Appendix G – La Quinta Village Hydrology Study

La Quinta Village Build-out Plan EIR
City of La Quinta

LA QUINTA VILLAGE HYDROLOGY STUDY

IN SUPPORT OF THE LA QUINTA VILLAGE BUILD-OUT PLAN EIR

PREPARED FOR:
CITY OF LA QUINTA
78-495 CALLE TAMPICO
PALM DESERT, CA 92260

PREPARED BY:

The Altum Group

THE ALTUM GROUP

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PALM DESERT, CA 92260
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August 4, 2016

Prepared Under the Supervision of:

8/4/16

James R. Bazua, P.E. — Date
R.C.E. 58394 — Exp. 12/31/16

LA QUINTA VILLAGE HYDROLOGY STUDY

IN SUPPORT OF THE LA QUINTA VILLAGE BUILD-OUT PLAN EIR

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I. PURPOSE AND SCOPE

This hydrology study has been prepared in support of the La Quinta Village Build-Out Plan EIR.

The La Quinta Village area studied in this report focuses on approximately 90 acres of land, generally located south of Calle Tampico, east of Eisenhower Drive and west of Desert Club Drive and is generally recognized as its traditional Downtown. City of La Quinta is undergoing a planning effort to develop a build-out scenario that addresses maximum potential commercial square footage while assuring that infrastructure is planned to accommodate build-out.

Traditionally, the downtown area has been developed without requiring on-site storm drain retention due to the commercial nature of the development. This study revisits that approach and compares impacts to the Downtown area due to future build-out of La Quinta Village area based on the 10 year storm event. Approximately 77 acres within the study area is currently developed and 13 acres are vacant. As this study is in support of the future commercial build-out of The La Quinta Village, the analysis will be limited to the increase in runoff volume due to the development of these vacant parcels.

II. DESIGN METHODOLGY

The La Quinta Village area is included within the boundaries of a Focused Drainage Study prepared by Michael Baker, Inc. for a portion of City of La Quinta. While the original intent of this study was to tier off of the report prepared by Michael Baker, Inc. which analyzes the 100 year storm event for a much larger area, it appears that portions of the Downtown Area Drainage Study prepared by Psomas in 2008 for City of La Quinta are more suitable to use as reference here since the Psomas report also targets the effects of the 10 year storm event for the same study area used in this report. The Psomas Downtown Area Drainage Study is included as Appendix F of the City of La Quinta's Master Draiunage Plan

The results contained in this drainage study can be separated into two sets of data that can be used for comparison. The data is generated by 1.) analyzing the anticipated maximum storm runoff volume generated on each vacant commercial site within the study area during the 10 year storm event and 2.) calculating the increase in runoff discharge due to development of the vacant parcels within the study area.

Runoff discharge calculations contained in this report were developed using Rational Method (Riverside County) software by CivilCADD/CivilDesign, and the anticipated runoff volumes were calculated using Riverside County Flood Control District (RCFCD) Synthetic Unit Hydrograph (Short-cut Method) for the 10 year storm event. The topographic data used in this study was prepared by the Federal Emergency Management Agency in 2011 and provided for use by City of La Quinta.

III. DESIGN CRITERIA

The following design parameters were used in the preparation of the analyses:

- 10 Year Storm Event
- Antecedent Moisture Condition 1
- 10 year – 3 hour precipitation 1.14 (NOAA ATLAS 14)
- 10 year – 6 hour precipitation 1.46 (NOAA ATLAS 14)
- 10 year – 24 hour precipitation 2.37 (NOAA ATLAS 14)
- 2 year – 1 hour precipitation 0.38 (NOAA ATLAS 14)
- 100 year – 1 hour precipitation 1.69 (NOAA ATLAS 14)
- Slope Intensity Duration Curve 0.59 (RCFCD Plate D-4.6)
- Hydraulic Soil Type 'A' (previously graded with relatively low potential for infiltration)

IV. ON-SITE RETENTION ANALYSIS

Several undeveloped parcels designated for commercial use within the La Quinta Village area were studied separately to determine the on-site retention volume capacity that would be required in order to capture 100% of the 10 year event (see APPENDIX "10 YEAR ON-SITE RETENTION STUDY MAP" and RCFCD Synthetic Unit Hydrograph Worksheets)

Each of the commercial parcels that were studied share similar topographic features in that they have less than minimum allowable fall in order to facilitate surface drainage. For the purposes of the analysis, it is assumed that a sufficient gradient will be provided in order to achieve positive surface flow and 90% impervious lot coverage will exist under the developed condition.

Since the undeveloped parcels within the La Quinta Village Study Area share similar characteristic, the results of the on-site retention study can be tabulated and averaged to produce a representative retention basin footprint size per acre of commercial development. The resulting value can be then be evaluated based on its feasibility on a lot by lot basis.

Build-out of the vacant commercial developments within the La Quinta Village would require approximately 2,200 sq.ft/acre designated for retention basin use in order to capture the on-site runoff generated during the 10 year storm event.

V. STREET CAPACITY ANALYSIS

Vacant parcels designated for commercial development within La Quinta Village were identified and studied to determine the runoff discharge tributary to each vacant parcel under the existing-vacant condition as well as the projected commercially developed condition. The results were compared for all vacant commercial parcels in order to determine the increase in runoff due to 100% buildout within La Quinta Village (see APPENDIX "10 YEAR DISCHARGE STUDY MAP" and Riverside County Rational Method Worksheets)

The total additional runoff generated by commercial development of existing vacant lots within La Quinta Village during the 10 year rain event is 9.89 cfs occurring along Calle Tampico where flows combine creating the worst case condition.

Based on the Psomas Downtown Area Drainage Report, the downtown area is subject to flooding under the existing condition in the northern reaches of Avenida Bermudas, Desert Club Drive and all along Calle Tampico. Existing catch basins along Calle Tampico and the underground storm drain pipe network do not have the capacity to convey the 10-year peak storm runoff from the downtown area and adjacent neighborhood. Existing studies calculate runoff tributary to Calle Tampico during the 10 year peak storm event by combining 71 cfs from the area west of Avenida Bermudas with 41.5 cfs generated between Avenida Bermudas and Desert Club Drive for a total of 112.5 cfs under the existing condition. Development of the existing vacant parcels within the study area for commercial use increases the discharge along Calle Tampico by 8.8%.

10 YEAR EVENT - INCREASE IN RUNOFF DUE TO DEVELOPMENT

SUBAREA	AREA (ac.)	PRE-DEVELOPMENT DISCHARGE (Q10 CFS)	POST DEVELOPMENT DISCHARGE (Q10 CFS)
①	0.36	0.49	0.85
②	0.78	1.20	2.03
③	0.65	0.94	1.61
④	1.73	2.31	4.00
⑤	0.92	1.47	2.47
⑥	0.11	0.21	0.34
⑦	0.35	0.55	0.93
⑧	0.35	0.56	0.94
⑨	0.79	1.24	2.09
⑩	1.16	1.70	2.89
⑪	1.21	1.63	2.82
⑫	0.58	0.90	1.52
⑬	0.57	0.87	1.47
		14.07	23.96

INCREASE IN RUNOFF DUE TO DEVELOPMENT OF EXISTING VACANT COMMERCIAL PARCELS WITHIN LA QUINTA VILLAGE . . . . . 9.89 CFS

VI. RECOMMENDATIONS

The results of the analyses contained in this report suggest that the level of impingement to commercial development in order to retain 10 year flows on site is large relative to the expected increase in surface street runoff due to development of existing vacant lots within La Quinta Village.

Since on-site streets and storm drain facilities along Calle Tampico already do not have full capacity to convey 10 year storm runoff under the existing condition, and the increase in runoff due to development of the existing vacant parcels is relatively small, it is our recommendation that an "drainage mitigation" development fee should be required to supplement funding for upgrades to the existing storm drain evacuation system.

