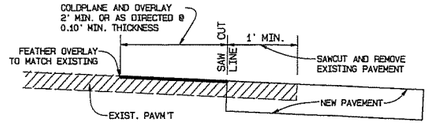


TYPICAL SECTION

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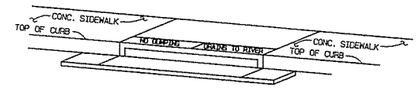
KINGS COURT & CAPITAN COURT – 13+01.98 TO 16+90.07

NTS



PAVEMENT JOIN DETAIL

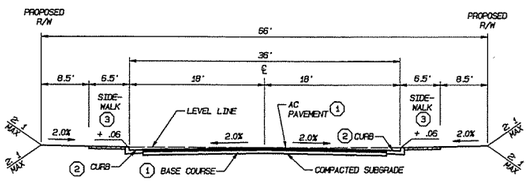
NTS



CATCH BASIN STENCILING DETAIL

N.T.S.

Ⓐ STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING DRAINS TO RIVER"
Ⓑ PLACE BOTH STENCILS CENTERED WITHIN THE CATCH BASIN OPENING AND WITHIN THE TOP OF THE CURB.
Ⓒ SPRAY BOTH STENCILS WITH WHITE PAINT.
Ⓓ REMOVE STENCILS WHEN PAINT IS DRY

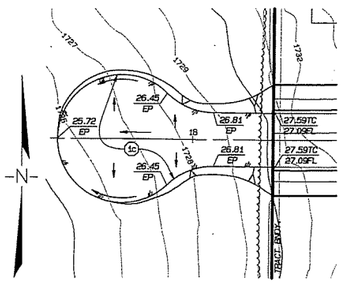


TYPICAL SECTION

TI= 5.0

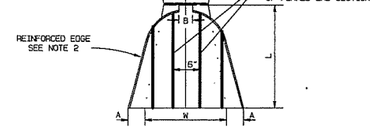
LONESTAR LANE, DILLON DRIVE, CALICO TRAIL, LAZY TRAIL & CAPITAN COURT – 10+00.00 TO 13+01.98

NTS

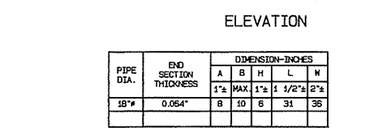


TEMPORAY FIRE ACCESS BULB DETAIL
LONESTAR LANE

SCALE: 1" 40'



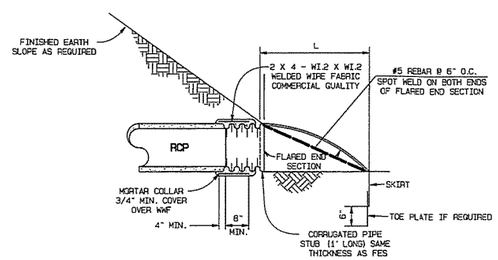
PLAN



ELEVATION

PIPE DIA.	END SECTION THICKNESS	DIMENSION-INCHES				
		A	B	H	L	W
		1"±	MAX	1"±	1 1/2"±	2"±
18"ø	0.054"	8	10	6	31	36

EQUIVALENT PLASTIC FES TO MEET AASHTO M-294 AND ASTM D-1248 SPECIFICATIONS



NOTES

1. ALL 3-PIECE BODIES TO HAVE 0.109" THICK SIDES AND 0.138" THICK CENTER PANELS, WIDTH OF CENTER PANELS TO BE GREATER THAN 20% OF THE PIPE PERIPHERY. MUTIPLE PANEL BODIES TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY RIVETS OR BOLTS.
2. REINFORCED EDGES TO BE SUPPLEMENTED WITH STIFFENER ANGLES FOR THE 60" THRU 84" ROUND, 77" X 52" AND 83" X 57" PIPE-ARCH SIZES. THE ANGLES WILL BE 2" X 2" X 1/4" FOR THE 60" THRU 72" ROUND, 77" X 52" AND 83" X 57" PIPE-ARCH SIZES AND 2" X 2 1/2"
3. ANGLES REINFORCEMENT SHALL BE PLACED UNDER THE CENTER PANEL SEAMS ON THE 77" X 52" AND 83" X 57" PIPE-ARCH SIZES.
4. TOE PLATE TO BE AVAILABLE AS AN ACCESSARY WHEN SPECIFIED.
5. END OF PIPE TO BE FINISHED WITH ANNULAR CORRUGATIONS TO CONFORM FLARED END SECTION SO THAT MINIMAL LEAKAGE RESULTS FROM THE CONNECTION. OTHER DESIGNS MAY BE USED WITH APPROVAL OF THE ENGINEER.
6. FOR 18" THRU 24" HELICAL END SECTION CONNECTION, A UNIVERSAL COUPLING BAND ATTACHED TO THE METAL END SECTION BY RIVETS, BOLTS OR ONE INCH LONG SHOP TACK WELDS SPACED AT SAME INTERVALS AS DIMPLES MAY BE USED IN PLACE OF THE 112" STUB SEE ST

FLARED END SECTION CONNECTION TO RCP

NOT TO SCALE

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE

MS 3936, I.P. 040011

FILE: G:\2003\03-0340\030340.dgn PLOT DATE: 5/28/2004

PC-4405

SEAL–COUNTY

REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN NO. 33950 EXP. 6-30-05 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:
KHALED A. OTHMAN, P.E. DATE 7/19/04
RECOMMENDED: WILLDAN DATE 7/15/04

DIGALERT

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

SEAL–ENGINEER

REGISTERED PROFESSIONAL ENGINEER ALBERT A. WEBB NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY _____ DATE 10-2-04
R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
1	ADD PAVEMENT SECTION	RVZ	10-7-05

DESIGNED BY: MAW CHECKED BY: LM

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		

APPROVED BY _____ CITY ENGINEER
DATE 8/25/04

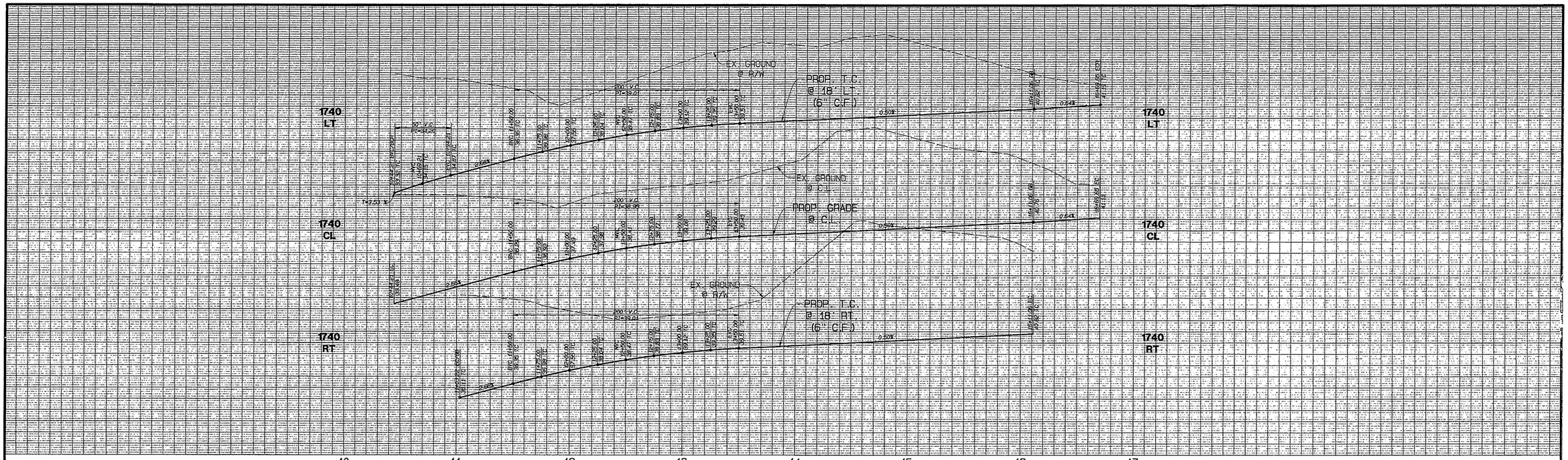
STREET IMPROVEMENT PLANS

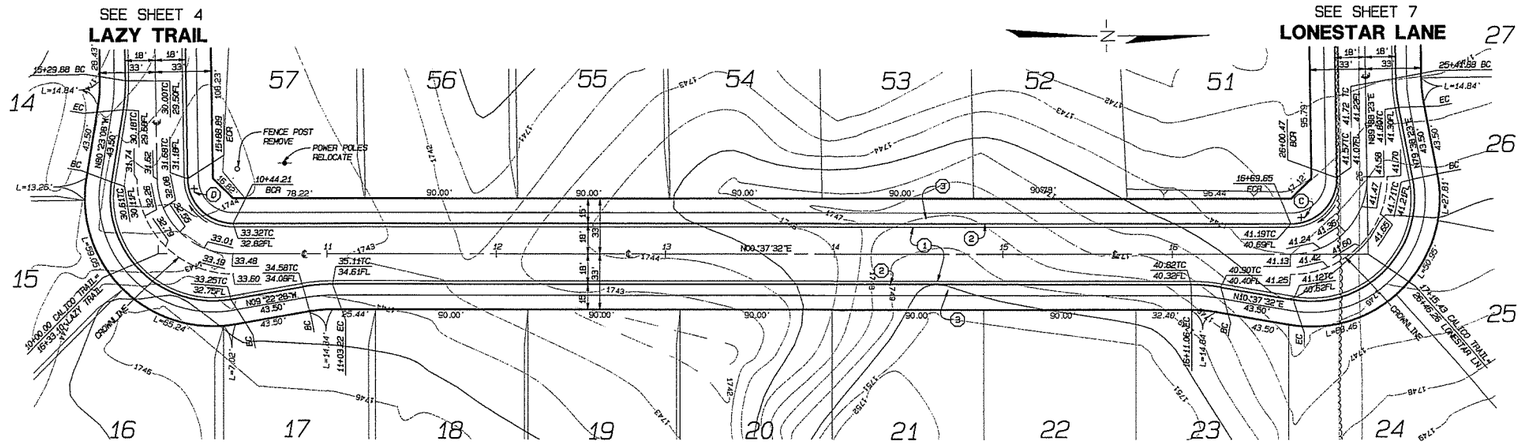
TRACT NO. 31361
SECTIONS & DETAILS

SCALE: AS SHOWN

ACCOUNT NO. 03-0340
DRAWING NUMBER
R-3777
SHEET 2 OF 11
PW03-0473

INDEXED 09/09/04 LH





CONSTRUCTION NOTES

1. CONSTRUCT 0.35' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R. 16.39 R= 40
2. CONSTRUCT TYPE 1 CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
5. CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304

⚠ CALICO TRAIL

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — HUA LIN McCAFFREY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY _____ DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	BY	DATE	APPR.
⚠1	ADD PAVEMENT SECTION	RJZ	10-7-05	

DESIGNED BY: MAW CHECKED BY: LM

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

	APPROVED BY	BY	DATE
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION			
STREET SERVICES			

APPROVED BY _____ CITY ENGINEER

DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361

CALICO TRAIL

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

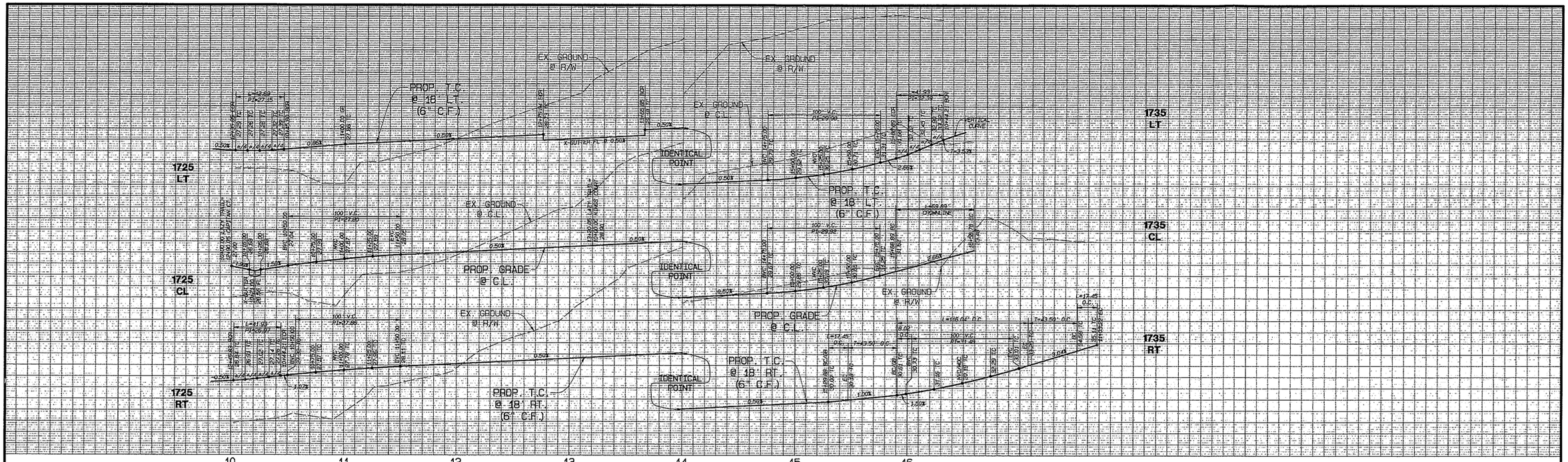
SHEET 3 OF 11

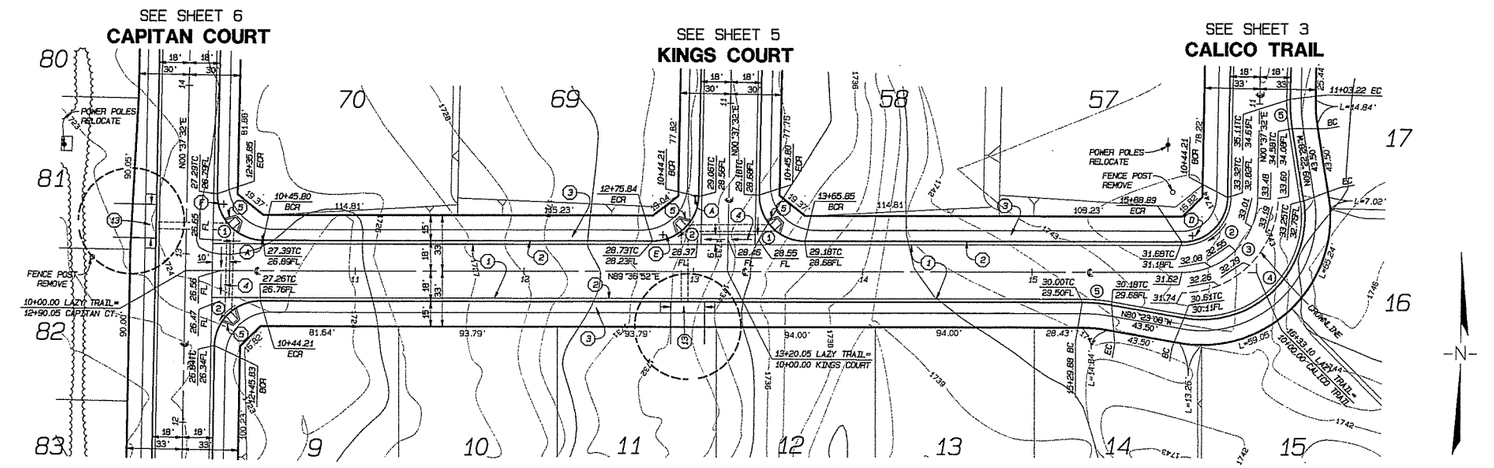
PW03-0473

FILE: G:\2003\03-0340\03030340.dgn PLOT DATE: 5/28/2004

PC - 440S - S

INDEXED 09/09/04 LH





CONSTRUCTION NOTES

1. CONSTRUCT 0.35' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R. 1653 R=40
2. CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
4. CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
5. CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304
13. CONSTRUCT WHEELCHAIR RAMP, TYPE VII, PER CITY OF RIVERSIDE STD. NO. 304

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	27.00'	42.69'	91°00'40"	27.48'
2	27.00'	41.93'	88°59'20"	26.53'
3	45.00'	69.89'	88°59'20"	44.21'
4	61.00'	116.04'	108°59'20"	86.50'
5	100.00'	17.45'	10°00'00"	8.75'

⚠ LAZY TRAIL

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

REGISTERED PROFESSIONAL ENGINEER — HUA LIN McCAFFREY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

APPROVED BY [signature] DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
⚠1	ADD PAVEMENT SECTION	RRZ	10-7-04

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA PUBLIC WORKS DEPARTMENT

	APPROVED BY	BY	DATE
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION			
STREET SERVICES			

APPROVED BY [signature] CITY ENGINEER

DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361

LAZY TRAIL

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

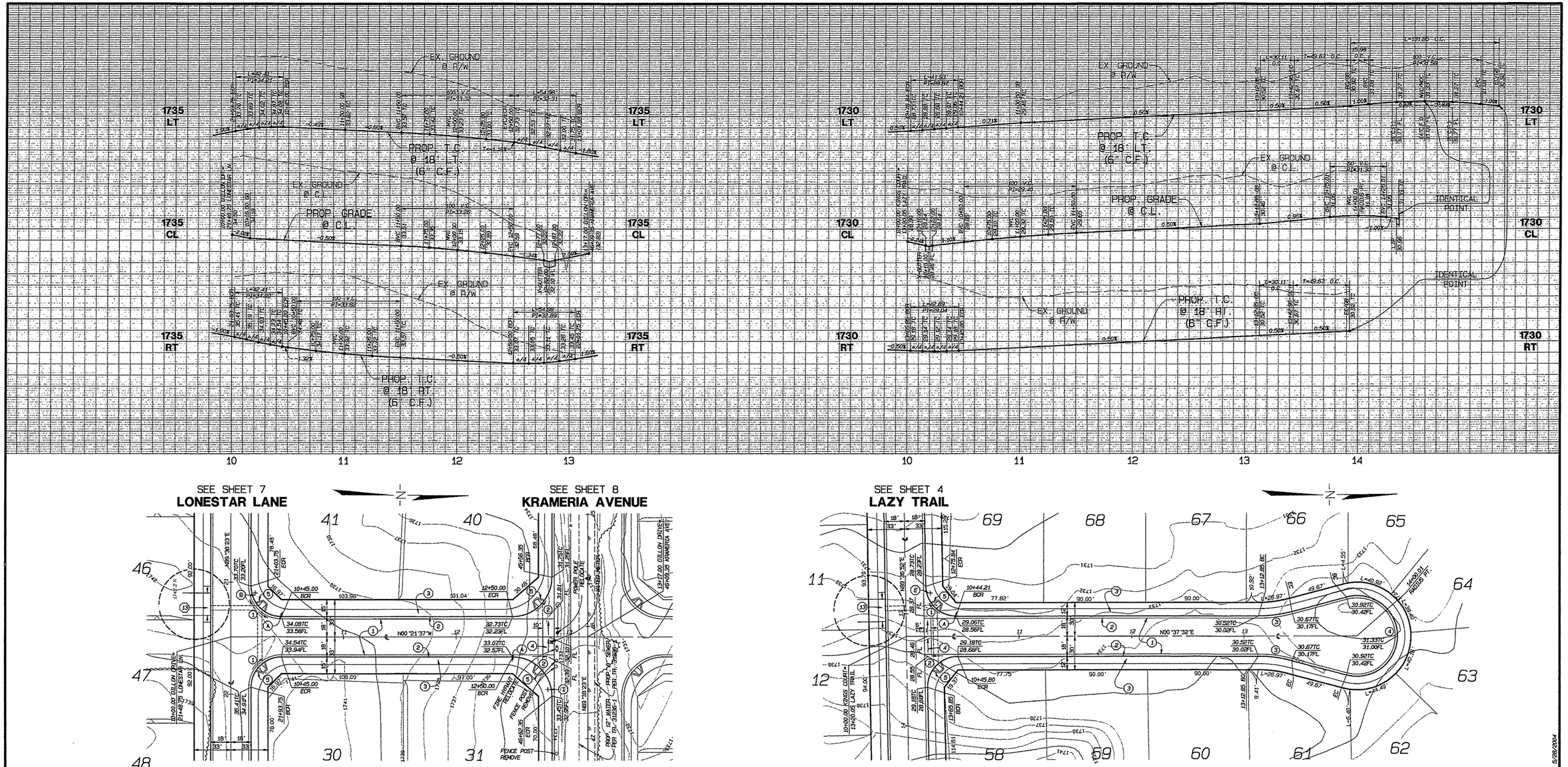
SHEET 4 OF 11

PW03-0473

FILE: G:\2003\03-0340\03340.prn PLOT DATE: 5/28/2004

PC - 4405 -5

INDEXED 09/09/04 HH



DILLON DRIVE

⚠ KINGS COURT

CONSTRUCTION NOTES

⚠ (1) CONSTRUCT 0.25 A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.P. 116 R= 40

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325

(4) CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304

(10) CONSTRUCT WHEELCHAIR RAMP, TYPE VII, PER CITY OF RIVERSIDE STD. NO. 304

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	27.00'	42.41'	90°00'00"	27.00'
2	35.00'	54.98'	90°00'00"	35.00'

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	27.00'	41.33'	88°59'20"	26.53'
2	27.00'	42.89'	91°00'40"	27.48'
3	115.00'	30.11'	15°00'00"	15.14'
4	35.00'	131.95'	210°00'00"	

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

REGISTERED PROFESSIONAL ENGINEER — ALAN LIN MCCAFFREY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED BY [signature] DATE 6-2-04
R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
⚠	ADD PAVEMENT SECTION	RJZ	10-17-05

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		

APPROVED BY [signature] CITY ENGINEER
DATE 8/25/04

STREET IMPROVEMENT PLANS
TRACT NO. 31361
DILLON DRIVE & KINGS COURT

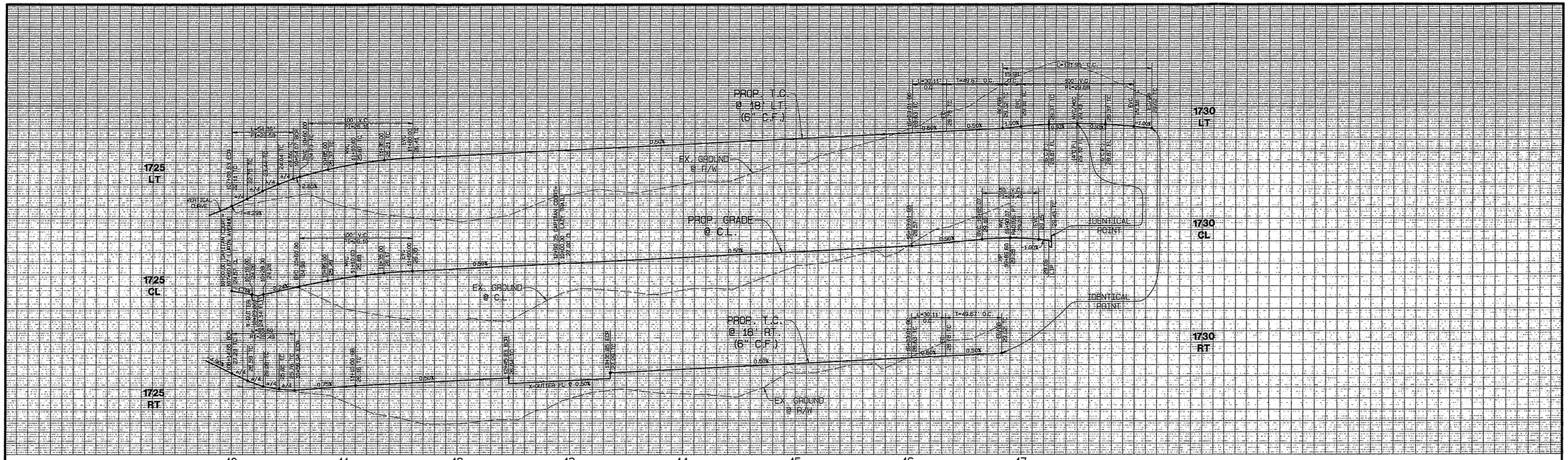
ACCOUNT NO. 03-0340
DRAWING NUMBER
R-3777
SHEET 5 OF 11

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'
PW03-0473

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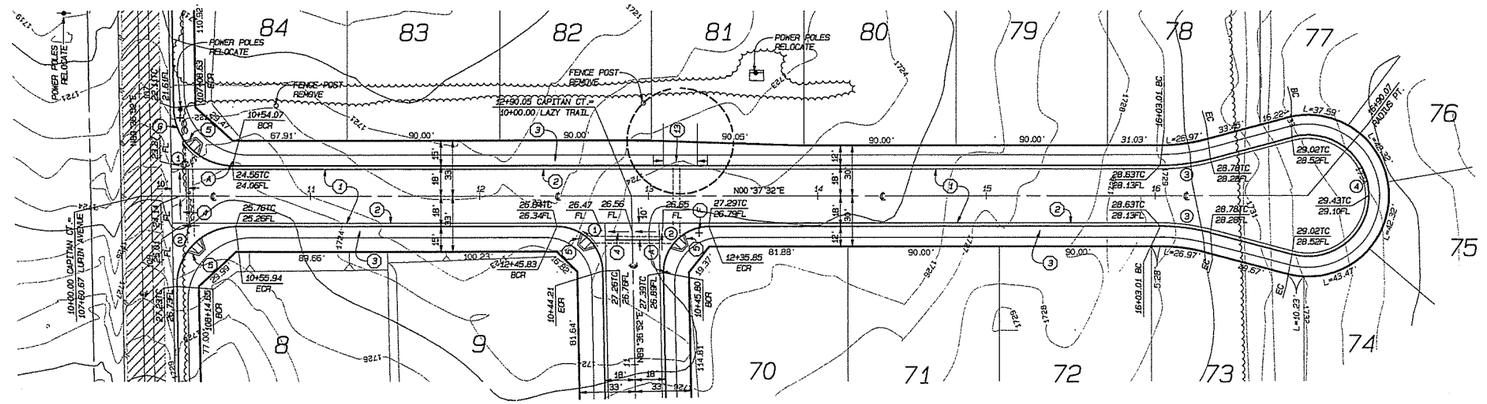
PC - 4405 - S

INDEXED 09/09/04 GH



SEE SHEET 7

LURIN AVENUE



SEE SHEET 4

⚠ CAPITAN COURT

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	35.00'	54.36'	88°59'20"	34.39'
2	35.00'	55.60'	91°00'40"	35.62'
3	115.00'	30.11'	15°00'00"	15.14'
4	36.00'	131.95'	210°00'00"	

CONSTRUCTION NOTES

⚠ (1) CONSTRUCT 0.25' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.R. 1a,5a R=40

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"). PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK. PER CITY OF RIVERSIDE STD. NO. 325

(4) CONSTRUCT CROSS GUTTER. PER CITY OF RIVERSIDE STD. NO. 220

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1. PER CITY OF RIVERSIDE STD. NO. 304

(10) CONSTRUCT WHEELCHAIR RAMP, TYPE VII. PER CITY OF RIVERSIDE STD. NO. 304

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — MARTIN MCCRAY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY _____ DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	BY	APPR.	DATE
⚠	ADD PAVEMENT SECTION	RFZ		10-17-06

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

	BY	DATE
APPROVED BY		
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		

APPROVED BY _____ CITY ENGINEER DATE 3/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361

CAPITAN COURT

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

SHEET 6 OF 11

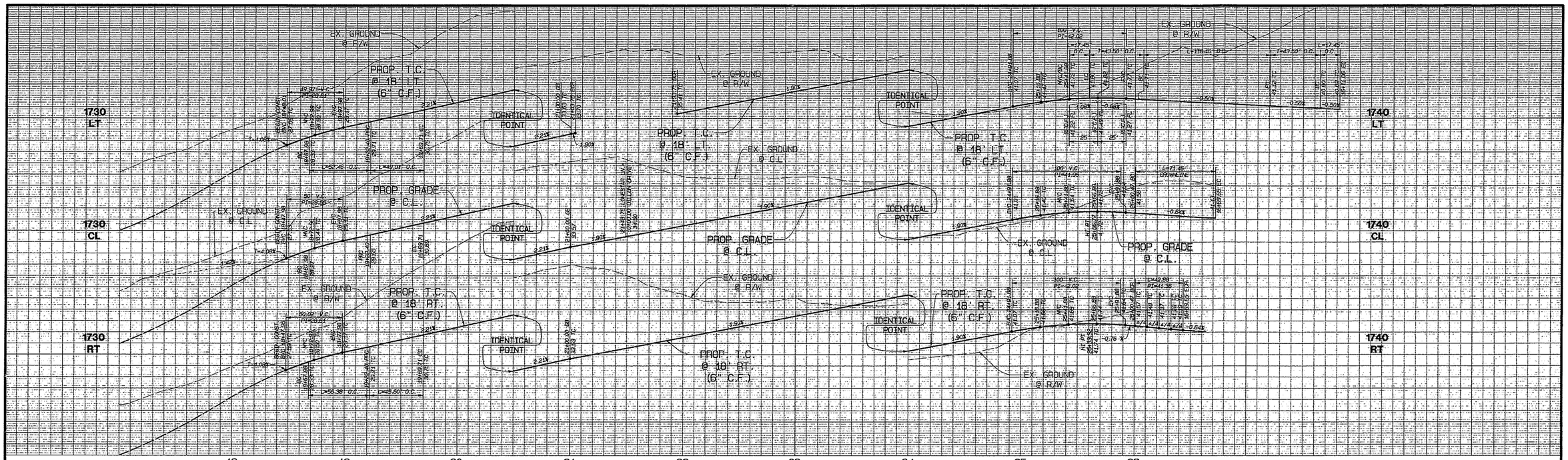
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

PW03-0473

INDEXED 09/09/04 LH

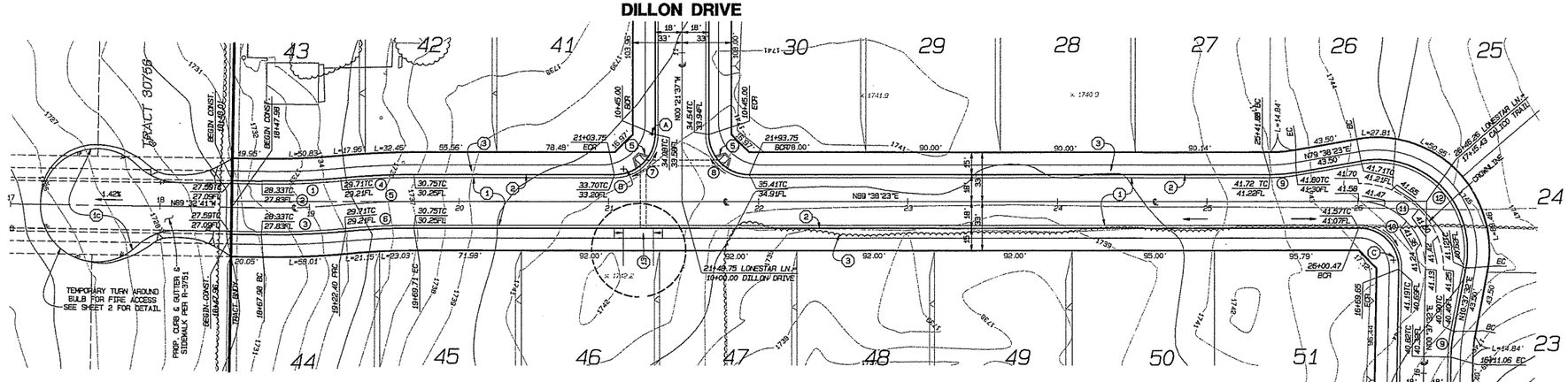
FILE: G:\2003\03-0340\03340.pro PLOT DATE: 5/26/2004

PC - 440 S



SEE SHEET 5

DILLON DRIVE



CONSTRUCTION NOTES

1. CONSTRUCT 0.25' A.C. PAVING OVER 0.56' CRUSHED AGGREGATE BASE PER S.R. 1995 R-40
1c. CONSTRUCT 0.25' A.C. OVER NATIVE
2. CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
5. CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304
19. CONSTRUCT WHEELCHAIR RAMP, TYPE VII, PER CITY OF RIVERSIDE STD. NO. 304

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	482.00'	52.46'	6°14'11"	26.26'
2	500.00'	54.42'	6°14'11"	27.24'
3	518.00'	56.38'	6°14'11"	28.22'
4	518.00'	49.01'	5°25'14"	24.52'
5	500.00'	47.30'	5°25'14"	23.67'
6	482.00'	45.60'	5°25'14"	22.82'
7	27.00'	42.41'	90°00'00"	27.00'
8	27.00'	42.41'	90°00'00"	27.00'
9	100.00'	17.45'	10°00'00"	8.75'
10	27.00'	42.89'	90°59'09"	27.47'
11	45.00'	71.46'	90°59'09"	45.78'
12	61.00'	118.16'	110°59'09"	88.73'

LONESTAR LANE

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — JOHN LIN MCCARTHY — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY [signature] DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE
1	ADD PAVEMENT SECTION	RLC	10-17-04

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

	APPROVED BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		

APPROVED BY [signature] CITY ENGINEER

DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361

LONESTAR LANE

STA. 18+47.98 TO STA. 26+46.26

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

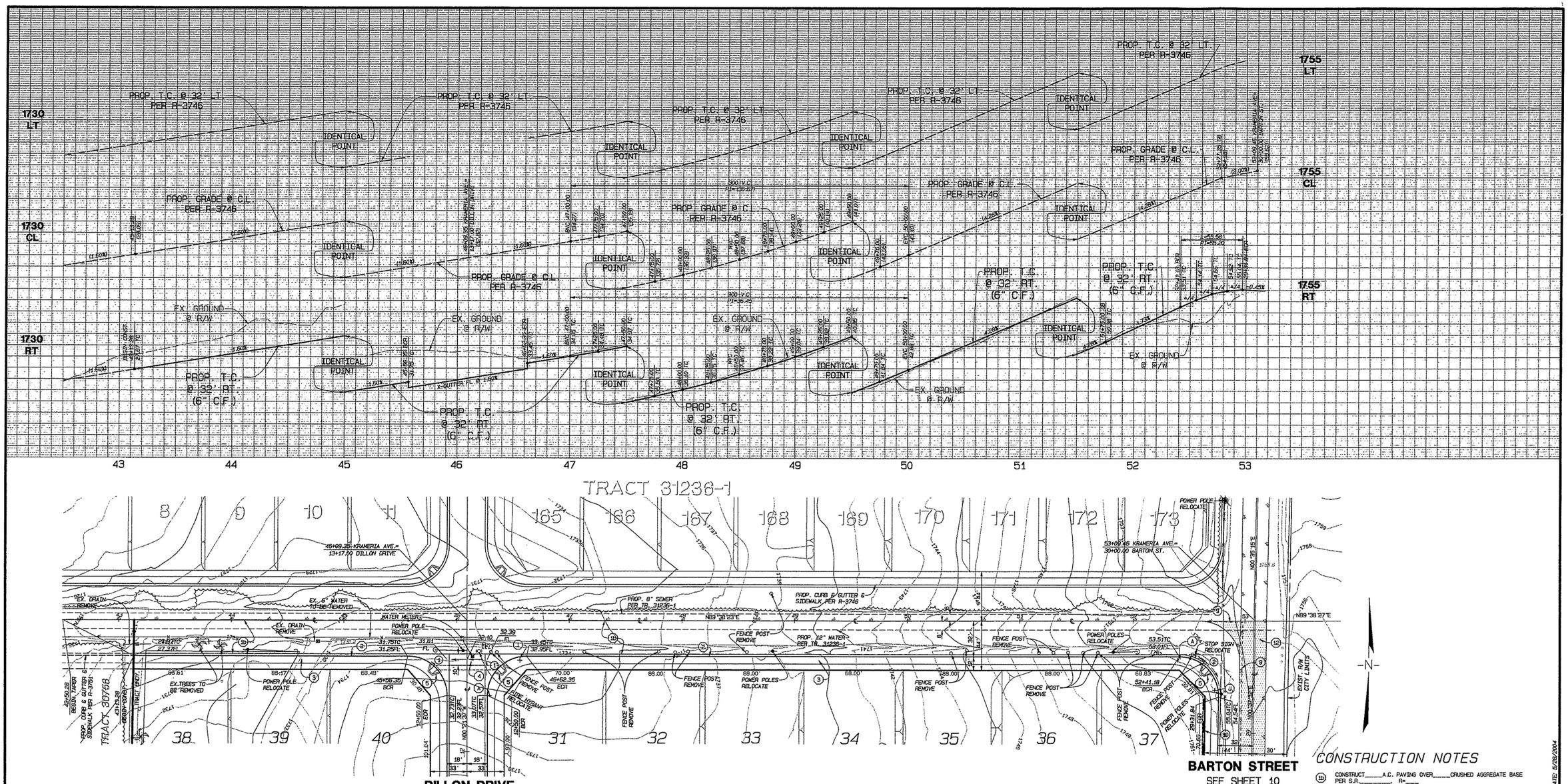
SHEET 7 OF 11

PW03-0473

FILE: G:\2003\03-0340\03340.dgn PLOT DATE: 5/28/2004

Pc - 4405-5

INDEXED 09/09/04 LH



CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	35.00'	54.98'	90°00'00"	35.00'
2	35.00'	55.58'	90°59'09"	35.51'

CONSTRUCTION NOTES

(1b) CONSTRUCT_____A.C. PAVING OVER_____CRUSHED AGGREGATE BASE PER S.R._____, R=____

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325

(4) CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304

(9) SAW CUT AND MATCH TO EXISTING PAVEMENT

(10) CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)

(12) A.C OVERLAY, VARIALBE THICKNESS (0.1' MIN.)

KRAMERIA AVENUE

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — LEE A. MARTIN — No. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS — CIVIL ENGINEERS — 3788 McCRAY ST. RIVERSIDE CA. 92506 (909) 686-1070

APPROVED BY [signature] DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA — PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		
PLANNING DEPT.		

APPROVED BY [signature] CITY ENGINEER DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361
KRAMERIA AVENUE
STA. 43+13.28 TO STA. 53+09.46

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340

DRAWING NUMBER **R-3777**

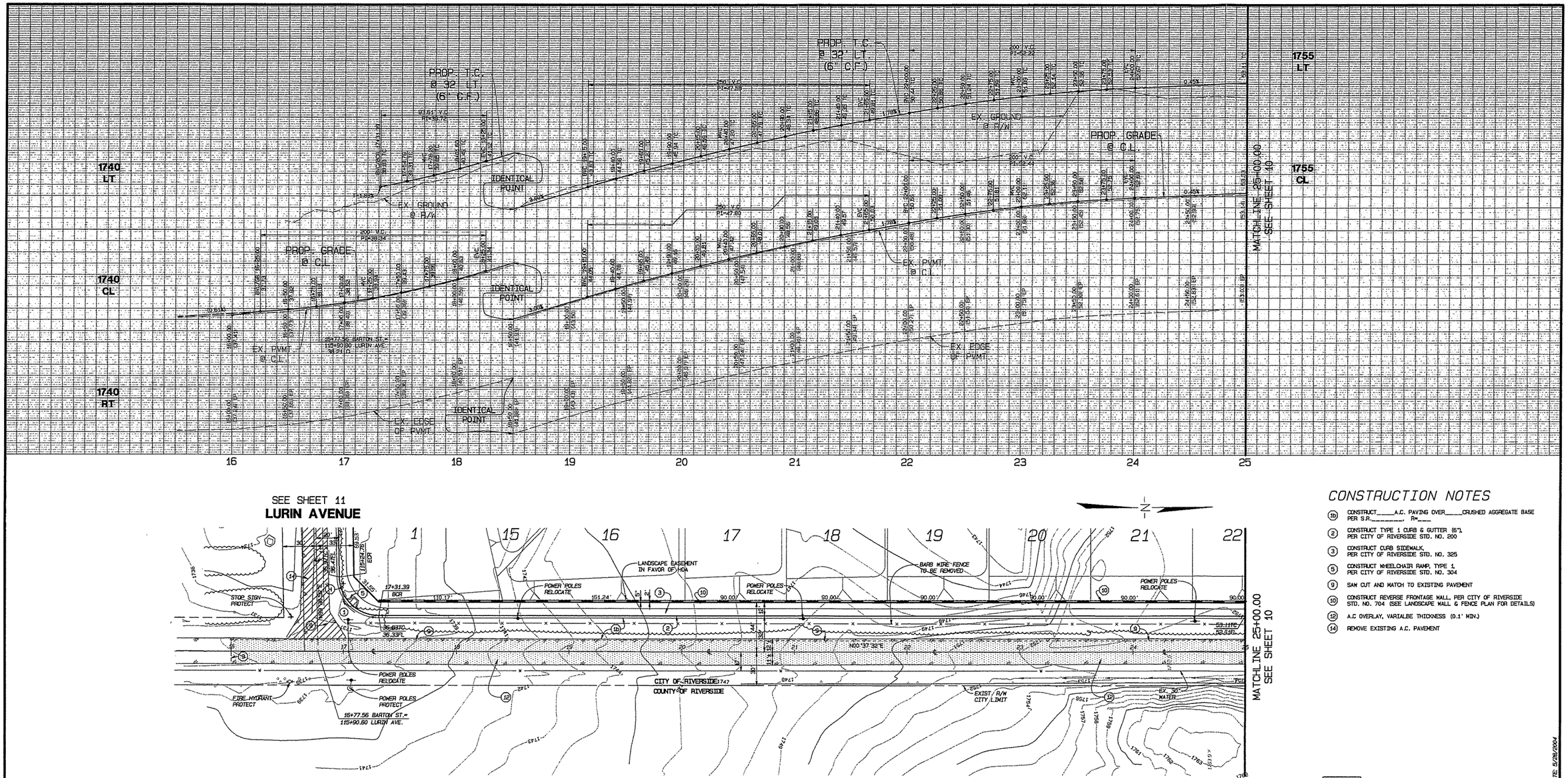
SHEET 8 OF 11

PW03-0473

FILE: G:\2003\03-0340\03340.prp PLOT DATE: 5/28/2004

PC - 440 S - S

INDEXED 09/09/04 LH



CONSTRUCTION NOTES

(19) CONSTRUCT_____A.C. PAVING OVER_____CRUSHED AGGREGATE BASE PER S.R._____, R=____

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304

(9) SAW CUT AND MATCH TO EXISTING PAVEMENT

(10) CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)

(12) A.C OVERLAY, VARIALBE THICKNESS (0.1' MIN.)

(14) REMOVE EXISTING A.C. PAVEMENT

— A.C. PAVEMENT OVERLAY

— EXISTING A.C. PAVEMENT REMOVAL

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	35.00'	54.36'	88°59'20"	34.39'

DIGALERT

DIAL BEFORE YOU DIG — TOLL FREE — TWO WORKING DAYS BEFORE YOU DIG

A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT 1-800-227-2600

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER — NO. C49405 EXP. 9-30-04 — CIVIL — STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS

CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED BY _____ DATE 6-2-04

R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	BY	DATE
APPROVED BY		
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		
PLANNING DEPT.		

APPROVED BY _____ CITY ENGINEER

DATE 8/25/04

STREET IMPROVEMENT PLANS

TRACT NO. 31361
BARTON STREET
STA. 16+00.00 TO STA. 25+00.00

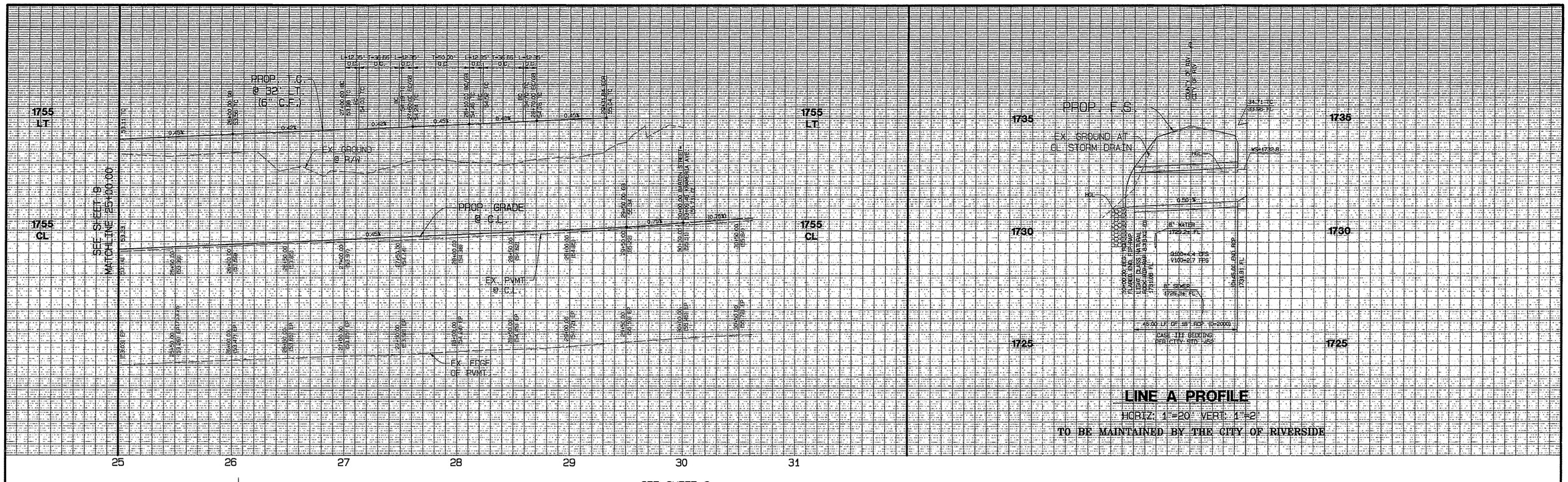
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ACCOUNT NO. 03-0340
DRAWING NUMBER
R-3777
SHEET 9 OF 11
PW03-0473

FILE: G:\2003\03-0340\03034Opro PLOT DATE: 5/28/2004

Pc - 446 - S

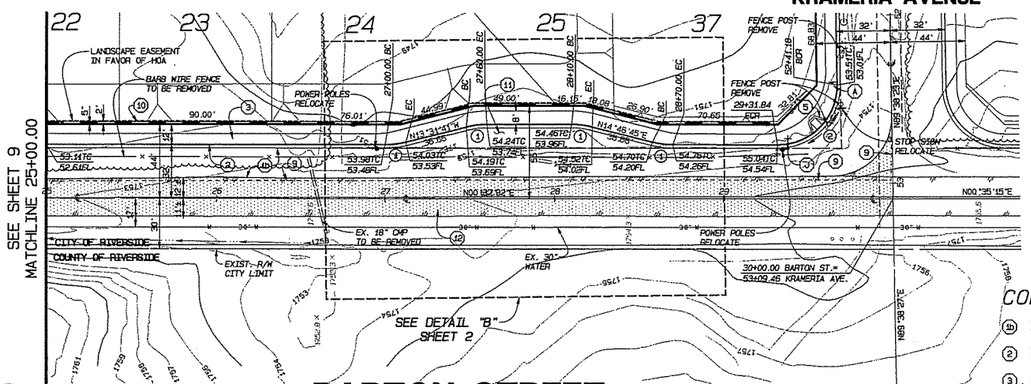
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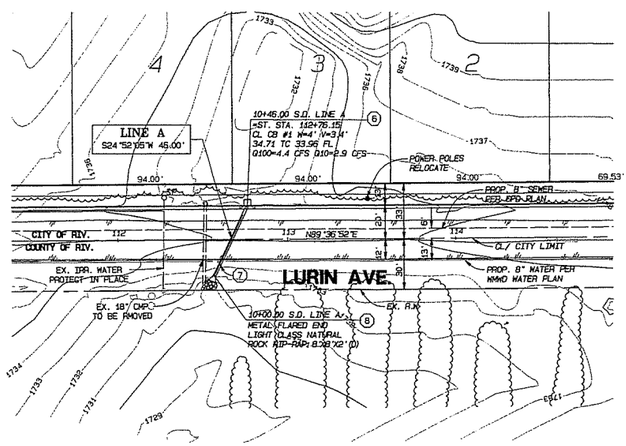
LINE A PROFILE

HORIZ. 1"=20' VERT. 1"=2'

TO BE MAINTAINED BY THE CITY OF RIVERSIDE



BARTON STREET



STORM DRAIN LINE A

CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	50.00'	12.36'	14°09'13"	6.21'
2	35.00'	55.56'	90°59'09"	35.61'

CONSTRUCTION NOTES

(10) CONSTRUCT_____A.C. PAVING OVER_____CRUSHED AGGREGATE BASE PER S.R._____, R#_____

(2) CONSTRUCT TYPE 1 CURB & GUTTER (6"), PER CITY OF RIVERSIDE STD. NO. 200

(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325

(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1, PER CITY OF RIVERSIDE STD. NO. 304

(6) CONSTRUCT CATCH BASIN PER CITY OF RIVERSIDE STD. NO. 405

(7) CONSTRUCT 18" RCP (D-2000)

(8) CONSTRUCT METAL FLARED END SECTION PER DETAIL ON SHEET 2

(9) SAW CUT AND MATCH TO EXISTING PAVEMENT

(10) CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)

(11) CONSTRUCT BUS STOP TURNOUT 8" CONCRETE WITH REINFORCEMENT (WITH #3 BARS @ 18" O.C.), SEE DETAIL ON SHEET 2

(12) A.C OVERLAY, VARIALBE THICKNESS (0.1' MIN.)

— A.C. PAVEMENT OVERLAY

— EXISTING A.C. PAVEMENT REMOVAL

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE

MS 3936, I.P. 040011

SEAL–COUNTY

REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN NO. 33950 EXP. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:

KHALED A. OTHMAN, P.E. — DATE 7/19/04

RECOMMENDED: WILLDAN — DATE 7/15/04

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

BENCH MARK: SEAL–COUNTY

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

SEAL–ENGINEER

REGISTERED PROFESSIONAL ENGINEER MARK A. WEDDINGTON NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED BY _____ DATE 6-2-04
R.C.E. NO. C49405 EXP. DATE 9-30-04

MARK | REVISIONS | APPR. | DATE

DESIGNED BY: MAW CHECKED BY: L.M.

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	APPROVED BY	BY	DATE
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION			
STREET SERVICES			
PLANNING DEPT.			

APPROVED BY _____ CITY ENGINEER DATE 8/25/04

STREET IMPROVEMENT PLANS

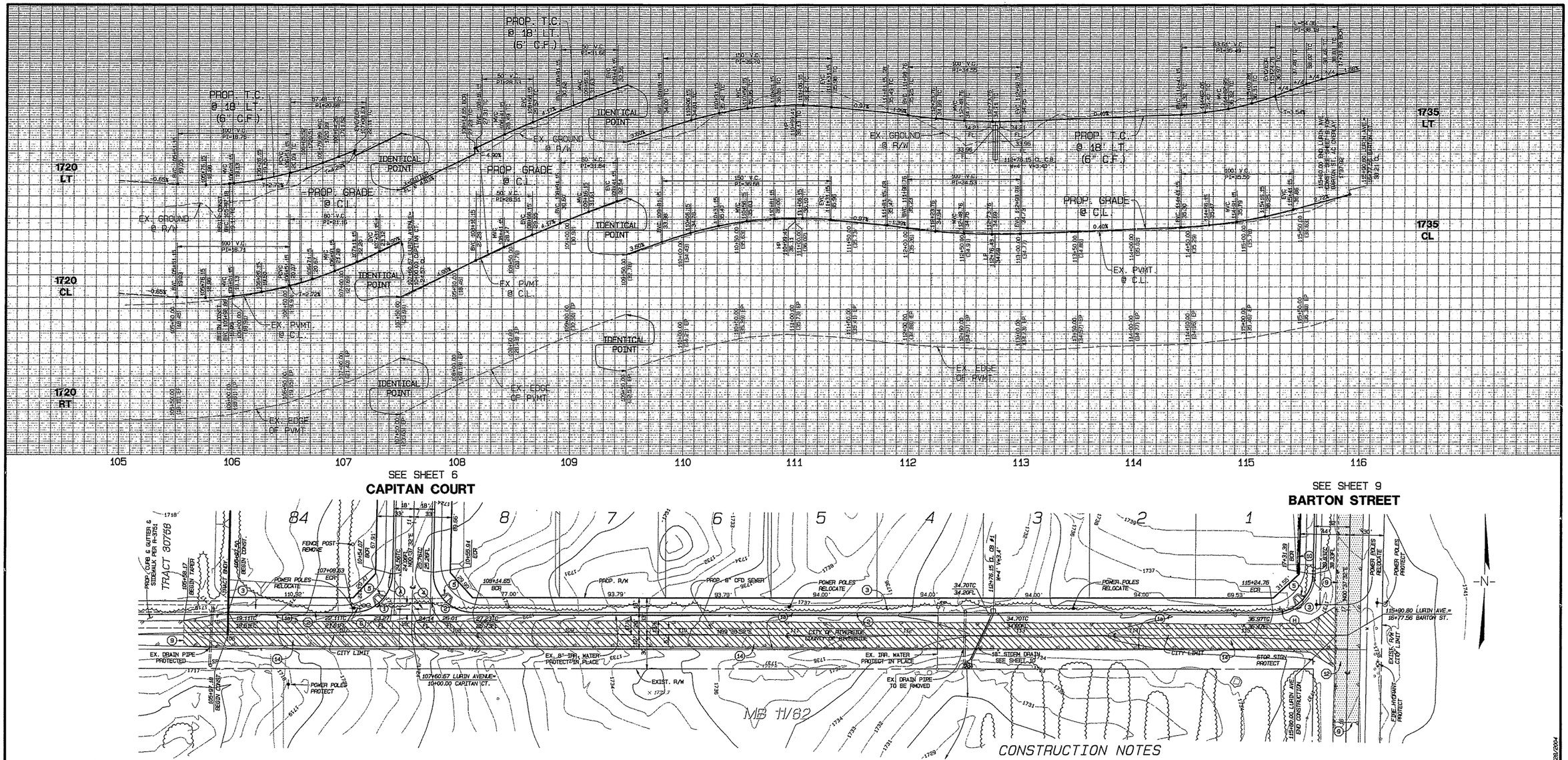
TRACT NO. 31361
BARTON STREET
STA. 25+00.00 TO STA. 30+00.00

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0340
DRAWING NUMBER
R-3777
SHEET 10 OF 11
PW03-0473

FILE: G:\2003\03-0340\02PAD\Pc - 4405 - S PLOT DATE: 8/26/2004

INDEXED 09/09/04 GH



CURVE DATA

	RADIUS	LENGTH	DELTA	TANGENT
1	35.00'	54.36'	88°59'20"	34.39'
2	35.00'	55.50'	91°00'40"	35.62'
3	35.00'	54.36'	88°59'20"	34.39'

CONSTRUCTION NOTES

(1a) CONSTRUCT 0.33' A.C. PAVING OVER 0.50' CRUSHED AGGREGATE BASE PER S.P.700013, R=30, ALSO SEE COUNTY GENERAL NOTES 4
(2) CONSTRUCT TYPE 1 CURB & GUTTER (6") PER CITY OF RIV. STD. NO. 200
(3) CONSTRUCT CURB SIDEWALK PER CITY OF RIV. STD. NO. 325
(4) CONSTRUCT CROSS GUTTER PER CITY OF RIVERSIDE STD. NO. 220
(5) CONSTRUCT WHEELCHAIR RAMP, TYPE 1 PER CITY OF RIV. STD. NO. 304
(9) SAW CUT AND MATCH TO EXISTING PAVEMENT PER JOIN DETAIL ON SHEET 2
(10) CONSTRUCT REVERSE FRONTAGE WALL, PER CITY OF RIVERSIDE STD. NO. 704 (SEE LANDSCAPE WALL & FENCE PLAN FOR DETAILS)
(12) A.C OVERLAY, VARIABLE THICKNESS (0.1' MIN.)
(14) REMOVE EXISTING A.C. PAVEMENT

A.C. PAVEMENT OVERLAY
EXISTING A.C. PAVEMENT REMOVAL

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE

LURIN AVENUE

MS 3936, I.P. 040011

SEAL—COUNTY

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:
KHALED A. OTHMAN, P.E. DATE 7/19/04
RECOMMENDED: WILLDAN DATE 7/15/04

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

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

SEAL—ENGINEER

ALBERT A. WEBB ASSOCIATES ENGINEERING CONSULTANTS
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(909) 686-1070

APPROVED BY [signature] DATE 6-2-04
R.C.E. NO. 49405 EXP. DATE 9-30-04

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: MAW CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE	APPROVED BY
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION			CITY ENGINEER
STREET SERVICES			
PLANNING DEPT.			DATE

STREET IMPROVEMENT PLANS
TRACT NO. 31361
LURIN AVENUE

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

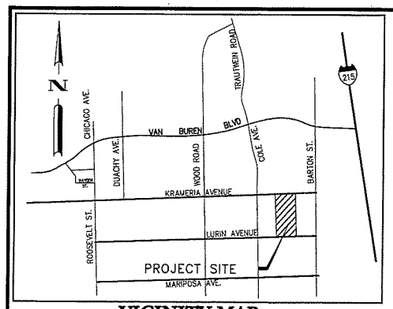
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DRAWING NUMBER R-3777
SHEET 11 OF 11
PW03-0473

FILE: G:\2003\03-0340\03340.dgn PLOT DATE: 5/28/2004

PC - 440 S - S

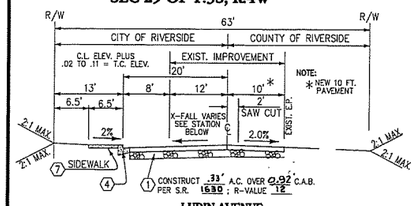
INDEXED 09/09/04 GH

STREET IMPROVEMENT PLANS
TRACT NO. 30756
CITY OF RIVERSIDE, CALIFORNIA



VICINITY MAP

SEC 29 OF T.3S, R.4W

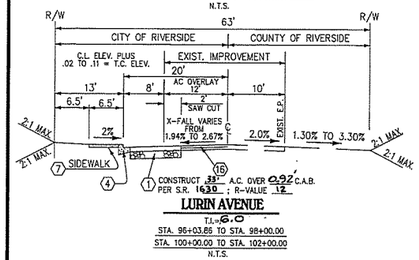


LURIN AVENUE

T.I.=6.0

STA. 95+03.86 TO STA. 98+03.86 @ 2.0%
STA. 98+00.00 TO STA. 100+00.00 @ 1.97 TO 2.69%
STA. 102+00.00 TO STA. 107+00.00 @ 1.97% *

N.T.S.

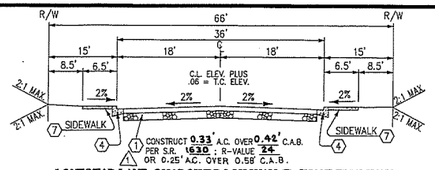


LURIN AVENUE

T.I.=6.0

STA. 95+03.86 TO STA. 98+00.00
STA. 100+00.00 TO STA. 102+00.00

N.T.S.

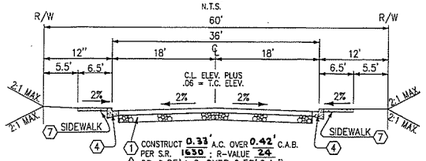


LONESTAR LANE, SHADOWBROOK WAY & CHANDELLE WAY
ESTRELLA HILLS ST. & COUNTRY ROSE DRIVE

COUNTRY ROSE DRIVE= STA. 8+53.00 TO 10+00.00

T.I.=5.0

N.T.S.

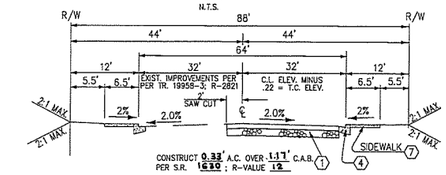


COUNTRY ROSE DRIVE
MERIDIANA COURT

COUNTRY ROSE DR. STA. 10+00.00 TO STA.15+89.63

T.I.=5.0

N.T.S.

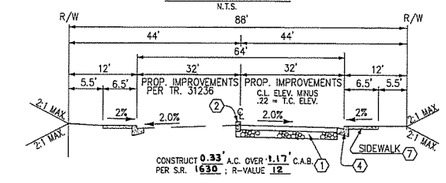


KRAMERIA AVENUE

T.I.=7.0

STA. 33+18.53 TO STA. 38+29.65

N.T.S.



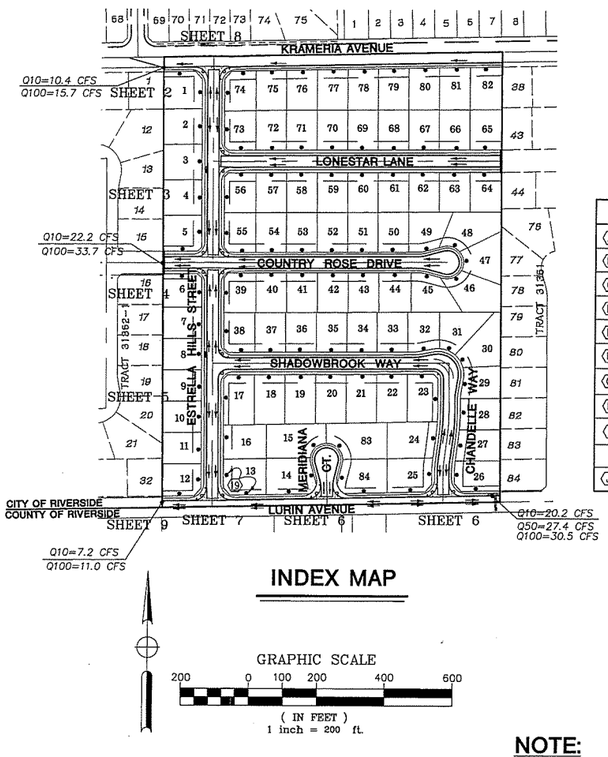
KRAMERIA AVENUE

T.I.=7.0

STA. 38+29.65 TO STA. 43+14.29

N.T.S.

