ANDREASEN ENGINEERING, INC.

Civil Engineering • Land Surveying • Municipal Engineering

DRAINAGE REPORT

TENTATIVE TRACT MAP NO. 73711

in the

CITY OF SAN DIMAS
741 & 811 N. SAN DIMAS AVENUE

for

WALBERN DEVELOPMENT USA, INC.
28 Monarch Bay Plaza, Suite Q
Dana Point, CA. 92629

Prepared by:

Andreasen Engineering, Inc.
580 N. Park Avenue
Pomona, CA. 91768

REGISTERED PROFESSIONAL ENGINEER
STEPHEN VENTURA
C 32437
Exp. 12/31/16
CIVIL
STATE OF CALIFORNIA

August 11, 2015
JN 3379

Stephen Ventura, R.C.E.
Vice President

8/11/15
Date

DISCUSSION

I. PURPOSE OF STUDY

The purpose of this study is to make a determination of the amount of runoff from proposed development. Calculation have been provided for a 10 year-24 Hour storm event

We have also provided calculations for 85th Percentile 24 hours Rain fall Depth Analysis and the SUSMP Appendix "A" to take the larger volume to size the retention basin.

II. PROJECT LOCATION

The proposed project is located in the City of San Dimas, County of Los Angeles, California. The project fronts San Dimas Avenue, south of Allen Avenue, and east of Cataract Avenue. It is on Thomas Map Book-Page 600, Grid B-1.

III. PRE DEVELOPED SITE CONDITIONS

The existing site consists of small buildings/barns, trails, plant nursery, and horse ranch. Off-site drainage comes from the Edison electrical power facility and slope embankment.

IV. POST DEVELOPED SITE CONDITIONS

The proposed development consist student single family homes.

V. HYDROLOGY

The method of calculating the runoff is based on the L.A.C.D.P.W. Peal Flow Hydrologic Analysis software to determine the runoff for a 10 year 24 hour storm event. Soil classification 007, 50 year 24 hour rainfall is 7.2 inches

Los Angeles County Public of Public Works *"Analysis of the 85th Percentile 24-hour Rainfall Depth"* February 2004 was using to calculated the volume.

Also, the Los Angeles County Public of Public Works Standard Urban Storm Water Mitigation Plan (SUSMP Appendix "A") method was used to determine the volume.

VI. RESULTS

The difference between the pre-development and post development volumes was determined, 85th Percentile, and SUSMP Appendix "A". 85th Percentile 24 Hours storm drain governs with a volume of 13728 cubic feet.

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HYDROLOGY CALCULATIONS

WELBERN - San Dimas Tentative Track Map No.73711

7--29-15

Retention Basin Volume Summary

Post Development

Subarea /	Area (ac.)	Q10 (cfs)	Volume (cu.ft)
A	1.37	1.83	11591
B	0.86	1.66	7296
C	0.97	2.28	8237
D	1.68	2.8	14238
E	1.54	2.41	13046
F	1.74	2.72	14740
G	1.42	2.03	5625
	9.58	**15.73**	**74773**

Pre Development

Subarea /	Area (ac.)	Q10 (cfs)	Volume (cu.ft)	
A	5.06	9.04	42905	
B	4.22	5.41	19651	
C	0.46	1.42	3096	
	9.74	**15.87**	**65652**	
	9.58	***15.61***	***64574***	***Adjusted Area***

DIFF PRE & POST VOLUME: 10199 cu.ft.

SUSMP

Subarea /	Area (ac.)	Qpm (cfs)	Vm (cu.ft)
A	1.37	0.08	1613
B	0.86	0.06	1012
C	0.97	0.08	1142
D	1.68	0.12	1978
E	1.54	0.1	1813
F	1.74	0.11	2048
G	1.42	0.03	690
	9.58	**0.58**	**10296**

85th Percentile 24 Hour Storm Event

Subarea /	Area (ac.)	Q (cfs)	V (cu.ft)
A	1.37	0.12	2150
B	0.86	0.11	1350
C	0.97	0.12	1523
D	1.68	0.17	2637
E	1.54	0.15	2417
F	1.74	0.16	2731
G	1.42	0.05	920
	9.58	**0.88**	***13728***

85th Percentile 24 Hour Storm Event Governs: 13728 cu.ft.

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JOB SAN DIMAS - WELBURA
SHEET NO. _____ OF _____
CALCULATED BY SV DATE _____
CHECKED BY _____ DATE _____
SCALE _____

HYDROLOGY CALC.

PRE-DEVELOPMENT

COMPOSITE RUNOFF COEFFICIENT

AREA "A" : TOTAL AREA 5.06 AC
0.36 AC BUILDING/BARNS % IMP 1.0
4.70 AC HORSE RANCH % IMP 0.42

COMPOSITE % IMP: $\frac{(1)(0.36)+(4.70)(0.42)}{5.06} = 0.42$

AREA "B" : 4.22 AC
ALL PLANT/NURSERY : % IMP : 0.15

AREA "C" : 0.66 AC
ALL PLANT/NURSERY : % IMP : 0.15

AREA "D" : 0.50 AC
0.05 AC BUILDING % IMP 1.0
0.45 AC NURSERY % IMP : 0.15

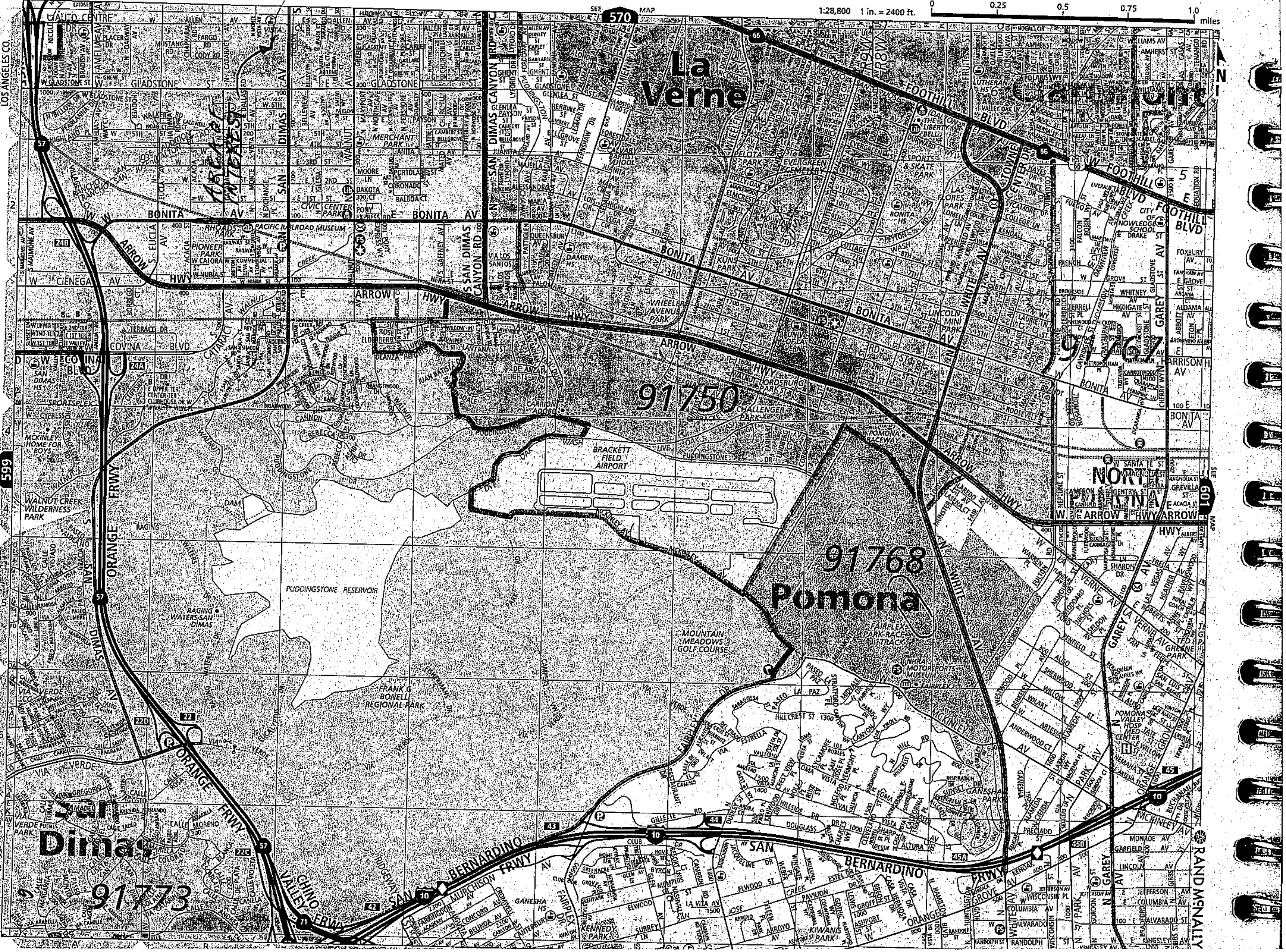
COMPOSITE % IMP: $\frac{(1)(0.05)+(0.45)(0.15)}{0.50} = 0.24$

AREA E : 1.38 AC.
ELECTRICAL POWER FACILITIES % IMP 0.47

Code	Land Use Description	% Impervious
1431	Electrical Power Facilities	47
1431.01	Electrical Power Facilities-Powerlines (Urban)	2
1431.02	Electrical Power Facilities-Powerlines (Rural)	1
1432	Solid Waste Disposal Facilities	15
1433	Liquid Waste Disposal Facilities	96
1434	Water Storage Facilities	91
1435	Natural Gas and Petroleum Facilities	91
1435.01	Natural Gas and Petroleum Facilities-Manufacturing, Assembly, and In	91
1435.02	Natural Gas and Petroleum Facilities-Petroleum Refining and Processing	91
1435.03	Natural Gas and Petroleum Facilities-Mineral Extraction – Oil and Gas	10
1435.04	Natural Gas and Petroleum Facilities-Vacant Undifferentiated	1
1436	Water Transfer Facilities	96
1437	Improved Flood Waterways and Structures	100
1440	Maintenance Yards	91
1450	Mixed Transportation	90
1460	Mixed Transportation and Utility	91
1460.01	Mixed Utility and Transportation-Improved Flood Waterways and Structures	100
1460.02	Mixed Utility and Transportation-Railroads	15
1460.03	Mixed Utility and Transportation-Freeways and Major Roads	91
1500	Mixed Commercial and Industrial	91
1600	Mixed Urban	89
1700	Under Construction (Use appropriate value)	91
1810	Golf Courses	3
1821	Developed Local Parks and Recreation	10
1822	Undeveloped Local Parks and Recreation	2
1831	Developed Regional Parks and Recreation	2
1832	Undeveloped Regional Parks and Recreation	1
1840	Cemeteries	10
1850	Wildlife Preserves and Sanctuaries	2
1850.01	Wildlife-Commercial Recreation	90
1850.02	Wildlife-Other Special Use Facilities	86
1850.03	Wildlife-Developed Local Parks and Recreation	10
1860	Specimen Gardens and Arboreta	15
1870	Beach Parks	10
1880	Other Open Space and Recreation	10
2110	Irrigated Cropland and Improved Pasture Land	2
2120	Non-Irrigated Cropland and Improved Pasture Land	2
2200	Orchards and Vineyards	2
2300	Nurseries	15
2400	Dairy, Intensive Livestock, and Associated Facilities	42
2500	Poultry Operations	62
2600	Other Agriculture	42
2700	Horse Ranches	42

Proportion Impervious Data

Code	Land Use Description	% Impervious
1111	High-Density Single Family Residential	42
1112	Low-Density Single Family Residential	21
1121	Mixed Multi-Family Residential	74
1122	Duplexes, Triplexes and 2-or 3-Unit Condominiums and Townhouses	55
1123	Low-Rise Apartments, Condominiums, and Townhouses	86
1124	Medium-Rise Apartments and Condominiums	86
1125	High-Rise Apartments and Condominiums	90
1131	Trailer Parks and Mobile Home Courts, High-Density	91
1132	Mobile Home Courts and Subdivisions, Low-Density	42
1140	Mixed Residential	59
1151	Rural Residential, High-Density	15
1152	Rural Residential, Low-Density	10
1211	Low- and Medium-Rise Major Office Use	91
1212	High-Rise Major Office Use	91
1213	Skyscrapers	91
1221	Regional Shopping Center	95
1222	Retail Centers (Non-Strip With Contiguous Interconnected Off-Street	96
1223	Modern Strip Development	96
1224	Older Strip Development	97
1231	Commercial Storage	90
1232	Commercial Recreation	90
1233	Hotels and Motels	96
1234	Attended Pay Public Parking Facilities	91
1241	Government Offices	91
1242	Police and Sheriff Stations	91
1243	Fire Stations	91
1244	Major Medical Health Care Facilities	74
1245	Religious Facilities	82
1246	Other Public Facilities	91
1247	Non-Attended Public Parking Facilities	91
1251	Correctional Facilities	91
1252	Special Care Facilities	74
1253	Other Special Use Facilities	86
1261	Pre-Schools/Day Care Centers	68
1262	Elementary Schools	82
1263	Junior or Intermediate High Schools	82
1264	Senior High Schools	82
1265	Colleges and Universities	47
1266	Trade Schools and Professional Training Facilities	91
1271	Base (Built-up Area)	65
1271.01	Base High-Density Single Family Residential	42
1271.02	Base Duplexes, Triplexes and 2-or 3-Unit Condominiums and T	55


SEE 570 MAP
1:28,800 1 in. = 2400 ft.
0 0.25 0.5 0.75 1.0 miles
N
La Verne
Claremont
91767
91750
91768
Pomona
San Dimas
91773
North Pomona
LOS ANGELES CO.
SEE 599 MAP
SEE 601 MAP
FOOTHILL BLVD
BONITA AV
ARROW HWY
ORANGE FRWY
SAN BERNARDINO FRWY
CHINO VALLEY FRWY
SAN DIMAS CANYON RD
BRACKETT FIELD AIRPORT
PUDDINGSTONE RESERVOIR
RAGING WATERS-SAN DIMAS
FRANK G BONELLI REGIONAL PARK
MOUNTAIN MEADOWS GOLF COURSE
FAIRPLEX PARK RACE TRACK
WALNUT CREEK WILDERNESS PARK
PACIFIC RAILROAD MUSEUM
RAND McNALLY