The use of an off-site retention basin designed to capture flows generated during the 10 year storm event has been suggested as a possible design solution and involves the need for existing surface streets and storm drain facilities to provide conveyance to an off-site location when they are already beyond capacity under the existing condition. This would seem to reinforce the opinion that a drainage mitigation fee intended to upgrade existing facilities is warranted

VII REFERENCES

Michael Baker International (February 2016) *City of La Quinta Focused Area Drainage Study*

Psomas (January 2008) *Downtown Area Drainage Study for City of La Quinta*

Riverside County Flood Control and Water Conservation District (April 1978) *Hydrology Manual*

VIII APPENDIX

NOAA Atlas 14, Volume 6, Version 2
Location name: La Quinta, California, US*
Latitude: 33.6760°, Longitude: -116.3040°
Elevation: 46 ft*
* source: Google Maps

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	0.070 (0.058-0.084)	0.107 (0.089-0.129)	0.164 (0.136-0.199)	0.217 (0.179-0.266)	0.302 (0.241-0.383)	0.379 (0.296-0.491)	0.469 (0.356-0.622)	0.575 (0.425-0.786)	0.745 (0.528-1.06)	0.904 (0.618-1.34)
10-min	0.100 (0.083-0.121)	0.153 (0.128-0.185)	0.235 (0.195-0.285)	0.311 (0.256-0.381)	0.433 (0.345-0.549)	0.543 (0.424-0.704)	0.672 (0.511-0.892)	0.824 (0.609-1.13)	1.07 (0.757-1.52)	1.30 (0.886-1.92)
15-min	0.121 (0.101-0.146)	0.185 (0.154-0.224)	0.284 (0.236-0.345)	0.376 (0.310-0.461)	0.524 (0.417-0.664)	0.657 (0.512-0.851)	0.812 (0.618-1.08)	0.996 (0.736-1.36)	1.29 (0.915-1.84)	1.57 (1.07-2.32)
30-min	0.177 (0.148-0.214)	0.272 (0.227-0.329)	0.417 (0.346-0.506)	0.552 (0.455-0.677)	0.769 (0.613-0.975)	0.965 (0.752-1.25)	1.19 (0.907-1.58)	1.46 (1.08-2.00)	1.90 (1.34-2.71)	2.30 (1.57-3.40)
60-min	0.251 (0.209-0.303)	0.384 (0.320-0.465)	0.589 (0.490-0.715)	0.781 (0.644-0.957)	1.09 (0.867-1.38)	1.36 (1.06-1.77)	1.69 (1.28-2.24)	2.07 (1.53-2.83)	2.68 (1.90-3.83)	3.25 (2.22-4.81)
2-hr	0.349 (0.291-0.422)	0.510 (0.426-0.618)	0.758 (0.630-0.920)	0.988 (0.815-1.21)	1.35 (1.08-1.71)	1.68 (1.31-2.17)	2.05 (1.56-2.72)	2.49 (1.84-3.40)	3.17 (2.25-4.53)	3.80 (2.60-5.61)
3-hr	0.416 (0.347-0.503)	0.600 (0.501-0.727)	0.881 (0.732-1.07)	1.14 (0.941-1.40)	1.55 (1.24-1.97)	1.91 (1.49-2.48)	2.33 (1.77-3.10)	2.81 (2.08-3.85)	3.57 (2.53-5.09)	4.25 (2.90-6.28)
6-hr	0.543 (0.454-0.657)	0.779 (0.649-0.943)	1.13 (0.942-1.38)	1.46 (1.20-1.79)	1.97 (1.57-2.49)	2.41 (1.88-3.12)	2.92 (2.22-3.87)	3.50 (2.58-4.78)	4.40 (3.12-6.28)	5.20 (3.55-7.68)
12-hr	0.659 (0.550-0.797)	0.967 (0.806-1.17)	1.42 (1.18-1.73)	1.83 (1.51-2.25)	2.46 (1.96-3.12)	3.01 (2.34-3.89)	3.62 (2.75-4.80)	4.31 (3.18-5.89)	5.36 (3.79-7.64)	6.27 (4.29-9.27)
24-hr	0.811 (0.718-0.935)	1.23 (1.08-1.42)	1.83 (1.61-2.12)	2.37 (2.07-2.76)	3.18 (2.69-3.83)	3.87 (3.21-4.75)	4.63 (3.75-5.82)	5.49 (4.33-7.09)	6.77 (5.14-9.11)	7.87 (5.78-10.9)
2-day	0.934 (0.826-1.08)	1.43 (1.27-1.66)	2.16 (1.90-2.50)	2.80 (2.45-3.27)	3.77 (3.19-4.54)	4.58 (3.81-5.63)	5.48 (4.45-6.90)	6.49 (5.13-8.39)	7.99 (6.07-10.8)	9.28 (6.81-12.9)
3-day	1.00 (0.885-1.15)	1.54 (1.37-1.78)	2.34 (2.06-2.71)	3.04 (2.66-3.55)	4.09 (3.47-4.93)	4.98 (4.14-6.13)	5.97 (4.84-7.51)	7.07 (5.58-9.14)	8.72 (6.61-11.7)	10.1 (7.43-14.1)
4-day	1.06 (0.940-1.23)	1.64 (1.45-1.90)	2.49 (2.19-2.88)	3.24 (2.83-3.78)	4.36 (3.69-5.25)	5.31 (4.41-6.52)	6.36 (5.16-8.00)	7.53 (5.95-9.73)	9.29 (7.05-12.5)	10.8 (7.92-15.0)
7-day	1.13 (0.998-1.30)	1.74 (1.54-2.01)	2.64 (2.32-3.05)	3.43 (3.00-4.00)	4.62 (3.91-5.56)	5.62 (4.66-6.90)	6.72 (5.45-8.45)	7.94 (6.27-10.3)	9.77 (7.41-13.1)	11.3 (8.31-15.7)
10-day	1.16 (1.02-1.34)	1.79 (1.58-2.07)	2.72 (2.39-3.14)	3.54 (3.09-4.12)	4.76 (4.03-5.73)	5.79 (4.80-7.11)	6.91 (5.61-8.70)	8.16 (6.45-10.6)	10.0 (7.61-13.5)	11.6 (8.51-16.1)
20-day	1.24 (1.10-1.43)	1.95 (1.73-2.25)	2.99 (2.63-3.46)	3.90 (3.41-4.55)	5.27 (4.46-6.34)	6.41 (5.32-7.88)	7.66 (6.21-9.63)	9.03 (7.13-11.7)	11.0 (8.37-14.8)	12.7 (9.32-17.7)
30-day	1.32 (1.17-1.53)	2.11 (1.87-2.44)	3.27 (2.88-3.79)	4.29 (3.76-5.01)	5.82 (4.93-7.01)	7.09 (5.89-8.72)	8.47 (6.87-10.7)	9.97 (7.87-12.9)	12.1 (9.21-16.3)	13.9 (10.2-19.4)
45-day	1.43 (1.26-1.65)	2.33 (2.06-2.69)	3.63 (3.20-4.21)	4.80 (4.20-5.60)	6.53 (5.54-7.87)	7.98 (6.63-9.80)	9.53 (7.73-12.0)	11.2 (8.85-14.5)	13.6 (10.3-18.3)	15.6 (11.4-21.7)
60-day	1.51 (1.34-1.75)	2.50 (2.21-2.89)	3.96 (3.49-4.58)	5.25 (4.59-6.12)	7.16 (6.07-8.63)	8.76 (7.27-10.8)	10.5 (8.49-13.2)	12.3 (9.71-15.9)	14.9 (11.3-20.1)	17.0 (12.5-23.7)

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

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

Please refer to NOAA Atlas 14 document for more information.

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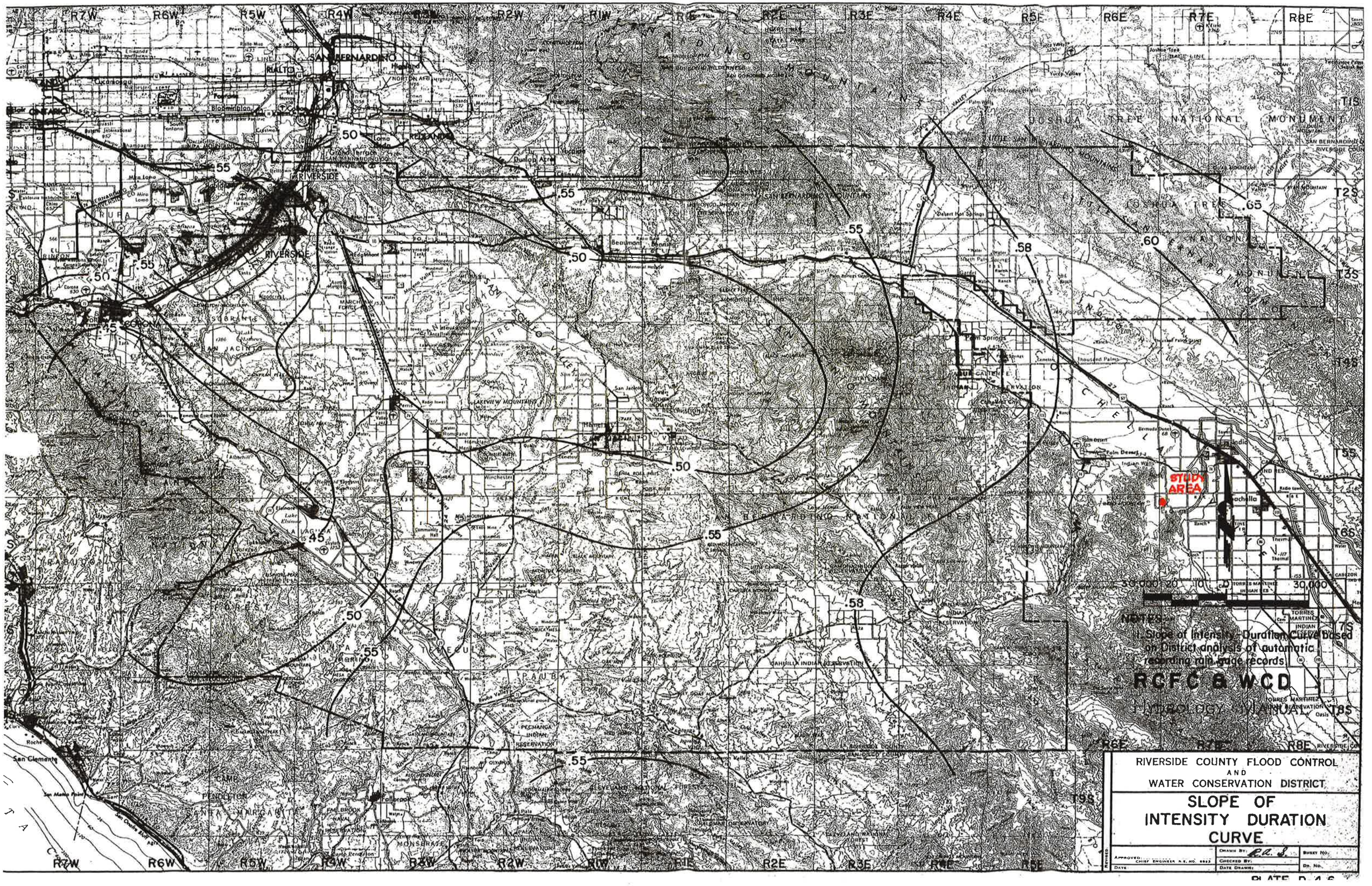
PF graphical