TYPICAL STREET SECTION



INDEX MAP

GRAPHIC SCALE

200 0 100 200 400 600

(IN FEET)
1 inch = 200 ft.

STREET SIGN SCHEDULE

(A)	KRAMERIA AVENUE ESTRELLA HILLS STREET	19600 9400
(B)	LONESTAR LANE ESTRELLA HILLS STREET	19600 9400
(C)	COUNTRY ROSE DRIVE ESTRELLA HILLS STREET	19600 9500
(D)	COUNTRY ROSE DRIVE ESTRELLA HILLS STREET	19600 9500
(E)	SHADOWBROOK WAY ESTRELLA HILLS STREET	19600 9500
(F)	CHANDELLE WAY LURIN AVENUE	9500 19700
(G)	MERIDIANA COURT LURIN AVENUE	9500 19600
(H)	SHADOWBROOK WAY CHANDELLE WAY	19600 9500
(I)	LURIN AVENUE ESTRELLA HILLS STREET	19600 9500
(J)	R-1 (STOP SIGN – 30")	8

INSTALL SIGNS PER CITY OF RIVERSIDE STANDARDS 662, 662A & 666

GENERAL NOTES

1. NO PERSON SHALL PERFORM ANY CONSTRUCTION ACTIVITY OR INSTALL ANY OBJECTS WITHIN THE PUBLIC RIGHT-OF-WAY OR EASEMENTS OF THE CITY OF RIVERSIDE WITHOUT A VALID CONSTRUCTION PERMIT OR A STREET OPENING PERMIT OR AN ENCROACHMENT PERMIT ISSUED BY THE CITY'S PUBLIC WORKS DEPARTMENT.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAR THE RIGHT-OF-WAY IN ACCORDANCE WITH THE PROVISIONS OF LAW AS IT AFFECTS EACH UTILITY INCLUDING IRRIGATION LINES AND APPURTENANCES AND AT NO COST TO THE CITY.
3. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF RIVERSIDE DEPARTMENT OF PUBLIC WORKS, STANDARD DRAWINGS, ITS SUPPLEMENTAL NOTES AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION.
4. THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.
5. THE DEVELOPER SHALL BE RESPONSIBLE FOR PRESERVING OR REESTABLISHING AND REFERENCING SURVEY MONUMENT DESTROYED, DISTURBED OR BURIED AS A RESULT OF CONSTRUCTION SHOWN HEREON.
6. ALL FLAGGED ELEVATIONS SHALL BE STAKED IN THE FIELD BY THE PRIVATE ENGINEER.
7. WHERE NEW PAVEMENT IS TO JOIN THE EXISTING PAVEMENT, THE EDGE OF THE EXISTING PAVEMENT SHALL BE TRIMMED IN A SMOOTH AND STRAIGHT LINE. CONSTRUCT MATCH-UP PAVING AS SHOWN ON THE PLANS AND OVERLAY PAVING AS DIRECTED IN THE FIELD TO PRODUCE A SMOOTH SECTION.
8. THE SUBDIVIDER SHALL ARRANGE FOR A SOIL TEST TO BE MADE BY A SOILS ENGINEER AFTER THE STREET HAVE BEEN PREPARED TO ROUGH GRADE AND PRIOR TO CURB AND GUTTER CONSTRUCTION. DEPTH OF BASE MATERIAL AND A.C. PAVING SHALL BE DETERMINED BY THE CITY OF RIVERSIDE DESIGN STANDARDS AND TEST PROCEDURES.
9. ON ALL AREAS WITHIN PUBLIC RIGHT-OF-WAY WHERE THE FILL IS ONE (1) FOOT OR GREATER, A LETTER WILL BE REQUIRED FROM THE SOILS ENGINEER, CERTIFYING THE COMPACTION OF THE FILL BELOW SUBGRADE, PRIOR TO ISSUANCE OF THE CONSTRUCTION PERMIT/CUT SHEETS.
10. ALL TRAFFIC SIGNS SHALL BE INSTALLED PRIOR TO OPENING THE STREETS TO TRAFFIC.
11. ANY TRAFFIC CONTROL STRIPING OBLITERATED AND/OR BADLY WORN DURING CONSTRUCTION SHALL BE RESTORED BY THE CONTRACTOR WITHIN FIVE DAYS AFTER NOTIFICATION FROM THE CITY INSPECTORS.
12. FINAL STRIPING FOR TRAFFIC CONTROL AND/OR PAVEMENT MARKING TO BE THE RESPONSIBILITY OF THE CONTRACTOR.
13. THE CONTRACTOR SHALL CALL IN A LOCATION REQUEST TO UNDERGROUND SERVICE ALERT (USA), PHONE # 1-800-227-2600, TWO WORKING DAYS BEFORE DIGGING. NO CONSTRUCTION PERMIT WILL BE ISSUED BY THE PUBLIC WORKS DEPARTMENT INVOLVING EXCAVATION FOR UNDERGROUND FACILITIES UNLESS THE APPLICANT HAS BEEN PROVIDED AN INQUIRY IDENTIFICATION NUMBER BY U.S.A.
14. THE CONTRACTOR SHALL COORDINATE TRENCHING FOR CABLE TELEVISION WITH OTHER TRENCHING WITHIN THE SUBDIVISION.
15. CONSTRUCT DRIVEWAY APPROACHES PER STANDARD DWG. 302. EXACT SIZE AND LOCATION TO BE STAKED BY THE PRIVATE ENGINEER PRIOR TO CONSTRUCTION OF THE CURB AND GUTTER.
16. BEFORE THE RIPRAP AT THE OUTLET OF ANY DRAINAGE STRUCTURE IS ACCEPTED BY THE CITY, IT SHALL BE UNDER FLOWS AS CLOSE AS POSSIBLE TO DESIGN CONDITIONS WITH WATER OBTAINED FROM THE FIRE HYDRANTS IN THE IMMEDIATE AREA.

COUNTY GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER OR CONTRACTOR TO APPLY TO THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT, PERMIT SECTION, FOR AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE; AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT. ADDITIONAL STUDIES AND/OR PERMITS MAY BE REQUIRED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITEE MUST INFORM COUNTY OF CONSTRUCTION AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.
   PHONE: (909) 955-6885
3. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE RIVERSIDE COUNTY TRANSPORTATION DEPT. IMPROVEMENT STANDARDS AND SPECIFICATIONS, LATEST EDITION, COUNTY ORDINANCE NO. 461 AND SUBSEQUENT AMENDMENTS.
4. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO NOTIFY THE ENGINEER TO INSTALL STREET CENTERLINE MONUMENTS AS REQUIRED BY RIVERSIDE COUNTY ORDINANCE NO. 461.
5. ALL UNDERGROUND FACILITIES, WITH LATERALS, SHALL BE IN PLACE PRIOR TO PAVING THE STREET INCLUDING, BUT NOT LIMITED TO THE FOLLOWING: SEWER, WATER, ELECTRIC, GAS STORM DRAINS.
6. ASPHALTIC EMULSION (FOG SEAL) SHALL BE APPLIED NOT LESS THAN FOURTEEN DAYS FOLLOWING PLACEMENT OF THE ASPHALT SURFACING. FOG SEAL AND PAINT BINDER SHALL BE APPLIED AT A RATE OF 0.05 & 0.03 GALLON PER SQUARE YARD RESPECTIVELY. ASPHALTIC EMULSION SHALL CONFORM TO SECTION 37, 39 AND 94 OF THE STATE STANDARD SPECIFICATIONS.
7. AS DETERMINED BY THE TRANSPORTATION DIRECTOR, THE DEVELOPER IS RESPONSIBLE AS A MINIMUM FOR ROAD IMPROVEMENTS TO CENTERLINE, AND MAY BE REQUIRED TO RECONSTRUCT EXISTING PAVEMENT, INCLUDING BASE, AND MATCHING OVERLAY REQUIRED TO MEET THE STRUCTURAL STANDARDS FOR THE CURRENT ASSIGNED TRAFFIC INDEX."
8. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR DEVELOPER TO INSTALL AND MAINTAIN ALL CONSTRUCTION, REGULATORY, GUIDE AND WARNINGS SIGNS WITHIN THE PROJECT LIMITS AND ITS SURROUNDINGS TO PROVIDE SAFE PASSAGE FOR THE TRAVELING PUBLIC AND WORKERS UNTIL THE FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT BY THE COUNTY.
   A TRAFFIC CONTROL PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO OBTAINING AN ENCROACHMENT PERMIT.
9. ALL STREET SECTIONS ARE TENTATIVE. ADDITIONAL SOIL TESTS SHALL BE TAKEN BY THE COUNTY AFTER ROUGH GRADING TO DETERMINE THE EXACT STREET SECTION REQUIREMENTS. USE STANDARD NO. 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
10. STREET LIGHTS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED STREET LIGHTING PLAN PER CITY OF RIVERSIDE APPROVED STREET LIGHTING PLAN.

CONSTRUCTION NOTES & QUANTITY ESTIMATE

NO.	ITEMS	QUANTITY	UNIT
(1)	CONSTRUCT PAVING SECTION PER TYPICAL SECTION	98,204	SF
(2)	INSTALL REDWOOD HEADER	485	LF
(3)	CONSTRUCT 2' WIDE, 20' LONG @ 2 1/2" THICK AC DRAINAGE APRON	8.4	SF
(4)	CONSTRUCT TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DWG. NO 200	9,302	LF
(5)	CONSTRUCT CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=PER PLAN)	6,721	SF
(6)	CONSTRUCT ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304,TYPE PER PLAN	19	EA
(7)	CONSTRUCT SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325	48,672	SF
(8)	INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662A/662 AS APPLIES	9	EA
(9)	CONSTRUCT A.C. BERM, TYPE I, PER CITY OF RIVERSIDE STD. NO. 250	110	LF
(10)	INSTALL STOP SIGN (R-1)	8	EA
(11)	CONSTRUCT BARRICADE PER CITY OF RIVERSIDE STD. NO. 180	132	LF
(12)	CONSTRUCT TYPE II CURB & GUTTER (8") PER CITY OF RIVERSIDE STD. DWG. NO 200	68	LF
(13)	INSTALL RIP-RAP (SIZES AS PER PLAN)	27	TON
(14)	CONSTRUCT CATCH BASIN PER CITY OF RIVERSIDE STD. DWG. NO.405	1	EA
(15)	CONSTRUCT REINFORCED CONCRETE BOX CULVERT NO.1 PER DETAIL ON SHEET 8	46	LF
(16)	CONSTRUCT A.C. OVERLAY	4,841	SF
(18)	CONSTRUCT DRIVEWAY APPROACH PER CITY OF RIVERSIDE STD. DWG. NO. 302	84	EA
(19)	PLANT TREES PER CITY OF RIVERSIDE PARK & RECREATION DEPT. STD.	101	EA
	INSTALL RESIDENTIAL LIGHTING (SEE STREET LIGHT PLAN)		

CONSTRUCTION NOTES & QUANTITY ESTIMATE (COUNTY)

NO.	ITEMS	QUANTITY	UNIT
(1)	CONSTRUCT PAVING SECTION PER TYPICAL SECTION	4,560	SF
(13)	INSTALL RIP-RAP (SIZES AS PER PLAN)	1	CY
(14)	CONSTRUCT CATCH BASIN PER CITY OF RIVERSIDE STD. DWG. NO.405	1	EA
(15)	CONSTRUCT REINFORCED CONCRETE BOX CULVERT NO.1 PER DETAIL ON SHEET 8	20	LF
	EXCAVATE & FILL	25	CY
	IMPORT & FILL	5	CY
	SAWCUT	300	LF

NOTE:

1. APPROXIMATE TREE LOCATION. NO STREET TREES SHALL BE PLANTED WITHIN 10 FEET OF DRIVEWAYS OR CORNER CUTBACKS.
2. QUANTITIES SHOWN HEREON ARE FOR PERMIT AND / OR BONDING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING. CONTRACTOR SHALL DETERMINE HIS OWN QUANTITIES AND BID TO COMPLETE THE PROJECT.
3. SEE CITY OF RIVERSIDE UTILITY APPROVED DRAWING FOR QUANTITY AND LOCATIONS OF REQUIRED STREET LIGHTS.

LEGEND:

● --- STREET TREES

▨ --- OVERLAY

▭ --- NEW PAVEMENT

INDEX OF SHEETS:

SHEET NO(S).	DESCRIPTION
1	TITLE SHEET
2 TO 7	PLAN & PROFILE
8 TO 9	PLAN & PROFILE, DETAIL & STORM DRAIN

DATE PREPARED: DECEMBER 2003
RIV. CO. NUMBER MS3939, IP040014
CITY BUSINESS TAX CERTIFICATE NO. 113295 EXP.08-30-2004

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

REVIEWED BY: SHEETS 1-9
WESTERN MUNICIPAL WATER DISTRICT
FOR NON-INTERFERENCE COMPLIANCE
CIVIL ENGINEER RCE 46212
DATE: 6/21/04

SEAL: REGISTERED PROFESSIONAL ENGINEER — KHALED A. OTHMAN — No. 33950 — Exp. 6-30-05 — CIVIL — STATE OF CALIFORNIA

APPROVED FOR CONSTRUCTION WITHIN THE COUNTY OF RIVERSIDE ONLY
COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: DATE 7/19/04
KHALED A. OTHMAN R.C.E. 33950
RECOMMENDED: WILLDAN DATE 7/15/04

ENGINEERS NOTE:

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE NEGLIGENCE OF THE OWNER OR ENGINEER.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A DILIGENT SEARCH OF AVAILABLE RECORDS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT ALL THE UTILITIES SHOWN AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES.

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN & ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

DATE	BY	MARK	REVISIONS:	APPR	DATE
8/7/04	HJH/GH	1	STRUCTURAL SECTION (OPTION) PER S.R. 1630	RVZ	8-23-04
	ENGINEER			CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:
PRINCIPAL ENGINEER		8/19/04
PARK DEPARTMENT	—	—
TRAFFIC DIVISION		8/9/04
STREET SERVICES		8/24/04

APPROVED BY: CITY ENGINEER 8/6/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HJK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41749 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780

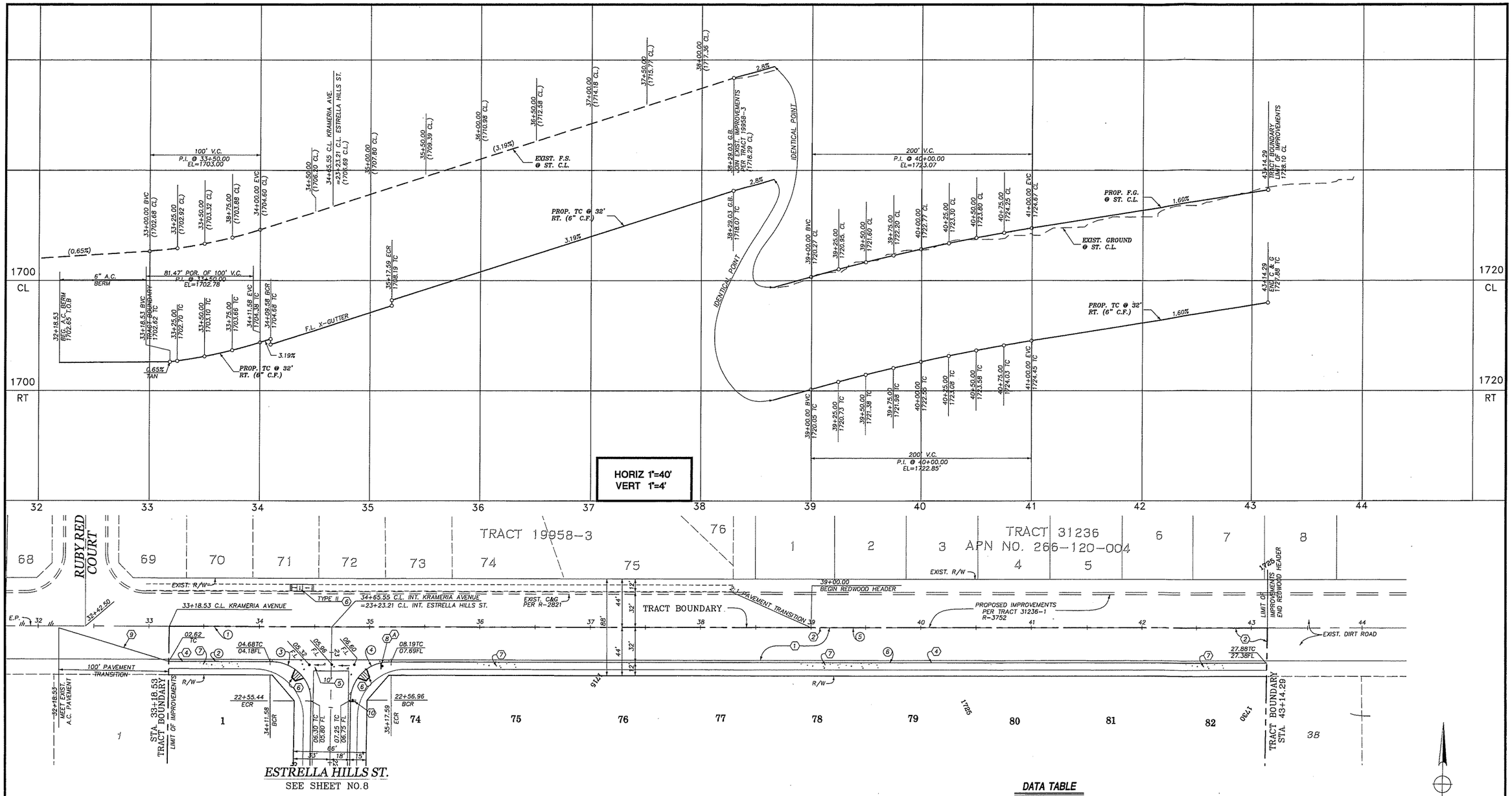
PREPARED BY: ROBERT T. FEDERIGHI R.C.E. NO. 30000 DATE 6/21/04

BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5' DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

STREET IMPROVEMENT PLANS
RIV. CO. MS3939, IP040014
TRACT NO. 30756
TITLE SHEET

ACCOUNT NO. ____
DRAWING NUMBER R- 3751
SHEET 1 OF 9
SCALE:
PW03-0357

As-Built-2/19/07 INDEXED 8-17-04 GH



CONSTRUCTION NOTES:

1. CONST. PAVING SECTION PER TYPICAL SECTION
2. INSTALL REDWOOD HEADER
4. CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
5. CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220
6. CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
7. CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
8. INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662A
9. CONSTRUCT A.C. BERM, TYPE I, PER CITY OF RIVERSIDE STD. NO. 250
10. INSTALL STOP SIGN (R-1)

DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
1	N88°54'01"E		147.02'	
2	N88°54'01"E		91.51'	
3	Δ=90°49'19"	35.00'	55.48'	35.51'
4	Δ=89°10'41"	35.00'	54.48'	34.50'
5	N88°54'01"E		995.76'	
6	N88°54'01"E		794.18'	

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN & ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

DATE	BY	MARK
ENGINEER		

REVISIONS:

APPR	DATE
CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:
PRINCIPAL ENGINEER	PH	8/9/04
PARK DEPARTMENT	—	—
TRAFFIC DIVISION	JE	8/9/04
STREET SERVICES	KEG	7/27/04

APPROVED BY:
CITY ENGINEER
8/9/04
DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY:
ROBERT T. FEDERIGHI
R.C.E. NO. 30000
DATE 6/21/04

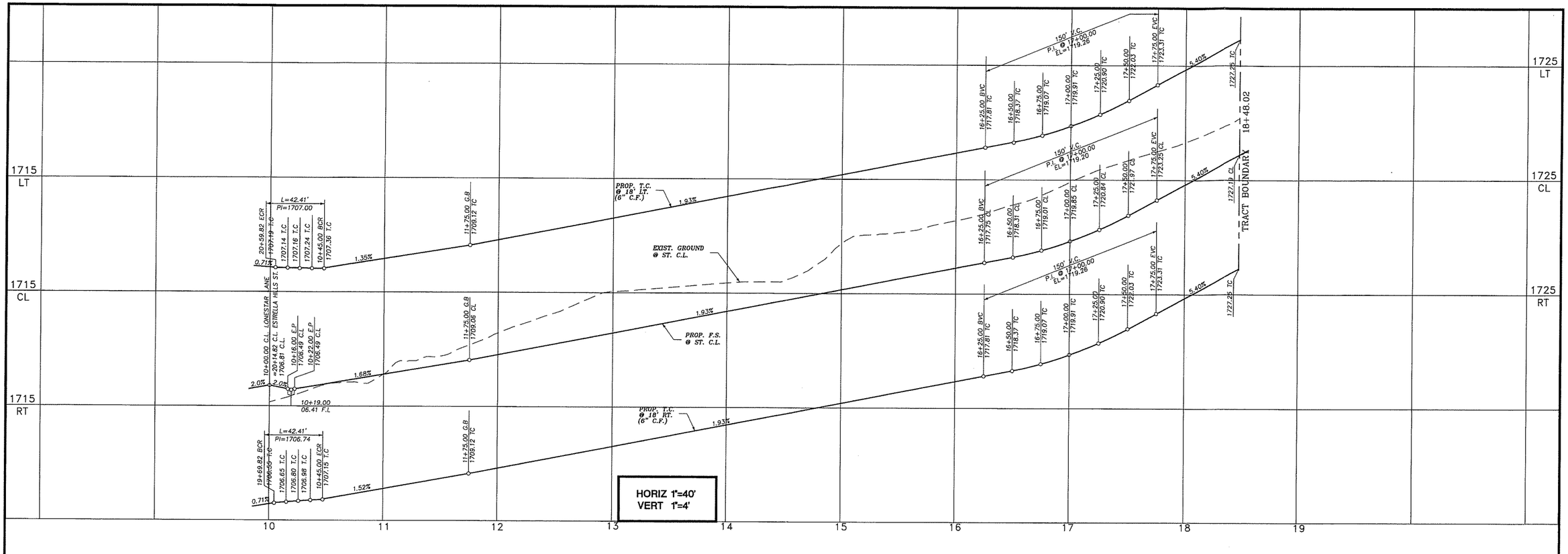
BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

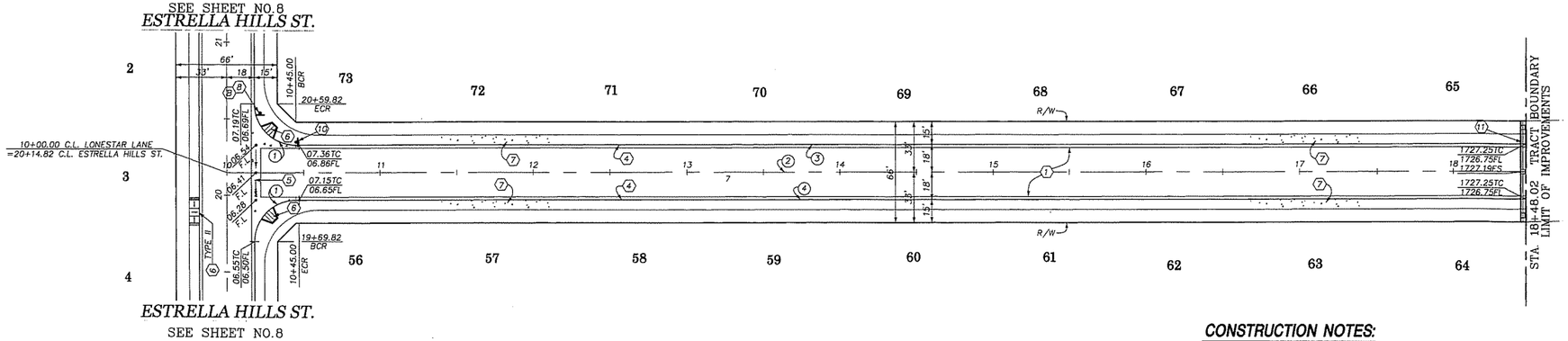
STREET IMPROVEMENT PLANS
TRACT NO. 30756
KRAMERIA AVENUE
STA. 33+18.53 TO STA. 43+14.29
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 2 OF 9
PW03-0357

SHT_2.dwg 6-19-04 1:41:45 pm EST

INDEXED 8-17-04 GH





DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	Δ=90°00'00"	27.00'	42.41'	27.00'
(2)	N89°43'20"E		848.02'	
(3)	N89°43'20"E		803.02'	
(4)	N89°43'20"E		803.02'	

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
(10) INSTALL STOP SIGN (R-1)
(11) CONSTRUCT BARRICADE PER CITY OF RIVERSIDE STD. NO. 180

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

LONESTAR LANE

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER		8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	CITY ENGINEER 8/9/04 DATE
STREET SERVICES		7/22/04	

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780

PREPARED BY: ROBERT T. FEDERIGHI — R.C.E. NO. 30000 — DATE 12/21/04

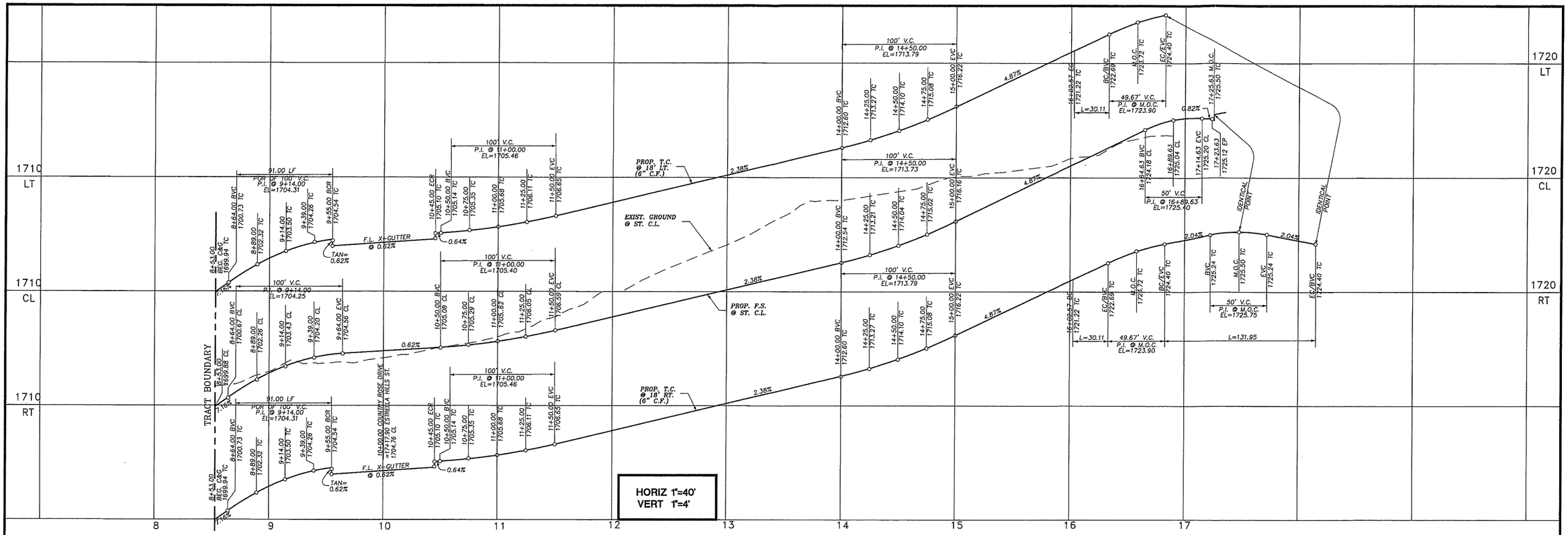
BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

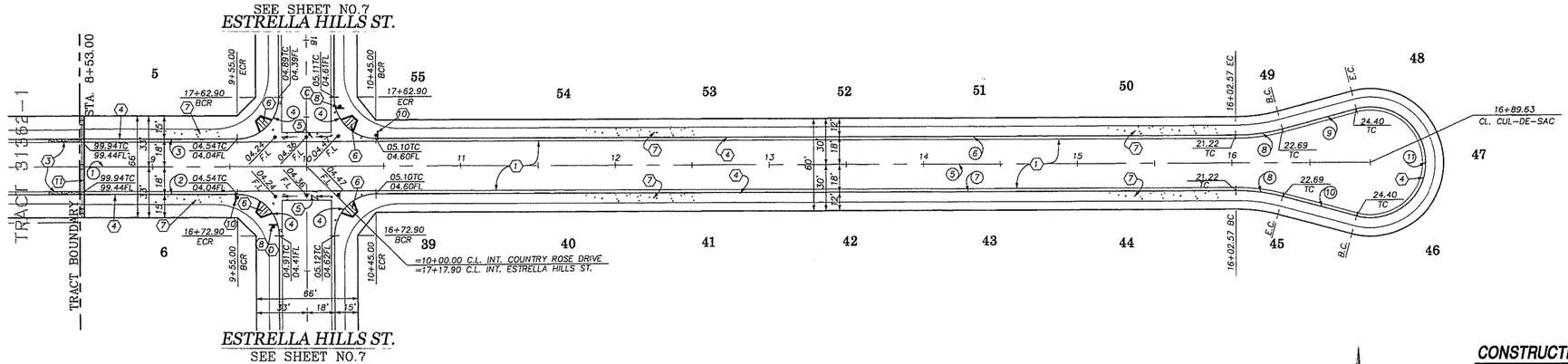
STREET IMPROVEMENT PLANS
TRACT NO. 30756
LONESTAR LANE
STA. 10+00.00 TO STA. 18+48.02
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 3 OF 9
PW03-0357

INDEXED 8-17-04 KH

SHT_3.dwg 6-19-04 1:52:20 pm EST





DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	N89°43'20"E		147.00'	
(2)	N89°43'20"E		102.00'	
(3)	N89°43'20"E		102.00'	
(4)	Δ=90°00'00"	27.00'	42.41'	27.00'
(5)	N18°43'20"E		689.63'	
(6)	N18°43'20"E		557.57'	
(7)	N18°43'20"E		557.57'	
(8)	Δ=15°00'00"	115.00'	30.11'	15.14'
(9)	N74°43'20"E		49.67'	
(10)	N75°16'40"W		49.67'	
(11)	Δ=210°00'00"	36.00'	131.95'	134.35

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(3) CONST. 2' WIDE, 20' LONG, 2-1/2" THICK AC DRAINAGE APRONS @ END OF C&G
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO. 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
(10) INSTALL STOP SIGN (R-1)
(11) CONST. BARRICADE PER CITY OF RIVERSIDE STD. DWG. NO. 180

COUNTRY ROSE DRIVE

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER	DA	8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	CITY ENGINEER
STREET SERVICES		7/21/04	8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HJ CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY: ROBERT T. FEDERIGHI
R.C.E. NO. 30000 DATE 6/21/04

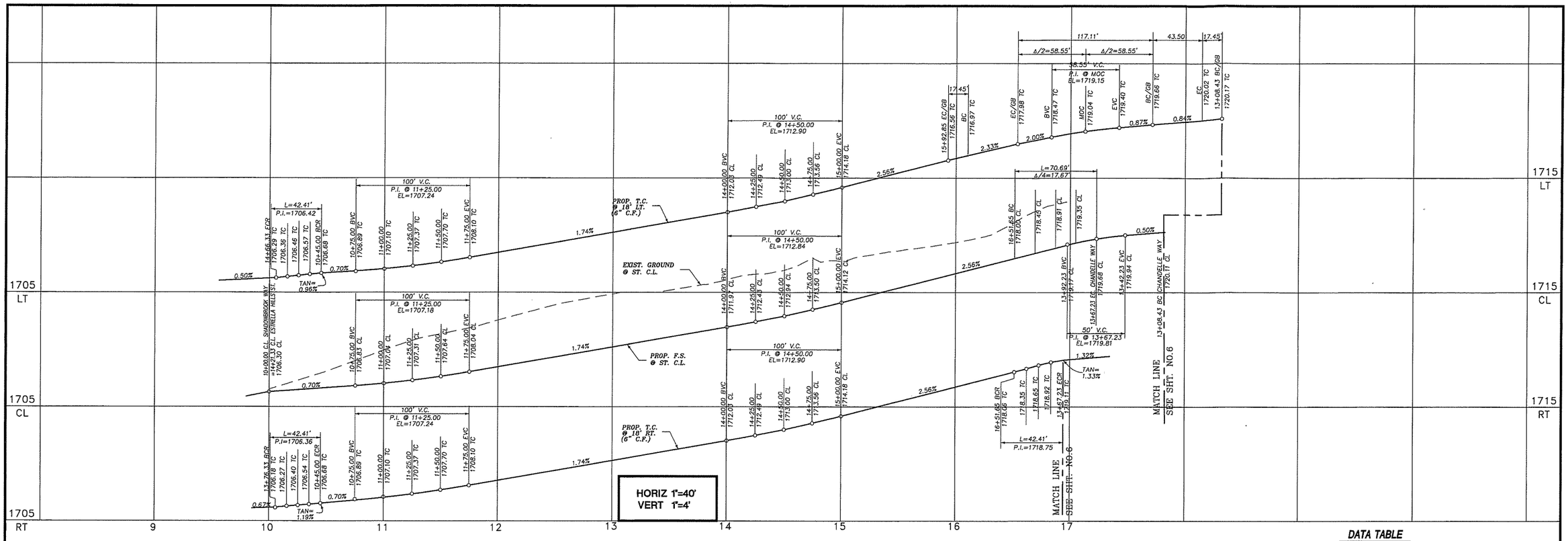
BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

STREET IMPROVEMENT PLANS
TRACT NO. 30756
COUNTRY ROSE DRIVE
STA. 8+53.00 TO STA. 16+89.63
SCALE: HORIZ.: 1'=40' VERT.: 1'=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 4 OF 9
PW03-0357

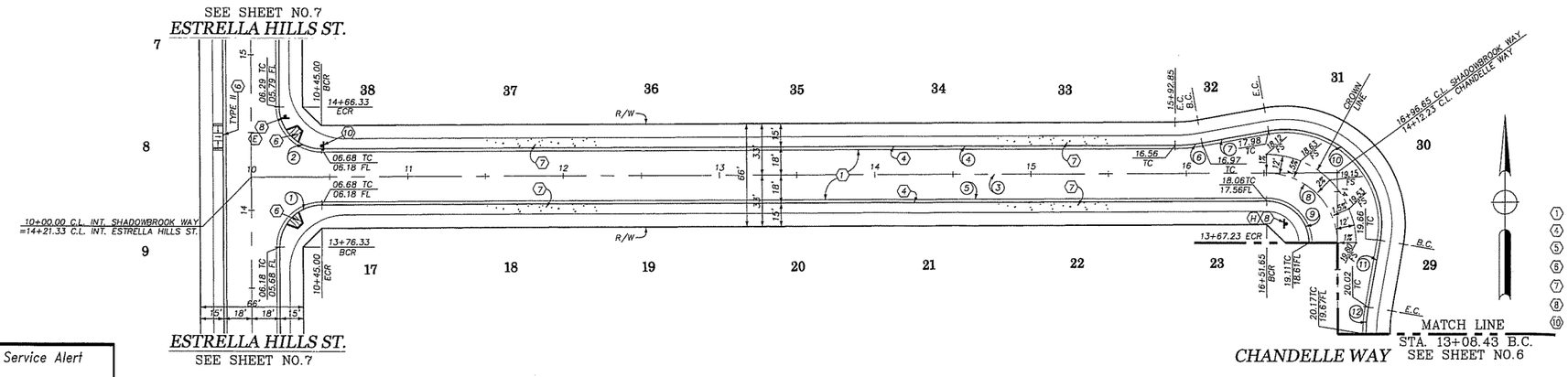
SHT_4.dwg 6-19-04 1:53:55 pm EST

INDEXED 8-17-04 fH



DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	Δ=90°00'00"	27.00'	42.41'	27.00'
(2)	Δ=90°00'00"	27.00'	42.41'	27.00'
(3)	N89°43'20"E		651.65'	
(4)	N89°43'20"E		547.85'	
(5)	N89°43'20"E		606.65'	
(6)	Δ=10°00'00"	100.00'	17.45'	8.75'
(7)	N79°43'20"E		43.50'	
(8)	Δ=90°00'00"	45.00'	70.69'	45.00'
(9)	Δ=90°00'00"	27.00'	42.41'	27.00'
(10)	Δ=110°00'00"	61.00'	117.11'	87.12'
(11)	N09°43'20"E		43.50'	
(12)	Δ=10°00'00"	100.00'	17.45'	8.75'



SHADOWBROOK WAY

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
(10) INSTALL STOP SIGN (R-1)

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER		8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	
			CITY ENGINEER
STREET SERVICES		7/12/04	8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HJK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780

PREPARED BY: ROBERT T. FEDERIGHI
R.C.E. NO. 30000
DATE 6/21/04

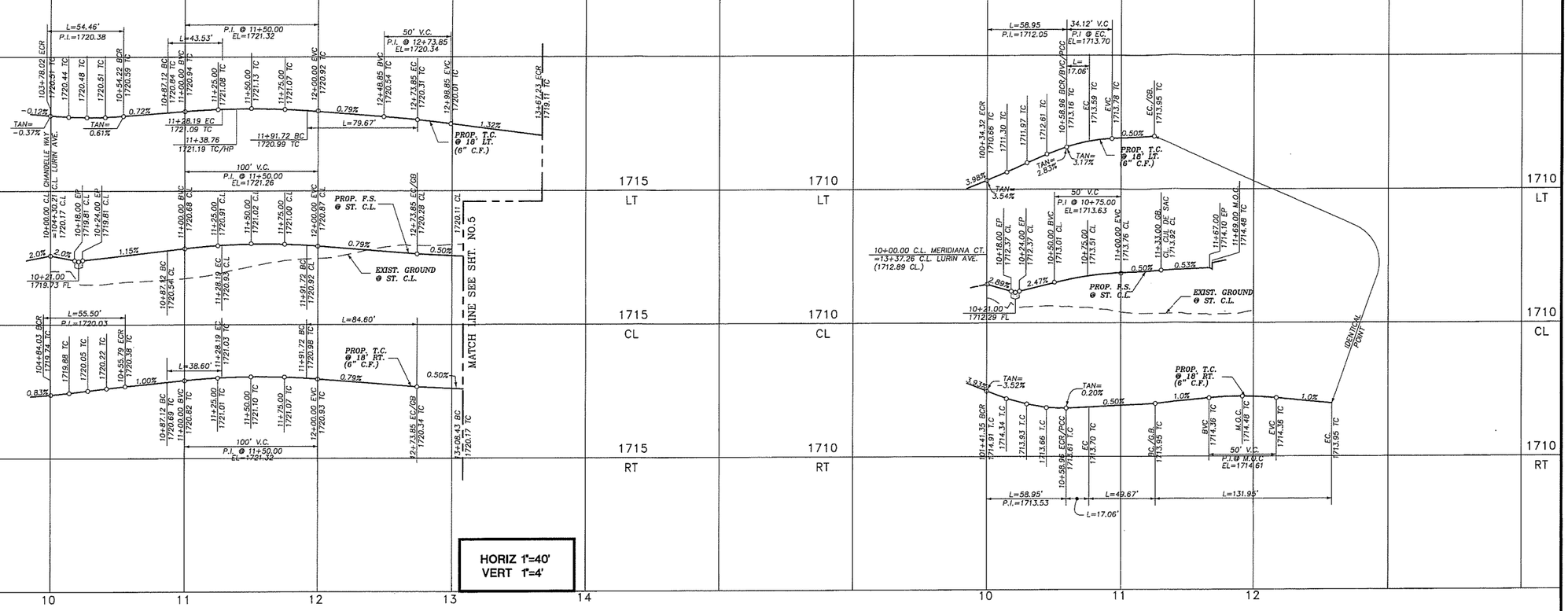
BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

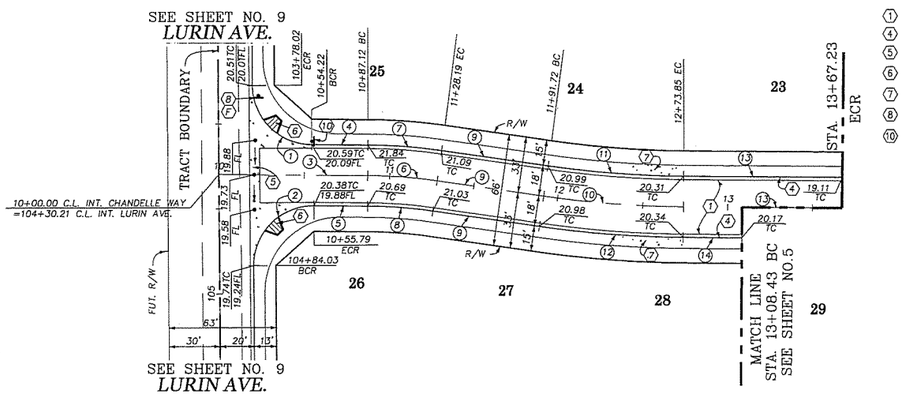
STREET IMPROVEMENT PLANS
TRACT NO. 30756
SHADOWBROOK WAY
STA. 10+00.00 TO STA. 16+96.65
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 5 OF 9
PW03-0357

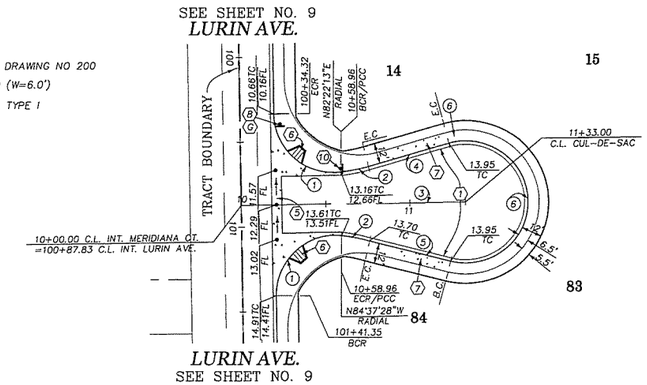
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INDEXED 8-17-04 4/11





CHANDELLE WAY



MERIDIANA COURT

CONSTRUCTION NOTES:

1. CONST. PAVING SECTION PER TYPICAL SECTION
4. CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
5. CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
6. CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
7. CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
8. INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
10. INSTALL STOP SIGN (R-1)

DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
1	Δ=89°09'03"	35.00'	54.46'	34.49'
2	Δ=90°50'57"	35.00'	55.50'	35.52'
3	N00°16'40"W		87.12'	
4	N00°16'40"W		32.90'	
5	N00°16'40"W		31.33'	
6	Δ=07°50'35"	300.00'	41.07'	20.57'
7	Δ=07°50'35"	318.00'	43.53'	21.80'
8	Δ=07°50'35"	282.00'	38.60'	19.33'
9	N07°33'55"E		63.53'	
10	Δ=07°50'35"	600.00'	82.13'	41.13'
11	Δ=07°50'35"	582.00'	79.67'	39.90'
12	Δ=07°50'35"	618.00'	84.60'	42.36'
13	N00°16'40"W		93.38'	
14	N00°16'40"W		34.58'	

DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
1	Δ=96°30'10"	35.00'	58.95'	39.22'
2	Δ=08°29'50"	115.00'	17.06'	8.54'
3	N01°07'37"W		133.00'	
4	N16°07'37"W		49.67'	
5	N13°52'23"W		49.67'	
6	Δ=210°00'05"	36.00'	131.95'	

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	
STREET SERVICES	KBS	7/28/04	CITY ENGINEER 8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER ROBERT T. FEDERIGHI No. 30000 Exp. 9-30-05 CIVIL STATE OF CALIFORNIA

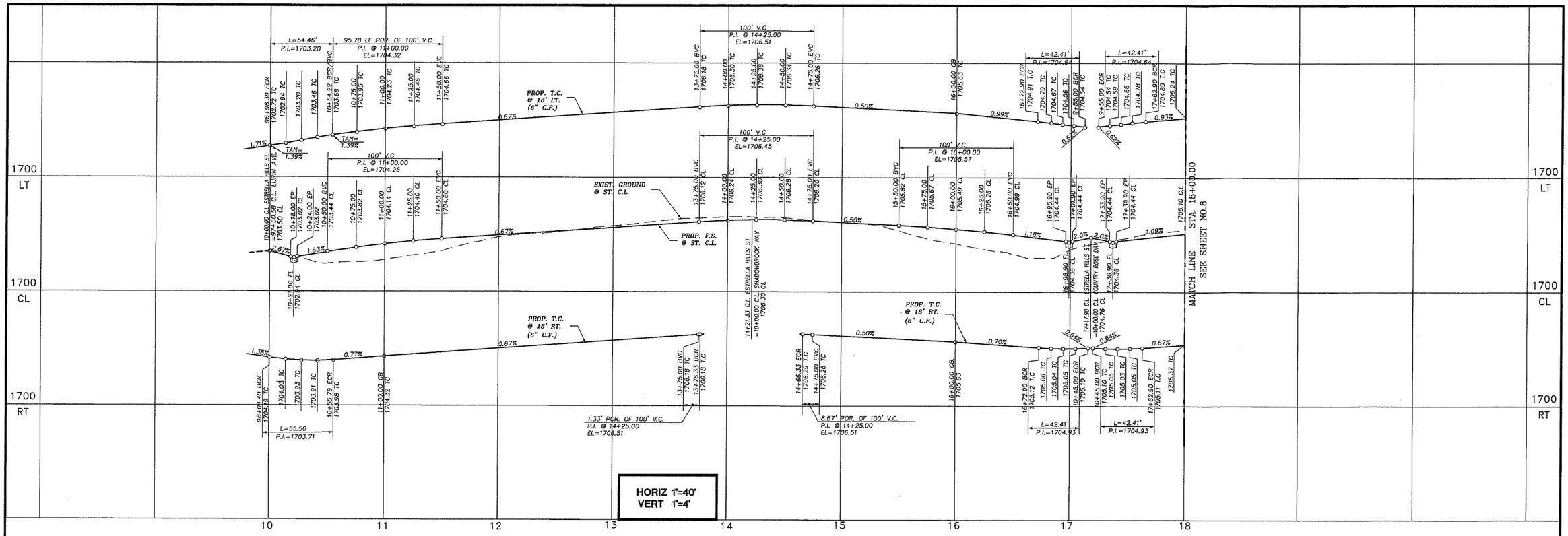
HK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY: Robert T. Federighi
ROBERT T. FEDERIGHI R.C.E. NO. 30000 DATE 6/21/04

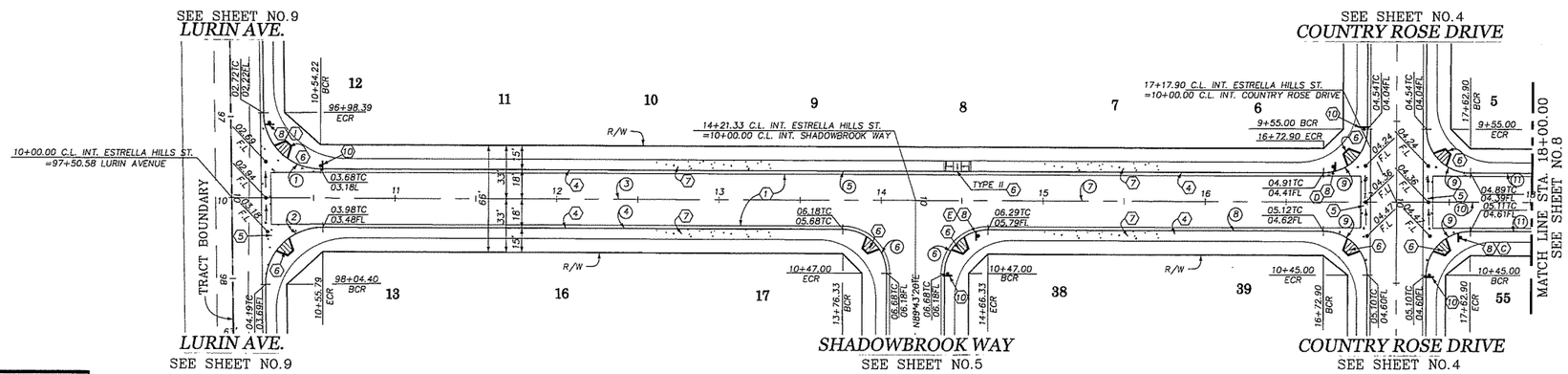
BENCHMARK:
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STREET IMPROVEMENT PLANS
TRACT NO. 30756
CHANDELLE WAY
STA. 10+00.00 TO STA. 13+67.23
MERIDIANA COURT
STA. 10+00.00 TO STA. 11+33.00
SCALE: HORIZ.: 1'=40' VERT.: 1'=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 6 OF 9
PW03-0357

INDEXED 8-17-04 FH





DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	Δ=89°09'03"	35.00'	54.46'	34.49'
(2)	Δ=90°50'57"	35.00'	55.50'	35.52'
(3)	N00°16'40"W		320.54'	
(4)	N00°16'40"W		618.68'	
(5)	N00°16'40"W		624.59'	
(6)	Δ=90°00'00"	27.00'	42.41'	27.00'
(7)	N00°16'40"W		296.57'	
(8)	N00°16'40"W		204.57'	
(9)	Δ=90°00'00"	27.00'	42.41'	27.00'
(10)	N00°16'40"W		82.10'	
(11)	N00°16'40"W		35.10'	

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
(10) INSTALL STOP SIGN (R-1)

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

ESTRELLA HILLS STREET

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN & ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER			
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	CITY ENGINEER
STREET SERVICES		7/22/04	DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780

PREPARED BY: Robert T. Federighi
ROBERT T. FEDERIGHI
R.C.E. NO. 30000
DATE 6/21/04

BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

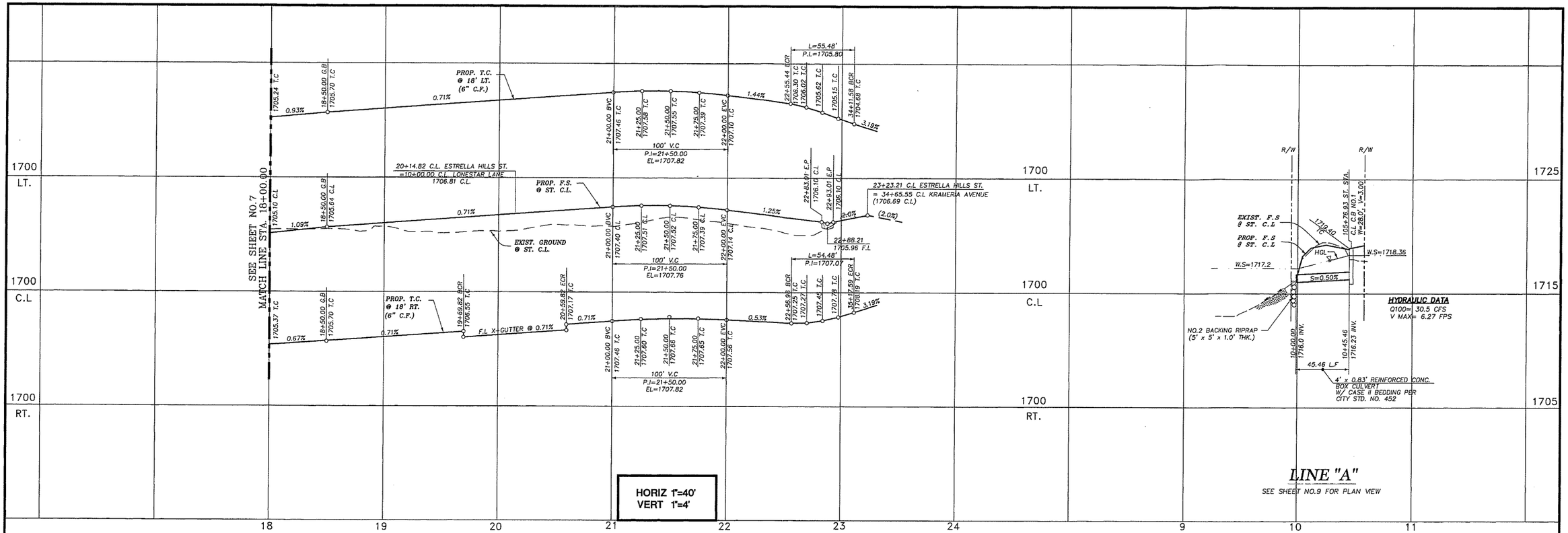
STREET IMPROVEMENT PLANS
TRACT NO. 30756
ESTRELLA HILLS STREET
STA. 10+00.00 TO STA. 18+00.00

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 7 OF 9
PW03-0357

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

SHT_7.dwg 6-19-04 2:15:36 pm EST

INDEXED 8-17-04 GH



LINE "A"

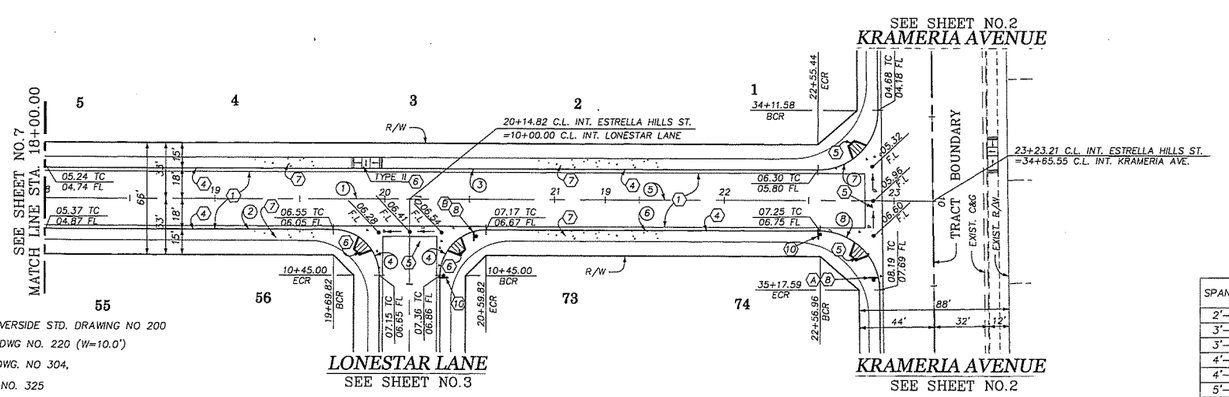
SEE SHEET NO.9 FOR PLAN VIEW

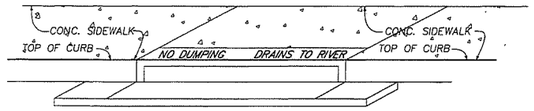
DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
(1)	N00°16'40"W		214.82'	
(2)	N00°16'40"W		169.82'	
(3)	N00°16'40"W		455.41'	
(4)	Δ=90°00'00"	27.00'	42.41'	27.00'
(5)	N00°16'40"W		308.39'	
(6)	N00°16'40"W		197.17'	
(7)	Δ=90°49'19"	35.00'	55.48'	35.51'
(8)	Δ=89°10'41"	35.00'	54.48'	34.50'

CONSTRUCTION NOTES:

(1) CONST. PAVING SECTION PER TYPICAL SECTION
(4) CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
(5) CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=10.0')
(6) CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304,
(7) CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
(8) INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662A/662 AS APPLICABLE
(10) INSTALL STOP SIGN (R-1)





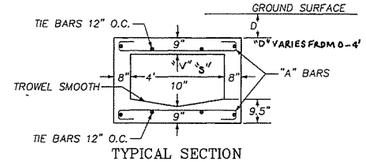
CATCH BASIN STENCILING DETAIL

N.T.S.
(SEE SHEET 9 OF 9)

(A) STENCILS TO HAVE 2" LETTERS AS FOLLOWS: NO DUMPING, DRAINS TO RIVER
(B) PLACE BOTH STENCILS CENTERED WITHIN THE CATCH BASIN OPENING AND WITHIN THE TOP OF CURB
(C) SPRAY BOTH STENCILS WITH WHITE PAINT
(D) REMOVE STENCILS WHEN PAINT IS DRY.

STANDARD REINFORCING

SPAN (S)	A-BARS			
	SIZE	CTR'S	L	LENGTH
2'-6"	#5	7 1/2"	3'-8"	5'-3"
3'-0"	#5	6 1/2"	4'-2"	5'-9"
3'-6"	#5	6"	4'-8"	6'-3"
4'-0"	#5	5 1/2"	5'-2"	6'-9"
4'-6"	#5	5"	5'-8"	7'-3"
5'-0"	#5	5"	6'-2"	7'-9"
5'-6"	#5	4 1/2"	6'-8"	8'-3"
6'-0"	#5	4"	7'-2"	8'-9"



TYPICAL SECTION

CITY OF RANCHO CUCAMONGA
REINFORCED CONCRETE BOX CULVERT NO. 1
STANDARD # 314

N.T.S.
SEE SHEET 9 OF 9

1. ALL BARS SHALL BE ROUND AND DEFORMED AND SHALL BE LAPPED 20 DIAMETERS AT ALL SPLICES.
2. TIE BARS TO BE #5.
3. DIMENSIONS "S" AND "V" ARE SPECIFIED ON PLAN.
4. BARS SHALL BE COVERED AT ALL PARTS WITH 1" OF CONCRETE UNLESS OTHERWISE SPECIFIED HEREON.
5. FORM SURFACE (SF PER FT) = S+4V+2.92 ("S" IN FEET, "V" IN INCHES)
6. CONCRETE SHALL BE CLASS B, MINIMUM 3250 PSI

RIV. CO. NUMBER MS3939, IP040014

QUANTITIES PER 10FT. LENGTH

SPAN (S)	CONCRETE CY FOR VARYING DEPTHS (V)								STEEL POUNDS
	8"	9"	10"	11"	12"	14"	16"	18"	
2'-6"	2.48	2.52	2.56	2.60	2.64	2.72	2.80	2.88	270
3'-0"	2.76	2.80	2.84	2.88	2.92	3.00	3.08	3.16	332
3'-6"	3.05	3.09	3.13	3.17	3.21	3.29	3.37	3.45	378
4'-0"	3.32	3.36	3.40	3.44	3.48	3.56	3.64	3.73	435
4'-6"	3.60	3.64	3.68	3.72	3.76	3.84	3.92	4.01	503
5'-0"	3.88	3.92	3.96	4.00	4.04	4.12	4.20	4.28	550
5'-6"	4.16	4.20	4.24	4.28	4.32	4.40	4.48	4.56	611
6'-0"	4.44	4.48	4.52	4.56	4.60	4.68	4.76	4.84	733

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

SEAL: REGISTERED PROFESSIONAL ENGINEER — KHALED A. OTHMAN — No. 33950 — Exp. 6-30-08 — CIVIL — STATE OF CALIFORNIA

APPROVED FOR CONSTRUCTION WITHIN THE COUNTY OF RIVERSIDE ONLY
COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:
KHALED A. OTHMAN R.C.E. 33950 — DATE 7/19/04
RECOMMENDED: WILLDAN — DATE 7/15/04

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK
ENGINEER		

REVISIONS:

APPR	DATE
CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY:	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER	DH	8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	
STREET SERVICES	KBW	7/26/04	CITY ENGINEER 8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY: ROBERT T. FEDERIGHI — R.C.E. NO. 30000 — DATE 6/21/04

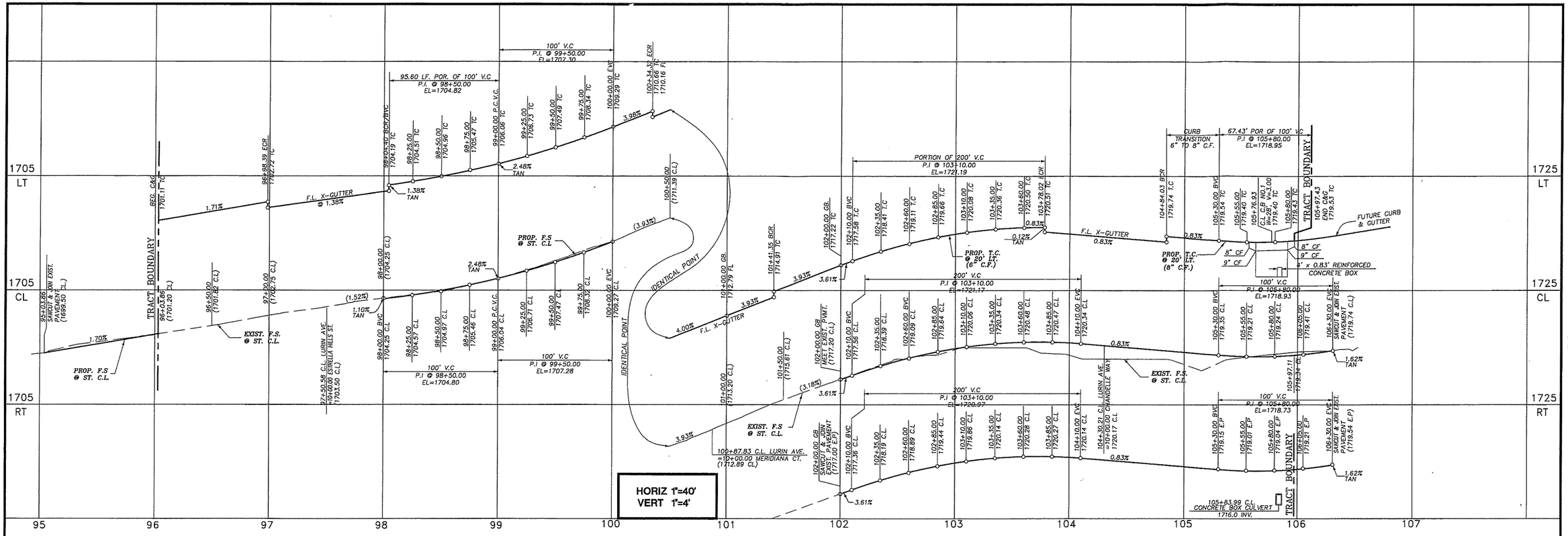
BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

STREET IMPROVEMENT PLANS
RIV. CO. MS3939, IP040014
TRACT NO. 30756
ESTRELLA HILLS STREET
STA. 18+00.00 TO STA. 23+23.21
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 8 OF 9
PW03-0357

SHT_8.dwg 6-19-04 2:16:19 pm EST

INDEXED 8-17-04 GH



SEE SHEET NO.7

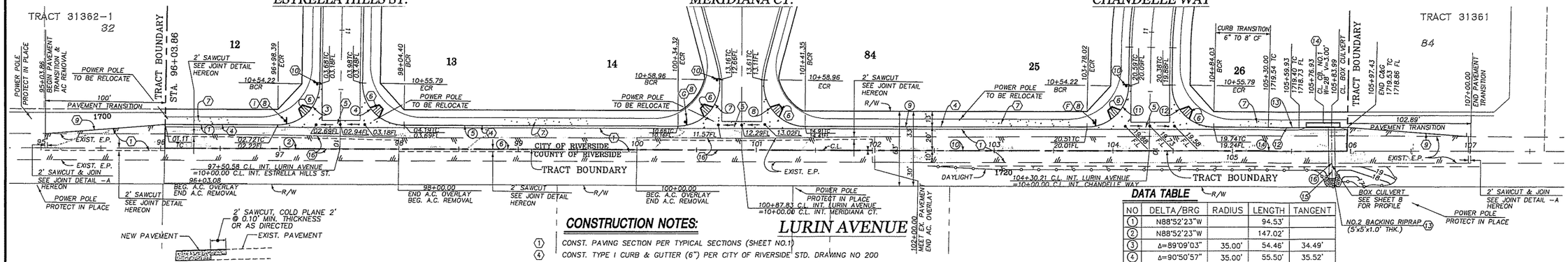
ESTRELLA HILLS ST.