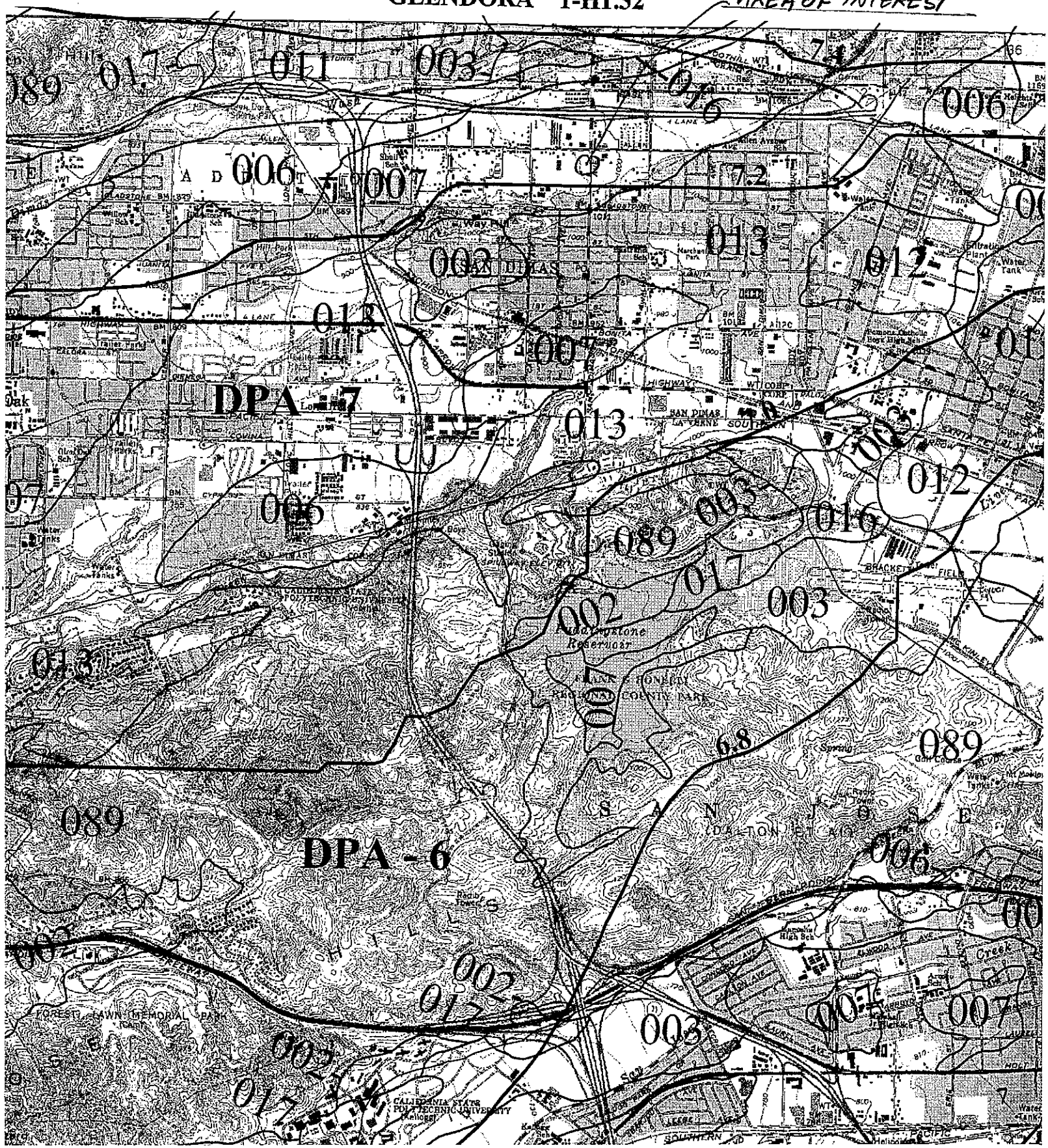
11 YR - 24 EVENT: 0.714 X 7.2 = 5.1 AC

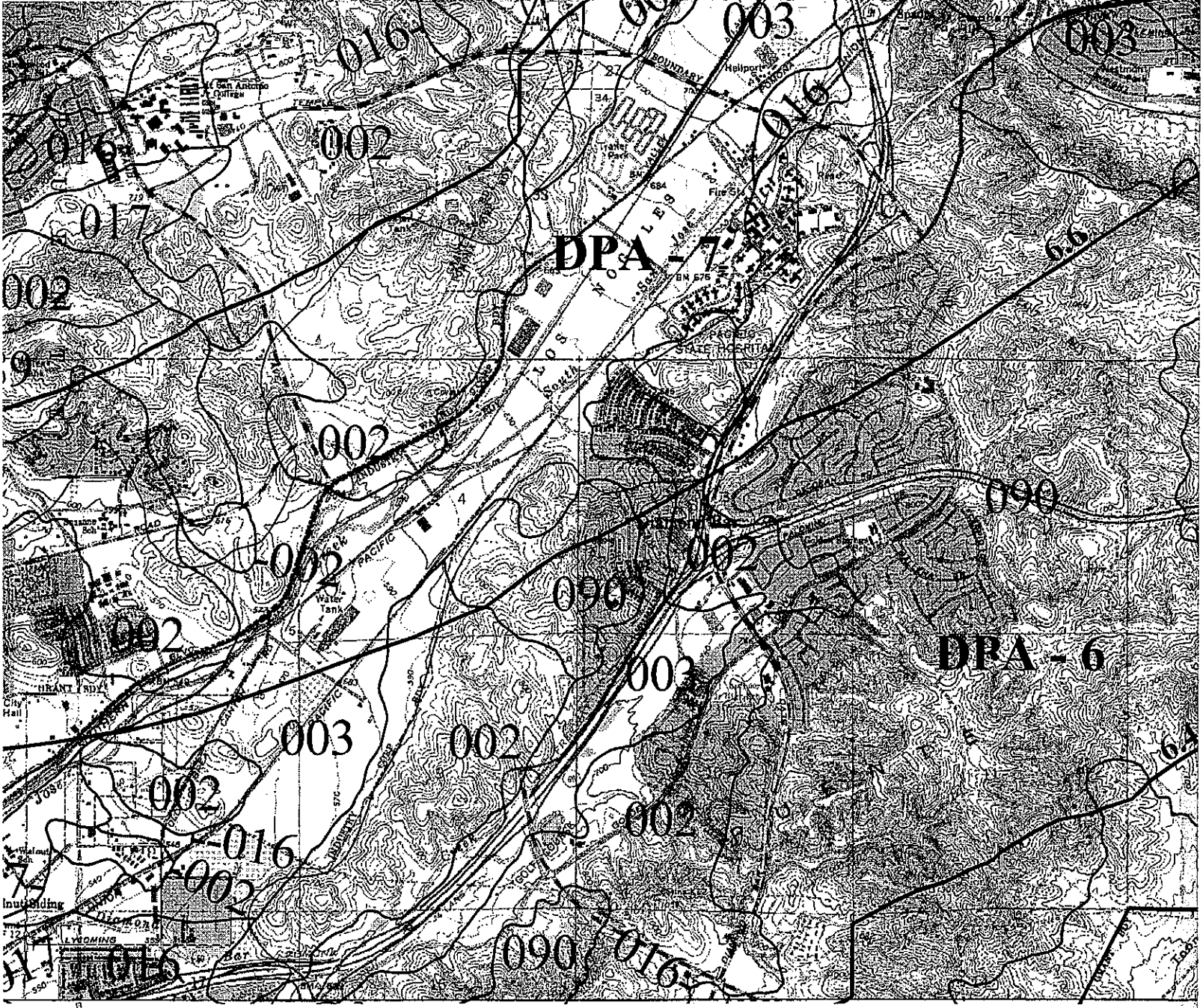
56 YR - 24 HR EVENT: 7.2"

SOIL CLASSIFICATION: 007

GLENDORA 1-H1.32

AREA OF INTEREST





YORBA LINDA 1-H1.12

SOIL CLASSIFICATION AREA

INCHES OF RAINFALL

6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878

10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

SAN DIMAS
50-YEAR 24-HOUR ISOHYET

· POST DEV.

Peak Flow Hydrologic Analysis

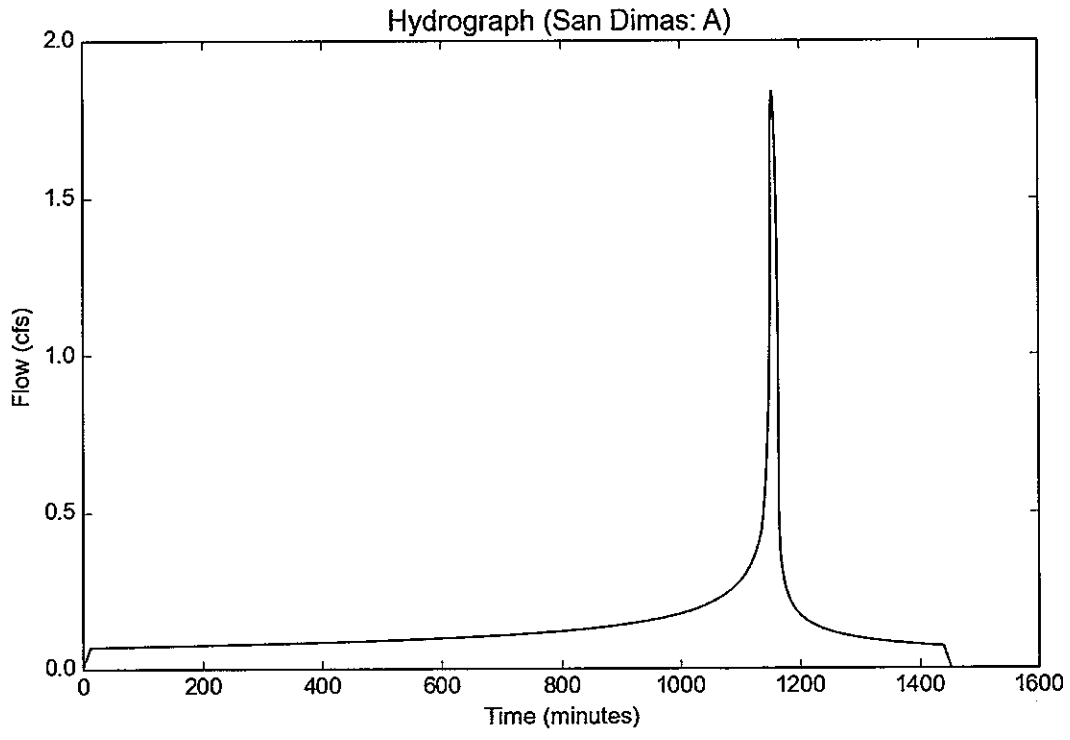
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/Post-Dev/San Dimas - A.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	A
Area (ac)	1.37
Flow Path Length (ft)	610.0
Flow Path Slope (vft/hft)	0.003
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	1.9575
Undeveloped Runoff Coefficient (Cu)	0.5279
Developed Runoff Coefficient (Cd)	0.6842
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	1.8347
Burned Peak Flow Rate (cfs)	1.8347
24-Hr Clear Runoff Volume (ac-ft)	0.2661
24-Hr Clear Runoff Volume (cu-ft)	11590.7158



POST DEV.

Peak Flow Hydrologic Analysis

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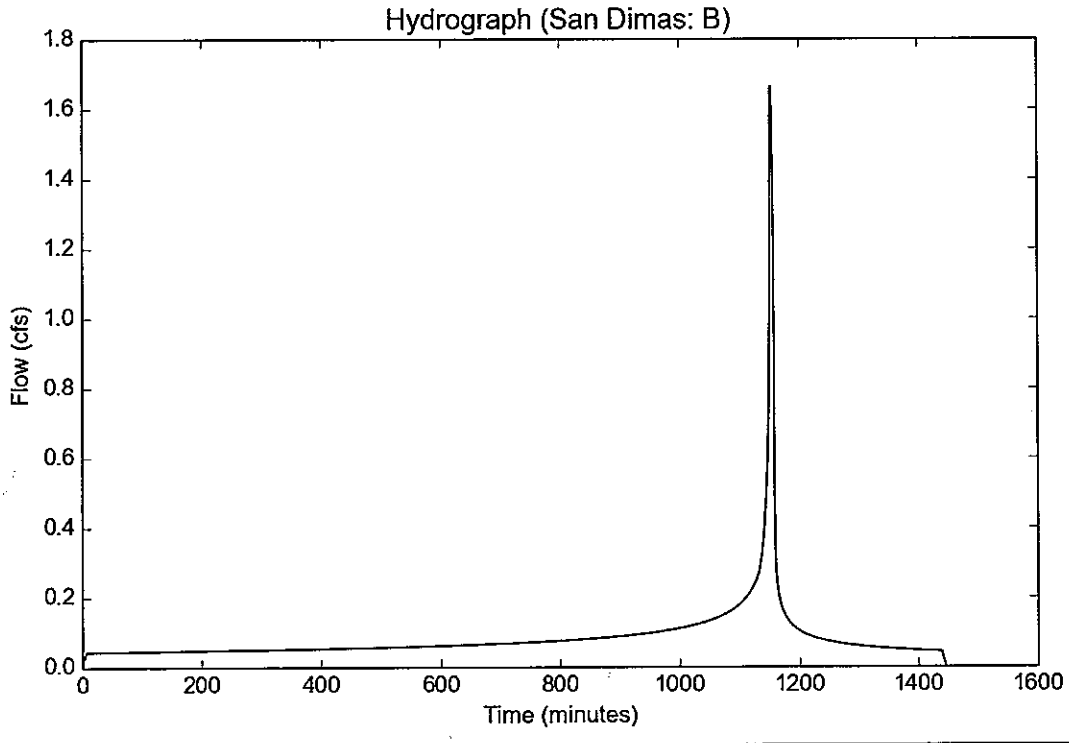
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	B
Area (ac)	0.86
Flow Path Length (ft)	414.0
Flow Path Slope (vft/hft)	0.016
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	2.6185
Undeveloped Runoff Coefficient (Cu)	0.6205
Developed Runoff Coefficient (Cd)	0.7379
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	1.6616
Burned Peak Flow Rate (cfs)	1.6616
24-Hr Clear Runoff Volume (ac-ft)	0.1675
24-Hr Clear Runoff Volume (cu-ft)	7295.6058



POST DEV.

Peak Flow Hydrologic Analysis

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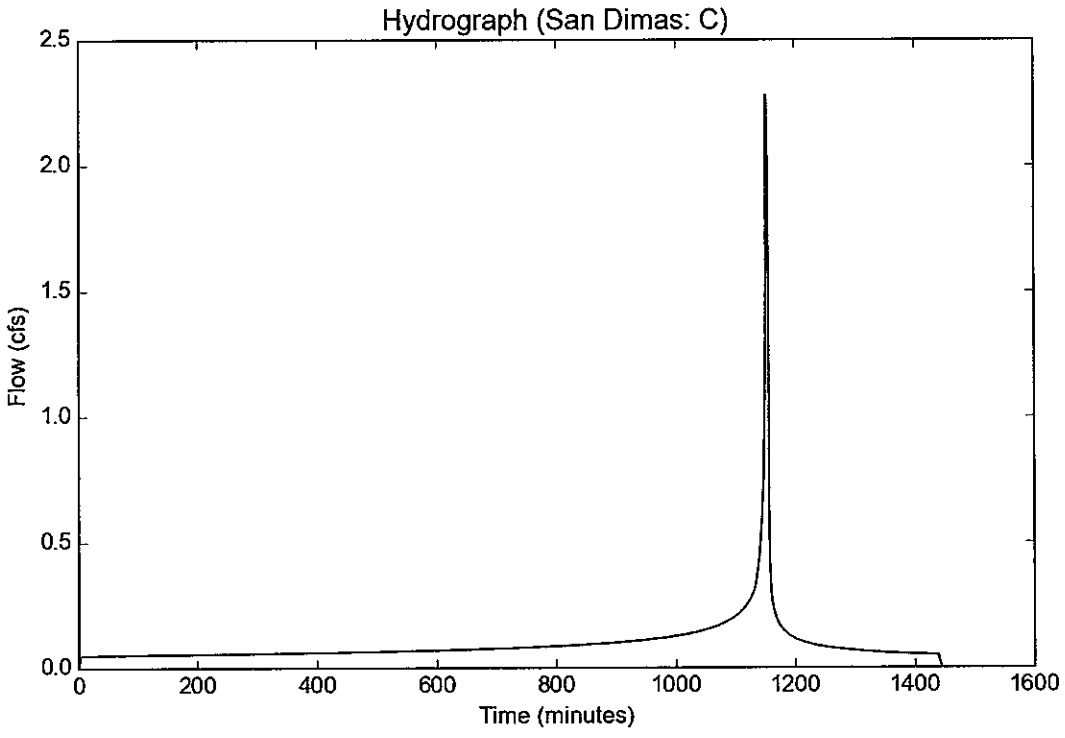
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	C
Area (ac)	0.97
Flow Path Length (ft)	306.0
Flow Path Slope (vft/hft)	0.023
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.6687
Developed Runoff Coefficient (Cd)	0.7659
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.2785
Burned Peak Flow Rate (cfs)	2.2785
24-Hr Clear Runoff Volume (ac-ft)	0.1891
24-Hr Clear Runoff Volume (cu-ft)	8236.9752



POST DEV.