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

SLOPE OF INTENSITY DURATION CURVE

APPROVED: CHIEF ENGINEER R.E. NO. 6862	DRAWN BY:	SHEET NO.
DATE	CHECKED BY:	DR. NO.
	DATE DRAWN:	

REVISED

PLATE D-4.6

RCFCD SYNTHETIC UNIT HYDROGRAPH WORSHEETS

HYDROLOGY CALCULATIONS - s Sample

10 YR EVENT – 1 HOUR VOLUME

Using the RCFC&WCD Short Cut Unit Hydrograph Method

Area Designations La Quinta Village - 1

Drainage Area (ac.)	0.61			
Unit time (minutes)	15	15	15	60
10 Year Storm Duration (hrs)	1	3	6	24
Total Precipitation (From Plates E-5.2, 5.4, 5.6)(in.)	0.78	1.14	1.46	2.37
Soils Group	A			
AMC index II Runoff Number (plate E-6.1)	32			
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.375 (AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	90			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.07 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	90			
Retention Basin Percolation Rate (in/hr)	0			

Percolation is taken incrementally.

Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to 0.001 or less, but should not be entered with 0 or program chokes.)

Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+1.3333)^2-(diam/2+0.3333)^2))

Drywell design factors **Upper sec. (ft.)=** **0.001** **Lower sec. (ft.)=** **0.001** **Ring diam. (ft.) =** **0.001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**

Drywell total(cf)= **0.00**

Ret. Basin design (area, depth) **Top =** **20000** s.f. **Bot. =** **10000 s.f.** **Max. Depth (d)=** **5** **Max. storage=** **73570.23** (d/3)*(bottom+top+(bottom*top)^0.50)

Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**

Outside Input from: **N/A**

1 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Loss Rate Value Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	13.6	0.4243	0.0713	N/A	0.3531	0.2154	193.84	0.00	0.00	0.00	0.00	0.00	193.83	10000.00	0.00	193.83	0.01	0.00	0.00
0:30	18.8	0.5866	0.0713	N/A	0.5153	0.3143	282.91	0.00	0.00	0.00	0.00	0.00	282.91	10026.35	0.00	476.74	0.03	0.00	0.00
0:45	29.7	0.9266	0.0713	N/A	0.8554	0.5218	469.61	0.00	0.00	0.00	0.00	0.00	469.61	10064.80	0.00	946.35	0.06	0.00	0.00
1:00	37.9	1.1825	0.0713	N/A	1.1112	0.6779	610.07	0.00	0.00	0.00	0.00	0.00	610.07	10128.63	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
2	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
3	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
4	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00
5	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10211.55	0.00	1556.41	0.11	0.00	0.00

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	LA QUINTA VILLAGE -1		
7		C1200		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	0.61		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	311		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	120		
30				
31	ELEVATION OF HEADWATER	52		
32	ELEVATION OF CONCENTRATION POINT	50.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	10		
37				
38	POINT RAIN			
39	3-HOUR	1.14		
40	6-HOUR	1.46		
41	24-HOUR	2.37		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT: LA QUINTA VILLAGE -1

BASIC DATA CALCULATION FORM — C1200

SHORTCUT METHOD — BY :S R. BAZUA, P.E. — DATE 7/26/2016

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	0.610
[4] L-FEET	311
[5] L-MILES	0.059
[6] La-FEET	120.00
[7] La-MILES	0.023
[8] ELEVATION OF HEADWATER	52
[9] ELEVATION OF CONCENTRATION POINT	50.5
[10] H-FEET	1.5
[11] S-FEET/MILE	25.5
[12] S^0.5	5.05
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.02
[16] LAG TIME-MINUTES	1.3
[17] 100% OF LAG-MINUTES	1.3
[18] 200% OF LAG-MINUTES	2.5
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

RAINFALL DATA

[1] SOURCE

[2] FREQUENCY-YEARS 10

[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
1.14	0.610	1.00	1.14	1.46	0.610	1.00	1.46	2.37	0.610	1.00	2.37
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	0.61	SUM [7]	1.14	SUM [9]	0.61	SUM [11]	1.46	SUM [13]	0.61	SUM [15]	2.37
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.14				1.46				2.37

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.72	0.69	0.70
FLOOD VOLUME	(cu-ft)	1,603	1,536	1,551
	(acre-ft)	0.04	0.04	0.04
REQUIRED STORAGE	(cu-ft)	1,589	1,523	1,538
	(acre-ft)	0.04	0.03	0.04
PEAK FLOW	(cfs)	0.60	0.51	0.12
MAXIMUM WSEL	(ft)	-	-	-

HYDROLOGY CALCULATIONS - s Sample

10 YR EVENT – 1 HOUR VOLUME

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations La Quinta Village - 2

Drainage Area (ac.)	**0.54**			
Unit time (minutes)	**15**	**15**	**15**	**60**
10 Year Storm Duration (hrs)	**1**	3	6	24
Total Precipitation (From Plates E-5.2, 5.4, 5.6)(in.)	**0.78**	**1.14**	**1.46**	**2.37**
Soils Group	**A**			
AMC index II Runoff Number (plate E-6.1)	**32**			
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	**0.375** (AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	**90**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.07 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	**90**			
Retention Basin Percolation Rate (in/hr)	**0**			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to 0.001 or less, but should not be entered with 0 or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+1.3333)^2-(diam/2+0.3333)^2))

Drywell design factors **Upper sec. (ft.)=** **0.001** **Lower sec. (ft.)=** **0.001** **Ring diam. (ft.) =** **0.001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Drywell total(cf)= **0.00**

Ret. Basin design (area, depth) **Top =** **20000** s.f. **Bot. =** **10000** **s.f.** **Max. Depth (d)=** **5** **Max. storage=** **73570.23** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Loss Rate Value Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	13.6	0.4243	0.0713	N/A	0.3531	0.1907	171.59	0.00	0.00	0.00	0.00	0.00	171.59	10000.00	0.00	171.59	0.01	0.00	0.00
0:30	18.8	0.5866	0.0713	N/A	0.5153	0.2783	250.44	0.00	0.00	0.00	0.00	0.00	250.44	10023.32	0.00	422.03	0.03	0.00	0.00
0:45	29.7	0.9266	0.0713	N/A	0.8554	0.4619	415.72	0.00	0.00	0.00	0.00	0.00	415.72	10057.36	0.00	837.75	0.06	0.00	0.00
1:00	37.9	1.1825	0.0713	N/A	1.1112	0.6001	540.06	0.00	0.00	0.00	0.00	0.00	540.06	10113.87	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
2	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
3	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
4	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00
5	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10187.28	0.00	1377.81	0.09	0.00	0.00