SEE SHEET NO.6

MERIDIANA CT.

SEE SHEET NO.6

CHANDELLE WAY



LURIN AVENUE

JOINT DETAIL – A
N.T.S.

JOINT DETAIL
N.T.S.

CONSTRUCTION NOTES:

1. CONST. PAVING SECTION PER TYPICAL SECTIONS (SHEET NO.1)
4. CONST. TYPE I CURB & GUTTER (6") PER CITY OF RIVERSIDE STD. DRAWING NO 200
5. CONST. CROSS GUTTER PER CITY OF RIVERSIDE STD. DWG NO. 220 (W=6.0')
6. CONST. ACCESS RAMP PER CITY OF RIVERSIDE STD. DWG. NO 304, TYPE I
7. CONST. SIDEWALK PER CITY OF RIVERSIDE STD. DWG. NO. 325
8. INSTALL STREET NAME SIGN PER CITY OF RIVERSIDE STD. NO 662
9. CONSTRUCT A.C. BERM, TYPE I, PER CITY OF RIVERSIDE STD. NO. 250
10. INSTALL STOP SIGN (R-1)
12. CONST. TYPE II CURB & GUTTER (8") PER CITY OF RIVERSIDE STD. DRAWING NO 200
13. INSTALL RIPRAP (SIZES AS PER PLAN)
14. CONSTRUCT CATCH BASIN, PER CITY OF RIVERSIDE STD. DWG. NO.405
15. CONSTRUCT REINFORCED CONCRETE NO.1 PER CITY OF RANCHO CUCAMONGA STD. # 314; S=4.00' – V=0.83'
16. CONSTRUCT A.C. OVERLAY

DATA TABLE

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
1	N88°52'23"W		94.53'	
2	N88°52'23"W		147.02'	
3	Δ=89°09'03"	35.00'	54.46'	34.49'
4	Δ=90°50'57"	35.00'	55.50'	35.52'
5	N88°52'23"E		229.92'	
6	N88°52'23"E		337.26'	
7	Δ=96°30'10"	35.00'	58.95'	39.22'
8	Δ=96°30'10"	35.00'	58.95'	39.92'
9	N88°52'23"E		236.68'	
10	N88°52'23"E		342.38'	
11	Δ=89°09'03"	35.00'	54.46'	34.49'
12	Δ=90°50'57"	35.00'	55.50'	35.52'
13	N88°52'23"E		113.40'	
14	N88°52'23"E		166.89'	
15	N02°04'16"W		44.45'	

NO	DELTA/BRG	RADIUS	LENGTH	TANGENT
16	N02°04'48"E		45.46'	

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

RIV. CO. NUMBER MS3939, IP040014

Underground Service Alert
Call: TOLL FREE
1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

SEAL: REGISTERED PROFESSIONAL ENGINEER — KHALED A. OTHMAN — No. 33950 — Exp. 6-30-06 — CIVIL — STATE OF CALIFORNIA

APPROVED FOR CONSTRUCTION WITHIN THE COUNTY OF RIVERSIDE ONLY

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: _____ DATE 7/19/04
KHALED A. OTHMAN, R.C.E. 33950
RECOMMENDED: WILLDAN DATE 7/15/04

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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DATE	BY	MARK	REVISIONS:	APPR	DATE
ENGINEER				CITY	

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	BY:	DATE:	APPROVED BY:
PRINCIPAL ENGINEER	PH	8/9/04	
PARK DEPARTMENT			
TRAFFIC DIVISION		8/9/04	
STREET SERVICES		7/16/04	CITY ENGINEER 8/9/04 DATE

SEAL: REGISTERED PROFESSIONAL ENGINEER — ROBERT T. FEDERIGHI — No. 30000 — Exp. 9-30-05 — CIVIL — STATE OF CALIFORNIA

HK CONSULTANTS, INC.
Civil Engineering • Land Planning • Land Surveying
41769 Enterprise Circle N., #202, Temecula, Ca. 92590
Tel: (909) 719-3770 Fax: (909) 719-3780
PREPARED BY: _____ R.C.E. NO. 30000
ROBERT T. FEDERIGHI DATE 6/21/04

BENCHMARK:
CITY OF RIVERSIDE
ELEVATION: 1757.219 GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BOULEVARD.

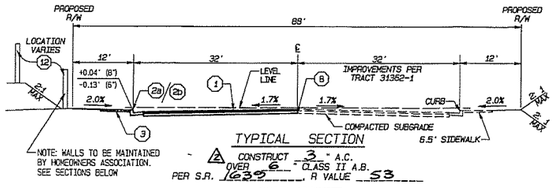
STREET IMPROVEMENT PLANS
RIV. CO. MS3939, IP040014
TRACT NO. 30756
LURIN AVENUE
STA. 95+03.86 TO STA. 107+00.00

ACCOUNT NO. _____
DRAWING NUMBER
R- 3751
SHEET 9 OF 9
PW03-0357

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

SHT_9.dwg 6-19-04 2:36:03 pm EST

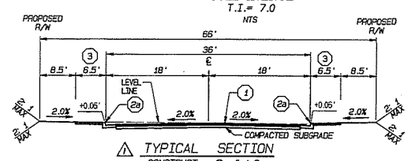
INDEXED 8-17-04 FH



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 6" CLASS II A.B.
PER S.R. 1633, R VALUE 53

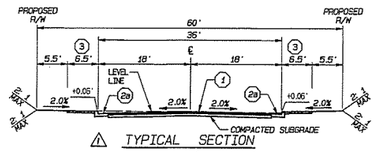
COLE AVENUE
T.I.= 7.0
NTS



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 6" CLASS II A.B.
PER S.R. 1637, R VALUE 40

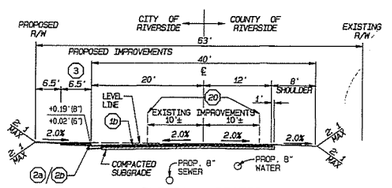
MISSION RANCH ROAD
STA. 10+00.00 TO 15+48.78
T.I.= 5.0
NTS



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 6" CLASS II A.B.
PER S.R. 1637, R VALUE 40

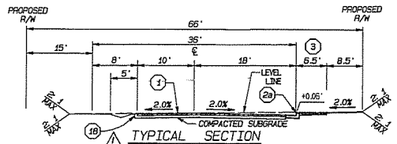
LOS AMIGOS COURT
FRIAR ROAD, MI CASA COURT
T.I.= 5.0
NTS



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 0.25' OVER 0.50' CLASS II A.B. (SEE COUNTY NOTE NO. 4)
PER S.R. 1639, R VALUE 45

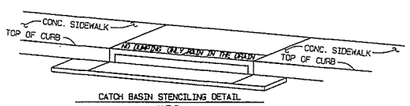
LURIN AVENUE
T.I.= 6.0
NTS



TYPICAL SECTION

CONSTRUCT 3" A.C. OVER 6" CLASS II A.B.
PER S.R. 1637, R VALUE 40

MISSION RANCH ROAD
STA. 15+48.78 TO 22+28.26
T.I.= 5.0
NTS



CATCH BASIN STENCILING DETAIL
N.T.S.

(A) STENCILS TO HAVE 2" LETTERS AS FOLLOWS: "NO DUMPING" "ONLY RAIN IN THE DRAIN"
(B) PLACE BOTH STENCILS CENTERED WITHIN THE CATCH BASIN OPENING AND WITHIN THE TOP OF THE CURB.
(C) SPRAY BOTH STENCILS WITH WHITE PAINT.
(D) REMOVE STENCILS WHEN PAINT IS DRY

NOTICE TO CONTRACTOR

ACCORDING TO INFORMATION PROVIDED BY UNDERGROUND SERVICE ALERT (U.S.A.) DATED SEPTEMBER 2, 2003, THE FOLLOWING ORGANIZATIONS ARE U.S.A. MEMBERS WITHIN THE PROJECT AREA:

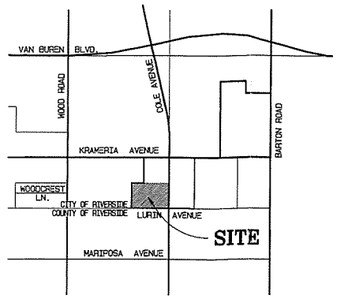
UTI FOR CHARTER COMMUNICATIONS
SBC / PACIFIC BELL
SOUTHERN CALIFORNIA GAS COMPANY
UTI FOR VERIZON - PERRIS
UTI FOR SC EDISON
WESTERN MUNICIPAL WATER DISTRICT
ABELPHIA - RIVERSIDE
UTI FOR CITY OF RIVERSIDE - ELECTRIC
CITY OF RIVERSIDE - TRAFFIC ENGINEERING
MARCH JOINT POWERS AUTHORITY

THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES (UTILITY PIPES, STRUCTURES, ETC.) SHOWN ON THESE PLANS (MAIN LINES ONLY - NO SERVICE LATERALS) WERE ASCERTAINED BY A REVIEW OF RECORDS PROVIDED BY THESE MEMBER AGENCIES AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT ALL UTILITIES SHOWN ON THESE PLANS AND/OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

CALL UNDERGROUND SERVICE ALERT (U.S.A.) 1-800-227-2600 AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION.

THE QUANTITY ESTIMATE FILED IN THE CITY IS FOR THE USE OF GOVERNING AGENCIES IN DETERMINING BOND AMOUNTS AND/OR FEES AND IS NOT TO BE USED FOR BID PURPOSES.



VICINITY MAP

N.T.S.

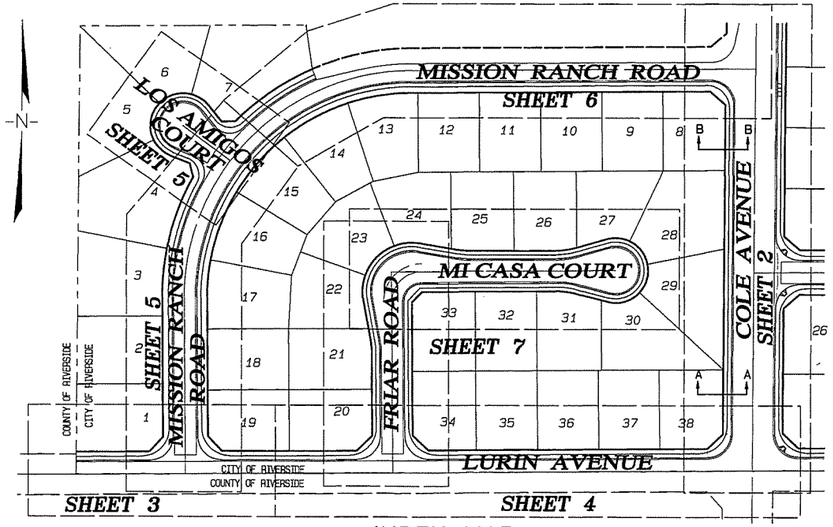
GENERAL NOTES

1. NO PERSON SHALL PERFORM ANY CONSTRUCTION ACTIVITY OR INSTALL ANY OBJECTS WITHIN THE PUBLIC RIGHTS-OF-WAY OR EASEMENTS OF THE CITY OF RIVERSIDE WITHOUT A VALID CONSTRUCTION PERMIT OR A STREET OPENING PERMIT OR AN ENCROACHMENT PERMIT ISSUED BY THE CITY'S PUBLIC WORKS DEPARTMENT.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAR THE RIGHT-OF-WAY IN ACCORDANCE WITH THE PROVISIONS OF LAW AS IT AFFECTS EACH UTILITY INCLUDING IRRIGATION LINES AND APPURTENANCES AND AT NO COST TO THE CITY.
3. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF RIVERSIDE DEPARTMENT OF PUBLIC WORKS, STANDARD DRAWINGS, ITS SUPPLEMENTAL NOTES AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION.
4. THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.
5. THE DEVELOPER SHALL BE RESPONSIBLE FOR PRESERVING OR RE-ESTABLISHING AND REFERENCING SURVEY MONUMENTS DESTROYED, DISTURBED OR BURIED AS A RESULT OF CONSTRUCTION SHOWN HEREON.
6. ALL FLAGGED ELEVATIONS SHALL BE STAKED IN THE FIELD BY THE PRIVATE ENGINEER.
7. WHERE NEW PAVEMENT IS TO JOIN THE EXISTING PAVEMENT, THE EDGE OF THE EXISTING PAVEMENT SHALL BE TRIMMED IN A SMOOTH AND STRAIGHT LINE. CONSTRUCT MATCH-UP PAVING AS SHOWN ON THE PLANS AND OVERLAY PAVING AS DIRECTED IN THE FIELD TO PRODUCE A SMOOTH SECTION.
8. THE SUBDIVIDER SHALL ARRANGE FOR A SOIL TEST TO BE MADE BY A SOILS ENGINEER AFTER THE STREETS HAVE BEEN PREPARED TO ROUGH GRADE AND PRIOR TO CURB AND GUTTER CONSTRUCTION. DEPTH OF BASE MATERIAL AND A.C. PAVING SHALL BE DETERMINED BY THE CITY OF RIVERSIDE DESIGN STANDARDS AND TEST PROCEDURES.
9. ON ALL AREAS WITHIN PUBLIC RIGHT-OF-WAY WHERE THE FILL IS ONE (1) FOOT OR GREATER, A LETTER WILL BE REQUIRED FROM THE SOILS ENGINEER, CERTIFYING THE COMPACTION OF THE FILL BELOW SUBGRADE, PRIOR TO ISSUANCE OF THE CONSTRUCTION PERMIT/CUT SHEETS.
10. ALL TRAFFIC SIGNS SHALL BE INSTALLED PRIOR TO OPENING THE STREETS TO TRAFFIC.
11. ANY TRAFFIC CONTROL STRIPING OBLITERATED AND/OR BADLY WORN DURING CONSTRUCTION SHALL BE RESTORED BY THE CONTRACTOR WITHIN FIVE DAYS AFTER NOTIFICATION FROM THE CITY INSPECTORS.
12. FINAL STRIPING FOR TRAFFIC CONTROL AND/OR PAVEMENT MARKING TO BE THE RESPONSIBILITY OF THE DEVELOPER.
13. THE CONTRACTOR SHALL CALL IN A LOCATION REQUEST TO UNDERGROUND SERVICE ALERT (USA), PHONE # 1-800-227-2600, TWO NORMAL DAYS BEFORE DIGGING. NO CONSTRUCTION PERMIT WILL BE ISSUED BY THE PUBLIC WORKS DEPARTMENT INVOLVING EXCAVATION FOR UNDERGROUND FACILITIES UNLESS THE APPLICANT HAS BEEN PROVIDED AN INQUIRY IDENTIFICATION NUMBER BY U.S.A.
14. THE CONTRACTOR SHALL COORDINATE TRENCHING FOR CABLE TELEVISION WITH OTHER TRENCHING WITHIN THE SUBDIVISION.
15. CONSTRUCT DRIVEWAY APPROACHES PER STANDARD DRAWING 302. EXACT SIZE AND LOCATION TO BE STAKED BY THE PRIVATE ENGINEER PRIOR TO CONSTRUCTION OF THE CURB AND GUTTER.
16. IN PAVEMENT OVERLAY AREAS, ANY DISTRESSED EXISTING PAVEMENT SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE INSPECTOR PRIOR TO OVERLAYING WITH A.C. PAVING.
17. SEE PUBLIC LANDSCAPE PLAN NO. R-3790-L AS PREPARED BY HERMANN & ASSOCIATES FOR LANDSCAPE IMPROVEMENTS ALONG COLE AVENUE.
18. QUANTITIES SHOWN ARE FOR INFORMATION ONLY AND THE CITY OF RIVERSIDE IS NOT RESPONSIBLE FOR THEIR ACCURACY..

STREET NAME AND TRAFFIC SIGN SCHEDULE

	NAME	BLOCK NO.
(A)	R-1 (STOP SIGN - 30")	
(B)	COLE AVENUE	9500
	LURIN AVENUE	19400
(C)	COLE AVENUE	9500
	MISSION RANCH RD.	19400
(D)	LURIN AVENUE	19400
	FRIAR ROAD	9500
(E)	LURIN AVENUE	19300
	MISSION RANCH RD.	9500
(F)	MISSION RANCH RD.	19300
	LOS AMIGOS COURT	9500
(G)	FRIAR ROAD	9500
	MI CASA COURT	19400

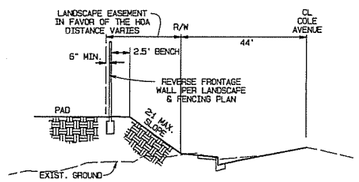
INSTALL SIGNS PER C/R STD. 662; C/R STD. 662A AND STD. 666.



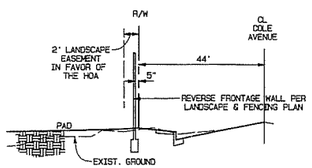
INDEX MAP

SCALE: 1" = 100'

GRAPHIC SCALE 1"=100'
0 100 200 300



SECTION B-B
N.T.S. FOR LOT 8



SECTION A-A
N.T.S. FOR LOTS 28, 29, & 38

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

NOTE: APPROVED FOR CONSTRUCTION WITHIN UNINCORPORATED AREA OF RIVERSIDE COUNTY ONLY.

CONSTRUCTION NOTES

		QUANTITIES (WITHIN COUNTY RIGHT-OF-WAY ONLY)
(1)	CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION	
(1b)	CONSTRUCT 4" A.C. PAVING OVER 6" CLASS II AGGREGATE BASE, PER TYPICAL SECTION	13,388 S.F.
(2a)	CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200	
(2b)	CONSTRUCT TYPE 1 CURB & GUTTER, 8" C.F., PER CITY OF RIVERSIDE STD. NO. 200	
(3)	CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325	
(4)	CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220	
(5a)	CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304	
(5b)	CONSTRUCT MID BLOCK WHEELCHAIR RAMP, TYPE II-A, PER CITY OF RIVERSIDE STD. NO. 304	
(5c)	CONSTRUCT WHEELCHAIR RAMP, TYPE VII W/ CURB SIDE SW, PER CITY OF RIVERSIDE STD. NO. 304	
(6)	CONSTRUCT STREET NAME SIGN, PER CITY OF RIVERSIDE STD. NO. 662 OR 662A	
(7)	CONSTRUCT BARRICADE, WITH 2 x 4 HEADER, PER CITY OF RIVERSIDE STD. NO. 180	
(8)	REMOVE 2 x 4 REDWOOD HEADER AND JOIN EXISTING PAVEMENT	
(9)	INSTALL CLASS I, TYPE F DELINEATORS PER CALTRANS STD. PLAN A73C (20' O.C. TYP.)	
(10)	PROTECT IN PLACE	
(11)	TO BE RELOCATED BY OTHERS	
(12)	CONSTRUCT BLOCK WALL PER CITY STD. 704, OR APPROVED DESIGNS (SEE PLAN FOR HEIGHT (6)) TYPE / COLOR OF BLOCK: 6"x8"x16" SPLIT FACE, "TAN", MORTAR COLOR: "TAN" SIZE/ TYPE / COLOR CAP: 4"x16"x16" BEVELED CAP, "NATURAL GREY". THIS WALL REQUIRES A PERMIT AND INSPECTION FROM THE PUBLIC WORKS ENGINEERING DIVISION.	
(13)	SAWCUT MINIMUM 1' AND JOIN EXISTING PAVEMENT PER DETAIL ON SHEET 3	25 L.F.
(14)	CONSTRUCT CATCH BASIN (N=21) PER CITY OF RIVERSIDE STD. NO. 405	
(15)	CONSTRUCT REINF. CONC. DBL. BOX CULVERT NO. 2 PER CITY OF RANCHO CUCAMONGA STD. PLAN 315 - DETAIL AS SHOWN ON SHEET 4; "S"= 6'-0", "V"= 0'-8"	17 C.Y
(16)	INSTALL LIGHT CLASS NATURAL ROCK RIP-RAP W/ 6" FILTER (DIMENSION PER PLAN)	30 C.Y
(17)	INSTALL 3.5'X1' CUTOFF WALL (DIMENSION PER PLAN)	4 C.Y
(18)	CONSTRUCT 2 x 4 REDWOOD HEADER ALONG EDGE OF PAVEMENT	
(19)	CONSTRUCT STEEL GUARD RAIL PER CITY OF RIVERSIDE STD. DWG. NO. 650	25 L.F.
(20)	REMOVE EXISTING PAVEMENT	13,388 S.F.
(21)	CONSTRUCT 12" PARKWAY DRAIN PER A.P.W.A. STD. PLAN 151	
	ROADWAY EXCAVATION	248 C.Y
	ASPHALT EMULSION	0.5 TON

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/OWNER OR CONTRACTOR TO APPLY TO THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT, PERMIT SECTION, FOR AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE; AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT. ADDITIONAL STUDIES AND/OR PERMITS MAY BE REQUIRED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITTEE MUST INFORM COUNTY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION. PHONE: (909) 955-6985
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR DEVELOPER TO INSTALL AND MAINTAIN ALL CONSTRUCTION, REGULATORY, GUIDE AND WARNING SIGNS WITHIN THE PROJECT LIMITS AND ITS SURROUNDINGS TO PROVIDE SAFE PASSAGE FOR THE TRAVELING PUBLIC AND WORKERS UNTIL THE FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT BY THE COUNTY. A TRAFFIC CONTROL PLAN SHALL BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO OBTAINING AN ENCROACHMENT PERMIT.
4. ALL STREET SECTIONS ARE TENTATIVE. ADDITIONAL SOILS TESTS SHALL BE TAKEN BY THE COUNTY AFTER ROUGH GRADING TO DETERMINE THE EXACT STREET SECTION REQUIREMENTS. USE STANDARD NO. 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
5. ASPHALTIC EMULSION (FOG SEAL)SHALL BE APPLIED NOT LESS THAN 14 DAYS FOLLOWING PLACEMENT OF THE ASPHALT SURFACING. FOG SEAL AND PAINT BINDER SHALL BE APPLIED AT A RATE OF 0.05 AND 0.03 GALLON PER SQUARE YARD RESPECTIVELY. ASPHALTIC EMULSION SHALL CONFORM TO SECTION 37, 39, AND 94 OF THE STATE STANDARD SPECIFICATIONS.
6. THE DEVELOPER SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ADDITIONAL SIGNS AND MARKINGS NOT INCLUDED IN THE SIGNING AND STRIPING PLAN WITHIN THE PROJECT AREAS, OR ON ROADWAYS ADJACENT TO THE PROJECT BOUNDARIES, UPON THE REQUEST OF THE DIRECTOR OF TRANSPORTATION OR HIS DESIGNEE TO IMPROVE TRAFFIC SAFETY ON THE ROADS UNDER THE JURISDICTION OF THE DEVELOPER.

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE.

RIV. CO. # MS 3938 I.P. 040013

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

REVIEW BY:
WESTERN MUNICIPAL WATER DISTRICT
FOR NON-INTERFERENCE COMPLIANCE
SHEET 1 THROUGH 7
CIVIL ENGINEER RCE 46212
DATE: 6/18/04

SEAL-COUNTY
REGISTERED PROFESSIONAL ENGINEER RAILED A. OTHMAN No. 33650 EXP. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: DATE 7/20/04
KHALED A. OTHMAN, P.E.
R.C.E. 33650 EXP. 6-30-06
RECOMMENDED: WILL DAN DATE 7/20/04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFREY No. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY: DATE 6-14-04
R.C.E. NO. 49405

MARK	REVISIONS	APPR.	DATE
1	ADDED PAVING SECTIONS	RJR	12-3-04
2	ADD INTERIOR STREET SECTIONS 10/6/04	RJR	10/21/04

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	APPROVED BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		8/16/04
TRAFFIC DIVISION		8/17/04
STREET SERVICES		8/3/04
PLANNING DEPT.		8/17/04

APPROVED BY: CITY ENGINEER
DATE 8/26/04

STREET IMPROVEMENT PLANS

TRACT NO. 31362
INCLUDES RIV. CO. TRANS. DEPT. MS # 3938
INDEX SHEET

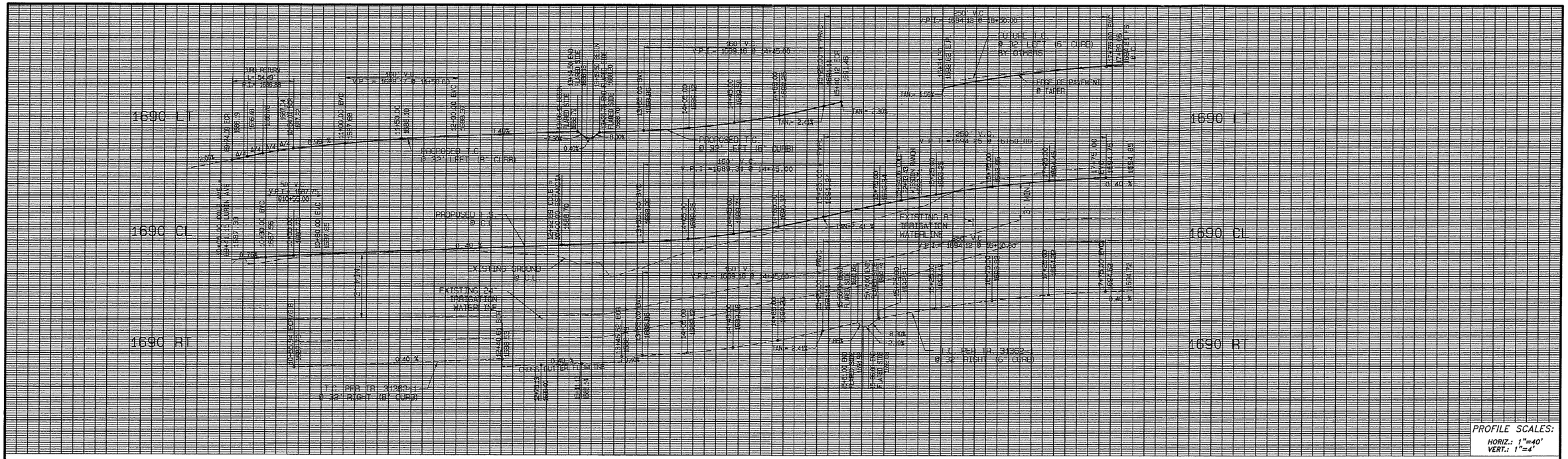
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ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 1 OF 7
PW 03-0504

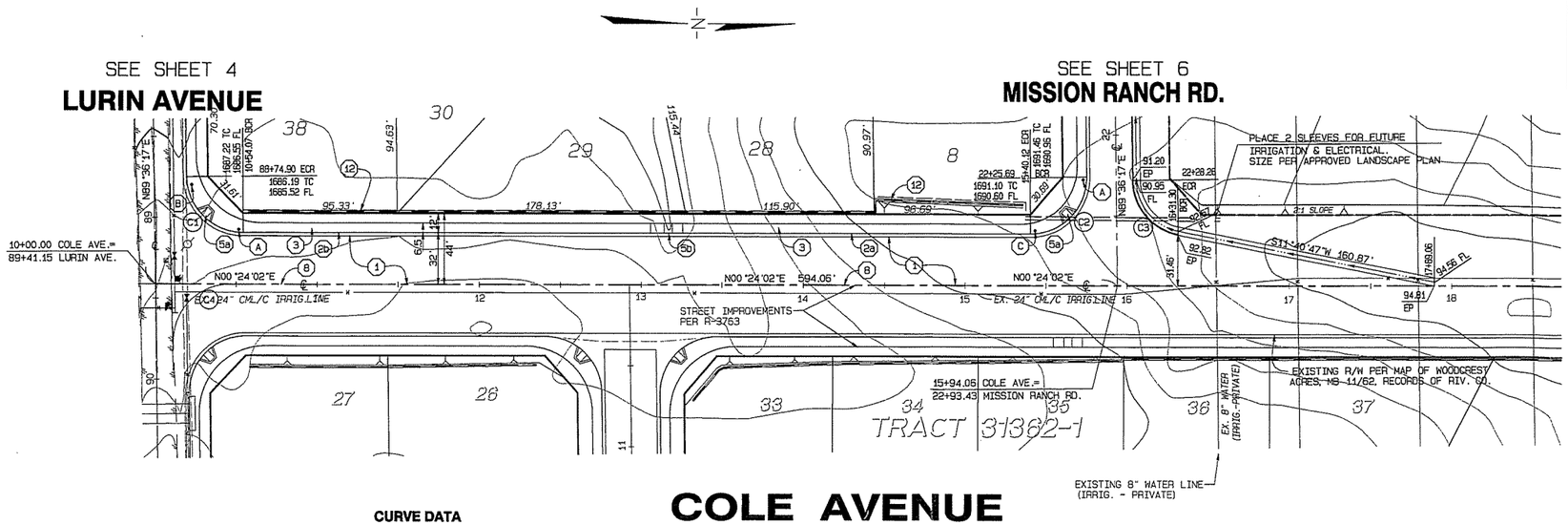
INDEXED 9-08-04 GH

FILE: G:\2003\03-0269\Streets\03-0269-Str.pro PLOT DATE: 6/14/2004

Pc 4404 S2



NOTE:
PRIVATE WATER LINES ARE SHOWN BASED ON BEST AVAILABLE INFORMATION. NO PUBLIC RECORDS HAVE BEEN FOUND TO DETERMINE OWNERSHIP, OR RIGHTS THERETO. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR ANY CHANGES TO, OR REMOVAL OF, ANY PRIVATE WATER LINES.



CONSTRUCTION NOTES

1. CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION
2a. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F. , PER CITY OF RIVERSIDE STD. NO. 200
2b. CONSTRUCT TYPE 1 CURB & GUTTER, 8" C.F. , PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
5a. CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304
5b. CONSTRUCT MID BLOCK WHEELCHAIR RAMP, TYPE II-A, PER CITY OF RIVERSIDE STD. NO. 304
8. REMOVE 2 x 4 REDWOOD HEADER AND JOIN EXISTING PAVEMENT
12. CONSTRUCT BLOCK WALL PER CITY STD. 704, OR APPROVED DESIGNS

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C1	89°12'15"	35.00'	54.49'	34.53'
C2	90°47'45"	35.00'	55.45'	35.49'
C3	77°55'30"	35.00'	47.60'	28.30'
C4	88°45'15"	35.00'	54.21'	34.24'

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK:
CITY OF RIVERSIDE BENCH MARK GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.
ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFREY NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY _____ DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		8/25/04
PARK DEPARTMENT		8/25/04
TRAFFIC DIVISION		8/25/04
STREET SERVICES		8/25/04
PLANNING DEPT.		8/25/04

APPROVED BY _____ CITY ENGINEER
DATE 8/26/04

STREET IMPROVEMENT PLANS
TRACT NO. 31362
COLE AVENUE

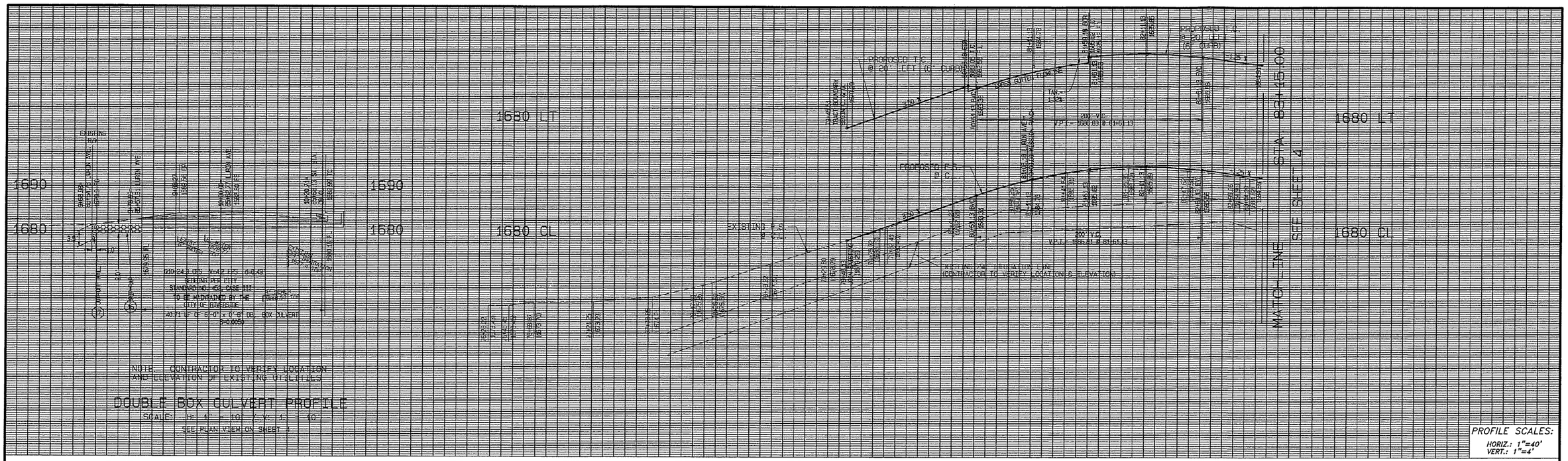
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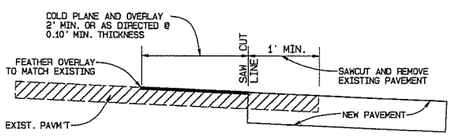
ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 2 OF 7
PW 03-00504

FILE: G:\2003\03-0269\Streets\03-0269-Str.prn PLOT DATE: 6/14/2004

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INDEXED 9-08-04 LH



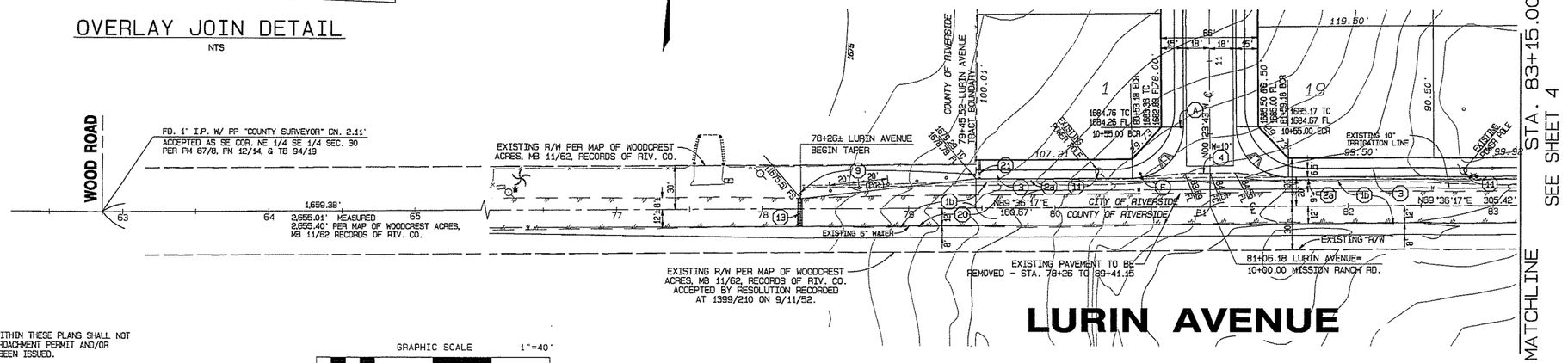


OVERLAY JOIN DETAIL

NTS

SEE SHEET 5

MISSION RANCH RD.



LURIN AVENUE

CONSTRUCTION NOTES

15. CONSTRUCT 0.33' A.C. PAVING OVER 0.50' CLASS II AGGREGATE BASE, PER TYPICAL SECTION
28. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
4. CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
9. INSTALL CLASS I, TYPE F DELINEATORS PER CALTRANS STD. PLAN A73C
11. TO BE RELOCATED BY OTHERS
12. CONSTRUCT BLOCK WALL PER CITY STD. 704, OR APPROVED DESIGNS
13. SAWCUT MIN. 1' AND JOIN EXISTING PAVEMENT PER DETAIL ON THIS SHEET
16. INSTALL LIGHT CLASS NATURAL ROCK RIP-RAP W/ 6" FILTER
17. INSTALL 3.5'X1' CUTOFF WALL (DIMENSION PER PLAN)
20. REMOVE EXISTING PAVEMENT
21. CONSTRUCT 12" PARKWAY DRAIN PER A.P.W.A. STD. PLAN 151

NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

NOTE: APPROVED FOR CONSTRUCTION WITHIN UNINCORPORATED AREA OF RIVERSIDE COUNTY ONLY.

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE.

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK:
CITY OF RIVERSIDE BENCH MARK GPS-67
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ELEVATION: 1757.219

SEAL—COUNTY
REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN NO. 33859 EXP. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: [signature] DATE 7/28/04
KHALED A. OTHMAN, P.E. R.C.E. 33859 EXP. 6-30-06
RECOMMENDED: WILLDAN [signature] DATE 7/20/04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFREY NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY [signature] DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		8/26/04
PARK DEPARTMENT		8/26/04
TRAFFIC DIVISION		8/26/04
STREET SERVICES		8/26/04

APPROVED BY [signature] CITY ENGINEER
DATE 8/26/04

STREET IMPROVEMENT PLANS

TRACT NO. 31362
INCLUDES RIV. CO. TRANS. DEPT. MS # 3938
LURIN AVENUE

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

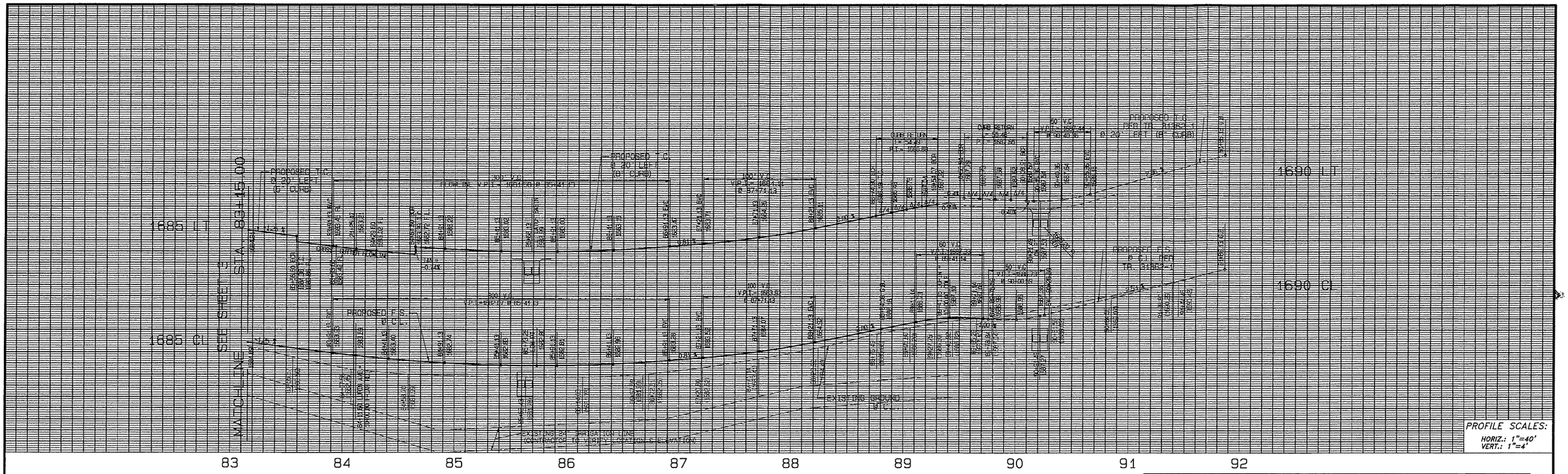
ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 3 OF 7
PW 03-00504

RIV. CO. # MS 3938 I.P. 040013

PC 44 of 52

INDEXED 9-08-04 GH

FILE: G:\2003\03-0269\Streets\03-0269-Sht-pmp PLOT DATE: 6/14/2004



NOTE: WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

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GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

NOTE: APPROVED FOR CONSTRUCTION WITHIN UNINCORPORATED AREA OF RIVERSIDE COUNTY ONLY.

PROFILE SCALES:
HORIZ.: 1"=40'
VERT.: 1"=4'

GENERAL NOTES

1. ALL BARS SHALL BE ROUND AND DEFORMED, AND SHALL BE LAPPED 20 DIAMETERS AT ALL SPLICES.
2. TIE BARS TO BE #5
3. DIMENSIONS "S" AND "V" ARE SPECIFIED ON PLAN
4. BARS SHALL BE COVERED AT ALL PARTS WITH 1" OF CONCRETE UNLESS OTHERWISE SPECIFIED HEREON.
5. FORM SURFACE (SF PER FT.) = 2'S' + 0.5'V' + 2.833 ('S' IN FT., 'V' IN INCHES)
6. "D" VARIES FROM 0'-4'
7. CONCRETE SHALL BE CLASS B, MINIMUM 3250PSI

STANDARD REINFORCING

SPAN (S)	A BARS SIZE	A BARS SPACING	A BARS LENGTH	B BARS SIZE	B BARS SPACING	B BARS "a"	B BARS LENGTH
3' 6"	# 5	14"	8' 10"	# 5	14"	22"	10' 8 1/2"
4' 0"	# 5	12"	9' 10"	# 5	12"	24"	11' 8 1/2"
4' 6"	# 5	11"	10' 10"	# 5	11"	26"	12' 8 1/2"
5' 0"	# 5	10"	11' 10"	# 5	10"	28"	13' 8 1/2"
5' 6"	# 5	10"	12' 10"	# 5	10"	30"	14' 8 1/2"
6' 0"	# 5	10"	13' 10"	# 5	10"	32"	15' 8 1/2"

QUANTITIES PER 10 FT. LENGTH

SPAN (S)	CONCRETE (CY) FOR VARYING DEPTHS 8"	9"	10"	12"	14"	16"	18"	STEEL POUNDS
3' 6"	5.54	5.60	5.66	5.79	5.91	6.03	6.15	742
4' 0"	6.11	6.17	6.23	6.36	6.48	6.60	6.73	845
4' 6"	6.67	6.73	6.79	6.92	7.04	7.16	7.29	998
5' 0"	7.23	7.29	7.35	7.48	7.60	7.72	7.85	1,118
5' 6"	7.80	7.85	7.92	8.05	8.17	8.29	8.42	1231
6' 0"	8.36	8.42	8.48	8.64	8.73	8.85	8.98	1,303

CITY OF RANCHO CUCAMONGA
REINFORCED CONCRETE BOX CULVERT NO. 2
STANDARD PLAN NO. 315

CONSTRUCTION NOTES

(1b) CONSTRUCT 0.33' A.C. PAVING OVER 0.50' CLASS II AGGREGATE BASE, PER TYPICAL SECTION
(2a) CONSTRUCT TYPE 1 CURB & GUTTER 6" C.F. PER CITY OF RIVERSIDE STD. NO. 200
(2b) CONSTRUCT TYPE 1 CURB & GUTTER, 8" C.F. , PER CITY OF RIVERSIDE STD. NO. 200
(3) CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
(4) CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
(11) TO BE RELOCATED BY OTHERS
(13) SAWCUT MIN. 1' AND JOIN EXISTING PAVEMENT PER DETAIL ON SHEET 3
(14) CONSTRUCT CATCH BASIN (W=21') PER CITY OF RIVERSIDE STD. NO. 405
(15) CONSTRUCT REINF. CONC. DBL. BOX CULVERT NO. 2 PER CITY OF RANCHO CUCAMONGA STD. PLAN 315 - DETAIL AS SHOWN ON THIS SHEET: "S"= 6'-0", "V"= 0'-8"
(16) INSTALL 2' LIGHT CLASS NATURAL ROCK RIP-RAP W/ 6" FILTER (DIMENSION PER PLAN)
(17) INSTALL 3.5'X1' CUTOFF WALL (DIMENSION PER PLAN)
(19) CONSTRUCT STEEL GUARD RAIL PER CITY OF RIVERSIDE STD. DWG. NO. 650
(20) REMOVE EXISTING PAVEMENT

NOTE: THESE PLANS INCLUDE RIVERSIDE CO. TRANSPORTATION DEPARTMENT HALF WIDTH IMPROVEMENTS FOR LURIN AVENUE.

RIV. CO. # MS 3938 I.P. 040013

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
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227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

REGISTERED PROFESSIONAL ENGINEER KHALED A. DIWAN NO. 33950 EXP. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: _____ DATE 7/20/04
KHALED A. DIWAN, P.E.
R.C.E. 33950 EXP. 6-30-06
RECOMMENDED: WILLDAN _____ DATE 7/20/04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFREY NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY _____ DATE 6-14-04
R.C.E. NO. C49405
DESIGNED BY: J.M. CHECKED BY: L.M.

MARK	REVISIONS	APPR.	DATE

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		
PARK DEPARTMENT		
TRAFFIC DIVISION		
STREET SERVICES		
PLANNING DEPT.		

APPROVED BY _____ CITY ENGINEER
DATE 8/25/04

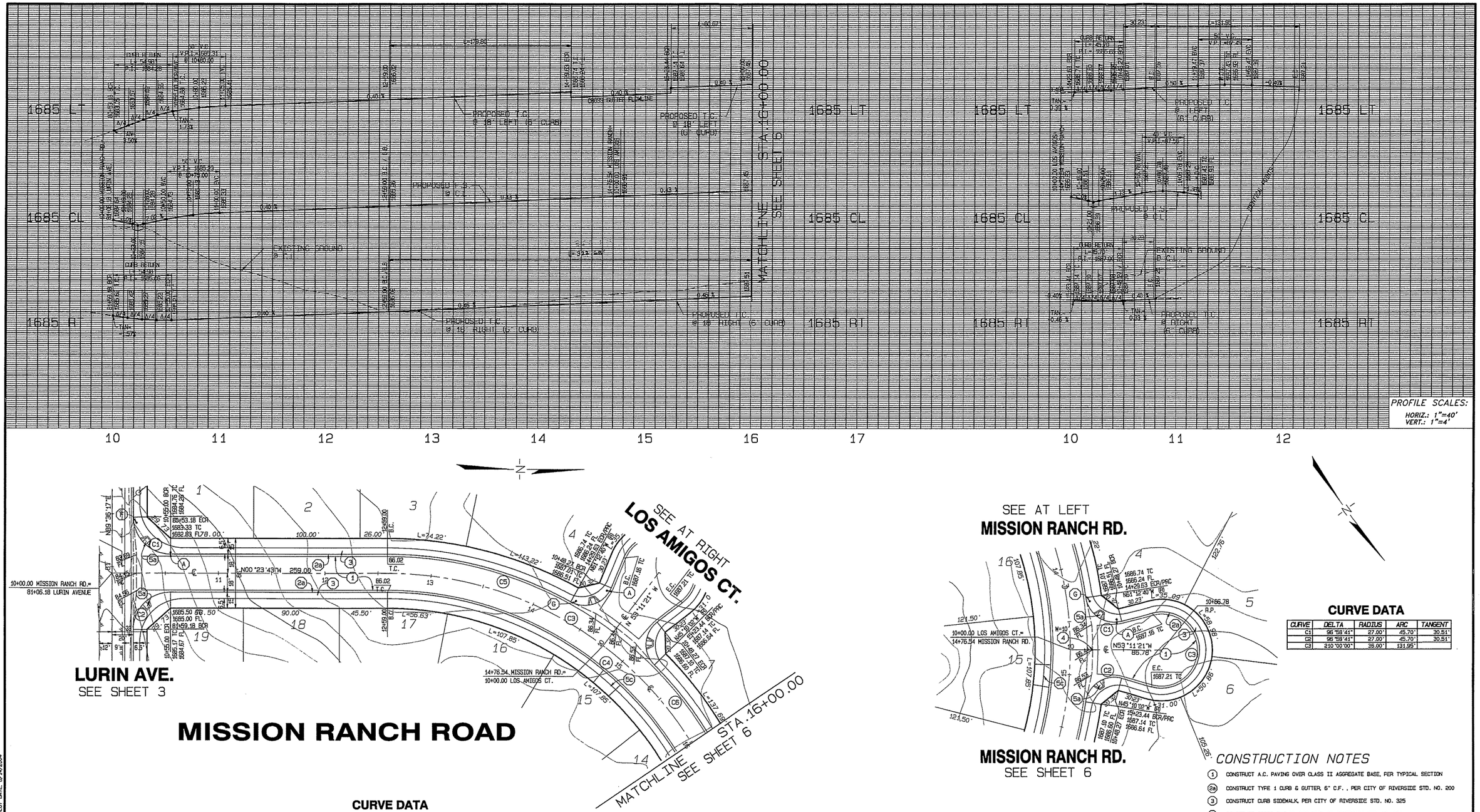
STREET IMPROVEMENT PLANS
TRACT NO. 31362
INCLUDES RIV. CO. TRANS. DEPT. MS # 3938
LURIN AVENUE
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 4 OF 7
PW 03-00504

PC 44 of 52

INDEXED 9-08-04 GH

FILE: G:\2003\03-0269\Streets\03-0269-Storm PLOT DATE: 6/14/2004



CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C1	90°00'00"	35.00'	54.98'	35.00'
C2	90°00'00"	35.00'	54.98'	35.00'
C3	58°19'19"	335.00'	341.00'	186.93'
C4	58°19'19"	317.00'	322.68'	176.89'
C5	29°11'02"	353.00'	179.80'	91.90'
C6	13°05'39"	353.00'	80.67'	40.51'

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C1	96°58'41"	27.00'	45.70'	30.51'
C2	96°58'41"	27.00'	45.70'	30.51'
C3	210°00'00"	35.00'	131.95'	

CONSTRUCTION NOTES

1. CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION
2a. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
4. CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
5a. CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304
5c. CONSTRUCT WHEELCHAIR RAMP, TYPE VII W/ CURB SIDE SW, PER CITY OF RIVERSIDE STD. NO. 304

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CALL: TOLL FREE
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227-2600
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BENCH MARK:
CITY OF RIVERSIDE BENCH MARK GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.
ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFERY NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY [signature] DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	APPROVED BY	DATE
PRINCIPAL ENGINEER	[signature]	6/24/04
PARK DEPARTMENT	—	—
TRAFFIC DIVISION	[signature]	6/24/04
STREET SERVICES	[signature]	6/23/04

APPROVED BY [signature] CITY ENGINEER
DATE 6/26/04

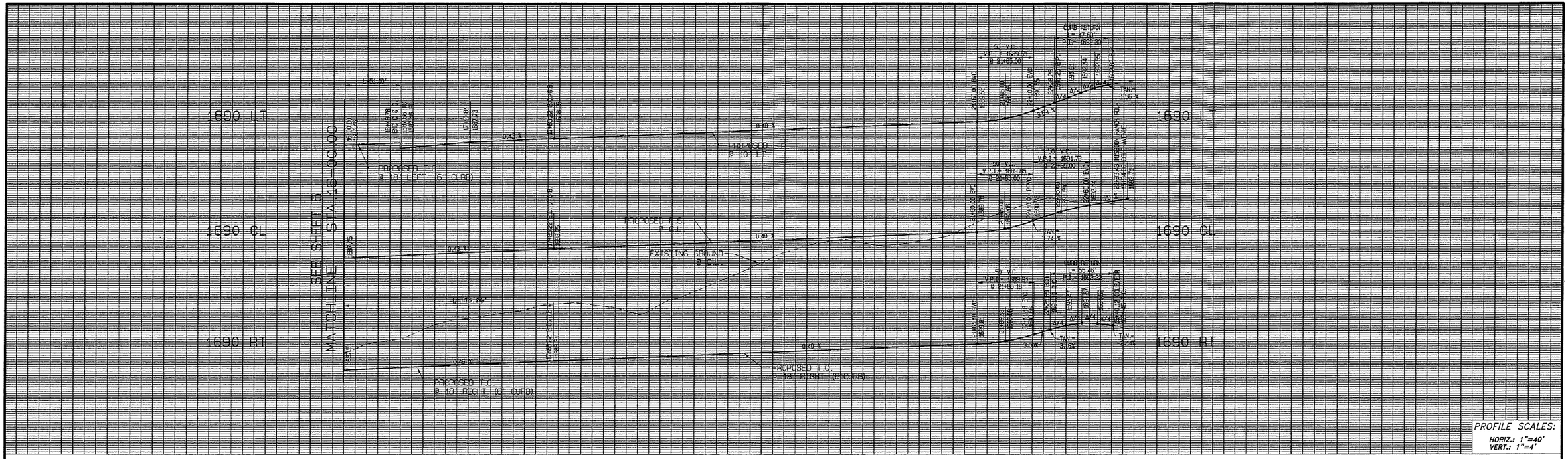
STREET IMPROVEMENT PLANS
TRACT NO. 31362
MISSION RANCH RD.
LOS AMIGOS CT.
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 5 OF 7
PW 03-00504

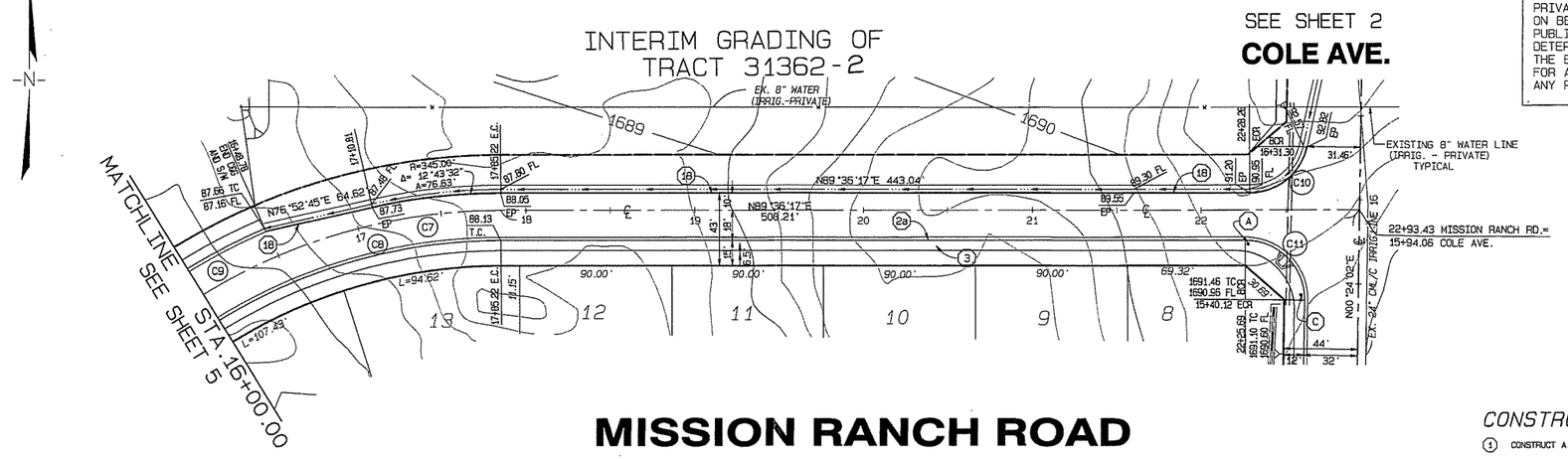
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Pc 44 of 52

INDEXED 9-08-04 LH



PROFILE SCALES:
HORIZ.: 1"=40'
VERT.: 1"=4'



NOTE:
PRIVATE WATER LINES ARE SHOWN BASED ON BEST AVAILABLE INFORMATION. NO PUBLIC RECORDS HAVE BEEN FOUND TO DETERMINE OWNERSHIP, OR RIGHTS THERETO. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR ANY CHANGES TO, OR REMOVAL OF, ANY PRIVATE WATER LINES.

