

PRELIMINARY HYDROLOGY STUDY

11733 FLORENCE AVE

SANTA FE SPRINGS, CA

Project Address:

11733 Florence Ave
Santa Fe Springs, CA 90670

Prepared For:

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Prepared February 2021

Executive Summary

The calculations provided within this report and within the attachments provide an understanding that there is no adverse impact to the post-development condition within the vicinity of the project site. The total runoff from Subareas A-1, B-1, and B-2 in the post-development conditions is less than the pre-development condition. The proposed grading and drainage will facilitate the anticipated stormwater peak flow from the subject property.

This Preliminary Hydrology Study was prepared by KES Technologies, Inc. under the supervision of _____, P.E.

_____, P.E. C_____

Date

KES Technologies Inc.

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Introduction

The preliminary hydrology study will determine the amount of stormwater runoff generated from the project site in the existing and proposed conditions. This study was also prepared to determine whether detention will be required or not by comparing the proposed and existing condition peak flow rate for the 2-year, 25-year, 50-year, and 100-year peak storm events.

Site Description

The proposed site is located at 11733 Florence Ave, in the City of Santa Fe Springs, County of Los Angeles. The site is bordered by Florence Ave to the south, single family homes to the west, an elementary school track and field to the north, and a church to the east as well as some townhouses. Existing site condition consists of a 3.02 net acre parcel used for a church and parking lot.

Existing Condition

In its existing condition, the site does not accept flows from the adjacent properties and will remain this way in its proposed condition.

Approximately 16% of the site generally flows over land towards Florence Ave (Subarea X1). The remaining 84% (Subarea X2) flows towards the site's northeast corner, onto the adjacent property. Offsite, this flow is contained within a 62' long 3' wide concrete gutter which directs the flows to a School District maintenance lot within curb and gutter, and ultimately to a 14' Los Angeles County Flood Control District (LACFCD) catch basin located at the intersection of a frontage road and Pioneer Blvd. The runoff then continues in an 18" Reinforced Concrete Pipe (RCP) before connecting to a 51" RCP "BI 7302 - Line B" and continues south. At the intersection of Pioneer Blvd and Florence, the flow joins LACFCD 10'x10" Reinforced Concrete Box (RCB) "BI 5905 - Norwalk". See continuation of flow in next paragraph.

Stormwater runoff tributary to Florence Ave is conveyed as street flow within the existing curb/gutter in the westerly direction and enters an existing 14' LACFCD catch basin located approximately 80 feet west of the site. Stormwater runoff enters this existing catch basin, continues within an existing LACFCD 21" RCP, connecting into the existing LACFCD RCB "BI 5905 – Norwalk", then to LACFCD RCB "BI 1110 - Hud 2 - Line A", then outletting to the San Gabriel River at Imperial Highway, ultimately discharging to the Pacific Ocean (refer to the As-built Drawings in [Appendix E](#) for reference).

Refer to the Existing Condition Hydrology Map located within [Appendix A](#) of this report.

Proposed Condition

The proposed project consists of 63 residential condominiums, along with recreational areas comprising approximately 3.02 acres. The proposed development includes drive aisles, parking, landscaping, walkways and common open space areas. The site will be graded to direct stormwater runoff to three established low points, two located near Florence Ave and one at the northwest corner of the site. The proposed development will utilize catch basins and an onsite area drain system to collect and convey to a proposed underground storm drain storage system. Stormwater runoff will be infiltrated via storage pipes and a dry-well system. Overflow will be conveyed offsite to Florence Avenue discharging through proposed parkway culverts.

To support the grading design, limit retaining conditions along the perimeter, and reduce the amount of fill, a slightly larger portion of the proposed development has been designed to drain towards Florence Avenue. Runoff tributary to Florence Avenue flows in the southerly direction, then continues in the westerly direction within Florence Avenue, therefore, reducing the overall historic drainage pattern of water conveyed to the north.

For preliminary hydrologic purposes, initial subareas were determined based on the proposed preliminary grading and drainage design (see [Appendix D](#)). Recommended impervious area ratio values from *Los Angeles County Hydrology Manual 2006 – Appendix D* were used in this study. During final engineering, the preliminary estimates of the

impervious area are to be verified for both the existing and proposed conditions to reflect peak flow values for individual subareas.

Refer to the Proposed Condition Hydrology Map located within [Appendix A](#) of this report.

Methodology

The site was analyzed using the *Los Angeles Hydrology Manual 2006* and the HydroCalc Software. The initial sub-areas were analyzed for acreage, land-use, soil type, peak flow rate and time of concentration according to the Rational Method. The site was graded to allow for a high point in the middle of the site, directing approximately 43% of the discharge onto Florence Ave, and 57% to the north.

In this preliminary hydrology study, the recommended values per *Los Angeles County Manual 2006 - Appendix D* were used for the percentage of impervious area for the proposed condition. In accordance with the *Los Angeles County Hydrology Manual* all habitable structures must have a finished floor elevation to allow 1 foot of freeboard during the 100-year storm event and the drop inlet catch basin and onsite conveyance storm drain pipes will be sized to convey runoff from the 25-year storm event. Catch basin, pipe sizing, and 100-year water surface elevation calculations will be provided during final engineering.

Design Assumptions

The following summarizes the facts about the project used in the analysis.

1. The property is located in the City of Santa Fe Springs, Los Angeles County rainfall region.
2. 100-year storm event flood level protection analysis required for habitable structures per the requirements of the *Los Angeles Hydrology Manual*.
3. 25-year storm event flood level protection analysis required for storm drain system per the requirements of the *Los Angeles County Hydrology Manual*.

-
4. Site located within Soil Type "003" per the LACDPW Hydrology Map GIS Viewer. (See [Appendix C](#) of this report for reference).
 5. 50-year storm event 24-hr rainfall depth = 6.0 per the LACDPW Hydrology Map GIS Viewer. (Refer to [Appendix C](#) of this report for reference).
 6. Existing impervious surface coverage is 28% for X1 and 94% for X2.
 7. Assumed Low-Rise Apartments, Condominiums, and Townhouses Land Use (86% impervious) for the proposed condition, The values for impervious areas were then selected from the recommended values in *Los Angeles County Hydrology Manual 2006 – Appendix D*.
 8. Peak flow rates and time of concentrations were calculated using the HydroCalc software provided by the Los Angeles County Department of Public Works.

References

See [Appendix D](#) and [Appendix E](#) for excerpts of some items below.

1. Los Angeles County Hydrology Manual 2006.
2. [HydroCalc v1.0.3 software](#) provided by LACDPW.
3. Tentative Map prepared by KES Technologies, Inc. dated February 2021.
4. Storm Drain As-built Plans.
5. LACDPW 50-year 24-hour Isohyet 1-H1.10 "Whittier" map.

Results

Hydrology Summary

See the [Appendix B](#) for complete results.

Existing Condition

Peak Storm Flow (cfs)	X1	X2	Total
2-yr	0.23	1.84	2.07
25-yr	1.06	5.71	6.77

50-yr	1.28	7.02	8.30
100-yr	1.48	7.90	9.38
Tc 100-yr (minutes)	5	6	

Proposed Condition

Peak Storm Flow (cfs)	A1	B1	B2	Total
2-yr	1.13	0.56	0.46	2.15
25-yr	3.63	1.70	1.39	6.72
50-yr	4.17	2.14	1.74	8.05
100-yr	5.03	2.41	1.97	9.41
Tc 100-yr (minutes)	7	5	5	

Summary of Peak Discharge Difference

Storm Event	Delta Total (cfs) Proposed - Existing	Percent Difference
2-yr	-0.08	-3.96%
25-yr	-0.05	-0.74%
50-yr	-0.25	-3.01%
100-yr	+0.03	+0.32%

Hydraulics Summary

See the [Appendix C](#) for complete results.

Parkway Drains Sizing

Parkway Drains are sized for the 25-year storm event.

Parkway Drain	Length, ft	Width, ft	Slope, %	Flow, cfs	Depth, in
#A1	56.0	5.0	0.25%	3.43	3.6
#B1	39.0	2.0	0.50%	1.70	3.5
#B2	46.0	3.0	0.25%	1.39	3.0

Detention Calculations

To be provided during Final Engineering.

100-year Water Surface Elevation

To be provided during Final Engineering.

Street Capacity Summary

To be provided during Final Engineering.

Catch Basin Sizing

To be provided during Final Engineering.

Storm Drain Pipe Sizing

To be provided during Final Engineering.

Conclusion

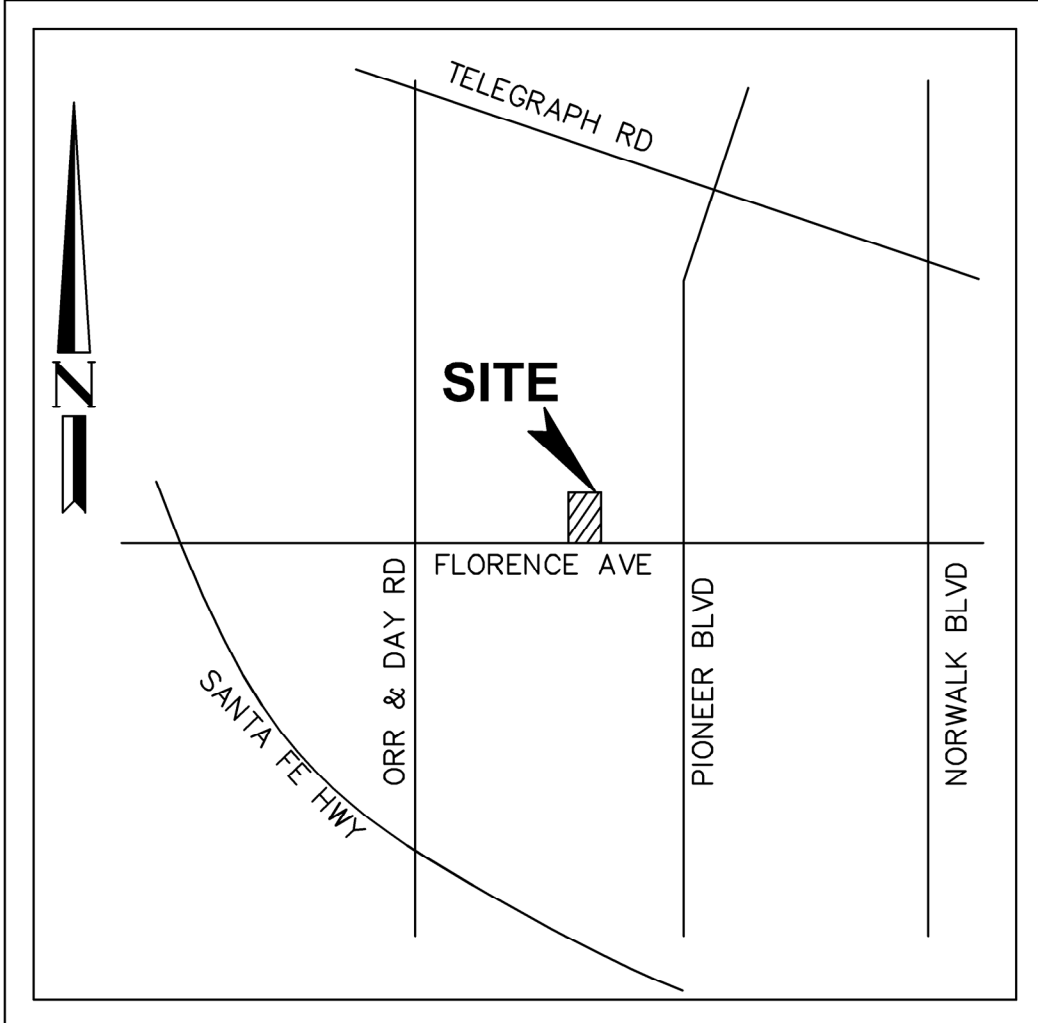
The results from this preliminary hydrology study utilizing HydroCalc software provided by Los Angeles County Department of Public Works demonstrate that the proposed stormwater peak flow from the subject site will be generally lower than the existing

condition peak flow as indicated in the hydrology summary results in the previous section of this study. The proposed peak flow being lower primarily because the project involves a change in land use from commercial to residential. Due to its existing condition of being a predominantly paved parking lot, the addition of landscape areas in our proposed residential development will ensure lower runoff rates. As previously noted, the preliminary estimates of impervious areas will be verified for both the existing and proposed conditions during final engineering.

In an event of overflowing, the proposed grading will facilitate the overflow by draining excess runoff through parkway drains, ensuring the ponding elevations remain below adjacent building finished floors.