RCFCD SYNTHETIC UNIT HYDROGRAPH

DATA INPUT SHEET

	A	B	C	D
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
6	PROJECT NAME	LA QUINTA VILLAGE - 2		
7		C1200		
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
12	TRIBUTARY AREAS	ACRES		
14	COMMERCIAL	0.54		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
28	LENGTH OF WATERCOURSE (L)	276		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	100		
31	ELEVATION OF HEADWATER	51.5		
32	ELEVATION OF CONCENTRATION POINT	50		
34	AVERAGE MANNINGS 'N' VALUE	0.02		
36	STORM FREQUENCY (YEAR)	10		
38	POINT RAIN			
39	3-HOUR	1.14		
40	6-HOUR	1.46		
41	24-HOUR	2.37		
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
52	PERCOLATION RATE (in/hr)	0		
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD PROJECT: LA QUINTA VILLAGE - 2
BASIC DATA CALCULATION FORM C1200
SHORTCUT METHOD BY ES R. BAZUA, P.E. DATE 7/26/2016

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	0.540
[4] L-FEET	276
[5] L-MILES	0.052
[6] La-FEET	100.00
[7] La-MILES	0.019
[8] ELEVATION OF HEADWATER	51.5
[9] ELEVATION OF CONCENTRATION POINT	50
[10] H-FEET	1.5
[11] S-FEET/MILE	28.7
[12] S^0.5	5.36
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.02
[16] LAG TIME-MINUTES	1.1
[17] 100% OF LAG-MINUTES	1.1
[18] 200% OF LAG-MINUTES	2.2
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 10
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
1.14	0.540	1.00	1.14	1.46	0.540	1.00	1.46	2.37	0.540	1.00	2.37
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	0.54	SUM [7]	1.14	SUM [9]	0.54	SUM [11]	1.46	SUM [13]	0.54	SUM [15]	2.37
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.14				1.46				2.37

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.72	0.69	0.70
FLOOD VOLUME	(cu-ft)	1,419	1,359	1,373
	(acre-ft)	0.03	0.03	0.03
REQUIRED STORAGE	(cu-ft)	1,407	1,348	1,362
	(acre-ft)	0.03	0.03	0.03
PEAK FLOW	(cfs)	0.53	0.45	0.11
MAXIMUM WSEL	(ft)	-	-	-

HYDROLOGY CALCULATIONS - s Sample

10 YR EVENT – 1 HOUR VOLUME

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations La Quinta Village - 3

Drainage Area (ac.)	**0.65**			
Unit time (minutes)	15	15	15	60
10 Year Storm Duration (hrs)	1	3	6	24
Total Precipitation (From Plates E-5.2, 5 4, 5 6)(in.)	**0.78**	**1.14**	**1.46**	**2.37**
Soils Group	**A**			
AMC index II Runoff Number (plate E-6.1)	**32**			
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	**0.375** (AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	**90**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.07 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	**90**			
Retention Basin Percolation Rate (in/hr)	**0**			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to 0.001 or less, but should not be entered with 0 or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+1.3333)^2-(diam/2+0.3333)^2))

Drywell design factors **Upper sec. (ft.)=** **0.001** **Lower sec. (ft.)=** **0.001** **Ring diam. (ft.) =** **0.001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** 0.00
Drywell total(cf)= **0.00**

Ret. Basin design (area, depth) **Top =** **20000** s.f. **Bot. =** **10000 s.f.** **Max. Depth (d)=** **5** **Max. storage=** **73570.23** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	13.6	0.4243	0.0713	N/A	0.3531	0.2295	206.55	0.00	0.00	0.00	0.00	0.00	206.54	10000.00	0.00	206.54	0.01	0.00	0.00
0:30	18.8	0.5866	0.0713	N/A	0.5153	0.3350	301.46	0.00	0.00	0.00	0.00	0.00	301.46	10028.07	0.00	508.00	0.03	0.00	0.00
0:45	29.7	0.9266	0.0713	N/A	0.8554	0.5560	500.40	0.00	0.00	0.00	0.00	0.00	500.40	10069.05	0.00	1008.40	0.07	0.00	0.00
1:00	37.9	1.1825	0.0713	N/A	1.1112	0.7223	650.07	0.00	0.00	0.00	0.00	0.00	650.07	10137.07	0.00	**1658.47**	0.11	**0.00**	**0.00**
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
2	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
3	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
4	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00
5	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10225.43	0.00	1658.47	0.11	0.00	0.00

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	LA QUINTA VILLAGE - 3		
7		C1200		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	0.65		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	330		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	120		
30				
31	ELEVATION OF HEADWATER	48.8		
32	ELEVATION OF CONCENTRATION POINT	47.15		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	10		
37				
38	POINT RAIN			
39	3-HOUR	1.14		
40	6-HOUR	1.46		
41	24-HOUR	2.37		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT: LA QUINTA VILLAGE - 3		
BASIC DATA CALCULATION FORM	C1200		
SHORTCUT METHOD	BY :S R. BAZUA, P.E.	DATE	7/26/2016

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	0.650
[4] L-FEET	330
[5] L-MILES	0.063
[6] La-FEET	120.00
[7] La-MILES	0.023
[8] ELEVATION OF HEADWATER	48.8
[9] ELEVATION OF CONCENTRATION POINT	47.15
[10] H-FEET	1.65
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.02
[16] LAG TIME-MINUTES	1.3
[17] 100% OF LAG-MINUTES	1.3
[18] 200% OF LAG-MINUTES	2.6
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 10
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
1.14	0.650	1.00	1.14	1.46	0.650	1.00	1.46	2.37	0.650	1.00	2.37
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	0.65	SUM [7]	1.14	SUM [9]	0.65	SUM [11]	1.46	SUM [13]	0.65	SUM [15]	2.37
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.14				1.46				2.37

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.72	0.69	0.70
FLOOD VOLUME	(cu-ft)	1,708	1,636	1,653
	(acre-ft)	0.04	0.04	0.04
REQUIRED STORAGE	(cu-ft)	1,694	1,623	1,639
	(acre-ft)	0.04	0.04	0.04
PEAK FLOW	(cfs)	0.64	0.55	0.13
MAXIMUM WSEL	(ft)	-	-	-

HYDROLOGY CALCULATIONS - s Sample

10 YR EVENT - 1 HOUR VOLUME

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations La Quinta Village - 4

Drainage Area (ac.)	**0.93**			
Unit time (minutes)	15	15	15	60
10 Year Storm Duration (hrs)	1	3	6	24
Total Precipitation (From Plates E-5.2, 5.4, 5.6)(in.)	**0.78**	**1.14**	**1.46**	**2.37**
Soils Group	**A**			
AMC index II Runoff Number (plate E-6.1)	**32**			
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	**0.375** (AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	**90**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.07 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	**90**			
Retention Basin Percolation Rate (in/hr)	**0**			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to 0.001 or less, but should not be entered with 0 or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+1.3333)^2-(diam/2+0.3333)^2))

Drywell design factors Upper sec. (ft.)= **0.001** Lower sec. (ft.)= **0.001** Ring diam. (ft.) = **0.001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** 0.00
Drywell total(cf)= **0.00**

Ret. Basin design (area, depth) Top = **20000** s.f. Bot. = **10000 s.f.** **Max. Depth (d)=** **5** **Max. storage=** **73570.23** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5) **(values must be non-zero or error occurs)**
Outside input from: N/A

1 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Loss Rate Value Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	13.6	0.4243	0.0713	N/A	0.3531	0.3284	295.52	0.00	0.00	0.00	0.00	0.00	295.52	10000.00	0.00	295.52	0.02	0.00	0.00
0:30	18.8	0.5866	0.0713	N/A	0.5153	0.4792	431.31	0.00	0.00	0.00	0.00	0.00	431.31	10040.17	0.00	726.83	0.05	0.00	0.00
0:45	29.7	0.9266	0.0713	N/A	0.8554	0.7955	715.96	0.00	0.00	0.00	0.00	0.00	715.96	10098.79	0.00	1442.79	0.10	0.00	0.00
1:00	37.9	1.1825	0.0713	N/A	1.1112	1.0334	930.10	0.00	0.00	0.00	0.00	0.00	930.10	10196.11	0.00	**2372.89**	**0.16**	**0.00**	**0.00**
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
2	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
3	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
4	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00
5	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10322.53	0.00	2372.89	0.16	0.00	0.00

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	LA QUINTA VILLAGE - 4		
7		C1200		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	0.93		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	430		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	140		
30				
31	ELEVATION OF HEADWATER	52.9		
32	ELEVATION OF CONCENTRATION POINT	50.75		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	10		
37				
38	POINT RAIN			
39	3-HOUR	1.14		
40	6-HOUR	1.46		
41	24-HOUR	2.37		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD PROJECT: LA QUINTA VILLAGE - 4
BASIC DATA CALCULATION FORM C1200
SHORTCUT METHOD BY :S R. BAZUA, P.E. DATE 7/26/2016