MISSION RANCH ROAD

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C7	31°49'41"	335.00'	185.22'	95.04'
C8	31°40'41"	317.00'	175.25'	89.94'
C9	8°20'35"	353.00'	51.40'	25.75'
C10	77°55'30"	35.00'	47.60'	28.30'
C11	90°47'45"	35.00'	55.46'	35.49'

CONSTRUCTION NOTES

1. CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION
2a. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
4. CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
18. CONSTRUCT 2 x 4 REDWOOD HEADER ALONG EDGE OF PAVEMENT

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BENCH MARK:
CITY OF RIVERSIDE BENCH MARK GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.
ELEVATION: 1757.219

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER
HUA LIN McCRAFFREY
NO. C49405
EXP. 9-30-04
CIVIL
STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY [signature] DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		8/26/04
PARK DEPARTMENT		
TRAFFIC DIVISION		8/25/04
STREET SERVICES		8/25/04

APPROVED BY [signature] CITY ENGINEER
DATE 8/26/04

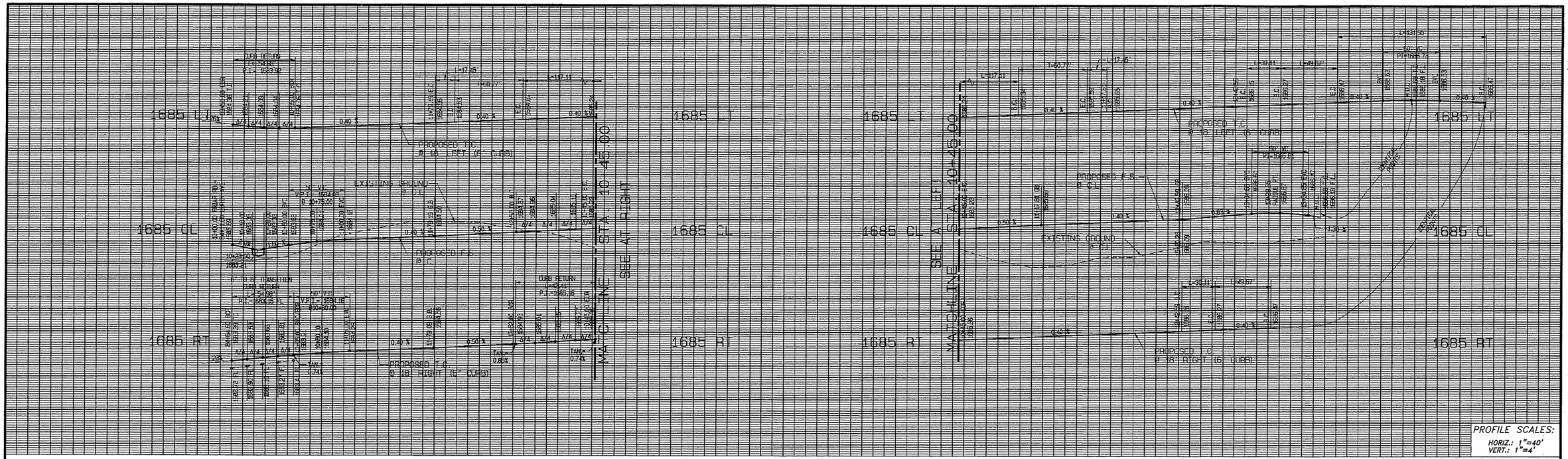
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TRACT NO. 31362
MISSION RANCH RD.
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

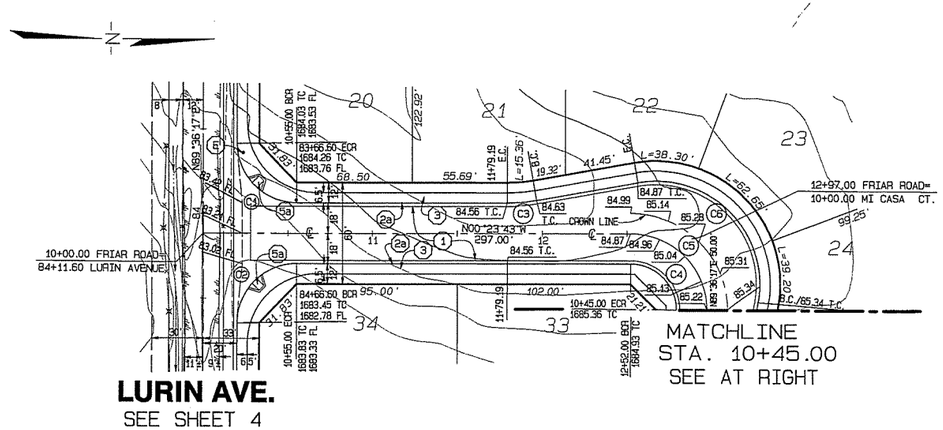
ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 6 OF 7
PW 03-00504

FILE: G:\2003\03-0269\Streets\03-0269-Str.dgn PLOT DATE: 6/14/2004

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INDEXED 9-08-04 LH





LURIN AVE.
SEE SHEET 4

FRIAR ROAD

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C1	90°00'00"	35.00'	54.98'	35.00'
C2	90°00'00"	35.00'	54.98'	35.00'
C3	10°00'00"	100.00'	17.45'	8.75'
C4	90°00'00"	27.00'	42.41'	27.00'
C5	90°00'00"	45.00'	70.69'	45.00'
C6	110°00'00"	61.00'	117.11'	87.12'

MI CASA COURT

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C7	10°00'00"	100.00'	17.45'	8.75'
C8	15°00'00"	115.00'	30.11'	15.14'
C9	15°00'00"	115.00'	30.11'	15.14'
C10	210°00'00"	36.00'	131.95'	

CONSTRUCTION NOTES

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3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
5a. CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304

PROFILE SCALES:
HORIZ.: 1"=40'
VERT.: 1"=4'

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BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER
IAN LIN McCRAFFREY
NO. C49405
EXP. 9-30-04
CIVIL
STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070

APPROVED BY [signature] DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		6/15/04
PARK DEPARTMENT		
TRAFFIC DIVISION		7/15/04
STREET SERVICES		7/13/04

APPROVED BY [signature] CITY ENGINEER
DATE 8/26/04

STREET IMPROVEMENT PLANS

TRACT NO. 31362
FRIAR ROAD
MI CASA COURT

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 7 OF 7
PW 03-00504

PC 4404 S2

INDEXED 9-08-04 LH

FILE: G:\2003\03-0269\Streets\03-0269-Str.pro PLOT DATE: 6/14/2004

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

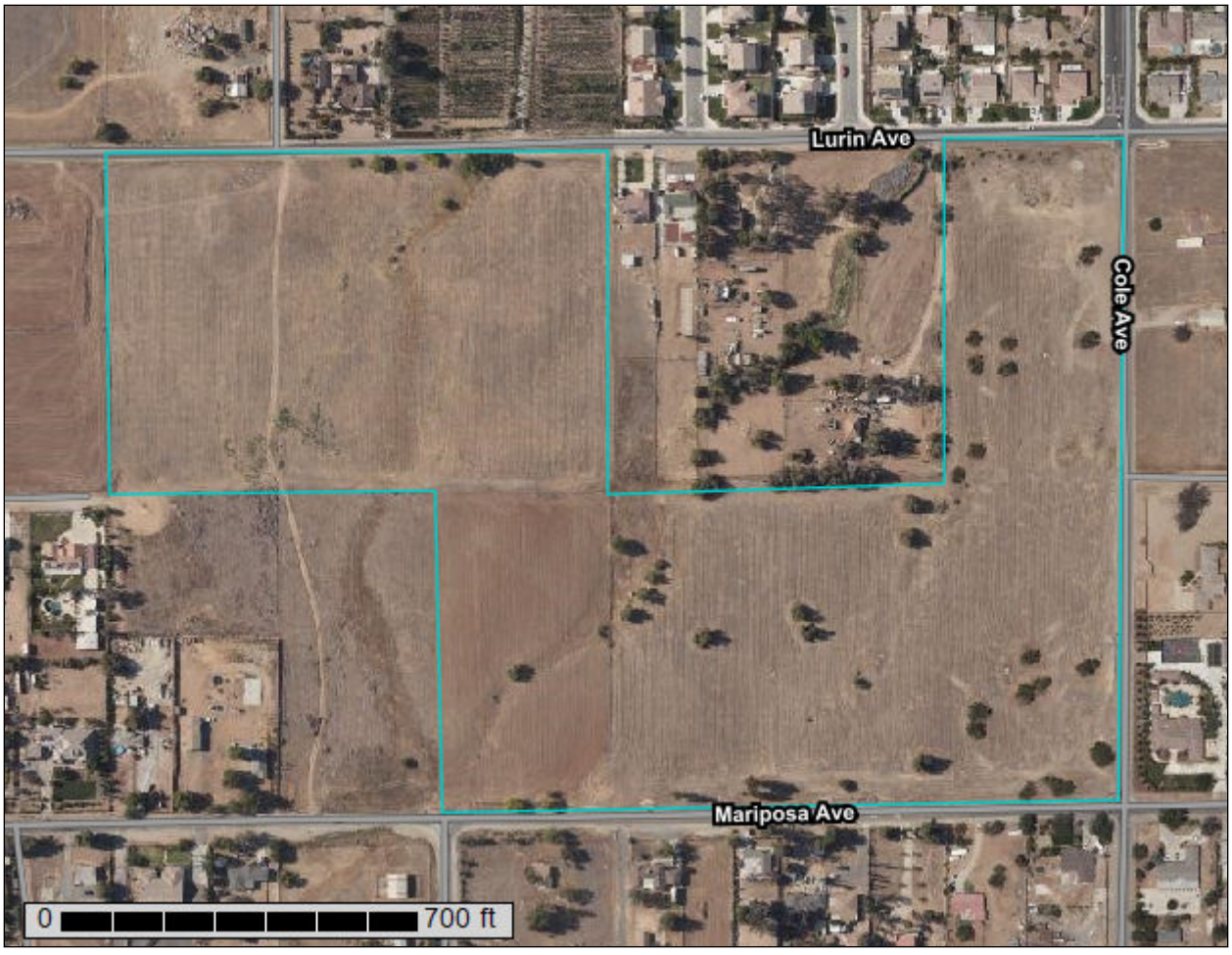
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Western Riverside Area, California



January 6, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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 1:15,800.

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: Western Riverside Area, California
Survey Area Data: Version 12, Sep 16, 2019

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

Date(s) aerial images were photographed: Apr 17, 2018—Jun 28, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FbC2	Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded	4.6	11.7%
FfC2	Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded	26.9	68.1%
MmB	Monserate sandy loam, 0 to 5 percent slopes	8.0	20.3%
Totals for Area of Interest		**39.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Western Riverside Area, California

FbC2—Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded

Map Unit Setting

National map unit symbol: hctr
Elevation: 300 to 2,000 feet
Mean annual precipitation: 12 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Fallbrook

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from tonalite and/or residuum weathered from granodiorite

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 18 inches: sandy clay loam
H3 - 18 to 22 inches: bedrock

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: SHALLOW LOAMY (1975) (R019XD060CA)
Hydric soil rating: No

Minor Components

Cieneba

Percent of map unit: 5 percent

Hydric soil rating: No

Bonsall

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

Vista

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

FfC2—Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded

Map Unit Setting

National map unit symbol: hctw
Elevation: 300 to 2,000 feet
Mean annual precipitation: 12 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Fallbrook

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granodiorite and/or residuum weathered from tonalite

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 24 inches: sandy clay loam
H3 - 24 to 28 inches: bedrock

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: LOAMY (1975) (R019XD029CA)
Hydric soil rating: No

Minor Components

Bonsall

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

Cieneba

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

Vista

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

MmB—Monserate sandy loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: hcx4
Elevation: 700 to 2,500 feet
Mean annual precipitation: 10 to 18 inches
Mean annual air temperature: 63 to 64 degrees F
Frost-free period: 220 to 280 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Monserate

Setting

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

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 28 inches: sandy clay loam
H3 - 28 to 45 inches: indurated
H4 - 45 to 57 inches: cemented

H5 - 57 to 70 inches: loamy coarse sand, coarse sandy loam
H5 - 57 to 70 inches:

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: 20 to 39 inches to duripan
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: LOAMY (1975) (R019XD029CA)
Hydric soil rating: No

Minor Components

Tujunga

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

Hanford

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

Greenfield

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

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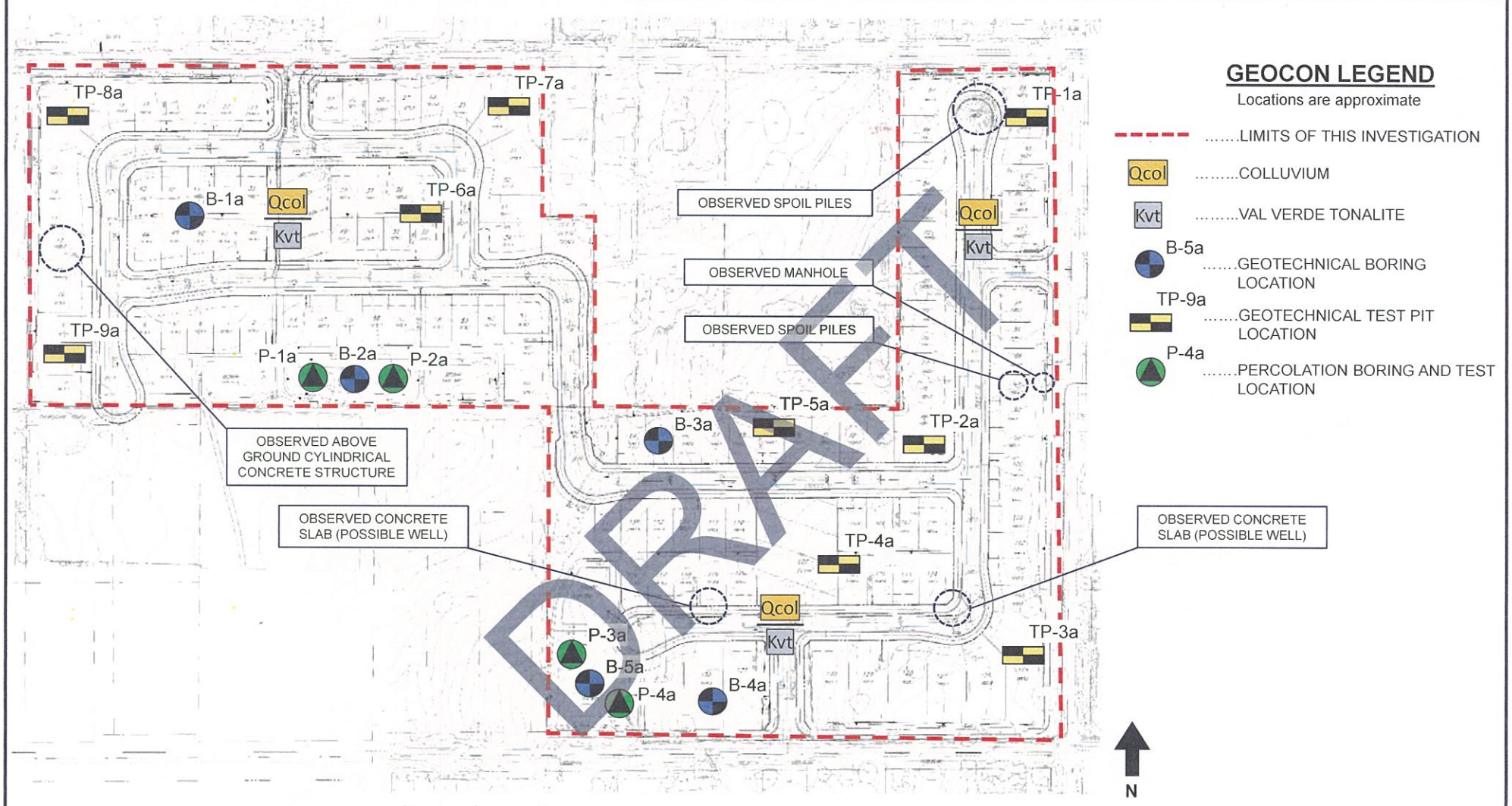
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SOURCE: KWC Engineers, 2019, Untitled Plan, Undated.

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ATS

GEOLOGIC MAP – TTM 37731

TTM 37731, TTM 37732, AND TTM 37733
COLE AVENUE, BARTON STREET, AND OBSIDIAN DRIVE
RIVERSIDE, CALIFORNIA

MAY 2019 | PROJECT NO. T2864-22-01 | FIG. 2a

PERCOLATION TEST REPORT

Project Name:	TTM 37731, TTM 37732, & TTM37733		**Project No.:**		T2864-22-01
Test Hole No.:	P-1a		**Date Excavated:**		4/30/2019
Length of Test Pipe:	24.0	inches	**Soil Classification:**		
Height of Pipe above Ground:	-2.4	inches	**Presoak Date:**		4/30/2019
Depth of Test Hole:	26.4	inches	**Perc Test Date:**		5/1/2019
Check for Sandy Soil Criteria Tested by:		ATS	**Percolation Tested by:**		ATS

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (inches)	Percolation Rate (min/inch)
1	7:53 AM 8:18 AM	25	25	9.6	9.6	0.0	No Rate
2	8:19 AM 8:44 AM	25	50	9.6	9.6	0.0	No Rate

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (inches)	Percolation Rate (min/inch)
1	9:11 AM 9:41 AM	30	30	9.6	9.6	0.0	No Rate
2	9:42 AM 10:12 AM	30	60	9.6	9.6	0.0	No Rate
3	10:13 AM 10:43 AM	30	90	9.6	9.6	0.0	No Rate
4	10:44 AM 11:14 AM	30	120	9.6	9.6	0.0	No Rate
5	11:15 AM 11:45 AM	30	150	9.6	9.6	0.0	No Rate
6	11:46 AM 12:16 PM	30	180	9.6	9.6	0.0	No Rate
7	12:17 PM 12:47 PM	30	210	9.6	9.6	0.0	No Rate
8	12:48 PM 1:18 PM	30	240	9.6	9.6	0.0	No Rate
9	1:19 PM 1:49 PM	30	270	9.6	9.6	0.0	No Rate
10	1:50 PM 2:20 PM	30	300	9.6	9.6	0.0	No Rate
11	2:21 PM 2:51 PM	30	330	9.6	9.6	0.0	No Rate
12	2:52 PM 3:22 PM	30	360	9.6	9.6	0.0	No Rate

Infiltration Rate (in/hr):	0.0
Radius of test hole (in):	4
Average Head (in):	9.6

Figure A-XX

DRAFT

PERCOLATION TEST REPORT

Project Name:	TTM 37731, TTM 37732, & TTM37733		**Project No.:**		T2864-22-01
Test Hole No.:	P-2a		**Date Excavated:**		4/30/2019
Length of Test Pipe:	32.4	inches	**Soil Classification:**		
Height of Pipe above Ground:	-1.2	inches	**Presoak Date:**		4/30/2019
Depth of Test Hole:	33.6	inches	**Perc Test Date:**		5/1/2019
Check for Sandy Soil Criteria Tested by:	ATS		**Percolation Tested by:**		ATS

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (inches)	Percolation Rate (min/inch)
1	8:00 AM 8:25 AM	25	25	10.8	0.0	10.8	2.3
2	8:26 AM 8:51 AM	25	50	10.8	1.2	9.6	2.6

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (inches)	Percolation Rate (min/inch)
1	9:06 AM 9:36 AM	30	30	10.8	1.2	9.6	3.1
2	9:37 AM 10:07 AM	30	60	10.8	2.4	8.4	3.6
3	10:08 AM 10:38 AM	30	90	10.8	3.6	7.2	4.2
4	10:39 AM 11:09 AM	30	120	10.8	4.2	6.6	4.5
5	11:10 AM 11:40 AM	30	150	10.8	4.8	6.0	5.0
6	11:41 AM 12:11 PM	30	180	10.8	5.4	5.4	5.6
7	12:12 PM 12:42 PM	30	210	10.8	4.8	6.0	5.0
8	12:43 PM 1:13 PM	30	240	10.8	4.8	6.0	5.0
9	1:14 PM 1:44 PM	30	270	10.8	6.0	4.8	6.3
10	1:45 PM 2:15 PM	30	300	10.8	6.0	4.8	6.3
11	2:16 PM 2:46 PM	30	330	10.8	6.0	4.8	6.3
12	2:47 PM 3:17 PM	30	360	10.8	6.0	4.8	6.3

Infiltration Rate (in/hr):	1.8	
Radius of test hole (in):	4	**Figure A-XX**
Average Head (in):	8.4	

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PERCOLATION TEST REPORT

Project Name:	TTM 37731, TTM 37732, & TTM37733		**Project No.:**		T2864-22-01
Test Hole No.:	P-3a		**Date Excavated:**		4/30/2019
Length of Test Pipe:	68.4	inches	**Soil Classification:**		
Height of Pipe above Ground:	10.8	inches	**Presoak Date:**		5/1/2019
Depth of Test Hole:	57.6	inches	**Perc Test Date:**		5/2/2019
Check for Sandy Soil Criteria Tested by:	ATS		**Percolation Tested by:**		ATS

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (inches)	Percolation Rate (min/inch)
1	6:49 AM 7:14 AM	25	25	22.8	16.8	6.0	4.2
2	7:15 AM 7:40 AM	25	50	22.8	18.0	4.8	5.2
			Soil Criteria: Normal				

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (inches)	Percolation Rate (min/inch)
1	8:26 AM 8:56 AM	30	30	22.8	19.2	3.6	8.3
2	8:57 AM 9:27 AM	30	60	22.8	19.2	3.6	8.3
3	9:28 AM 9:58 AM	30	90	22.8	19.2	3.6	8.3
4	9:59 AM 10:29 AM	30	120	22.8	19.2	3.6	8.3
5	10:30 AM 11:00 AM	30	150	22.8	19.2	3.6	8.3
6	11:01 AM 11:31 AM	30	180	22.8	19.2	3.6	8.3
7	11:32 AM 12:02 PM	30	210	22.8	19.2	3.6	8.3
8	12:03 PM 12:33 PM	30	240	22.8	19.2	3.6	8.3
9	12:34 PM 1:04 PM	30	270	22.8	19.8	3.0	10.0
10	1:05 PM 1:35 PM	30	300	22.8	19.8	3.0	10.0
11	1:36 PM 2:06 PM	30	330	22.8	19.8	3.0	10.0
12	2:07 PM 2:37 PM	30	360	22.8	19.8	3.0	10.0

Infiltration Rate (in/hr):	0.5	
Radius of test hole (in):	4	**Figure A-XX**
Average Head (in):	21.3	

DRAFT

PERCOLATION TEST REPORT

Project Name:	TTM 37731, TTM 37732, & TTM37733		**Project No.:**		T2864-22-01
Test Hole No.:	P-4a		**Date Excavated:**		4/30/2019
Length of Test Pipe:	96.0	inches	**Soil Classification:**		
Height of Pipe above Ground:	-1.2	inches	**Presoak Date:**		5/1/2019
Depth of Test Hole:	97.2	inches	**Perc Test Date:**		5/2/2019
Check for Sandy Soil Criteria Tested by:	ATS		**Percolation Tested by:**		ATS

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (inches)	Percolation Rate (min/inch)
1	6:53 AM 7:18 AM	25	25	10.8	14.4	3.6	6.9
2	7:19 AM 7:44 AM	25	50	13.2	12.0	1.2	20.8
			Soil Criteria: Normal				

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (inches)	Percolation Rate (min/inch)
1	8:31 AM 9:01 AM	30	30	21.6	15.6	6.0	5.0
2	9:02 AM 9:32 AM	30	60	21.6	18.0	3.6	8.3
3	9:33 AM 10:03 AM	30	90	21.6	17.4	4.2	7.1
4	10:04 AM 10:34 AM	30	120	21.6	9.6	12.0	2.5
5	10:35 AM 11:05 AM	30	150	21.6	10.8	10.8	2.8
6	11:06 AM 11:36 AM	30	180	21.6	9.6	12.0	2.5
7	11:37 AM 12:07 PM	30	210	21.6	9.6	12.0	2.5
8	12:08 PM 12:38 PM	30	240	21.6	9.6	12.0	2.5
9	12:39 PM 1:09 PM	30	270	21.6	9.0	12.6	2.4
10	1:10 PM 1:40 PM	30	300	21.6	9.6	12.0	2.5
11	1:41 PM 2:11 PM	30	330	21.6	9.6	12.0	2.5
12	2:12 PM 2:42 PM	30	360	21.6	9.6	12.0	2.5

Infiltration Rate (in/hr):	2.7	
Radius of test hole (in):	4	**Figure A-XX**
Average Head (in):	15.6	

DRAFT

Infiltration Summary

Bio-retention Basin 1A had two infiltration test done on or near the basin location which are P-1a and P-2a, and have an infiltration rate of 0.0 and 1.8 in/hr respectively. Averaging these rates yields a rate of 0.9 in/hr which is just under the feasibility of 1 in/hr for infiltration. Furthermore, since 0 in/hr was measured near the area a bio-retention with underdrains is proposed as safer BMP measure.

Infiltration Basin 2A had one infiltration test done on or near the basin location which was P-4a and had an infiltration rate of 2.7 in/hr. Since the infiltration is higher than the minimum 1 in/hr needed for infiltrating, a infiltration basin is proposed.

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Not Apply

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Not Apply

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
SITE
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | MORENO VALLEY | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | HEMET | CANYON LAKE | LAKE ELSINORE | MENIFEE | WILDOMAR | MURRIETA | TEMECULA

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: KWC Engineers — Date: 3/25/2020
Designed by: Hector Cardenas — Case No:
Company Project Number/Name: 2017.1713 City of Riverside

BMP Identification

BMP NAME / ID: Bio-Retention Basin 1A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.54 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Roofs	*204000*	*Roofs*	*1*	*0.89*	*181968*			
Dwy	*14960*	*Concrete or Asphalt*	*1*	*0.892*	*13344.3*			
Street	*191325*	*Concrete or Asphalt*	*1*	*0.892*	*170661.9*			
Open	*0*	*Natural (D Soil)*	*0.4*	*0.279712*	*0*			
Landscape	*406465*	*Ornamental Landscaping*	*0.1*	*0.110458*	*44897.3*			

Bioretention Facility - Design Procedure	BMP ID: A1	Legend:	Required Entries / Calculated Cells

Company Name: KWC Engineers — Date:

Designed by: Hector Cardenas — County/City Case No.:

Design Volume

Enter the area tributary to this feature — A_T = 18.75 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 18,489 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 2.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 85.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.49 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 12,395 ft^2

Proposed Surface Area — A= 12,659 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0.5 %

6" Check Dam Spacing — 0 feet

Describe Vegetation: Other

Notes: Total treatment volume provided is equal to 18,764 cu-ft.

WQMP BMP SIZING -Bioretention Facility BASIN A1
DATE OF LATEST REVISION: 3/24/2020

BASIN	BMP Design Volume Required Vbmp[1]	Basin Top Area	Basin Bottom Area	Basin Average Area	Basin Depth	Media Volume Provided	Basin Volume Provided	Total Basin Volume Provided	Total Basin Volume Provided
	(cu-ft)	(s.f.)	(s.f.)	(s.f.)	(ft)	(cu.ft)	(cu.ft)	(cu.ft)	(ac-ft)
BASIN A1	18,489	12,659	11,764	12,212	0.5	12,659	6,106	18,765	0.43

Assume Media: 24" sand filter media (30% void spacing) over 12" of gravel (40% void spacing)

Note:

1) See BMP Design Volume Worksheet for Vbmp calculations.

Bioretention Facility Design: (4:1 Side Slope)

Tributary Area, A_T=	816,750	sf	
Design Volume, V_{BMP}=	18,489	cf	
Depth of Eng. Soil, d_S=	2	ft	
Depth of Ponding, d_P=	0.5	ft	
Top Width, W_T=	85	ft	
Total Effective Depth, d_E=	1.49	ft	(note: calculated using LID Bioretention Facility design equation)
Min. Surface Area Req'd, A_M=	12,394	sf	(note: calculated using LID Bioretention Facility design equation)
Min. Surface Area Provided=	12,659	sf	(greater than required, okay)

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: KWC Engineers — Date: 3/24/2020
Designed by: Hector Cardenas — Case No:
Company Project Number/Name: 2017.1713 City of Riverside

BMP Identification

BMP NAME / ID: Infiltration Basin 2A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.54 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
Roofs	*127200*	*Roofs*	*1*	*0.89*	*113462.4*			
Dwy	*9328*	*Concrete or Asphalt*	*1*	*0.892*	*8320.6*			
Street	*137698*	*Concrete or Asphalt*	*1*	*0.892*	*122826.6*			
Open	*0*	*Natural (D Soil)*	*0.4*	*0.279712*	*0*			
Landscape	*326902*	*Ornamental Landscaping*	*0.1*	*0.110458*	*36108.9*			

Infiltration Basin - Design Procedure (Rev. 03-2012)	BMP ID	Legend:	Required Entries / Calculated Cells

Company Name: KWC Engineers — Date: 6/6/2019

Designed by: Tony E — County/City Case No.:

Design Volume

a) Tributary area (BMP subarea)	A_T =	15.04	acres
b) Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	12,632	ft^3

Maximum Depth

a) Infiltration rate	I =	1	in/hr
b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook)	FS =	2	
c) Calculate D_1 $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times FS}$	D_1 =	3.0	ft
d) Enter the depth of freeboard (at least 1 ft)		1	ft
e) Enter depth to historic high ground water (measured from **top** of basin)		50	ft
f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin)		60	ft
g) D_2 is the smaller of: Depth to groundwater - (10 ft + freeboard) and Depth to impermeable layer - (5 ft + freeboard)	D_2 =	39.0	ft
h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet	D_{MAX} =	3.0	ft

Basin Geometry

a) Basin side slopes (no steeper than 4:1)	z =	4	:1
b) Proposed basin depth (excluding freeboard)	d_B =	2	ft
c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$)	A_S =	6316	ft^2
d) Proposed Design Surface Area	A_D =	19218	ft^2

Forebay

a) Forebay volume (minimum 0.5% V_{BMP})	Volume =	63	ft^3
b) Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =	1	ft
c) Forebay surface area (minimum)	Area =	63	ft^2
d) Full height notch-type weir	Width (W) =	6.0	in

Notes: Total treatment volume provided is equal to (21,466 + 17,070)/2 x 2 = 38,536 cu-ft.

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

NOAA Atlas 14, Volume 6, Version 2
Location name: Riverside, California, USA*
Latitude: 33.8729°, Longitude: -117.3139°
Elevation: 1743.86 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.088** (0.074-0.106)	**0.119** (0.099-0.144)	**0.162** (0.134-0.196)	**0.198** (0.164-0.243)	**0.252** (0.201-0.319)	**0.296** (0.230-0.383)	**0.342** (0.260-0.455)	**0.394** (0.291-0.539)	**0.468** (0.331-0.669)	**0.530** (0.361-0.785)
10-min	**0.126** (0.105-0.152)	**0.170** (0.142-0.206)	**0.232** (0.193-0.281)	**0.284** (0.235-0.348)	**0.361** (0.288-0.458)	**0.424** (0.330-0.549)	**0.491** (0.373-0.653)	**0.564** (0.416-0.772)	**0.671** (0.474-0.959)	**0.760** (0.518-1.13)
15-min	**0.152** (0.127-0.184)	**0.206** (0.172-0.249)	**0.280** (0.233-0.340)	**0.344** (0.284-0.421)	**0.436** (0.348-0.553)	**0.512** (0.399-0.664)	**0.594** (0.451-0.789)	**0.682** (0.504-0.934)	**0.811** (0.573-1.16)	**0.919** (0.626-1.36)
30-min	**0.232** (0.194-0.280)	**0.313** (0.261-0.379)	**0.425** (0.354-0.516)	**0.523** (0.431-0.640)	**0.663** (0.528-0.841)	**0.778** (0.607-1.01)	**0.902** (0.685-1.20)	**1.04** (0.765-1.42)	**1.23** (0.871-1.76)	**1.40** (0.951-2.07)
60-min	**0.331** (0.277-0.400)	**0.447** (0.373-0.541)	**0.608** (0.506-0.738)	**0.747** (0.616-0.915)	**0.948** (0.755-1.20)	**1.11** (0.867-1.44)	**1.29** (0.980-1.71)	**1.48** (1.09-2.03)	**1.76** (1.25-2.52)	**2.00** (1.36-2.96)
2-hr	**0.487** (0.407-0.588)	**0.637** (0.532-0.771)	**0.840** (0.699-1.02)	**1.01** (0.833-1.24)	**1.25** (0.995-1.58)	**1.44** (1.12-1.86)	**1.64** (1.24-2.18)	**1.85** (1.36-2.53)	**2.14** (1.52-3.06)	**2.38** (1.62-3.53)
3-hr	**0.596** (0.498-0.720)	**0.771** (0.644-0.934)	**1.01** (0.837-1.22)	**1.20** (0.991-1.47)	**1.47** (1.17-1.86)	**1.68** (1.31-2.18)	**1.90** (1.44-2.53)	**2.13** (1.57-2.92)	**2.45** (1.73-3.50)	**2.70** (1.84-4.01)
6-hr	**0.822** (0.687-0.994)	**1.06** (0.882-1.28)	**1.37** (1.14-1.66)	**1.62** (1.34-1.98)	**1.96** (1.56-2.49)	**2.23** (1.74-2.89)	**2.51** (1.90-3.33)	**2.79** (2.06-3.82)	**3.18** (2.25-4.54)	**3.49** (2.38-5.17)
12-hr	**1.07** (0.894-1.29)	**1.38** (1.15-1.67)	**1.79** (1.49-2.17)	**2.12** (1.75-2.59)	**2.57** (2.05-3.26)	**2.92** (2.28-3.79)	**3.28** (2.49-4.36)	**3.65** (2.70-5.00)	**4.16** (2.94-5.95)	**4.56** (3.11-6.76)
24-hr	**1.42** (1.25-1.64)	**1.85** (1.64-2.14)	**2.42** (2.13-2.80)	**2.89** (2.53-3.37)	**3.53** (2.99-4.26)	**4.03** (3.35-4.96)	**4.55** (3.68-5.73)	**5.08** (4.01-6.58)	**5.81** (4.40-7.83)	**6.39** (4.68-8.91)
2-day	**1.70** (1.51-1.96)	**2.26** (2.00-2.61)	**3.00** (2.64-3.47)	**3.61** (3.16-4.22)	**4.46** (3.77-5.37)	**5.12** (4.24-6.29)	**5.80** (4.70-7.30)	**6.51** (5.13-8.42)	**7.49** (5.67-10.1)	**8.26** (6.05-11.5)
3-day	**1.82** (1.61-2.10)	**2.45** (2.17-2.83)	**3.29** (2.90-3.81)	**3.98** (3.48-4.65)	**4.94** (4.19-5.96)	**5.70** (4.73-7.01)	**6.48** (5.25-8.16)	**7.30** (5.76-9.45)	**8.44** (6.39-11.4)	**9.34** (6.84-13.0)
4-day	**1.97** (1.74-2.27)	**2.67** (2.36-3.09)	**3.61** (3.19-4.18)	**4.40** (3.85-5.13)	**5.49** (4.64-6.61)	**6.34** (5.26-7.80)	**7.23** (5.86-9.11)	**8.17** (6.44-10.6)	**9.46** (7.17-12.8)	**10.5** (7.69-14.6)
7-day	**2.23** (1.97-2.57)	**3.08** (2.72-3.55)	**4.22** (3.72-4.88)	**5.17** (4.52-6.04)	**6.51** (5.51-7.84)	**7.57** (6.28-9.31)	**8.67** (7.02-10.9)	**9.83** (7.75-12.7)	**11.5** (8.68-15.4)	**12.8** (9.35-17.8)
10-day	**2.39** (2.12-2.76)	**3.33** (2.95-3.85)	**4.61** (4.06-5.34)	**5.68** (4.96-6.63)	**7.18** (6.08-8.66)	**8.38** (6.95-10.3)	**9.63** (7.80-12.1)	**11.0** (8.64-14.2)	**12.8** (9.71-17.3)	**14.3** (10.5-20.0)
20-day	**2.85** (2.52-3.29)	**4.02** (3.56-4.64)	**5.62** (4.96-6.51)	**6.98** (6.10-8.15)	**8.91** (7.55-10.7)	**10.5** (8.68-12.9)	**12.1** (9.81-15.3)	**13.9** (10.9-18.0)	**16.4** (12.4-22.1)	**18.4** (13.5-25.7)
30-day	**3.40** (3.01-3.92)	**4.79** (4.23-5.53)	**6.70** (5.90-7.75)	**8.33** (7.28-9.72)	**10.7** (9.04-12.9)	**12.6** (10.4-15.5)	**14.6** (11.8-18.4)	**16.8** (13.3-21.8)	**20.0** (15.1-26.9)	**22.6** (16.5-31.5)
45-day	**4.05** (3.58-4.67)	**5.63** (4.98-6.50)	**7.84** (6.91-9.07)	**9.74** (8.52-11.4)	**12.5** (10.6-15.1)	**14.8** (12.2-18.2)	**17.2** (13.9-21.7)	**19.9** (15.7-25.7)	**23.7** (18.0-32.0)	**27.0** (19.7-37.6)
60-day	**4.71** (4.16-5.43)	**6.45** (5.70-7.45)	**8.89** (7.84-10.3)	**11.0** (9.63-12.9)	**14.1** (11.9-17.0)	**16.7** (13.8-20.5)	**19.5** (15.8-24.5)	**22.5** (17.8-29.2)	**27.0** (20.5-36.4)	**30.8** (22.5-42.9)

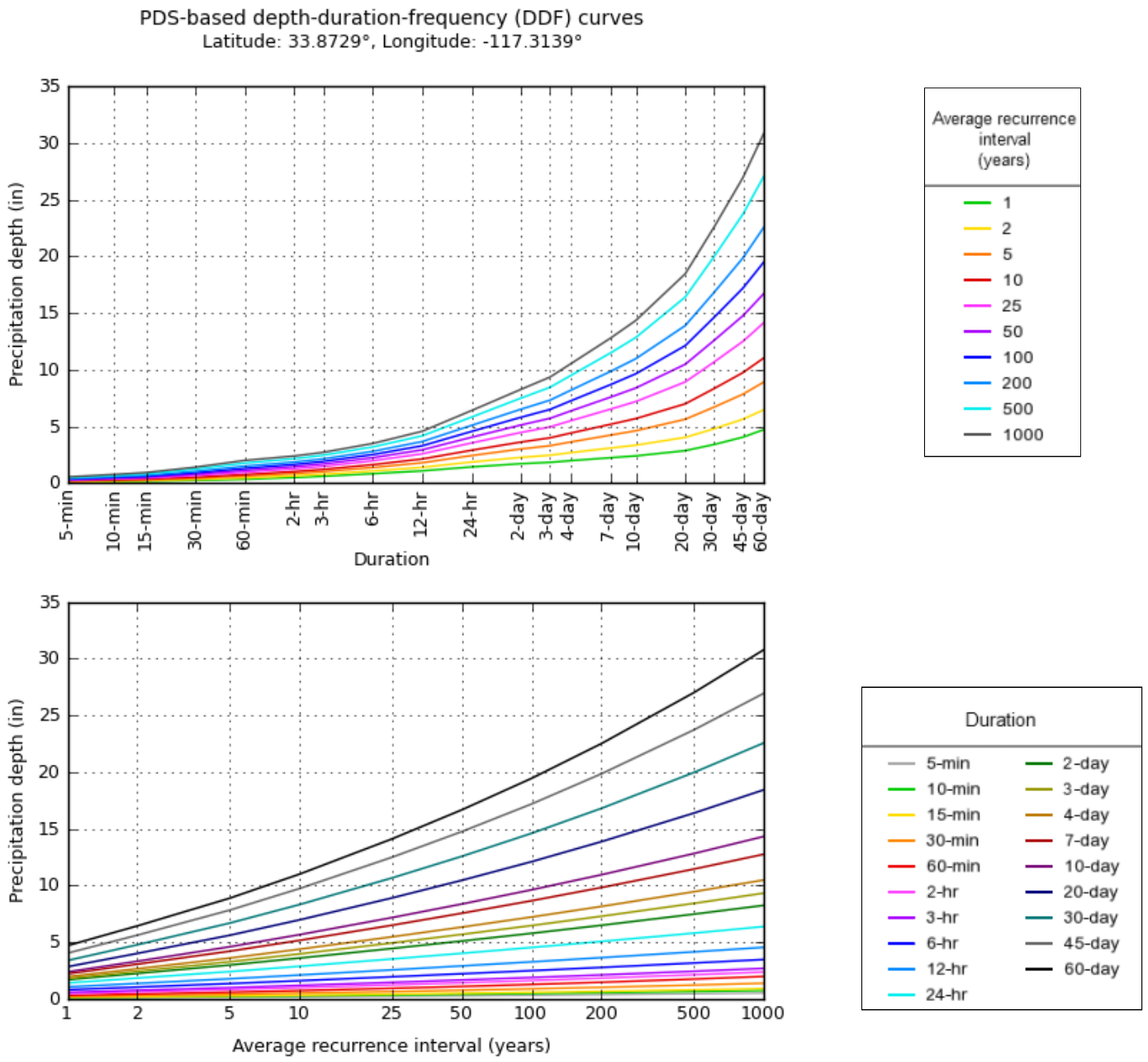
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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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PF graphical



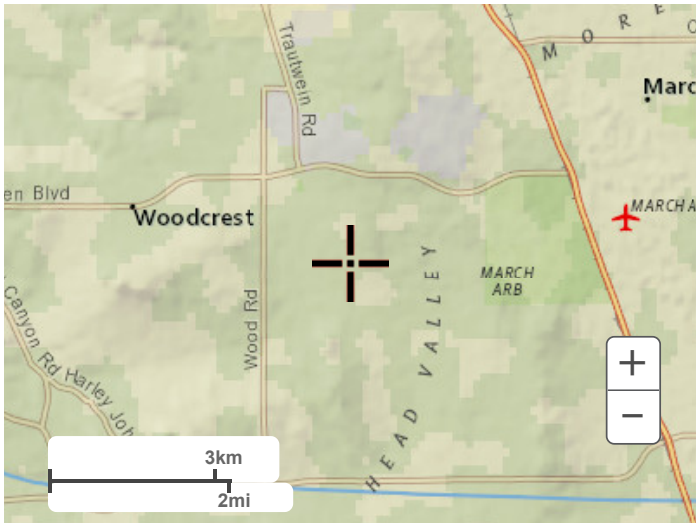
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Mon Jun 10 17:31:55 2019

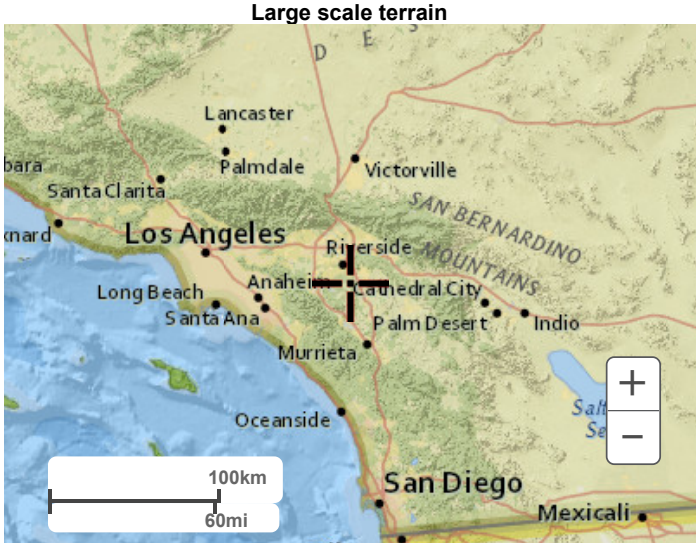
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Maps & aerials

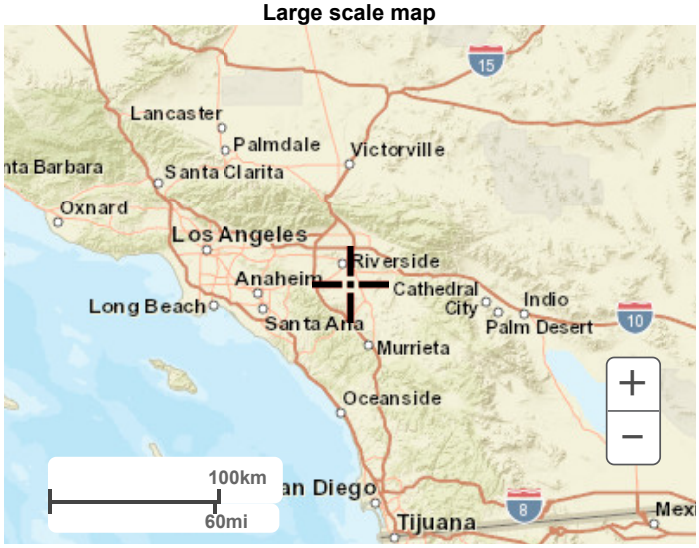
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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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

JURUPA VALLEY
EASTVALE
NORCO
PRADO DAM
CORONA
RIVERSIDE
ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
ZONE 7
LAKE MATHEWS
LAKE ELSINORE
CANYON LAKE
SITE
MORENO VALLEY
CALIMESA
BEAUMONT
BANNING
MYSTIC LAKE
SAN JACINTO
HEMET
PERRIS
MENIFEE
WILDOMAR
MURRIETA
DIAMOND VALLEY LAKE
LAKE PERRIS

Legend

Stream Type
- Not Susceptible Stream Channels
- Potentially Susceptible Stream Channels
- Large River (Not Susceptible)
- Santa Ana River
- Adequate Sump

Watershed Areas
- Not Applicable Area
- Applicable Area
- Applicable Area Watershed Boundaries

- Flood Control and Water Conservation District Boundary
- Study Area
- County Boundary

0 1 2 3 4 Miles

HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

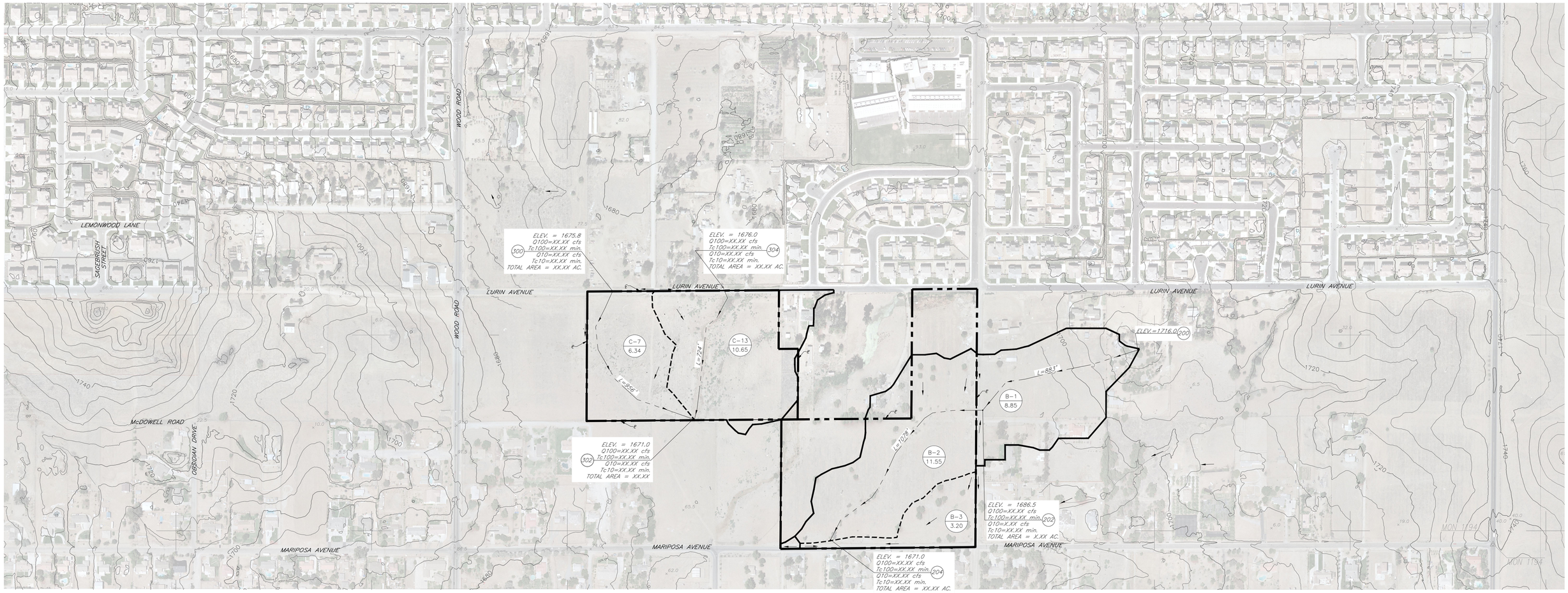
Map 2

200' 0 200' 400' 600'

SCALE IN FEET



VICINITY MAP



LEGEND

- MAJOR WATERSHED BOUNDARY
- SUB DRAINAGE AREA BOUNDARY
- FLOW PATH
- DIRECTION OF FLOW
- C17 / 70.21 — DRAINAGE AREA DESIGNATION / ACRES
- 340 — NODE DESIGNATION
- L=300' — LENGTH OF EXISTING FLOW PATH
- Q_{100} — CALCULATED 100-YEAR STORM RUNOFF
- Q_{10} — CALCULATED 10-YEAR STORM RUNOFF

SOIL TYPE "C"

FIGURE 5

UNIT HYDROGRAPH
EXISTING CONDITION
HYDROLOGY KEY MAP
FOR
SWC OF COLE AVE. AND
LURIN AVE. PROJECT SITE

CITY OF RIVERSIDE, COUNTY RIVERSIDE

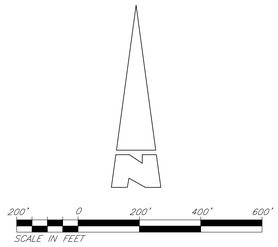
PREPARED BY:

KWC ENGINEERS

CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA 92881-3370 951-734-2130

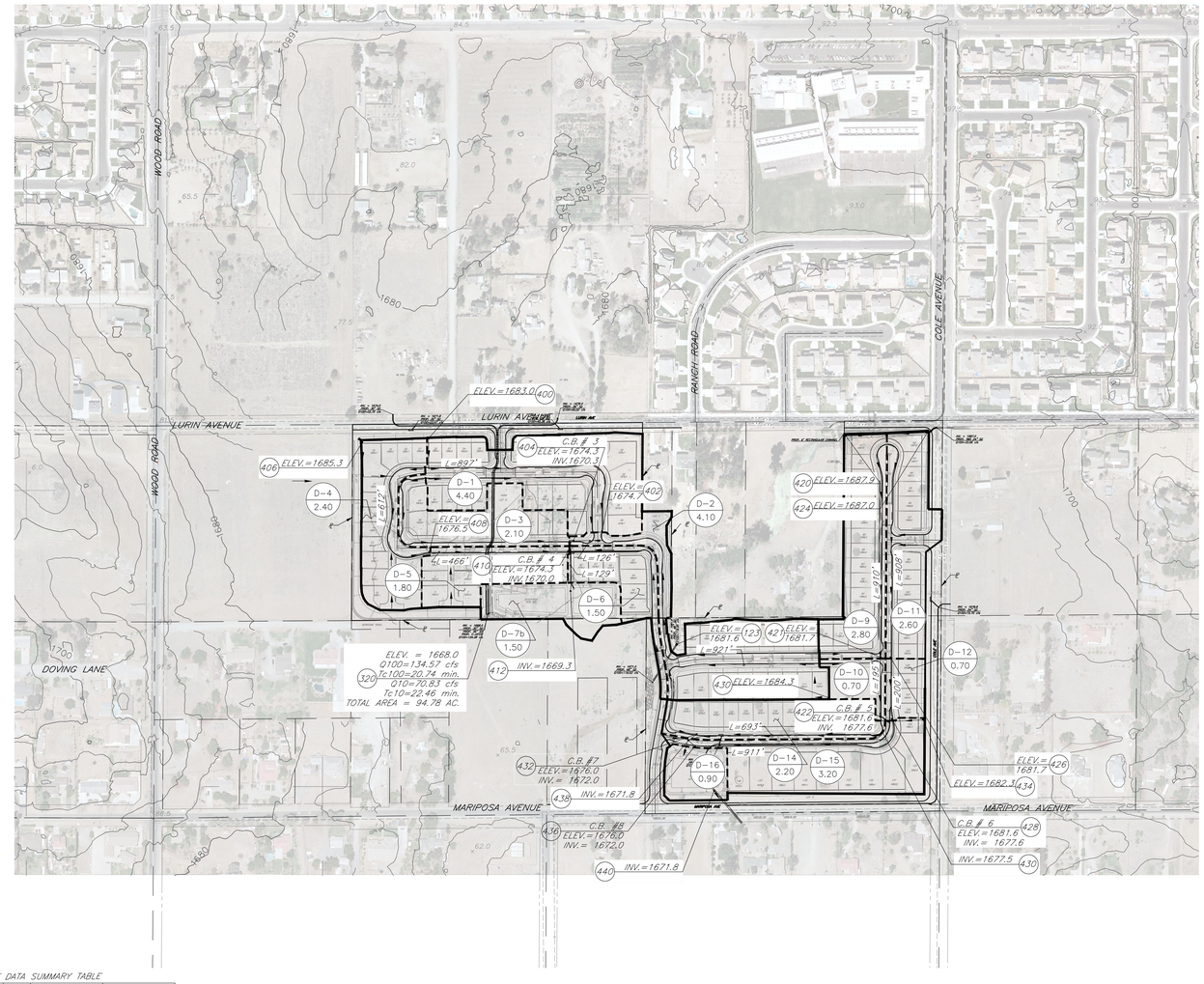
SHEET 1 OF 1 SHEETS

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VICINITY MAP



LEGEND

- MAJOR WATERSHED BOUNDARY
- SUB DRAINAGE AREA BOUNDARY
- FLOW PATH
- DIRECTION OF FLOW
- C17 / 70.21 — DRAINAGE AREA DESIGNATION / ACRES
- 340 — NODE DESIGNATION
- L=300' — LENGTH OF EXISTING FLOW PATH
- Q_{100} — CALCULATED 100-YEAR STORM RUNOFF
- Q_{10} — CALCULATED 10-YEAR STORM RUNOFF

SOIL TYPE "c"

ONSITE HYDROLOGY RESULT DATA SUMMARY TABLE

NODE #	Q10 cfs	Tc10 min.	Q100 cfs	Tc100 min.	CATCH BASIN CONDITION	DOWNSTREAM CONDITION
313.2	0.46	17.39	0.73	33.58	C.B.#1-SUMP	STORM DRAIN
313.4	12.46	17.39	26.12	33.58	–	STORM DRAIN
318.2	2.04	22.57	3.13	21.51	C.B.#2-SUMP	STORM DRAIN
318.4	26.62	22.57	48.64	21.51	–	STORM DRAIN
404	6.76	16.42	12.05	16.15	C.B.#3-SUMP	STORM DRAIN
410	6.06	16.65	10.86	15.94	C.B.#4-SUMP	STORM DRAIN
Σ 410	12.78	16.53	22.80	16.25	–	BASIN
422	3.34	20.67	6.00	19.74	C.B.#5-FLOWBY	STORM DRAIN
428	3.08	21.47	5.55	20.48	C.B.#6-FLOWBY	STORM DRAIN
430	6.30	20.77	11.33	19.83	–	STORM DRAIN
432	4.07	15.34	7.23	15.34	C.B.#7-SUMP	STORM DRAIN
436	3.15	16.10	5.62	16.10	C.B.#8-SUMP	STORM DRAIN
438	12.20	22.78	22.15	21.57	–	BASIN
440	12.91	22.78	23.48	21.57	–	STORM DRAIN
450	0.79	14.36	1.17	14.35	C.B.#9-SUMP	STORM DRAIN
456	3.85	12.49	5.71	12.49	C.B.#10-SUMP	STORM DRAIN
458	11.65	18.35	22.05	17.79	–	STORM DRAIN

FIGURE 6

UNIT HYDROGRAPH
PROPOSED CONDITION
HYDROLOGY KEY MAP
FOR
SWC OF COLE AVE. AND
LURIN AVE. PROJECT SITE

CITY OF RIVERSIDE, COUNTY RIVERSIDE

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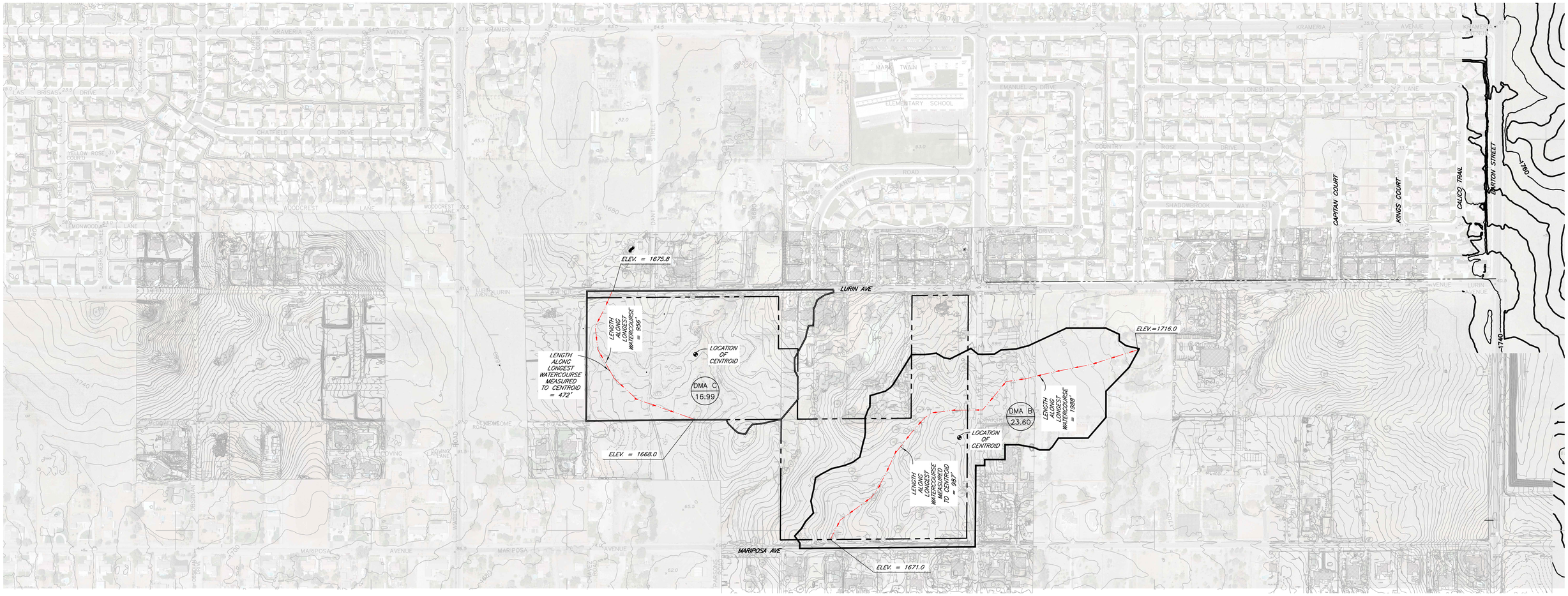
SHEET 1 OF 1 SHEETS

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VICINITY MAP



LEGEND

- TRACT BOUNDARY
- TRIBUTARY AREA BOUNDARY
- DIRECTION OF FLOW
- DMA 1A / 3.00 — DMA NUMBER / TRIBUTARY AREA (ACRES)
- CENTROID LOCATION

N

100' 0 100' 200' 300'
SCALE IN FEET

PRE-DEVELOPMENT CONDITION UNIT HYDROGRAPH

FOR

TTM NO. 37731

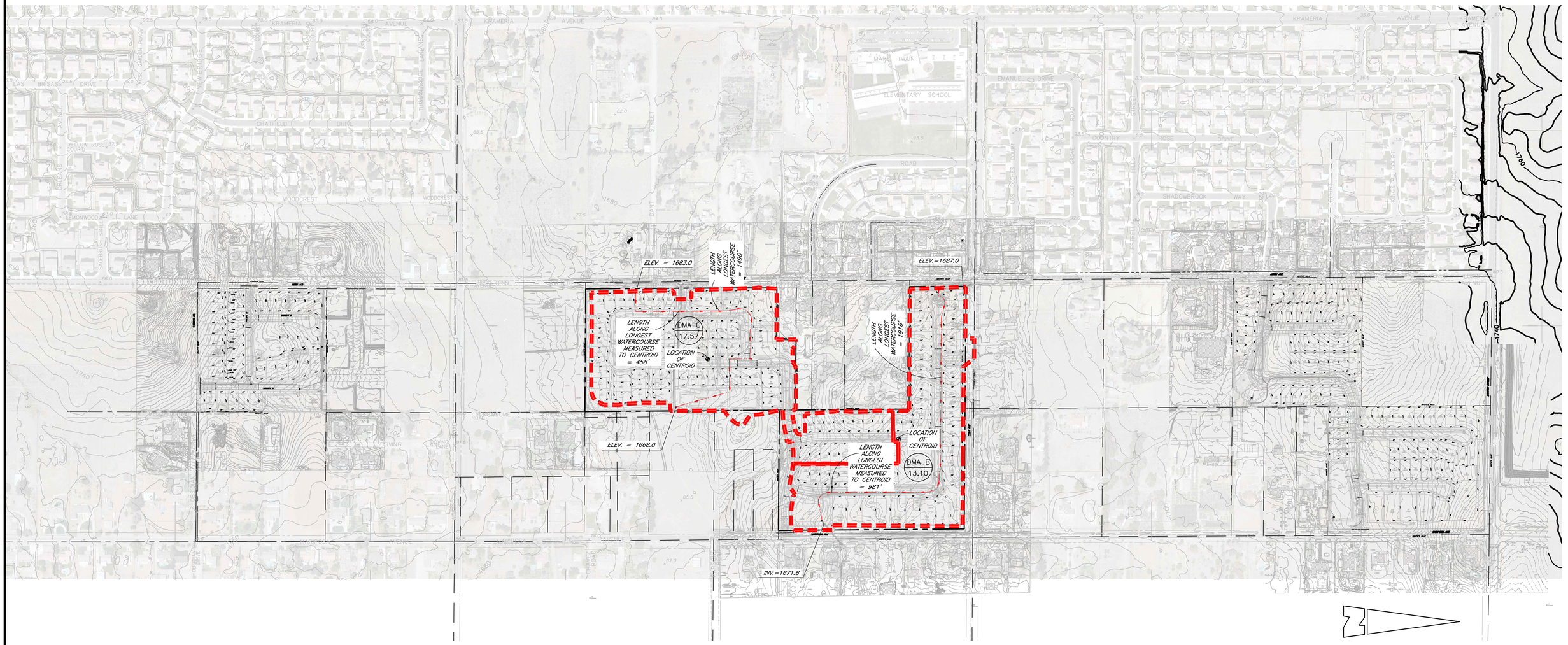
RIVERSIDE, CALIFORNIA

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SHEET 1 OF 1 SHEETS



VICINITY MAP



100' 0 100' 200' 300'

SCALE IN FEET

LEGEND

- TRACT BOUNDARY
- TRIBUTARY AREA BOUNDARY
- DIRECTION OF FLOW
- DMA 1A / 3.00 — DMA NUMBER / TRIBUTARY AREA (ACRES)
- CENTROID LOCATION

POST-DEVELOPMENT CONDITION UNIT HYDROGRAPH

FOR

TTM NO. 37731

RIVERSIDE, CALIFORNIA

PREPARED BY:

KWC ENGINEERS

CIVIL ENGINEERS • PLANNERS • SURVEYORS

1880 COMPTON AVENUE, SUITE 100 CORONA, CA. 92881-3370 951-734-2130

SHEET 1 OF 1 SHEETS

Unit Hydrograph Rational Method

Existing

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/21/19 File:e1713q2b.out

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2 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
EXISTING CONDITION AREA B

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.490(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 200.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 883.000(Ft.)
Top (of initial area) elevation = 1716.000(Ft.)
Bottom (of initial area) elevation = 1686.500(Ft.)
Difference in elevation = 29.500(Ft.)
Slope = 0.03341 s(percent)= 3.34
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.284 min.
Rainfall intensity = 1.080(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.501
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.800; Impervious fraction = 0.200

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Initial subarea runoff =      4.784(CFS)
Total initial stream area =        8.850(Ac.)
Pervious area fraction = 0.800


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Process from Point/Station      202.000 to Point/Station      204.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =   1686.500(Ft.)
End of natural channel elevation =   1671.000(Ft.)
Length of natural channel  =  1078.000(Ft.)
Estimated mean flow rate at midpoint of channel =      7.906(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0144
Corrected/adjusted channel slope =  0.0144
Travel time =    6.36 min.     TC =   20.64  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.563
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.882(In/Hr) for a     2.0 year storm
Subarea runoff =      5.729(CFS) for     11.550(Ac.)
Total runoff =     10.514(CFS)   Total area =      20.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.563
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    20.64 min.
Rainfall intensity =      0.882(In/Hr) for a     2.0 year storm
Subarea runoff =      1.587(CFS) for      3.200(Ac.)
Total runoff =     12.101(CFS)   Total area =      23.600(Ac.)
End of computations, total study area =           23.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.925
Area averaged RI index number =  79.6
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/21/19 File:e1713q2c.out

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2 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF COLE AND LURIN AVENUE PROJECT SITE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
EXISTING CONDITION AREA C