APPENDIX A HYDROLOGY MAPS

EXISTING CONDITION HYDROLOGY MAP
CITY OF SANTA FE SPRINGS, COUNTY OF LOS ANGELES



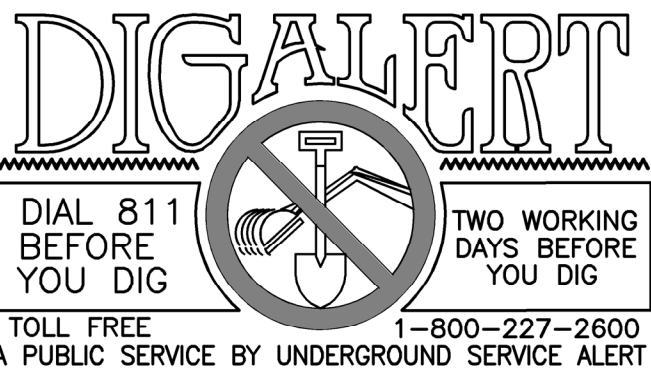
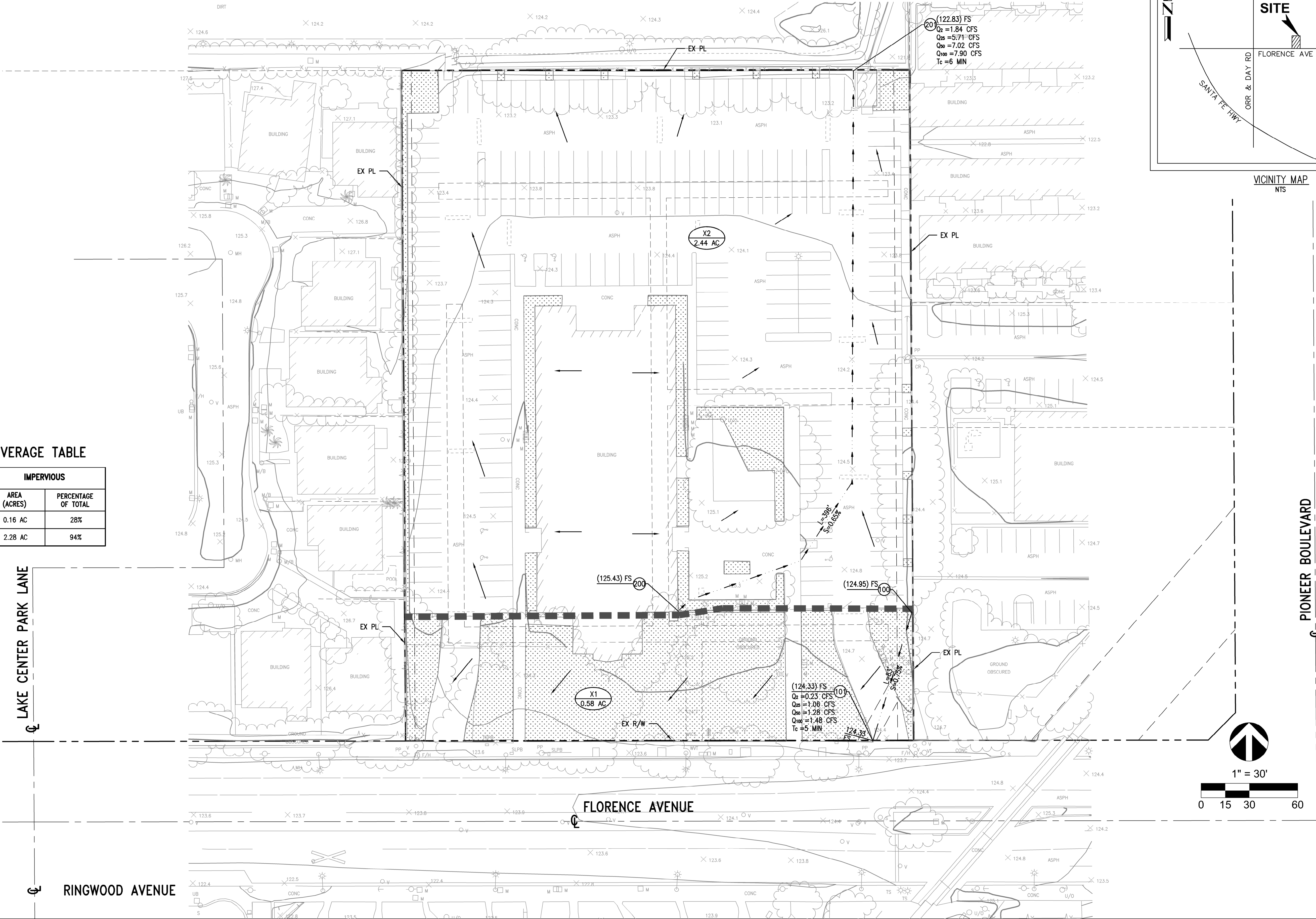
VICINITY MAP
NTS

LEGEND

- EXISTING RIGHT-OF-WAY/ BOUNDARY
- DRAINAGE AREA BOUNDARY
- LONGEST FLOW PATH
- FLOW DIRECTION
- EXISTING PERVIOUS COVERAGE
- INITIAL SUBAREA NODE
- (00.0) FS SPOT ELEVATION
- $Q_{100} = X.XX$ CFS PEAK RUNOFF (CFS)
- $T_c = X.X$ MIN TIME OF CONCENTRATION (MIN)
- X0 DRAINAGE AREA
- 0.0 AC ACREAGE (ACRES)

IMPERVIOUS & PERVIOUS COVERAGE TABLE

SUBAREA	PERVIOUS		IMPERVIOUS	
	AREA (ACRES)	PERCENTAGE OF TOTAL	AREA (ACRES)	PERCENTAGE OF TOTAL
X1	0.42 AC	72%	0.16 AC	28%
X2	0.16 AC	6%	2.28 AC	94%



REVISIONS

NO.	DATE	BY	DESCRIPTION	APPR.	DATE

DESIGNED BY	
DRAWN BY	
CHECKED BY	
APPROVED BY	
DATE	

PLAN PREPARED BY:
KES TECHNOLOGIES INC
CIVIL ENGINEERING
LAND PLANNING AND SURVEYING
1 VENTURE STE 100
IRVINE, CALIFORNIA 92618
PHONE (949) 339-5331

DATE

EXISTING CONDITION HYDROLOGY MAP
TENTATIVE TRACT 83383 - 11733 FLORENCE AVE
DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA FE SPRINGS

DRAWING NO.	
REV.	
SHEET 1 OF 2	

PROPOSED CONDITION HYDROLOGY MAP

CITY OF SANTA FE SPRINGS, COUNTY OF LOS ANGELES

LEGEND

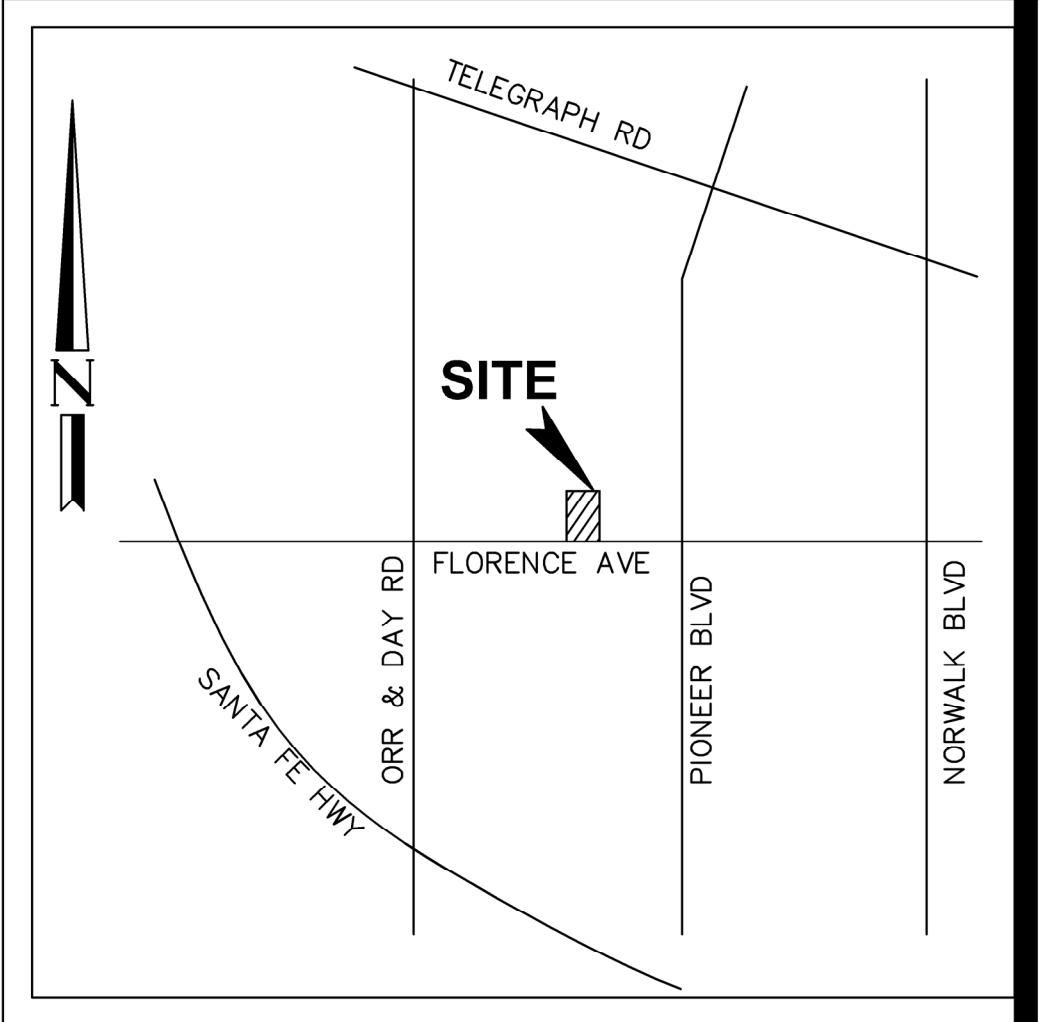
- EXISTING RIGHT-OF-WAY/ BOUNDARY
- DRAINAGE AREA BOUNDARY
- LONGEST FLOW PATH
- FLOW DIRECTION

INITIAL SUBAREA NODE
SPOT ELEVATION
PEAK RUNOFF (CFS)
TIME OF CONCENTRATION (MIN)

DRAINAGE AREA
ACREAGE (ACRES)

IMPERVIOUS & PERVIOUS COVERAGE

86% IMPERVIOUS PER HYDROLOGY MANUAL APPENDIX D
(LOW-RISE APARTMENTS, CONDOMINIUMS, AND TOWNHOUSES)
14% PERVIOUS



VICINITY MAP
NTS

LAKE CENTER PARK LANE

RINGWOOD AVENUE

PIONEER BOULEVARD

FLORENCE AVENUE



1" = 30'

0 15 30 60



DIAL 811
BEFORE
YOU DIG
TWO WORKING
DAYS BEFORE
YOU DIG
TOLL FREE
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REVISIONS

NO.	DATE	BY	DESCRIPTION	APPR.	DATE

DESIGNED BY	
DRAWN BY	
CHECKED BY	
APPROVED BY	
DATE	

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CIVIL ENGINEERING
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DATE

PROPOSED CONDITION HYDROLOGY MAP
TENTATIVE TRACT 83383 - 11733 FLORENCE AVE
DEPARTMENT OF PUBLIC WORKS
CITY OF SANTA FE SPRINGS

DRAWING NO.	
REV.	
SHEET 2 OF 2	

APPENDIX B HYDROLOGY CALCULATIONS

Subarea X1 - Existing Condition (2, 25, 50, 100-year)

Peak Flow Hydrologic Analysis

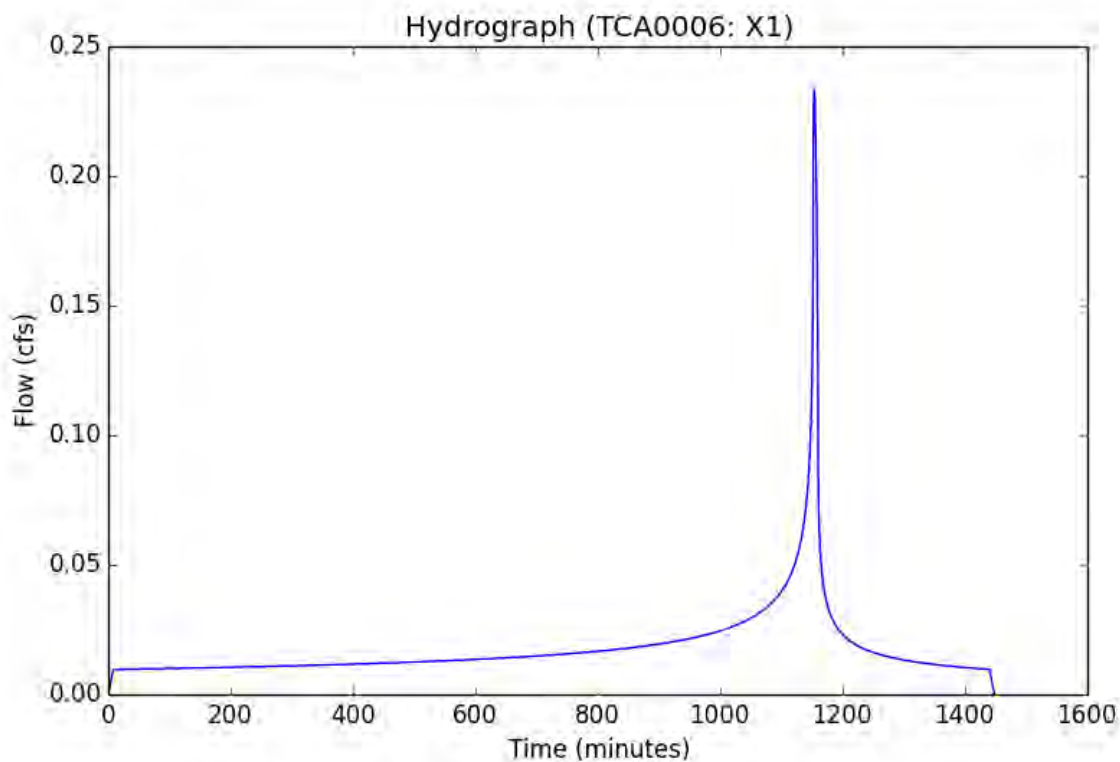
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	X1
Area (ac)	0.576561065197
Flow Path Length (ft)	83.0
Flow Path Slope (vft/hft)	0.00746987951807
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.28
Soil Type	3
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.322
Peak Intensity (in/hr)	1.1108
Undeveloped Runoff Coefficient (Cu)	0.1562
Developed Runoff Coefficient (Cd)	0.3645
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	0.2334
Burned Peak Flow Rate (cfs)	0.2334
24-Hr Clear Runoff Volume (ac-ft)	0.036
24-Hr Clear Runoff Volume (cu-ft)	1568.9124



Peak Flow Hydrologic Analysis

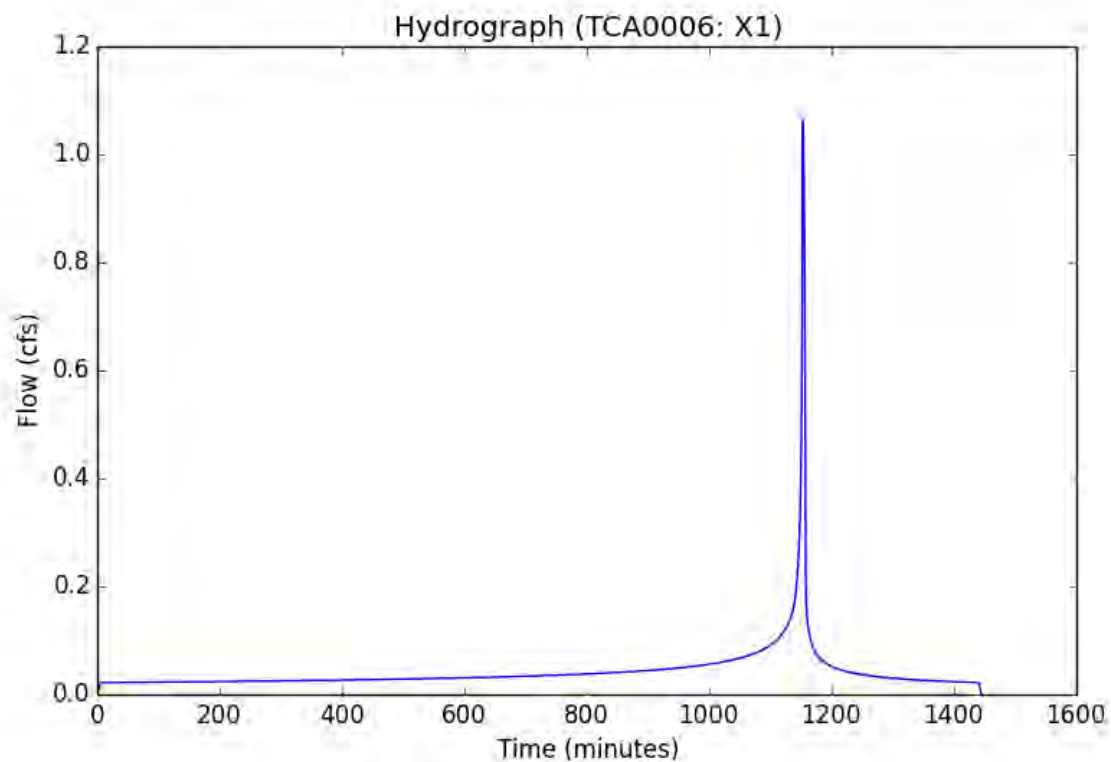
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	X1
Area (ac)	0.576561065197
Flow Path Length (ft)	83.0
Flow Path Slope (vft/hft)	0.00746987951807
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.28
Soil Type	3
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.268
Peak Intensity (in/hr)	3.143
Undeveloped Runoff Coefficient (Cu)	0.4651
Developed Runoff Coefficient (Cd)	0.5869
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.0635
Burned Peak Flow Rate (cfs)	1.0635
24-Hr Clear Runoff Volume (ac-ft)	0.0851
24-Hr Clear Runoff Volume (cu-ft)	3705.4894