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	0.930
[4] L-FEET	430
[5] L-MILES	0.081
[6] La-FEET	140.00
[7] La-MILES	0.027
[8] ELEVATION OF HEADWATER	52.9
[9] ELEVATION OF CONCENTRATION POINT	50.75
[10] H-FEET	2.15
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.03
[16] LAG TIME-MINUTES	1.5
[17] 100% OF LAG-MINUTES	1.5
[18] 200% OF LAG-MINUTES	3.0
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 10
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
1.14	0.930	1.00	1.14	1.46	0.930	1.00	1.46	2.37	0.930	1.00	2.37
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	0.93	SUM [7]	1.14	SUM [9]	0.93	SUM [11]	1.46	SUM [13]	0.93	SUM [15]	2.37
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.14				1.46				2.37

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.72	0.69	0.70
FLOOD VOLUME	(cu-ft)	2,443	2,341	2,364
	(acre-ft)	0.06	0.05	0.05
REQUIRED STORAGE	(cu-ft)	2,423	2,322	2,345
	(acre-ft)	0.06	0.05	0.05
PEAK FLOW	(cfs)	0.91	0.78	0.19
MAXIMUM WSEL	(ft)	-	-	-

HYDROLOGY CALCULATIONS - s Sample

10 YR EVENT - 1 HOUR VOLUME

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations La Quinta Village - 5

Drainage Area (ac.)	0.79			
Unit time (minutes)	15	15	15	60
10 Year Storm Duration (hrs)	1	3	6	24
Total Precipitation (From Plates E-5.2, 5.4, 5.6)(in.)	**0.78**	**1.14**	**1.46**	**2.37**
Soils Group	**A**			
AMC index II Runoff Number (plate E-6.1)	**32**			
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	**0.375** (AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	**90**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.07 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	**90**			
Retention Basin Percolation Rate (in/hr)	**0**			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to 0.001 or less, but should not be entered with 0 or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+1.3333)^2-(diam/2+0.3333)^2))

Drywell design factors Upper sec. (ft.)= **0.001** Lower sec. (ft.)= **0.001** Ring diam. (ft.) = **0.001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** 0.00
Drywell total(cf)= **0.00**

Ret. Basin design (area, depth) Top = **20000** s.f. Bot. = **10000** s.f. **Max. Depth (d)=** **5** **Max. storage=** **73570.23** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5) **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Loss Rate Value Min	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	13.6	0.4243	0.0713	N/A	0.3531	0.2789	251.03	0.00	0.00	0.00	0.00	0.00	251.03	10000.00	0.00	251.03	0.02	0.00	0.00
0:30	18.8	0.5866	0.0713	N/A	0.5153	0.4071	366.39	0.00	0.00	0.00	0.00	0.00	366.39	10034.12	0.00	617.42	0.04	0.00	0.00
0:45	29.7	0.9266	0.0713	N/A	0.8554	0.6758	608.18	0.00	0.00	0.00	0.00	0.00	608.18	10083.92	0.00	1225.60	0.08	0.00	0.00
1:00	37.9	1.1825	0.0713	N/A	1.1112	0.8779	790.08	0.00	0.00	0.00	0.00	0.00	790.08	10166.59	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
2	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
3	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
4	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00
5	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10273.98	0.00	2015.68	0.14	0.00	0.00

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	LA QUINTA VILLAGE - 5		
7		C1200		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	0.79		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	360		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	125		
30				
31	ELEVATION OF HEADWATER	48.7		
32	ELEVATION OF CONCENTRATION POINT	46.9		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	10		
37				
38	POINT RAIN			
39	3-HOUR	1.14		
40	6-HOUR	1.46		
41	24-HOUR	2.37		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT: LA QUINTA VILLAGE - 5		
BASIC DATA CALCULATION FORM		C1200	
SHORTCUT METHOD	BY	:S R. BAZUA, P.E.	DATE 7/26/2016

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	0.790
[4] L-FEET	360
[5] L-MILES	0.068
[6] La-FEET	125.00
[7] La-MILES	0.024
[8] ELEVATION OF HEADWATER	48.7
[9] ELEVATION OF CONCENTRATION POINT	46.9
[10] H-FEET	1.8
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.02
[16] LAG TIME-MINUTES	1.3
[17] 100% OF LAG-MINUTES	1.3
[18] 200% OF LAG-MINUTES	2.7
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 10
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
1.14	0.790	1.00	1.14	1.46	0.790	1.00	1.46	2.37	0.790	1.00	2.37
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	0.79	SUM [7]	1.14	SUM [9]	0.79	SUM [11]	1.46	SUM [13]	0.79	SUM [15]	2.37
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.14				1.46				2.37

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.72	0.69	0.70
FLOOD VOLUME	(cu-ft)	2,076	1,989	2,009
	(acre-ft)	0.05	0.05	0.05
REQUIRED STORAGE	(cu-ft)	2,058	1,972	1,992
	(acre-ft)	0.05	0.05	0.05
PEAK FLOW	(cfs)	0.78	0.66	0.16
MAXIMUM WSEL	(ft)	-	-	-

HYDROLOGY CALCULATIONS - s Sample

10 YR EVENT – 1 HOUR VOLUME

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **La Quinta Village - 6**

Drainage Area (ac.)	**0.58**			
Unit time (minutes)	**15**	**15**	**15**	**60**
10 Year Storm Duration (hrs)	1	3	6	24
Total Precipitation (From Plates E-5.2, 5.4, 5.6)(in.)	**0.78**	**1.14**	**1.46**	**2.37**
Soils Group	**A**			
AMC index II Runoff Number (plate E-6.1)	**32**			
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	**0.375** (AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)	**90**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.07 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	**90**			
Retention Basin Percolation Rate (in/hr)	**0**			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to 0.001 or less, but should not be entered with 0 or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+1.3333)^2-(diam/2+0.3333)^2))

Drywell design factors Upper sec. (ft.)= **0.001** Lower sec. (ft.)= **0.001** Ring diam. (ft.) = **0.001** **Drywell lower max. (cf)= 0.00 Upper max.(cf)=** 0.00
Drywell total(cf)= 0.00

Ret. Basin design (area, depth) Top = **20000** s.f. Bot. = **10000 s.f.** **Max. Depth (d)= 5** **Max. storage= 73570.23** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas vol=(h/3)*(bottom+top+(bottom*top)^0.50) area=bottom+(h/d)*(top-bottom) h=(vol*3)/(bottom+top+(bottom*top)^0.5) **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	13.6	0.4243	0.0713	N/A	0.3531	0.2048	184.30	0.00	0.00	0.00	0.00	0.00	184.30	10000.00	0.00	184.30	0.01	0.00	0.00
0:30	18.8	0.5866	0.0713	N/A	0.5153	0.2989	268.99	0.00	0.00	0.00	0.00	0.00	268.99	10025.05	0.00	453.29	0.03	0.00	0.00
0:45	29.7	0.9266	0.0713	N/A	0.8554	0.4961	446.51	0.00	0.00	0.00	0.00	0.00	446.51	10061.61	0.00	899.81	0.06	0.00	0.00
1:00	37.9	1.1825	0.0713	N/A	1.1112	0.6445	580.06	0.00	0.00	0.00	0.00	0.00	580.06	10122.31	0.00	**1479.87**	**0.10**	**0.00**	**0.00**
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
2	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
3	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
4	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00
5	0	0.0000	0.0713	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10201.15	0.00	1479.87	0.10	0.00	0.00

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	LA QUINTA VILLAGE - 6		
7		C1200		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	0.58		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	300		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	80		
30				
31	ELEVATION OF HEADWATER	44.9		
32	ELEVATION OF CONCENTRATION POINT	43.4		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	10		
37				
38	POINT RAIN			
39	3-HOUR	1.14		
40	6-HOUR	1.46		
41	24-HOUR	2.37		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT: LA QUINTA VILLAGE - 6		
BASIC DATA CALCULATION FORM	C1200		
SHORTCUT METHOD	BY :S R. BAZUA, P.E.	DATE	7/26/2016

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	0.580
[4] L-FEET	300
[5] L-MILES	0.057
[6] La-FEET	80.00
[7] La-MILES	0.015
[8] ELEVATION OF HEADWATER	44.9
[9] ELEVATION OF CONCENTRATION POINT	43.4
[10] H-FEET	1.5
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.02
[16] LAG TIME-MINUTES	1.1
[17] 100% OF LAG-MINUTES	1.1
[18] 200% OF LAG-MINUTES	2.1
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 10
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
1.14	0.580	1.00	1.14	1.46	0.580	1.00	1.46	2.37	0.580	1.00	2.37
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	0.58	SUM [7]	1.14	SUM [9]	0.58	SUM [11]	1.46	SUM [13]	0.58	SUM [15]	2.37
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.14				1.46				2.37

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.72	0.69	0.70
FLOOD VOLUME	(cu-ft)	1,524	1,460	1,475
	(acre-ft)	0.03	0.03	0.03
REQUIRED STORAGE	(cu-ft)	1,511	1,448	1,462
	(acre-ft)	0.03	0.03	0.03
PEAK FLOW	(cfs)	0.57	0.49	0.12
MAXIMUM WSEL	(ft)	-	-	-

V. STREET CAPACITY ANALYSIS

Vacant parcels designated for commercial development within La Quinta Village were identified and studied to determine the runoff discharge tributary to each vacant parcel under the existing-vacant condition as well as the projected commercially developed condition. The results were compared for all vacant commercial parcels in order to determine the increase in runoff due to 100% buildout within La Quinta Village (see APPENDIX "10 YEAR DISCHARGE STUDY MAP")

The total additional runoff generated by commercial development of existing vacant lots within La Quinta Village during the 10 year rain event is 9.89 cfs occurring along Calle Tampico where flows combine creating the worst case condition.