Peak Flow Hydrologic Analysis

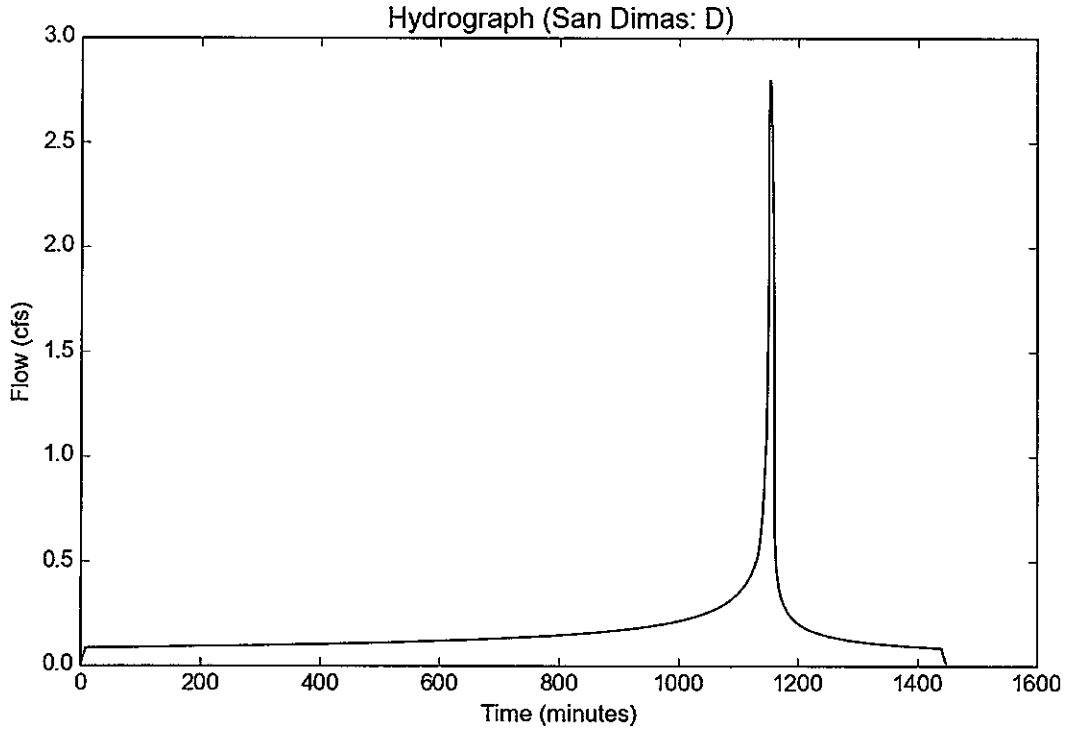
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/Post-Dev/San Dimas - D.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	D
Area (ac)	1.68
Flow Path Length (ft)	488.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	2.3268
Undeveloped Runoff Coefficient (Cu)	0.5826
Developed Runoff Coefficient (Cd)	0.7159
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	2.7985
Burned Peak Flow Rate (cfs)	2.7985
24-Hr Clear Runoff Volume (ac-ft)	0.3269
24-Hr Clear Runoff Volume (cu-ft)	14238.2557



POST DEV

Peak Flow Hydrologic Analysis

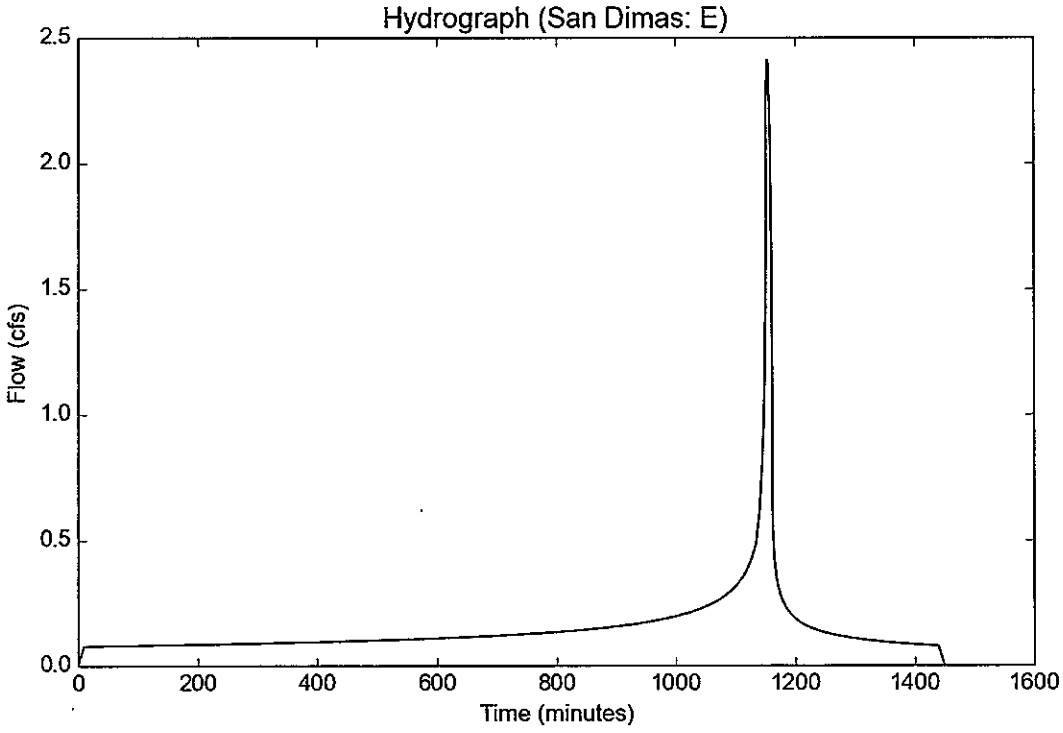
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/Post-Dev/San Dimas - E.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	E
Area (ac)	1.54
Flow Path Length (ft)	634.0
Flow Path Slope (vft/hft)	0.013
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	2.2144
Undeveloped Runoff Coefficient (Cu)	0.5667
Developed Runoff Coefficient (Cd)	0.7067
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	2.4098
Burned Peak Flow Rate (cfs)	2.4098
24-Hr Clear Runoff Volume (ac-ft)	0.2995
24-Hr Clear Runoff Volume (cu-ft)	13046.2193



POST DEV.

Peak Flow Hydrologic Analysis

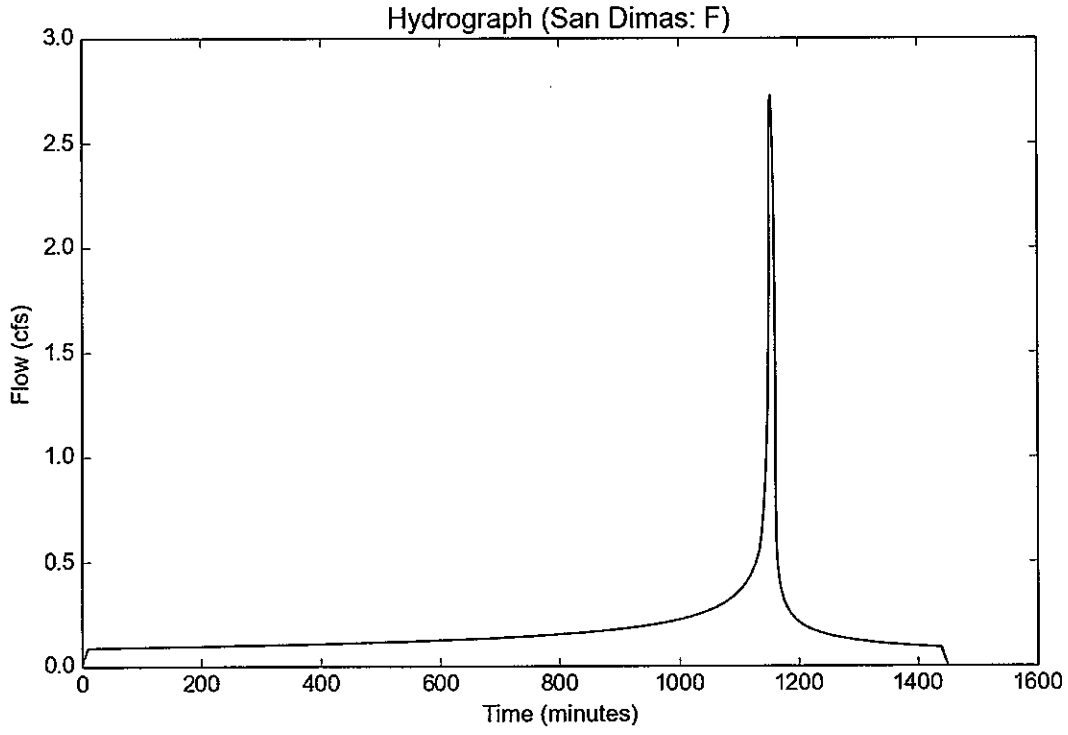
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/Post-Dev/San Dimas - F.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	F
Area (ac)	1.74
Flow Path Length (ft)	485.0
Flow Path Slope (vft/hft)	0.0045
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	2.2144
Undeveloped Runoff Coefficient (Cu)	0.5667
Developed Runoff Coefficient (Cd)	0.7067
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	2.7228
Burned Peak Flow Rate (cfs)	2.7228
24-Hr Clear Runoff Volume (ac-ft)	0.3384
24-Hr Clear Runoff Volume (cu-ft)	14740.5335



POST DEV.

Peak Flow Hydrologic Analysis

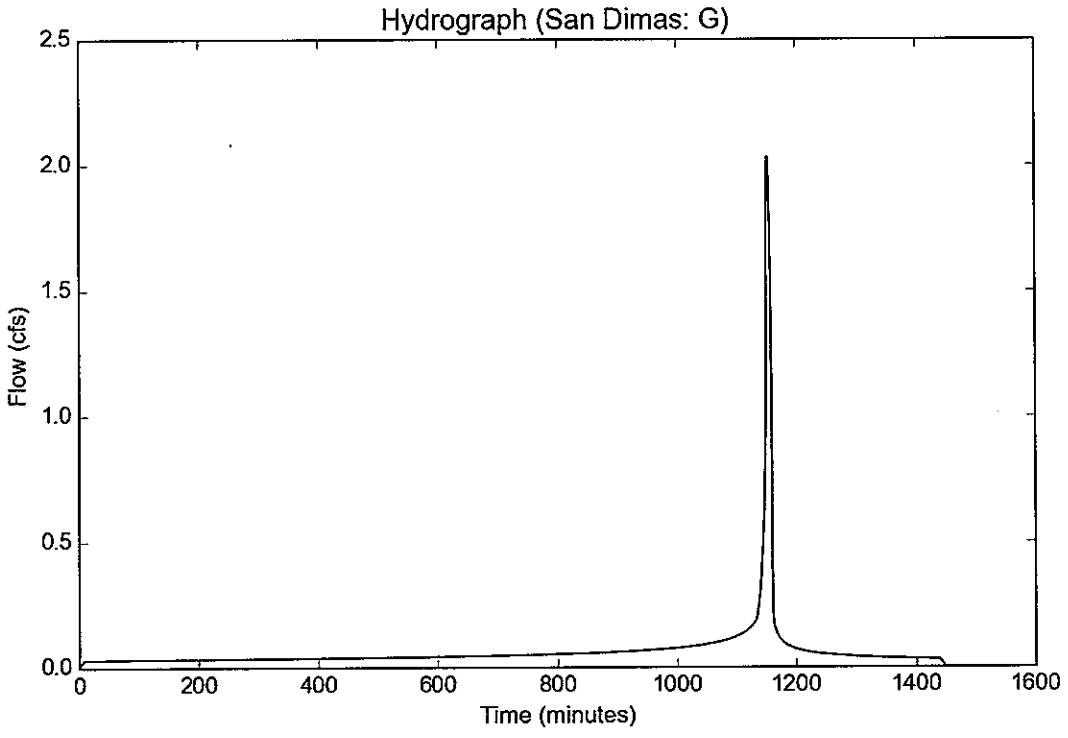
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/Post-Dev/San Dimas - G.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	G
Area (ac)	1.42
Flow Path Length (ft)	712.0
Flow Path Slope (vft/hft)	0.0576
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.1
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	2.3268
Undeveloped Runoff Coefficient (Cu)	0.5826
Developed Runoff Coefficient (Cd)	0.6144
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	2.0299
Burned Peak Flow Rate (cfs)	2.0299
24-Hr Clear Runoff Volume (ac-ft)	0.1291
24-Hr Clear Runoff Volume (cu-ft)	5625.2813



PRE-DEV.

Peak Flow Hydrologic Analysis

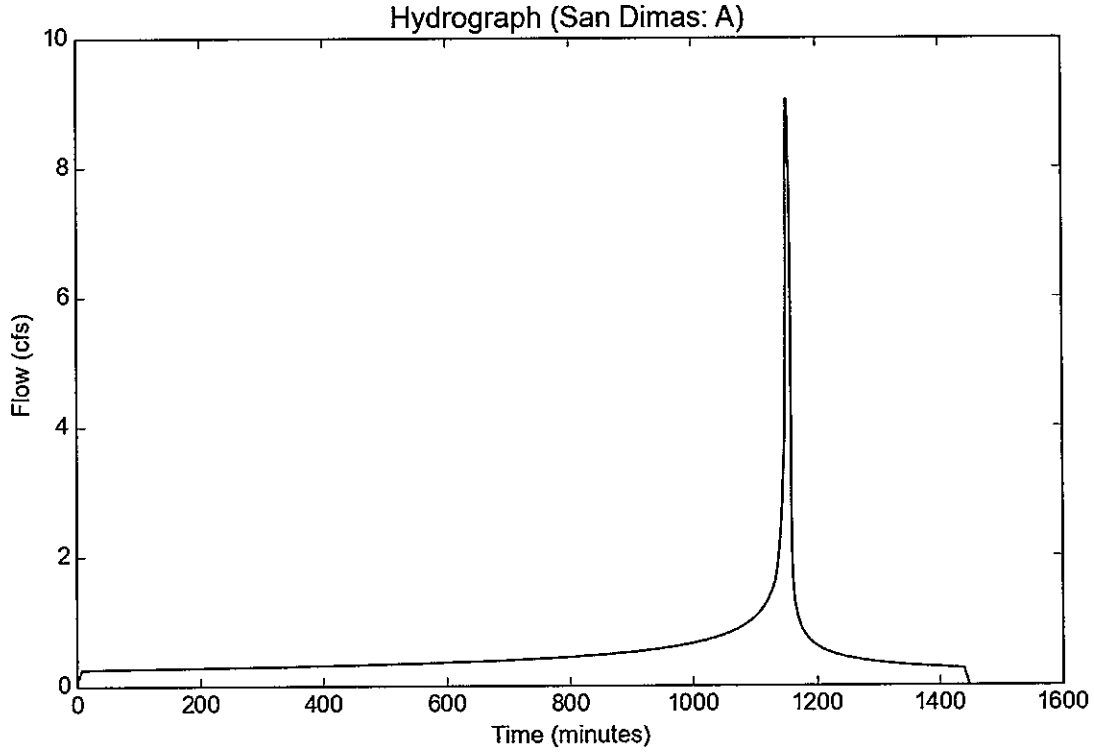
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welburn/San Dimas - A.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	A
Area (ac)	5.06
Flow Path Length (ft)	720.0
Flow Path Slope (vft/hft)	0.0533
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	2.4592
Undeveloped Runoff Coefficient (Cu)	0.6014
Developed Runoff Coefficient (Cd)	0.7268
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	9.0443
Burned Peak Flow Rate (cfs)	9.0443
24-Hr Clear Runoff Volume (ac-ft)	0.985
24-Hr Clear Runoff Volume (cu-ft)	42904.8426



PRE-DEV.