Peak Flow Hydrologic Analysis

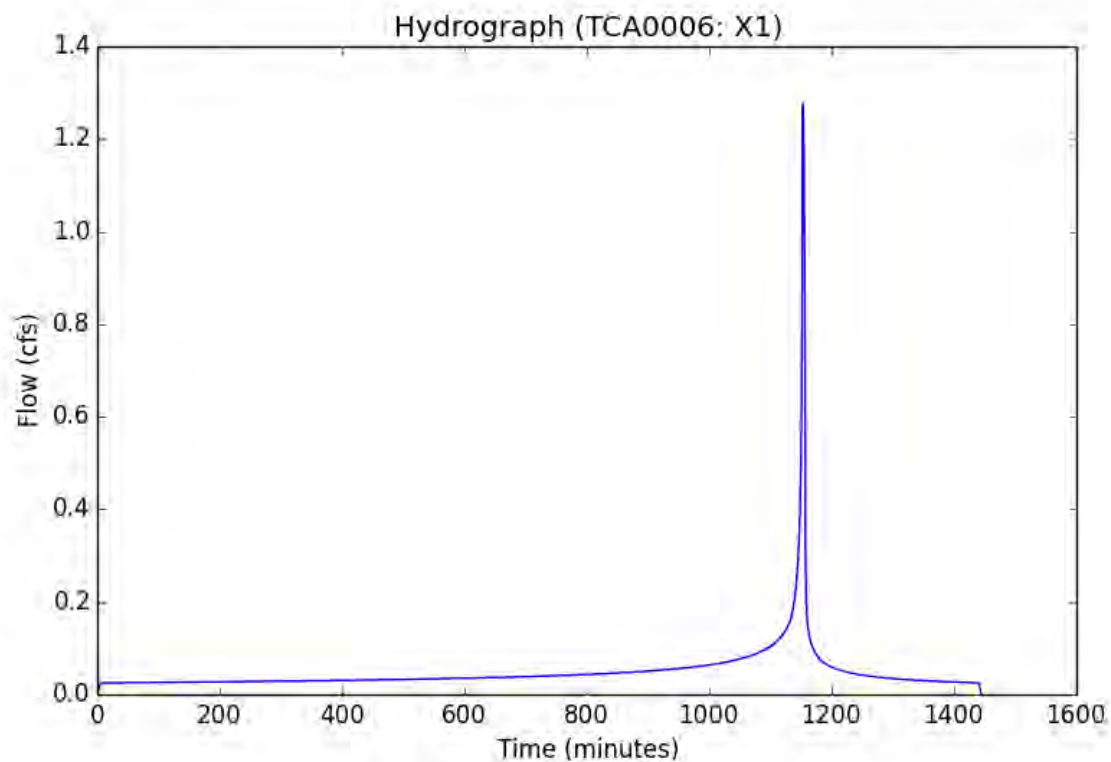
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Input Parameters

Project Name	TCA0006
Subarea ID	X1
Area (ac)	0.576561065197
Flow Path Length (ft)	83.0
Flow Path Slope (vft/hft)	0.00746987951807
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.28
Soil Type	3
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.5798
Undeveloped Runoff Coefficient (Cu)	0.5084
Developed Runoff Coefficient (Cd)	0.6181
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.2757
Burned Peak Flow Rate (cfs)	1.2757
24-Hr Clear Runoff Volume (ac-ft)	0.0978
24-Hr Clear Runoff Volume (cu-ft)	4258.2848



Peak Flow Hydrologic Analysis

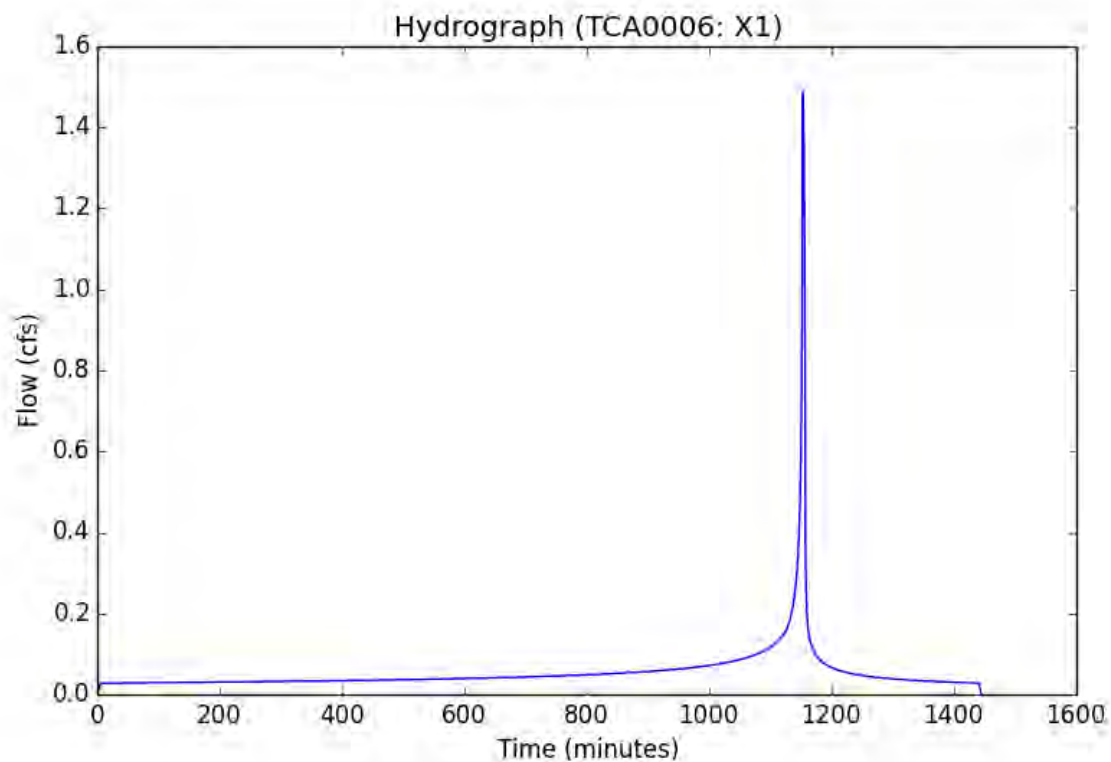
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Input Parameters

Project Name	TCA0006
Subarea ID	X1
Area (ac)	0.576561065197
Flow Path Length (ft)	83.0
Flow Path Slope (vft/hft)	0.00746987951807
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.28
Soil Type	3
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	6.732
Peak Intensity (in/hr)	4.0165
Undeveloped Runoff Coefficient (Cu)	0.5404
Developed Runoff Coefficient (Cd)	0.6411
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4845
Burned Peak Flow Rate (cfs)	1.4845
24-Hr Clear Runoff Volume (ac-ft)	0.1106
24-Hr Clear Runoff Volume (cu-ft)	4819.0267



Subarea X2 - Existing Condition (2, 25, 50, 100-year)

Peak Flow Hydrologic Analysis

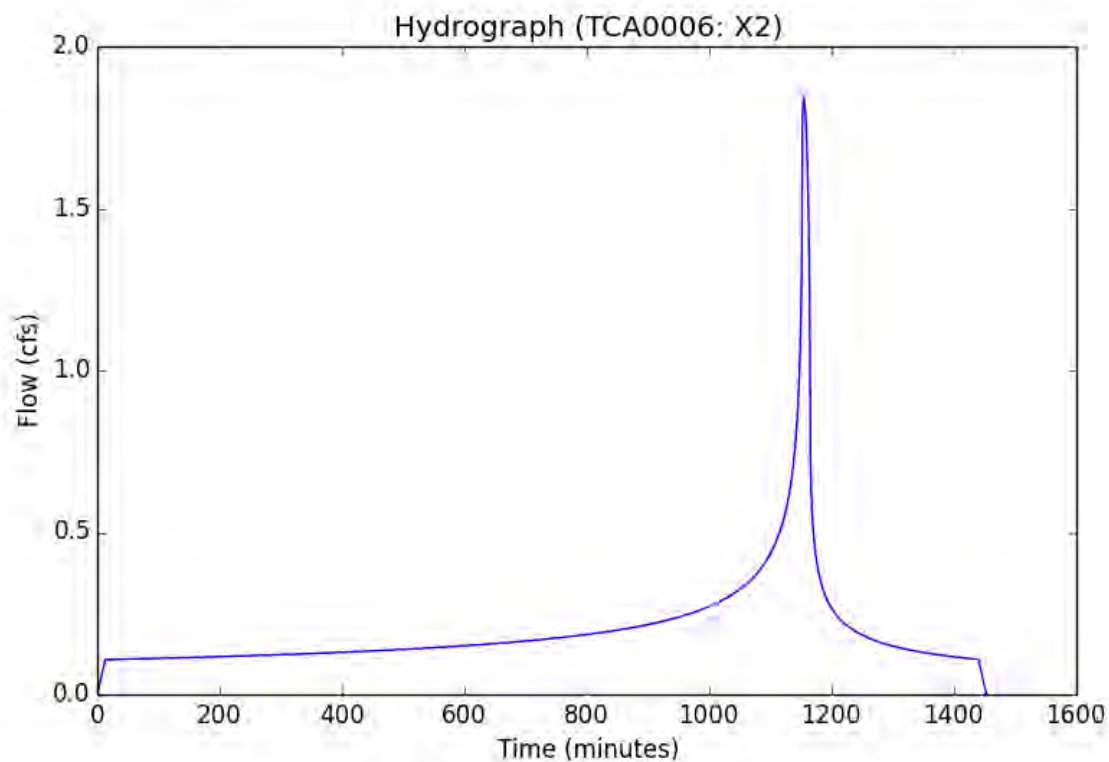
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Input Parameters

Project Name	TCA0006
Subarea ID	X2
Area (ac)	2.44366391185
Flow Path Length (ft)	396.0
Flow Path Slope (vft/hft)	0.00656565656566
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.94
Soil Type	3
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.322
Peak Intensity (in/hr)	0.8842
Undeveloped Runoff Coefficient (Cu)	0.1054
Developed Runoff Coefficient (Cd)	0.8523
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	1.8415
Burned Peak Flow Rate (cfs)	1.8415
24-Hr Clear Runoff Volume (ac-ft)	0.3995
24-Hr Clear Runoff Volume (cu-ft)	17404.0386



Peak Flow Hydrologic Analysis

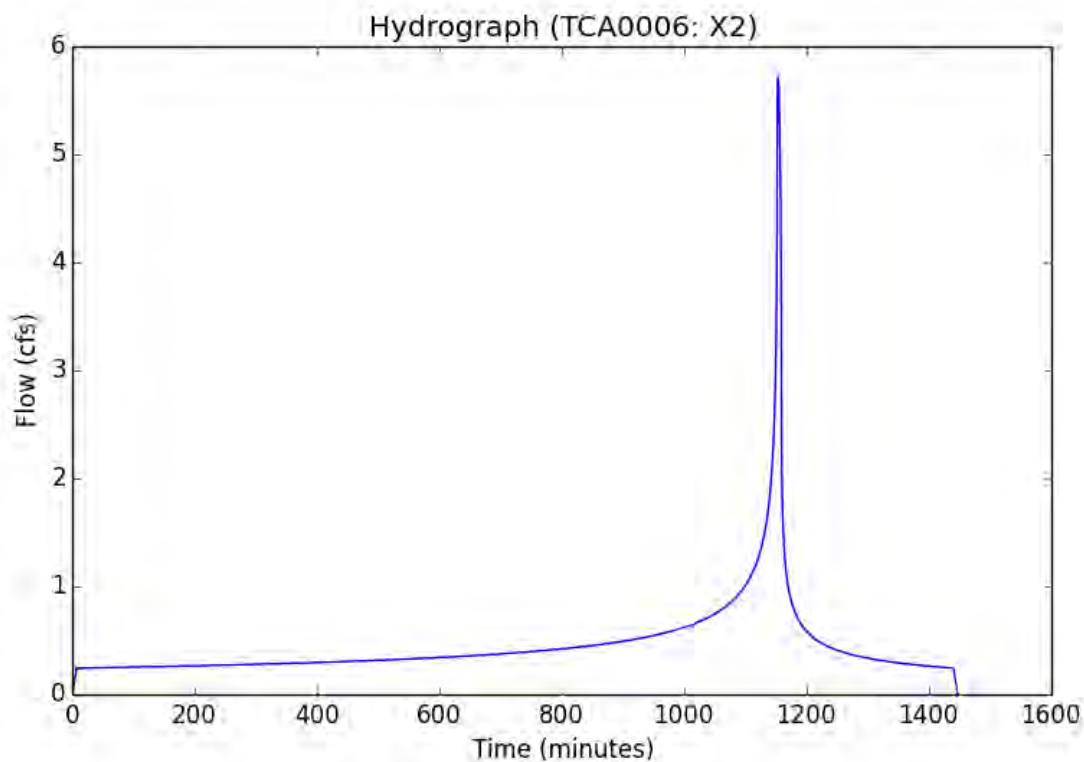
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Input Parameters

Project Name	TCA0006
Subarea ID	X2
Area (ac)	2.44366391185
Flow Path Length (ft)	396.0
Flow Path Slope (vft/hft)	0.00656565656566
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.94
Soil Type	3
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.268
Peak Intensity (in/hr)	2.6833
Undeveloped Runoff Coefficient (Cu)	0.4168
Developed Runoff Coefficient (Cd)	0.871
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	5.7113
Burned Peak Flow Rate (cfs)	5.7113
24-Hr Clear Runoff Volume (ac-ft)	0.9077
24-Hr Clear Runoff Volume (cu-ft)	39539.2883