Based on the Psomas Downtown Area Drainage Report, the downtown area is subject to flooding under the existing condition in the northern reaches of Avenida Bermudas, Desert Club Drive and all along Calle Tampico. Existing catch basins along Calle Tampico and the underground storm drain pipe network do not have the capacity to convey the 10-year peak storm runoff from the downtown area and adjacent neighborhood. Existing studies calculate runoff tributary to Calle Tampico during the 10 year peak storm event by combining 71 cfs from the area west of Avenida Bermudas with 41.5 cfs generated between Avenida Bermudas and Desert Club Drive for a total of 112.5 cfs under the existing condition. Development of the existing vacant parcels within the study area for commercial use increases the discharge along Calle Tampico by 8.8%.

RIVERSIDE COUNTY RATIONAL METHOD WORSHEETS

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED1.out
     ------------------------------------------------------------------
------
     SUBAREA 1 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

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


     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      100.000 to Point/Station
101.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   410.000(Ft.)
     Top (of initial area) elevation =    51.400(Ft.)
     Bottom (of initial area) elevation =    49.300(Ft.)
     Difference in elevation =     2.100(Ft.)
     Slope =    0.00512  s(percent)=       0.51
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   16.885 min.
     Rainfall intensity =      1.942(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.707
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 0.494(CFS)
Total initial stream area = 0.360(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.36 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED2.out
     ------------------------------------------------------------------
------
     SUBAREA 2 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT

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

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

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

     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      200.000 to Point/Station
202.000
     **** INITIAL AREA EVALUATION ****
     ____________________________________________________________________
____
     Initial area flow distance =   275.000(Ft.)
     Top (of initial area) elevation =    51.400(Ft.)
     Bottom (of initial area) elevation =    50.000(Ft.)
     Difference in elevation =     1.400(Ft.)
     Slope =    0.00509  s(percent)=       0.51
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   14.410 min.
     Rainfall intensity =      2.132(In/Hr) for a    10.0 year storm
```

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.721
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 =      1.199(CFS)
Total initial stream area =        0.780(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            0.78 (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
```

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED3.out
     ------------------------------------------------------------------
------
     SUBAREA 3 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT

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

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

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

     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      300.000 to Point/Station
303.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   335.000(Ft.)
     Top (of initial area) elevation =    49.600(Ft.)
     Bottom (of initial area) elevation =    47.900(Ft.)
     Difference in elevation =     1.700(Ft.)
     Slope =    0.00507  s(percent)=       0.51
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   15.603 min.
     Rainfall intensity =      2.034(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.714
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 0.944(CFS)
Total initial stream area = 0.650(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.65 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED4.out
     ------------------------------------------------------------------
------
     SUBAREA 4 - UNDEVELOPED CONDITION
     10 YEAR EVENT

     ------------------------------------------------------------------
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      *********   Hydrology Study Control Information **********
      English (in-lb) Units used in input data file
     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900



     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      400.000 to Point/Station
404.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   450.000(Ft.)
     Top (of initial area) elevation =    55.400(Ft.)
     Bottom (of initial area) elevation =    53.100(Ft.)
     Difference in elevation =     2.300(Ft.)
     Slope =    0.00511  s(percent)=       0.51
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   17.533 min.
     Rainfall intensity =      1.899(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.704
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 2.313(CFS)
Total initial stream area = 1.730(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.73 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED5.out
     ------------------------------------------------------------------
------
     SUBAREA 5 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      500.000 to Point/Station
505.000
     **** INITIAL AREA EVALUATION ****
     ____________________________________________________________________
____
     Initial area flow distance =   240.000(Ft.)
     Top (of initial area) elevation =    51.500(Ft.)
     Bottom (of initial area) elevation =    50.300(Ft.)
     Difference in elevation =     1.200(Ft.)
     Slope =    0.00500  s(percent)=       0.50
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   13.695 min.
     Rainfall intensity =      2.197(In/Hr) for a    10.0 year storm
```

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.725
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 =      1.466(CFS)
Total initial stream area =        0.920(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            0.92 (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
```

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED6.out
     ------------------------------------------------------------------
------
     SUBAREA 6 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      600.000 to Point/Station
606.000
     **** INITIAL AREA EVALUATION ****
     ____________________________________________________________________
____
     Initial area flow distance =   145.000(Ft.)
     Top (of initial area) elevation =    55.700(Ft.)
     Bottom (of initial area) elevation =    54.900(Ft.)
     Difference in elevation =     0.800(Ft.)
     Slope =    0.00552  s(percent)=       0.55
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   10.977 min.
     Rainfall intensity =      2.503(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.743
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 0.205(CFS)
Total initial stream area = 0.110(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.11 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED7.out
     ------------------------------------------------------------------
------
     SUBAREA 7 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      700.000 to Point/Station
707.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   245.000(Ft.)
     Top (of initial area) elevation =    47.100(Ft.)
     Bottom (of initial area) elevation =    45.900(Ft.)
     Difference in elevation =     1.200(Ft.)
     Slope =    0.00490  s(percent)=       0.49
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   13.866 min.
     Rainfall intensity =      2.181(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.724
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 0.553(CFS)
Total initial stream area = 0.350(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.35 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED8.out
     ------------------------------------------------------------------
------
     SUBAREA 8 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      800.000 to Point/Station
808.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   240.000(Ft.)
     Top (of initial area) elevation =    46.400(Ft.)
     Bottom (of initial area) elevation =    45.200(Ft.)
     Difference in elevation =     1.200(Ft.)
     Slope =    0.00500  s(percent)=       0.50
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   13.695 min.
     Rainfall intensity =      2.197(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.725
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 0.558(CFS)
Total initial stream area = 0.350(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.35 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED9.out
     ------------------------------------------------------------------
------
     SUBAREA 9 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT

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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900



     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      900.000 to Point/Station
909.000
     **** INITIAL AREA EVALUATION ****
     ____________________________________________________________________
____
     Initial area flow distance =   255.000(Ft.)
     Top (of initial area) elevation =    48.700(Ft.)
     Bottom (of initial area) elevation =    47.400(Ft.)
     Difference in elevation =     1.300(Ft.)
     Slope =    0.00510  s(percent)=       0.51
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   13.977 min.
     Rainfall intensity =      2.171(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.724
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 1.241(CFS)
Total initial stream area = 0.790(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.79 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED10.out
     ------------------------------------------------------------------
------
     SUBAREA 10 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station     1000.000 to Point/Station
1010.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   330.000(Ft.)
     Top (of initial area) elevation =    46.200(Ft.)
     Bottom (of initial area) elevation =    44.500(Ft.)
     Difference in elevation =     1.700(Ft.)
     Slope =    0.00515  s(percent)=       0.52
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   15.463 min.
     Rainfall intensity =      2.045(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.715
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 1.696(CFS)
Total initial stream area = 1.160(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.16 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED11.out
     ------------------------------------------------------------------
------
     SUBAREA 11 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station     1100.000 to Point/Station
1111.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   435.000(Ft.)
     Top (of initial area) elevation =    39.600(Ft.)
     Bottom (of initial area) elevation =    37.400(Ft.)
     Difference in elevation =     2.200(Ft.)
     Slope =    0.00506  s(percent)=       0.51
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   17.333 min.
     Rainfall intensity =      1.912(In/Hr) for a    10.0 year storm
```

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.705
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 =      1.631(CFS)
Total initial stream area =        1.210(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.21 (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
```

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED12.out
     ---------------------------------------------------------------------
------
     SUBAREA 12 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