Peak Flow Hydrologic Analysis

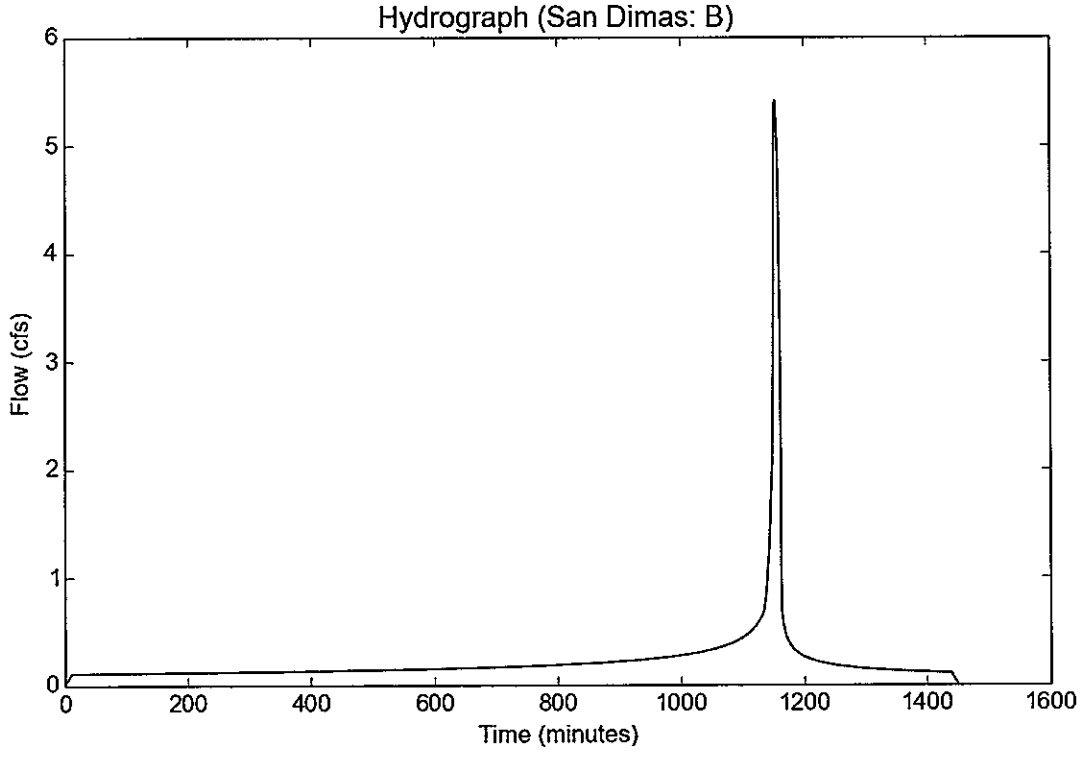
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welburn/San Dimas - B.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	B
Area (ac)	4.22
Flow Path Length (ft)	717.0
Flow Path Slope (vft/hft)	0.0172
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.15
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	2.1174
Undeveloped Runoff Coefficient (Cu)	0.5529
Developed Runoff Coefficient (Cd)	0.605
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	5.4056
Burned Peak Flow Rate (cfs)	5.4056
24-Hr Clear Runoff Volume (ac-ft)	0.4511
24-Hr Clear Runoff Volume (cu-ft)	19650.5005



PRE-DEV.

Peak Flow Hydrologic Analysis

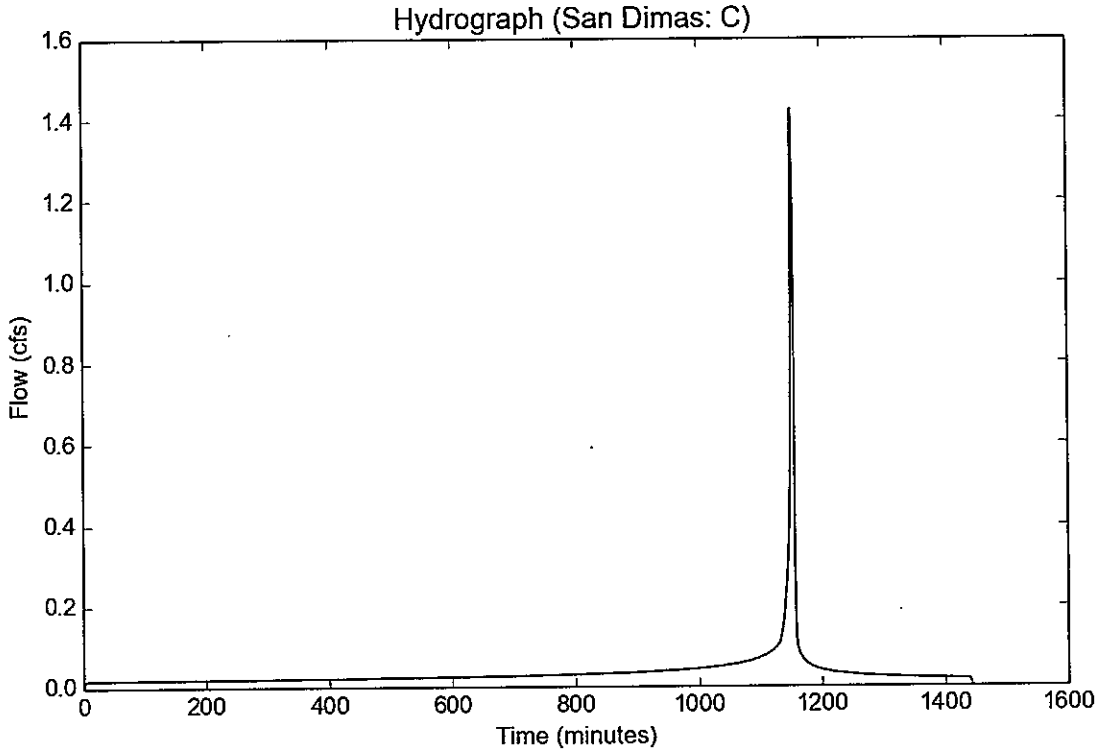
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welburn/San Dimas - C.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	C
Area (ac)	0.66
Flow Path Length (ft)	238.0
Flow Path Slope (vft/hft)	0.0168
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.15
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.6687
Developed Runoff Coefficient (Cd)	0.7034
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4239
Burned Peak Flow Rate (cfs)	1.4239
24-Hr Clear Runoff Volume (ac-ft)	0.0711
24-Hr Clear Runoff Volume (cu-ft)	3096.0767



PRE-DEV.

Peak Flow Hydrologic Analysis

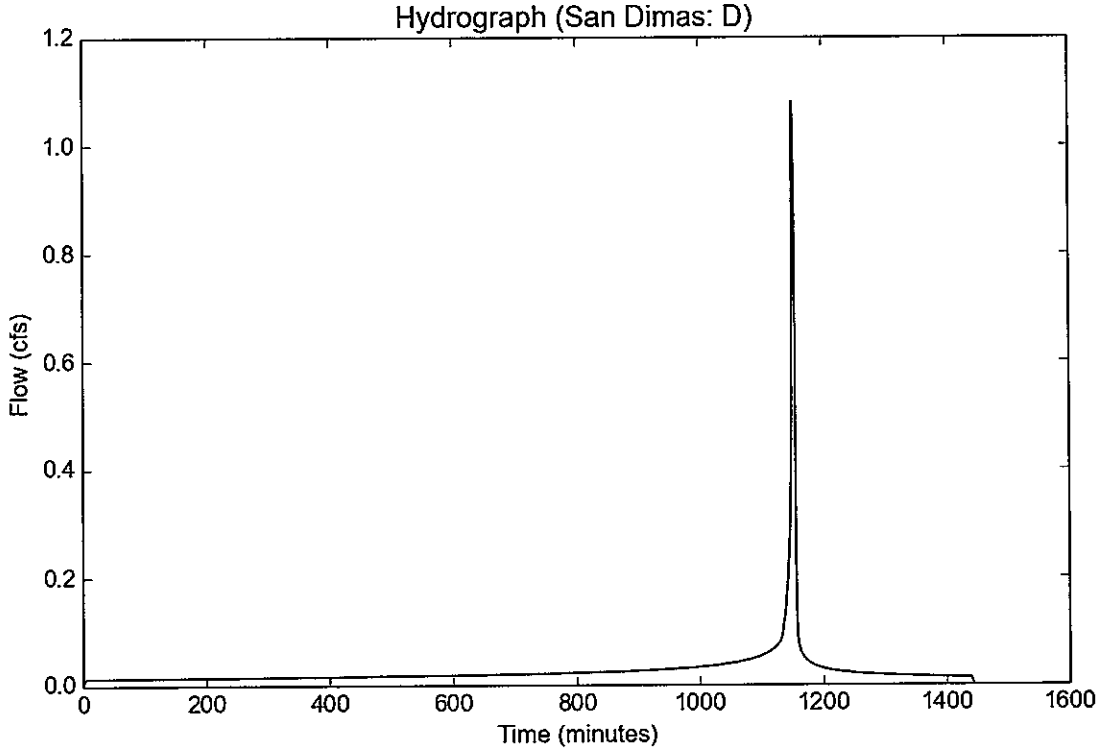
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welburn/San Dimas - D.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	D
Area (ac)	0.5
Flow Path Length (ft)	178.0
Flow Path Slope (vft/hft)	0.0169
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.15
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.6687
Developed Runoff Coefficient (Cd)	0.7034
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.0787
Burned Peak Flow Rate (cfs)	1.0787
24-Hr Clear Runoff Volume (ac-ft)	0.0538
24-Hr Clear Runoff Volume (cu-ft)	2345.5127



PRE DEV.

Peak Flow Hydrologic Analysis

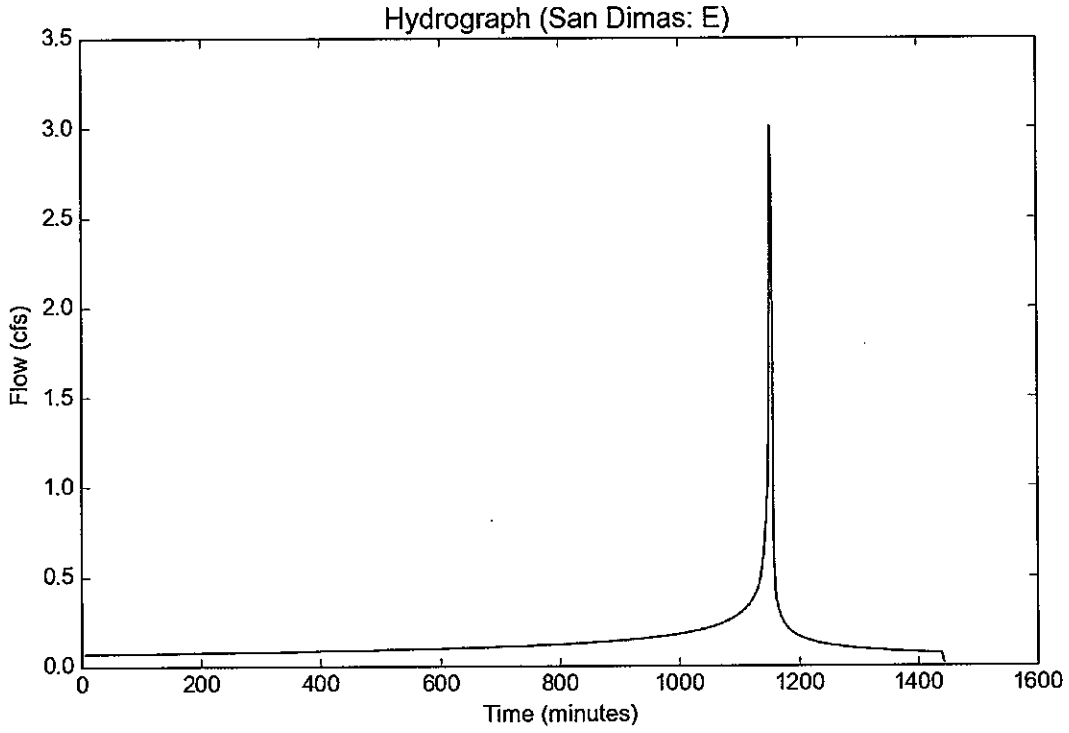
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welburn/San Dimas - E.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	E
Area (ac)	1.26
Flow Path Length (ft)	243.0
Flow Path Slope (vft/hft)	0.0152
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.47
Soil Type	7
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.6687
Developed Runoff Coefficient (Cd)	0.7774
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.0044
Burned Peak Flow Rate (cfs)	3.0044
24-Hr Clear Runoff Volume (ac-ft)	0.266
24-Hr Clear Runoff Volume (cu-ft)	11586.4064



HYDRAULIC CALCULATIONS

ANDREASEN ENGINEERING, INC.
580 North Park Avenue
Pomona, California 91768
(909) 623-1595
FAX (909) 620-0016

JOB WELBERN DEV- SAN DIMAS

SHEET NO. _____ OF _____

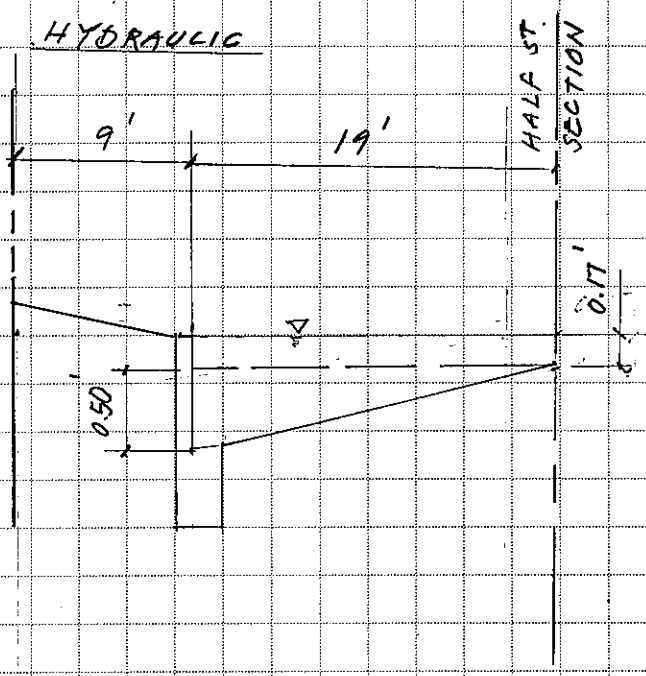
CALCULATED BY S.V. DATE _____

CHECKED BY _____ DATE _____

SCALE _____

HORIZ: 1" = 10'