Peak Flow Hydrologic Analysis

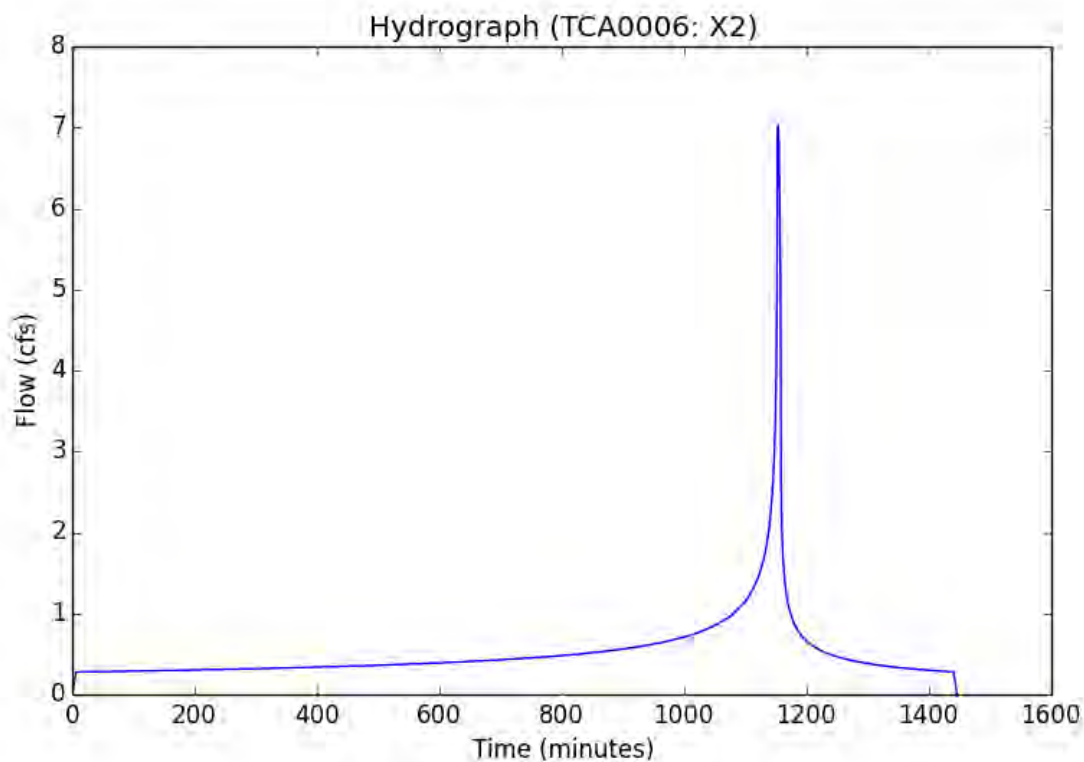
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Input Parameters

Project Name	TCA0006
Subarea ID	X2
Area (ac)	2.44366391185
Flow Path Length (ft)	396.0
Flow Path Slope (vft/hft)	0.00656565656566
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.94
Soil Type	3
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.2858
Undeveloped Runoff Coefficient (Cu)	0.4801
Developed Runoff Coefficient (Cd)	0.8748
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	7.0241
Burned Peak Flow Rate (cfs)	7.0241
24-Hr Clear Runoff Volume (ac-ft)	1.0342
24-Hr Clear Runoff Volume (cu-ft)	45048.14



Peak Flow Hydrologic Analysis

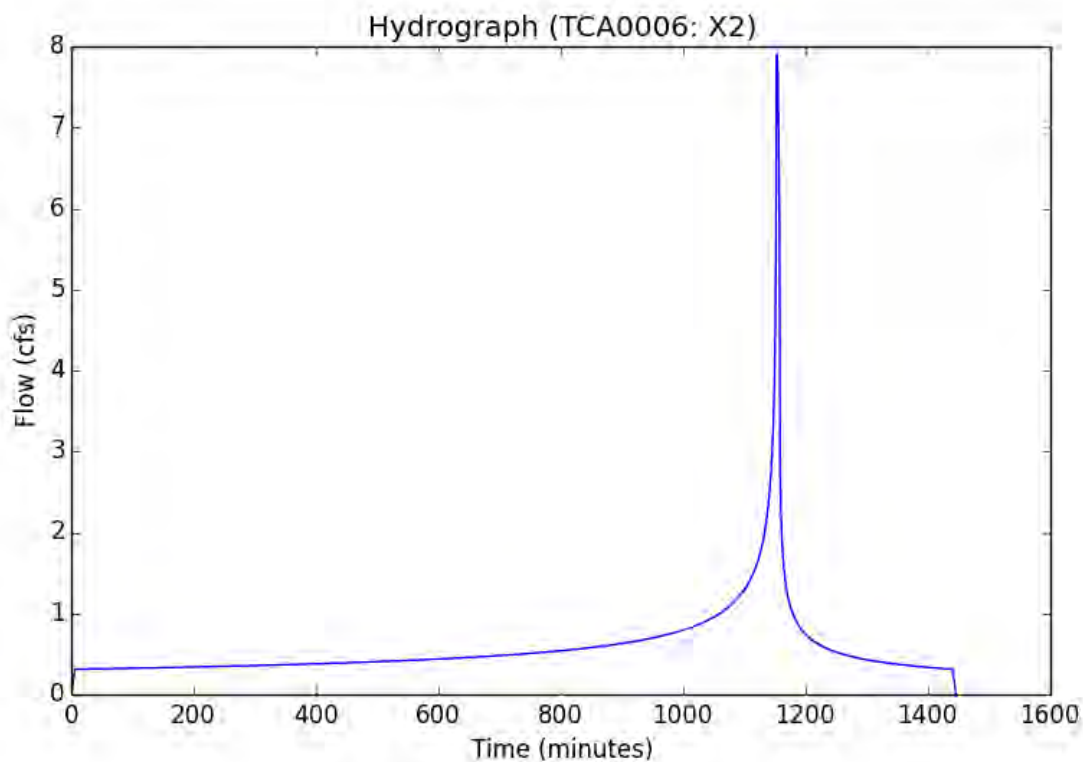
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Input Parameters

Project Name	TCA0006
Subarea ID	X2
Area (ac)	2.44366391185
Flow Path Length (ft)	396.0
Flow Path Slope (vft/hft)	0.00656565656566
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.94
Soil Type	3
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	6.732
Peak Intensity (in/hr)	3.6867
Undeveloped Runoff Coefficient (Cu)	0.5163
Developed Runoff Coefficient (Cd)	0.877
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	7.9006
Burned Peak Flow Rate (cfs)	7.9006
24-Hr Clear Runoff Volume (ac-ft)	1.1607
24-Hr Clear Runoff Volume (cu-ft)	50559.1353



Subarea A1 - Proposed Condition (2, 25, 50, 100-year)

Peak Flow Hydrologic Analysis

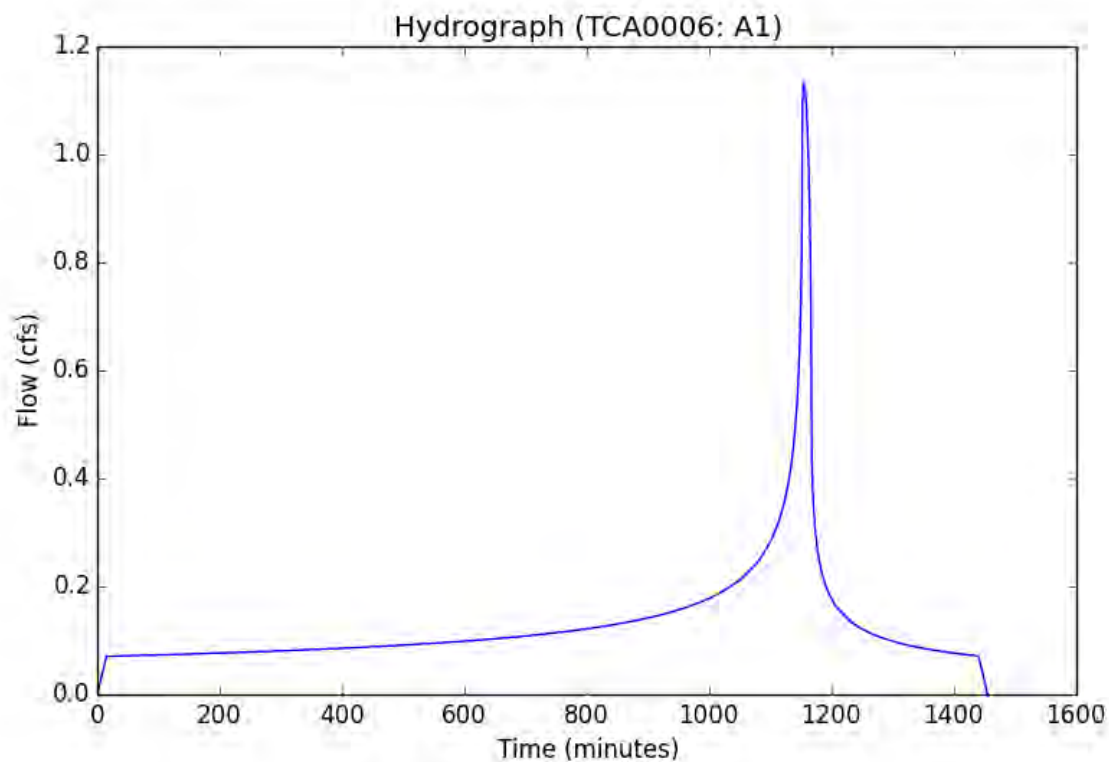
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	A1
Area (ac)	1.73769513315
Flow Path Length (ft)	506.0
Flow Path Slope (vft/hft)	0.00768774703557
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.322
Peak Intensity (in/hr)	0.8266
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.788
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	1.1319
Burned Peak Flow Rate (cfs)	1.1319
24-Hr Clear Runoff Volume (ac-ft)	0.2628
24-Hr Clear Runoff Volume (cu-ft)	11446.3166



Peak Flow Hydrologic Analysis

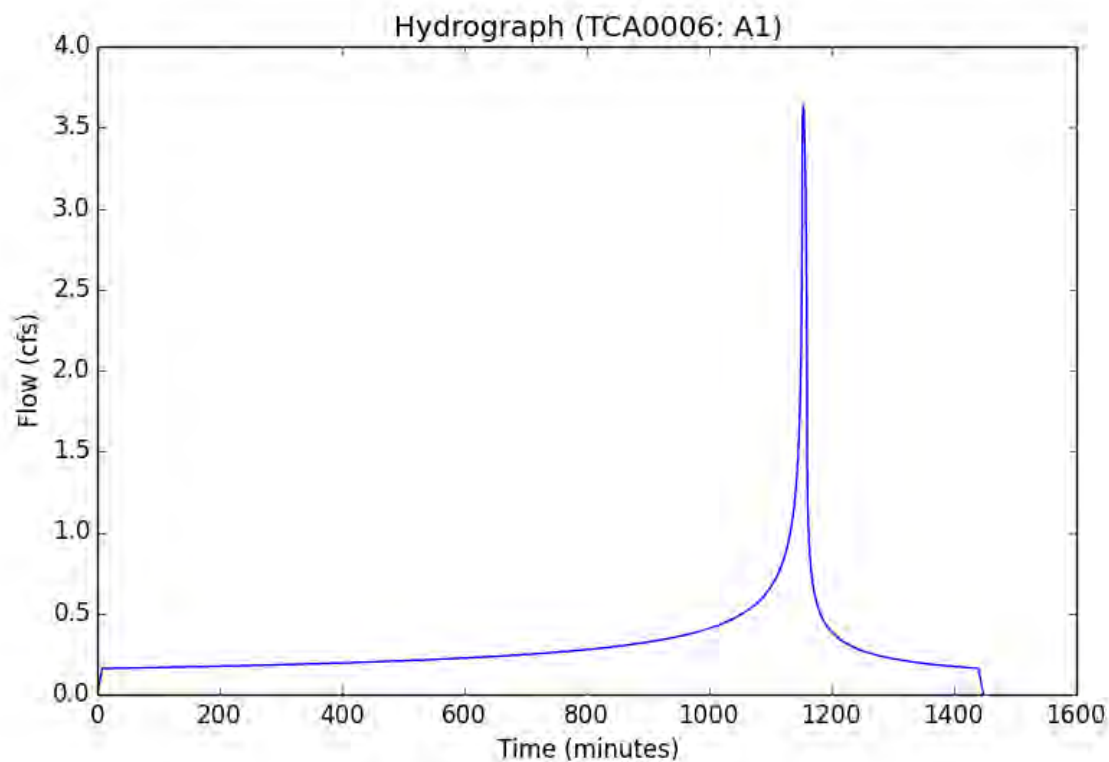
File location: P:/TCA0006/Reports/Hydrology/Prelim/Appendix B - Hydrology Calculations/TCA0006 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	A1
Area (ac)	1.73769513315
Flow Path Length (ft)	506.0
Flow Path Slope (vft/hft)	0.00768774703557
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.268
Peak Intensity (in/hr)	2.5201
Undeveloped Runoff Coefficient (Cu)	0.3997
Developed Runoff Coefficient (Cd)	0.83
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	3.6345
Burned Peak Flow Rate (cfs)	3.6345
24-Hr Clear Runoff Volume (ac-ft)	0.5982
24-Hr Clear Runoff Volume (cu-ft)	26056.696