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.490(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 304.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 724.000(Ft.)
Top (of initial area) elevation = 1676.000(Ft.)
Bottom (of initial area) elevation = 1671.000(Ft.)
Difference in elevation = 5.000(Ft.)
Slope = 0.00691 s(percent)= 0.69
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.968 min.
Rainfall intensity = 0.898(In/Hr) for a 2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.566
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 71.60
Pervious area fraction = 1.000; Impervious fraction = 0.000

```
Initial subarea runoff =      5.417(CFS)
Total initial stream area =       10.650(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      302.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.566
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  71.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    19.97 min.
Rainfall intensity =      0.898(In/Hr) for a     2.0 year storm
Subarea runoff =      3.225(CFS) for      6.340(Ac.)
Total runoff =      8.642(CFS)   Total area =      16.990(Ac.)
End of computations, total study area =           16.99 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  86.0
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Proposed

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/24/19 File:p1713q2b.out

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2 YEAR STORM EVENT HYDROLOGY ANALYSIS
SWC OF LURIN AND COLE AVENUE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
PROPOSED CONDITION AREA B

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.490(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 420.000 to Point/Station 421.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 910.000(Ft.)
Top (of initial area) elevation = 1687.900(Ft.)
Bottom (of initial area) elevation = 1681.700(Ft.)
Difference in elevation = 6.200(Ft.)
Slope = 0.00681 s(percent)= 0.68
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.144 min.
Rainfall intensity = 1.009(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.643
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500

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Initial subarea runoff =      1.817(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      421.000 to Point/Station      422.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      2.044(CFS)
Depth of flow =   0.347(Ft.), Average velocity =   0.611(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   0.61(Ft/s)
Travel time =    5.32 min.     TC =   21.47  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.626
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.863(In/Hr) for a     2.0 year storm
Subarea runoff =      0.378(CFS) for      0.700(Ac.)
Total runoff =      2.195(CFS)    Total area =       3.500(Ac.)
Street flow at end of street =      2.195(CFS)
Half street flow at end of street =      2.195(CFS)
Depth of flow =   0.355(Ft.), Average velocity =   0.628(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station      422.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.195(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.195(CFS)
Normal flow depth in pipe =    9.38(In.)
Flow top width inside pipe =    9.92(In.)
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Critical Depth =    7.60(In.)
Pipe flow velocity =      3.33(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    21.59 min.


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Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.500(Ac.)
Runoff from this stream =      2.195(CFS)
Time of concentration =   21.59 min.
Rainfall intensity =     0.860(In/Hr)


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Process from Point/Station      424.000 to Point/Station      426.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   908.000(Ft.)
Top (of initial area) elevation =  1687.000(Ft.)
Bottom (of initial area) elevation =  1681.700(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00584  s(percent)=       0.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.636 min.
Rainfall intensity =      0.993(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.655(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      426.000 to Point/Station      428.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1681.700(Ft.)
End of street segment elevation =  1681.600(Ft.)
Length of street segment  =   200.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      1.878(CFS)
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Depth of flow =   0.339(Ft.), Average velocity =   0.587(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.929(Ft.)
Flow velocity =   0.59(Ft/s)
Travel time =    5.68 min.     TC =   22.32  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.624
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.845(In/Hr) for a     2.0 year storm
Subarea runoff =      0.369(CFS) for      0.700(Ac.)
Total runoff =      2.024(CFS)   Total area =       3.300(Ac.)
Street flow at end of street =      2.024(CFS)
Half street flow at end of street =      2.024(CFS)
Depth of flow =   0.347(Ft.), Average velocity =   0.604(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      428.000 to Point/Station      430.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1677.600(Ft.)
Downstream point/station elevation =  1677.500(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.024(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.024(CFS)
Normal flow depth in pipe =    8.54(In.)
Flow top width inside pipe =   14.86(In.)
Critical Depth =    6.80(In.)
Pipe flow velocity =      2.81(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    22.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      430.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.300(Ac.)
Runoff from this stream =      2.024(CFS)
Time of concentration =   22.55 min.
Rainfall intensity =     0.840(In/Hr)
Summary of stream data:

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


1        2.195     21.59                 0.860
2        2.024     22.55                 0.840
Largest stream flow has longer or shorter time of concentration
Qp =      2.195 + sum of
         Qa          Tb/Ta
          2.024 *    0.957 =      1.938
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Qp =      4.133

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.195       2.024
Area of streams before confluence:
        3.500        3.300
Results of confluence:
Total flow rate =      4.133(CFS)
Time of concentration =    21.585 min.
Effective stream area after confluence =      6.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      430.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1677.500(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =   693.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.133(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.133(CFS)
Normal flow depth in pipe =    9.29(In.)
Flow top width inside pipe =   14.57(In.)
Critical Depth =    9.88(In.)
Pipe flow velocity =      5.17(Ft/s)
Travel time through pipe =    2.23 min.
Time of concentration (TC) =    23.82 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.800(Ac.)
Runoff from this stream =      4.133(CFS)
Time of concentration =   23.82 min.
Rainfall intensity =     0.815(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      432.000 to Point/Station      432.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    23.82 min.
Rainfall intensity =      0.815(In/Hr) for a     2.0 year storm
Subarea runoff =      1.111(CFS) for      2.200(Ac.)
Total runoff =      1.111(CFS)   Total area =       9.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      432.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.111(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.111(CFS)
Normal flow depth in pipe =    6.61(In.)
Flow top width inside pipe =    7.95(In.)
Critical Depth =    5.81(In.)
Pipe flow velocity =      3.20(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    24.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      9.000(Ac.)
Runoff from this stream =      1.111(CFS)
Time of concentration =   24.00 min.
Rainfall intensity =     0.812(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      434.000 to Point/Station      436.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  1682.300(Ft.)
Bottom (of initial area) elevation =  1676.000(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.00692  s(percent)=       0.69
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.103 min.
Rainfall intensity =      1.011(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.643
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.080(CFS)
Total initial stream area =        3.200(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      436.000 to Point/Station      438.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1672.000(Ft.)
Downstream point/station elevation =  1671.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.080(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.080(CFS)
Normal flow depth in pipe =    7.50(In.)
Flow top width inside pipe =   11.62(In.)
```

```
Critical Depth =    7.40(In.)
Pipe flow velocity =      4.02(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    16.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      438.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      3.200(Ac.)
Runoff from this stream =      2.080(CFS)
Time of concentration =   16.23 min.
Rainfall intensity =     1.007(In/Hr)
Summary of stream data:

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


1        4.133     23.82                0.815
2        1.111     24.00                0.812
3        2.080     16.23                1.007
Largest stream flow has longer or shorter time of concentration
Qp =      4.133 + sum of
         Qa          Tb/Ta
          1.111 *    0.992 =      1.103
         Qb         Ia/Ib
          2.080 *    0.810 =      1.684
Qp =      6.920

Total of 3 streams to confluence:
Flow rates before confluence point:
       4.133       1.111       2.080
Area of streams before confluence:
        6.800        9.000        3.200
Results of confluence:
Total flow rate =      6.920(CFS)
Time of concentration =    23.818 min.
Effective stream area after confluence =     19.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      438.000 to Point/Station      440.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    23.82 min.
Rainfall intensity =      0.815(In/Hr) for a     2.0 year storm
Subarea runoff =      0.455(CFS) for      0.900(Ac.)
Total runoff =      7.375(CFS)   Total area =      19.900(Ac.)
End of computations, total study area =           13.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

Area averaged pervious area fraction(Ap) = 0.500
Area averaged RI index number = 69.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 06/24/19 File:p1713q2c.out

2
SWC OF LURIN AND COLE AVENUE
CITY OF RIVERSIDE, COUNTY OF RIVERSIDE
PROPOSED CONDITION AREA C

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

English (in-lb) Units used in input data file

Program License Serial Number 6062

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.490(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 400.000 to Point/Station 402.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 897.000(Ft.)
Top (of initial area) elevation = 1683.000(Ft.)
Bottom (of initial area) elevation = 1674.700(Ft.)
Difference in elevation = 8.300(Ft.)
Slope = 0.00925 s(percent)= 0.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 15.098 min.
Rainfall intensity = 1.047(In/Hr) for a 2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.647
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 49.80
Pervious area fraction = 0.500; Impervious fraction = 0.500

```
Initial subarea runoff =      2.982(CFS)
Total initial stream area =        4.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1674.700(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   126.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      4.331(CFS)
Depth of flow =   0.327(Ft.), Average velocity =   1.447(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.344(Ft.)
Flow velocity =   1.45(Ft/s)
Travel time =    1.45 min.     TC =   16.55  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.996(In/Hr) for a     2.0 year storm
Subarea runoff =      2.619(CFS) for      4.100(Ac.)
Total runoff =      5.600(CFS)    Total area =       8.500(Ac.)
Street flow at end of street =      5.600(CFS)
Half street flow at end of street =      5.600(CFS)
Depth of flow =   0.358(Ft.), Average velocity =   1.579(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      404.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.641
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    16.55 min.
```

```
Rainfall intensity =      0.996(In/Hr) for a     2.0 year storm
Subarea runoff =      1.341(CFS) for      2.100(Ac.)
Total runoff =      6.942(CFS)   Total area =      10.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      410.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1670.300(Ft.)
Downstream point/station elevation =  1670.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.942(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.942(CFS)
Normal flow depth in pipe =   11.57(In.)
Flow top width inside pipe =   17.25(In.)
Critical Depth =   12.25(In.)
Pipe flow velocity =      5.79(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    16.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     10.600(Ac.)
Runoff from this stream =      6.942(CFS)
Time of concentration =   16.66 min.
Rainfall intensity =     0.992(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      406.000 to Point/Station      408.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   612.000(Ft.)
Top (of initial area) elevation =  1685.300(Ft.)
Bottom (of initial area) elevation =  1676.500(Ft.)
Difference in elevation =     8.800(Ft.)
Slope =    0.01438  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.864 min.
Rainfall intensity =      1.196(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.662
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.899(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      408.000 to Point/Station      410.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
```

```
Top of street segment elevation =  1676.500(Ft.)
End of street segment elevation =  1674.300(Ft.)
Length of street segment  =   466.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =  16.500(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  =   6.500(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  0.125(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0180
 Manning's N from grade break to crown =  0.0180
Estimated mean flow rate at midpoint of street =      2.499(CFS)
Depth of flow =   0.243(Ft.), Average velocity =   1.467(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.108(Ft.)
Flow velocity =   1.47(Ft/s)
Travel time =    5.29 min.     TC =   17.16  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      0.976(In/Hr) for a     2.0 year storm
Subarea runoff =      1.123(CFS) for      1.800(Ac.)
Total runoff =      3.023(CFS)   Total area =       4.200(Ac.)
Street flow at end of street =      3.023(CFS)
Half street flow at end of street =      3.023(CFS)
Depth of flow =   0.262(Ft.), Average velocity =   1.537(Ft/s)
Flow width (from curb towards crown)=  14.074(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.16 min.
Rainfall intensity =      0.976(In/Hr) for a     2.0 year storm
Subarea runoff =      0.936(CFS) for      1.500(Ac.)
Total runoff =      3.959(CFS)   Total area =       5.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      410.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
```

```
Stream flow area =      5.700(Ac.)
Runoff from this stream =      3.959(CFS)
Time of concentration =   17.16 min.
Rainfall intensity =     0.976(In/Hr)
Summary of stream data:

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


1        6.942     16.66                 0.992
2        3.959     17.16                 0.976
Largest stream flow has longer or shorter time of concentration
Qp =      6.942 + sum of
         Qa          Tb/Ta
          3.959 *    0.971 =      3.844
Qp =     10.785

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.942       3.959
Area of streams before confluence:
       10.600        5.700
Results of confluence:
Total flow rate =     10.785(CFS)
Time of concentration =    16.659 min.
Effective stream area after confluence =     16.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      410.000 to Point/Station      412.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1670.000(Ft.)
Downstream point/station elevation =  1669.300(Ft.)
Pipe length  =   129.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.785(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.785(CFS)
Normal flow depth in pipe =   15.94(In.)
Flow top width inside pipe =   17.96(In.)
Critical Depth =   14.68(In.)
Pipe flow velocity =      5.51(Ft/s)
Travel time through pipe =    0.39 min.
Time of concentration (TC) =    17.05 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      412.000 to Point/Station      320.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.640
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  49.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.05 min.
Rainfall intensity =      0.980(In/Hr) for a     2.0 year storm
Subarea runoff =      0.940(CFS) for      1.500(Ac.)
Total runoff =     11.725(CFS)   Total area =      17.800(Ac.)
```

End of computations, total study area = 17.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged RI index number = 69.0

Calibration Unit Hydrograph

Existing

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

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Study date 06/21/19 File: e1713uhq21b12.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6062

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Barton Project
Calibration Unit Hydrograph
Existing Condition Area B
2-Year 1-Hour Storm

Drainage Area = 23.60(Ac.) = 0.037 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 23.60(Ac.) = 0.037 Sq. Mi.
Length along longest watercourse = 1988.00(Ft.)
Length along longest watercourse measured to centroid = 987.00(Ft.)
Length along longest watercourse = 0.377 Mi.
Length along longest watercourse measured to centroid = 0.187 Mi.
Difference in elevation = 45.00(Ft.)
Slope along watercourse = 119.5171 Ft./Mi.
Average Manning's 'N' = 0.048
Lag time = 0.169 Hr.
Lag time = 10.16 Min.
25% of lag time = 2.54 Min.
40% of lag time = 4.06 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.60	0.49	11.56

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.60	1.00	23.60

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 0.490(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 0.490(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 0.490(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
23.600	79.60	0.075

Total Area Entered = 23.60(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
79.6	62.5	0.443	0.075	0.413	1.000	0.413
					Sum (F) =	0.413

Area averaged mean soil loss (F) (In/Hr) = 0.413
Minimum soil loss rate ((In/Hr)) = 0.206
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	49.209	5.977	1.422
2	0.167	98.417	25.473	6.059
3	0.250	147.626	28.910	6.876
4	0.333	196.834	13.246	3.151
5	0.417	246.043	6.873	1.635
6	0.500	295.252	4.769	1.134
7	0.583	344.460	3.440	0.818
8	0.667	393.669	2.645	0.629
9	0.750	442.877	1.946	0.463
10	0.833	492.086	1.544	0.367
11	0.917	541.295	1.339	0.318
12	1.000	590.503	1.021	0.243
13	1.083	639.712	0.825	0.196
14	1.167	688.920	0.631	0.150
15	1.250	738.129	0.496	0.118
16	1.333	787.338	0.492	0.117
17	1.417	836.546	0.373	0.089
			Sum = 100.000	Sum= 23.784

Unit Time	(Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.194	0.413	0.175	0.02
2	0.17	4.20	0.247	0.413	0.222	0.02
3	0.25	4.40	0.259	0.413	0.233	0.03
4	0.33	4.80	0.282	0.413	0.254	0.03
5	0.42	5.20	0.306	0.413	0.275	0.03
6	0.50	6.20	0.364	0.413	0.328	0.04
7	0.58	6.80	0.400	0.413	0.360	0.04
8	0.67	8.80	0.517	0.413	---	0.10
9	0.75	13.90	0.817	0.413	---	0.40

10	0.83	31.40	1.846	0.413	---	1.43
11	0.92	7.20	0.423	0.413	---	0.01
12	1.00	3.80	0.223	0.413	0.201	0.02
	Sum =	100.0			Sum =	2.2

Flood volume = Effective rainfall 0.18(In)
times area 23.6(Ac.)/[(In)/(Ft.)] = 0.4(Ac.Ft)
Total soil loss = 0.31(In)
Total soil loss = 0.606(Ac.Ft)
Total rainfall = 0.49(In)
Flood volume = 15560.1 Cubic Feet
Total soil loss = 26408.2 Cubic Feet

Peak flow rate of this hydrograph = 11.989(CFS)

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1 - 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	0.0002	0.03	Q	|	|	|	|
0+10	0.0012	0.15	Q	|	|	|	|
0+15	0.0034	0.32	Q	|	|	|	|
0+20	0.0064	0.43	Q	|	|	|	|
0+25	0.0099	0.50	|Q	|	|	|	|
0+30	0.0138	0.58	|Q	|	|	|	|
0+35	0.0184	0.66	|QV	|	|	|	|
0+40	0.0242	0.85	|QV	|	|	|	|
0+45	0.0361	1.73	| QV	|	|	|	|
0+50	0.0739	5.49	| V Q	|	|	|	|
0+55	0.1564	11.99	| |	V |	Q |	|	|
1+ 0	0.2358	11.53	| |	|	Q V |	|	|
1+ 5	0.2744	5.60	| |Q	|	| V	|	|
1+10	0.2961	3.15	| Q |	|	|	| V	|
1+15	0.3111	2.17	| Q |	|	|	| V	|
1+20	0.3219	1.57	| Q |	|	|	| V |	|
1+25	0.3302	1.20	| Q |	|	|	| V |	|
1+30	0.3364	0.90	|Q |	|	|	| V |	|
1+35	0.3413	0.72	|Q |	|	|	| V |	|
1+40	0.3455	0.61	|Q |	|	|	| V |	|
1+45	0.3487	0.47	Q |	|	|	| V |	|
1+50	0.3513	0.37	Q |	|	|	| V |	|
1+55	0.3532	0.29	Q |	|	|	| V |	|
2+ 0	0.3548	0.23	Q |	|	|	| V |	|
2+ 5	0.3563	0.21	Q |	|	|	| V |	|
2+10	0.3572	0.13	Q |	|	|	| V |	|
2+15	0.3572	0.00	Q |	|	|	| V |	|
2+20	0.3572	0.00	Q |	|	|	| V |	|

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

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Study date 06/21/19 File: e1713uhq21c12.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6062

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Barton Project
Calibration Unit Hydrograph
Existing Condition Area C
2-Year 1-Hour Storm

Drainage Area = 16.99(Ac.) = 0.027 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 16.99(Ac.) = 0.027 Sq. Mi.
Length along longest watercourse = 956.00(Ft.)
Length along longest watercourse measured to centroid = 472.00(Ft.)
Length along longest watercourse = 0.181 Mi.
Length along longest watercourse measured to centroid = 0.089 Mi.
Difference in elevation = 7.80(Ft.)
Slope along watercourse = 43.0795 Ft./Mi.
Average Manning's 'N' = 0.090
Lag time = 0.221 Hr.
Lag time = 13.23 Min.
25% of lag time = 3.31 Min.
40% of lag time = 5.29 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
16.99	0.49	8.33

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
16.99	1.00	16.99

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 0.490(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 0.490(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 0.490(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
16.990	86.00	0.000

Total Area Entered = 16.99(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
86.0	71.6	0.343	0.000	0.343	1.000	0.343
					Sum (F) =	0.343

Area averaged mean soil loss (F) (In/Hr) = 0.343
Minimum soil loss rate ((In/Hr)) = 0.172
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	37.793	4.004	0.686
2	0.167	75.585	16.173	2.769
3	0.250	113.378	25.392	4.348
4	0.333	151.170	18.510	3.169
5	0.417	188.963	9.233	1.581
6	0.500	226.755	5.585	0.956
7	0.583	264.548	4.134	0.708
8	0.667	302.340	3.252	0.557
9	0.750	340.133	2.490	0.426
10	0.833	377.926	2.102	0.360
11	0.917	415.718	1.644	0.282
12	1.000	453.511	1.286	0.220
13	1.083	491.303	1.165	0.199
14	1.167	529.096	1.044	0.179
15	1.250	566.888	0.824	0.141
16	1.333	604.681	0.702	0.120
17	1.417	642.473	0.587	0.101
18	1.500	680.266	0.481	0.082
19	1.583	718.059	0.381	0.065
20	1.667	755.851	0.378	0.065
21	1.750	793.644	0.378	0.065
22	1.833	831.436	0.253	0.043
			Sum = 100.000	Sum= 17.123

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.194	0.343	0.175	0.02
2	0.17	4.20	0.247	0.343	0.222	0.02
3	0.25	4.40	0.259	0.343	0.233	0.03
4	0.33	4.80	0.282	0.343	0.254	0.03

5	0.42	5.20	0.306	0.343	0.275	0.03
6	0.50	6.20	0.365	0.343	---	0.02
7	0.58	6.80	0.400	0.343	---	0.06
8	0.67	8.80	0.517	0.343	---	0.17
9	0.75	13.90	0.817	0.343	---	0.47
10	0.83	31.40	1.846	0.343	---	1.50
11	0.92	7.20	0.423	0.343	---	0.08
12	1.00	3.80	0.223	0.343	0.201	0.02
Sum =		100.0			Sum =	2.5

Flood volume = Effective rainfall 0.21(In)
times area 17.0(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.28(In)
Total soil loss = 0.403(Ac.Ft)
Total rainfall = 0.49(In)
Flood volume = 12645.9 Cubic Feet
Total soil loss = 17569.6 Cubic Feet

Peak flow rate of this hydrograph = 8.673(CFS)

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1 - 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	0.0001	0.01	Q				
0+10	0.0006	0.07	Q				
0+15	0.0018	0.17	Q				
0+20	0.0035	0.26	VQ				
0+25	0.0058	0.32	VQ				
0+30	0.0082	0.36	|Q				
0+35	0.0110	0.40	|Q				
0+40	0.0149	0.56	| Q				
0+45	0.0234	1.24	| VQ				
0+50	0.0468	3.40	| V	| Q			
0+55	0.0951	7.01	|	| V	| Q		
1+ 0	0.1548	8.67	|	|	|V |	Q	
1+ 5	0.1974	6.18	|	|	| Q V |		
1+10	0.2207	3.38	|	| Q	| V		
1+15	0.2353	2.13	| Q	|	|	V	
1+20	0.2461	1.56	| Q	|	|	| V	
1+25	0.2545	1.22	| Q	|	|	| V	
1+30	0.2611	0.95	| Q	|	|	| V	
1+35	0.2665	0.79	| Q	|	|	| V	
1+40	0.2708	0.63	| Q	|	|	| V	
1+45	0.2743	0.51	| Q	|	|	| V	
1+50	0.2774	0.45	|Q	|	|	| V	
1+55	0.2801	0.39	|Q	|	|	| V	
2+ 0	0.2823	0.32	|Q	|	|	| V	
2+ 5	0.2841	0.27	|Q	|	|	| V	
2+10	0.2856	0.22	Q	|	|	| V	
2+15	0.2869	0.18	Q	|	|	| V	
2+20	0.2879	0.15	Q	|	|	| V	
2+25	0.2889	0.14	Q	|	|	| V	
2+30	0.2898	0.12	Q	|	|	| V	
2+35	0.2903	0.07	Q	|	|	| V	
2+40	0.2903	0.00	Q	|	|	| V	
2+45	0.2903	0.00	Q	|	|	| V	

Proposed

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

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6062

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Barton Project
Calibration Unit Hydrograph
Proposed Condition Area B
2-Year 1-Hour Storm

Drainage Area = 13.10(Ac.) = 0.020 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.10(Ac.) = 0.020 Sq. Mi.
Length along longest watercourse = 1916.00(Ft.)
Length along longest watercourse measured to centroid = 981.00(Ft.)
Length along longest watercourse = 0.363 Mi.
Length along longest watercourse measured to centroid = 0.186 Mi.
Difference in elevation = 15.20(Ft.)
Slope along watercourse = 41.8873 Ft./Mi.
Average Manning's 'N' = 0.049
Lag time = 0.208 Hr.
Lag time = 12.45 Min.
25% of lag time = 3.11 Min.
40% of lag time = 4.98 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.10	0.49	6.42

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.10	1.00	13.10

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 0.490(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 0.490(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 0.490(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.100	69.00	0.500

Total Area Entered = 13.10(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
69.0	49.8	0.574	0.500	0.316	1.000	0.316
					Sum (F) =	0.316

Area averaged mean soil loss (F) (In/Hr) = 0.316
Minimum soil loss rate ((In/Hr)) = 0.158
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.534

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	40.148	4.381	0.578
2	0.167	80.296	18.004	2.377
3	0.250	120.444	26.832	3.542
4	0.333	160.592	17.373	2.294
5	0.417	200.740	8.483	1.120
6	0.500	240.888	5.362	0.708
7	0.583	281.036	4.010	0.529
8	0.667	321.184	3.068	0.405
9	0.750	361.332	2.437	0.322
10	0.833	401.480	1.932	0.255
11	0.917	441.628	1.508	0.199
12	1.000	481.776	1.260	0.166
13	1.083	521.924	1.158	0.153
14	1.167	562.072	0.909	0.120
15	1.250	602.221	0.762	0.101
16	1.333	642.369	0.634	0.084
17	1.417	682.517	0.509	0.067
18	1.500	722.665	0.404	0.053
19	1.583	762.813	0.401	0.053
20	1.667	802.961	0.573	0.076
			Sum = 100.000	Sum= 13.202

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.194	0.316	0.104	0.09
2	0.17	4.20	0.247	0.316	0.132	0.11
3	0.25	4.40	0.259	0.316	0.138	0.12
4	0.33	4.80	0.282	0.316	0.151	0.13
5	0.42	5.20	0.306	0.316	0.163	0.14
6	0.50	6.20	0.365	0.316	---	0.05

7	0.58	6.80	0.400	0.316	---	0.08
8	0.67	8.80	0.517	0.316	---	0.20
9	0.75	13.90	0.817	0.316	---	0.50
10	0.83	31.40	1.846	0.316	---	1.53
11	0.92	7.20	0.423	0.316	---	0.11
12	1.00	3.80	0.223	0.316	0.119	0.10
Sum =		100.0			Sum =	3.2

Flood volume = Effective rainfall 0.26(In)
times area 13.1(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.23(In)
Total soil loss = 0.246(Ac.Ft)
Total rainfall = 0.49(In)
Flood volume = 12592.7 Cubic Feet
Total soil loss = 10705.5 Cubic Feet

Peak flow rate of this hydrograph = 7.372(CFS)

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1 - 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	0.0004	0.05	Q				
0+10	0.0023	0.28	VQ				
0+15	0.0069	0.66	V Q				
0+20	0.0136	0.98	V Q				
0+25	0.0218	1.19	VQ				
0+30	0.0307	1.30	VQ				
0+35	0.0392	1.24	QV				
0+40	0.0471	1.15	Q V				
0+45	0.0580	1.57	Q V				
0+50	0.0808	3.32	V Q				
0+55	0.1241	6.29	V	Q			
1+ 0	0.1749	7.37	V	Q			
1+ 5	0.2096	5.05	Q	V			
1+10	0.2300	2.95	Q	V			
1+15	0.2432	1.92	Q	V			
1+20	0.2527	1.38	Q	V			
1+25	0.2600	1.05	Q	V			
1+30	0.2657	0.83	Q	V			
1+35	0.2703	0.66	Q	V			
1+40	0.2740	0.54	Q	V			
1+45	0.2771	0.45	Q	V			
1+50	0.2797	0.39	Q	V			
1+55	0.2819	0.31	Q	V			
2+ 0	0.2836	0.26	Q	V			
2+ 5	0.2851	0.20	Q	V			
2+10	0.2862	0.17	Q	V			
2+15	0.2872	0.14	Q	V			
2+20	0.2881	0.13	Q	V			
2+25	0.2889	0.13	Q	V			
2+30	0.2890	0.01	Q	V			
2+35	0.2891	0.01	Q	V			

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

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Study date 06/24/19 File: p1713uhq21c12.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6062

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

2
Calibration Unit Hydrograph
Proposed Condition Area C
2-Year 1-Hour Storm

Drainage Area = 17.57(Ac.) = 0.027 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 17.57(Ac.) = 0.027 Sq. Mi.
Length along longest watercourse = 1490.00(Ft.)
Length along longest watercourse measured to centroid = 458.00(Ft.)
Length along longest watercourse = 0.282 Mi.
Length along longest watercourse measured to centroid = 0.087 Mi.
Difference in elevation = 15.00(Ft.)
Slope along watercourse = 53.1544 Ft./Mi.
Average Manning's 'N' = 0.054
Lag time = 0.149 Hr.
Lag time = 8.93 Min.
25% of lag time = 2.23 Min.
40% of lag time = 3.57 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.57	0.49	8.61

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.57	1.00	17.57

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 0.490(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 0.490(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 0.490(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
17.570	69.00	0.500

Total Area Entered = 17.57(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
69.0	49.8	0.574	0.500	0.316	1.000	0.316
					Sum (F) =	0.316

Area averaged mean soil loss (F) (In/Hr) = 0.316
Minimum soil loss rate ((In/Hr)) = 0.158
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.521

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	56.018	7.337	1.299
2	0.167	112.036	31.025	5.494
3	0.250	168.054	27.770	4.917
4	0.333	224.072	11.131	1.971
5	0.417	280.090	6.344	1.123
6	0.500	336.109	4.336	0.768
7	0.583	392.127	3.150	0.558
8	0.667	448.145	2.244	0.397
9	0.750	504.163	1.746	0.309
10	0.833	560.181	1.421	0.252
11	0.917	616.199	1.074	0.190
12	1.000	672.217	0.823	0.146
13	1.083	728.235	0.601	0.106
14	1.167	784.253	0.560	0.099
15	1.250	840.271	0.438	0.077
			Sum = 100.000	Sum= 17.707

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.194	0.316	0.101	0.09
2	0.17	4.20	0.247	0.316	0.129	0.12
3	0.25	4.40	0.259	0.316	0.135	0.12
4	0.33	4.80	0.282	0.316	0.147	0.14
5	0.42	5.20	0.306	0.316	0.159	0.15
6	0.50	6.20	0.365	0.316	---	0.05
7	0.58	6.80	0.400	0.316	---	0.08
8	0.67	8.80	0.517	0.316	---	0.20
9	0.75	13.90	0.817	0.316	---	0.50
10	0.83	31.40	1.846	0.316	---	1.53
11	0.92	7.20	0.423	0.316	---	0.11

```
12   1.00     3.80      0.223         0.316     0.116         0.11
   Sum =     100.0                                  Sum =      3.2
     Flood volume = Effective rainfall      0.27(In)
      times area      17.6(Ac.)/[(In)/(Ft.)] =       0.4(Ac.Ft)
     Total soil loss =      0.22(In)
     Total soil loss =     0.327(Ac.Ft)
     Total rainfall =      0.49(In)
     Flood volume =       16997.7 Cubic Feet
     Total soil loss =       14249.1 Cubic Feet
     ---------------------------------------------------------------------
      Peak flow rate of this hydrograph =     11.770(CFS)
     ---------------------------------------------------------------------
     +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - 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       0.0008      0.12  Q         |         |         |         |
   0+10       0.0054      0.66  VQ        |         |         |         |
   0+15       0.0141      1.27  |VQ       |         |         |         |
   0+20       0.0253      1.62  | VQ      |         |         |         |
   0+25       0.0383      1.88  |  Q      |         |         |         |
   0+30       0.0519      1.98  |  Q V    |         |         |         |
   0+35       0.0633      1.65  |  Q  V   |         |         |         |
   0+40       0.0743      1.60  |  Q   V  |         |         |         |
   0+45       0.0928      2.68  |    Q   V|         |         |         |
   0+50       0.1359      6.26  |         | QV      |         |         |
   0+55       0.2170     11.77  |         |         | VQ      |         |
   1+ 0       0.2840      9.73  |         |        Q|        V|         |
   1+ 5       0.3188      5.05  |        Q         |         | V       |
   1+10       0.3402      3.11  |     Q   |         |         |   V     |
   1+15       0.3539      1.99  |  Q      |         |         |     V   |
   1+20       0.3636      1.41  | Q       |         |         |      V  |
   1+25       0.3706      1.02  | Q       |         |         |      V  |
   1+30       0.3760      0.78  |Q        |         |         |       V |
   1+35       0.3802      0.61  |Q        |         |         |       V |
   1+40       0.3833      0.46  Q         |         |         |        V|
   1+45       0.3857      0.35  Q         |         |         |        V|
   1+50       0.3876      0.26  Q         |         |         |        V|
   1+55       0.3891      0.22  Q         |         |         |        V|
   2+ 0       0.3900      0.14  Q         |         |         |        V|
   2+ 5       0.3902      0.02  Q         |         |         |        V|
   2+10       0.3902      0.01  Q         |         |         |         V
------------------------------------------------------------------------
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Unit Hydrograph

Existing

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

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Study date 06/21/19 File: e1713uhq21b242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6062

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Barton Project
Unit Hydrograph
Existing Condition Area B
2-Year 24-Hour Storm

Drainage Area = 23.60(Ac.) = 0.037 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 23.60(Ac.) = 0.037 Sq. Mi.
Length along longest watercourse = 1988.00(Ft.)
Length along longest watercourse measured to centroid = 987.00(Ft.)
Length along longest watercourse = 0.377 Mi.
Length along longest watercourse measured to centroid = 0.187 Mi.
Difference in elevation = 45.00(Ft.)
Slope along watercourse = 119.5171 Ft./Mi.
Average Manning's 'N' = 0.048
Lag time = 0.169 Hr.
Lag time = 10.16 Min.
25% of lag time = 2.54 Min.
40% of lag time = 4.06 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.60	1.85	43.66

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.60	4.55	107.38

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.850(In)
Area Averaged 100-Year Rainfall = 4.550(In)

Point rain (area averaged) = 1.850(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.850(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
23.600	79.60	0.075

Total Area Entered = 23.60(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
79.6	62.5	0.443	0.075	0.413	1.000	0.413
					Sum (F) =	0.413

Area averaged mean soil loss (F) (In/Hr) = 0.413
Minimum soil loss rate ((In/Hr)) = 0.206
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	49.209	5.977	1.422
2	0.167	98.417	25.473	6.059
3	0.250	147.626	28.910	6.876
4	0.333	196.834	13.246	3.151
5	0.417	246.043	6.873	1.635
6	0.500	295.252	4.769	1.134
7	0.583	344.460	3.440	0.818
8	0.667	393.669	2.645	0.629
9	0.750	442.877	1.946	0.463
10	0.833	492.086	1.544	0.367
11	0.917	541.295	1.339	0.318
12	1.000	590.503	1.021	0.243
13	1.083	639.712	0.825	0.196
14	1.167	688.920	0.631	0.150
15	1.250	738.129	0.496	0.118
16	1.333	787.338	0.492	0.117
17	1.417	836.546	0.373	0.089
			Sum = 100.000	Sum= 23.784

Unit Time	(Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.015	0.732	0.013	0.00
2	0.17	0.07	0.015	0.729	0.013	0.00
3	0.25	0.07	0.015	0.726	0.013	0.00
4	0.33	0.10	0.022	0.723	0.020	0.00
5	0.42	0.10	0.022	0.721	0.020	0.00
6	0.50	0.10	0.022	0.718	0.020	0.00
7	0.58	0.10	0.022	0.715	0.020	0.00
8	0.67	0.10	0.022	0.712	0.020	0.00
9	0.75	0.10	0.022	0.709	0.020	0.00
10	0.83	0.13	0.030	0.707	0.027	0.00
11	0.92	0.13	0.030	0.704	0.027	0.00

12	1.00	0.13	0.030	0.701	0.027	0.00
13	1.08	0.10	0.022	0.698	0.020	0.00
14	1.17	0.10	0.022	0.696	0.020	0.00
15	1.25	0.10	0.022	0.693	0.020	0.00
16	1.33	0.10	0.022	0.690	0.020	0.00
17	1.42	0.10	0.022	0.687	0.020	0.00
18	1.50	0.10	0.022	0.685	0.020	0.00
19	1.58	0.10	0.022	0.682	0.020	0.00
20	1.67	0.10	0.022	0.679	0.020	0.00
21	1.75	0.10	0.022	0.676	0.020	0.00
22	1.83	0.13	0.030	0.674	0.027	0.00
23	1.92	0.13	0.030	0.671	0.027	0.00
24	2.00	0.13	0.030	0.668	0.027	0.00
25	2.08	0.13	0.030	0.666	0.027	0.00
26	2.17	0.13	0.030	0.663	0.027	0.00
27	2.25	0.13	0.030	0.660	0.027	0.00
28	2.33	0.13	0.030	0.657	0.027	0.00
29	2.42	0.13	0.030	0.655	0.027	0.00
30	2.50	0.13	0.030	0.652	0.027	0.00
31	2.58	0.17	0.037	0.649	0.033	0.00
32	2.67	0.17	0.037	0.647	0.033	0.00
33	2.75	0.17	0.037	0.644	0.033	0.00
34	2.83	0.17	0.037	0.641	0.033	0.00
35	2.92	0.17	0.037	0.639	0.033	0.00
36	3.00	0.17	0.037	0.636	0.033	0.00
37	3.08	0.17	0.037	0.634	0.033	0.00
38	3.17	0.17	0.037	0.631	0.033	0.00
39	3.25	0.17	0.037	0.628	0.033	0.00
40	3.33	0.17	0.037	0.626	0.033	0.00
41	3.42	0.17	0.037	0.623	0.033	0.00
42	3.50	0.17	0.037	0.620	0.033	0.00
43	3.58	0.17	0.037	0.618	0.033	0.00
44	3.67	0.17	0.037	0.615	0.033	0.00
45	3.75	0.17	0.037	0.613	0.033	0.00
46	3.83	0.20	0.044	0.610	0.040	0.00
47	3.92	0.20	0.044	0.608	0.040	0.00
48	4.00	0.20	0.044	0.605	0.040	0.00
49	4.08	0.20	0.044	0.602	0.040	0.00
50	4.17	0.20	0.044	0.600	0.040	0.00
51	4.25	0.20	0.044	0.597	0.040	0.00
52	4.33	0.23	0.052	0.595	0.047	0.01
53	4.42	0.23	0.052	0.592	0.047	0.01
54	4.50	0.23	0.052	0.590	0.047	0.01
55	4.58	0.23	0.052	0.587	0.047	0.01
56	4.67	0.23	0.052	0.585	0.047	0.01
57	4.75	0.23	0.052	0.582	0.047	0.01
58	4.83	0.27	0.059	0.580	0.053	0.01
59	4.92	0.27	0.059	0.577	0.053	0.01
60	5.00	0.27	0.059	0.575	0.053	0.01
61	5.08	0.20	0.044	0.572	0.040	0.00
62	5.17	0.20	0.044	0.570	0.040	0.00
63	5.25	0.20	0.044	0.567	0.040	0.00
64	5.33	0.23	0.052	0.565	0.047	0.01
65	5.42	0.23	0.052	0.562	0.047	0.01
66	5.50	0.23	0.052	0.560	0.047	0.01
67	5.58	0.27	0.059	0.557	0.053	0.01
68	5.67	0.27	0.059	0.555	0.053	0.01
69	5.75	0.27	0.059	0.552	0.053	0.01
70	5.83	0.27	0.059	0.550	0.053	0.01
71	5.92	0.27	0.059	0.547	0.053	0.01
72	6.00	0.27	0.059	0.545	0.053	0.01
73	6.08	0.30	0.067	0.543	0.060	0.01
74	6.17	0.30	0.067	0.540	0.060	0.01

75	6.25	0.30	0.067	0.538	0.060	0.01
76	6.33	0.30	0.067	0.535	0.060	0.01
77	6.42	0.30	0.067	0.533	0.060	0.01
78	6.50	0.30	0.067	0.531	0.060	0.01
79	6.58	0.33	0.074	0.528	0.067	0.01
80	6.67	0.33	0.074	0.526	0.067	0.01
81	6.75	0.33	0.074	0.523	0.067	0.01
82	6.83	0.33	0.074	0.521	0.067	0.01
83	6.92	0.33	0.074	0.519	0.067	0.01
84	7.00	0.33	0.074	0.516	0.067	0.01
85	7.08	0.33	0.074	0.514	0.067	0.01
86	7.17	0.33	0.074	0.512	0.067	0.01
87	7.25	0.33	0.074	0.509	0.067	0.01
88	7.33	0.37	0.081	0.507	0.073	0.01
89	7.42	0.37	0.081	0.505	0.073	0.01
90	7.50	0.37	0.081	0.502	0.073	0.01
91	7.58	0.40	0.089	0.500	0.080	0.01
92	7.67	0.40	0.089	0.498	0.080	0.01
93	7.75	0.40	0.089	0.495	0.080	0.01
94	7.83	0.43	0.096	0.493	0.087	0.01
95	7.92	0.43	0.096	0.491	0.087	0.01
96	8.00	0.43	0.096	0.489	0.087	0.01
97	8.08	0.50	0.111	0.486	0.100	0.01
98	8.17	0.50	0.111	0.484	0.100	0.01
99	8.25	0.50	0.111	0.482	0.100	0.01
100	8.33	0.50	0.111	0.480	0.100	0.01
101	8.42	0.50	0.111	0.477	0.100	0.01
102	8.50	0.50	0.111	0.475	0.100	0.01
103	8.58	0.53	0.118	0.473	0.107	0.01
104	8.67	0.53	0.118	0.471	0.107	0.01
105	8.75	0.53	0.118	0.468	0.107	0.01
106	8.83	0.57	0.126	0.466	0.113	0.01
107	8.92	0.57	0.126	0.464	0.113	0.01
108	9.00	0.57	0.126	0.462	0.113	0.01
109	9.08	0.63	0.141	0.460	0.127	0.01
110	9.17	0.63	0.141	0.457	0.127	0.01
111	9.25	0.63	0.141	0.455	0.127	0.01
112	9.33	0.67	0.148	0.453	0.133	0.01
113	9.42	0.67	0.148	0.451	0.133	0.01
114	9.50	0.67	0.148	0.449	0.133	0.01
115	9.58	0.70	0.155	0.447	0.140	0.02
116	9.67	0.70	0.155	0.445	0.140	0.02
117	9.75	0.70	0.155	0.442	0.140	0.02
118	9.83	0.73	0.163	0.440	0.147	0.02
119	9.92	0.73	0.163	0.438	0.147	0.02
120	10.00	0.73	0.163	0.436	0.147	0.02
121	10.08	0.50	0.111	0.434	0.100	0.01
122	10.17	0.50	0.111	0.432	0.100	0.01
123	10.25	0.50	0.111	0.430	0.100	0.01
124	10.33	0.50	0.111	0.428	0.100	0.01
125	10.42	0.50	0.111	0.426	0.100	0.01
126	10.50	0.50	0.111	0.423	0.100	0.01
127	10.58	0.67	0.148	0.421	0.133	0.01
128	10.67	0.67	0.148	0.419	0.133	0.01
129	10.75	0.67	0.148	0.417	0.133	0.01
130	10.83	0.67	0.148	0.415	0.133	0.01
131	10.92	0.67	0.148	0.413	0.133	0.01
132	11.00	0.67	0.148	0.411	0.133	0.01
133	11.08	0.63	0.141	0.409	0.127	0.01
134	11.17	0.63	0.141	0.407	0.127	0.01
135	11.25	0.63	0.141	0.405	0.127	0.01
136	11.33	0.63	0.141	0.403	0.127	0.01
137	11.42	0.63	0.141	0.401	0.127	0.01

138	11.50	0.63	0.141	0.399	0.127	0.01
139	11.58	0.57	0.126	0.397	0.113	0.01
140	11.67	0.57	0.126	0.395	0.113	0.01
141	11.75	0.57	0.126	0.393	0.113	0.01
142	11.83	0.60	0.133	0.391	0.120	0.01
143	11.92	0.60	0.133	0.389	0.120	0.01
144	12.00	0.60	0.133	0.387	0.120	0.01
145	12.08	0.83	0.185	0.385	0.166	0.02
146	12.17	0.83	0.185	0.383	0.166	0.02
147	12.25	0.83	0.185	0.382	0.166	0.02
148	12.33	0.87	0.192	0.380	0.173	0.02
149	12.42	0.87	0.192	0.378	0.173	0.02
150	12.50	0.87	0.192	0.376	0.173	0.02
151	12.58	0.93	0.207	0.374	0.186	0.02
152	12.67	0.93	0.207	0.372	0.186	0.02
153	12.75	0.93	0.207	0.370	0.186	0.02
154	12.83	0.97	0.215	0.368	0.193	0.02
155	12.92	0.97	0.215	0.366	0.193	0.02
156	13.00	0.97	0.215	0.365	0.193	0.02
157	13.08	1.13	0.252	0.363	0.226	0.03
158	13.17	1.13	0.252	0.361	0.226	0.03
159	13.25	1.13	0.252	0.359	0.226	0.03
160	13.33	1.13	0.252	0.357	0.226	0.03
161	13.42	1.13	0.252	0.355	0.226	0.03
162	13.50	1.13	0.252	0.354	0.226	0.03
163	13.58	0.77	0.170	0.352	0.153	0.02
164	13.67	0.77	0.170	0.350	0.153	0.02
165	13.75	0.77	0.170	0.348	0.153	0.02
166	13.83	0.77	0.170	0.347	0.153	0.02
167	13.92	0.77	0.170	0.345	0.153	0.02
168	14.00	0.77	0.170	0.343	0.153	0.02
169	14.08	0.90	0.200	0.341	0.180	0.02
170	14.17	0.90	0.200	0.339	0.180	0.02
171	14.25	0.90	0.200	0.338	0.180	0.02
172	14.33	0.87	0.192	0.336	0.173	0.02
173	14.42	0.87	0.192	0.334	0.173	0.02
174	14.50	0.87	0.192	0.333	0.173	0.02
175	14.58	0.87	0.192	0.331	0.173	0.02
176	14.67	0.87	0.192	0.329	0.173	0.02
177	14.75	0.87	0.192	0.327	0.173	0.02
178	14.83	0.83	0.185	0.326	0.166	0.02
179	14.92	0.83	0.185	0.324	0.166	0.02
180	15.00	0.83	0.185	0.322	0.166	0.02
181	15.08	0.80	0.178	0.321	0.160	0.02
182	15.17	0.80	0.178	0.319	0.160	0.02
183	15.25	0.80	0.178	0.318	0.160	0.02
184	15.33	0.77	0.170	0.316	0.153	0.02
185	15.42	0.77	0.170	0.314	0.153	0.02
186	15.50	0.77	0.170	0.313	0.153	0.02
187	15.58	0.63	0.141	0.311	0.127	0.01
188	15.67	0.63	0.141	0.309	0.127	0.01
189	15.75	0.63	0.141	0.308	0.127	0.01
190	15.83	0.63	0.141	0.306	0.127	0.01
191	15.92	0.63	0.141	0.305	0.127	0.01
192	16.00	0.63	0.141	0.303	0.127	0.01
193	16.08	0.13	0.030	0.302	0.027	0.00
194	16.17	0.13	0.030	0.300	0.027	0.00
195	16.25	0.13	0.030	0.299	0.027	0.00
196	16.33	0.13	0.030	0.297	0.027	0.00
197	16.42	0.13	0.030	0.296	0.027	0.00
198	16.50	0.13	0.030	0.294	0.027	0.00
199	16.58	0.10	0.022	0.293	0.020	0.00
200	16.67	0.10	0.022	0.291	0.020	0.00

201	16.75	0.10	0.022	0.290	0.020	0.00
202	16.83	0.10	0.022	0.288	0.020	0.00
203	16.92	0.10	0.022	0.287	0.020	0.00
204	17.00	0.10	0.022	0.285	0.020	0.00
205	17.08	0.17	0.037	0.284	0.033	0.00
206	17.17	0.17	0.037	0.282	0.033	0.00
207	17.25	0.17	0.037	0.281	0.033	0.00
208	17.33	0.17	0.037	0.280	0.033	0.00
209	17.42	0.17	0.037	0.278	0.033	0.00
210	17.50	0.17	0.037	0.277	0.033	0.00
211	17.58	0.17	0.037	0.275	0.033	0.00
212	17.67	0.17	0.037	0.274	0.033	0.00
213	17.75	0.17	0.037	0.273	0.033	0.00
214	17.83	0.13	0.030	0.271	0.027	0.00
215	17.92	0.13	0.030	0.270	0.027	0.00
216	18.00	0.13	0.030	0.269	0.027	0.00
217	18.08	0.13	0.030	0.267	0.027	0.00
218	18.17	0.13	0.030	0.266	0.027	0.00
219	18.25	0.13	0.030	0.265	0.027	0.00
220	18.33	0.13	0.030	0.263	0.027	0.00
221	18.42	0.13	0.030	0.262	0.027	0.00
222	18.50	0.13	0.030	0.261	0.027	0.00
223	18.58	0.10	0.022	0.260	0.020	0.00
224	18.67	0.10	0.022	0.258	0.020	0.00
225	18.75	0.10	0.022	0.257	0.020	0.00
226	18.83	0.07	0.015	0.256	0.013	0.00
227	18.92	0.07	0.015	0.255	0.013	0.00
228	19.00	0.07	0.015	0.253	0.013	0.00
229	19.08	0.10	0.022	0.252	0.020	0.00
230	19.17	0.10	0.022	0.251	0.020	0.00
231	19.25	0.10	0.022	0.250	0.020	0.00
232	19.33	0.13	0.030	0.249	0.027	0.00
233	19.42	0.13	0.030	0.248	0.027	0.00
234	19.50	0.13	0.030	0.246	0.027	0.00
235	19.58	0.10	0.022	0.245	0.020	0.00
236	19.67	0.10	0.022	0.244	0.020	0.00
237	19.75	0.10	0.022	0.243	0.020	0.00
238	19.83	0.07	0.015	0.242	0.013	0.00
239	19.92	0.07	0.015	0.241	0.013	0.00
240	20.00	0.07	0.015	0.240	0.013	0.00
241	20.08	0.10	0.022	0.239	0.020	0.00
242	20.17	0.10	0.022	0.238	0.020	0.00
243	20.25	0.10	0.022	0.237	0.020	0.00
244	20.33	0.10	0.022	0.236	0.020	0.00
245	20.42	0.10	0.022	0.235	0.020	0.00
246	20.50	0.10	0.022	0.234	0.020	0.00
247	20.58	0.10	0.022	0.233	0.020	0.00
248	20.67	0.10	0.022	0.232	0.020	0.00
249	20.75	0.10	0.022	0.231	0.020	0.00
250	20.83	0.07	0.015	0.230	0.013	0.00
251	20.92	0.07	0.015	0.229	0.013	0.00
252	21.00	0.07	0.015	0.228	0.013	0.00
253	21.08	0.10	0.022	0.227	0.020	0.00
254	21.17	0.10	0.022	0.226	0.020	0.00
255	21.25	0.10	0.022	0.225	0.020	0.00
256	21.33	0.07	0.015	0.224	0.013	0.00
257	21.42	0.07	0.015	0.224	0.013	0.00
258	21.50	0.07	0.015	0.223	0.013	0.00
259	21.58	0.10	0.022	0.222	0.020	0.00
260	21.67	0.10	0.022	0.221	0.020	0.00
261	21.75	0.10	0.022	0.220	0.020	0.00
262	21.83	0.07	0.015	0.220	0.013	0.00
263	21.92	0.07	0.015	0.219	0.013	0.00

264	22.00	0.07	0.015	0.218	0.013	0.00
265	22.08	0.10	0.022	0.217	0.020	0.00
266	22.17	0.10	0.022	0.217	0.020	0.00
267	22.25	0.10	0.022	0.216	0.020	0.00
268	22.33	0.07	0.015	0.215	0.013	0.00
269	22.42	0.07	0.015	0.215	0.013	0.00
270	22.50	0.07	0.015	0.214	0.013	0.00
271	22.58	0.07	0.015	0.213	0.013	0.00
272	22.67	0.07	0.015	0.213	0.013	0.00
273	22.75	0.07	0.015	0.212	0.013	0.00
274	22.83	0.07	0.015	0.212	0.013	0.00
275	22.92	0.07	0.015	0.211	0.013	0.00
276	23.00	0.07	0.015	0.211	0.013	0.00
277	23.08	0.07	0.015	0.210	0.013	0.00
278	23.17	0.07	0.015	0.210	0.013	0.00
279	23.25	0.07	0.015	0.209	0.013	0.00
280	23.33	0.07	0.015	0.209	0.013	0.00
281	23.42	0.07	0.015	0.208	0.013	0.00
282	23.50	0.07	0.015	0.208	0.013	0.00
283	23.58	0.07	0.015	0.208	0.013	0.00
284	23.67	0.07	0.015	0.207	0.013	0.00
285	23.75	0.07	0.015	0.207	0.013	0.00
286	23.83	0.07	0.015	0.207	0.013	0.00
287	23.92	0.07	0.015	0.207	0.013	0.00
288	24.00	0.07	0.015	0.206	0.013	0.00
	Sum =	100.0			Sum =	2.2

Flood volume = Effective rainfall 0.18(In)
times area 23.6(Ac.)/[(In)/(Ft.)] = 0.4(Ac.Ft)
Total soil loss = 1.66(In)
Total soil loss = 3.274(Ac.Ft)
Total rainfall = 1.85(In)
Flood volume = 15847.8 Cubic Feet
Total soil loss = 142630.6 Cubic Feet

Peak flow rate of this hydrograph = 0.583(CFS)

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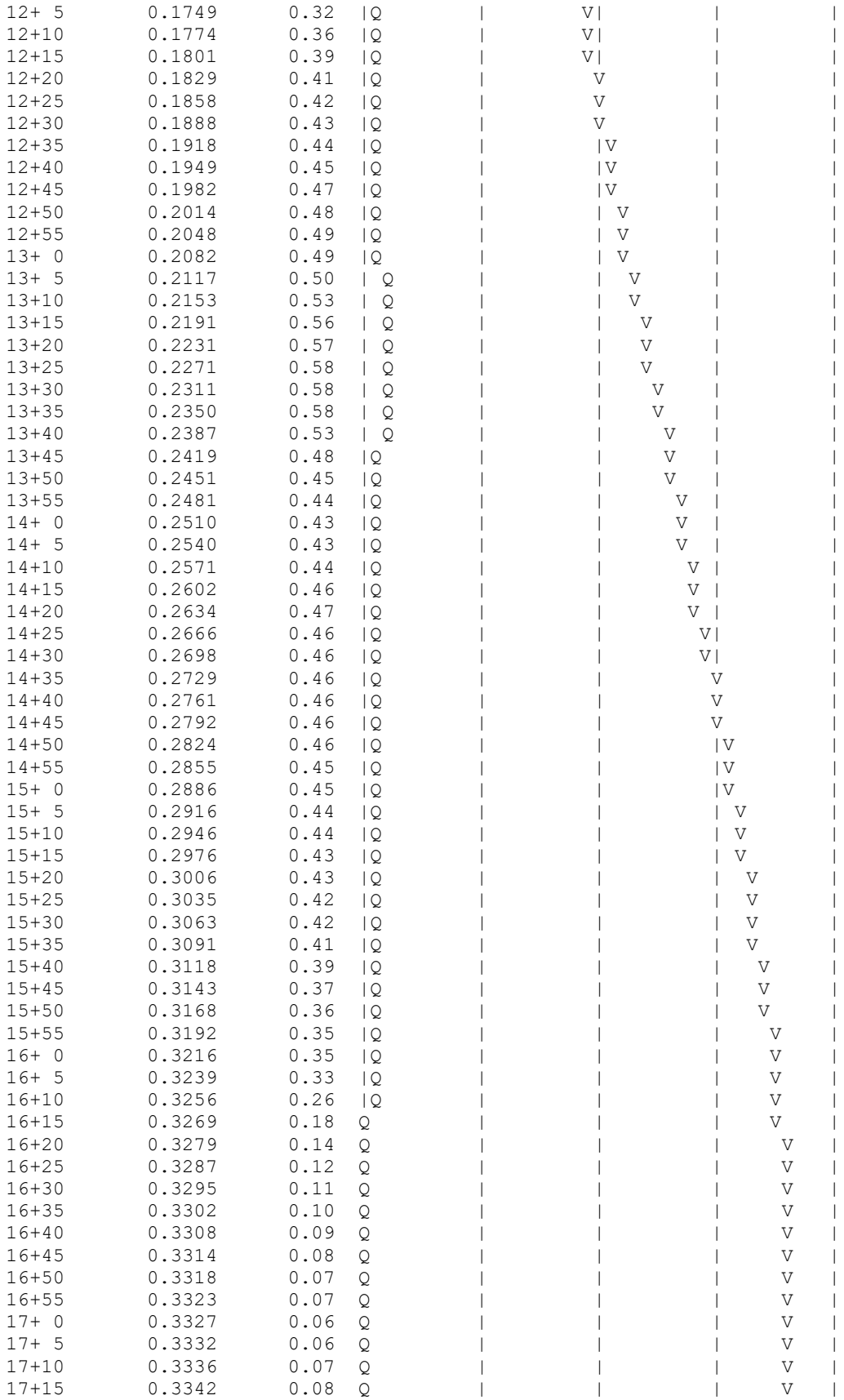
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+15	0.0002	0.02	Q	|	|	|	|
0+20	0.0004	0.03	Q	|	|	|	|
0+25	0.0007	0.03	Q	|	|	|	|
0+30	0.0009	0.04	Q	|	|	|	|
0+35	0.0012	0.04	Q	|	|	|	|
0+40	0.0016	0.05	Q	|	|	|	|
0+45	0.0019	0.05	Q	|	|	|	|
0+50	0.0022	0.05	Q	|	|	|	|
0+55	0.0026	0.06	Q	|	|	|	|
1+ 0	0.0030	0.06	Q	|	|	|	|
1+ 5	0.0035	0.06	Q	|	|	|	|
1+10	0.0039	0.06	Q	|	|	|	|
1+15	0.0043	0.06	Q	|	|	|	|
1+20	0.0047	0.05	Q	|	|	|	|
1+25	0.0050	0.05	Q	|	|	|	|
1+30	0.0054	0.05	Q	|	|	|	|

1+35	0.0058	0.05	Q	|	|	|	|
1+40	0.0061	0.05	Q	|	|	|	|
1+45	0.0065	0.05	Q	|	|	|	|
1+50	0.0069	0.05	Q	|	|	|	|
1+55	0.0073	0.06	Q	|	|	|	|
2+ 0	0.0077	0.06	Q	|	|	|	|
2+ 5	0.0082	0.07	Q	|	|	|	|
2+10	0.0086	0.07	Q	|	|	|	|
2+15	0.0091	0.07	QV	|	|	|	|
2+20	0.0096	0.07	QV	|	|	|	|
2+25	0.0101	0.07	QV	|	|	|	|
2+30	0.0105	0.07	QV	|	|	|	|
2+35	0.0110	0.07	QV	|	|	|	|
2+40	0.0115	0.08	QV	|	|	|	|
2+45	0.0121	0.08	QV	|	|	|	|
2+50	0.0127	0.08	QV	|	|	|	|
2+55	0.0133	0.08	QV	|	|	|	|
3+ 0	0.0138	0.09	QV	|	|	|	|
3+ 5	0.0144	0.09	QV	|	|	|	|
3+10	0.0150	0.09	QV	|	|	|	|
3+15	0.0156	0.09	QV	|	|	|	|
3+20	0.0162	0.09	QV	|	|	|	|
3+25	0.0168	0.09	QV	|	|	|	|
3+30	0.0174	0.09	QV	|	|	|	|
3+35	0.0180	0.09	QV	|	|	|	|
3+40	0.0186	0.09	Q V	|	|	|	|
3+45	0.0192	0.09	Q V	|	|	|	|
3+50	0.0199	0.09	Q V	|	|	|	|
3+55	0.0205	0.09	Q V	|	|	|	|
4+ 0	0.0212	0.10	Q V	|	|	|	|
4+ 5	0.0219	0.10	Q V	|	|	|	|
4+10	0.0226	0.10	Q V	|	|	|	|
4+15	0.0233	0.10	Q V	|	|	|	|
4+20	0.0240	0.10	Q V	|	|	|	|
4+25	0.0248	0.11	Q V	|	|	|	|
4+30	0.0256	0.12	Q V	|	|	|	|
4+35	0.0264	0.12	Q V	|	|	|	|
4+40	0.0272	0.12	Q V	|	|	|	|
4+45	0.0280	0.12	Q V	|	|	|	|
4+50	0.0289	0.12	Q V	|	|	|	|
4+55	0.0297	0.13	Q V	|	|	|	|
5+ 0	0.0306	0.13	Q V	|	|	|	|
5+ 5	0.0316	0.13	Q V	|	|	|	|
5+10	0.0324	0.13	Q V	|	|	|	|
5+15	0.0332	0.12	Q V	|	|	|	|
5+20	0.0340	0.11	Q V	|	|	|	|
5+25	0.0348	0.12	Q V	|	|	|	|
5+30	0.0356	0.12	Q V	|	|	|	|
5+35	0.0365	0.12	Q V	|	|	|	|
5+40	0.0374	0.13	Q V	|	|	|	|
5+45	0.0383	0.13	Q V	|	|	|	|
5+50	0.0392	0.14	Q V	|	|	|	|
5+55	0.0402	0.14	Q V	|	|	|	|
6+ 0	0.0411	0.14	Q V	|	|	|	|
6+ 5	0.0421	0.14	Q V	|	|	|	|
6+10	0.0431	0.14	Q V	|	|	|	|
6+15	0.0441	0.15	Q V	|	|	|	|
6+20	0.0452	0.15	Q V	|	|	|	|
6+25	0.0462	0.15	Q V	|	|	|	|
6+30	0.0473	0.16	Q V	|	|	|	|
6+35	0.0484	0.16	Q V	|	|	|	|
6+40	0.0495	0.16	Q V	|	|	|	|
6+45	0.0506	0.17	Q V	|	|	|	|