HYDRAULIC



$A = (19 \times 0.17) + (\frac{1}{2} \times 19 \times 0.50)$
$= 7.98^{\square}$

$WP = 0.17 + (0.50^2 + 19^2)$
$= 19.01'$

$Q = \frac{1.486}{n} \frac{A^{5/3}}{WP^{2/3}} S^{1/2}$ $n = 0.013$

$Q = \frac{1.486}{0.013} \times \frac{(7.98)^{5/3}}{(19.01)^{2/3}} (0.01)^{1/2}$

$= 51.1$ cfs

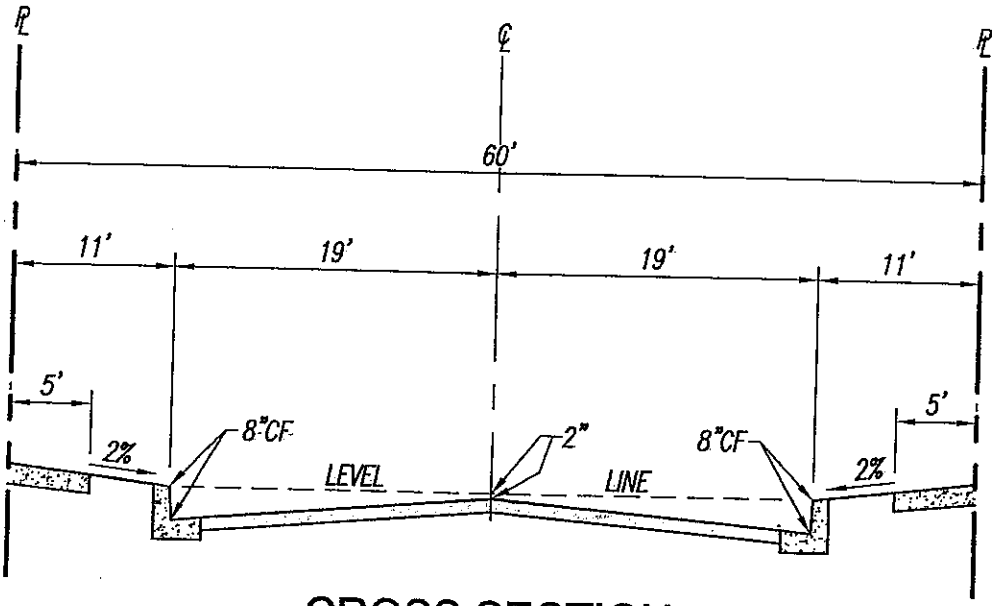
FULL ST. 102.3 CFS

POST $\Sigma Q_{10} = 15.7$ cfs, $Q_{50} = 22.0$ cfs

CONCLUSION

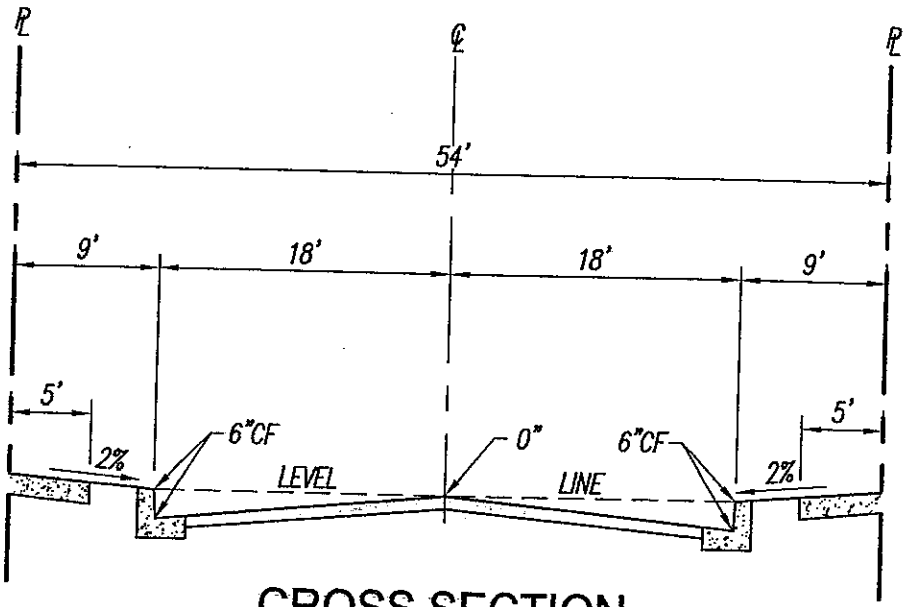
CROSS SECTION "A" STREET CAN CONVEY FLOW FROM ON-SITE NEAR PROPOSE RETENTION BASIN

NO CATCH BASIN NEEDED AT THIS LOCATION SOUTH EAST CORNER OF LOT 10.



CROSS SECTION
"A" STREET

NOT TO SCALE



CROSS SECTION
"B" STREET

NOT TO SCALE

SUSMP CALCULATIONS

SUSMP

Peak Flow Hydrologic Analysis

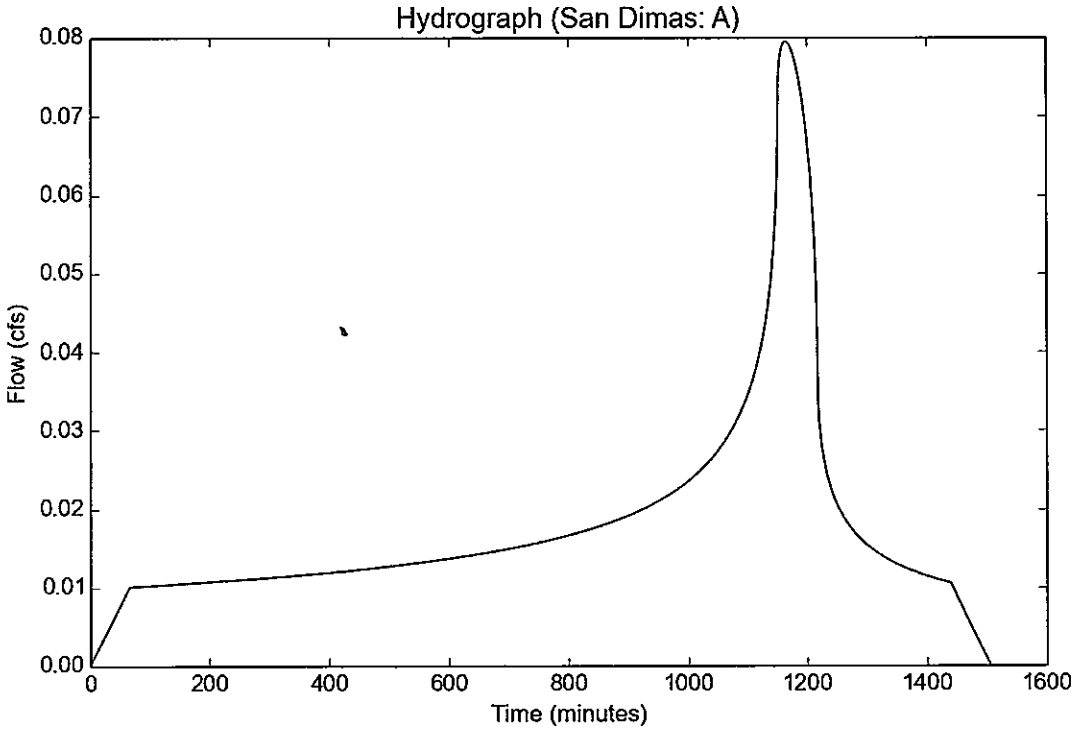
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/.75 inch SUSMP/San Dimas - A.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	A
Area (ac)	1.37
Flow Path Length (ft)	610.0
Flow Path Slope (vft/hft)	0.003
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1331
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	66.0
Clear Peak Flow Rate (cfs)	0.0795
Burned Peak Flow Rate (cfs)	0.0795
24-Hr Clear Runoff Volume (ac-ft)	0.037
24-Hr Clear Runoff Volume (cu-ft)	1612.8558



SUSMP

Peak Flow Hydrologic Analysis

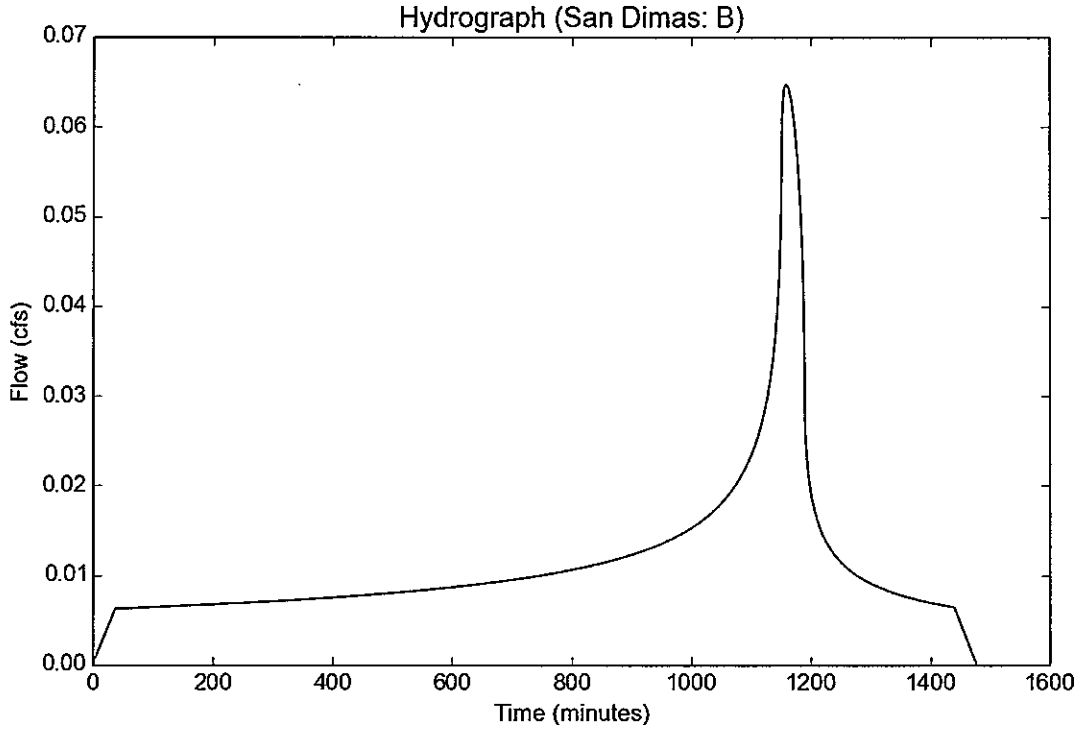
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/.75 inch SUSMP/San Dimas - B.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	B
Area (ac)	0.86
Flow Path Length (ft)	414.0
Flow Path Slope (vft/hft)	0.016
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1725
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	38.0
Clear Peak Flow Rate (cfs)	0.0647
Burned Peak Flow Rate (cfs)	0.0647
24-Hr Clear Runoff Volume (ac-ft)	0.0232
24-Hr Clear Runoff Volume (cu-ft)	1012.4107



SUSMP

Peak Flow Hydrologic Analysis

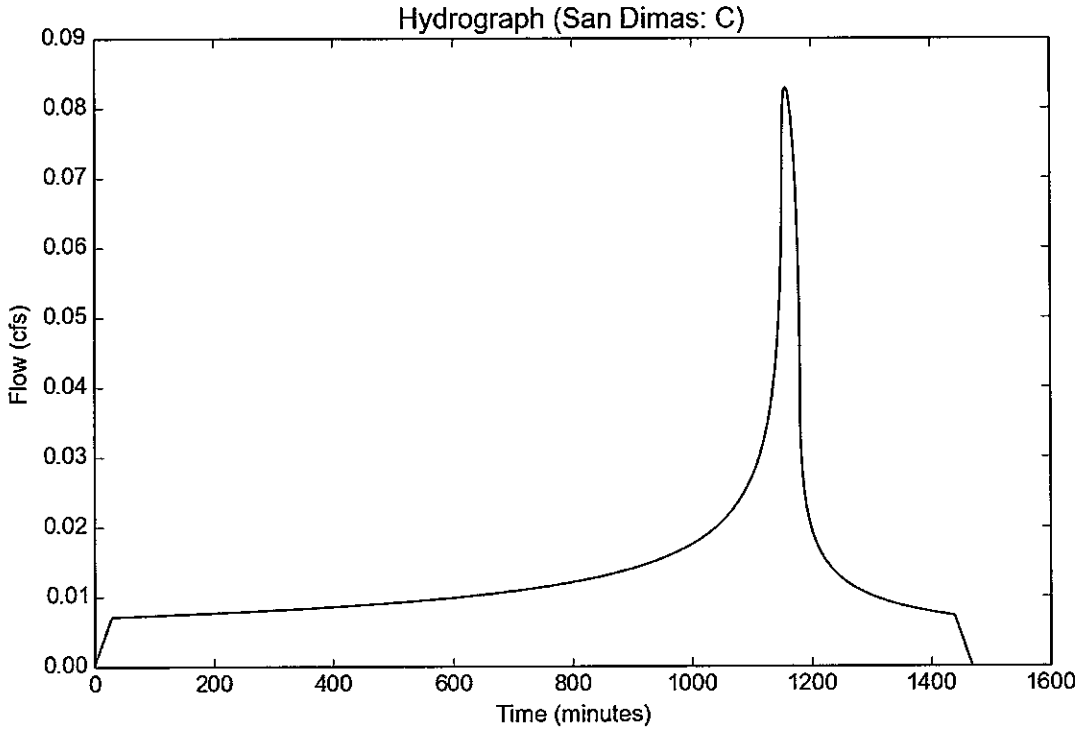
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/.75 inch SUSMP/San Dimas - C.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	C
Area (ac)	0.97
Flow Path Length (ft)	306.0
Flow Path Slope (vft/hft)	0.023
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1959
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.0828
Burned Peak Flow Rate (cfs)	0.0828
24-Hr Clear Runoff Volume (ac-ft)	0.0262
24-Hr Clear Runoff Volume (cu-ft)	1141.8962