Peak Flow Hydrologic Analysis

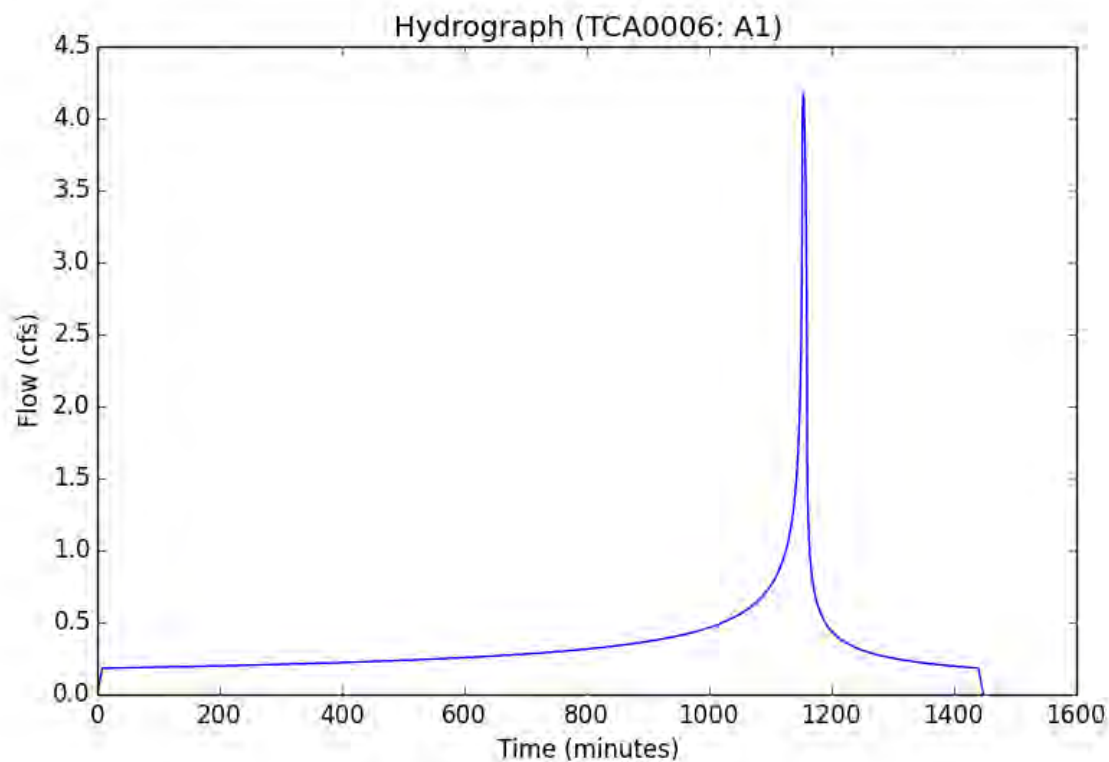
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	A1
Area (ac)	1.73769513315
Flow Path Length (ft)	506.0
Flow Path Slope (vft/hft)	0.00768774703557
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.8702
Undeveloped Runoff Coefficient (Cu)	0.4365
Developed Runoff Coefficient (Cd)	0.8351
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	4.1652
Burned Peak Flow Rate (cfs)	4.1652
24-Hr Clear Runoff Volume (ac-ft)	0.6818
24-Hr Clear Runoff Volume (cu-ft)	29699.1526



Peak Flow Hydrologic Analysis

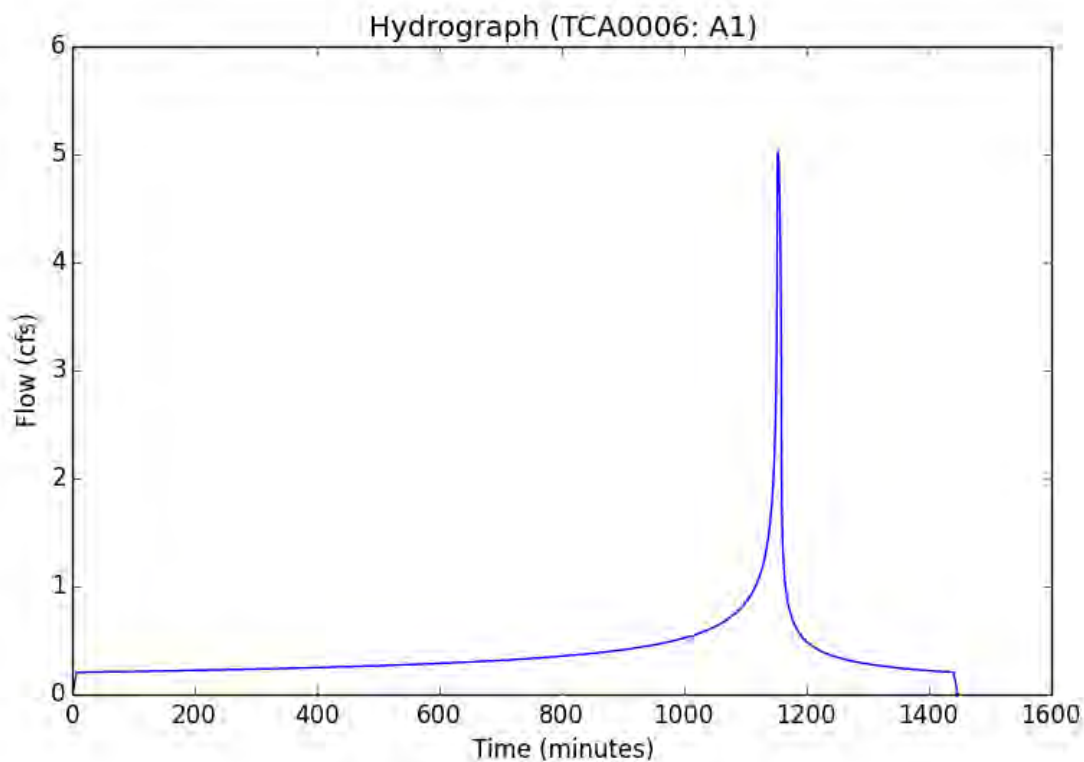
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	A1
Area (ac)	1.73769513315
Flow Path Length (ft)	506.0
Flow Path Slope (vft/hft)	0.00768774703557
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	6.732
Peak Intensity (in/hr)	3.429
Undeveloped Runoff Coefficient (Cu)	0.4952
Developed Runoff Coefficient (Cd)	0.8433
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	5.025
Burned Peak Flow Rate (cfs)	5.025
24-Hr Clear Runoff Volume (ac-ft)	0.7656
24-Hr Clear Runoff Volume (cu-ft)	33350.5118



Subarea B1 - Proposed Condition (2, 25, 50, 100-year)

Peak Flow Hydrologic Analysis

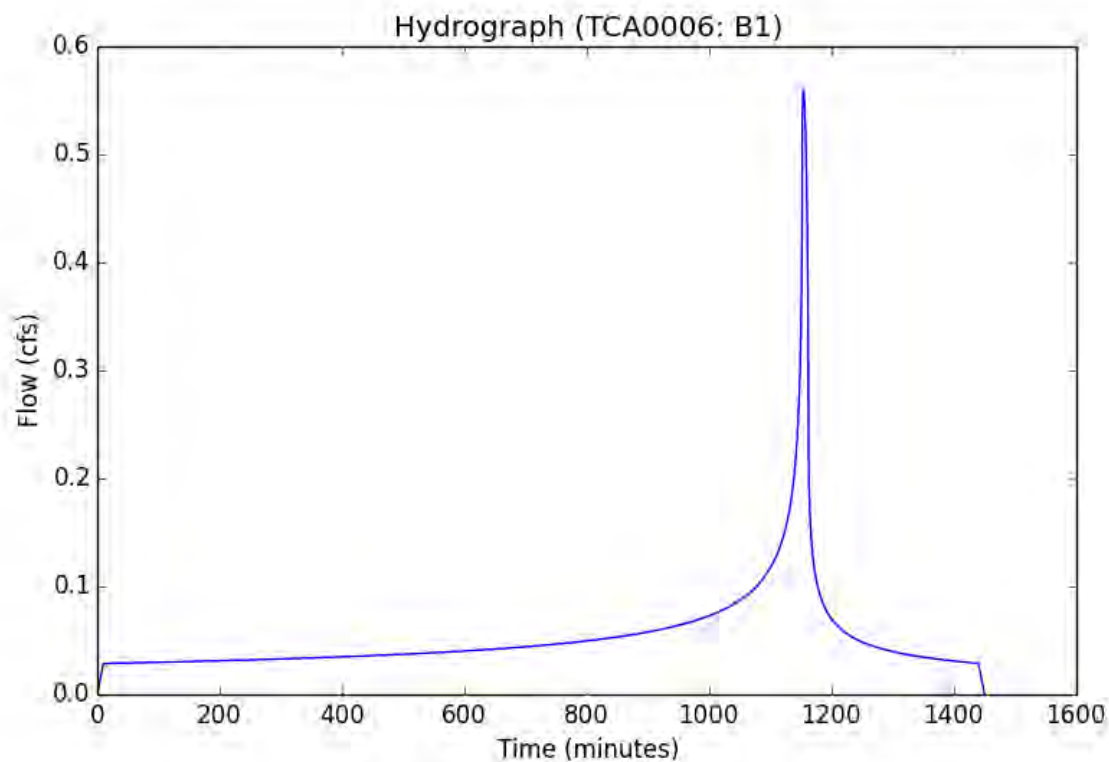
File location: P:/TCA0006/Reports/Hydrology/Prelim/Appendix B - Hydrology Calculations/TCA0006 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	B1
Area (ac)	0.706267217631
Flow Path Length (ft)	297.0
Flow Path Slope (vft/hft)	0.0104
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.322
Peak Intensity (in/hr)	1.0002
Undeveloped Runoff Coefficient (Cu)	0.1314
Developed Runoff Coefficient (Cd)	0.7924
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	0.5597
Burned Peak Flow Rate (cfs)	0.5597
24-Hr Clear Runoff Volume (ac-ft)	0.1068
24-Hr Clear Runoff Volume (cu-ft)	4653.1479



Peak Flow Hydrologic Analysis

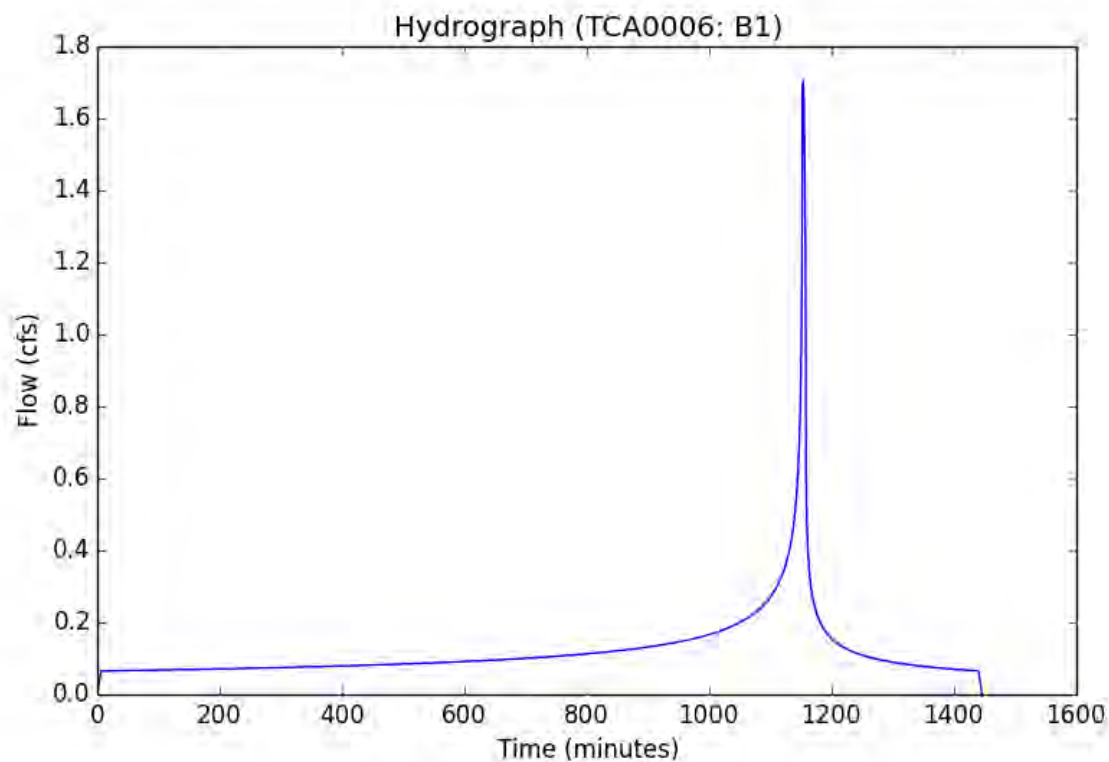
File location: P:/TCA0006/Reports/Hydrology/Prelim/Appendix B - Hydrology Calculations/TCA0006 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	B1
Area (ac)	0.706267217631
Flow Path Length (ft)	297.0
Flow Path Slope (vft/hft)	0.0104
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.268
Peak Intensity (in/hr)	2.8849
Undeveloped Runoff Coefficient (Cu)	0.438
Developed Runoff Coefficient (Cd)	0.8353
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.702
Burned Peak Flow Rate (cfs)	1.702
24-Hr Clear Runoff Volume (ac-ft)	0.2432
24-Hr Clear Runoff Volume (cu-ft)	10592.3605



Peak Flow Hydrologic Analysis

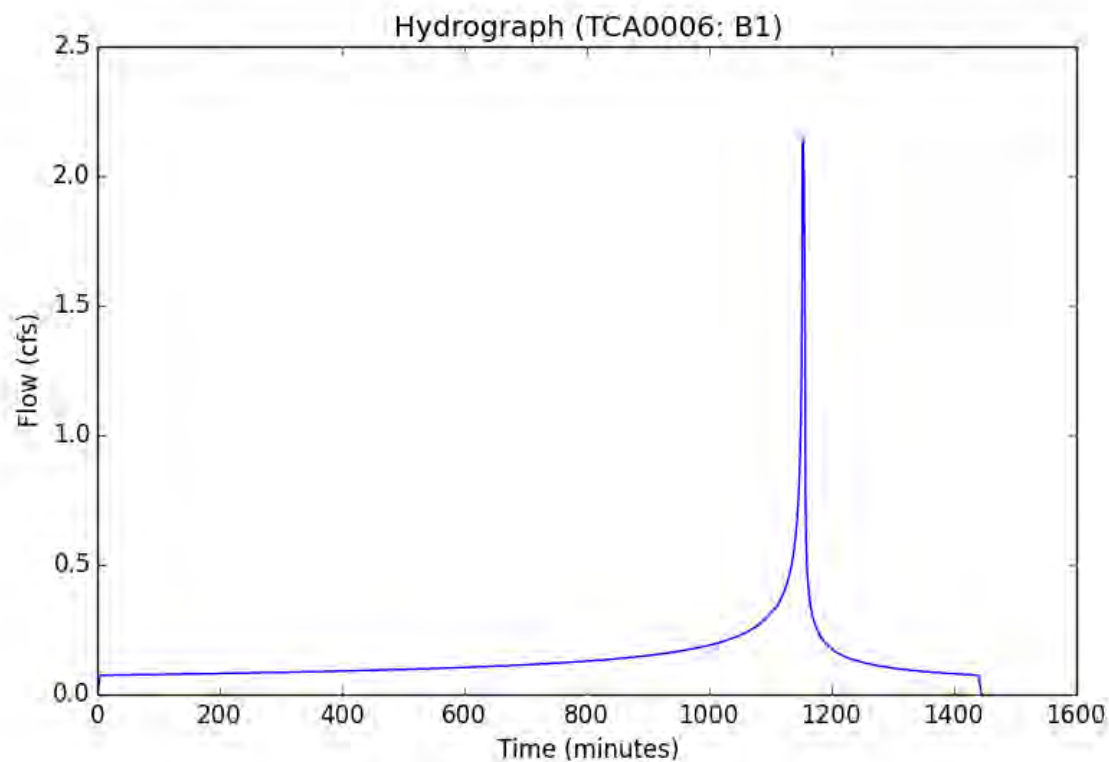
File location: P:/TCA0006/Reports/Hydrology/Prelim/Appendix B - Hydrology Calculations/TCA0006 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	B1
Area (ac)	0.706267217631
Flow Path Length (ft)	297.0
Flow Path Slope (vft/hft)	0.0104
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.5798
Undeveloped Runoff Coefficient (Cu)	0.5084
Developed Runoff Coefficient (Cd)	0.8452
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.1368
Burned Peak Flow Rate (cfs)	2.1368
24-Hr Clear Runoff Volume (ac-ft)	0.2772
24-Hr Clear Runoff Volume (cu-ft)	12074.419