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


     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station     1200.000 to Point/Station
1212.000
     **** INITIAL AREA EVALUATION ****
     ---------------------------------------------------------------------
____
     Initial area flow distance =   270.000(Ft.)
     Top (of initial area) elevation =    45.200(Ft.)
     Bottom (of initial area) elevation =    43.800(Ft.)
     Difference in elevation =     1.400(Ft.)
     Slope =    0.00519  s(percent)=       0.52
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   14.252 min.
     Rainfall intensity =      2.146(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.722
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 0.899(CFS)
Total initial stream area = 0.580(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.58 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:UNDEVELOPED13.out
     ------------------------------------------------------------------
------
     SUBAREA 13 - UNDEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station     1300.000 to Point/Station
1313.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   290.000(Ft.)
     Top (of initial area) elevation =    43.900(Ft.)
     Bottom (of initial area) elevation =    42.400(Ft.)
     Difference in elevation =     1.500(Ft.)
     Slope =    0.00517  s(percent)=       0.52
     TC = k(0.530)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =   14.672 min.
     Rainfall intensity =      2.109(In/Hr) for a    10.0 year storm
```

UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.720
Decimal fraction soil group A = 0.000
Decimal fraction soil 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 = 0.865(CFS)
Total initial stream area = 0.570(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.57 (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

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version
7.1
          Rational Hydrology Study        Date: 06/21/16
File:DEVELOPED1.out
     ------------------------------------------------------------------
------
     SUBAREA 1 - DEVELOPED CONDITION
     10 YEAR RAIN EVENT

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

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

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

     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      100.000 to Point/Station
101.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
----
     Initial area flow distance =   410.000(Ft.)
     Top (of initial area) elevation =    51.400(Ft.)
     Bottom (of initial area) elevation =    49.300(Ft.)
     Difference in elevation =     2.100(Ft.)
     Slope =    0.00512  s(percent)=       0.51
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    9.558 min.
     Rainfall intensity =      2.716(In/Hr) for a    10.0 year storm
```

COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction 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 = 0.851(CFS)
Total initial stream area = 0.360(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.36 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED2.out
     ------------------------------------------------------------------
------
     SUBAREA 2 - DEVELOPED CONDITION
     10 YEAR RAIN EVENT

     ------------------------------------------------------------------
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      *********   Hydrology Study Control Information **********
      English (in-lb) Units used in input data file
     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      200.000 to Point/Station
202.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   275.000(Ft.)
     Top (of initial area) elevation =    51.400(Ft.)
     Bottom (of initial area) elevation =    50.000(Ft.)
     Difference in elevation =     1.400(Ft.)
     Slope =    0.00509  s(percent)=       0.51
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    8.156 min.
     Rainfall intensity =      2.983(In/Hr) for a    10.0 year storm
```

COMMERCIAL subarea type
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 1) = 49.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.029(CFS)
Total initial stream area = 0.780(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.78 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED3.out
     ------------------------------------------------------------------
------
     SUBAREA 3 - DEVELOPED CONDITION
     10 YEAR RAIN EVENT

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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      300.000 to Point/Station
303.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
------
     Initial area flow distance =   335.000(Ft.)
     Top (of initial area) elevation =    49.600(Ft.)
     Bottom (of initial area) elevation =    47.900(Ft.)
     Difference in elevation =     1.700(Ft.)
     Slope =    0.00507  s(percent)=       0.51
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    8.832 min.
     Rainfall intensity =      2.846(In/Hr) for a    10.0 year storm
```

```
COMMERCIAL subarea type
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 1)  =  49.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.611(CFS)
Total initial stream area =        0.650(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.65 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED4.out

SUBAREA 4 - DEVELOPED CONDITION
10 YEAR RAIN EVENT

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

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

Program License Serial Number 6253

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

2 year, 1 hour precipitation = 0.380(In.)
100 year, 1 hour precipitation = 1.690(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.919(In/Hr)
Slope of intensity duration curve = 0.5900

++

Process from Point/Station 400.000 to Point/Station 404.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 450.000(Ft.)
Top (of initial area) elevation = 55.400(Ft.)
Bottom (of initial area) elevation = 53.100(Ft.)
Difference in elevation = 2.300(Ft.)
Slope = 0.00511 s(percent)= 0.51
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.924 min.
Rainfall intensity = 2.657(In/Hr) for a 10.0 year storm

```
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction 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 =      3.998(CFS)
Total initial stream area =        1.730(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =           1.73 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED5.out
     ------------------------------------------------------------------
------
     SUBAREA 5 - DEVELOPED CONDITION
     10 YEAR RAIN EVENT

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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      500.000 to Point/Station
505.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   240.000(Ft.)
     Top (of initial area) elevation =    51.500(Ft.)
     Bottom (of initial area) elevation =    50.300(Ft.)
     Difference in elevation =     1.200(Ft.)
     Slope =    0.00500  s(percent)=       0.50
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    7.752 min.
     Rainfall intensity =      3.074(In/Hr) for a    10.0 year storm
```

COMMERCIAL subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction 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 = 2.468(CFS)
Total initial stream area = 0.920(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.92 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED6.out

SUBAREA 6 - DEVELOPED CONDITION
10 YEAR EVENT

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

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

Program License Serial Number 6253

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

2 year, 1 hour precipitation = 0.380(In.)
100 year, 1 hour precipitation = 1.690(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.919(In/Hr)
Slope of intensity duration curve = 0.5900

++

Process from Point/Station 600.000 to Point/Station 606.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 145.000(Ft.)
Top (of initial area) elevation = 55.700(Ft.)
Bottom (of initial area) elevation = 54.900(Ft.)
Difference in elevation = 0.800(Ft.)
Slope = 0.00552 s(percent)= 0.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.213 min.
Rainfall intensity = 3.502(In/Hr) for a 10.0 year storm

```
COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction 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 =      0.337(CFS)
Total initial stream area =        0.110(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.11 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:7DEVELOPED7.out
     ------------------------------------------------------------------
------
     SUBAREA 7 - DEVELOPED CONDITION
     10 YEAR RAIN EVENT

     ------------------------------------------------------------------
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      *********   Hydrology Study Control Information **********
      English (in-lb) Units used in input data file
     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      700.000 to Point/Station
707.000
     **** INITIAL AREA EVALUATION ****
          .
     ------------------------------------------------------------------
____
     Initial area flow distance =   245.000(Ft.)
     Top (of initial area) elevation =    47.100(Ft.)
     Bottom (of initial area) elevation =    45.900(Ft.)
     Difference in elevation =     1.200(Ft.)
     Slope =    0.00490  s(percent)=       0.49
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    7.848 min.
     Rainfall intensity =      3.051(In/Hr) for a    10.0 year storm
```

COMMERCIAL subarea type
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 1) = 49.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 0.932(CFS)
Total initial stream area = 0.350(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.35 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED8.out
     ---------------------------------------------------------------------
------
     SUBAREA 8 - DEVELOPED CONDITION
     10 YEAR RAIN EVENT

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

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

     ---------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station      800.000 to Point/Station
808.000
     **** INITIAL AREA EVALUATION ****
     ---------------------------------------------------------------------
____
     Initial area flow distance =   240.000(Ft.)
     Top (of initial area) elevation =    46.400(Ft.)
     Bottom (of initial area) elevation =    45.200(Ft.)
     Difference in elevation =     1.200(Ft.)
     Slope =    0.00500  s(percent)=       0.50
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    7.752 min.
     Rainfall intensity =      3.074(In/Hr) for a    10.0 year storm
```

COMMERCIAL subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction 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 = 0.939(CFS)
Total initial stream area = 0.350(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.35 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16 File:DEVELOPED9.out

SUBAREA 9 - DEVELOPED CONDITION

10 YEAR RAIN EVENT

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

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

Program License Serial Number 6253

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

2 year, 1 hour precipitation = 0.380(In.)
100 year, 1 hour precipitation = 1.690(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.919(In/Hr)
Slope of intensity duration curve = 0.5900

++

Process from Point/Station 900.000 to Point/Station 909.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 255.000(Ft.)
Top (of initial area) elevation = 48.700(Ft.)
Bottom (of initial area) elevation = 47.400(Ft.)
Difference in elevation = 1.300(Ft.)
Slope = 0.00510 s(percent)= 0.51
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.911 min.
Rainfall intensity = 3.037(In/Hr) for a 10.0 year storm