SUSMP

Peak Flow Hydrologic Analysis

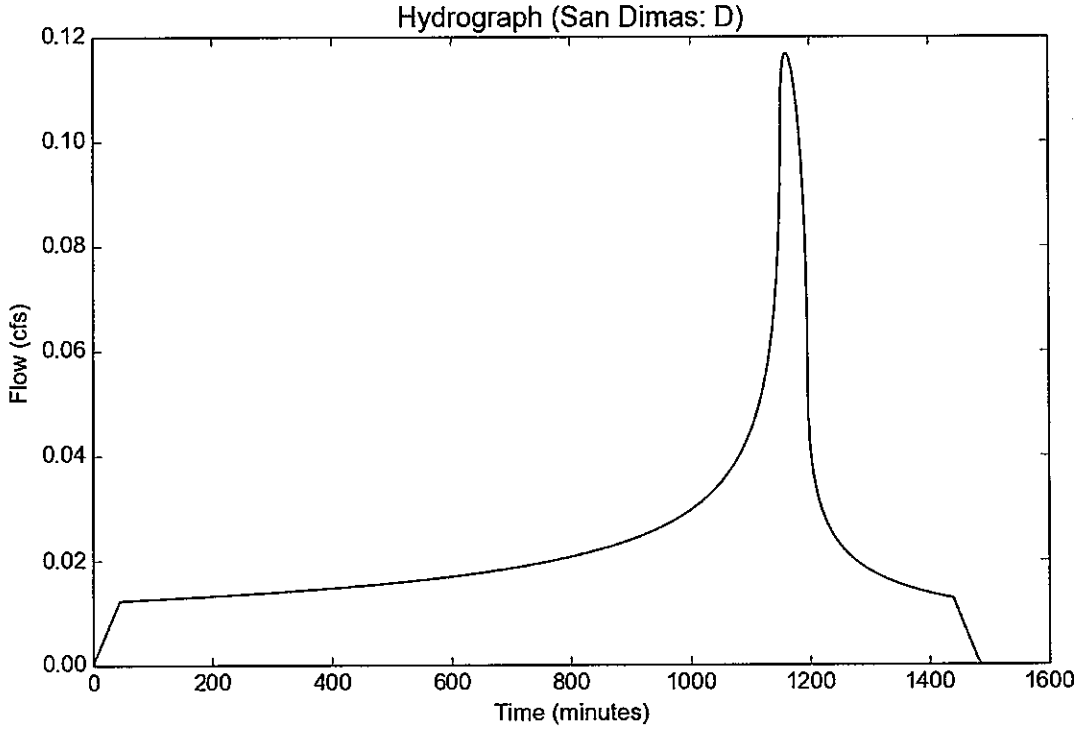
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/.75 inch SUSMP/San Dimas - D.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	D
Area (ac)	1.68
Flow Path Length (ft)	488.0
Flow Path Slope (vft/hft)	0.011
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1593
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	45.0
Clear Peak Flow Rate (cfs)	0.1167
Burned Peak Flow Rate (cfs)	0.1167
24-Hr Clear Runoff Volume (ac-ft)	0.0454
24-Hr Clear Runoff Volume (cu-ft)	1977.7476



SUSMP

Peak Flow Hydrologic Analysis

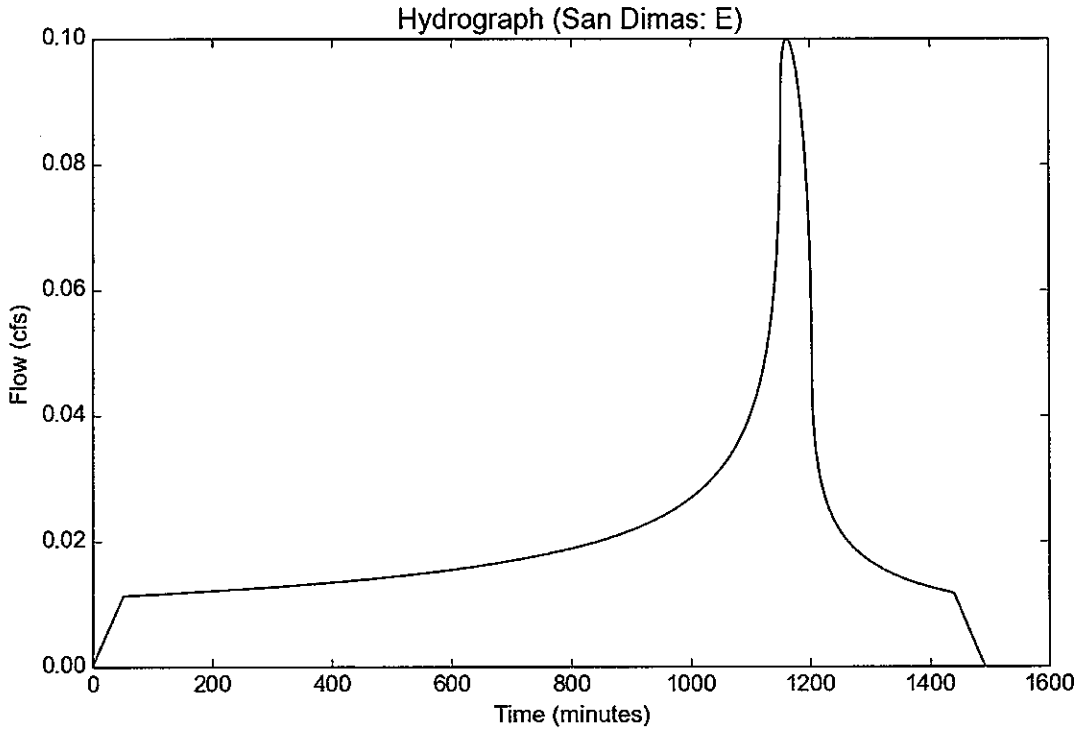
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/.75 inch SUSMP/San Dimas - E.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	E
Area (ac)	1.54
Flow Path Length (ft)	634.0
Flow Path Slope (vft/hft)	0.013
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1489
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	52.0
Clear Peak Flow Rate (cfs)	0.0999
Burned Peak Flow Rate (cfs)	0.0999
24-Hr Clear Runoff Volume (ac-ft)	0.0416
24-Hr Clear Runoff Volume (cu-ft)	1812.9514



SUSMP

Peak Flow Hydrologic Analysis

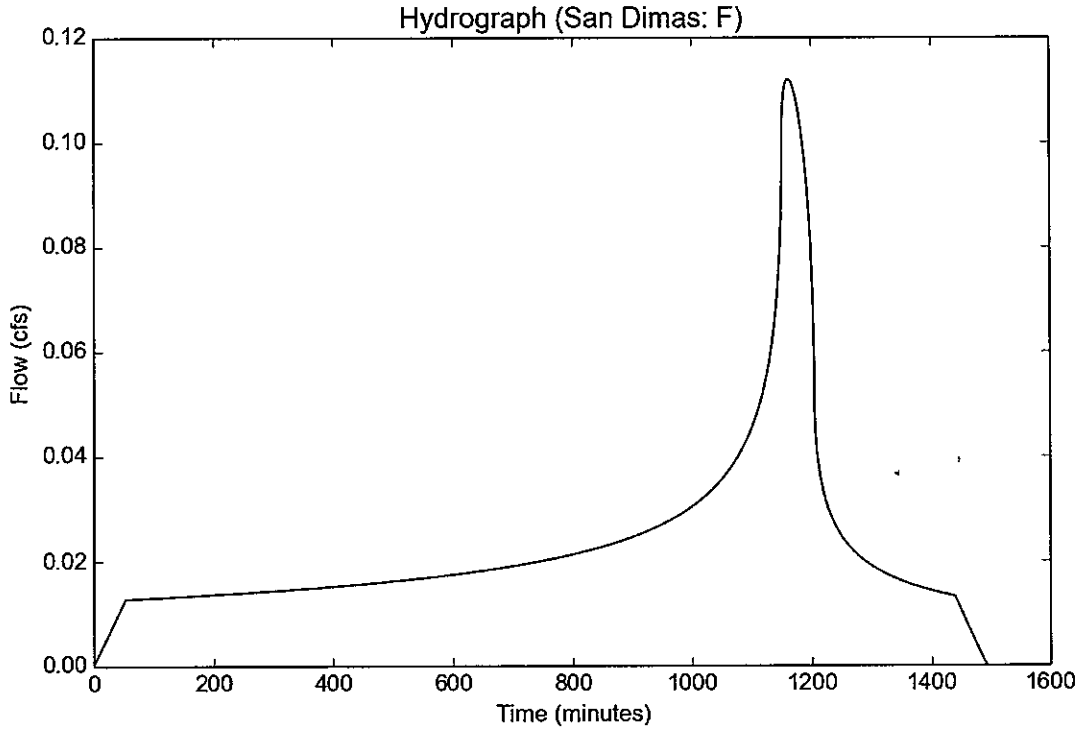
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/.75 inch SUSMP/San Dimas - F.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	F
Area (ac)	1.74
Flow Path Length (ft)	485.0
Flow Path Slope (vft/hft)	0.0045
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1475
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	53.0
Clear Peak Flow Rate (cfs)	0.1119
Burned Peak Flow Rate (cfs)	0.1119
24-Hr Clear Runoff Volume (ac-ft)	0.047
24-Hr Clear Runoff Volume (cu-ft)	2048.4025



SUSMP

Peak Flow Hydrologic Analysis

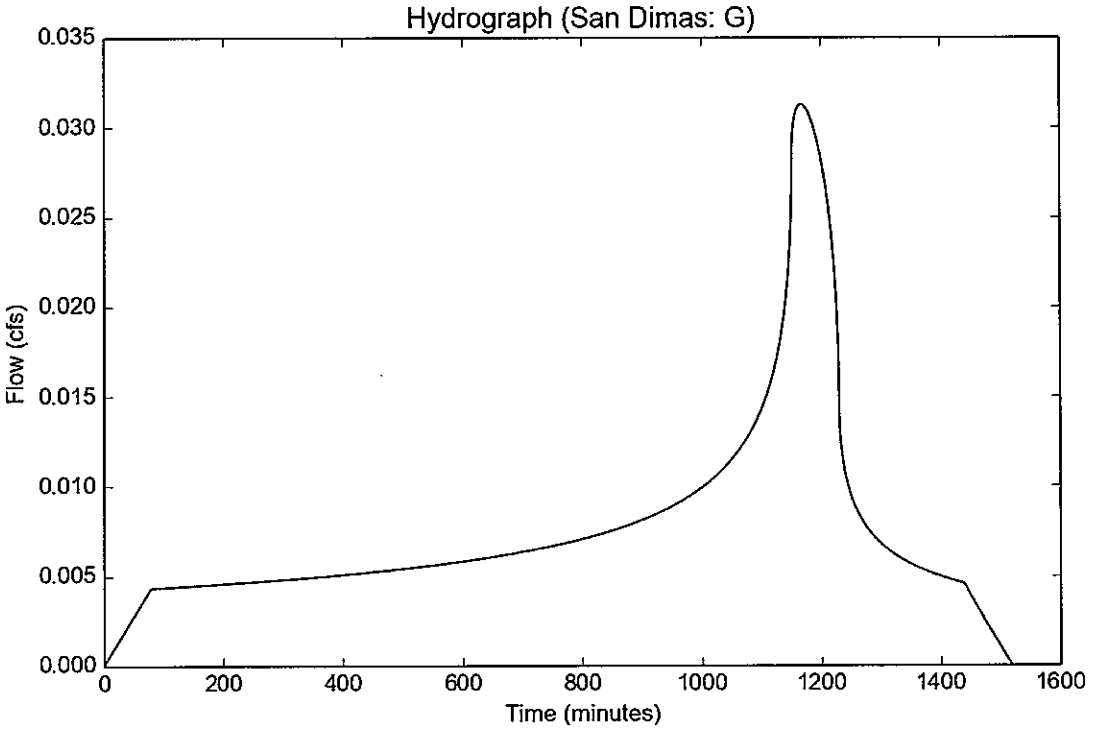
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/.75 inch SUSMP/San Dimas - G.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	G
Area (ac)	1.42
Flow Path Length (ft)	715.0
Flow Path Slope (vft/hft)	0.0576
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.1
Soil Type	7
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1223
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	79.0
Clear Peak Flow Rate (cfs)	0.0313
Burned Peak Flow Rate (cfs)	0.0313
24-Hr Clear Runoff Volume (ac-ft)	0.0158
24-Hr Clear Runoff Volume (cu-ft)	690.1768



85th PERCENTILE 24 HOUR RAINFALL

85th

Peak Flow Hydrologic Analysis

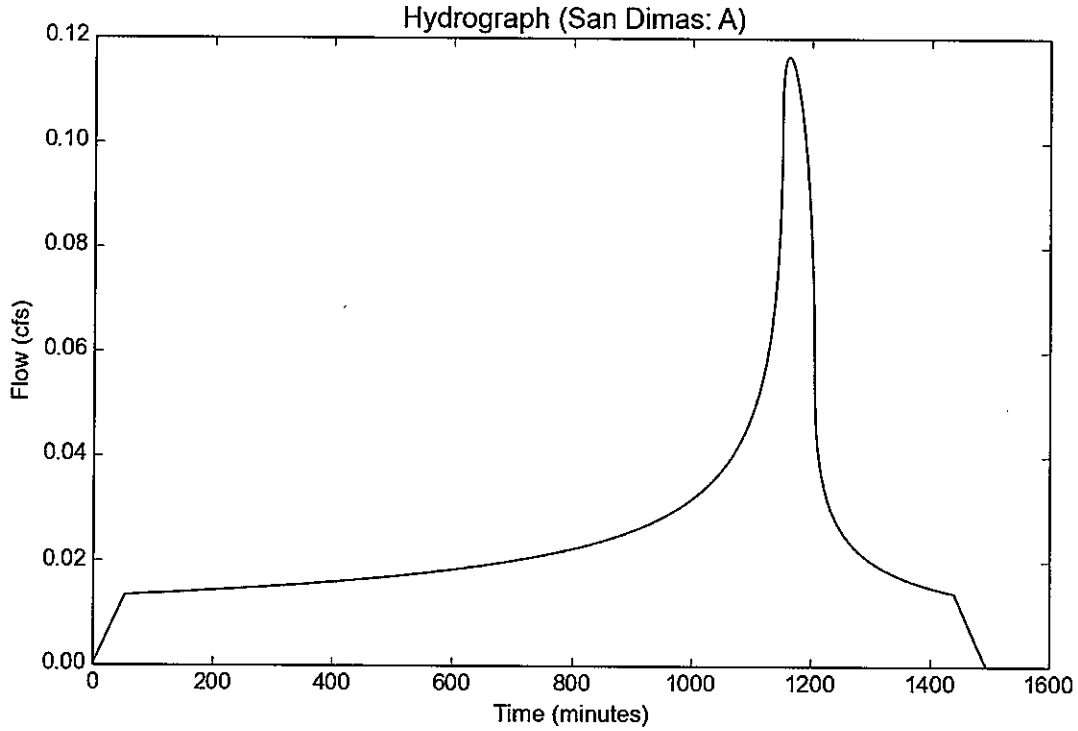
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/85th 24Hr Storm/San Dimas - A.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	A
Area (ac)	1.37
Flow Path Length (ft)	610.0
Flow Path Slope (vft/hft)	0.003
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.195
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	54.0
Clear Peak Flow Rate (cfs)	0.1165
Burned Peak Flow Rate (cfs)	0.1165
24-Hr Clear Runoff Volume (ac-ft)	0.0494
24-Hr Clear Runoff Volume (cu-ft)	2150.4333