6+50	0.0518	0.17	Q	V	|	|	|	|
6+55	0.0530	0.17	Q	V	|	|	|	|
7+ 0	0.0542	0.17	Q	V	|	|	|	|
7+ 5	0.0554	0.17	Q	V	|	|	|	|
7+10	0.0566	0.17	Q	V	|	|	|	|
7+15	0.0578	0.17	Q	V	|	|	|	|
7+20	0.0590	0.18	Q	V	|	|	|	|
7+25	0.0603	0.18	Q	V	|	|	|	|
7+30	0.0615	0.19	Q	V	|	|	|	|
7+35	0.0628	0.19	Q	V	|	|	|	|
7+40	0.0642	0.20	Q	V	|	|	|	|
7+45	0.0656	0.20	Q	V	|	|	|	|
7+50	0.0670	0.21	Q	V	|	|	|	|
7+55	0.0685	0.21	Q	V	|	|	|	|
8+ 0	0.0700	0.22	Q	V	|	|	|	|
8+ 5	0.0715	0.22	Q	V	|	|	|	|
8+10	0.0731	0.23	Q	V	|	|	|	|
8+15	0.0748	0.25	Q	V	|	|	|	|
8+20	0.0765	0.25	|Q	V	|	|	|	|
8+25	0.0783	0.25	|Q	V	|	|	|	|
8+30	0.0801	0.26	|Q	V	|	|	|	|
8+35	0.0819	0.26	|Q	V	|	|	|	|
8+40	0.0837	0.27	|Q	V	|	|	|	|
8+45	0.0856	0.27	|Q	V	|	|	|	|
8+50	0.0875	0.28	|Q	V	|	|	|	|
8+55	0.0894	0.28	|Q	V	|	|	|	|
9+ 0	0.0914	0.29	|Q	V	|	|	|	|
9+ 5	0.0934	0.29	|Q	V	|	|	|	|
9+10	0.0955	0.30	|Q	V	|	|	|	|
9+15	0.0977	0.32	|Q	V	|	|	|	|
9+20	0.0999	0.32	|Q	V	|	|	|	|
9+25	0.1022	0.33	|Q	V	|	|	|	|
9+30	0.1045	0.34	|Q	V	|	|	|	|
9+35	0.1069	0.34	|Q	V	|	|	|	|
9+40	0.1093	0.35	|Q	V	|	|	|	|
9+45	0.1118	0.36	|Q	V	|	|	|	|
9+50	0.1143	0.36	|Q	V	|	|	|	|
9+55	0.1168	0.37	|Q	V	|	|	|	|
10+ 0	0.1194	0.38	|Q	V	|	|	|	|
10+ 5	0.1219	0.37	|Q	V	|	|	|	|
10+10	0.1243	0.34	|Q	V	|	|	|	|
10+15	0.1264	0.31	|Q	V	|	|	|	|
10+20	0.1284	0.29	|Q	V	|	|	|	|
10+25	0.1304	0.29	|Q	V	|	|	|	|
10+30	0.1323	0.28	|Q	V	|	|	|	|
10+35	0.1343	0.28	|Q	V	|	|	|	|
10+40	0.1364	0.30	|Q	V	|	|	|	|
10+45	0.1386	0.32	|Q	V	|	|	|	|
10+50	0.1409	0.33	|Q	V	|	|	|	|
10+55	0.1432	0.34	|Q	V	|	|	|	|
11+ 0	0.1456	0.34	|Q	V	|	|	|	|
11+ 5	0.1480	0.34	|Q	V	|	|	|	|
11+10	0.1503	0.34	|Q	V	|	|	|	|
11+15	0.1526	0.34	|Q	V	|	|	|	|
11+20	0.1549	0.34	|Q	V	|	|	|	|
11+25	0.1572	0.33	|Q	V	|	|	|	|
11+30	0.1596	0.33	|Q	V	|	|	|	|
11+35	0.1618	0.33	|Q	V	|	|	|	|
11+40	0.1641	0.32	|Q	V	|	|	|	|
11+45	0.1662	0.31	|Q	V	|	|	|	|
11+50	0.1684	0.31	|Q	V	|	|	|	|
11+55	0.1705	0.31	|Q	V	|	|	|	|
12+ 0	0.1727	0.32	|Q	V	|	|	|	|



17+20	0.3347	0.08	Q				V
17+25	0.3353	0.08	Q				V
17+30	0.3359	0.08	Q				V
17+35	0.3364	0.08	Q				V
17+40	0.3370	0.09	Q				V
17+45	0.3376	0.09	Q				V
17+50	0.3382	0.09	Q				V
17+55	0.3388	0.08	Q				V
18+ 0	0.3393	0.08	Q				V
18+ 5	0.3398	0.07	Q				V
18+10	0.3403	0.07	Q				V
18+15	0.3408	0.07	Q				V
18+20	0.3413	0.07	Q				V
18+25	0.3418	0.07	Q				V
18+30	0.3423	0.07	Q				V
18+35	0.3428	0.07	Q				V
18+40	0.3432	0.07	Q				V
18+45	0.3437	0.06	Q				V
18+50	0.3440	0.06	Q				V
18+55	0.3444	0.05	Q				V
19+ 0	0.3447	0.04	Q				V
19+ 5	0.3450	0.04	Q				V
19+10	0.3453	0.05	Q				V
19+15	0.3457	0.05	Q				V
19+20	0.3460	0.05	Q				V
19+25	0.3464	0.06	Q				V
19+30	0.3468	0.06	Q				V
19+35	0.3473	0.06	Q				V
19+40	0.3477	0.06	Q				V
19+45	0.3481	0.06	Q				V
19+50	0.3485	0.05	Q				V
19+55	0.3488	0.05	Q				V
20+ 0	0.3491	0.04	Q				V
20+ 5	0.3494	0.04	Q				V
20+10	0.3497	0.04	Q				V
20+15	0.3500	0.05	Q				V
20+20	0.3504	0.05	Q				V
20+25	0.3507	0.05	Q				V
20+30	0.3511	0.05	Q				V
20+35	0.3514	0.05	Q				V
20+40	0.3518	0.05	Q				V
20+45	0.3522	0.05	Q				V
20+50	0.3525	0.05	Q				V
20+55	0.3528	0.05	Q				V
21+ 0	0.3531	0.04	Q				V
21+ 5	0.3534	0.04	Q				V
21+10	0.3537	0.04	Q				V
21+15	0.3540	0.05	Q				V
21+20	0.3544	0.05	Q				V
21+25	0.3547	0.05	Q				V
21+30	0.3550	0.04	Q				V
21+35	0.3553	0.04	Q				V
21+40	0.3555	0.04	Q				V
21+45	0.3559	0.05	Q				V
21+50	0.3562	0.05	Q				V
21+55	0.3565	0.04	Q				V
22+ 0	0.3568	0.04	Q				V
22+ 5	0.3571	0.04	Q				V
22+10	0.3574	0.04	Q				V
22+15	0.3577	0.05	Q				V
22+20	0.3580	0.05	Q				V
22+25	0.3583	0.04	Q				V
22+30	0.3586	0.04	Q				V

22+35	0.3589	0.04	Q	|	|	|	V|
22+40	0.3591	0.04	Q	|	|	|	V|
22+45	0.3594	0.04	Q	|	|	|	V|
22+50	0.3597	0.04	Q	|	|	|	V|
22+55	0.3599	0.04	Q	|	|	|	V|
23+ 0	0.3601	0.04	Q	|	|	|	V|
23+ 5	0.3604	0.04	Q	|	|	|	V|
23+10	0.3606	0.04	Q	|	|	|	V|
23+15	0.3609	0.04	Q	|	|	|	V|
23+20	0.3611	0.04	Q	|	|	|	V|
23+25	0.3614	0.04	Q	|	|	|	V|
23+30	0.3616	0.04	Q	|	|	|	V|
23+35	0.3619	0.04	Q	|	|	|	V|
23+40	0.3621	0.04	Q	|	|	|	V|
23+45	0.3623	0.04	Q	|	|	|	V|
23+50	0.3626	0.04	Q	|	|	|	V|
23+55	0.3628	0.04	Q	|	|	|	V|
24+ 0	0.3631	0.04	Q	|	|	|	V|
24+ 5	0.3633	0.03	Q	|	|	|	V|
24+10	0.3635	0.02	Q	|	|	|	V|
24+15	0.3636	0.01	Q	|	|	|	V|
24+20	0.3636	0.01	Q	|	|	|	V|
24+25	0.3637	0.01	Q	|	|	|	V|
24+30	0.3637	0.01	Q	|	|	|	V|
24+35	0.3637	0.00	Q	|	|	|	V|
24+40	0.3638	0.00	Q	|	|	|	V|
24+45	0.3638	0.00	Q	|	|	|	V|
24+50	0.3638	0.00	Q	|	|	|	V|
24+55	0.3638	0.00	Q	|	|	|	V|
25+ 0	0.3638	0.00	Q	|	|	|	V|
25+ 5	0.3638	0.00	Q	|	|	|	V|
25+10	0.3638	0.00	Q	|	|	|	V|
25+15	0.3638	0.00	Q	|	|	|	V|
25+20	0.3638	0.00	Q	|	|	|	V|

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

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Study date 06/21/19 File: e1713uhq21c242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6062

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Barton Project
Unit Hydrograph
Existing Condition Area C
2-Year 24-Hour Storm

Drainage Area = 16.99(Ac.) = 0.027 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 16.99(Ac.) = 0.027 Sq. Mi.
Length along longest watercourse = 956.00(Ft.)
Length along longest watercourse measured to centroid = 472.00(Ft.)
Length along longest watercourse = 0.181 Mi.
Length along longest watercourse measured to centroid = 0.089 Mi.
Difference in elevation = 7.80(Ft.)
Slope along watercourse = 43.0795 Ft./Mi.
Average Manning's 'N' = 0.090
Lag time = 0.221 Hr.
Lag time = 13.23 Min.
25% of lag time = 3.31 Min.
40% of lag time = 5.29 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
16.99	1.85	31.43

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
16.99	4.55	77.30

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.850(In)
Area Averaged 100-Year Rainfall = 4.550(In)

Point rain (area averaged) = 1.850(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.850(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
16.990	86.00	0.000

Total Area Entered = 16.99(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
86.0	71.6	0.343	0.000	0.343	1.000	0.343
					Sum (F) =	0.343

Area averaged mean soil loss (F) (In/Hr) = 0.343
Minimum soil loss rate ((In/Hr)) = 0.172
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	37.793	4.004	0.686
2	0.167	75.585	16.173	2.769
3	0.250	113.378	25.392	4.348
4	0.333	151.170	18.510	3.169
5	0.417	188.963	9.233	1.581
6	0.500	226.755	5.585	0.956
7	0.583	264.548	4.134	0.708
8	0.667	302.340	3.252	0.557
9	0.750	340.133	2.490	0.426
10	0.833	377.926	2.102	0.360
11	0.917	415.718	1.644	0.282
12	1.000	453.511	1.286	0.220
13	1.083	491.303	1.165	0.199
14	1.167	529.096	1.044	0.179
15	1.250	566.888	0.824	0.141
16	1.333	604.681	0.702	0.120
17	1.417	642.473	0.587	0.101
18	1.500	680.266	0.481	0.082
19	1.583	718.059	0.381	0.065
20	1.667	755.851	0.378	0.065
21	1.750	793.644	0.378	0.065
22	1.833	831.436	0.253	0.043
			Sum = 100.000	Sum= 17.123

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.015	0.608	0.013	0.00
2	0.17	0.07	0.015	0.606	0.013	0.00
3	0.25	0.07	0.015	0.604	0.013	0.00
4	0.33	0.10	0.022	0.601	0.020	0.00
5	0.42	0.10	0.022	0.599	0.020	0.00
6	0.50	0.10	0.022	0.597	0.020	0.00

7	0.58	0.10	0.022	0.594	0.020	0.00
8	0.67	0.10	0.022	0.592	0.020	0.00
9	0.75	0.10	0.022	0.590	0.020	0.00
10	0.83	0.13	0.030	0.587	0.027	0.00
11	0.92	0.13	0.030	0.585	0.027	0.00
12	1.00	0.13	0.030	0.583	0.027	0.00
13	1.08	0.10	0.022	0.580	0.020	0.00
14	1.17	0.10	0.022	0.578	0.020	0.00
15	1.25	0.10	0.022	0.576	0.020	0.00
16	1.33	0.10	0.022	0.573	0.020	0.00
17	1.42	0.10	0.022	0.571	0.020	0.00
18	1.50	0.10	0.022	0.569	0.020	0.00
19	1.58	0.10	0.022	0.567	0.020	0.00
20	1.67	0.10	0.022	0.564	0.020	0.00
21	1.75	0.10	0.022	0.562	0.020	0.00
22	1.83	0.13	0.030	0.560	0.027	0.00
23	1.92	0.13	0.030	0.558	0.027	0.00
24	2.00	0.13	0.030	0.555	0.027	0.00
25	2.08	0.13	0.030	0.553	0.027	0.00
26	2.17	0.13	0.030	0.551	0.027	0.00
27	2.25	0.13	0.030	0.549	0.027	0.00
28	2.33	0.13	0.030	0.546	0.027	0.00
29	2.42	0.13	0.030	0.544	0.027	0.00
30	2.50	0.13	0.030	0.542	0.027	0.00
31	2.58	0.17	0.037	0.540	0.033	0.00
32	2.67	0.17	0.037	0.537	0.033	0.00
33	2.75	0.17	0.037	0.535	0.033	0.00
34	2.83	0.17	0.037	0.533	0.033	0.00
35	2.92	0.17	0.037	0.531	0.033	0.00
36	3.00	0.17	0.037	0.529	0.033	0.00
37	3.08	0.17	0.037	0.526	0.033	0.00
38	3.17	0.17	0.037	0.524	0.033	0.00
39	3.25	0.17	0.037	0.522	0.033	0.00
40	3.33	0.17	0.037	0.520	0.033	0.00
41	3.42	0.17	0.037	0.518	0.033	0.00
42	3.50	0.17	0.037	0.516	0.033	0.00
43	3.58	0.17	0.037	0.513	0.033	0.00
44	3.67	0.17	0.037	0.511	0.033	0.00
45	3.75	0.17	0.037	0.509	0.033	0.00
46	3.83	0.20	0.044	0.507	0.040	0.00
47	3.92	0.20	0.044	0.505	0.040	0.00
48	4.00	0.20	0.044	0.503	0.040	0.00
49	4.08	0.20	0.044	0.501	0.040	0.00
50	4.17	0.20	0.044	0.498	0.040	0.00
51	4.25	0.20	0.044	0.496	0.040	0.00
52	4.33	0.23	0.052	0.494	0.047	0.01
53	4.42	0.23	0.052	0.492	0.047	0.01
54	4.50	0.23	0.052	0.490	0.047	0.01
55	4.58	0.23	0.052	0.488	0.047	0.01
56	4.67	0.23	0.052	0.486	0.047	0.01
57	4.75	0.23	0.052	0.484	0.047	0.01
58	4.83	0.27	0.059	0.482	0.053	0.01
59	4.92	0.27	0.059	0.480	0.053	0.01
60	5.00	0.27	0.059	0.477	0.053	0.01
61	5.08	0.20	0.044	0.475	0.040	0.00
62	5.17	0.20	0.044	0.473	0.040	0.00
63	5.25	0.20	0.044	0.471	0.040	0.00
64	5.33	0.23	0.052	0.469	0.047	0.01
65	5.42	0.23	0.052	0.467	0.047	0.01
66	5.50	0.23	0.052	0.465	0.047	0.01
67	5.58	0.27	0.059	0.463	0.053	0.01
68	5.67	0.27	0.059	0.461	0.053	0.01
69	5.75	0.27	0.059	0.459	0.053	0.01

70	5.83	0.27	0.059	0.457	0.053	0.01
71	5.92	0.27	0.059	0.455	0.053	0.01
72	6.00	0.27	0.059	0.453	0.053	0.01
73	6.08	0.30	0.067	0.451	0.060	0.01
74	6.17	0.30	0.067	0.449	0.060	0.01
75	6.25	0.30	0.067	0.447	0.060	0.01
76	6.33	0.30	0.067	0.445	0.060	0.01
77	6.42	0.30	0.067	0.443	0.060	0.01
78	6.50	0.30	0.067	0.441	0.060	0.01
79	6.58	0.33	0.074	0.439	0.067	0.01
80	6.67	0.33	0.074	0.437	0.067	0.01
81	6.75	0.33	0.074	0.435	0.067	0.01
82	6.83	0.33	0.074	0.433	0.067	0.01
83	6.92	0.33	0.074	0.431	0.067	0.01
84	7.00	0.33	0.074	0.429	0.067	0.01
85	7.08	0.33	0.074	0.427	0.067	0.01
86	7.17	0.33	0.074	0.425	0.067	0.01
87	7.25	0.33	0.074	0.423	0.067	0.01
88	7.33	0.37	0.081	0.421	0.073	0.01
89	7.42	0.37	0.081	0.419	0.073	0.01
90	7.50	0.37	0.081	0.417	0.073	0.01
91	7.58	0.40	0.089	0.416	0.080	0.01
92	7.67	0.40	0.089	0.414	0.080	0.01
93	7.75	0.40	0.089	0.412	0.080	0.01
94	7.83	0.43	0.096	0.410	0.087	0.01
95	7.92	0.43	0.096	0.408	0.087	0.01
96	8.00	0.43	0.096	0.406	0.087	0.01
97	8.08	0.50	0.111	0.404	0.100	0.01
98	8.17	0.50	0.111	0.402	0.100	0.01
99	8.25	0.50	0.111	0.400	0.100	0.01
100	8.33	0.50	0.111	0.399	0.100	0.01
101	8.42	0.50	0.111	0.397	0.100	0.01
102	8.50	0.50	0.111	0.395	0.100	0.01
103	8.58	0.53	0.118	0.393	0.107	0.01
104	8.67	0.53	0.118	0.391	0.107	0.01
105	8.75	0.53	0.118	0.389	0.107	0.01
106	8.83	0.57	0.126	0.387	0.113	0.01
107	8.92	0.57	0.126	0.386	0.113	0.01
108	9.00	0.57	0.126	0.384	0.113	0.01
109	9.08	0.63	0.141	0.382	0.127	0.01
110	9.17	0.63	0.141	0.380	0.127	0.01
111	9.25	0.63	0.141	0.378	0.127	0.01
112	9.33	0.67	0.148	0.377	0.133	0.01
113	9.42	0.67	0.148	0.375	0.133	0.01
114	9.50	0.67	0.148	0.373	0.133	0.01
115	9.58	0.70	0.155	0.371	0.140	0.02
116	9.67	0.70	0.155	0.369	0.140	0.02
117	9.75	0.70	0.155	0.368	0.140	0.02
118	9.83	0.73	0.163	0.366	0.147	0.02
119	9.92	0.73	0.163	0.364	0.147	0.02
120	10.00	0.73	0.163	0.362	0.147	0.02
121	10.08	0.50	0.111	0.361	0.100	0.01
122	10.17	0.50	0.111	0.359	0.100	0.01
123	10.25	0.50	0.111	0.357	0.100	0.01
124	10.33	0.50	0.111	0.355	0.100	0.01
125	10.42	0.50	0.111	0.354	0.100	0.01
126	10.50	0.50	0.111	0.352	0.100	0.01
127	10.58	0.67	0.148	0.350	0.133	0.01
128	10.67	0.67	0.148	0.348	0.133	0.01
129	10.75	0.67	0.148	0.347	0.133	0.01
130	10.83	0.67	0.148	0.345	0.133	0.01
131	10.92	0.67	0.148	0.343	0.133	0.01
132	11.00	0.67	0.148	0.342	0.133	0.01

133	11.08	0.63	0.141	0.340	0.127	0.01
134	11.17	0.63	0.141	0.338	0.127	0.01
135	11.25	0.63	0.141	0.337	0.127	0.01
136	11.33	0.63	0.141	0.335	0.127	0.01
137	11.42	0.63	0.141	0.333	0.127	0.01
138	11.50	0.63	0.141	0.332	0.127	0.01
139	11.58	0.57	0.126	0.330	0.113	0.01
140	11.67	0.57	0.126	0.328	0.113	0.01
141	11.75	0.57	0.126	0.327	0.113	0.01
142	11.83	0.60	0.133	0.325	0.120	0.01
143	11.92	0.60	0.133	0.324	0.120	0.01
144	12.00	0.60	0.133	0.322	0.120	0.01
145	12.08	0.83	0.185	0.320	0.166	0.02
146	12.17	0.83	0.185	0.319	0.166	0.02
147	12.25	0.83	0.185	0.317	0.166	0.02
148	12.33	0.87	0.192	0.316	0.173	0.02
149	12.42	0.87	0.192	0.314	0.173	0.02
150	12.50	0.87	0.192	0.312	0.173	0.02
151	12.58	0.93	0.207	0.311	0.186	0.02
152	12.67	0.93	0.207	0.309	0.186	0.02
153	12.75	0.93	0.207	0.308	0.186	0.02
154	12.83	0.97	0.215	0.306	0.193	0.02
155	12.92	0.97	0.215	0.305	0.193	0.02
156	13.00	0.97	0.215	0.303	0.193	0.02
157	13.08	1.13	0.252	0.301	0.226	0.03
158	13.17	1.13	0.252	0.300	0.226	0.03
159	13.25	1.13	0.252	0.298	0.226	0.03
160	13.33	1.13	0.252	0.297	0.226	0.03
161	13.42	1.13	0.252	0.295	0.226	0.03
162	13.50	1.13	0.252	0.294	0.226	0.03
163	13.58	0.77	0.170	0.292	0.153	0.02
164	13.67	0.77	0.170	0.291	0.153	0.02
165	13.75	0.77	0.170	0.289	0.153	0.02
166	13.83	0.77	0.170	0.288	0.153	0.02
167	13.92	0.77	0.170	0.286	0.153	0.02
168	14.00	0.77	0.170	0.285	0.153	0.02
169	14.08	0.90	0.200	0.284	0.180	0.02
170	14.17	0.90	0.200	0.282	0.180	0.02
171	14.25	0.90	0.200	0.281	0.180	0.02
172	14.33	0.87	0.192	0.279	0.173	0.02
173	14.42	0.87	0.192	0.278	0.173	0.02
174	14.50	0.87	0.192	0.276	0.173	0.02
175	14.58	0.87	0.192	0.275	0.173	0.02
176	14.67	0.87	0.192	0.274	0.173	0.02
177	14.75	0.87	0.192	0.272	0.173	0.02
178	14.83	0.83	0.185	0.271	0.166	0.02
179	14.92	0.83	0.185	0.269	0.166	0.02
180	15.00	0.83	0.185	0.268	0.166	0.02
181	15.08	0.80	0.178	0.267	0.160	0.02
182	15.17	0.80	0.178	0.265	0.160	0.02
183	15.25	0.80	0.178	0.264	0.160	0.02
184	15.33	0.77	0.170	0.263	0.153	0.02
185	15.42	0.77	0.170	0.261	0.153	0.02
186	15.50	0.77	0.170	0.260	0.153	0.02
187	15.58	0.63	0.141	0.259	0.127	0.01
188	15.67	0.63	0.141	0.257	0.127	0.01
189	15.75	0.63	0.141	0.256	0.127	0.01
190	15.83	0.63	0.141	0.255	0.127	0.01
191	15.92	0.63	0.141	0.253	0.127	0.01
192	16.00	0.63	0.141	0.252	0.127	0.01
193	16.08	0.13	0.030	0.251	0.027	0.00
194	16.17	0.13	0.030	0.249	0.027	0.00
195	16.25	0.13	0.030	0.248	0.027	0.00

196	16.33	0.13	0.030	0.247	0.027	0.00
197	16.42	0.13	0.030	0.246	0.027	0.00
198	16.50	0.13	0.030	0.244	0.027	0.00
199	16.58	0.10	0.022	0.243	0.020	0.00
200	16.67	0.10	0.022	0.242	0.020	0.00
201	16.75	0.10	0.022	0.241	0.020	0.00
202	16.83	0.10	0.022	0.239	0.020	0.00
203	16.92	0.10	0.022	0.238	0.020	0.00
204	17.00	0.10	0.022	0.237	0.020	0.00
205	17.08	0.17	0.037	0.236	0.033	0.00
206	17.17	0.17	0.037	0.235	0.033	0.00
207	17.25	0.17	0.037	0.233	0.033	0.00
208	17.33	0.17	0.037	0.232	0.033	0.00
209	17.42	0.17	0.037	0.231	0.033	0.00
210	17.50	0.17	0.037	0.230	0.033	0.00
211	17.58	0.17	0.037	0.229	0.033	0.00
212	17.67	0.17	0.037	0.228	0.033	0.00
213	17.75	0.17	0.037	0.227	0.033	0.00
214	17.83	0.13	0.030	0.225	0.027	0.00
215	17.92	0.13	0.030	0.224	0.027	0.00
216	18.00	0.13	0.030	0.223	0.027	0.00
217	18.08	0.13	0.030	0.222	0.027	0.00
218	18.17	0.13	0.030	0.221	0.027	0.00
219	18.25	0.13	0.030	0.220	0.027	0.00
220	18.33	0.13	0.030	0.219	0.027	0.00
221	18.42	0.13	0.030	0.218	0.027	0.00
222	18.50	0.13	0.030	0.217	0.027	0.00
223	18.58	0.10	0.022	0.216	0.020	0.00
224	18.67	0.10	0.022	0.215	0.020	0.00
225	18.75	0.10	0.022	0.214	0.020	0.00
226	18.83	0.07	0.015	0.213	0.013	0.00
227	18.92	0.07	0.015	0.212	0.013	0.00
228	19.00	0.07	0.015	0.211	0.013	0.00
229	19.08	0.10	0.022	0.210	0.020	0.00
230	19.17	0.10	0.022	0.209	0.020	0.00
231	19.25	0.10	0.022	0.208	0.020	0.00
232	19.33	0.13	0.030	0.207	0.027	0.00
233	19.42	0.13	0.030	0.206	0.027	0.00
234	19.50	0.13	0.030	0.205	0.027	0.00
235	19.58	0.10	0.022	0.204	0.020	0.00
236	19.67	0.10	0.022	0.203	0.020	0.00
237	19.75	0.10	0.022	0.202	0.020	0.00
238	19.83	0.07	0.015	0.201	0.013	0.00
239	19.92	0.07	0.015	0.200	0.013	0.00
240	20.00	0.07	0.015	0.199	0.013	0.00
241	20.08	0.10	0.022	0.198	0.020	0.00
242	20.17	0.10	0.022	0.197	0.020	0.00
243	20.25	0.10	0.022	0.197	0.020	0.00
244	20.33	0.10	0.022	0.196	0.020	0.00
245	20.42	0.10	0.022	0.195	0.020	0.00
246	20.50	0.10	0.022	0.194	0.020	0.00
247	20.58	0.10	0.022	0.193	0.020	0.00
248	20.67	0.10	0.022	0.192	0.020	0.00
249	20.75	0.10	0.022	0.192	0.020	0.00
250	20.83	0.07	0.015	0.191	0.013	0.00
251	20.92	0.07	0.015	0.190	0.013	0.00
252	21.00	0.07	0.015	0.189	0.013	0.00
253	21.08	0.10	0.022	0.189	0.020	0.00
254	21.17	0.10	0.022	0.188	0.020	0.00
255	21.25	0.10	0.022	0.187	0.020	0.00
256	21.33	0.07	0.015	0.186	0.013	0.00
257	21.42	0.07	0.015	0.186	0.013	0.00
258	21.50	0.07	0.015	0.185	0.013	0.00

259	21.58	0.10	0.022	0.184	0.020	0.00
260	21.67	0.10	0.022	0.184	0.020	0.00
261	21.75	0.10	0.022	0.183	0.020	0.00
262	21.83	0.07	0.015	0.182	0.013	0.00
263	21.92	0.07	0.015	0.182	0.013	0.00
264	22.00	0.07	0.015	0.181	0.013	0.00
265	22.08	0.10	0.022	0.181	0.020	0.00
266	22.17	0.10	0.022	0.180	0.020	0.00
267	22.25	0.10	0.022	0.179	0.020	0.00
268	22.33	0.07	0.015	0.179	0.013	0.00
269	22.42	0.07	0.015	0.178	0.013	0.00
270	22.50	0.07	0.015	0.178	0.013	0.00
271	22.58	0.07	0.015	0.177	0.013	0.00
272	22.67	0.07	0.015	0.177	0.013	0.00
273	22.75	0.07	0.015	0.176	0.013	0.00
274	22.83	0.07	0.015	0.176	0.013	0.00
275	22.92	0.07	0.015	0.175	0.013	0.00
276	23.00	0.07	0.015	0.175	0.013	0.00
277	23.08	0.07	0.015	0.175	0.013	0.00
278	23.17	0.07	0.015	0.174	0.013	0.00
279	23.25	0.07	0.015	0.174	0.013	0.00
280	23.33	0.07	0.015	0.173	0.013	0.00
281	23.42	0.07	0.015	0.173	0.013	0.00
282	23.50	0.07	0.015	0.173	0.013	0.00
283	23.58	0.07	0.015	0.173	0.013	0.00
284	23.67	0.07	0.015	0.172	0.013	0.00
285	23.75	0.07	0.015	0.172	0.013	0.00
286	23.83	0.07	0.015	0.172	0.013	0.00
287	23.92	0.07	0.015	0.172	0.013	0.00
288	24.00	0.07	0.015	0.172	0.013	0.00
Sum =		100.0			Sum =	2.2

Flood volume = Effective rainfall 0.18(In)
times area 17.0(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 1.66(In)
Total soil loss = 2.357(Ac.Ft)
Total rainfall = 1.85(In)
Flood volume = 11409.3 Cubic Feet
Total soil loss = 102683.3 Cubic Feet

Peak flow rate of this hydrograph = 0.413(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	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.01	Q	|	|	|	|
0+15	0.0001	0.01	Q	|	|	|	|
0+20	0.0002	0.02	Q	|	|	|	|
0+25	0.0004	0.02	Q	|	|	|	|
0+30	0.0006	0.03	Q	|	|	|	|
0+35	0.0008	0.03	Q	|	|	|	|
0+40	0.0010	0.03	Q	|	|	|	|
0+45	0.0012	0.03	Q	|	|	|	|
0+50	0.0014	0.03	Q	|	|	|	|
0+55	0.0017	0.04	Q	|	|	|	|
1+ 0	0.0020	0.04	Q	|	|	|	|
1+ 5	0.0023	0.04	Q	|	|	|	|

1+10	0.0026	0.04	Q	|	|	|	|
1+15	0.0028	0.04	Q	|	|	|	|
1+20	0.0031	0.04	Q	|	|	|	|
1+25	0.0034	0.04	Q	|	|	|	|
1+30	0.0036	0.04	Q	|	|	|	|
1+35	0.0039	0.04	Q	|	|	|	|
1+40	0.0042	0.04	Q	|	|	|	|
1+45	0.0044	0.04	Q	|	|	|	|
1+50	0.0047	0.04	Q	|	|	|	|
1+55	0.0050	0.04	Q	|	|	|	|
2+ 0	0.0053	0.04	Q	|	|	|	|
2+ 5	0.0056	0.05	Q	|	|	|	|
2+10	0.0059	0.05	Q	|	|	|	|
2+15	0.0063	0.05	Q	|	|	|	|
2+20	0.0066	0.05	QV	|	|	|	|
2+25	0.0069	0.05	QV	|	|	|	|
2+30	0.0073	0.05	QV	|	|	|	|
2+35	0.0076	0.05	QV	|	|	|	|
2+40	0.0080	0.05	QV	|	|	|	|
2+45	0.0084	0.06	QV	|	|	|	|
2+50	0.0088	0.06	QV	|	|	|	|
2+55	0.0092	0.06	QV	|	|	|	|
3+ 0	0.0096	0.06	QV	|	|	|	|
3+ 5	0.0100	0.06	QV	|	|	|	|
3+10	0.0104	0.06	QV	|	|	|	|
3+15	0.0109	0.06	QV	|	|	|	|
3+20	0.0113	0.06	QV	|	|	|	|
3+25	0.0117	0.06	QV	|	|	|	|
3+30	0.0122	0.06	QV	|	|	|	|
3+35	0.0126	0.06	QV	|	|	|	|
3+40	0.0130	0.06	QV	|	|	|	|
3+45	0.0135	0.06	Q V	|	|	|	|
3+50	0.0139	0.06	Q V	|	|	|	|
3+55	0.0143	0.07	Q V	|	|	|	|
4+ 0	0.0148	0.07	Q V	|	|	|	|
4+ 5	0.0153	0.07	Q V	|	|	|	|
4+10	0.0158	0.07	Q V	|	|	|	|
4+15	0.0163	0.07	Q V	|	|	|	|
4+20	0.0168	0.07	Q V	|	|	|	|
4+25	0.0174	0.08	Q V	|	|	|	|
4+30	0.0179	0.08	Q V	|	|	|	|
4+35	0.0185	0.08	Q V	|	|	|	|
4+40	0.0191	0.08	Q V	|	|	|	|
4+45	0.0197	0.09	Q V	|	|	|	|
4+50	0.0203	0.09	Q V	|	|	|	|
4+55	0.0209	0.09	Q V	|	|	|	|
5+ 0	0.0215	0.09	Q V	|	|	|	|
5+ 5	0.0222	0.09	Q V	|	|	|	|
5+10	0.0228	0.09	Q V	|	|	|	|
5+15	0.0234	0.09	Q V	|	|	|	|
5+20	0.0239	0.08	Q V	|	|	|	|
5+25	0.0245	0.08	Q V	|	|	|	|
5+30	0.0251	0.09	Q V	|	|	|	|
5+35	0.0257	0.09	Q V	|	|	|	|
5+40	0.0263	0.09	Q V	|	|	|	|
5+45	0.0270	0.09	Q V	|	|	|	|
5+50	0.0276	0.10	Q V	|	|	|	|
5+55	0.0283	0.10	Q V	|	|	|	|
6+ 0	0.0290	0.10	Q V	|	|	|	|
6+ 5	0.0297	0.10	Q V	|	|	|	|
6+10	0.0304	0.10	Q V	|	|	|	|
6+15	0.0311	0.11	Q V	|	|	|	|
6+20	0.0319	0.11	Q V	|	|	|	|

6+25	0.0326	0.11	Q	V	|	|	|	|
6+30	0.0334	0.11	Q	V	|	|	|	|
6+35	0.0341	0.11	Q	V	|	|	|	|
6+40	0.0349	0.11	Q	V	|	|	|	|
6+45	0.0357	0.12	Q	V	|	|	|	|
6+50	0.0366	0.12	Q	V	|	|	|	|
6+55	0.0374	0.12	Q	V	|	|	|	|
7+ 0	0.0383	0.12	Q	V	|	|	|	|
7+ 5	0.0391	0.12	Q	V	|	|	|	|
7+10	0.0400	0.12	Q	V	|	|	|	|
7+15	0.0408	0.12	Q	V	|	|	|	|
7+20	0.0417	0.13	Q	V	|	|	|	|
7+25	0.0426	0.13	Q	V	|	|	|	|
7+30	0.0435	0.13	Q	V	|	|	|	|
7+35	0.0444	0.13	Q	V	|	|	|	|
7+40	0.0454	0.14	Q	V	|	|	|	|
7+45	0.0463	0.14	Q	V	|	|	|	|
7+50	0.0473	0.15	Q	V	|	|	|	|
7+55	0.0484	0.15	Q	V	|	|	|	|
8+ 0	0.0494	0.15	Q	V	|	|	|	|
8+ 5	0.0505	0.16	Q	V	|	|	|	|
8+10	0.0516	0.16	Q	V	|	|	|	|
8+15	0.0528	0.17	Q	V	|	|	|	|
8+20	0.0540	0.18	Q	V	|	|	|	|
8+25	0.0553	0.18	Q	V	|	|	|	|
8+30	0.0565	0.18	Q	V	|	|	|	|
8+35	0.0578	0.18	Q	V	|	|	|	|
8+40	0.0591	0.19	Q	V	|	|	|	|
8+45	0.0604	0.19	Q	V	|	|	|	|
8+50	0.0618	0.20	Q	V	|	|	|	|
8+55	0.0631	0.20	Q	V	|	|	|	|
9+ 0	0.0645	0.20	Q	V	|	|	|	|
9+ 5	0.0660	0.21	Q	V	|	|	|	|
9+10	0.0675	0.21	Q	V	|	|	|	|
9+15	0.0690	0.22	Q	V	|	|	|	|
9+20	0.0706	0.23	Q	V	|	|	|	|
9+25	0.0722	0.23	Q	|	V	|	|	|
9+30	0.0738	0.24	Q	|	V	|	|	|
9+35	0.0755	0.24	Q	|	V	|	|	|
9+40	0.0772	0.25	Q	|	V	|	|	|
9+45	0.0789	0.25	|	Q	|	V	|	|
9+50	0.0807	0.26	|	Q	|	V	|	|
9+55	0.0825	0.26	|	Q	|	V	|	|
10+ 0	0.0843	0.27	|	Q	|	V	|	|
10+ 5	0.0861	0.27	|	Q	|	V	|	|
10+10	0.0879	0.25	|	Q	|	V	|	|
10+15	0.0895	0.23	Q	|	V	|	|	|
10+20	0.0910	0.22	Q	|	V	|	|	|
10+25	0.0924	0.21	Q	|	V	|	|	|
10+30	0.0939	0.21	Q	|	V	|	|	|
10+35	0.0953	0.21	Q	|	V	|	|	|
10+40	0.0967	0.21	Q	|	V	|	|	|
10+45	0.0983	0.23	Q	|	V	|	|	|
10+50	0.0999	0.24	Q	|	V	|	|	|
10+55	0.1016	0.24	Q	|	V	|	|	|
11+ 0	0.1033	0.25	Q	|	V	|	|	|
11+ 5	0.1050	0.25	Q	|	V	|	|	|
11+10	0.1067	0.25	Q	|	V	|	|	|
11+15	0.1084	0.24	Q	|	V	|	|	|
11+20	0.1100	0.24	Q	|	V	|	|	|
11+25	0.1117	0.24	Q	|	V	|	|	|
11+30	0.1134	0.24	Q	|	V	|	|	|
11+35	0.1150	0.24	Q	|	V	|	|	|

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11+40       0.1166      0.24  Q          |      V  |          |          |
11+45       0.1182      0.23  Q          |       V |          |          |
11+50       0.1197      0.22  Q          |       V |          |          |
11+55       0.1213      0.22  Q          |       V |          |          |
12+ 0       0.1229      0.23  Q          |       V |          |          |
12+ 5       0.1244      0.23  Q          |        V|          |          |
12+10       0.1261      0.25  Q          |        V|          |          |
12+15       0.1280      0.27  |Q         |        V|          |          |
12+20       0.1300      0.29  |Q         |        V|          |          |
12+25       0.1320      0.30  |Q         |         V          |          |
12+30       0.1341      0.30  |Q         |         V          |          |
12+35       0.1362      0.31  |Q         |         V          |          |
12+40       0.1384      0.32  |Q         |         |V         |          |
12+45       0.1407      0.33  |Q         |         |V         |          |
12+50       0.1430      0.34  |Q         |         |V         |          |
12+55       0.1454      0.34  |Q         |         | V        |          |
13+ 0       0.1478      0.35  |Q         |         | V        |          |
13+ 5       0.1502      0.36  |Q         |         | V        |          |
13+10       0.1528      0.37  |Q         |         |  V       |          |
13+15       0.1554      0.39  |Q         |         |  V       |          |
13+20       0.1582      0.40  |Q         |         |   V      |          |
13+25       0.1610      0.41  |Q         |         |   V      |          |
13+30       0.1639      0.41  |Q         |         |    V     |          |
13+35       0.1667      0.41  |Q         |         |    V     |          |
13+40       0.1694      0.39  |Q         |         |    V     |          |
13+45       0.1719      0.36  |Q         |         |     V    |          |
13+50       0.1742      0.33  |Q         |         |     V    |          |
13+55       0.1764      0.32  |Q         |         |     V    |          |
14+ 0       0.1786      0.32  |Q         |         |      V   |          |
14+ 5       0.1807      0.31  |Q         |         |      V   |          |
14+10       0.1829      0.32  |Q         |         |      V   |          |
14+15       0.1852      0.33  |Q         |         |       V  |          |
14+20       0.1875      0.33  |Q         |         |       V  |          |
14+25       0.1898      0.34  |Q         |         |       V  |          |
14+30       0.1921      0.33  |Q         |         |        V |          |
14+35       0.1944      0.33  |Q         |         |        V |          |
14+40       0.1966      0.33  |Q         |         |         V          |
14+45       0.1989      0.33  |Q         |         |         V          |
14+50       0.2012      0.33  |Q         |         |         V          |
14+55       0.2035      0.33  |Q         |         |         |V         |
15+ 0       0.2057      0.32  |Q         |         |         |V         |
15+ 5       0.2079      0.32  |Q         |         |         |V         |
15+10       0.2101      0.32  |Q         |         |         | V        |
15+15       0.2122      0.31  |Q         |         |         | V        |
15+20       0.2144      0.31  |Q         |         |         | V        |
15+25       0.2165      0.31  |Q         |         |         |  V       |
15+30       0.2186      0.30  |Q         |         |         |  V       |
15+35       0.2206      0.30  |Q         |         |         |  V       |
15+40       0.2226      0.29  |Q         |         |         |  V       |
15+45       0.2245      0.27  |Q         |         |         |   V      |
15+50       0.2263      0.26  |Q         |         |         |   V      |
15+55       0.2281      0.26  |Q         |         |         |   V      |
16+ 0       0.2298      0.25  |Q         |         |         |    V     |
16+ 5       0.2315      0.24  Q          |         |         |    V     |
16+10       0.2329      0.21  Q          |         |         |    V     |
16+15       0.2341      0.16  Q          |         |         |    V     |
16+20       0.2349      0.12  Q          |         |         |    V     |
16+25       0.2356      0.11  Q          |         |         |    V     |
16+30       0.2363      0.09  Q          |         |         |     V    |
16+35       0.2369      0.09  Q          |         |         |     V    |
16+40       0.2374      0.08  Q          |         |         |     V    |
16+45       0.2379      0.07  Q          |         |         |     V    |
16+50       0.2383      0.06  Q          |         |         |     V    |
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16+55	0.2387	0.06	Q	|	|	|	V |
17+ 0	0.2391	0.05	Q	|	|	|	V |
17+ 5	0.2394	0.05	Q	|	|	|	V |
17+10	0.2398	0.05	Q	|	|	|	V |
17+15	0.2402	0.06	Q	|	|	|	V |
17+20	0.2406	0.06	Q	|	|	|	V |
17+25	0.2410	0.06	Q	|	|	|	V |
17+30	0.2414	0.06	Q	|	|	|	V |
17+35	0.2419	0.06	Q	|	|	|	V |
17+40	0.2423	0.06	Q	|	|	|	V |
17+45	0.2427	0.06	Q	|	|	|	V |
17+50	0.2431	0.06	Q	|	|	|	V |
17+55	0.2435	0.06	Q	|	|	|	V |
18+ 0	0.2439	0.06	Q	|	|	|	V |
18+ 5	0.2443	0.05	Q	|	|	|	V |
18+10	0.2447	0.05	Q	|	|	|	V |
18+15	0.2450	0.05	Q	|	|	|	V |
18+20	0.2454	0.05	Q	|	|	|	V |
18+25	0.2457	0.05	Q	|	|	|	V |
18+30	0.2461	0.05	Q	|	|	|	V |
18+35	0.2464	0.05	Q	|	|	|	V |
18+40	0.2468	0.05	Q	|	|	|	V |
18+45	0.2471	0.05	Q	|	|	|	V |
18+50	0.2474	0.04	Q	|	|	|	V |
18+55	0.2477	0.04	Q	|	|	|	V |
19+ 0	0.2479	0.04	Q	|	|	|	V |
19+ 5	0.2481	0.03	Q	|	|	|	V |
19+10	0.2484	0.03	Q	|	|	|	V |
19+15	0.2486	0.04	Q	|	|	|	V |
19+20	0.2489	0.04	Q	|	|	|	V |
19+25	0.2491	0.04	Q	|	|	|	V |
19+30	0.2494	0.04	Q	|	|	|	V |
19+35	0.2497	0.05	Q	|	|	|	V |
19+40	0.2501	0.04	Q	|	|	|	V |
19+45	0.2503	0.04	Q	|	|	|	V |
19+50	0.2506	0.04	Q	|	|	|	V |
19+55	0.2509	0.04	Q	|	|	|	V |
20+ 0	0.2511	0.03	Q	|	|	|	V |
20+ 5	0.2513	0.03	Q	|	|	|	V |
20+10	0.2515	0.03	Q	|	|	|	V |
20+15	0.2518	0.03	Q	|	|	|	V |
20+20	0.2520	0.04	Q	|	|	|	V |
20+25	0.2523	0.04	Q	|	|	|	V |
20+30	0.2525	0.04	Q	|	|	|	V |
20+35	0.2528	0.04	Q	|	|	|	V |
20+40	0.2530	0.04	Q	|	|	|	V |
20+45	0.2533	0.04	Q	|	|	|	V |
20+50	0.2536	0.04	Q	|	|	|	V |
20+55	0.2538	0.04	Q	|	|	|	V |
21+ 0	0.2540	0.03	Q	|	|	|	V |
21+ 5	0.2542	0.03	Q	|	|	|	V |
21+10	0.2544	0.03	Q	|	|	|	V |
21+15	0.2547	0.03	Q	|	|	|	V |
21+20	0.2549	0.03	Q	|	|	|	V |
21+25	0.2551	0.03	Q	|	|	|	V |
21+30	0.2554	0.03	Q	|	|	|	V |
21+35	0.2556	0.03	Q	|	|	|	V|
21+40	0.2558	0.03	Q	|	|	|	V|
21+45	0.2560	0.03	Q	|	|	|	V|
21+50	0.2562	0.03	Q	|	|	|	V|
21+55	0.2565	0.03	Q	|	|	|	V|
22+ 0	0.2567	0.03	Q	|	|	|	V|
22+ 5	0.2569	0.03	Q	|	|	|	V|

22+10	0.2571	0.03	Q	|	|	|	V|
22+15	0.2573	0.03	Q	|	|	|	V|
22+20	0.2575	0.03	Q	|	|	|	V|
22+25	0.2578	0.03	Q	|	|	|	V|
22+30	0.2580	0.03	Q	|	|	|	V|
22+35	0.2582	0.03	Q	|	|	|	V|
22+40	0.2584	0.03	Q	|	|	|	V|
22+45	0.2586	0.03	Q	|	|	|	V|
22+50	0.2587	0.03	Q	|	|	|	V|
22+55	0.2589	0.03	Q	|	|	|	V|
23+ 0	0.2591	0.03	Q	|	|	|	V|
23+ 5	0.2593	0.03	Q	|	|	|	V|
23+10	0.2595	0.03	Q	|	|	|	V|
23+15	0.2596	0.03	Q	|	|	|	V|
23+20	0.2598	0.03	Q	|	|	|	V|
23+25	0.2600	0.03	Q	|	|	|	V|
23+30	0.2602	0.03	Q	|	|	|	V|
23+35	0.2603	0.03	Q	|	|	|	V|
23+40	0.2605	0.03	Q	|	|	|	V|
23+45	0.2607	0.03	Q	|	|	|	V|
23+50	0.2609	0.03	Q	|	|	|	V|
23+55	0.2610	0.03	Q	|	|	|	V|
24+ 0	0.2612	0.03	Q	|	|	|	V|
24+ 5	0.2614	0.02	Q	|	|	|	V|
24+10	0.2615	0.02	Q	|	|	|	V|
24+15	0.2616	0.01	Q	|	|	|	V|
24+20	0.2617	0.01	Q	|	|	|	V|
24+25	0.2617	0.01	Q	|	|	|	V|
24+30	0.2618	0.01	Q	|	|	|	V|
24+35	0.2618	0.00	Q	|	|	|	V|
24+40	0.2618	0.00	Q	|	|	|	V|
24+45	0.2618	0.00	Q	|	|	|	V|
24+50	0.2619	0.00	Q	|	|	|	V|
24+55	0.2619	0.00	Q	|	|	|	V|
25+ 0	0.2619	0.00	Q	|	|	|	V|
25+ 5	0.2619	0.00	Q	|	|	|	V|
25+10	0.2619	0.00	Q	|	|	|	V|
25+15	0.2619	0.00	Q	|	|	|	V|
25+20	0.2619	0.00	Q	|	|	|	V|
25+25	0.2619	0.00	Q	|	|	|	V|
25+30	0.2619	0.00	Q	|	|	|	V|
25+35	0.2619	0.00	Q	|	|	|	V|
25+40	0.2619	0.00	Q	|	|	|	V|
25+45	0.2619	0.00	Q	|	|	|	V|

Proposed

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

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Study date 06/24/19 File: p1713uhq242b242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6062

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Barton Project
Unit Hydrograph
Proposed Condition Area B
2-Year 24-Hour Storm

Drainage Area = 13.10(Ac.) = 0.020 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.10(Ac.) = 0.020 Sq. Mi.
Length along longest watercourse = 1916.00(Ft.)
Length along longest watercourse measured to centroid = 981.00(Ft.)
Length along longest watercourse = 0.363 Mi.
Length along longest watercourse measured to centroid = 0.186 Mi.
Difference in elevation = 15.20(Ft.)
Slope along watercourse = 41.8873 Ft./Mi.
Average Manning's 'N' = 0.049
Lag time = 0.208 Hr.
Lag time = 12.45 Min.
25% of lag time = 3.11 Min.
40% of lag time = 4.98 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.10	1.85	24.23

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.10	4.55	59.60

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.850(In)
Area Averaged 100-Year Rainfall = 4.550(In)

Point rain (area averaged) = 1.850(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.850(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.100	69.00	0.500

Total Area Entered = 13.10(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
69.0	49.8	0.574	0.500	0.316	1.000	0.316
					Sum (F) =	0.316

Area averaged mean soil loss (F) (In/Hr) = 0.316
Minimum soil loss rate ((In/Hr)) = 0.158
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.534

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	40.148	4.381	0.578
2	0.167	80.296	18.004	2.377
3	0.250	120.444	26.832	3.542
4	0.333	160.592	17.373	2.294
5	0.417	200.740	8.483	1.120
6	0.500	240.888	5.362	0.708
7	0.583	281.036	4.010	0.529
8	0.667	321.184	3.068	0.405
9	0.750	361.332	2.437	0.322
10	0.833	401.480	1.932	0.255
11	0.917	441.628	1.508	0.199
12	1.000	481.776	1.260	0.166
13	1.083	521.924	1.158	0.153
14	1.167	562.072	0.909	0.120
15	1.250	602.221	0.762	0.101
16	1.333	642.369	0.634	0.084
17	1.417	682.517	0.509	0.067
18	1.500	722.665	0.404	0.053
19	1.583	762.813	0.401	0.053
20	1.667	802.961	0.573	0.076
		Sum = 100.000	Sum=	13.202

Unit Time	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.015	0.560	0.008	0.01
2	0.17	0.07	0.015	0.557	0.008	0.01
3	0.25	0.07	0.015	0.555	0.008	0.01
4	0.33	0.10	0.022	0.553	0.012	0.01
5	0.42	0.10	0.022	0.551	0.012	0.01
6	0.50	0.10	0.022	0.549	0.012	0.01
7	0.58	0.10	0.022	0.547	0.012	0.01
8	0.67	0.10	0.022	0.545	0.012	0.01

9	0.75	0.10	0.022	0.542	0.012	0.01
10	0.83	0.13	0.030	0.540	0.016	0.01
11	0.92	0.13	0.030	0.538	0.016	0.01
12	1.00	0.13	0.030	0.536	0.016	0.01
13	1.08	0.10	0.022	0.534	0.012	0.01
14	1.17	0.10	0.022	0.532	0.012	0.01
15	1.25	0.10	0.022	0.530	0.012	0.01
16	1.33	0.10	0.022	0.528	0.012	0.01
17	1.42	0.10	0.022	0.525	0.012	0.01
18	1.50	0.10	0.022	0.523	0.012	0.01
19	1.58	0.10	0.022	0.521	0.012	0.01
20	1.67	0.10	0.022	0.519	0.012	0.01
21	1.75	0.10	0.022	0.517	0.012	0.01
22	1.83	0.13	0.030	0.515	0.016	0.01
23	1.92	0.13	0.030	0.513	0.016	0.01
24	2.00	0.13	0.030	0.511	0.016	0.01
25	2.08	0.13	0.030	0.509	0.016	0.01
26	2.17	0.13	0.030	0.507	0.016	0.01
27	2.25	0.13	0.030	0.505	0.016	0.01
28	2.33	0.13	0.030	0.503	0.016	0.01
29	2.42	0.13	0.030	0.501	0.016	0.01
30	2.50	0.13	0.030	0.499	0.016	0.01
31	2.58	0.17	0.037	0.497	0.020	0.02
32	2.67	0.17	0.037	0.494	0.020	0.02
33	2.75	0.17	0.037	0.492	0.020	0.02
34	2.83	0.17	0.037	0.490	0.020	0.02
35	2.92	0.17	0.037	0.488	0.020	0.02
36	3.00	0.17	0.037	0.486	0.020	0.02
37	3.08	0.17	0.037	0.484	0.020	0.02
38	3.17	0.17	0.037	0.482	0.020	0.02
39	3.25	0.17	0.037	0.480	0.020	0.02
40	3.33	0.17	0.037	0.478	0.020	0.02
41	3.42	0.17	0.037	0.476	0.020	0.02
42	3.50	0.17	0.037	0.474	0.020	0.02
43	3.58	0.17	0.037	0.472	0.020	0.02
44	3.67	0.17	0.037	0.470	0.020	0.02
45	3.75	0.17	0.037	0.468	0.020	0.02
46	3.83	0.20	0.044	0.466	0.024	0.02
47	3.92	0.20	0.044	0.464	0.024	0.02
48	4.00	0.20	0.044	0.463	0.024	0.02
49	4.08	0.20	0.044	0.461	0.024	0.02
50	4.17	0.20	0.044	0.459	0.024	0.02
51	4.25	0.20	0.044	0.457	0.024	0.02
52	4.33	0.23	0.052	0.455	0.028	0.02
53	4.42	0.23	0.052	0.453	0.028	0.02
54	4.50	0.23	0.052	0.451	0.028	0.02
55	4.58	0.23	0.052	0.449	0.028	0.02
56	4.67	0.23	0.052	0.447	0.028	0.02
57	4.75	0.23	0.052	0.445	0.028	0.02
58	4.83	0.27	0.059	0.443	0.032	0.03
59	4.92	0.27	0.059	0.441	0.032	0.03
60	5.00	0.27	0.059	0.439	0.032	0.03
61	5.08	0.20	0.044	0.437	0.024	0.02
62	5.17	0.20	0.044	0.435	0.024	0.02
63	5.25	0.20	0.044	0.434	0.024	0.02
64	5.33	0.23	0.052	0.432	0.028	0.02
65	5.42	0.23	0.052	0.430	0.028	0.02
66	5.50	0.23	0.052	0.428	0.028	0.02
67	5.58	0.27	0.059	0.426	0.032	0.03
68	5.67	0.27	0.059	0.424	0.032	0.03
69	5.75	0.27	0.059	0.422	0.032	0.03
70	5.83	0.27	0.059	0.420	0.032	0.03
71	5.92	0.27	0.059	0.419	0.032	0.03

72	6.00	0.27	0.059	0.417	0.032	0.03
73	6.08	0.30	0.067	0.415	0.036	0.03
74	6.17	0.30	0.067	0.413	0.036	0.03
75	6.25	0.30	0.067	0.411	0.036	0.03
76	6.33	0.30	0.067	0.409	0.036	0.03
77	6.42	0.30	0.067	0.407	0.036	0.03
78	6.50	0.30	0.067	0.406	0.036	0.03
79	6.58	0.33	0.074	0.404	0.040	0.03
80	6.67	0.33	0.074	0.402	0.040	0.03
81	6.75	0.33	0.074	0.400	0.040	0.03
82	6.83	0.33	0.074	0.398	0.040	0.03
83	6.92	0.33	0.074	0.397	0.040	0.03
84	7.00	0.33	0.074	0.395	0.040	0.03
85	7.08	0.33	0.074	0.393	0.040	0.03
86	7.17	0.33	0.074	0.391	0.040	0.03
87	7.25	0.33	0.074	0.389	0.040	0.03
88	7.33	0.37	0.081	0.388	0.043	0.04
89	7.42	0.37	0.081	0.386	0.043	0.04
90	7.50	0.37	0.081	0.384	0.043	0.04
91	7.58	0.40	0.089	0.382	0.047	0.04
92	7.67	0.40	0.089	0.381	0.047	0.04
93	7.75	0.40	0.089	0.379	0.047	0.04
94	7.83	0.43	0.096	0.377	0.051	0.04
95	7.92	0.43	0.096	0.375	0.051	0.04
96	8.00	0.43	0.096	0.374	0.051	0.04
97	8.08	0.50	0.111	0.372	0.059	0.05
98	8.17	0.50	0.111	0.370	0.059	0.05
99	8.25	0.50	0.111	0.368	0.059	0.05
100	8.33	0.50	0.111	0.367	0.059	0.05
101	8.42	0.50	0.111	0.365	0.059	0.05
102	8.50	0.50	0.111	0.363	0.059	0.05
103	8.58	0.53	0.118	0.362	0.063	0.06
104	8.67	0.53	0.118	0.360	0.063	0.06
105	8.75	0.53	0.118	0.358	0.063	0.06
106	8.83	0.57	0.126	0.356	0.067	0.06
107	8.92	0.57	0.126	0.355	0.067	0.06
108	9.00	0.57	0.126	0.353	0.067	0.06
109	9.08	0.63	0.141	0.351	0.075	0.07
110	9.17	0.63	0.141	0.350	0.075	0.07
111	9.25	0.63	0.141	0.348	0.075	0.07
112	9.33	0.67	0.148	0.346	0.079	0.07
113	9.42	0.67	0.148	0.345	0.079	0.07
114	9.50	0.67	0.148	0.343	0.079	0.07
115	9.58	0.70	0.155	0.341	0.083	0.07
116	9.67	0.70	0.155	0.340	0.083	0.07
117	9.75	0.70	0.155	0.338	0.083	0.07
118	9.83	0.73	0.163	0.337	0.087	0.08
119	9.92	0.73	0.163	0.335	0.087	0.08
120	10.00	0.73	0.163	0.333	0.087	0.08
121	10.08	0.50	0.111	0.332	0.059	0.05
122	10.17	0.50	0.111	0.330	0.059	0.05
123	10.25	0.50	0.111	0.329	0.059	0.05
124	10.33	0.50	0.111	0.327	0.059	0.05
125	10.42	0.50	0.111	0.325	0.059	0.05
126	10.50	0.50	0.111	0.324	0.059	0.05
127	10.58	0.67	0.148	0.322	0.079	0.07
128	10.67	0.67	0.148	0.321	0.079	0.07
129	10.75	0.67	0.148	0.319	0.079	0.07
130	10.83	0.67	0.148	0.317	0.079	0.07
131	10.92	0.67	0.148	0.316	0.079	0.07
132	11.00	0.67	0.148	0.314	0.079	0.07
133	11.08	0.63	0.141	0.313	0.075	0.07
134	11.17	0.63	0.141	0.311	0.075	0.07

135	11.25	0.63	0.141	0.310	0.075	0.07
136	11.33	0.63	0.141	0.308	0.075	0.07
137	11.42	0.63	0.141	0.307	0.075	0.07
138	11.50	0.63	0.141	0.305	0.075	0.07
139	11.58	0.57	0.126	0.304	0.067	0.06
140	11.67	0.57	0.126	0.302	0.067	0.06
141	11.75	0.57	0.126	0.301	0.067	0.06
142	11.83	0.60	0.133	0.299	0.071	0.06
143	11.92	0.60	0.133	0.298	0.071	0.06
144	12.00	0.60	0.133	0.296	0.071	0.06
145	12.08	0.83	0.185	0.295	0.099	0.09
146	12.17	0.83	0.185	0.293	0.099	0.09
147	12.25	0.83	0.185	0.292	0.099	0.09
148	12.33	0.87	0.192	0.290	0.103	0.09
149	12.42	0.87	0.192	0.289	0.103	0.09
150	12.50	0.87	0.192	0.287	0.103	0.09
151	12.58	0.93	0.207	0.286	0.111	0.10
152	12.67	0.93	0.207	0.284	0.111	0.10
153	12.75	0.93	0.207	0.283	0.111	0.10
154	12.83	0.97	0.215	0.282	0.115	0.10
155	12.92	0.97	0.215	0.280	0.115	0.10
156	13.00	0.97	0.215	0.279	0.115	0.10
157	13.08	1.13	0.252	0.277	0.134	0.12
158	13.17	1.13	0.252	0.276	0.134	0.12
159	13.25	1.13	0.252	0.275	0.134	0.12
160	13.33	1.13	0.252	0.273	0.134	0.12
161	13.42	1.13	0.252	0.272	0.134	0.12
162	13.50	1.13	0.252	0.270	0.134	0.12
163	13.58	0.77	0.170	0.269	0.091	0.08
164	13.67	0.77	0.170	0.268	0.091	0.08
165	13.75	0.77	0.170	0.266	0.091	0.08
166	13.83	0.77	0.170	0.265	0.091	0.08
167	13.92	0.77	0.170	0.264	0.091	0.08
168	14.00	0.77	0.170	0.262	0.091	0.08
169	14.08	0.90	0.200	0.261	0.107	0.09
170	14.17	0.90	0.200	0.260	0.107	0.09
171	14.25	0.90	0.200	0.258	0.107	0.09
172	14.33	0.87	0.192	0.257	0.103	0.09
173	14.42	0.87	0.192	0.256	0.103	0.09
174	14.50	0.87	0.192	0.254	0.103	0.09
175	14.58	0.87	0.192	0.253	0.103	0.09
176	14.67	0.87	0.192	0.252	0.103	0.09
177	14.75	0.87	0.192	0.250	0.103	0.09
178	14.83	0.83	0.185	0.249	0.099	0.09
179	14.92	0.83	0.185	0.248	0.099	0.09
180	15.00	0.83	0.185	0.247	0.099	0.09
181	15.08	0.80	0.178	0.245	0.095	0.08
182	15.17	0.80	0.178	0.244	0.095	0.08
183	15.25	0.80	0.178	0.243	0.095	0.08
184	15.33	0.77	0.170	0.242	0.091	0.08
185	15.42	0.77	0.170	0.240	0.091	0.08
186	15.50	0.77	0.170	0.239	0.091	0.08
187	15.58	0.63	0.141	0.238	0.075	0.07
188	15.67	0.63	0.141	0.237	0.075	0.07
189	15.75	0.63	0.141	0.235	0.075	0.07
190	15.83	0.63	0.141	0.234	0.075	0.07
191	15.92	0.63	0.141	0.233	0.075	0.07
192	16.00	0.63	0.141	0.232	0.075	0.07
193	16.08	0.13	0.030	0.231	0.016	0.01
194	16.17	0.13	0.030	0.229	0.016	0.01
195	16.25	0.13	0.030	0.228	0.016	0.01
196	16.33	0.13	0.030	0.227	0.016	0.01
197	16.42	0.13	0.030	0.226	0.016	0.01