Peak Flow Hydrologic Analysis

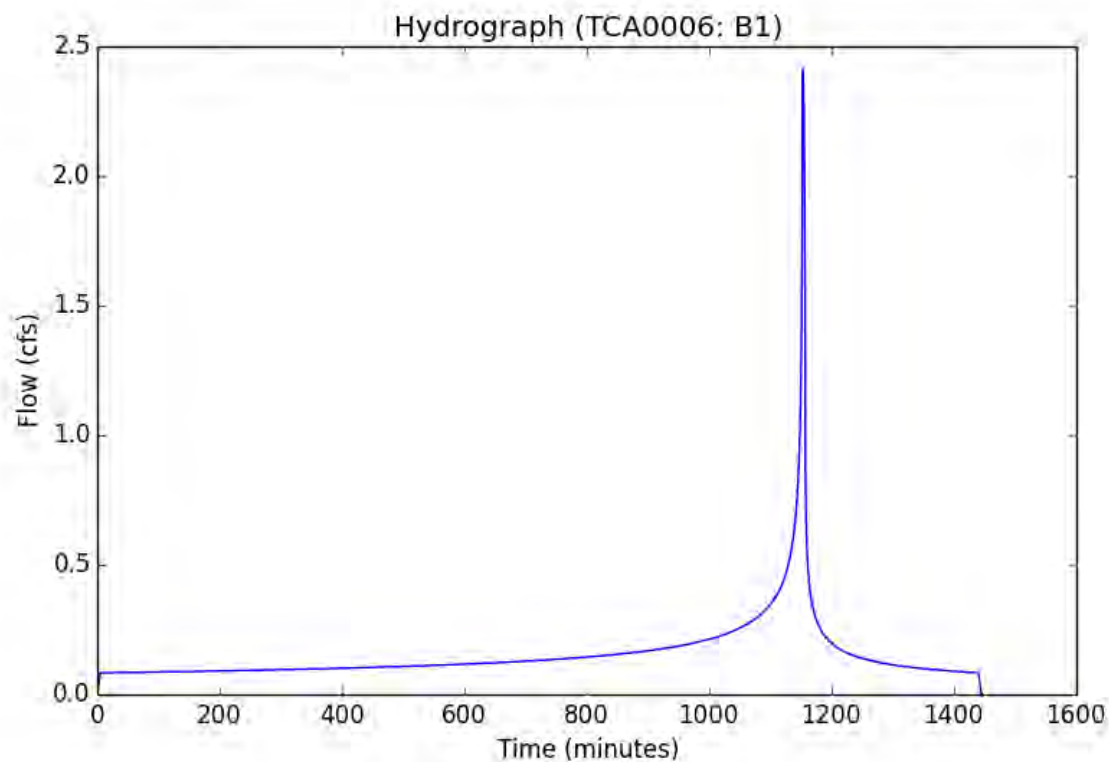
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	B1
Area (ac)	0.706267217631
Flow Path Length (ft)	297.0
Flow Path Slope (vft/hft)	0.0104
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	6.732
Peak Intensity (in/hr)	4.0165
Undeveloped Runoff Coefficient (Cu)	0.5404
Developed Runoff Coefficient (Cd)	0.8497
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.4102
Burned Peak Flow Rate (cfs)	2.4102
24-Hr Clear Runoff Volume (ac-ft)	0.3112
24-Hr Clear Runoff Volume (cu-ft)	13557.3189



Subarea B2 - Proposed Condition (2, 25, 50, 100-year)

Peak Flow Hydrologic Analysis

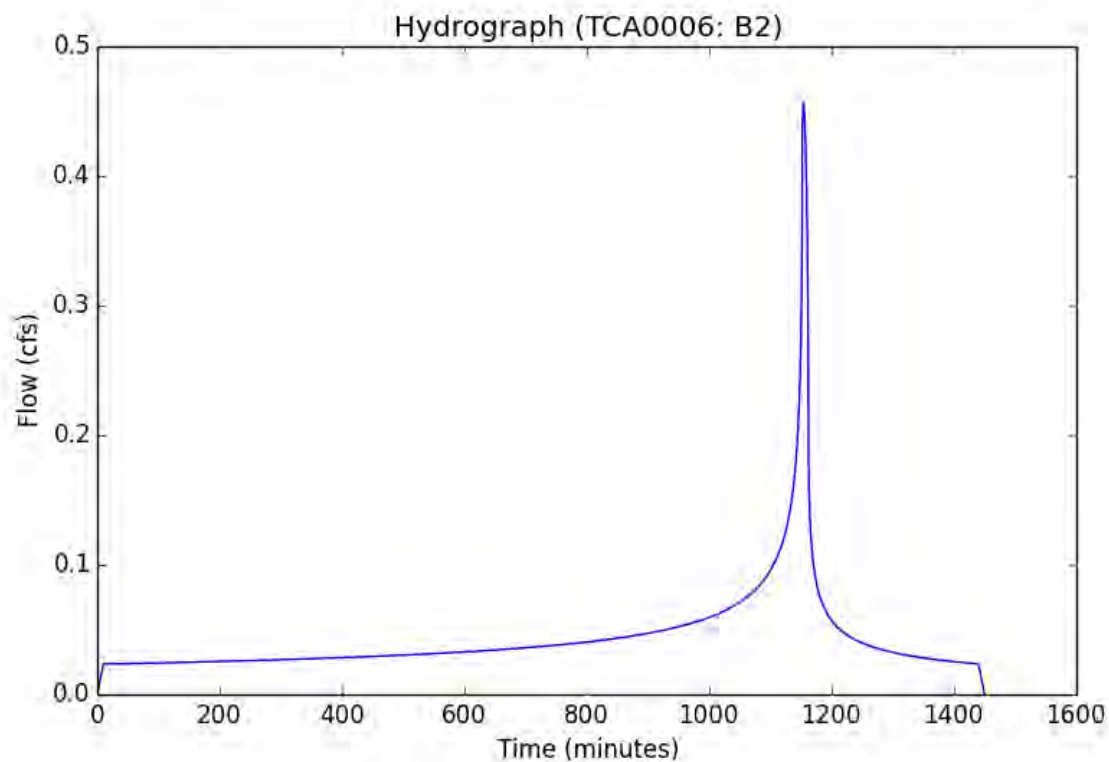
File location: P:/TCA0006/Reports/Hydrology/Prelim/Appendix B - Hydrology Calculations/TCA0006 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	B2
Area (ac)	0.576262626263
Flow Path Length (ft)	299.0
Flow Path Slope (vft/hft)	0.0108
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	2.322
Peak Intensity (in/hr)	1.0002
Undeveloped Runoff Coefficient (Cu)	0.1314
Developed Runoff Coefficient (Cd)	0.7924
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	0.4567
Burned Peak Flow Rate (cfs)	0.4567
24-Hr Clear Runoff Volume (ac-ft)	0.0872
24-Hr Clear Runoff Volume (cu-ft)	3796.6299



Peak Flow Hydrologic Analysis

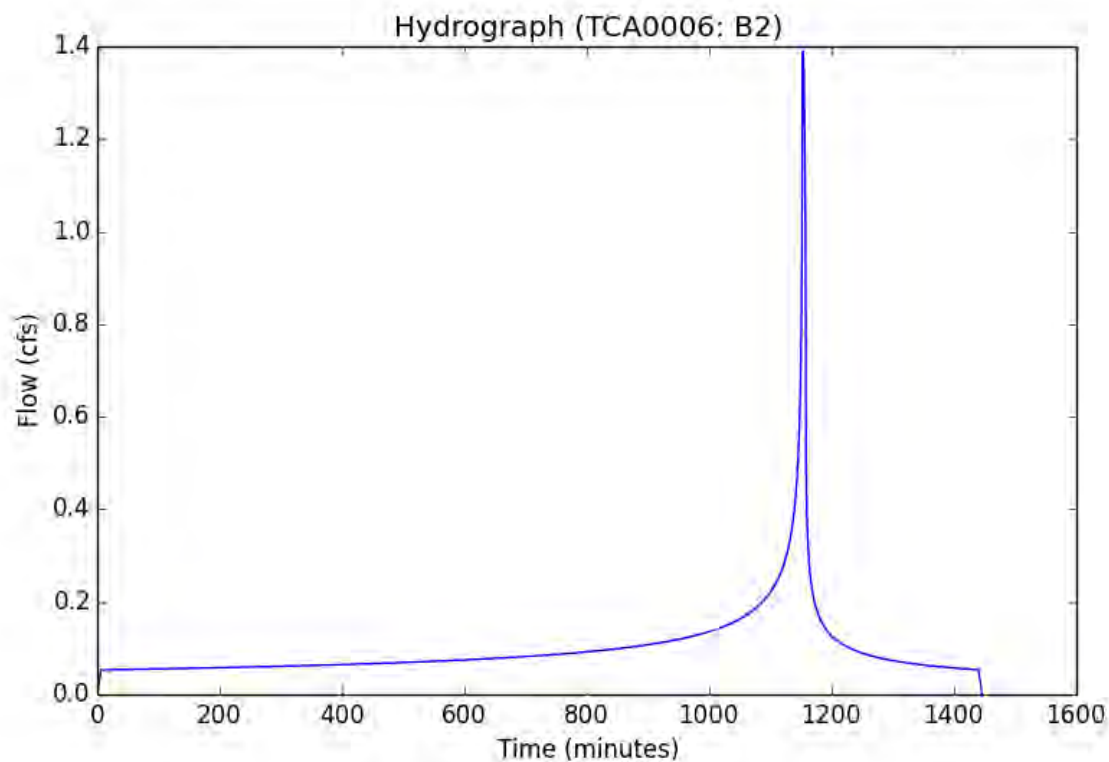
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	B2
Area (ac)	0.576262626263
Flow Path Length (ft)	299.0
Flow Path Slope (vft/hft)	0.0108
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.268
Peak Intensity (in/hr)	2.8849
Undeveloped Runoff Coefficient (Cu)	0.438
Developed Runoff Coefficient (Cd)	0.8353
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.3887
Burned Peak Flow Rate (cfs)	1.3887
24-Hr Clear Runoff Volume (ac-ft)	0.1984
24-Hr Clear Runoff Volume (cu-ft)	8642.5949



Peak Flow Hydrologic Analysis

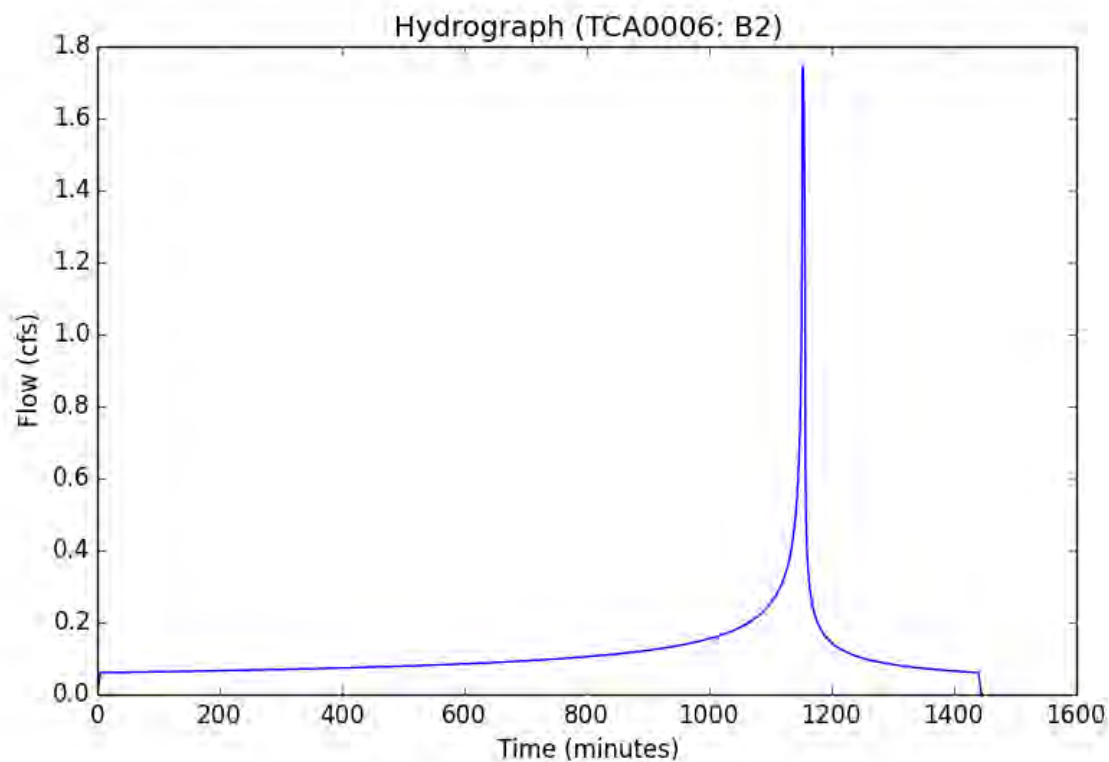
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	B2
Area (ac)	0.576262626263
Flow Path Length (ft)	299.0
Flow Path Slope (vft/hft)	0.0108
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	3.5798
Undeveloped Runoff Coefficient (Cu)	0.5084
Developed Runoff Coefficient (Cd)	0.8452
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.7435
Burned Peak Flow Rate (cfs)	1.7435
24-Hr Clear Runoff Volume (ac-ft)	0.2262
24-Hr Clear Runoff Volume (cu-ft)	9851.8468