85th

Peak Flow Hydrologic Analysis

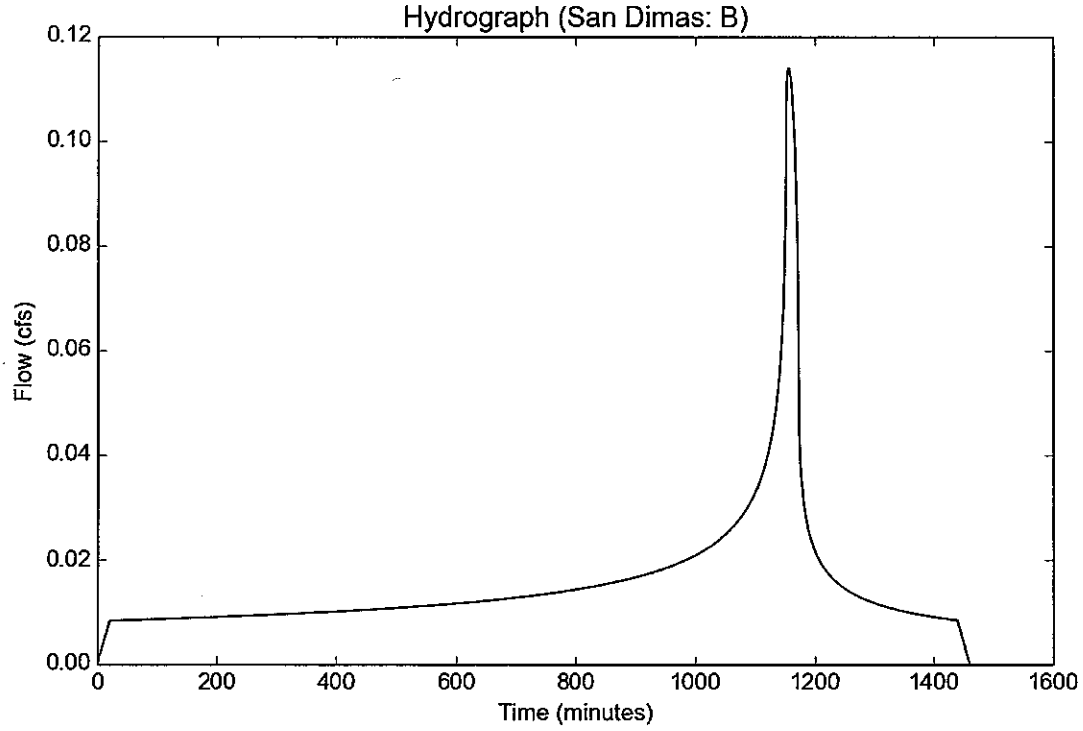
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/85th 24Hr Storm/San Dimas - B.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Dimas
Subarea ID	B
Area (ac)	0.86
Flow Path Length (ft)	414.0
Flow Path Slope (vft/hft)	0.16
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.3039
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	21.0
Clear Peak Flow Rate (cfs)	0.114
Burned Peak Flow Rate (cfs)	0.114
24-Hr Clear Runoff Volume (ac-ft)	0.031
24-Hr Clear Runoff Volume (cu-ft)	1349.8635



85th

Peak Flow Hydrologic Analysis

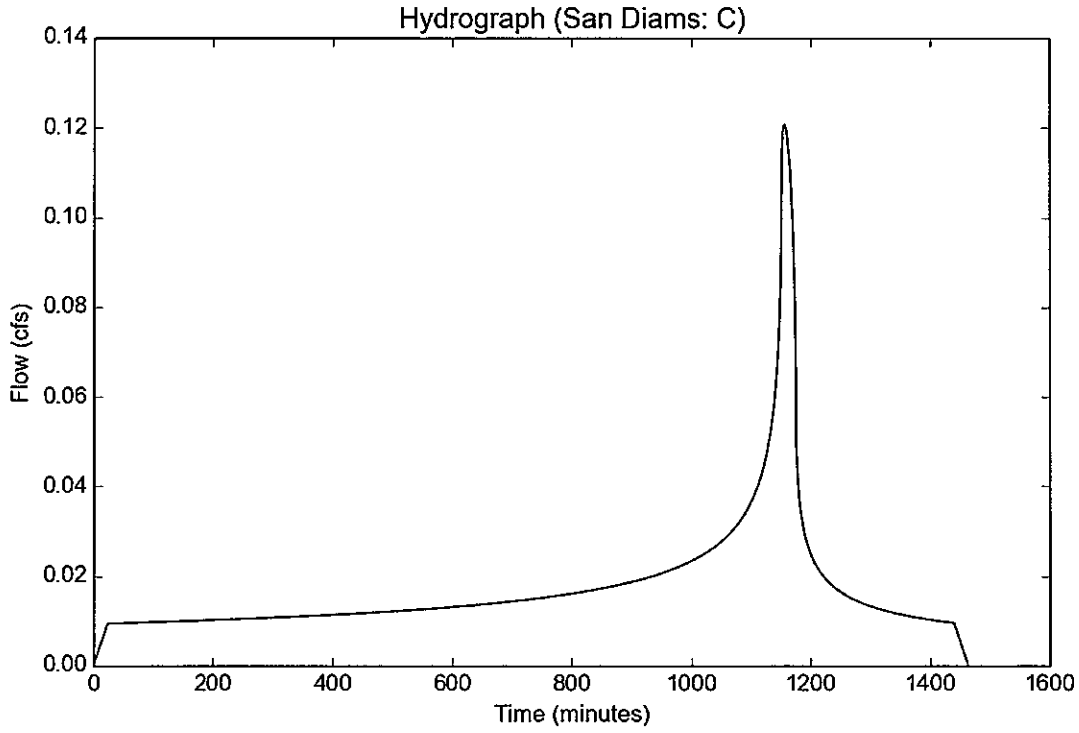
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/85th 24Hr Storm/San Diams - C.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Diams
Subarea ID	C
Area (ac)	0.97
Flow Path Length (ft)	306.0
Flow Path Slope (vft/hft)	0.023
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2854
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	24.0
Clear Peak Flow Rate (cfs)	0.1207
Burned Peak Flow Rate (cfs)	0.1207
24-Hr Clear Runoff Volume (ac-ft)	0.035
24-Hr Clear Runoff Volume (cu-ft)	1522.5231



85th

Peak Flow Hydrologic Analysis

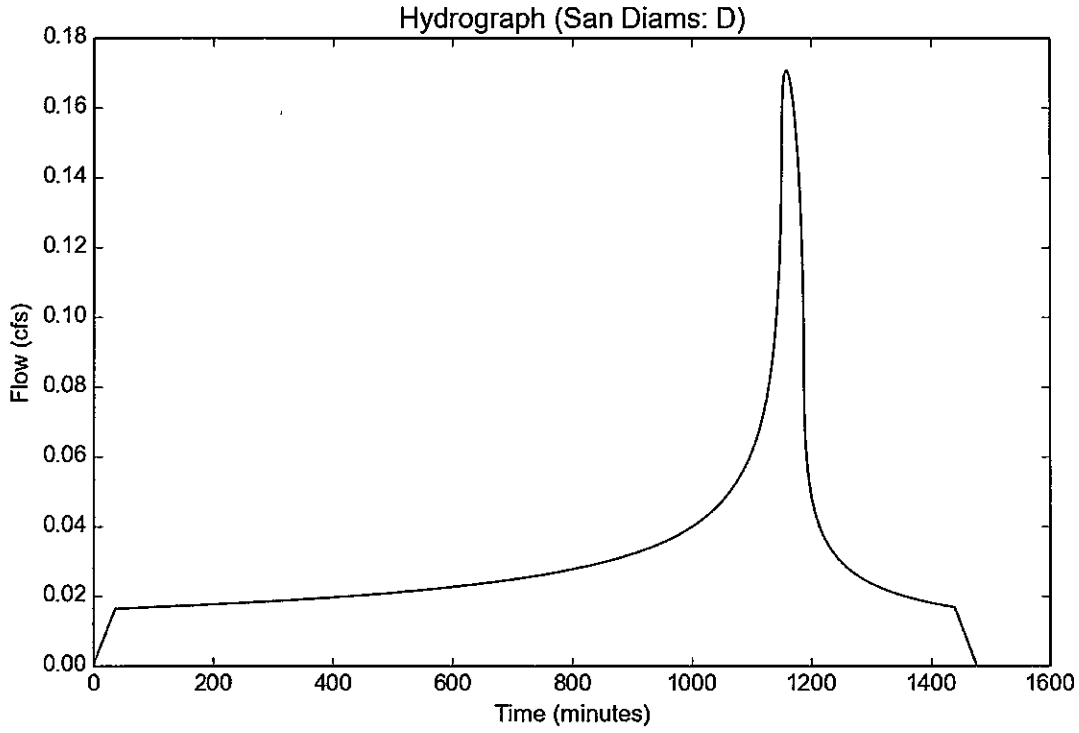
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/85th 24Hr Storm/San Diams - D.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Diams
Subarea ID	D
Area (ac)	1.68
Flow Path Length (ft)	488.0
Flow Path Slope (vft/hft)	0.011
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.2329
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	37.0
Clear Peak Flow Rate (cfs)	0.1706
Burned Peak Flow Rate (cfs)	0.1706
24-Hr Clear Runoff Volume (ac-ft)	0.0605
24-Hr Clear Runoff Volume (cu-ft)	2636.9743



85th

Peak Flow Hydrologic Analysis

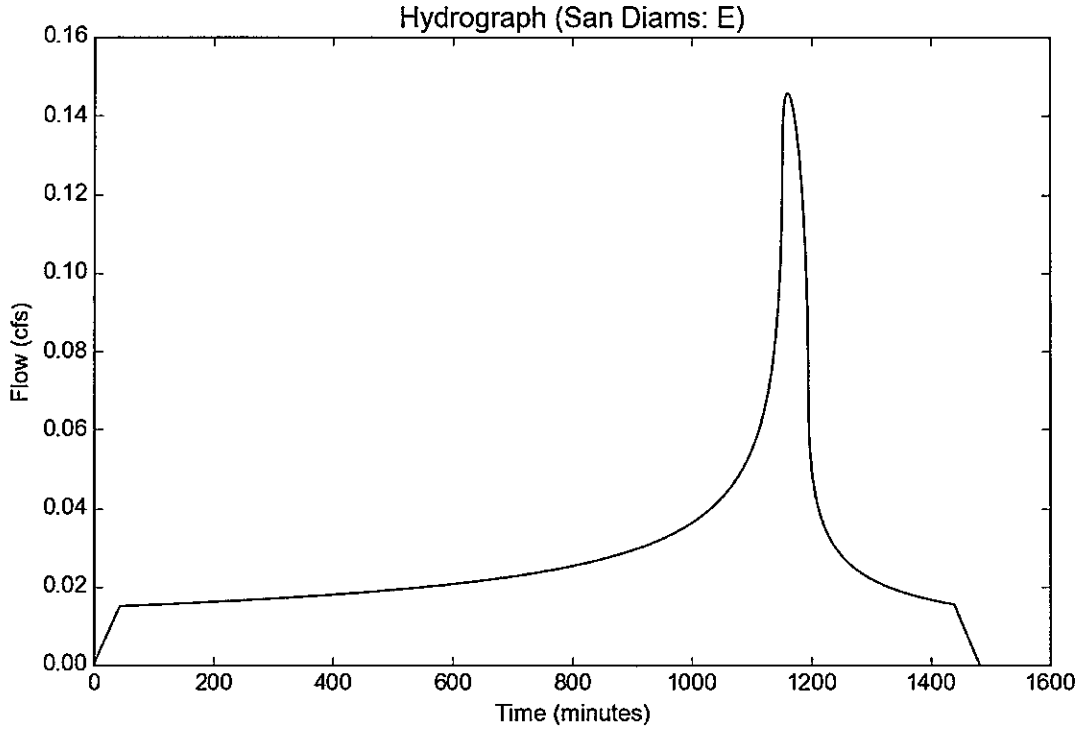
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/85th 24Hr Storm/San Diams - E.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Diams
Subarea ID	E
Area (ac)	1.54
Flow Path Length (ft)	634.0
Flow Path Slope (vft/hft)	0.013
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.217
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	43.0
Clear Peak Flow Rate (cfs)	0.1457
Burned Peak Flow Rate (cfs)	0.1457
24-Hr Clear Runoff Volume (ac-ft)	0.0555
24-Hr Clear Runoff Volume (cu-ft)	2417.2415



85th

Peak Flow Hydrologic Analysis

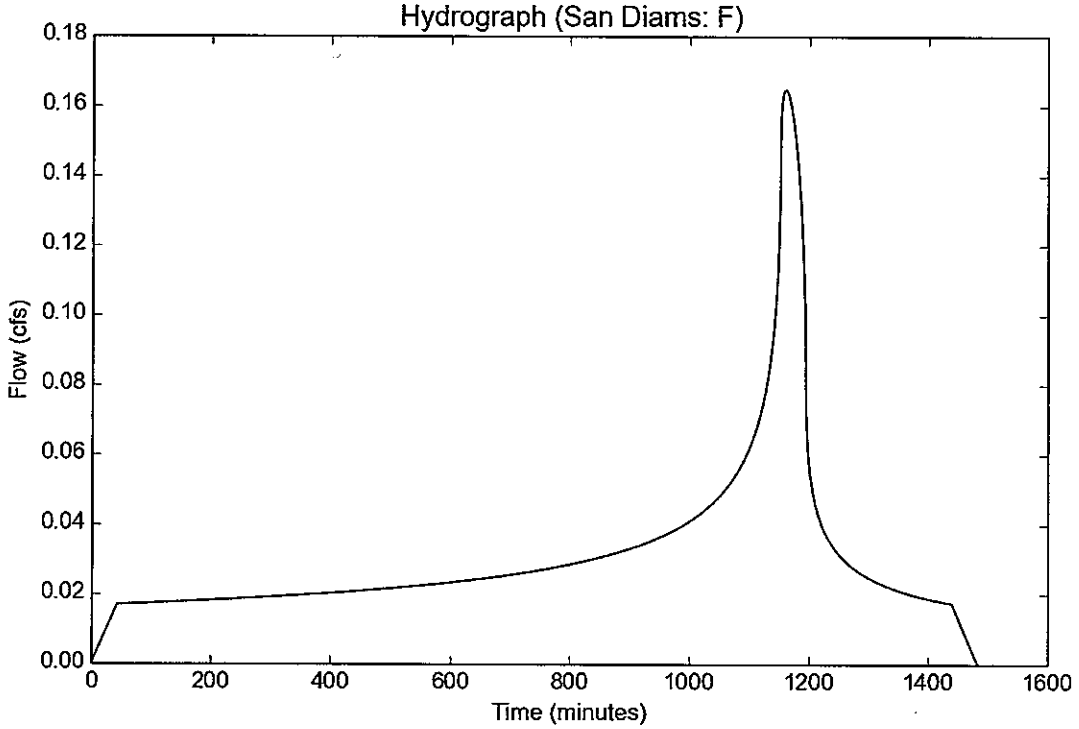
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/85th 24Hr Storm/San Diams - F.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Diams
Subarea ID	F
Area (ac)	1.74
Flow Path Length (ft)	485.0
Flow Path Slope (vft/hft)	0.0045
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.42
Soil Type	7
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.217
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.436
Time of Concentration (min)	43.0
Clear Peak Flow Rate (cfs)	0.1646
Burned Peak Flow Rate (cfs)	0.1646
24-Hr Clear Runoff Volume (ac-ft)	0.0627
24-Hr Clear Runoff Volume (cu-ft)	2731.169