198	16.50	0.13	0.030	0.225	0.016	0.01
199	16.58	0.10	0.022	0.224	0.012	0.01
200	16.67	0.10	0.022	0.223	0.012	0.01
201	16.75	0.10	0.022	0.221	0.012	0.01
202	16.83	0.10	0.022	0.220	0.012	0.01
203	16.92	0.10	0.022	0.219	0.012	0.01
204	17.00	0.10	0.022	0.218	0.012	0.01
205	17.08	0.17	0.037	0.217	0.020	0.02
206	17.17	0.17	0.037	0.216	0.020	0.02
207	17.25	0.17	0.037	0.215	0.020	0.02
208	17.33	0.17	0.037	0.214	0.020	0.02
209	17.42	0.17	0.037	0.213	0.020	0.02
210	17.50	0.17	0.037	0.212	0.020	0.02
211	17.58	0.17	0.037	0.211	0.020	0.02
212	17.67	0.17	0.037	0.209	0.020	0.02
213	17.75	0.17	0.037	0.208	0.020	0.02
214	17.83	0.13	0.030	0.207	0.016	0.01
215	17.92	0.13	0.030	0.206	0.016	0.01
216	18.00	0.13	0.030	0.205	0.016	0.01
217	18.08	0.13	0.030	0.204	0.016	0.01
218	18.17	0.13	0.030	0.203	0.016	0.01
219	18.25	0.13	0.030	0.202	0.016	0.01
220	18.33	0.13	0.030	0.201	0.016	0.01
221	18.42	0.13	0.030	0.200	0.016	0.01
222	18.50	0.13	0.030	0.199	0.016	0.01
223	18.58	0.10	0.022	0.198	0.012	0.01
224	18.67	0.10	0.022	0.197	0.012	0.01
225	18.75	0.10	0.022	0.197	0.012	0.01
226	18.83	0.07	0.015	0.196	0.008	0.01
227	18.92	0.07	0.015	0.195	0.008	0.01
228	19.00	0.07	0.015	0.194	0.008	0.01
229	19.08	0.10	0.022	0.193	0.012	0.01
230	19.17	0.10	0.022	0.192	0.012	0.01
231	19.25	0.10	0.022	0.191	0.012	0.01
232	19.33	0.13	0.030	0.190	0.016	0.01
233	19.42	0.13	0.030	0.189	0.016	0.01
234	19.50	0.13	0.030	0.188	0.016	0.01
235	19.58	0.10	0.022	0.187	0.012	0.01
236	19.67	0.10	0.022	0.187	0.012	0.01
237	19.75	0.10	0.022	0.186	0.012	0.01
238	19.83	0.07	0.015	0.185	0.008	0.01
239	19.92	0.07	0.015	0.184	0.008	0.01
240	20.00	0.07	0.015	0.183	0.008	0.01
241	20.08	0.10	0.022	0.182	0.012	0.01
242	20.17	0.10	0.022	0.182	0.012	0.01
243	20.25	0.10	0.022	0.181	0.012	0.01
244	20.33	0.10	0.022	0.180	0.012	0.01
245	20.42	0.10	0.022	0.179	0.012	0.01
246	20.50	0.10	0.022	0.179	0.012	0.01
247	20.58	0.10	0.022	0.178	0.012	0.01
248	20.67	0.10	0.022	0.177	0.012	0.01
249	20.75	0.10	0.022	0.176	0.012	0.01
250	20.83	0.07	0.015	0.176	0.008	0.01
251	20.92	0.07	0.015	0.175	0.008	0.01
252	21.00	0.07	0.015	0.174	0.008	0.01
253	21.08	0.10	0.022	0.174	0.012	0.01
254	21.17	0.10	0.022	0.173	0.012	0.01
255	21.25	0.10	0.022	0.172	0.012	0.01
256	21.33	0.07	0.015	0.172	0.008	0.01
257	21.42	0.07	0.015	0.171	0.008	0.01
258	21.50	0.07	0.015	0.170	0.008	0.01
259	21.58	0.10	0.022	0.170	0.012	0.01
260	21.67	0.10	0.022	0.169	0.012	0.01

261	21.75	0.10	0.022	0.168	0.012	0.01
262	21.83	0.07	0.015	0.168	0.008	0.01
263	21.92	0.07	0.015	0.167	0.008	0.01
264	22.00	0.07	0.015	0.167	0.008	0.01
265	22.08	0.10	0.022	0.166	0.012	0.01
266	22.17	0.10	0.022	0.166	0.012	0.01
267	22.25	0.10	0.022	0.165	0.012	0.01
268	22.33	0.07	0.015	0.165	0.008	0.01
269	22.42	0.07	0.015	0.164	0.008	0.01
270	22.50	0.07	0.015	0.164	0.008	0.01
271	22.58	0.07	0.015	0.163	0.008	0.01
272	22.67	0.07	0.015	0.163	0.008	0.01
273	22.75	0.07	0.015	0.162	0.008	0.01
274	22.83	0.07	0.015	0.162	0.008	0.01
275	22.92	0.07	0.015	0.161	0.008	0.01
276	23.00	0.07	0.015	0.161	0.008	0.01
277	23.08	0.07	0.015	0.161	0.008	0.01
278	23.17	0.07	0.015	0.160	0.008	0.01
279	23.25	0.07	0.015	0.160	0.008	0.01
280	23.33	0.07	0.015	0.160	0.008	0.01
281	23.42	0.07	0.015	0.159	0.008	0.01
282	23.50	0.07	0.015	0.159	0.008	0.01
283	23.58	0.07	0.015	0.159	0.008	0.01
284	23.67	0.07	0.015	0.158	0.008	0.01
285	23.75	0.07	0.015	0.158	0.008	0.01
286	23.83	0.07	0.015	0.158	0.008	0.01
287	23.92	0.07	0.015	0.158	0.008	0.01
288	24.00	0.07	0.015	0.158	0.008	0.01
	Sum =	100.0			Sum =	10.3

Flood volume = Effective rainfall 0.86(In)
times area 13.1(Ac.)/[(In)/(Ft.)] = 0.9(Ac.Ft)
Total soil loss = 0.99(In)
Total soil loss = 1.079(Ac.Ft)
Total rainfall = 1.85(In)
Flood volume = 40959.2 Cubic Feet
Total soil loss = 47011.6 Cubic Feet

Peak flow rate of this hydrograph = 1.489(CFS)

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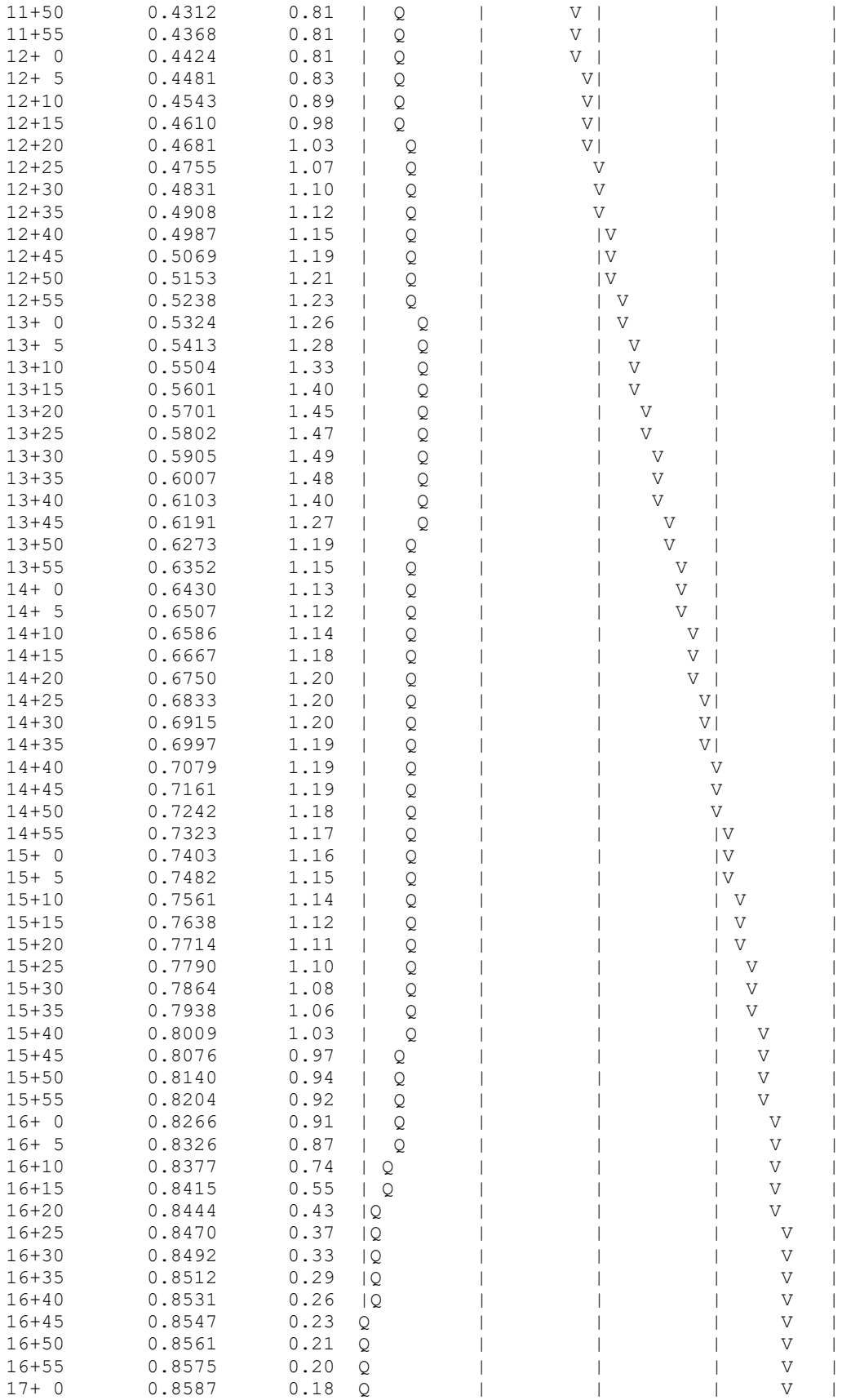
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	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	0.0009	0.06	Q	|	|	|	|
0+25	0.0014	0.08	Q	|	|	|	|
0+30	0.0021	0.10	Q	|	|	|	|
0+35	0.0028	0.11	Q	|	|	|	|
0+40	0.0036	0.11	Q	|	|	|	|
0+45	0.0044	0.12	Q	|	|	|	|
0+50	0.0053	0.12	Q	|	|	|	|
0+55	0.0062	0.14	Q	|	|	|	|
1+ 0	0.0073	0.15	Q	|	|	|	|
1+ 5	0.0083	0.16	Q	|	|	|	|
1+10	0.0094	0.15	Q	|	|	|	|
1+15	0.0104	0.15	Q	|	|	|	|

1+20	0.0114	0.14	Q	|	|	|	|
1+25	0.0123	0.14	Q	|	|	|	|
1+30	0.0133	0.14	Q	|	|	|	|
1+35	0.0143	0.14	Q	|	|	|	|
1+40	0.0152	0.14	Q	|	|	|	|
1+45	0.0162	0.14	Q	|	|	|	|
1+50	0.0171	0.14	Q	|	|	|	|
1+55	0.0181	0.15	Q	|	|	|	|
2+ 0	0.0192	0.16	Q	|	|	|	|
2+ 5	0.0204	0.17	Q	|	|	|	|
2+10	0.0216	0.17	Q	|	|	|	|
2+15	0.0228	0.17	Q	|	|	|	|
2+20	0.0240	0.18	QV	|	|	|	|
2+25	0.0252	0.18	QV	|	|	|	|
2+30	0.0264	0.18	QV	|	|	|	|
2+35	0.0277	0.18	QV	|	|	|	|
2+40	0.0290	0.19	QV	|	|	|	|
2+45	0.0304	0.20	QV	|	|	|	|
2+50	0.0318	0.21	QV	|	|	|	|
2+55	0.0333	0.21	QV	|	|	|	|
3+ 0	0.0348	0.22	QV	|	|	|	|
3+ 5	0.0363	0.22	QV	|	|	|	|
3+10	0.0378	0.22	QV	|	|	|	|
3+15	0.0394	0.22	QV	|	|	|	|
3+20	0.0409	0.22	QV	|	|	|	|
3+25	0.0425	0.22	QV	|	|	|	|
3+30	0.0440	0.23	QV	|	|	|	|
3+35	0.0456	0.23	QV	|	|	|	|
3+40	0.0471	0.23	Q V	|	|	|	|
3+45	0.0487	0.23	Q V	|	|	|	|
3+50	0.0503	0.23	Q V	|	|	|	|
3+55	0.0519	0.24	Q V	|	|	|	|
4+ 0	0.0536	0.25	Q V	|	|	|	|
4+ 5	0.0554	0.26	|QV	|	|	|	|
4+10	0.0572	0.26	|QV	|	|	|	|
4+15	0.0590	0.26	|QV	|	|	|	|
4+20	0.0608	0.27	|QV	|	|	|	|
4+25	0.0628	0.28	|QV	|	|	|	|
4+30	0.0648	0.29	|QV	|	|	|	|
4+35	0.0668	0.30	|QV	|	|	|	|
4+40	0.0689	0.30	|QV	|	|	|	|
4+45	0.0710	0.31	|Q V	|	|	|	|
4+50	0.0732	0.31	|Q V	|	|	|	|
4+55	0.0754	0.32	|Q V	|	|	|	|
5+ 0	0.0777	0.34	|Q V	|	|	|	|
5+ 5	0.0800	0.34	|Q V	|	|	|	|
5+10	0.0823	0.33	|Q V	|	|	|	|
5+15	0.0844	0.31	|Q V	|	|	|	|
5+20	0.0865	0.30	|Q V	|	|	|	|
5+25	0.0885	0.30	|Q V	|	|	|	|
5+30	0.0906	0.31	|Q V	|	|	|	|
5+35	0.0928	0.31	|Q V	|	|	|	|
5+40	0.0951	0.33	|Q V	|	|	|	|
5+45	0.0974	0.34	|Q V	|	|	|	|
5+50	0.0998	0.35	|Q V	|	|	|	|
5+55	0.1022	0.35	|Q V	|	|	|	|
6+ 0	0.1046	0.35	|Q V	|	|	|	|
6+ 5	0.1071	0.36	|Q V	|	|	|	|
6+10	0.1096	0.37	|Q V	|	|	|	|
6+15	0.1123	0.38	|Q V	|	|	|	|
6+20	0.1150	0.39	|Q V	|	|	|	|
6+25	0.1177	0.39	|Q V	|	|	|	|
6+30	0.1204	0.40	|Q V	|	|	|	|

6+35	0.1232	0.40	|Q V |	|	|	|
6+40	0.1260	0.41	|Q V |	|	|	|
6+45	0.1290	0.43	|Q V |	|	|	|
6+50	0.1319	0.44	|Q V |	|	|	|
6+55	0.1350	0.44	|Q V |	|	|	|
7+ 0	0.1380	0.44	|Q V |	|	|	|
7+ 5	0.1411	0.45	|Q V |	|	|	|
7+10	0.1442	0.45	|Q V |	|	|	|
7+15	0.1473	0.45	|Q V |	|	|	|
7+20	0.1504	0.45	|Q V |	|	|	|
7+25	0.1536	0.46	|Q V |	|	|	|
7+30	0.1568	0.47	|Q V |	|	|	|
7+35	0.1602	0.49	|Q V |	|	|	|
7+40	0.1636	0.50	|Q V |	|	|	|
7+45	0.1672	0.51	| Q V |	|	|	|
7+50	0.1708	0.52	| Q V |	|	|	|
7+55	0.1745	0.54	| Q V |	|	|	|
8+ 0	0.1783	0.55	| Q V |	|	|	|
8+ 5	0.1822	0.57	| Q V |	|	|	|
8+10	0.1863	0.59	| Q V |	|	|	|
8+15	0.1906	0.62	| Q V |	|	|	|
8+20	0.1950	0.64	| Q V |	|	|	|
8+25	0.1994	0.65	| Q V |	|	|	|
8+30	0.2040	0.66	| Q V |	|	|	|
8+35	0.2085	0.66	| Q V |	|	|	|
8+40	0.2132	0.68	| Q V|	|	|	|
8+45	0.2180	0.69	| Q V|	|	|	|
8+50	0.2228	0.70	| Q V|	|	|	|
8+55	0.2278	0.72	| Q V|	|	|	|
9+ 0	0.2328	0.74	| Q V|	|	|	|
9+ 5	0.2380	0.75	| Q V |	|	|	|
9+10	0.2433	0.77	| Q V |	|	|	|
9+15	0.2489	0.80	| Q V |	|	|	|
9+20	0.2545	0.82	| Q V |	|	|	|
9+25	0.2603	0.84	| Q |V |	|	|	|
9+30	0.2663	0.86	| Q |V |	|	|	|
9+35	0.2723	0.88	| Q |V |	|	|	|
9+40	0.2784	0.89	| Q |V |	|	|	|
9+45	0.2847	0.91	| Q | V |	|	|	|
9+50	0.2911	0.93	| Q | V |	|	|	|
9+55	0.2976	0.94	| Q | V |	|	|	|
10+ 0	0.3042	0.96	| Q | V |	|	|	|
10+ 5	0.3108	0.96	| Q | V |	|	|	|
10+10	0.3170	0.91	| Q | V |	|	|	|
10+15	0.3227	0.83	| Q | V |	|	|	|
10+20	0.3280	0.77	| Q | V |	|	|	|
10+25	0.3332	0.75	| Q | V |	|	|	|
10+30	0.3383	0.74	| Q | V |	|	|	|
10+35	0.3433	0.74	| Q | V |	|	|	|
10+40	0.3486	0.77	| Q | V |	|	|	|
10+45	0.3543	0.82	| Q | V |	|	|	|
10+50	0.3602	0.86	| Q | V |	|	|	|
10+55	0.3662	0.87	| Q | V |	|	|	|
11+ 0	0.3723	0.88	| Q | V |	|	|	|
11+ 5	0.3784	0.89	| Q | V |	|	|	|
11+10	0.3844	0.88	| Q | V |	|	|	|
11+15	0.3904	0.87	| Q | V |	|	|	|
11+20	0.3964	0.87	| Q | V |	|	|	|
11+25	0.4024	0.87	| Q | V |	|	|	|
11+30	0.4083	0.86	| Q | V |	|	|	|
11+35	0.4142	0.86	| Q | V |	|	|	|
11+40	0.4200	0.84	| Q | V |	|	|	|
11+45	0.4257	0.82	| Q | V |	|	|	|



17+ 5	0.8600	0.18	Q	|	|	|	V |
17+10	0.8612	0.19	Q	|	|	|	V |
17+15	0.8626	0.20	Q	|	|	|	V |
17+20	0.8641	0.21	Q	|	|	|	V |
17+25	0.8656	0.22	Q	|	|	|	V |
17+30	0.8671	0.22	Q	|	|	|	V |
17+35	0.8686	0.22	Q	|	|	|	V |
17+40	0.8701	0.22	Q	|	|	|	V |
17+45	0.8716	0.22	Q	|	|	|	V |
17+50	0.8731	0.22	Q	|	|	|	V |
17+55	0.8746	0.21	Q	|	|	|	V |
18+ 0	0.8760	0.20	Q	|	|	|	V |
18+ 5	0.8773	0.19	Q	|	|	|	V |
18+10	0.8786	0.19	Q	|	|	|	V |
18+15	0.8799	0.19	Q	|	|	|	V |
18+20	0.8812	0.19	Q	|	|	|	V |
18+25	0.8825	0.19	Q	|	|	|	V |
18+30	0.8838	0.19	Q	|	|	|	V |
18+35	0.8850	0.18	Q	|	|	|	V |
18+40	0.8862	0.17	Q	|	|	|	V |
18+45	0.8874	0.16	Q	|	|	|	V |
18+50	0.8884	0.15	Q	|	|	|	V |
18+55	0.8894	0.14	Q	|	|	|	V |
19+ 0	0.8902	0.12	Q	|	|	|	V |
19+ 5	0.8910	0.12	Q	|	|	|	V |
19+10	0.8918	0.12	Q	|	|	|	V |
19+15	0.8927	0.13	Q	|	|	|	V |
19+20	0.8936	0.13	Q	|	|	|	V |
19+25	0.8946	0.14	Q	|	|	|	V |
19+30	0.8957	0.16	Q	|	|	|	V |
19+35	0.8968	0.16	Q	|	|	|	V |
19+40	0.8979	0.16	Q	|	|	|	V |
19+45	0.8990	0.15	Q	|	|	|	V |
19+50	0.8999	0.14	Q	|	|	|	V |
19+55	0.9008	0.13	Q	|	|	|	V |
20+ 0	0.9016	0.12	Q	|	|	|	V |
20+ 5	0.9024	0.11	Q	|	|	|	V |
20+10	0.9032	0.11	Q	|	|	|	V |
20+15	0.9041	0.12	Q	|	|	|	V |
20+20	0.9049	0.13	Q	|	|	|	V |
20+25	0.9059	0.13	Q	|	|	|	V |
20+30	0.9068	0.13	Q	|	|	|	V |
20+35	0.9077	0.13	Q	|	|	|	V |
20+40	0.9086	0.13	Q	|	|	|	V |
20+45	0.9095	0.14	Q	|	|	|	V |
20+50	0.9105	0.13	Q	|	|	|	V |
20+55	0.9113	0.13	Q	|	|	|	V |
21+ 0	0.9121	0.11	Q	|	|	|	V |
21+ 5	0.9129	0.11	Q	|	|	|	V |
21+10	0.9136	0.11	Q	|	|	|	V |
21+15	0.9145	0.12	Q	|	|	|	V |
21+20	0.9153	0.13	Q	|	|	|	V |
21+25	0.9162	0.12	Q	|	|	|	V |
21+30	0.9169	0.11	Q	|	|	|	V|
21+35	0.9176	0.10	Q	|	|	|	V|
21+40	0.9184	0.11	Q	|	|	|	V|
21+45	0.9192	0.12	Q	|	|	|	V|
21+50	0.9201	0.12	Q	|	|	|	V|
21+55	0.9209	0.12	Q	|	|	|	V|
22+ 0	0.9216	0.11	Q	|	|	|	V|
22+ 5	0.9224	0.10	Q	|	|	|	V|
22+10	0.9231	0.11	Q	|	|	|	V|
22+15	0.9239	0.12	Q	|	|	|	V|

22+20	0.9248	0.12	Q	|	|	|	V|
22+25	0.9256	0.12	Q	|	|	|	V|
22+30	0.9263	0.11	Q	|	|	|	V|
22+35	0.9270	0.10	Q	|	|	|	V|
22+40	0.9277	0.10	Q	|	|	|	V|
22+45	0.9284	0.10	Q	|	|	|	V|
22+50	0.9290	0.10	Q	|	|	|	V|
22+55	0.9297	0.09	Q	|	|	|	V|
23+ 0	0.9303	0.09	Q	|	|	|	V|
23+ 5	0.9310	0.09	Q	|	|	|	V|
23+10	0.9316	0.09	Q	|	|	|	V|
23+15	0.9323	0.09	Q	|	|	|	V|
23+20	0.9329	0.09	Q	|	|	|	V|
23+25	0.9335	0.09	Q	|	|	|	V|
23+30	0.9342	0.09	Q	|	|	|	V|
23+35	0.9348	0.09	Q	|	|	|	V|
23+40	0.9354	0.09	Q	|	|	|	V|
23+45	0.9361	0.09	Q	|	|	|	V|
23+50	0.9367	0.09	Q	|	|	|	V|
23+55	0.9373	0.09	Q	|	|	|	V|
24+ 0	0.9379	0.09	Q	|	|	|	V|
24+ 5	0.9385	0.09	Q	|	|	|	V|
24+10	0.9390	0.07	Q	|	|	|	V|
24+15	0.9393	0.05	Q	|	|	|	V|
24+20	0.9396	0.03	Q	|	|	|	V|
24+25	0.9397	0.02	Q	|	|	|	V|
24+30	0.9398	0.02	Q	|	|	|	V|
24+35	0.9399	0.01	Q	|	|	|	V|
24+40	0.9400	0.01	Q	|	|	|	V|
24+45	0.9401	0.01	Q	|	|	|	V|
24+50	0.9401	0.01	Q	|	|	|	V|
24+55	0.9402	0.01	Q	|	|	|	V|
25+ 0	0.9402	0.00	Q	|	|	|	V|
25+ 5	0.9402	0.00	Q	|	|	|	V|
25+10	0.9402	0.00	Q	|	|	|	V|
25+15	0.9403	0.00	Q	|	|	|	V|
25+20	0.9403	0.00	Q	|	|	|	V|
25+25	0.9403	0.00	Q	|	|	|	V|
25+30	0.9403	0.00	Q	|	|	|	V|
25+35	0.9403	0.00	Q	|	|	|	V

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

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Study date 06/24/19 File: p1713uhq242c242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6062

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Barton Project
Unit Hydrograph
Proposed Condition Area C
2-Year 24-Hour Storm

Drainage Area = 17.57(Ac.) = 0.027 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 17.57(Ac.) = 0.027 Sq. Mi.
Length along longest watercourse = 1490.00(Ft.)
Length along longest watercourse measured to centroid = 458.00(Ft.)
Length along longest watercourse = 0.282 Mi.
Length along longest watercourse measured to centroid = 0.087 Mi.
Difference in elevation = 15.00(Ft.)
Slope along watercourse = 53.1544 Ft./Mi.
Average Manning's 'N' = 0.054
Lag time = 0.149 Hr.
Lag time = 8.93 Min.
25% of lag time = 2.23 Min.
40% of lag time = 3.57 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.57	1.85	32.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.57	4.55	79.94

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.850(In)
Area Averaged 100-Year Rainfall = 4.550(In)

Point rain (area averaged) = 1.850(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.850(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
17.570	69.00	0.500

Total Area Entered = 17.57(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
69.0	49.8	0.574	0.500	0.316	1.000	0.316
					Sum (F) =	0.316

Area averaged mean soil loss (F) (In/Hr) = 0.316
Minimum soil loss rate ((In/Hr)) = 0.158
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.521

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	56.018	7.337	1.299
2	0.167	112.036	31.025	5.494
3	0.250	168.054	27.770	4.917
4	0.333	224.072	11.131	1.971
5	0.417	280.090	6.344	1.123
6	0.500	336.109	4.336	0.768
7	0.583	392.127	3.150	0.558
8	0.667	448.145	2.244	0.397
9	0.750	504.163	1.746	0.309
10	0.833	560.181	1.421	0.252
11	0.917	616.199	1.074	0.190
12	1.000	672.217	0.823	0.146
13	1.083	728.235	0.601	0.106
14	1.167	784.253	0.560	0.099
15	1.250	840.271	0.438	0.077
		Sum = 100.000	Sum=	17.707

Unit Time	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.015	0.560	0.008	0.01
2	0.17	0.07	0.015	0.557	0.008	0.01
3	0.25	0.07	0.015	0.555	0.008	0.01
4	0.33	0.10	0.022	0.553	0.012	0.01
5	0.42	0.10	0.022	0.551	0.012	0.01
6	0.50	0.10	0.022	0.549	0.012	0.01
7	0.58	0.10	0.022	0.547	0.012	0.01
8	0.67	0.10	0.022	0.545	0.012	0.01
9	0.75	0.10	0.022	0.542	0.012	0.01
10	0.83	0.13	0.030	0.540	0.015	0.01
11	0.92	0.13	0.030	0.538	0.015	0.01
12	1.00	0.13	0.030	0.536	0.015	0.01
13	1.08	0.10	0.022	0.534	0.012	0.01

14	1.17	0.10	0.022	0.532	0.012	0.01
15	1.25	0.10	0.022	0.530	0.012	0.01
16	1.33	0.10	0.022	0.528	0.012	0.01
17	1.42	0.10	0.022	0.525	0.012	0.01
18	1.50	0.10	0.022	0.523	0.012	0.01
19	1.58	0.10	0.022	0.521	0.012	0.01
20	1.67	0.10	0.022	0.519	0.012	0.01
21	1.75	0.10	0.022	0.517	0.012	0.01
22	1.83	0.13	0.030	0.515	0.015	0.01
23	1.92	0.13	0.030	0.513	0.015	0.01
24	2.00	0.13	0.030	0.511	0.015	0.01
25	2.08	0.13	0.030	0.509	0.015	0.01
26	2.17	0.13	0.030	0.507	0.015	0.01
27	2.25	0.13	0.030	0.505	0.015	0.01
28	2.33	0.13	0.030	0.503	0.015	0.01
29	2.42	0.13	0.030	0.501	0.015	0.01
30	2.50	0.13	0.030	0.499	0.015	0.01
31	2.58	0.17	0.037	0.497	0.019	0.02
32	2.67	0.17	0.037	0.494	0.019	0.02
33	2.75	0.17	0.037	0.492	0.019	0.02
34	2.83	0.17	0.037	0.490	0.019	0.02
35	2.92	0.17	0.037	0.488	0.019	0.02
36	3.00	0.17	0.037	0.486	0.019	0.02
37	3.08	0.17	0.037	0.484	0.019	0.02
38	3.17	0.17	0.037	0.482	0.019	0.02
39	3.25	0.17	0.037	0.480	0.019	0.02
40	3.33	0.17	0.037	0.478	0.019	0.02
41	3.42	0.17	0.037	0.476	0.019	0.02
42	3.50	0.17	0.037	0.474	0.019	0.02
43	3.58	0.17	0.037	0.472	0.019	0.02
44	3.67	0.17	0.037	0.470	0.019	0.02
45	3.75	0.17	0.037	0.468	0.019	0.02
46	3.83	0.20	0.044	0.466	0.023	0.02
47	3.92	0.20	0.044	0.464	0.023	0.02
48	4.00	0.20	0.044	0.463	0.023	0.02
49	4.08	0.20	0.044	0.461	0.023	0.02
50	4.17	0.20	0.044	0.459	0.023	0.02
51	4.25	0.20	0.044	0.457	0.023	0.02
52	4.33	0.23	0.052	0.455	0.027	0.02
53	4.42	0.23	0.052	0.453	0.027	0.02
54	4.50	0.23	0.052	0.451	0.027	0.02
55	4.58	0.23	0.052	0.449	0.027	0.02
56	4.67	0.23	0.052	0.447	0.027	0.02
57	4.75	0.23	0.052	0.445	0.027	0.02
58	4.83	0.27	0.059	0.443	0.031	0.03
59	4.92	0.27	0.059	0.441	0.031	0.03
60	5.00	0.27	0.059	0.439	0.031	0.03
61	5.08	0.20	0.044	0.437	0.023	0.02
62	5.17	0.20	0.044	0.435	0.023	0.02
63	5.25	0.20	0.044	0.434	0.023	0.02
64	5.33	0.23	0.052	0.432	0.027	0.02
65	5.42	0.23	0.052	0.430	0.027	0.02
66	5.50	0.23	0.052	0.428	0.027	0.02
67	5.58	0.27	0.059	0.426	0.031	0.03
68	5.67	0.27	0.059	0.424	0.031	0.03
69	5.75	0.27	0.059	0.422	0.031	0.03
70	5.83	0.27	0.059	0.420	0.031	0.03
71	5.92	0.27	0.059	0.419	0.031	0.03
72	6.00	0.27	0.059	0.417	0.031	0.03
73	6.08	0.30	0.067	0.415	0.035	0.03
74	6.17	0.30	0.067	0.413	0.035	0.03
75	6.25	0.30	0.067	0.411	0.035	0.03
76	6.33	0.30	0.067	0.409	0.035	0.03

77	6.42	0.30	0.067	0.407	0.035	0.03
78	6.50	0.30	0.067	0.406	0.035	0.03
79	6.58	0.33	0.074	0.404	0.039	0.04
80	6.67	0.33	0.074	0.402	0.039	0.04
81	6.75	0.33	0.074	0.400	0.039	0.04
82	6.83	0.33	0.074	0.398	0.039	0.04
83	6.92	0.33	0.074	0.397	0.039	0.04
84	7.00	0.33	0.074	0.395	0.039	0.04
85	7.08	0.33	0.074	0.393	0.039	0.04
86	7.17	0.33	0.074	0.391	0.039	0.04
87	7.25	0.33	0.074	0.389	0.039	0.04
88	7.33	0.37	0.081	0.388	0.042	0.04
89	7.42	0.37	0.081	0.386	0.042	0.04
90	7.50	0.37	0.081	0.384	0.042	0.04
91	7.58	0.40	0.089	0.382	0.046	0.04
92	7.67	0.40	0.089	0.381	0.046	0.04
93	7.75	0.40	0.089	0.379	0.046	0.04
94	7.83	0.43	0.096	0.377	0.050	0.05
95	7.92	0.43	0.096	0.375	0.050	0.05
96	8.00	0.43	0.096	0.374	0.050	0.05
97	8.08	0.50	0.111	0.372	0.058	0.05
98	8.17	0.50	0.111	0.370	0.058	0.05
99	8.25	0.50	0.111	0.368	0.058	0.05
100	8.33	0.50	0.111	0.367	0.058	0.05
101	8.42	0.50	0.111	0.365	0.058	0.05
102	8.50	0.50	0.111	0.363	0.058	0.05
103	8.58	0.53	0.118	0.362	0.062	0.06
104	8.67	0.53	0.118	0.360	0.062	0.06
105	8.75	0.53	0.118	0.358	0.062	0.06
106	8.83	0.57	0.126	0.356	0.066	0.06
107	8.92	0.57	0.126	0.355	0.066	0.06
108	9.00	0.57	0.126	0.353	0.066	0.06
109	9.08	0.63	0.141	0.351	0.073	0.07
110	9.17	0.63	0.141	0.350	0.073	0.07
111	9.25	0.63	0.141	0.348	0.073	0.07
112	9.33	0.67	0.148	0.346	0.077	0.07
113	9.42	0.67	0.148	0.345	0.077	0.07
114	9.50	0.67	0.148	0.343	0.077	0.07
115	9.58	0.70	0.155	0.341	0.081	0.07
116	9.67	0.70	0.155	0.340	0.081	0.07
117	9.75	0.70	0.155	0.338	0.081	0.07
118	9.83	0.73	0.163	0.337	0.085	0.08
119	9.92	0.73	0.163	0.335	0.085	0.08
120	10.00	0.73	0.163	0.333	0.085	0.08
121	10.08	0.50	0.111	0.332	0.058	0.05
122	10.17	0.50	0.111	0.330	0.058	0.05
123	10.25	0.50	0.111	0.329	0.058	0.05
124	10.33	0.50	0.111	0.327	0.058	0.05
125	10.42	0.50	0.111	0.325	0.058	0.05
126	10.50	0.50	0.111	0.324	0.058	0.05
127	10.58	0.67	0.148	0.322	0.077	0.07
128	10.67	0.67	0.148	0.321	0.077	0.07
129	10.75	0.67	0.148	0.319	0.077	0.07
130	10.83	0.67	0.148	0.317	0.077	0.07
131	10.92	0.67	0.148	0.316	0.077	0.07
132	11.00	0.67	0.148	0.314	0.077	0.07
133	11.08	0.63	0.141	0.313	0.073	0.07
134	11.17	0.63	0.141	0.311	0.073	0.07
135	11.25	0.63	0.141	0.310	0.073	0.07
136	11.33	0.63	0.141	0.308	0.073	0.07
137	11.42	0.63	0.141	0.307	0.073	0.07
138	11.50	0.63	0.141	0.305	0.073	0.07
139	11.58	0.57	0.126	0.304	0.066	0.06

140	11.67	0.57	0.126	0.302	0.066	0.06
141	11.75	0.57	0.126	0.301	0.066	0.06
142	11.83	0.60	0.133	0.299	0.069	0.06
143	11.92	0.60	0.133	0.298	0.069	0.06
144	12.00	0.60	0.133	0.296	0.069	0.06
145	12.08	0.83	0.185	0.295	0.096	0.09
146	12.17	0.83	0.185	0.293	0.096	0.09
147	12.25	0.83	0.185	0.292	0.096	0.09
148	12.33	0.87	0.192	0.290	0.100	0.09
149	12.42	0.87	0.192	0.289	0.100	0.09
150	12.50	0.87	0.192	0.287	0.100	0.09
151	12.58	0.93	0.207	0.286	0.108	0.10
152	12.67	0.93	0.207	0.284	0.108	0.10
153	12.75	0.93	0.207	0.283	0.108	0.10
154	12.83	0.97	0.215	0.282	0.112	0.10
155	12.92	0.97	0.215	0.280	0.112	0.10
156	13.00	0.97	0.215	0.279	0.112	0.10
157	13.08	1.13	0.252	0.277	0.131	0.12
158	13.17	1.13	0.252	0.276	0.131	0.12
159	13.25	1.13	0.252	0.275	0.131	0.12
160	13.33	1.13	0.252	0.273	0.131	0.12
161	13.42	1.13	0.252	0.272	0.131	0.12
162	13.50	1.13	0.252	0.270	0.131	0.12
163	13.58	0.77	0.170	0.269	0.089	0.08
164	13.67	0.77	0.170	0.268	0.089	0.08
165	13.75	0.77	0.170	0.266	0.089	0.08
166	13.83	0.77	0.170	0.265	0.089	0.08
167	13.92	0.77	0.170	0.264	0.089	0.08
168	14.00	0.77	0.170	0.262	0.089	0.08
169	14.08	0.90	0.200	0.261	0.104	0.10
170	14.17	0.90	0.200	0.260	0.104	0.10
171	14.25	0.90	0.200	0.258	0.104	0.10
172	14.33	0.87	0.192	0.257	0.100	0.09
173	14.42	0.87	0.192	0.256	0.100	0.09
174	14.50	0.87	0.192	0.254	0.100	0.09
175	14.58	0.87	0.192	0.253	0.100	0.09
176	14.67	0.87	0.192	0.252	0.100	0.09
177	14.75	0.87	0.192	0.250	0.100	0.09
178	14.83	0.83	0.185	0.249	0.096	0.09
179	14.92	0.83	0.185	0.248	0.096	0.09
180	15.00	0.83	0.185	0.247	0.096	0.09
181	15.08	0.80	0.178	0.245	0.092	0.09
182	15.17	0.80	0.178	0.244	0.092	0.09
183	15.25	0.80	0.178	0.243	0.092	0.09
184	15.33	0.77	0.170	0.242	0.089	0.08
185	15.42	0.77	0.170	0.240	0.089	0.08
186	15.50	0.77	0.170	0.239	0.089	0.08
187	15.58	0.63	0.141	0.238	0.073	0.07
188	15.67	0.63	0.141	0.237	0.073	0.07
189	15.75	0.63	0.141	0.235	0.073	0.07
190	15.83	0.63	0.141	0.234	0.073	0.07
191	15.92	0.63	0.141	0.233	0.073	0.07
192	16.00	0.63	0.141	0.232	0.073	0.07
193	16.08	0.13	0.030	0.231	0.015	0.01
194	16.17	0.13	0.030	0.229	0.015	0.01
195	16.25	0.13	0.030	0.228	0.015	0.01
196	16.33	0.13	0.030	0.227	0.015	0.01
197	16.42	0.13	0.030	0.226	0.015	0.01
198	16.50	0.13	0.030	0.225	0.015	0.01
199	16.58	0.10	0.022	0.224	0.012	0.01
200	16.67	0.10	0.022	0.223	0.012	0.01
201	16.75	0.10	0.022	0.221	0.012	0.01
202	16.83	0.10	0.022	0.220	0.012	0.01

203	16.92	0.10	0.022	0.219	0.012	0.01
204	17.00	0.10	0.022	0.218	0.012	0.01
205	17.08	0.17	0.037	0.217	0.019	0.02
206	17.17	0.17	0.037	0.216	0.019	0.02
207	17.25	0.17	0.037	0.215	0.019	0.02
208	17.33	0.17	0.037	0.214	0.019	0.02
209	17.42	0.17	0.037	0.213	0.019	0.02
210	17.50	0.17	0.037	0.212	0.019	0.02
211	17.58	0.17	0.037	0.211	0.019	0.02
212	17.67	0.17	0.037	0.209	0.019	0.02
213	17.75	0.17	0.037	0.208	0.019	0.02
214	17.83	0.13	0.030	0.207	0.015	0.01
215	17.92	0.13	0.030	0.206	0.015	0.01
216	18.00	0.13	0.030	0.205	0.015	0.01
217	18.08	0.13	0.030	0.204	0.015	0.01
218	18.17	0.13	0.030	0.203	0.015	0.01
219	18.25	0.13	0.030	0.202	0.015	0.01
220	18.33	0.13	0.030	0.201	0.015	0.01
221	18.42	0.13	0.030	0.200	0.015	0.01
222	18.50	0.13	0.030	0.199	0.015	0.01
223	18.58	0.10	0.022	0.198	0.012	0.01
224	18.67	0.10	0.022	0.197	0.012	0.01
225	18.75	0.10	0.022	0.197	0.012	0.01
226	18.83	0.07	0.015	0.196	0.008	0.01
227	18.92	0.07	0.015	0.195	0.008	0.01
228	19.00	0.07	0.015	0.194	0.008	0.01
229	19.08	0.10	0.022	0.193	0.012	0.01
230	19.17	0.10	0.022	0.192	0.012	0.01
231	19.25	0.10	0.022	0.191	0.012	0.01
232	19.33	0.13	0.030	0.190	0.015	0.01
233	19.42	0.13	0.030	0.189	0.015	0.01
234	19.50	0.13	0.030	0.188	0.015	0.01
235	19.58	0.10	0.022	0.187	0.012	0.01
236	19.67	0.10	0.022	0.187	0.012	0.01
237	19.75	0.10	0.022	0.186	0.012	0.01
238	19.83	0.07	0.015	0.185	0.008	0.01
239	19.92	0.07	0.015	0.184	0.008	0.01
240	20.00	0.07	0.015	0.183	0.008	0.01
241	20.08	0.10	0.022	0.182	0.012	0.01
242	20.17	0.10	0.022	0.182	0.012	0.01
243	20.25	0.10	0.022	0.181	0.012	0.01
244	20.33	0.10	0.022	0.180	0.012	0.01
245	20.42	0.10	0.022	0.179	0.012	0.01
246	20.50	0.10	0.022	0.179	0.012	0.01
247	20.58	0.10	0.022	0.178	0.012	0.01
248	20.67	0.10	0.022	0.177	0.012	0.01
249	20.75	0.10	0.022	0.176	0.012	0.01
250	20.83	0.07	0.015	0.176	0.008	0.01
251	20.92	0.07	0.015	0.175	0.008	0.01
252	21.00	0.07	0.015	0.174	0.008	0.01
253	21.08	0.10	0.022	0.174	0.012	0.01
254	21.17	0.10	0.022	0.173	0.012	0.01
255	21.25	0.10	0.022	0.172	0.012	0.01
256	21.33	0.07	0.015	0.172	0.008	0.01
257	21.42	0.07	0.015	0.171	0.008	0.01
258	21.50	0.07	0.015	0.170	0.008	0.01
259	21.58	0.10	0.022	0.170	0.012	0.01
260	21.67	0.10	0.022	0.169	0.012	0.01
261	21.75	0.10	0.022	0.168	0.012	0.01
262	21.83	0.07	0.015	0.168	0.008	0.01
263	21.92	0.07	0.015	0.167	0.008	0.01
264	22.00	0.07	0.015	0.167	0.008	0.01
265	22.08	0.10	0.022	0.166	0.012	0.01

266	22.17	0.10	0.022	0.166	0.012	0.01
267	22.25	0.10	0.022	0.165	0.012	0.01
268	22.33	0.07	0.015	0.165	0.008	0.01
269	22.42	0.07	0.015	0.164	0.008	0.01
270	22.50	0.07	0.015	0.164	0.008	0.01
271	22.58	0.07	0.015	0.163	0.008	0.01
272	22.67	0.07	0.015	0.163	0.008	0.01
273	22.75	0.07	0.015	0.162	0.008	0.01
274	22.83	0.07	0.015	0.162	0.008	0.01
275	22.92	0.07	0.015	0.161	0.008	0.01
276	23.00	0.07	0.015	0.161	0.008	0.01
277	23.08	0.07	0.015	0.161	0.008	0.01
278	23.17	0.07	0.015	0.160	0.008	0.01
279	23.25	0.07	0.015	0.160	0.008	0.01
280	23.33	0.07	0.015	0.160	0.008	0.01
281	23.42	0.07	0.015	0.159	0.008	0.01
282	23.50	0.07	0.015	0.159	0.008	0.01
283	23.58	0.07	0.015	0.159	0.008	0.01
284	23.67	0.07	0.015	0.158	0.008	0.01
285	23.75	0.07	0.015	0.158	0.008	0.01
286	23.83	0.07	0.015	0.158	0.008	0.01
287	23.92	0.07	0.015	0.158	0.008	0.01
288	24.00	0.07	0.015	0.158	0.008	0.01
	Sum =	100.0			Sum =	10.6

Flood volume = Effective rainfall 0.89(In)
times area 17.6(Ac.)/[(In)/(Ft.)] = 1.3(Ac.Ft)
Total soil loss = 0.96(In)
Total soil loss = 1.411(Ac.Ft)
Total rainfall = 1.85(In)
Flood volume = 56539.5 Cubic Feet
Total soil loss = 61447.8 Cubic Feet

Peak flow rate of this hydrograph = 2.093(CFS)

++

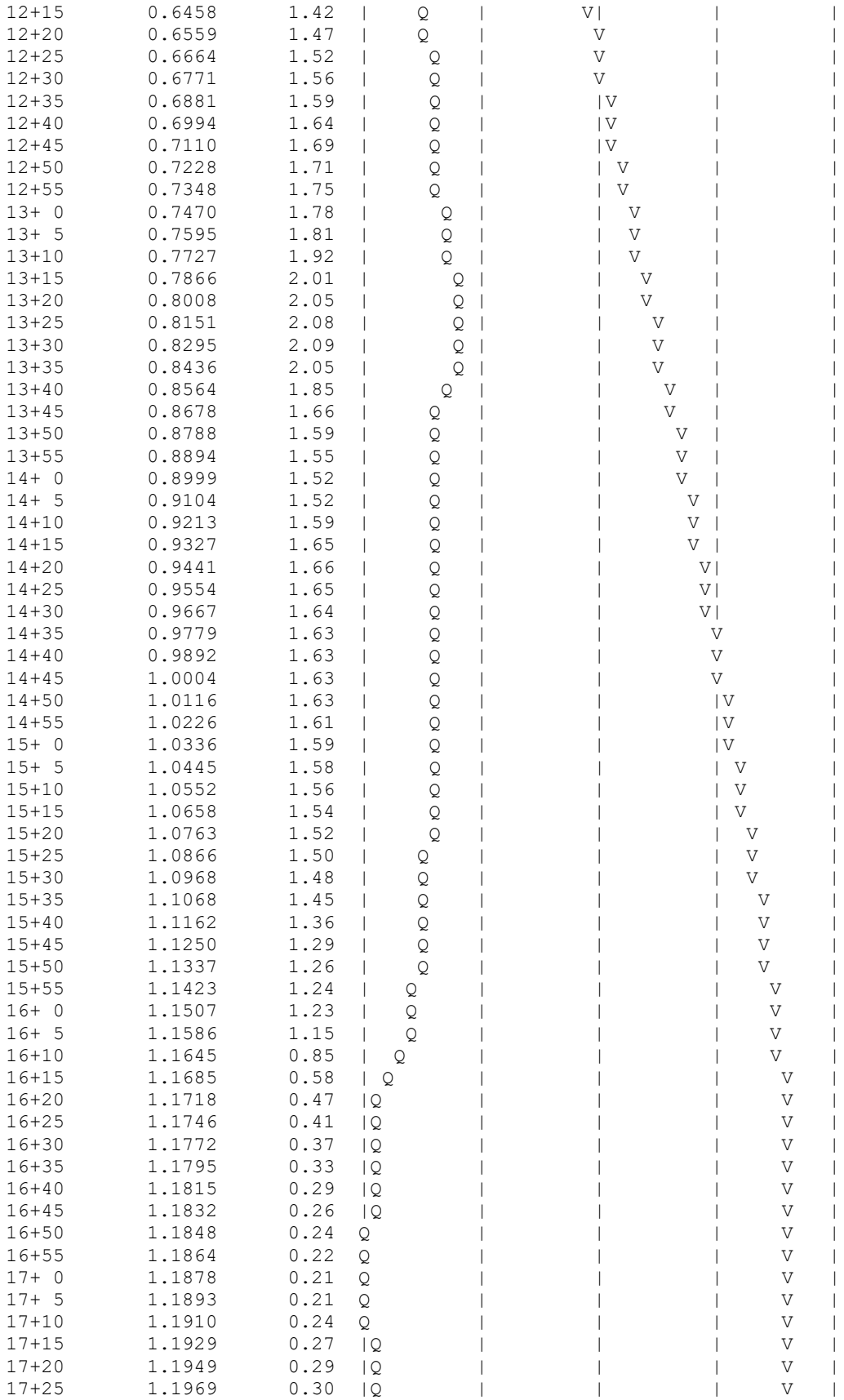
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

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	0.0001	0.01	Q	|	|	|	|
0+10	0.0004	0.05	Q	|	|	|	|
0+15	0.0010	0.08	Q	|	|	|	|
0+20	0.0017	0.10	Q	|	|	|	|
0+25	0.0026	0.13	Q	|	|	|	|
0+30	0.0036	0.15	Q	|	|	|	|
0+35	0.0047	0.16	Q	|	|	|	|
0+40	0.0059	0.17	Q	|	|	|	|
0+45	0.0071	0.17	Q	|	|	|	|
0+50	0.0084	0.18	Q	|	|	|	|
0+55	0.0098	0.21	Q	|	|	|	|
1+ 0	0.0113	0.22	Q	|	|	|	|
1+ 5	0.0129	0.23	Q	|	|	|	|
1+10	0.0144	0.21	Q	|	|	|	|
1+15	0.0158	0.20	Q	|	|	|	|
1+20	0.0171	0.20	Q	|	|	|	|
1+25	0.0185	0.19	Q	|	|	|	|
1+30	0.0198	0.19	Q	|	|	|	|
1+35	0.0211	0.19	Q	|	|	|	|
1+40	0.0224	0.19	Q	|	|	|	|

1+45	0.0237	0.19	Q				
1+50	0.0251	0.19	Q				
1+55	0.0265	0.21	Q				
2+ 0	0.0281	0.23	Q				
2+ 5	0.0298	0.24	Q				
2+10	0.0314	0.24	Q				
2+15	0.0331	0.24	QV				
2+20	0.0348	0.25	QV				
2+25	0.0365	0.25	QV				
2+30	0.0382	0.25	QV				
2+35	0.0400	0.25	|Q				
2+40	0.0419	0.27	|Q				
2+45	0.0439	0.29	|Q				
2+50	0.0459	0.30	|Q				
2+55	0.0480	0.30	|Q				
3+ 0	0.0501	0.31	|Q				
3+ 5	0.0523	0.31	|Q				
3+10	0.0544	0.31	|Q				
3+15	0.0565	0.31	|Q				
3+20	0.0587	0.31	|Q				
3+25	0.0608	0.31	|Q				
3+30	0.0630	0.31	|Q				
3+35	0.0651	0.31	|QV				
3+40	0.0673	0.31	|QV				
3+45	0.0695	0.31	|QV				
3+50	0.0717	0.32	|QV				
3+55	0.0740	0.34	|QV				
4+ 0	0.0764	0.36	|QV				
4+ 5	0.0789	0.36	|QV				
4+10	0.0815	0.37	|QV				
4+15	0.0840	0.37	|QV				
4+20	0.0866	0.38	|QV				
4+25	0.0893	0.40	|QV				
4+30	0.0922	0.42	|QV				
4+35	0.0951	0.42	|QV				
4+40	0.0981	0.43	|Q V				
4+45	0.1010	0.43	|Q V				
4+50	0.1040	0.44	|Q V				
4+55	0.1072	0.46	|Q V				
5+ 0	0.1105	0.48	|Q V				
5+ 5	0.1138	0.48	|Q V				
5+10	0.1168	0.44	|Q V				
5+15	0.1197	0.41	|Q V				
5+20	0.1224	0.40	|Q V				
5+25	0.1253	0.42	|Q V				
5+30	0.1283	0.43	|Q V				
5+35	0.1313	0.44	|Q V				
5+40	0.1345	0.46	|Q V				
5+45	0.1378	0.48	|Q V				
5+50	0.1411	0.49	|Q V				
5+55	0.1445	0.49	|Q V				
6+ 0	0.1479	0.49	|Q V				
6+ 5	0.1514	0.50	| Q V				
6+10	0.1549	0.52	| Q V				
6+15	0.1587	0.54	| Q V				
6+20	0.1624	0.55	| Q V				
6+25	0.1662	0.55	| Q V				
6+30	0.1701	0.56	| Q V				
6+35	0.1740	0.56	| Q V				
6+40	0.1780	0.59	| Q V				
6+45	0.1822	0.60	| Q V				
6+50	0.1864	0.61	| Q V				
6+55	0.1906	0.62	| Q V				

7+ 0	0.1949	0.62	Q V				
7+ 5	0.1992	0.62	Q V				
7+10	0.2035	0.62	Q V				
7+15	0.2078	0.63	Q V				
7+20	0.2121	0.63	Q V				
7+25	0.2166	0.65	Q V				
7+30	0.2212	0.67	Q V				
7+35	0.2259	0.68	Q V				
7+40	0.2307	0.70	Q V				
7+45	0.2357	0.73	Q V				
7+50	0.2408	0.74	Q V				
7+55	0.2461	0.76	Q V				
8+ 0	0.2515	0.78	Q V				
8+ 5	0.2570	0.80	Q V				
8+10	0.2629	0.85	Q V				
8+15	0.2690	0.89	Q V				
8+20	0.2752	0.91	Q V				
8+25	0.2815	0.92	Q V				
8+30	0.2879	0.92	Q V				
8+35	0.2943	0.93	Q V				
8+40	0.3009	0.96	Q V				
8+45	0.3076	0.98	Q V				
8+50	0.3144	0.99	Q V				
8+55	0.3214	1.02	Q V				
9+ 0	0.3286	1.04	Q V				
9+ 5	0.3358	1.06	Q V				
9+10	0.3434	1.10	Q V				
9+15	0.3513	1.14	Q V				
9+20	0.3593	1.16	Q V				
9+25	0.3675	1.19	Q V				
9+30	0.3759	1.22	Q V				
9+35	0.3844	1.23	Q V				
9+40	0.3930	1.26	Q V				
9+45	0.4019	1.28	Q V				
9+50	0.4108	1.30	Q V				
9+55	0.4199	1.33	Q V				
10+ 0	0.4292	1.35	Q V				
10+ 5	0.4384	1.33	Q V				
10+10	0.4466	1.20	Q V				
10+15	0.4540	1.08	Q V				
10+20	0.4612	1.03	Q V				
10+25	0.4681	1.01	Q V				
10+30	0.4749	0.99	Q V				
10+35	0.4818	1.00	Q V				
10+40	0.4893	1.09	Q V				
10+45	0.4974	1.17	Q V				
10+50	0.5057	1.20	Q V				
10+55	0.5140	1.22	Q V				
11+ 0	0.5225	1.23	Q V				
11+ 5	0.5309	1.23	Q V				
11+10	0.5393	1.21	Q V				
11+15	0.5476	1.20	Q V				
11+20	0.5558	1.20	Q V				
11+25	0.5640	1.20	Q V				
11+30	0.5723	1.20	Q V				
11+35	0.5805	1.19	Q V				
11+40	0.5884	1.15	Q V				
11+45	0.5960	1.11	Q V				
11+50	0.6036	1.10	Q V				
11+55	0.6113	1.11	Q V				
12+ 0	0.6191	1.13	Q V				
12+ 5	0.6270	1.16	Q V				
12+10	0.6360	1.30	Q V				



17+30	1.1989	0.30	|Q	|	|	|	V |
17+35	1.2010	0.30	|Q	|	|	|	V |
17+40	1.2031	0.31	|Q	|	|	|	V |
17+45	1.2053	0.31	|Q	|	|	|	V |
17+50	1.2074	0.31	|Q	|	|	|	V |
17+55	1.2093	0.29	|Q	|	|	|	V |
18+ 0	1.2112	0.27	|Q	|	|	|	V |
18+ 5	1.2130	0.26	|Q	|	|	|	V |
18+10	1.2148	0.26	|Q	|	|	|	V |
18+15	1.2166	0.26	|Q	|	|	|	V |
18+20	1.2184	0.26	|Q	|	|	|	V |
18+25	1.2201	0.26	|Q	|	|	|	V |
18+30	1.2219	0.25	|Q	|	|	|	V |
18+35	1.2236	0.25	Q	|	|	|	V |
18+40	1.2252	0.23	Q	|	|	|	V |
18+45	1.2266	0.21	Q	|	|	|	V |
18+50	1.2280	0.20	Q	|	|	|	V |
18+55	1.2292	0.17	Q	|	|	|	V |
19+ 0	1.2303	0.15	Q	|	|	|	V |
19+ 5	1.2313	0.15	Q	|	|	|	V |
19+10	1.2324	0.16	Q	|	|	|	V |
19+15	1.2337	0.18	Q	|	|	|	V |
19+20	1.2349	0.19	Q	|	|	|	V |
19+25	1.2364	0.21	Q	|	|	|	V |
19+30	1.2379	0.23	Q	|	|	|	V |
19+35	1.2395	0.23	Q	|	|	|	V |
19+40	1.2410	0.21	Q	|	|	|	V |
19+45	1.2424	0.20	Q	|	|	|	V |
19+50	1.2437	0.19	Q	|	|	|	V |
19+55	1.2449	0.17	Q	|	|	|	V |
20+ 0	1.2459	0.15	Q	|	|	|	V |
20+ 5	1.2469	0.15	Q	|	|	|	V |
20+10	1.2480	0.16	Q	|	|	|	V |
20+15	1.2492	0.18	Q	|	|	|	V |
20+20	1.2505	0.18	Q	|	|	|	V |
20+25	1.2518	0.18	Q	|	|	|	V |
20+30	1.2530	0.18	Q	|	|	|	V |
20+35	1.2543	0.19	Q	|	|	|	V |
20+40	1.2556	0.19	Q	|	|	|	V |
20+45	1.2569	0.19	Q	|	|	|	V |
20+50	1.2581	0.18	Q	|	|	|	V |
20+55	1.2592	0.16	Q	|	|	|	V |
21+ 0	1.2603	0.15	Q	|	|	|	V |
21+ 5	1.2612	0.14	Q	|	|	|	V |
21+10	1.2623	0.16	Q	|	|	|	V |
21+15	1.2635	0.17	Q	|	|	|	V |
21+20	1.2648	0.18	Q	|	|	|	V |
21+25	1.2658	0.16	Q	|	|	|	V|
21+30	1.2668	0.14	Q	|	|	|	V|
21+35	1.2678	0.14	Q	|	|	|	V|
21+40	1.2689	0.16	Q	|	|	|	V|
21+45	1.2701	0.17	Q	|	|	|	V|
21+50	1.2713	0.17	Q	|	|	|	V|
21+55	1.2723	0.16	Q	|	|	|	V|
22+ 0	1.2733	0.14	Q	|	|	|	V|
22+ 5	1.2743	0.14	Q	|	|	|	V|
22+10	1.2754	0.16	Q	|	|	|	V|
22+15	1.2766	0.17	Q	|	|	|	V|
22+20	1.2778	0.17	Q	|	|	|	V|
22+25	1.2788	0.16	Q	|	|	|	V|
22+30	1.2798	0.14	Q	|	|	|	V|
22+35	1.2807	0.14	Q	|	|	|	V|
22+40	1.2817	0.13	Q	|	|	|	V|

22+45	1.2826	0.13	Q	|	|	|	V|
22+50	1.2835	0.13	Q	|	|	|	V|
22+55	1.2843	0.13	Q	|	|	|	V|
23+ 0	1.2852	0.13	Q	|	|	|	V|
23+ 5	1.2861	0.13	Q	|	|	|	V|
23+10	1.2870	0.13	Q	|	|	|	V|
23+15	1.2878	0.13	Q	|	|	|	V|
23+20	1.2887	0.13	Q	|	|	|	V|
23+25	1.2896	0.13	Q	|	|	|	V|
23+30	1.2905	0.13	Q	|	|	|	V|
23+35	1.2913	0.13	Q	|	|	|	V|
23+40	1.2922	0.13	Q	|	|	|	V|
23+45	1.2930	0.13	Q	|	|	|	V|
23+50	1.2939	0.13	Q	|	|	|	V|
23+55	1.2948	0.13	Q	|	|	|	V|
24+ 0	1.2956	0.13	Q	|	|	|	V|
24+ 5	1.2964	0.12	Q	|	|	|	V|
24+10	1.2970	0.08	Q	|	|	|	V|
24+15	1.2973	0.04	Q	|	|	|	V|
24+20	1.2975	0.03	Q	|	|	|	V|
24+25	1.2976	0.02	Q	|	|	|	V|
24+30	1.2977	0.02	Q	|	|	|	V|
24+35	1.2978	0.01	Q	|	|	|	V|
24+40	1.2978	0.01	Q	|	|	|	V|
24+45	1.2979	0.01	Q	|	|	|	V|
24+50	1.2979	0.00	Q	|	|	|	V|
24+55	1.2979	0.00	Q	|	|	|	V|
25+ 0	1.2980	0.00	Q	|	|	|	V|
25+ 5	1.2980	0.00	Q	|	|	|	V|
25+10	1.2980	0.00	Q	|	|	|	V

Unit Hydrograph Summary Table

Drainage Area	Pre-Development UH Flowrate (cfs)	Post-Development UH Flowrate (cfs)	Difference $Q_{2\ 24\ UH}$ Flowrate (Prop-Exist)	Pre-Dev. $Q_{2\ 24\ UH}$ Runoff Volume (acre-feet)	Post Dev. $Q_{2\ 24\ UH}$ Runoff Volume (acre-feet)	Difference $Q_{2\ 24\ UH}$ Runoff Volume (acre-feet)
DMA B	0.583	1.489	0.78	0.4	0.9	0.5
DMA C	0.413	2.093	1.68	0.3	1.3	1.0

Table above shows a major increase in peak flowrate for both DMA B and C, therefore, the WQMP basins or proposed detention basins will need to detain the difference in runoff volume to satisfy the HCOC requirements.