Peak Flow Hydrologic Analysis

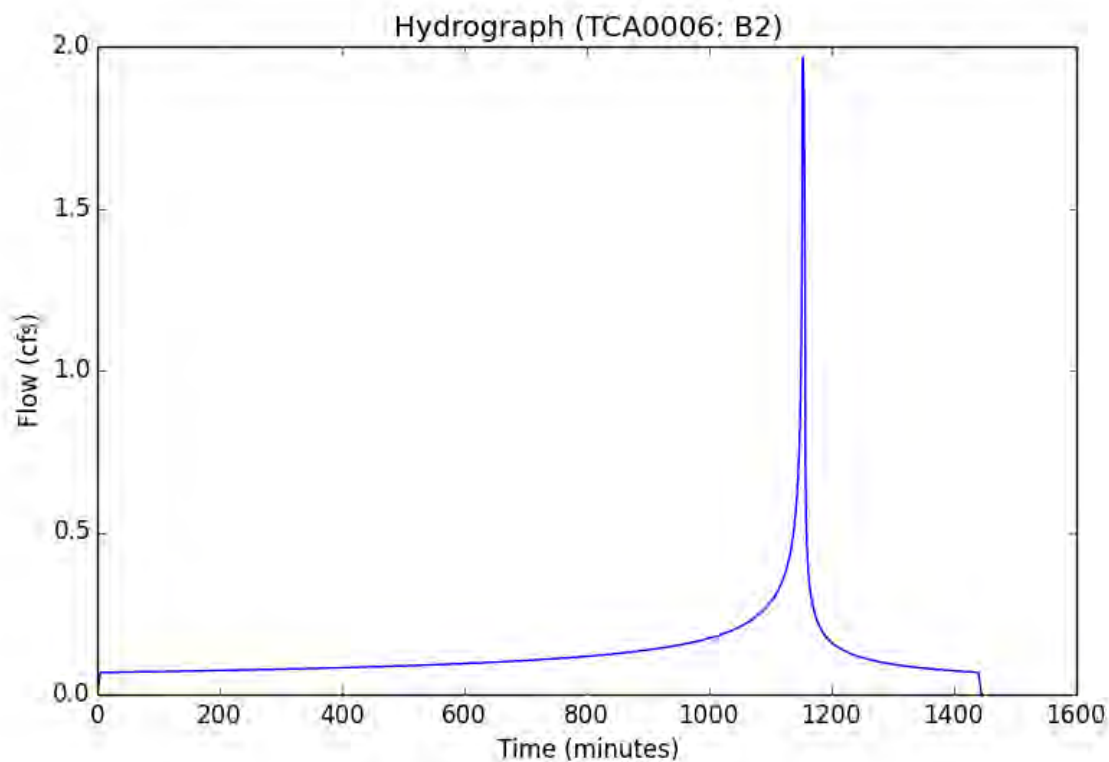
File location: P:/TCA0006/Reports/Hydrology/Prelim/Appendix B - Hydrology Calculations/TCA0006 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TCA0006
Subarea ID	B2
Area (ac)	0.576262626263
Flow Path Length (ft)	299.0
Flow Path Slope (vft/hft)	0.0108
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.86
Soil Type	3
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	6.732
Peak Intensity (in/hr)	4.0165
Undeveloped Runoff Coefficient (Cu)	0.5404
Developed Runoff Coefficient (Cd)	0.8497
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.9666
Burned Peak Flow Rate (cfs)	1.9666
24-Hr Clear Runoff Volume (ac-ft)	0.2539
24-Hr Clear Runoff Volume (cu-ft)	11061.7851