COMMERCIAL subarea type
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 1) = 49.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.093(CFS)
Total initial stream area = 0.790(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.79 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED10.out
     ------------------------------------------------------------------
------
     SUBAREA 10 - DEVELOPED CONDITION
     10 YEWAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station     1000.000 to Point/Station
1010.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   330.000(Ft.)
     Top (of initial area) elevation =    46.200(Ft.)
     Bottom (of initial area) elevation =    44.500(Ft.)
     Difference in elevation =     1.700(Ft.)
     Slope =    0.00515  s(percent)=       0.52
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    8.753 min.
     Rainfall intensity =      2.861(In/Hr) for a    10.0 year storm
```

COMMERCIAL subarea type
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 1) = 49.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.892(CFS)
Total initial stream area = 1.160(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 1.16 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED11.out

SUBAREA 11 - DEVELOPED CONDITION

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

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

Program License Serial Number 6253

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

2 year, 1 hour precipitation = 0.380(In.)
100 year, 1 hour precipitation = 1.690(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.919(In/Hr)
Slope of intensity duration curve = 0.5900

++

Process from Point/Station 1100.000 to Point/Station 1111.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 434.000(Ft.)
Top (of initial area) elevation = 39.600(Ft.)
Bottom (of initial area) elevation = 37.400(Ft.)
Difference in elevation = 2.200(Ft.)
Slope = 0.00507 s(percent)= 0.51
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.798 min.
Rainfall intensity = 2.677(In/Hr) for a 10.0 year storm

COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction 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 = 2.818(CFS)
Total initial stream area = 1.210(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 1.21 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED12.out
     ------------------------------------------------------------------
------
     SUBAREA 12
     DEVELOPED CONDITION
     10 YEAR RAIN EVENT

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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station     1200.000 to Point/Station
1212.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   270.000(Ft.)
     Top (of initial area) elevation =    45.200(Ft.)
     Bottom (of initial area) elevation =    43.800(Ft.)
     Difference in elevation =     1.400(Ft.)
     Slope =    0.00519  s(percent)=       0.52
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    8.067 min.
     Rainfall intensity =      3.002(In/Hr) for a    10.0 year storm
```

COMMERCIAL subarea type
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 1) = 49.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 1.519(CFS)
Total initial stream area = 0.580(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.58 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
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: 06/21/16
File:DEVELOPED13.out
     ------------------------------------------------------------------
------
     SUBAREA 13 - DEVELOPED CONDITION
     10 YEAR RAIN EVENT


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

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

     ------------------------------------------------------------------
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     Program License Serial Number 6253

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

     2 year, 1 hour precipitation =  0.380(In.)
     100 year, 1 hour precipitation =  1.690(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.919(In/Hr)
     Slope of intensity duration curve = 0.5900




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
     Process from Point/Station     1300.000 to Point/Station
1313.000
     **** INITIAL AREA EVALUATION ****
     ------------------------------------------------------------------
____
     Initial area flow distance =   290.000(Ft.)
     Top (of initial area) elevation =    43.900(Ft.)
     Bottom (of initial area) elevation =    42.400(Ft.)
     Difference in elevation =     1.500(Ft.)
     Slope =    0.00517  s(percent)=       0.52
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    8.305 min.
     Rainfall intensity =      2.951(In/Hr) for a    10.0 year storm
```

COMMERCIAL subarea type
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 1) = 49.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 1.467(CFS)
Total initial stream area = 0.570(Ac.)
Pervious area fraction = 0.100
End of computations, total study area = 0.57 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 69.0

LEGEND

CD . . . . . COMMERCIAL DEVELOPED
CU . . . . . COMMERCIAL UNDEVELOPED

10 YEAR STORM RETENTION VOLUME

SUBAREA	AREA (ac.)	VOLUME (CU.FT.)	BASIN AREA (AT 4' DEEP)
①	0.61	1,590	1,370 S.F.
②	0.54	1,410	1,300 S.F.
③	0.65	1,695	1,450 S.F.
④	0.93	2,425	1,850 S.F.
⑤	0.79	2,060	1,620 S.F.
⑥	0.58	1,510	1,355 S.F.
	4.1		8,945 S.F.
			2,181 S.F./ACRE

N

GRAPHIC SCALE
SCALE 1"=200'
0 100 200 400 600 800

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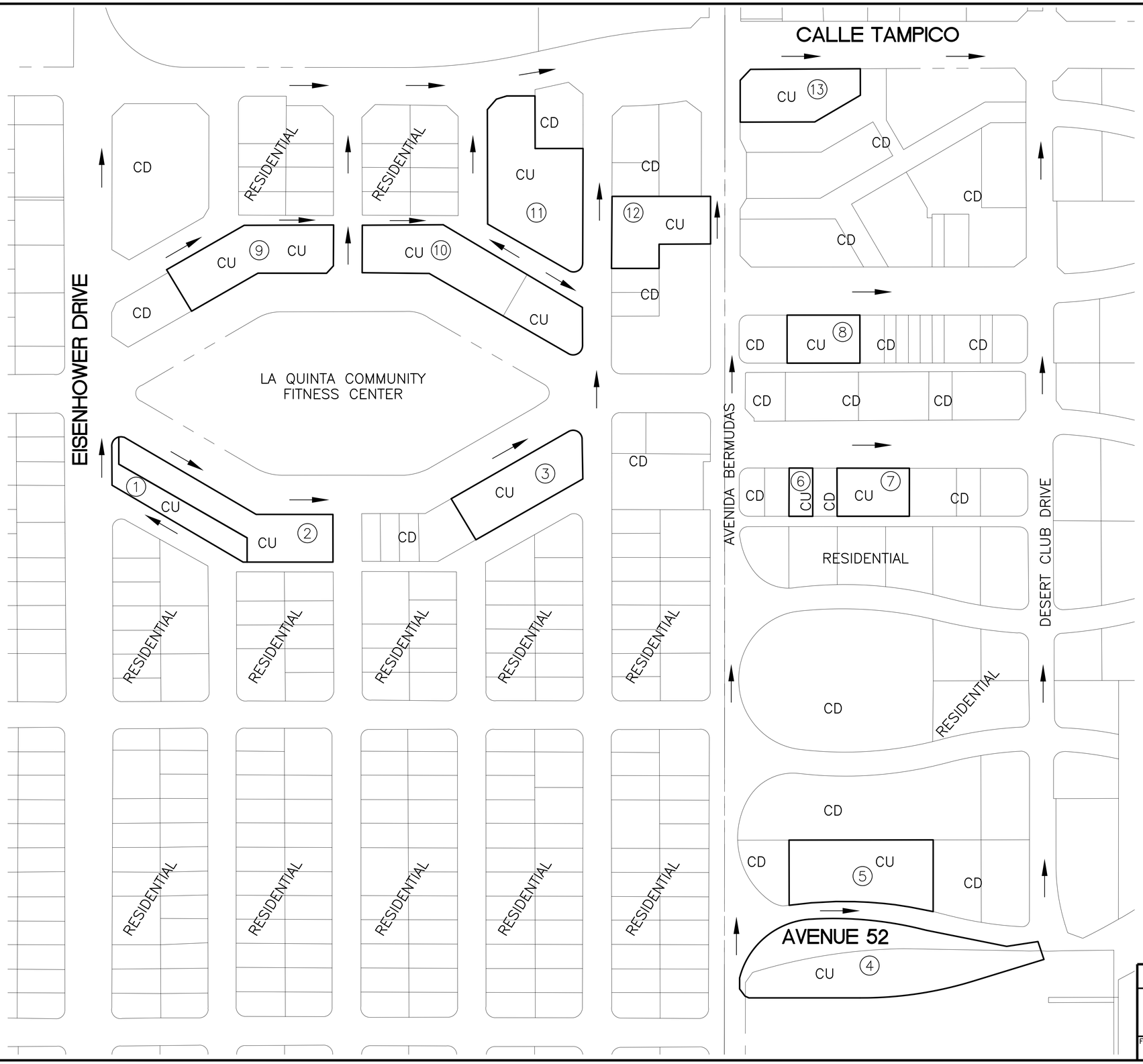
CITY OF LA QUINTA
LA QUINTA VILLAGE HYDROLOGY
10 YEAR ON-SITE RETENTION STUDY

FOR:

SHEET 1
OF 1



LEGEND

_____ . . . . . DIRECTIONAL FLOW ARROW
CD . . . . . COMMERCIAL DEVELOPED
CU . . . . . COMMERCIAL UNDEVELOPED

10 YEAR INCREASE IN RUNOFF DUE TO DEVELOPMENT

(ASSUMES NO ON-SITE RETENTION)

SUBAREA	AREA (ac.)	PRE-DEVELOPMENT DISCHARGE (Q10 CFS)	POST DEVELOPMENT DISCHARGE (Q10 CFS)
①	0.36	0.49	0.85
②	0.78	1.20	2.03
③	0.65	0.94	1.61
④	1.73	2.31	4.00
⑤	0.92	1.47	2.47
⑥	0.11	0.21	0.34
⑦	0.35	0.55	0.93
⑧	0.35	0.56	0.94
⑨	0.79	1.24	2.09
⑩	1.16	1.70	2.89
⑪	1.21	1.63	2.82
⑫	0.58	0.90	1.52
⑬	0.57	0.87	1.47
		14.07	23.96

INCREASE IN RUNOFF DUE TO DEVELOPMENT
OF EXISTING VACANT COMMERCIAL PARCELS
WITHIN LA QUINTA VILLAGE . . . . . 9.89 CFS

N

GRAPHIC SCALE
SCALE 1"=100'
0 50 100 200 300 400

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CITY OF LA QUINTA	SHEET 1
LA QUINTA VILLAGE HYDROLOGY 10 YEAR DISCHARGE STUDY MAP	OF 1
FOR:	