DMA B correlates to the Area and WQMP Basin shown on the WQMP Site Plan as DMA 2A. As shown above, the difference in runoff volume for DMA B is 0.5 acre-feet which equals to 21,780 cf. This is the required volume to detain in order to meet HCOC requirements. The WQMP Basin 2A is sized to hold 38,536 cf which is enough to meet HCOC requirements.

DMA C correlates to the Area and WQMP Basin shown on the WQMP Site Plan as DMA 1A. As shown above, the difference in runoff volume for DMA B is 1.0 acre-feet which equals to 43,560 cf. This is the required volume to detain in order to meet HCOC requirements. The Detention Basin in DMA 1A is sized to hold 52,076 cf which is enough to meet HCOC requirements.

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
■ **A.** On-site storm drain inlets	■ Locations of inlets.	■ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	■ Maintain and periodically repaint or replace inlet markings. ■ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ■ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ■ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
❑ **B.** Interior floor drains and elevator shaft sump pumps		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **C.** Interior parking garages		❑ State that parking garage floor drains will be plumbed to the sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
❑ **D1.** Need for future indoor & structural pest control		❑ Note building design features that discourage entry of pests.	❑ Provide Integrated Pest Management information to owners, lessees, and operators.
■ **D2.** Landscape/ Outdoor Pesticide Use	❑ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ■ Show self-retaining landscape areas, if any. ■ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	State that final landscape plans will accomplish all of the following. ❑ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ■ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ■ Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	■ Maintain landscaping using minimum or no pesticides. ■ See applicable operational BMPs in **"What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** ■ Provide IPM information to new owners, lessees and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ **E.** Pools, spas, ponds, decorative fountains, and other water features. N/A	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
❑ **F.** Food service N/A	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	❑ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.
❑ **G.** Refuse areas N/A	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
❑ **H.** Industrial processes. N/A	❑ Show process area.	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
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❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.) N/A	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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❑ **J.** Vehicle and Equipment Cleaning N/A	❑ Show on drawings as appropriate: **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑**Car dealerships and similar may rinse cars with water only.**

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❑ **K.** Vehicle/Equipment Repair and Maintenance	❑ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ❑ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ❑ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	❑ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ❑ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ❑ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ❑ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ❑ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ❑ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

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❑ **L.** Fuel Dispensing Areas N/A	❑ Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

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❑ **M.** Loading Docks N/A	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ❑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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❑ **N.** Fire Sprinkler Test Water N/A		❑ Provide a means to drain fire sprinkler test water to the sanitary sewer.	❑ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
O. Miscellaneous Drain or Wash Water or Other Sources ❑ Boiler drain lines ❑ Condensate drain lines ❑ Rooftop equipment ❑ Drainage sumps ❑ Roofing, gutters, and trim. ❑ Other sources N/A		❑ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ❑ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ❑ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ❑ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ❑ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. Include controls for other sources as specified by local reviewer.	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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❑ **P.** Plazas, sidewalks, and parking lots.			❑ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

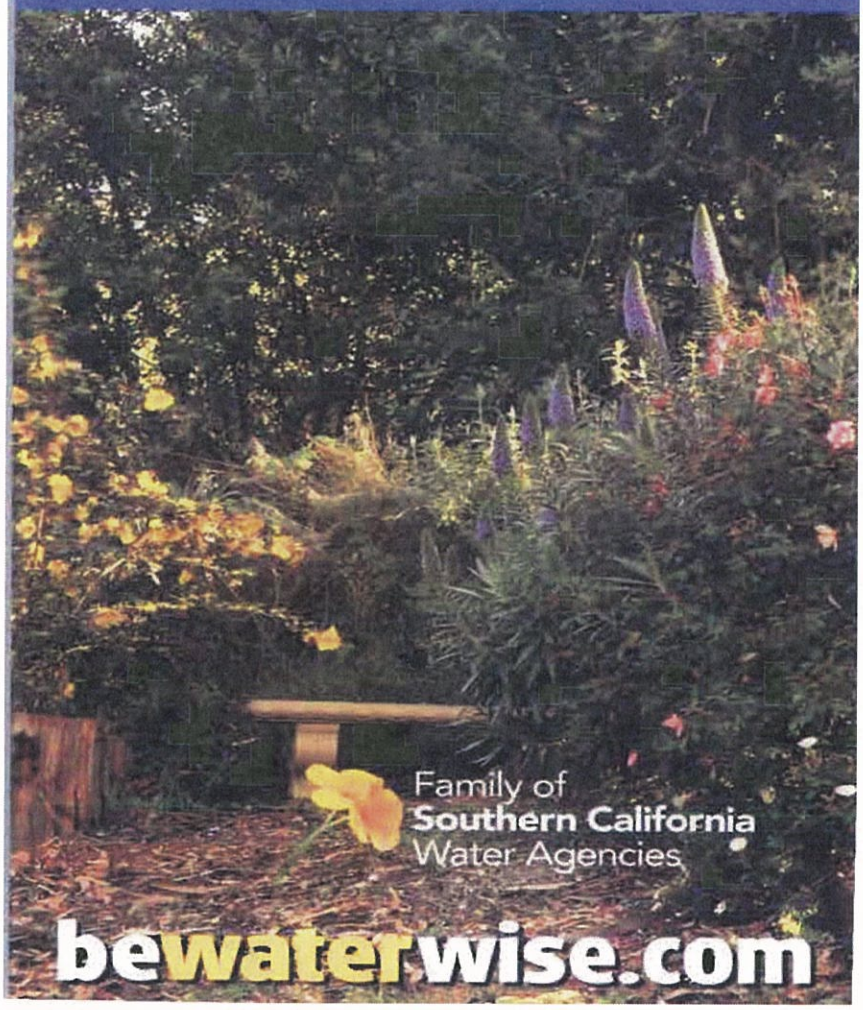
Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Will be provided in Final Engineering

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

10 Ways to Save Water Outdoors



TIP #1 The average homeowner uses twice the amount of water needed to keep plants healthy. Use the watering calculator and index at **bewaterwise.com** to know exactly how much water your plants need.

TIP #2 Check your sprinkler system for leaks, overspray and broken sprinkler heads. Update with drip or other more water-efficient sprinklers where appropriate.

TIP #3 This fall, plant a portion of your garden with beautiful native and California Friendly plants. Browse the plant database at **bewaterwise.com** to find just the right look for your outdoor spaces.

TIP #4 Reduce the amount of water-thirsty grass. Keep only what you need and replace the rest with less-thirsty plants or permeable paving.

TIP #5 For the grass you keep, set your lawnmower blade higher.

TIP #6 Adjust your sprinkler timer downward in September. Plants need less water when days are shorter.

TIP #7 Use a broom instead of the hose for cleaning sidewalks and patios.

TIP #8 Mulch! A layer of bark, gravel, compost, sawdust or low-growing groundcover evens out soil temperature and allows better water retention.

TIP #9 Check the list of invasive plants that hurt our environment at **caleppc.org** and remove any from your garden.

TIP #10 Share these tips with your gardener, neighbors and friends. Water conservation should be a part of every Southern Californian's lifestyle, but that doesn't mean we can't have lush and beautiful outdoor spaces.

bewaterwise.com

After the Storm

A Citizen's Guide to Understanding Stormwater

EPA 833-B-03-002
January 2003

For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

What is stormwater runoff?

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.

- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.

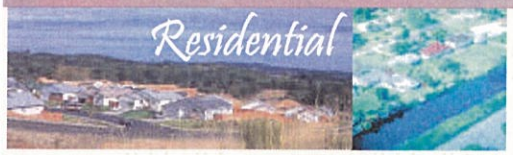
- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Stormwater Pollution Solutions



Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential



Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Auto care



Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Lawn care



Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Septic systems



Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Pet waste



Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.



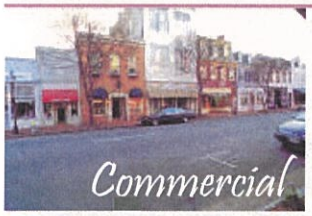
Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.



Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

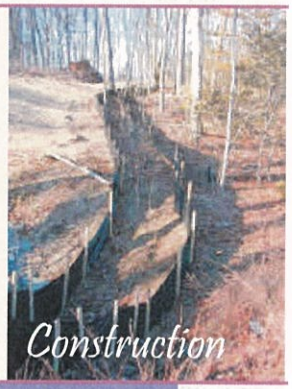
Commercial



Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Construction



Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.

Agriculture

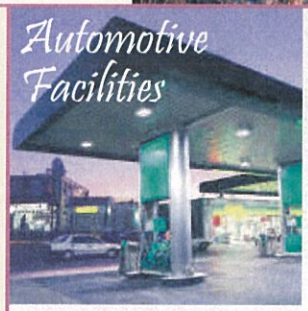


Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.



- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.

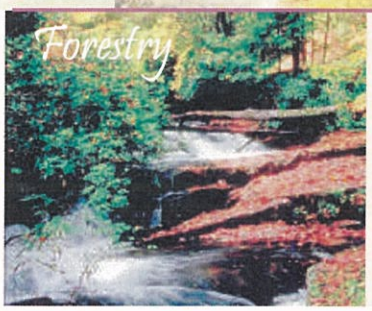
Automotive Facilities



Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

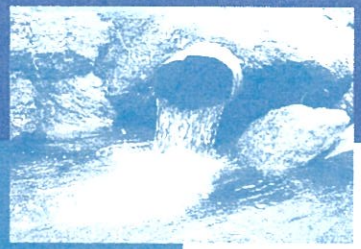
- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

Forestry



Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.



Landscaping and garden maintenance activities can be major contributors to water pollution. Soils, yard wastes, over-watering and garden chemicals become part of the urban runoff mix that winds its way through streets, gutters and storm drains before entering lakes, rivers, streams, etc. Urban runoff pollution contaminates water and harms aquatic life!

In Riverside County, report illegal discharges into the storm drain, call
1-800-506-2555
"Only Rain Down the Storm Drain"

Important Links:

Riverside County Household Hazardous Waste Collection Information
1-800-304-2226 or www.rivcowm.org

Riverside County Backyard Composting Program
1-800-366-SAVE

Integrated Pest Management (IPM) Solutions
www.ipm.ucdavis.edu

California Master Gardener Programs
www.mastergardeners.org
www.camastergardeners.ucdavis.edu

California Native Plant Society
www.cnps.org

The Riverside County "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges Orange County's Storm Water Program for their contribution to this brochure.

...Only Rain Down ...the Storm Drain

What you should know for... Landscape and Gardening

Best Management tips for:

- Professionals
- Novices
- Landscapers
- Gardeners
- Cultivators

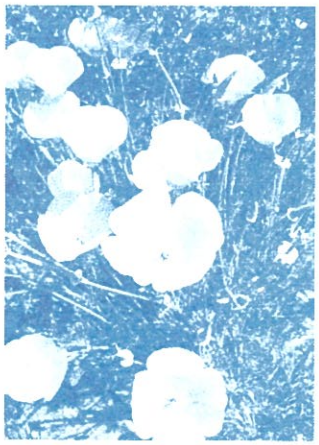


Tips for Landscape & Gardening

This brochure will help you to get the most of your lawn and gardening efforts and keep our waterways clean. Clean waterways provide recreation, establish thriving fish habitats, secure safe sanctuaries for wildlife, and add beauty to our communities. NEVER allow gardening products or waste water to enter the street, gutter or storm drain.

General Landscaping Tips

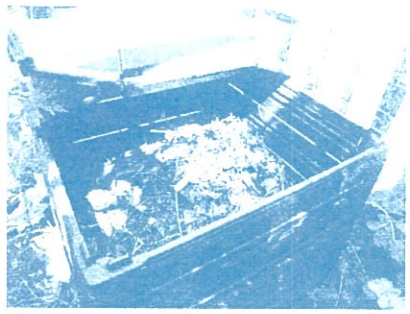
- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.



- Plant native vegetation to reduce the amount of water, fertilizers and pesticides applied to the landscape.
- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.

Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro-spray systems. Periodically inspect and fix leaks and misdirected sprinklers.
- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.



- Consider recycling your green waste and adding "nature's own fertilizer" to your lawn or garden.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.
- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains or sewers. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting.
- Try natural long-term common sense solutions first. Integrated Pest Management (IPM) can provide landscaping guidance and solutions, such as:
  - **Physical Controls** - Try hand picking, barriers, traps or caulking holes to control weeds and pests.
  - **Biological Controls** - Use predatory insects to control harmful pests.
  - **Chemical Controls** - Check out www.ipm.ucdavis.edu before using chemicals. Remember, all chemicals should be used cautiously and in moderation.
- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Waste Collection Center to be recycled.
- *Dumping toxics into the street, gutter or storm drain is illegal!*

www.bewaterwise.com Great water conservation tips and drought tolerant garden designs.

www.ourwaterourworld.com Learn how to safely manage home and garden pests.

Additional information can also be found on the back of this brochure.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers



Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

Do you know where street flows actually go?

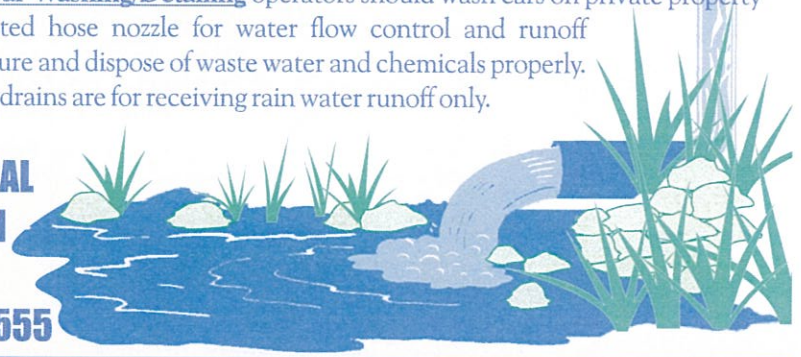
Storm drains are NOT connected to sanitary sewer systems and treatment plants!



The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL 1-800-506-2555



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.



Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.



When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

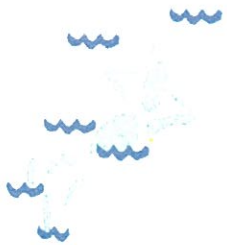
Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

Saltwater Pools



NEVER put unused chemicals into the trash, onto the ground or down a storm drain.

IMPORTANT:

Helpful telephone numbers and links

RIVERSIDE COUNTY WATER AGENCIES:

CALL 1-800-506-2555 to:

Or visit our
Riverside County Flood Control and Water Conservation District
website at: www.rcflood.org

Other links to additional storm drain pollution information:

- www.rivcoeh.org
- www.waterboards.ca.gov
- www.casqa.org
- www.epa.gov/compliance/assistance

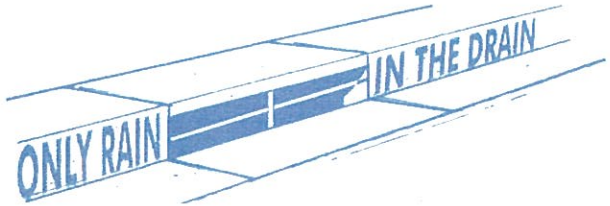


Guidelines for Maintaining your...



Swimming Pool, Jacuzzi and Garden Fountain

Where does the water go?



Pool backwash, deep drain discharges and some water used to clean tile/deck/stonework that reaches storm drains enters the storm drain and be conveyed directly into local streams, rivers or bridges.



A storm drain's purpose is to prevent flooding by carrying rainwater away from developed areas. Storm drains are not connected to sanitary sewer systems and treatment plants!

Wastewater from residential swimming pools, hot tubs, fishponds and fountains often contains chemicals used for sanitizing or cleansing purposes. Pool chemicals (such as chlorine or copper-based algaecides) may pollute the environment when discharged into a storm drain system.

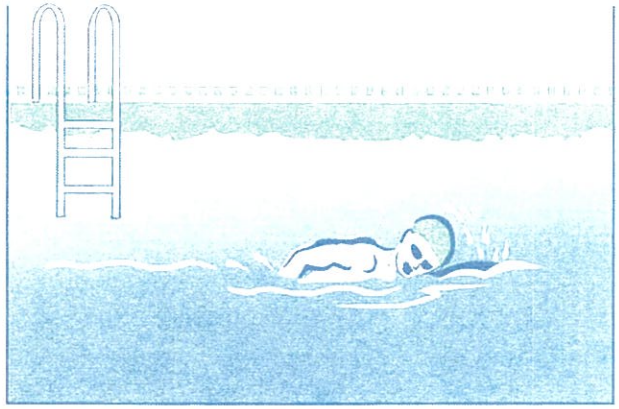
The Cities and Counties of Riverside have adopted ordinances that prohibit the discharge of wastewater to the street and storm drain system.



Discharge Regulations

Regulatory requirements for discharging wastewater from your pool may differ from city to city. Chlorinated waters should not be discharged into the street storm drain or surface waters. Check with your water agency to see if disposal to the sanitary sewer is allowed. Pool discharges have to meet the Riverside County sewer ordinance.

A chlorine residual can be removed from the pool water prior to release to the private sewer system, by letting the water dissipate for several days.



If you cannot discharge to the sewer, you may drain your fountain, pool, or spa to a vegetated area by following these guidelines:

First, reduce or eliminate solids (algae, leaves, dirt) in the pool water and allow the chlorine in the pool water to dissipate before draining the pool (this could take up to 7 days, so plan ahead and get started early).

Second, drain [illegible] at a low rate, over several days, to minimize erosion and runoff. Consider using a hose to direct water to a vegetated area. Do not allow drainage to enter the street, storm drain, or creek.

Maintenance & Chemicals

Cleaning Filters



Algaecides

Chemical Storage and Handling

-
-
-
-



1-800-506-2555

Drainage System Maintenance SC-44



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

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- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
  - Purchase and installation of signs.
  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Infiltration Basin TC-11



Maintenance Concerns, Objectives, and Goals

- Vector Control
- Clogged soil or outlet structures
- Vegetation/Landscape Maintenance
- Groundwater contamination
- Accumulation of metals
- Aesthetics

General Description

An infiltration basin is a shallow impoundment that is designed to infiltrate stormwater. Infiltration basins use the natural filtering ability of the soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually infiltrates into the soil and eventually into the water table. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.

Targeted Constituents

✓	Sediment	■
✓	Nutrients	■
✓	Trash	■
✓	Metals	■
✓	Bacteria	■
✓	Oil and Grease	■
✓	Organics	■
✓	Oxygen Demanding	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

Inspection/Maintenance Considerations

Infiltration basins perform better in well-drained permeable soils. Infiltration basins in areas of low permeability can clog within a couple years, and require more frequent inspections and maintenance. The use and regular maintenance of pretreatment BMPs will significantly minimize maintenance requirements for the basin. Spill response procedures and controls should be implemented to prevent spills from reaching the infiltration system.

Scarification or other disturbance should only be performed when there are actual signs of clogging or significant loss of infiltrative capacity, rather than on a routine basis. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller, if possible, or a disc harrow pulled by a light tractor. This BMP may require groundwater monitoring. Basins cannot be put into operation until the upstream tributary area stabilized.

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Clogged infiltration basins with surface standing water can become a breeding area for mosquitoes and midges. Maintenance efforts associated with infiltration basins should include frequent inspections to ensure that water infiltrates into the subsurface completely (recommended infiltration rate of 72 hours or less) and that vegetation is carefully managed to prevent creating mosquito and other vector habitats.

Inspection Activities	Suggested Frequency
■ Observe drain time for a storm after completion or modification of the facility to confirm that the desired drain time has been obtained. ■ Newly established vegetation should be inspected several times to determine if any landscape maintenance (reseeding, irrigation, etc.) is necessary.	Post construction
■ Inspect for the following issues: differential accumulation of sediment, signs of wetness or damage to structures, erosion of the basin floor, dead or dying grass on the bottom, condition of riprap, drain time, signs of petroleum hydrocarbon contamination, standing water, trash and debris, sediment accumulation, slope stability, pretreatment device condition	Semi-annual and after extreme events
Maintenance Activities	**Suggested Frequency**
■ Factors responsible for clogging should be repaired immediately. ■ Weed once monthly during the first two growing seasons.	Post construction
■ Stabilize eroded banks. ■ Repair undercut and eroded areas at inflow and outflow structures. ■ Maintain access to the basin for regular maintenance activities. ■ Mow as appropriate for vegetative cover species. ■ Monitor health of vegetation and replace as necessary. ■ Control mosquitoes as necessary. ■ Remove litter and debris from infiltration basin area as required.	Standard maintenance (as needed)
■ Mow and remove grass clippings, litter, and debris. ■ Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons. ■ Replant eroded or barren spots to prevent erosion and accumulation of sediment.	Semi-annual
■ Scrape bottom and remove sediment when accumulated sediment reduces original infiltration rate by 25-50%. Restore original cross-section and infiltration rate. Properly dispose of sediment. ■ Seed or sod to restore ground cover. ■ Disc or otherwise aerate bottom. ■ Dethatch basin bottom.	3-5 year maintenance

Additional Information

In most cases, sediment from an infiltration basin does not contain toxins at levels posing a hazardous concern. Studies to date indicate that pond sediments are generally below toxicity limits and can be safely landfilled or disposed onsite. Onsite sediment disposal is always preferable (if local authorities permit) as long as the sediments are deposited away from the shoreline to prevent their reentry into the pond and away from recreation areas, where they could possibly be ingested by young children. Sediments should be tested for toxicants in compliance with current disposal requirements if land uses in the catchment include commercial or industrial zones, or if visual or olfactory indications of pollution are noticed. Sediments containing high levels of pollutants should be disposed of properly.

Light equipment, which will not compact the underlying soil, should be used to remove the top layer of sediment. The remaining soil should be tilled and revegetated as soon as possible.

Sediment removal within the basin should be performed when the sediment is dry enough so that it is cracked and readily separates from the basin floor. This also prevents smearing of the basin floor.

References

King County, Stormwater Pollution Control Manual – Best Management Practices for Businesses. July, 1995 Available at: ftp://dnr metrokc.gov/wlr/dss/spcm/SPCM.HTM

Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: http://www.cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

3.1 INFILTRATION BASIN

Type of BMP	LID - Infiltration
Treatment Mechanisms	Infiltration, Evapotranspiration (when vegetated), Evaporation, and Sedimentation
Maximum Treatment Area	50 acres
Other Names	Bioinfiltration Basin

Description

An Infiltration Basin is a flat earthen basin designed to capture the design capture volume, V_{BMP}. The stormwater infiltrates through the bottom of the basin into the underlying soil over a 72 hour drawdown period. Flows exceeding V_{BMP} must discharge to a downstream conveyance system. Trash and sediment accumulate within the forebay as stormwater passes into the basin. Infiltration basins are highly effective in removing all targeted pollutants from stormwater runoff.



Figure 1 – Infiltration Basin

See Appendix A, and Appendix C, Section 1 of *Basin Guidelines*, for additional requirements.

Siting Considerations

The use of infiltration basins may be restricted by concerns over ground water contamination, soil permeability, and clogging at the site. See the applicable WQMP for any specific feasibility considerations for using infiltration BMPs. Where this BMP is being used, the soil beneath the basin must be thoroughly evaluated in a geotechnical report since the underlying soils are critical to the basin's long term performance. To protect the basin from erosion, the sides and bottom of the basin must be vegetated, preferably with native or low water use plant species.

In addition, these basins may not be appropriate for the following site conditions:

- Industrial sites or locations where spills of toxic materials may occur
- Sites with very low soil infiltration rates
- Sites with high groundwater tables or excessively high soil infiltration rates, where pollutants can affect ground water quality
- Sites with unstabilized soil or construction activity upstream
- On steeply sloping terrain
- Infiltration basins located in a fill condition should refer to Appendix A of this Handbook for details on special requirements/restrictions

Setbacks

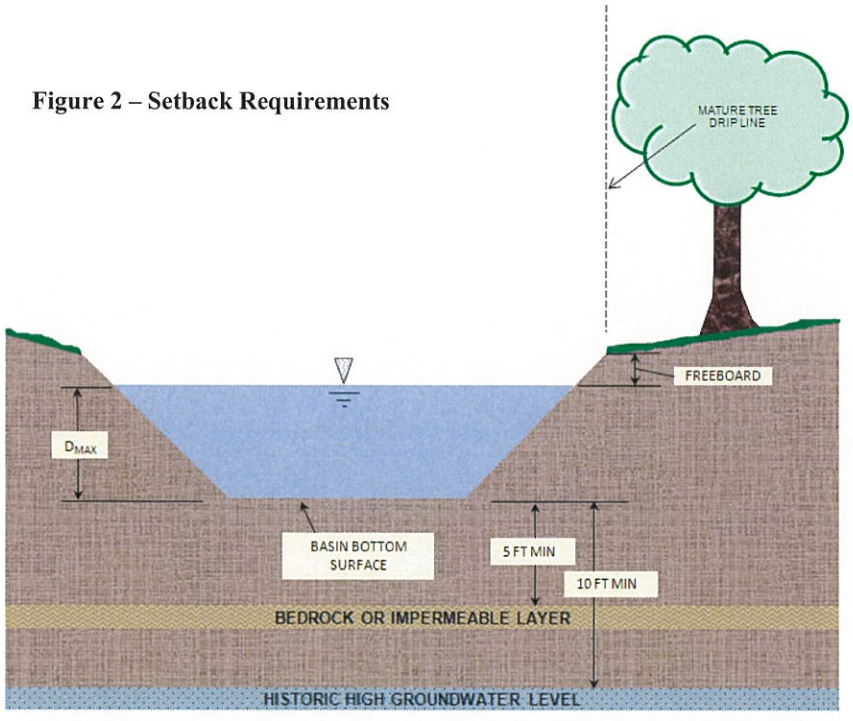
Always consult your geotechnical engineer for site specific recommendations regarding setbacks for infiltration trenches. Recommended setbacks are needed to protect buildings, existing trees, walls, onsite or nearby wells, streams, and tanks. Setbacks should be considered early in the design process since they can affect where infiltration facilities may be placed and how deep they are allowed to be. For instance, depth setbacks can dictate fairly shallow facilities that will have a larger footprint and, in some cases, may make an infiltration basin infeasible. In that instance, another BMP must be selected.

Infiltration basins typically must be set back:

- 10 feet from the historic high groundwater (measured vertically from the bottom of the basin, as shown in Figure 2)
- 5 feet from bedrock or impermeable surface layer (measured vertically from the bottom of the basin, as shown in Figure 2)
- From all existing mature tree drip lines as indicated in Figure 2 (to protect their root structure)
- 100 feet horizontally from wells, tanks or springs

Setbacks to walls and foundations must be included as part of the Geotechnical Report. All other setbacks shall be in accordance with applicable standards of the District's *Basin Guidelines* (Appendix C).

Figure 2 – Setback Requirements



Forebay

A concrete forebay shall be provided to reduce sediment clogging and to reduce erosion. The forebay shall have a design volume of at least 0.5% V_{BMP} and a minimum 1 foot high concrete splashwall / berm. Full height notch-type weir(s), offset from the line of flow from the basin inlet to prevent short circuiting, shall be used to outlet the forebay. It is recommended that two weirs be used and that they be located on opposite sides of the forebay (see Figure 2).

Overflow

Flows exceeding V_{BMP} must discharge to an acceptable downstream conveyance system. Where an adequate outlet is present, an overflow structure may be used. Where an embankment is present, an emergency spillway may be used instead. Overflows must be placed just above the design water surface for V_{BMP} and be near the outlet of the system. The overflow structure shall be similar to the District's Standard Drawing CB 110. Additional details may be found in the District's *Basin Guidelines* (Appendix C).

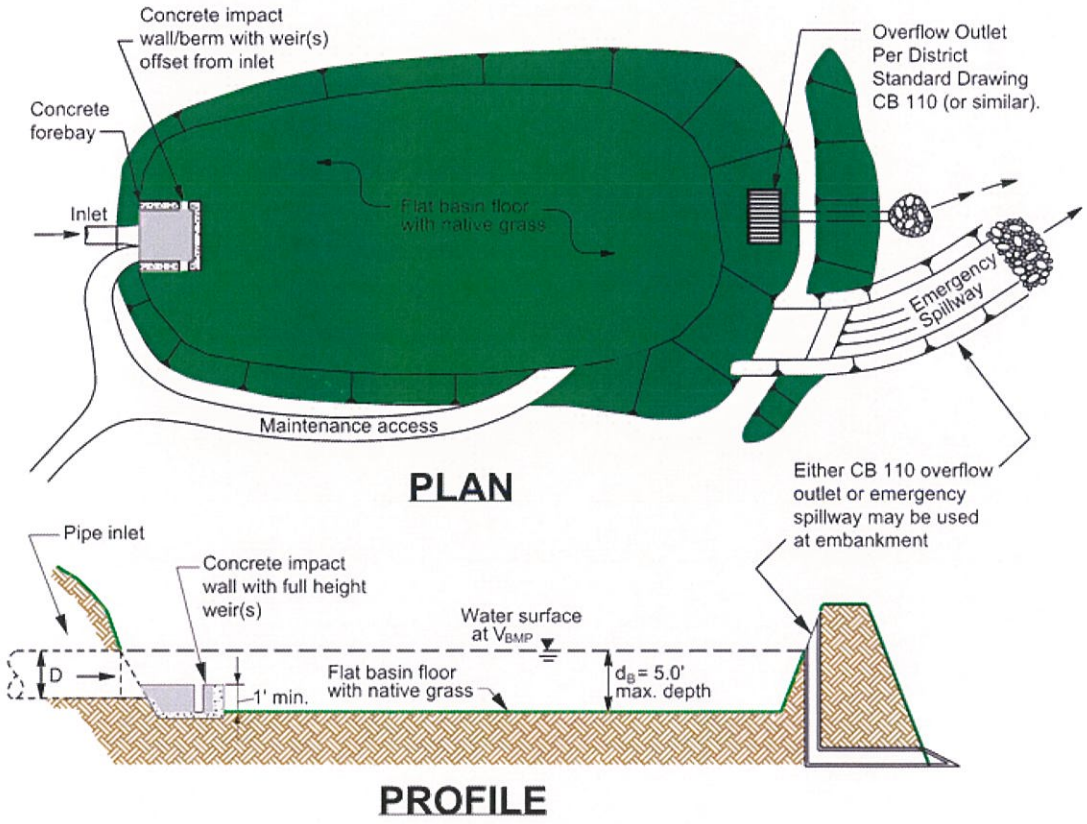


Figure 3 – Infiltration Basin

Landscaping Requirements

Basin vegetation provides erosion protection, improves sediment removal and assists in allowing infiltration to occur. The basin surface and side slopes shall be planted with native grasses. Proper landscape management is also required to ensure that the vegetation does not contribute to water pollution through pesticides, herbicides, or fertilizers. Landscaping shall be in accordance with County of Riverside Ordinance 859 and the District's *Basin Guidelines* (Appendix C), or other guidelines issued by the Engineering Authority.

Maintenance

Normal maintenance of an infiltration basin includes the maintenance of landscaping, debris and trash removal from the surface of the basin, and tending to problems associated with standing water (vectors, odors, etc.). Significant ponding, especially more than 72 hours after an event, may indicate that the basin surface is no longer providing sufficient infiltration and requires aeration. See the District's *Basin Guidelines* (Appendix C) for additional requirements (i.e., fencing, maintenance access, etc.).

Table 1 - Inspection and Maintenance

Schedule	Inspection and Maintenance Activity

Ongoing including just before annual storm seasons and following rainfall events.	• Maintain vegetation as needed. Use of fertilizers, pesticides and herbicides should be strenuously avoided to ensure they don't contribute to water pollution. If appropriate native plant selections and other IPM methods are used, such products shouldn't be needed. If such projects are used,
	  ○ Products shall be applied in accordance with their labeling, especially in relation to application to water, and in areas subjected to flooding.
	  ○ Fertilizers should not be applied within 15 days before, after, or during the rain season.
	• Remove debris and litter from the entire basin to minimize clogging and improve aesthetics.
	• Check for obvious problems and repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water.
	• Check for erosion and sediment laden areas in the basin. Repair as needed. Clean forebay if needed.
	• Revegetate side slopes where needed.

Annually. If possible, schedule these inspections within 72 hours after a significant rainfall.	• Inspection of hydraulic and structural facilities. Examine the inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element. • Check for erosion, slumping and overgrowth. Repair as needed. • Check basin depth for sediment build up and reduced total capacity. Scrape bottom as needed and remove sediment. Restore to original cross-section and infiltration rate. Replant basin vegetation. • Verify the basin bottom is allowing acceptable infiltration. Use a disc or other method to aerate basin bottom only if there is actual significant loss of infiltrative capacity, rather than on a routine basis[1]. • No water should be present 72 hours after an event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed.

1. **CA Stormwater BMP Handbook for New Development and Significant Redevelopment**

Table 2 - Design and Sizing Criteria for Infiltration Basins

Design Parameter	Infiltration Basin
Design Volume	V_{BMP}
Forebay Volume	0.5% V_{BMP}
Drawdown time (maximum)	72 hours
Maximum tributary area	50 acres [2]
Minimum infiltration rate	Must be sufficient to drain the basin within the required Drawdown time over the life of the BMP. The WQMP may include specific requirements for minimum tested infiltration rates.
Maximum Depth	5 feet
Spillway erosion control	Energy dissipators to reduce velocities [1]
Basin Slope	0%
Freeboard (minimum)	1 foot [1]
Historic High Groundwater Setback (max)	10 feet
Bedrock/impermeable layer setback (max)	5 feet
Tree setbacks	Mature tree drip line must not overhang the basin
Set back from wells, tanks or springs	100 feet
Set back from foundations	As recommended in Geotechnical Report

1. **Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures**
2. **CA Stormwater BMP Handbook for New Development and Significant Redevelopment**

Note: The information contained in this BMP Factsheet is intended to be a summary of design considerations and requirements. Additional information which applies to all detention basins may be found in the District's Basin Guidelines (Appendix C). In addition, information herein may be superseded by other guidelines issued by the co-permittee.

INFILTRATION BASIN SIZING PROCEDURE

1. Find the Design Volume, V_{BMP}.
    a) Enter the Tributary Area, A_T.
    b) Enter the Design Volume, V_{BMP}, determined from Section 2.1 of this Handbook.
2. Determine the Maximum Depth.
    a) Enter the infiltration rate. The infiltration rate shall be established as described in Appendix A: "Infiltration Testing".
    b) Enter the design Factor of Safety from Table 1 in Appendix A: "Infiltration Testing".
    c) The spreadsheet will determine D_1, the maximum allowable depth of the basin based on the infiltration rate along with the maximum drawdown time (72 hours) and the Factor of Safety.

$$D_1 = [(t) \times (I)] / 12s$$

Where I = site infiltration rate (in/hr)
s = safety factor
t = drawdown time (maximum 72 hours)

d) Enter the depth of freeboard.

e) Enter the depth to the historic high groundwater level measured from the top of the basin.

f) Enter the depth to the top of bedrock or other impermeable layer measured from the finished grade.

g) The spreadsheet will determine D_2, the total basin depth (including freeboard, if used) of the basin, based on restrictions to the depth by groundwater and an impermeable layer.

D_2 = Depth to groundwater – (10 + freeboard) (ft);

or

D_2 = Depth to impermeable layer – (5 + freeboard) (ft)

Whichever is least.

h) The spreadsheet will determine the maximum allowable effective depth of basin, D_{MAX}, based on the smallest value between D_1 and D_2. D_{MAX} is the maximum depth of water only and does not include freeboard. D_{MAX} shall not exceed 5 feet.

3. Basin Geometry

a) Enter the basin side slopes, z (no steeper than 4:1).

b) Enter the proposed basin depth, d_B excluding freeboard.

c) The spreadsheet will determine the minimum required surface area of the basin:

$$A_s = V_{BMP} / d_B$$

Where A_s = minimum area required (ft^2)
V_{BMP} = volume of the infiltration basin (ft^3)
d_B= proposed depth not to exceed maximum allowable depth, D_{MAX} (ft)

d) Enter the proposed bottom surface area. This area shall not be less than the minimum required surface area.

4. Forebay

A concrete forebay with a design volume of at least 0.5% V_{BMP} and a minimum 1 foot high concrete splashwall shall be provided. Full-height rectangular weir(s) shall be used to outlet the forebay. The weir(s) must be offset from the line of flow from the basin inlet. It is recommended that two weirs be used and that they be located on opposite sides of the forebay (see Figure 2).

a) The spreadsheet will determine the minimum required forebay volume based on 0.5% V_{BMP}.

b) Enter the proposed depth of the forebay berm/splashwall (1foot minimum).

c) The spreadsheet will determine the minimum required forebay surface area.

d) Enter the width of rectangular weir to be used (minimum 1.5 inches). Weir width should be established based on a 5 minute drawdown time.

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

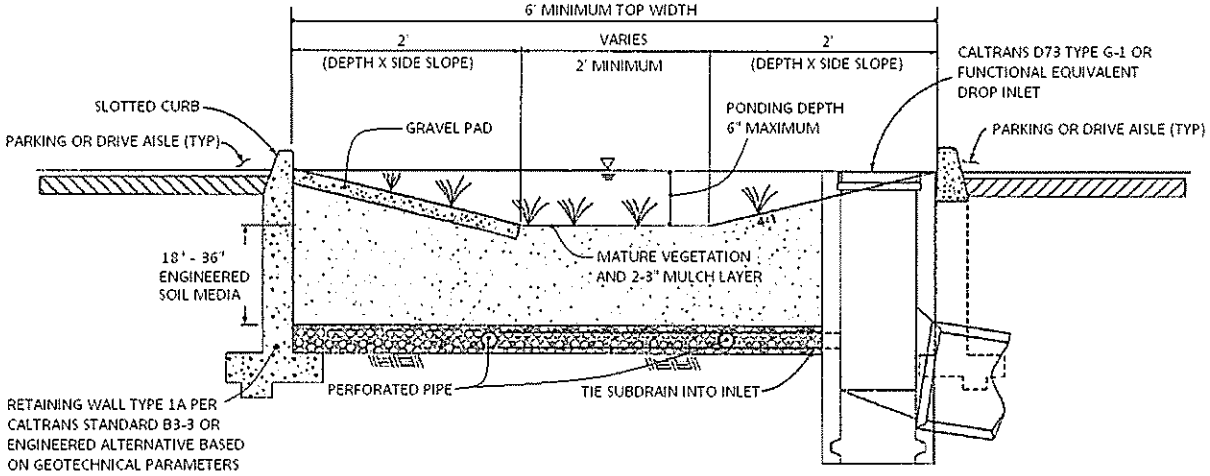
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/



Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

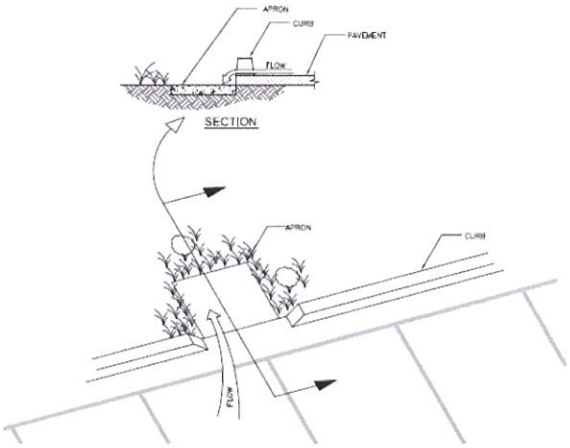


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

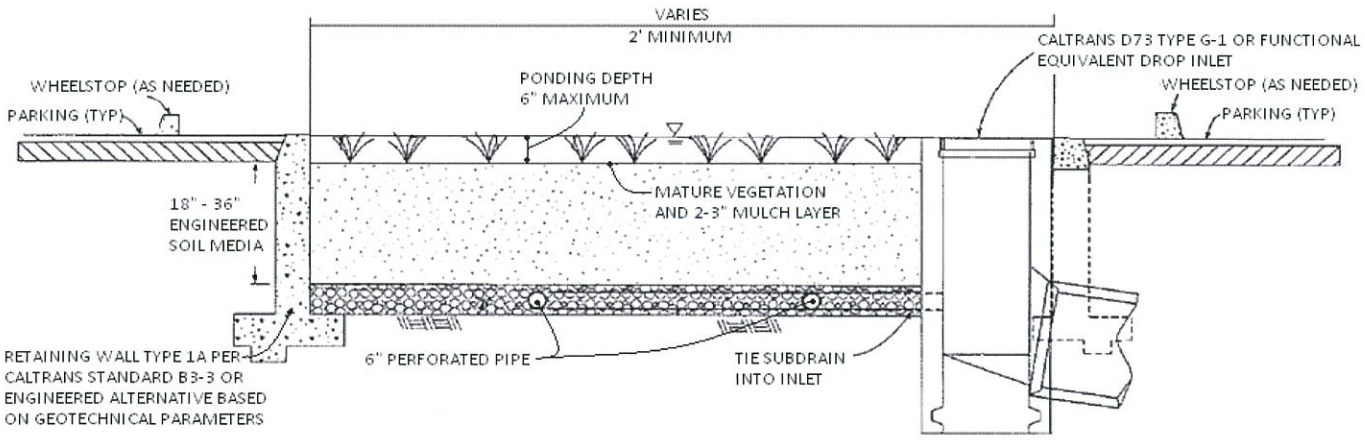
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.



Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.



Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

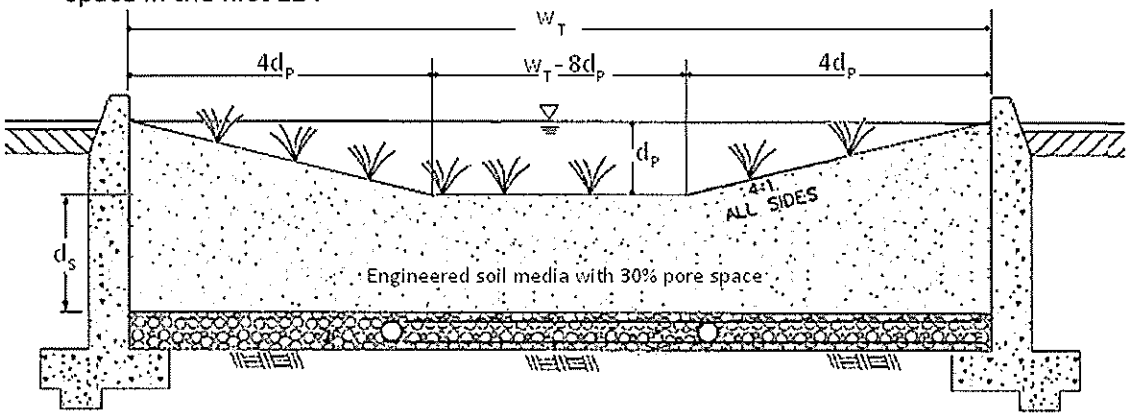
2) Enter the Design Volume, V_{BMP}, determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \times 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = 0.5\ (\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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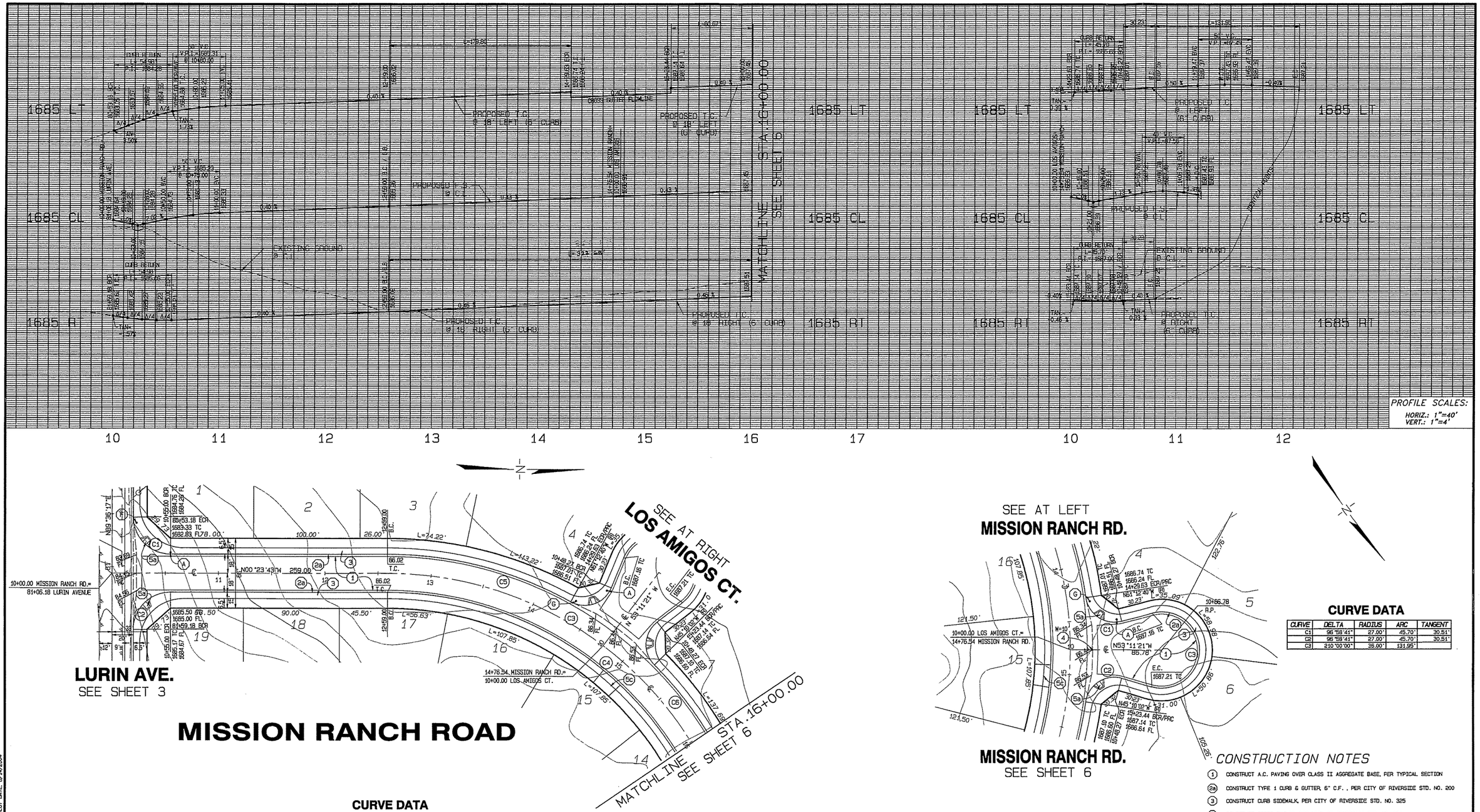
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CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C1	90°00'00"	35.00'	54.98'	35.00'
C2	90°00'00"	35.00'	54.98'	35.00'
C3	58°19'19"	335.00'	341.00'	186.93'
C4	58°19'19"	317.00'	322.68'	176.89'
C5	29°11'02"	353.00'	179.80'	91.90'
C6	13°05'39"	353.00'	80.67'	40.51'

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C1	96°58'41"	27.00'	45.70'	30.51'
C2	96°58'41"	27.00'	45.70'	30.51'
C3	210°00'00"	35.00'	131.95'	

CONSTRUCTION NOTES

1. CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION
2a. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
4. CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
5a. CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304
5c. CONSTRUCT WHEELCHAIR RAMP, TYPE VII W/ CURB SIDE SW, PER CITY OF RIVERSIDE STD. NO. 304

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK:
CITY OF RIVERSIDE BENCH MARK GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.
ELEVATION: 1757.219

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER HUA LIN McCAFFERY NO. C49405 EXP. 9-30-04 CIVIL STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY [signature] DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

	APPROVED BY	DATE
PRINCIPAL ENGINEER	[signature]	6/24/04
PARK DEPARTMENT	—	—
TRAFFIC DIVISION	[signature]	6/24/04
STREET SERVICES	[signature]	6/23/04

APPROVED BY [signature] CITY ENGINEER
DATE 6/26/04

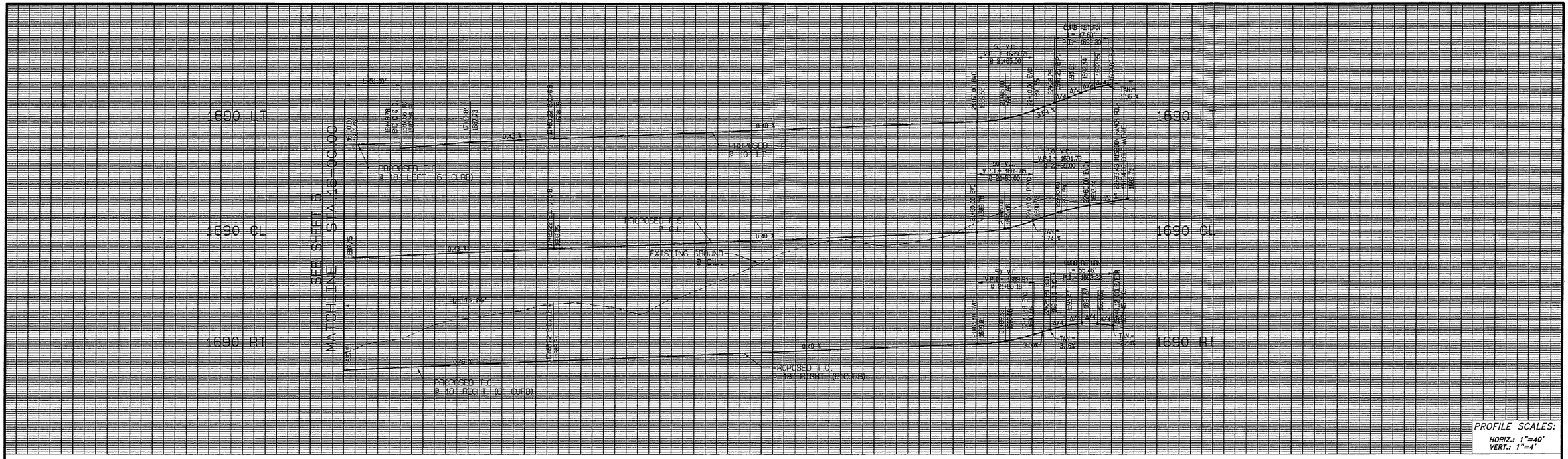
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ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 5 OF 7
PW 03-00504

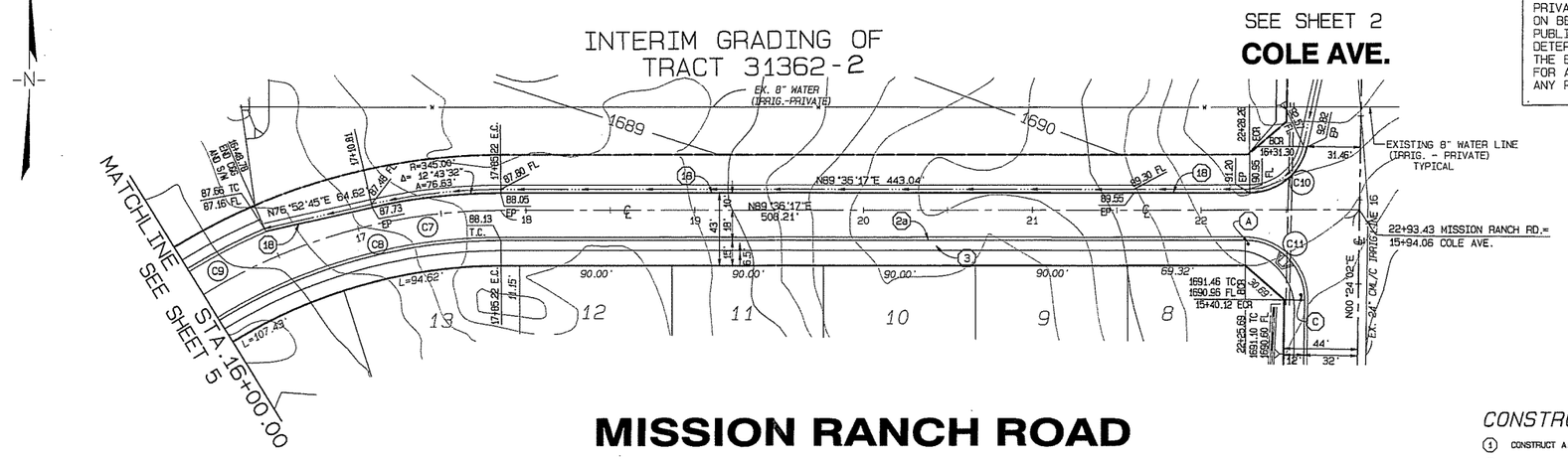
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Pc 44 of 52

INDEXED 9-08-04 LH



PROFILE SCALES:
HORIZ.: 1"=40'
VERT.: 1"=4'



NOTE:
PRIVATE WATER LINES ARE SHOWN BASED ON BEST AVAILABLE INFORMATION. NO PUBLIC RECORDS HAVE BEEN FOUND TO DETERMINE OWNERSHIP, OR RIGHTS THERETO. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR ANY CHANGES TO, OR REMOVAL OF, ANY PRIVATE WATER LINES.

MISSION RANCH ROAD

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C7	31°49'41"	335.00'	185.22'	95.04'
C8	31°40'41"	317.00'	175.25'	89.94'
C9	8°20'35"	353.00'	51.40'	25.75'
C10	77°55'30"	35.00'	47.60'	28.30'
C11	90°47'45"	35.00'	55.46'	35.49'

CONSTRUCTION NOTES

1. CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION
2a. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
4. CONSTRUCT CROSS GUTTER, PER CITY OF RIVERSIDE STD. NO. 220
18. CONSTRUCT 2 x 4 REDWOOD HEADER ALONG EDGE OF PAVEMENT

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK:
CITY OF RIVERSIDE BENCH MARK GPS-67
1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.
ELEVATION: 1757.219

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER
HUA LIN McCRAFFREY
NO. C49405
EXP. 9-30-04
CIVIL
STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070
APPROVED BY [signature] DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		8/26/04
PARK DEPARTMENT		
TRAFFIC DIVISION		8/25/04
STREET SERVICES		8/25/04

APPROVED BY [signature] CITY ENGINEER
DATE 8/26/04

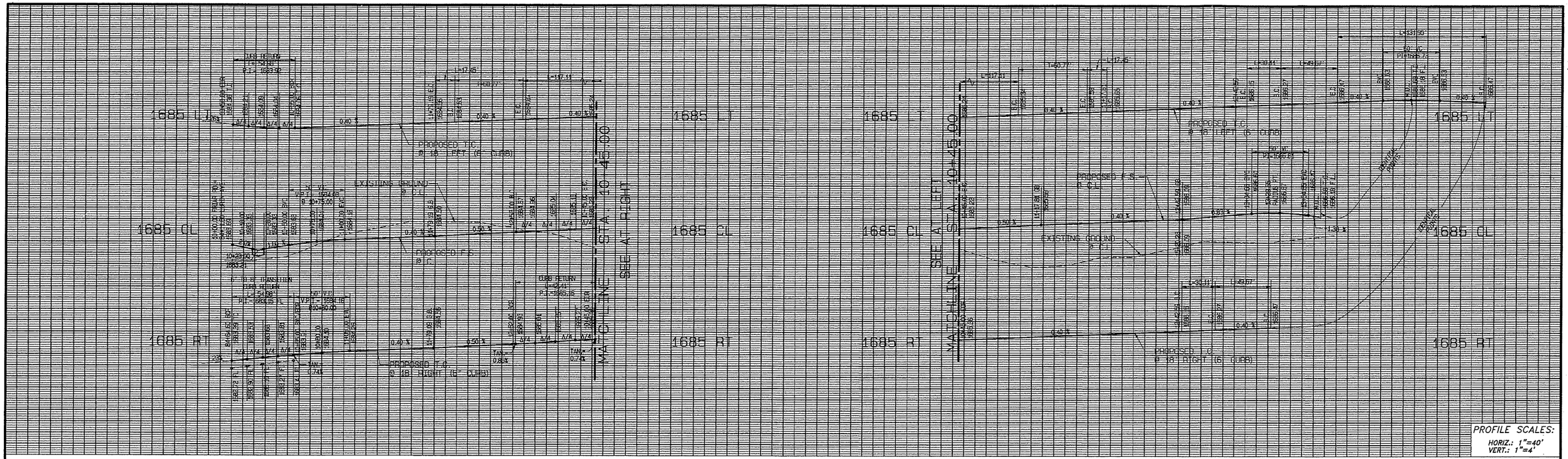
STREET IMPROVEMENT PLANS
TRACT NO. 31362
MISSION RANCH RD.
SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

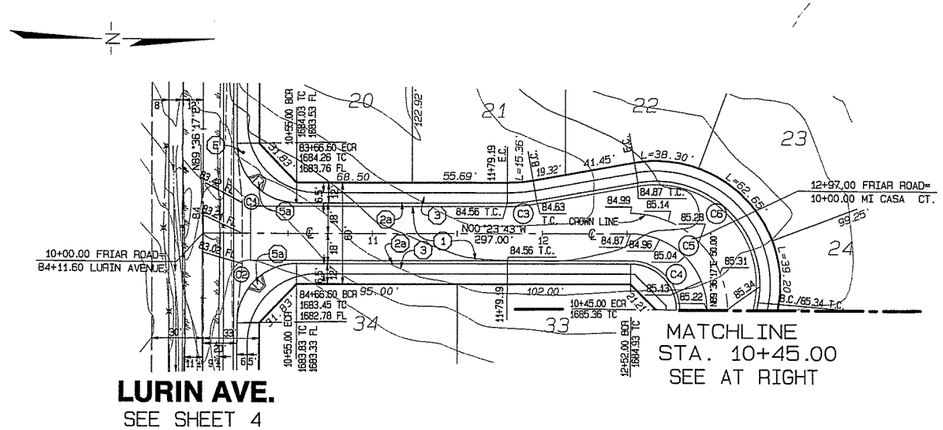
ACCOUNT NO. 03-0269
DRAWING NUMBER
R-3790
SHEET 6 OF 7
PW 03-00504

FILE: G:\2003\03-0269\Streets\03-0269-Str.dgn PLOT DATE: 6/14/2004

Pc 44of S2

INDEXED 9-08-04 LH





LURIN AVE.
SEE SHEET 4

FRIAR ROAD

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C1	90°00'00"	35.00'	54.98'	35.00'
C2	90°00'00"	35.00'	54.98'	35.00'
C3	10°00'00"	100.00'	17.45'	8.75'
C4	90°00'00"	27.00'	42.41'	27.00'
C5	90°00'00"	45.00'	70.69'	45.00'
C6	110°00'00"	61.00'	117.11'	87.12'

MI CASA COURT

CURVE DATA

CURVE	DELTA	RADIUS	ARC	TANGENT
C7	10°00'00"	100.00'	17.45'	8.75'
C8	15°00'00"	115.00'	30.11'	15.14'
C9	15°00'00"	115.00'	30.11'	15.14'
C10	210°00'00"	36.00'	131.95'	

CONSTRUCTION NOTES

1. CONSTRUCT A.C. PAVING OVER CLASS II AGGREGATE BASE, PER TYPICAL SECTION
2a. CONSTRUCT TYPE 1 CURB & GUTTER, 6" C.F., PER CITY OF RIVERSIDE STD. NO. 200
3. CONSTRUCT CURB SIDEWALK, PER CITY OF RIVERSIDE STD. NO. 325
5a. CONSTRUCT WHEELCHAIR RAMP, TYPE I, PER CITY OF RIVERSIDE STD. NO. 304

PROFILE SCALES:
HORIZ.: 1"=40'
VERT.: 1"=4'

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK:

CITY OF RIVERSIDE BENCH MARK GPS-67

1-1/4" BRASS CAP IN A WELL MONUMENT, 5" DEEP IN THE CENTER OF BARTON STREET, 230 FEET SOUTHERLY OF THE INTERSECTION OF BARTON AND VAN BUREN BLVD.

ELEVATION: 1757.219

GRAPHIC SCALE 1"=40'
40 20 0 40 80 120

CITY BUSINESS TAX CERTIFICATE NO. 005751 EXP. 12-31-04

REGISTERED PROFESSIONAL ENGINEER
IAN LIN McCRAFFREY
NO. C49405
EXP. 9-30-04
CIVIL
STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY STREET RIVERSIDE, CA 92506
(909) 686-1070

APPROVED BY [signature] DATE 6-14-04
R.C.E. NO. C49405

MARK	REVISIONS	APPR.	DATE

DESIGNED BY: J.M. CHECKED BY: L.M.

CITY OF RIVERSIDE, CALIFORNIA
PUBLIC WORKS DEPARTMENT

APPROVED BY	BY	DATE
PRINCIPAL ENGINEER		6/15/04
PARK DEPARTMENT		
TRAFFIC DIVISION		7/15/04
STREET SERVICES		7/13/04

APPROVED BY [signature] CITY ENGINEER
DATE 8/26/04

STREET IMPROVEMENT PLANS

TRACT NO. 31362
FRIAR ROAD
MI CASA COURT

SCALE: HORIZ.: 1"=40' VERT.: 1"=4'

ACCOUNT NO. 03-0269
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SHEET 7 OF 7
PW 03-00504

PC 4404 S2

INDEXED 9-08-04 LH

FILE: G:\2003\03-0269\Streets\03-0269-Str.pro PLOT DATE: 6/14/2004