APPENDIX C HYDRAULIC CALCULATIONS

Parkway Drains Sizing

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 1 2021

Parkway B2

Rectangular

Bottom Width (ft) = 3.00

Total Depth (ft) = 0.33

Invert Elev (ft) = 1.00

Slope (%) = 0.25

N-Value = 0.013

Calculations

Compute by: Known Q

Known Q (cfs) = 1.39

Highlighted

Depth (ft) = 0.24

Q (cfs) = 1.390

Area (sqft) = 0.72

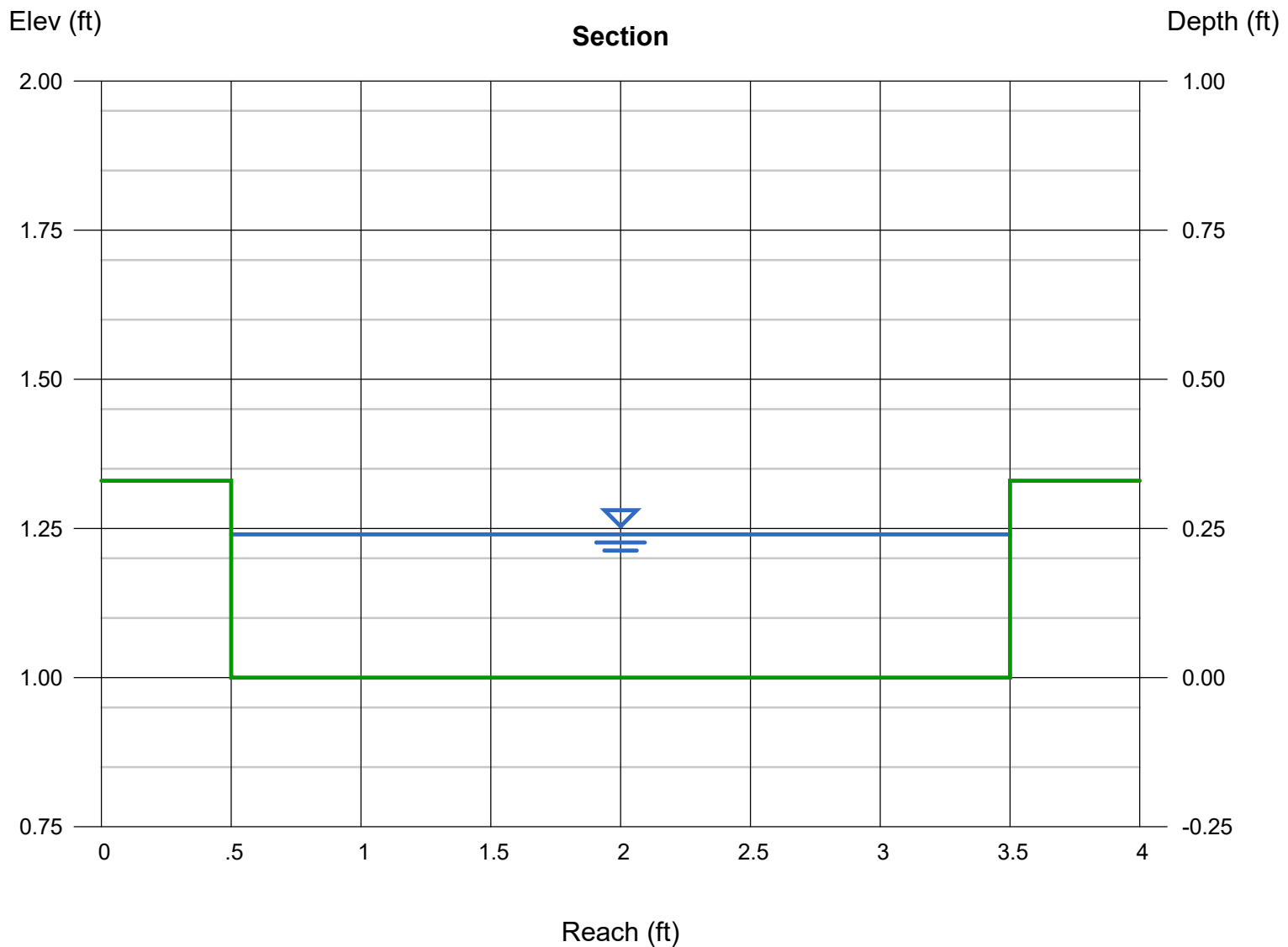
Velocity (ft/s) = 1.93

Wetted Perim (ft) = 3.48

Crit Depth, Yc (ft) = 0.19

Top Width (ft) = 3.00

EGL (ft) = 0.30



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 1 2021

Parkway B1

Rectangular

Bottom Width (ft) = 2.00

Total Depth (ft) = 0.33

Invert Elev (ft) = 1.00

Slope (%) = 0.50

N-Value = 0.013

Calculations

Compute by: Known Q

Known Q (cfs) = 1.70

Highlighted

Depth (ft) = 0.29

Q (cfs) = 1.700

Area (sqft) = 0.58

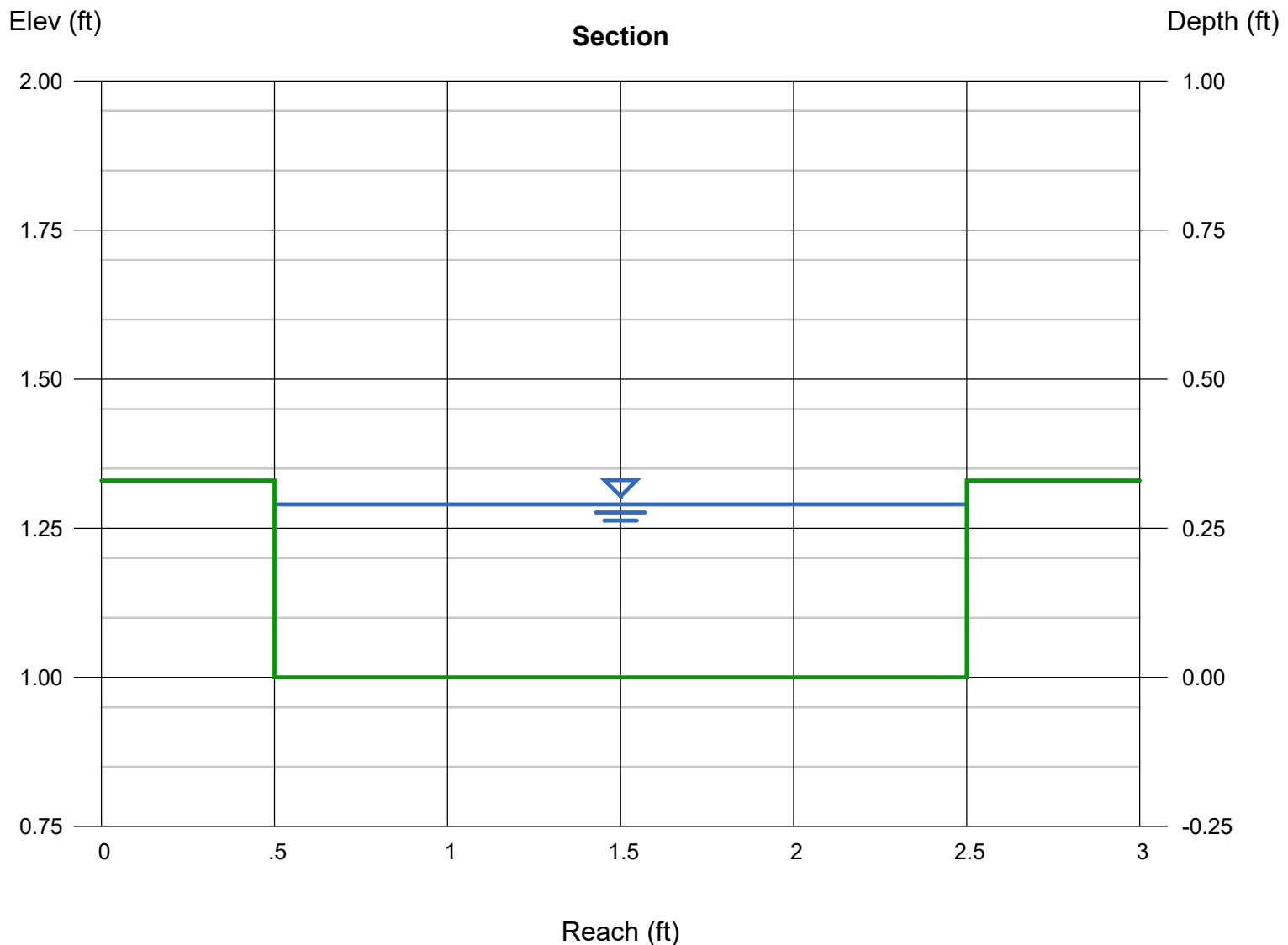
Velocity (ft/s) = 2.93

Wetted Perim (ft) = 2.58

Crit Depth, Yc (ft) = 0.29

Top Width (ft) = 2.00

EGL (ft) = 0.42



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 1 2021

Parkway A1

Rectangular

Bottom Width (ft) = 5.00

Total Depth (ft) = 0.33

Invert Elev (ft) = 1.00

Slope (%) = 0.25

N-Value = 0.013

Calculations

Compute by: Known Q

Known Q (cfs) = 3.43

Highlighted

Depth (ft) = 0.30

Q (cfs) = 3.430

Area (sqft) = 1.50

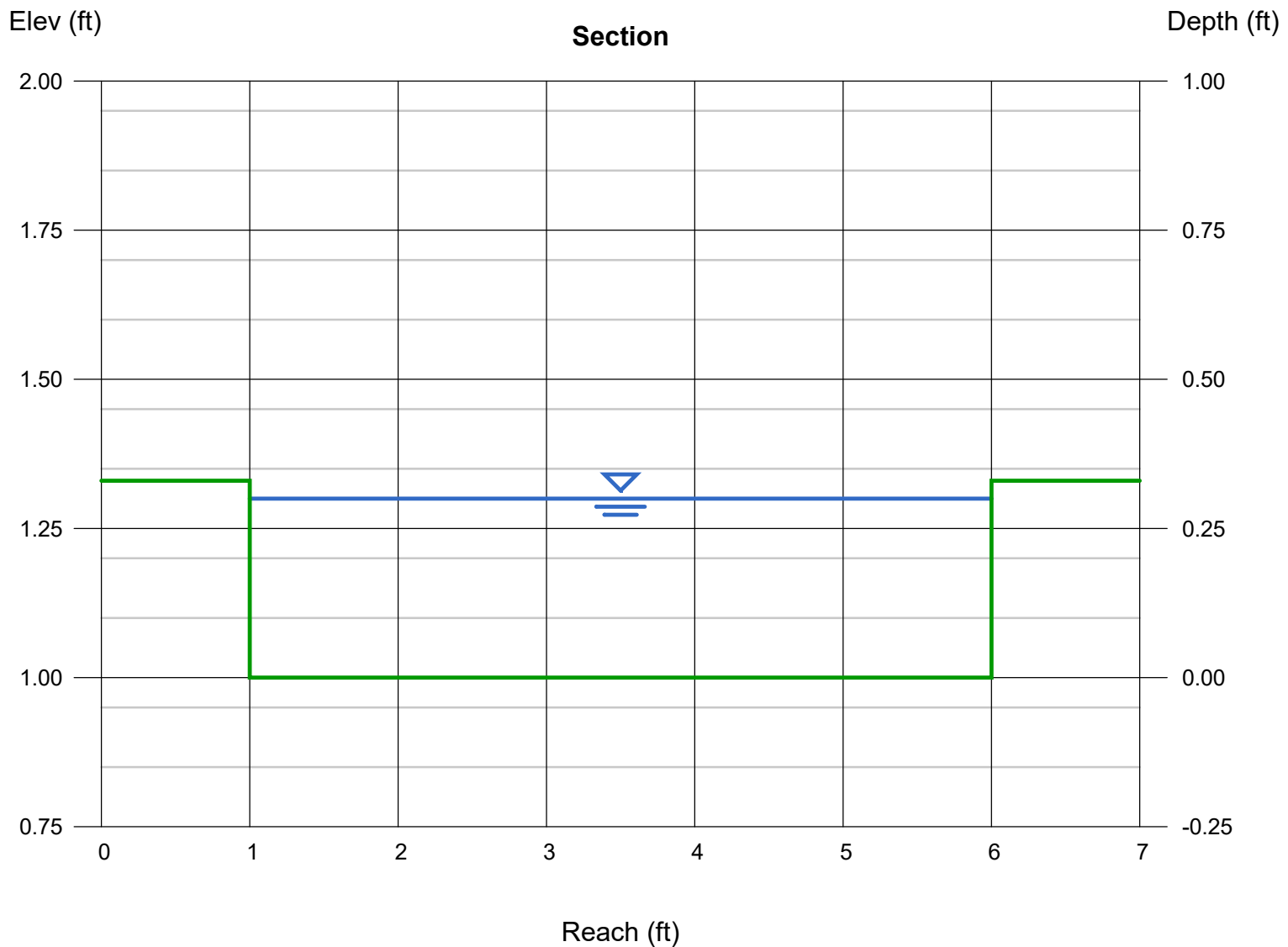
Velocity (ft/s) = 2.29

Wetted Perim (ft) = 5.60

Crit Depth, Yc (ft) = 0.25

Top Width (ft) = 5.00

EGL (ft) = 0.38



Detention Sizing

To be provided during Final Engineering

100-year Water Surface Elevation

To be provided during Final Engineering

Catch Basin Sizing

To be provided during Final Engineering

Street Capacity Sizing

To be provided during Final Engineering

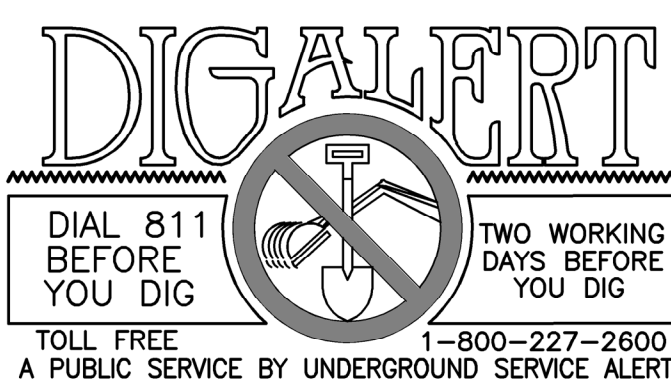
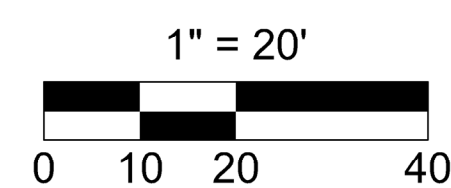
Storm Drain Pipe Sizing

To be provided during Final Engineering

APPENDIX D CURRENT PLANS

Site Plan Details:

- Buildings:** 25 buildings shown, including existing structures (e.g., 10720 LK CTR PARK LN, 10722 LK CTR PARK LN, 10724 LK CTR PARK LN, 10726 LK CTR PARK LN) and new buildings (1-25).
- Parking:** 10 parking spaces shown, including a 3' parkway drain for emergency overflow.
- Drainage:** 54" storage pipe, 8" PVC SD, and 6" block wall (proposed) for emergency overflow.
- Other Features:** Catch basin, 3' parkway drain, 6' block wall, 8" curb and gutter, and 4-1/4" depression at back of sidewalk.
- Notes:**
 - REMOVE EXISTING DRIVEWAY AND REPLACE WITH SFS STD R-6.4B WITH 4-1/4" DEPRESSION AT BACK OF SIDEWALK
 - REMOVE EXISTING DRIVEWAY AND REPLACE WITH 8" CURB AND GUTTER
 - PROPOSED 6' BLOCK WALL
 - 3' PARKWAY DRAIN (FOR EMERGENCY OVERFLOW)
 - CATCH BASIN
- Survey Data:**
 - N89°55'55"E 315.73'
 - N89°55'55"E 796.77'
- Other Labels:** EX PL, EX PP (PROTECT), EX PP 4768388E P (PROTECT), OWNERSHIP UNKNOWN APN 8008017033, 10721 PIONEER BLVD APN 8008017034, UNION PACIFIC RAILROAD, ASPH, CONC, GROUND OBSCURED, 124.4, 124.5, 124.6, 124.7, 124.8, 124.9, 125.0, 125.1, 125.2, 125.3, 125.4, 125.5, 125.6, 125.7, 125.8, 125.9, 126.0, 126.1, 126.2, 126.3, 126.4, 126.5, 126.6, 126.7, 126.8, 126.9, 127.0, 127.1, 127.2, 127.3, 127.4, 127.5, 127.6, 127.7, 127.8, 127.9, 128.0, 128.1, 128.2, 128.3, 128.4, 128.5, 128.6, 128.7, 128.8, 128.9, 129.0, 129.1, 129.2, 129.3, 129.4, 129.5, 129.6, 129.7, 129.8, 129.9, 130.0, 130.1, 130.2, 130.3, 130.4, 130.5, 130.6, 130.7, 130.8, 130.9, 131.0, 131.1, 131.2, 131.3, 131.4, 131.5, 131.6, 131.7, 131.8, 131.9, 132.0, 132.1, 132.2, 132.3, 132.4, 132.5, 132.6, 132.7, 132.8, 132.9, 133.0, 133.1, 133.2, 133.3, 133.4, 133.5, 133.6, 133.7, 133.8, 133.9, 134.0, 134.1, 134.2, 134.3, 134.4, 134.5, 134.6, 134.7, 134.8, 134.9, 135.0, 135.1, 135.2, 135.3, 135.4, 135.5, 135.6, 135.7, 135.8, 135.9, 136.0, 136.1, 136.2, 136.3, 136.4, 136.5, 136.6, 136.7, 136.8, 136.9, 137.0, 137.1, 137.2, 137.3, 137.4, 137.5, 137.6, 137.7, 137.8, 137.9, 138.0, 138.1, 138.2, 138.3, 138.4, 138.5, 138.6, 138.7, 138.8, 138.9, 139.0, 139.1, 139.2, 139.3, 139.4, 139.5, 139.6, 139.7, 139.8, 139.9, 140.0, 140.1, 140.2, 140.3, 140.4, 140.5, 140.6, 140.7, 140.8, 140.9, 141.0, 141.1, 141.2, 141.3, 141.4, 141.5, 141.6, 141.7, 141.8, 141.9, 142.0, 142.1, 142.2, 142.3, 142.4, 142.5, 142.6, 142.7, 142.8, 142.9, 143.0, 143.1, 143.2, 143.3, 143.4, 143.5, 143.6, 143.7, 143.8, 143.9, 144.0, 144.1, 144.2, 144.3, 144.4, 144.5, 144.6, 144.7, 144.8, 144.9, 145.0, 145.1, 145.2, 145.3, 145.4, 145.5, 145.6, 145.7, 145.8, 145.9, 146.0, 146.1, 146.2, 146.3, 146.4, 146.5, 146.6, 146.7, 146.8, 146.9, 147.0, 147.1, 147.2, 147.3, 147.4, 147.5, 147.6, 147.7, 147.8, 147.9, 148.0, 148.1, 148.2, 148.3, 148.4, 148.5, 148.6, 148.7, 148.8, 148.9, 149.0, 149.1, 149.2, 149.3, 149.4, 149.5, 149.6, 149.7, 149.8, 149.9, 150.0, 150.1, 150.2, 150.3, 150.4, 150.5, 150.6, 150.7, 150.8, 150.9, 151.0, 151.1, 151.2, 151.3, 151.4, 151.5, 151.6, 151.7, 151.8, 151.9, 152.0, 152.1, 152.2, 152.3, 152.4, 152.5, 152.6, 152.7, 152.8, 152.9, 153.0, 153.1, 153.2, 153.3, 153.4, 153.5, 153.6, 153.7, 153.8, 153.9, 154.0, 154.1, 154.2, 154.3, 154.4, 154.5, 154.6, 154.7, 154.8, 154.9, 155.0, 155.1, 155.2, 155.3, 155.4, 155.5, 155.6, 155.7, 155.8, 155.9, 156.0, 156.1, 156.2, 156.3, 156.4, 156.5, 156.6, 156.7, 156.8, 156.9, 157.0, 157.1, 157.2, 157.3, 157.4, 157.5, 157.6, 157.7, 157.8, 157.9, 158.0, 158.1, 158.2, 158.3, 158.4, 158.5, 158.6, 158.7, 158.8, 158.9, 159.0, 159.1, 159.2, 159.3, 159.4, 159.5, 159.6, 159.7, 159.8, 159.9, 160.0, 160.1, 160.2, 160.3, 160.4, 160.5, 160.6, 160.7, 160.8, 160.9, 161.0, 161.1, 161.2, 161.3, 161.4, 161.5, 161.6, 161.7, 161.8, 161.9, 162.0, 162.1, 162.2, 162.3, 162.4, 162.5, 162.6, 162.7, 162.8, 162.9, 163.0, 163.1, 163.2, 163.3, 163.4, 163.5, 163.6, 163.7, 163.8, 163.9, 164.0, 164.1, 164.2, 164.3, 164.4, 164.5, 164.6, 164.7, 164.8, 164.9, 165.0, 165.1, 165.2, 165.3, 165.4, 165.5, 165.6, 165.7, 165.8, 165.9, 166.0, 166.1, 166.2, 166.3, 166.4, 166.5, 166.6, 166.7, 166.8, 166.9, 167.0, 167.1, 167.2, 167.3, 167.4, 167.5, 167.6, 167.7, 167.8, 167.9, 168.0, 168.1, 168.2, 168.3, 168.4, 168.5, 168.6, 168.7, 168.8, 168.9, 169.0, 169.1, 169.2, 169.3, 169.4, 169.5, 169.6, 169.7, 169.8, 169.9, 170.0, 170.1, 170.2, 170.3, 170.4, 170.5, 170.6, 170.7, 170.8, 170.9, 171.0, 171.1, 171.2, 171.3, 171.4, 171.5, 171.6, 171.7, 171.8, 171.9, 172.0, 172.1, 172.2, 172.3, 172.4, 172.5, 172.6, 172.7, 172.8, 172.9, 173.0, 173.1, 173.2, 173.3, 173.4, 173.5, 173.6, 173.7, 173.8, 173.9, 174.0, 174.1, 174.2, 174.3, 174.4, 174

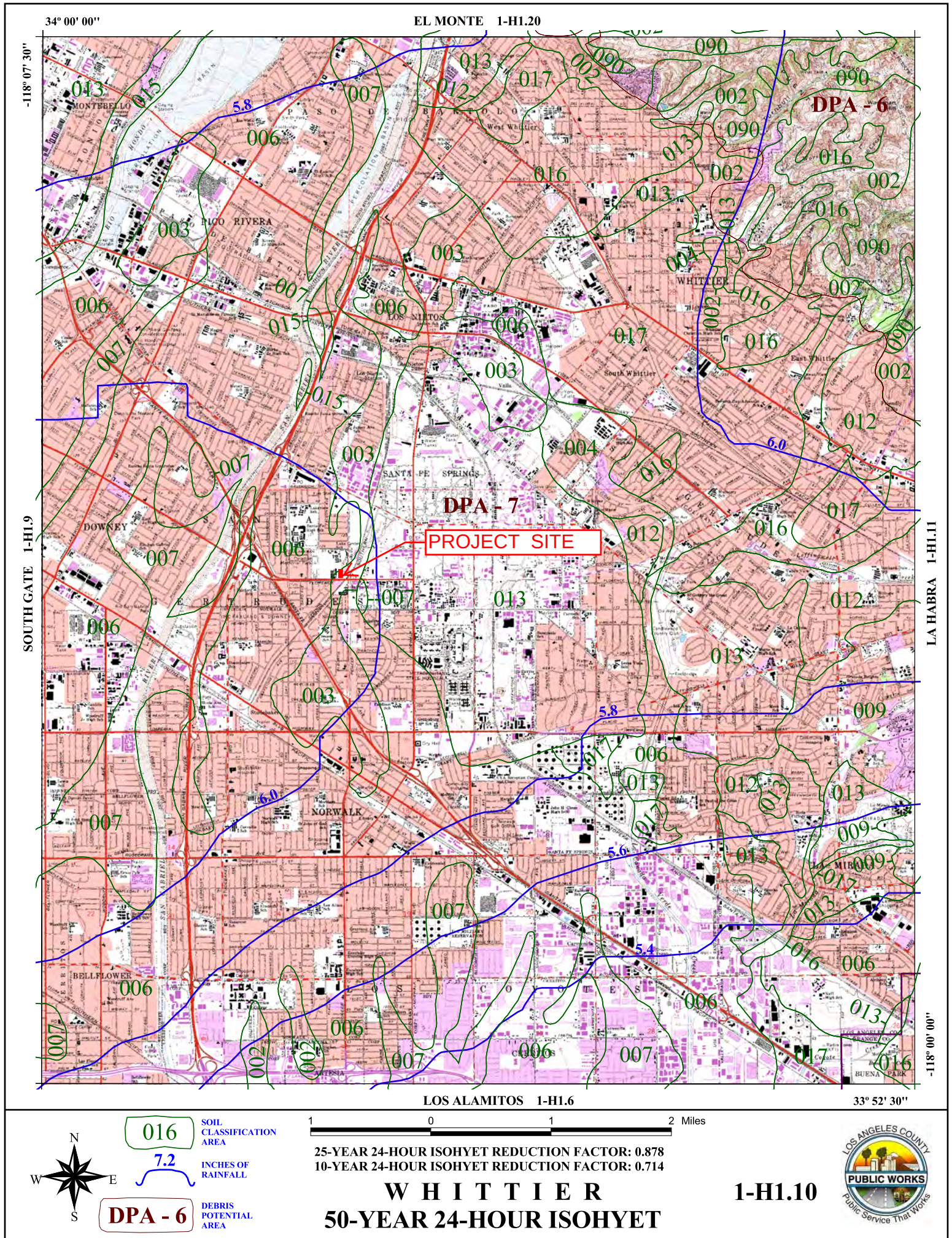


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APPENDIX E REFERENCES & AS-BUILT INFORMATION

Isohyet Map



25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
 10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

W H I T T I E R 50-YEAR 24-HOUR ISOHYET

1-H1.10

Hydrology Manual Appendix D

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

LACFCD As-builts