85TH

Peak Flow Hydrologic Analysis

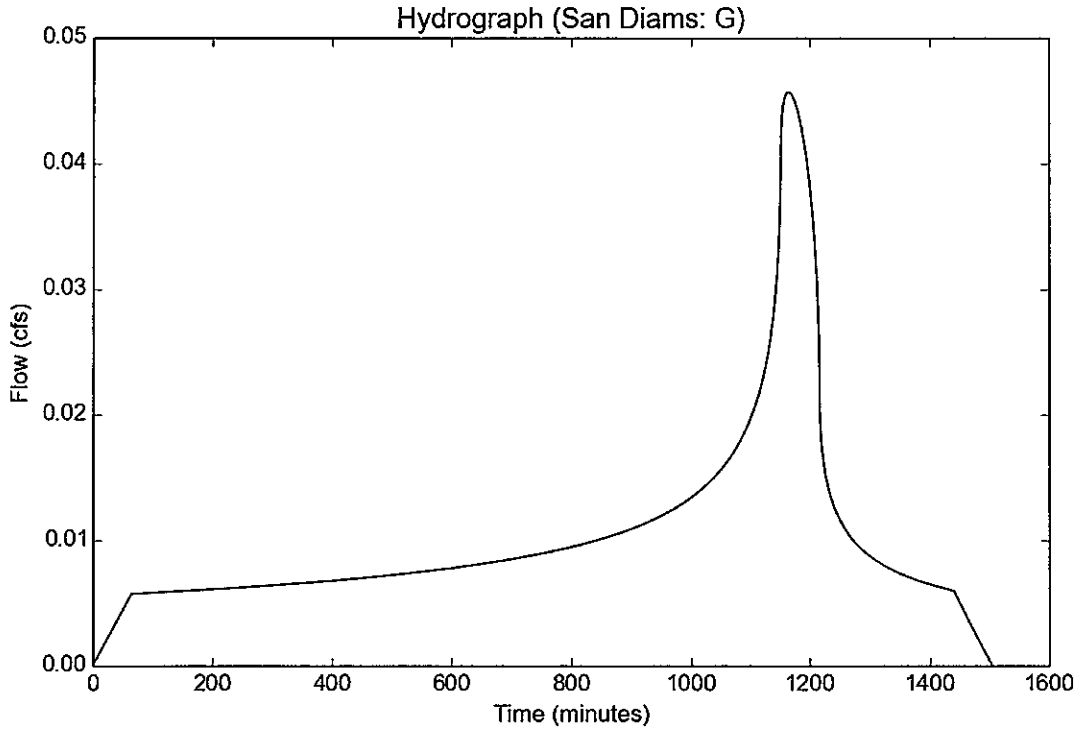
File location: C:/Users/Steve/Desktop/HYDROCALC FILE/San Dimas-Welbern/85th 24Hr Storm/San Diams - G.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	San Diams
Subarea ID	G
Area (ac)	1.42
Flow Path Length (ft)	712.0
Flow Path Slope (vft/hft)	0.0576
85th Percentile Rainfall Depth (in)	1.0
Percent Impervious	0.1
Soil Type	7
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.0
Peak Intensity (in/hr)	0.1787
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	65.0
Clear Peak Flow Rate (cfs)	0.0457
Burned Peak Flow Rate (cfs)	0.0457
24-Hr Clear Runoff Volume (ac-ft)	0.0211
24-Hr Clear Runoff Volume (cu-ft)	920.2108



RETENTION BASIN CALCULATIONS

ANDREASEN ENGINEERING, INC.
580 North Park Avenue
Pomona, California 91768
(909) 623-1595
FAX (909) 620-0016

JOB WELBERN DEV. - SAN DIMAS
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

PERCOLATION TEST RESULTS ADJUSTMENTS:

P-1 4.2 IN/HR, P-2 8.6 IN/HR
(USE AVERAGE FOR PRELIMINARY STUDY AND TTM SUBMITTAL) 6.4 IN/HR (AVE)

$P_{DESIGN} = P_{MEA} \times F_{TESTING} \times F_{PLUGGING} \times F_{GEOMETRY}$

$= 6.4 \times 0.5 \times 0.9 \times 1$
$= 2.9$ IN/HR

USE 24 HR TO INFILTRATE

24 HR X 2.9 IN/HR = 69.6 IN OR 5.8 FT (IN 24 HRS)

TARGET VOLUME: 13,728 CU. FT

RETENTION BASIN VOLUME:

CONTOUR	AREA	AVE. AREA (FT^2)	VOL. (FT^3)
967	3010		
		2765	2765
966	2520		
		2216	2881
964.7	1912.5		5645

INFILTRATION VOLUME:

FT x FT
5.8 FT (24 HR) x 70.5 X 25 (BOTTOM AREA)
$= 11,093\ FT^3$
$+ 5645$
$16738\ FT^3 > 13728\ FT^3$ TARGET VOLUME

Stephen Ventura

From: "Gary" <garyand@aeicivil.com>
Date: Saturday, August 08, 2015 9:44 AM
To: "Stephen Ventura" <stephen@aeicivil.com>
Subject: Fwd: perc numbers for your design

You can finish both the Hydrology Report and Infiltration Basin sizing. Please send Hydrology Report to Ryan so he can finalize the WQMP. Thanks

Gary

Begin forwarded message:

From: Stan Stringfellow <stan@dev1group.com>
Date: August 7, 2015 at 4:19:34 PM PDT
To: "Gary Andreasen (garyand@aeicivil.com)" <garyand@aeicivil.com>, Matt Waken <matt@walbern.com>
Subject: FW: perc numbers for your designer

Gary,
I am forwarding you the perc test numbers. See below.

Stan Stringfellow

Development 1 Group inc.

2011 E. Financial Way, Ste 203
Glendora, CA. 91741
T: 626-914-7800
M: 626-945-9138

From: John McKeown [mailto:JMcKeown@chjconsultants.com]
Sent: Friday, August 07, 2015 11:54 AM
To: Stan Stringfellow <stan@dev1group.com>
Subject: perc numbers for your designer

Stan:

We ran the numbers for the perc tests performed yesterday.

P-1	10.8 cm/hr	4.2 in/hr
P-2	21.8 cm/hr	8.6 in/hr

Formal report will follow.

Thank you,

John McKeown
CHJ

- Vegetated Swales (Section 3)
- Proprietary Devices (Section 11)

Sizing Criteria

As with sand filters, infiltration facilities can be sized using one of two methods: a simple sizing method or a routing modeling method. With either method the SUSMP volume must be completely infiltrated within 72 hours. Infiltration basins provide the majority of storage above ground while infiltration trenches provide the majority of storage in the voids of the rock fill. The simple sizing procedures provided below can be used for either infiltration basins or trenches. For the routing modeling method, refer to Section 10 - Sand Filters.

Step 1: Calculate the design volume

Infiltration facilities shall be sized to capture and infiltrate the SUSMP volume (see *A Manual for the Standard Urban Storm Water Mitigation Plan*, LACDPW, September 2002 (or as amended)).

Step 2: Determine the design percolation rate

The percolation rate will decline between maintenance cycles as the surface becomes occluded and particulates accumulate in the infiltrative layer. Monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. It is important that adequate conservatism is incorporated in the selection of design percolation rates. For infiltration trenches, the design percolation rate discussed here is the percolation rate of the underlying soils and not the percolation rate of the filter media bed (refer to the "Facility Geometry" section for the recommended composition of the filter media bed for infiltration trenches).

A simplified method may be used to determine the design percolation rate by applying correction factors to the field measured percolation rate. These factors take into account uncertainty in measurement procedure, depth to water table or impermeable strata, infiltration facility geometry, and long term reductions in permeability due to biofouling and accumulation of fines.

$$P_{design} = P_{measured} \times F_{testing} \times F_{plugging} \times F_{geometry} \qquad \text{(Equation 6-1)}$$

Where:

P_{design}	=	design percolation rate (in/hr)
$P_{measured}$	=	measured percolation rate (per Policy for New Percolation Basin Testing, Design, and Maintenance, Appendix G or as amended) (in/hr)
F	=	correction factor

$F_{testing}$ takes into account uncertainties in the testing method and is 0.5.

$F_{plugging}$ accounts for reductions in infiltration rates over the long term caused by plugging of soils. The factor is:

- 0.7 for loams and sandy loams
- 0.8 for fine sands and loamy sands
- 0.9 for medium sands
- 1.0 for coarse sands or cobbles or for any facility preceded by a full specification filter strip or vegetated swale.

$F_{geometry}$ accounts for the influence of facility geometry and depth to the water table or impervious strata on the actual infiltration rate. $F_{geometry}$ must be between 0.25 and 1.0 as determined by the following equation:

$$F_{geometry} = 4\ D/W + 0.05 \qquad \text{(Equation 6-2)}$$

Where:

D = depth from the bottom of the facility to the maximum wet-season water table elevation or nearest impervious layer, whichever is less (ft)
W = width of the facility (ft)

Note that adjusted percolation rate (P_{design}) may be different for basins and trenches installed in the same location due to differences in dimension.

Step 3: Calculate the surface area

Determine the size of the required infiltrating surface by assuming the SUSMP volume will fill the available ponding depth plus the void spaces based on the computed porosity of the filter media (normally about 32%).

1. Determine the maximum depth of runoff that can be infiltrated within the required drain time (72 hr) as follows:

$$d_{\max} = \frac{P_{design}}{12} t \qquad \text{(Equation 6-3)}$$

Where:

t = required drain time (hrs) [Use 72 hours]
P_{design} = design percolation rate of underlying soils (in/hr)
d_{max} = the maximum depth of water that can be infiltrated within the required drain time (ft)

2. Choose the ponding depth (d_p) and/or trench depth (d_t) such that:

$$d_{\max} \geq d_p \qquad \text{For Infiltration Basins} \qquad \text{(Equation 6-4)}$$

$$d_{\max} \geq n_t d_t + d_p \qquad \text{For Infiltration Trenches} \qquad \text{(Equation 6-5)}$$

Infiltration Facility Operations and Maintenance

General Requirements

Infiltration facility maintenance should include frequent inspections to ensure that water infiltrates into the subsurface completely within the recommended infiltration time of 72 hours or less after a storm (see Appendix E for guidance on facility inspection and Appendix F for an infiltration inspection and maintenance checklist).

Maintenance and regular inspections are of primary importance if infiltration basins and trenches are to continue to function as originally designed. A specific maintenance plan shall be developed specific to each facility outlining the schedule and scope of maintenance operations, as well as the documentation and reporting requirements. The following are general maintenance requirements:

1. Regular inspection should determine if the sediment pretreatment structures require routine maintenance.

2. If water is noticed in the basin more than 72 hours after a major storm or in the observation well of the infiltration trench more than 48 hours after a major storm, the infiltration facility may be clogged. Maintenance activities triggered by a potentially clogged facility include:

    - Check for debris/sediment accumulation, rake surface and remove sediment (if any) and evaluate potential sources of sediment and vegetative or other debris (e.g., embankment erosion, channel scour, overhanging trees, etc). If suspected upland sources are outside of the County's jurisdiction, additional pretreatment operations (e.g., trash racks, vegetated swales, etc.) may be necessary.

    - For basins, removal of the top layer of native soil may be required to restore infiltrative capacity.

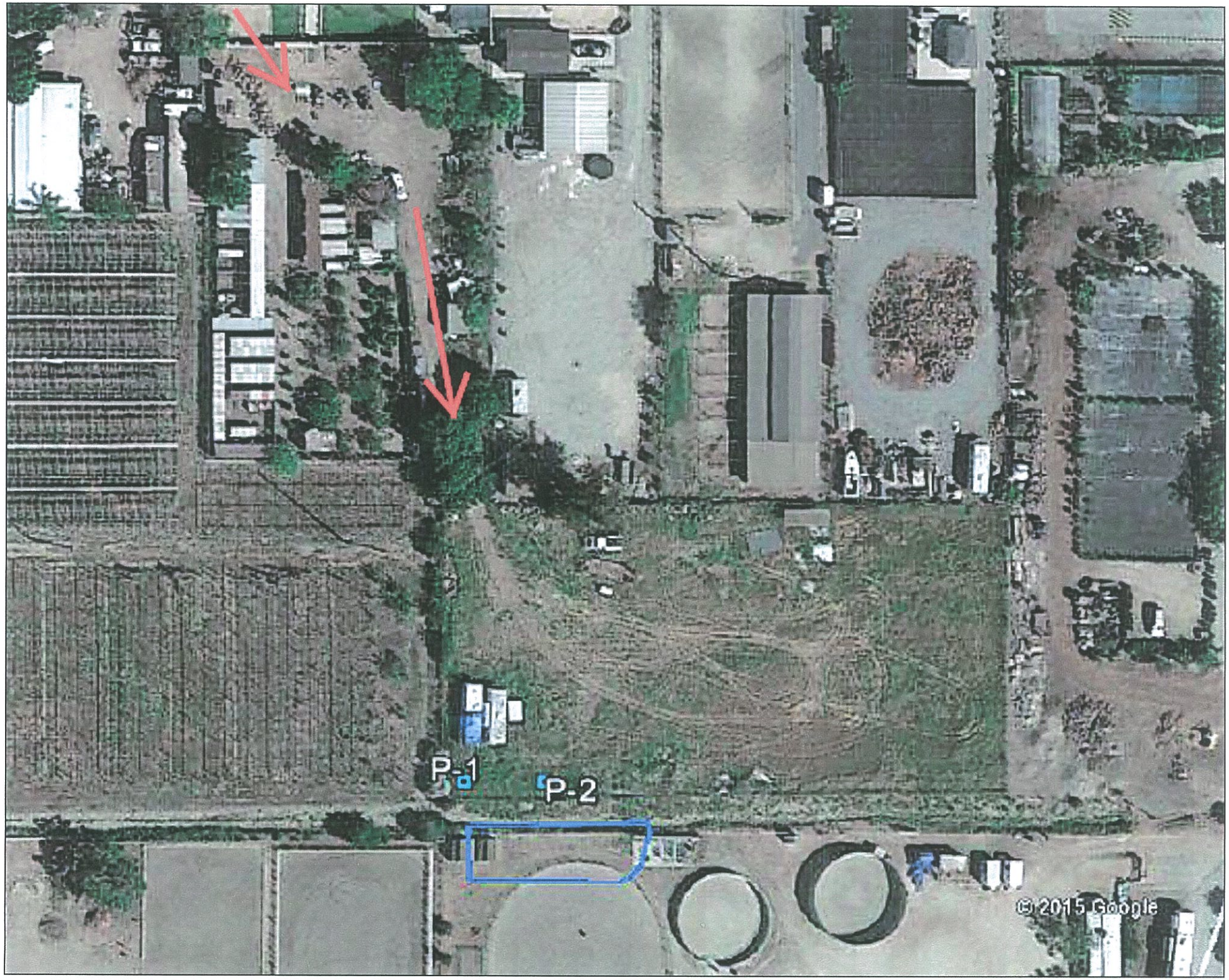
    - For trenches, assess the condition of the top aggregate layer for sediment buildup and crusting. Remove top layer of pea gravel and replace. If slow draining conditions persist, entire trench may need to be excavated and replaced.

3. Any debris or algae growth located on top of the infiltration facility should be removed and disposed of properly.

4. Facilities should be inspected annually. Trash and debris should be removed as needed, but at least annually prior to the beginning of the wet season.

5. Site vegetation should be maintained as frequently as necessary to maintain the aesthetic appearance of the site, and as follows:

    - Vegetation, large shrubs, or trees that limit access or interfere with basin operation should be pruned or removed.


P-1
P-2
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