Appendix O

Industrial Site Preliminary Hydrology Calculations

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

TODD AVENUE
NORTHEAST CORNER OF TODD AVE AND 10TH STREET
AZUSA, CALIFORNIA

PREPARED FOR

OVERTON MOORE PROPERTIES
19300 HAMILTON AVENUE
GARDENA, CA 90148
PHONE: (310) 323-9100
FAX: (310) 608-7997

MAY 4, 2022
REVISED APRIL 20, 2023
REVISED SEPTEMBER 6, 2023
REVISED JUNE 6, 2024

JOB NO. 4081

PREPARED BY

THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90639
P. (714) 521- 4811
FAX. (714) 521- 4173

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

TODD AVENUE

PREPARED UNDER
THE SUPERVISION OF

_____

REINHARD STENZEL DATE:
R.C.E. 56155
EXP. 12/31/2024

INTRODUCTION

A: PROJECT LOCATION

The project site is located to the northeasterly corner of Todd Avenue and 10th Street in Azusa, California. Please see the next page for a vicinity map.

B: STUDY PURPOSE

The purpose of this study is to determine the 50-year peak flow rate for the project site that will ultimately discharge to an existing storm drain connected to 10th Street.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Kristie Ferronato
Morgan Holve

DISCUSSION

Project Description

The project site encompasses approximately 19.25 acres. Proposed improvements include six warehouse-style buildings and truckyards. There is a large trailer parking area in the middle of the site. There is landscaping fronting Todd Avenue, 10th Street and located throughout the site.

Existing Condition

The site is currently developed as a golf course. It was assumed that there was 10% impervious areas around the golf course due to pathways and other paved areas. Runoff drains to three main areas.

The northerly landscaped frontage (Area A1) sheet flows offsite to Sierra Madre Avenue. Flows are captured in an existing catch basin located at the corner of Todd Avenue and Sierra Madre Avenue. The 50-year peak flow rate from this area is approximately 1.0 cfs. The westerly portion of the site (Area B1) sheet flows offsite to Todd Avenue. Flows continue southerly in Todd Avenue. The 50-year peak flow rate from this area is approximately 26.7 cfs. The easterly portion of the site (Area 1C) sheet flows offsite to 10th Street. Flows are collected in an existing catch basin and conveyed southerly in an existing 27" storm drain. The 50-year peak flow rate to this catch basin is approximately 48.5 cfs.

The total existing condition peak flow rate from the project site is approximately 76.2 cfs.

The existing 36" CMP storm drain system conveys flows from the northerly adjacent property (Area D1) through the project site. The 50-year peak flow rate through the 36" CMP is approximately 53.5 cfs.

See Appendix "B" for existing condition hydrology calculations and Appendix "E" for existing condition hydrology map.

Existing Storm Drains

There is an existing 36" CMP storm drain that runs north to south through the project site. It connects an existing curb-opening catch basin in 10th Street at its downstream end. A portion of the existing pipe is damaged and will be removed and replaced as part of the onsite improvements.

The pipe was modeled in its existing condition in order to establish the current capacity and performance of the CMP pipe. A separate model was also prepared to determine how the pipe performed with the replacement HDPE section and addition of the proposed onsite storm drain systems. Due to a lack of hydrologic and hydraulic information on the

existing pipe, it was assumed that the downstream controlling hydraulic grade line (HGL) was the flow line of the existing catch basin (elev. 627.60 from DWG. SD-038).

It was determined that, with the more efficient replacement pipe, the existing 36" storm drain could convey the onsite peak flow rate in addition to the flows from the northerly adjacent property.

See Appendix "A" for the 36" storm drain plan and profile and Appendix "C" for existing and proposed condition hydraulic models of the existing 36" storm drain.

Proposed Condition

The site will continue to drain to the three main areas similar to the existing conditions.

Runoff from Buildings 1, 2 and 3 (Areas A1-A7) discharge out to Todd Avenue via proposed parkway culverts. The landscaped areas fronting Todd Avenue (Area A8) also sheet flow offsite to the street. Flows continue southerly down Todd Avenue, similar to existing conditions. The 50-year peak flow rate to Todd Avenue is approximately 23.1 cfs (direct sum of individual areas).

Runoff from Building 4 (Areas B1-B3) and its adjacent trailer parking area (Areas B4) drain to catch basins located in the parking area. Flows are captured and conveyed easterly in a proposed onsite storm drain system. Flows ultimately discharge into an existing 36" CMP storm drain that connects into the back of the existing catch basin in 10th Street. The 50-year peak flow rate through this storm drain line is approximately 17.5 cfs.

Runoff from Building 5 and its easterly parking area (Areas C1-C3) drain to catch basins located in the truck yard. A proposed onsite storm drain system conveys flows easterly to the existing 36" CMP storm drain. The 50-year peak flow rate through this storm drain is approximately 16.3 cfs.

The Building 4 southerly vehicle parking areas (Areas D1-D2) and Building 6 (Areas D4-D6) discharge out to 10th Street via proposed parkway culverts. The southerly landscaped area (Area D3) sheet flows directly offsite. Flows drain to the existing catch basin in 10th Street. The 50-year peak flow rate to the existing basin is approximately 18.5 cfs.

The northerly landscaped area (E1) sheet flows directly offsite to Sierra Madre Avenue. The 50-year peak flow rate to this area is approximately 0.7 cfs.

The total 50-year peak flow rate from the project site is approximately 76.1 cfs.

See Appendix "B" for proposed condition hydrology calculations and Appendix "D" for proposed condition hydrology map.

Detention

As previously mentioned, the existing 36" CMP storm drain running through the project site can carry the total 50-year peak flow rate from the onsite storm drain connections. However, to minimize the impact to the existing storm drain, some detention will be utilized across the truck yards in Building 4 and Building 5.

The entire northwesterly portion of the site (Areas A1-A8) will discharge directly to Todd Avenue without any detention. The proposed condition peak flow rate to this street (23.1 cfs) is less than the existing condition peak flow rate to the street (26.7 cfs). Therefore, there will be no negative downstream hydraulic impacts to any existing drainage facilities and detention will not be required for this area.

Similarly, the northerly landscaped area (Area E1) discharges less flow to the existing catch basin in Todd Avenue in the proposed condition (0.7 cfs) than the existing condition (1.0 cfs). Therefore, there will be no negative hydraulic impacts to the existing catch basin.

The southerly parking areas, landscaped areas, Building 6 and a small portion just north of Building 4 (Areas D1-D6, Area B1) discharge from the project site undetained and are collected in the existing 10th Street catch basin. The total 50-year peak flow rate from these areas is approximately 19.6 cfs.

The discharge from Building 4 will be limited to approximately 7.5 cfs. The remaining flows will be temporarily detained on the surface of the truck yard, with a required volume of approximately 0.059 ac-ft at a depth of approximately 0.36'.

The discharge from Building 5 will be limited to approximately 6.0 cfs. The remaining flows will be temporarily detained on the surface of the truck yard, with a required volume of approximately 0.093 ac-ft at a depth of approximately 0.50'.

With detention, the total 50-year peak flow rate to the existing 36" CMP will be limited to approximately 33.1 cfs (19.6 cfs +7.5 cfs+ 6.0 cfs). This is approximately 68% of the existing condition peak flow rate to the 10th Street catch basin (48.5 cfs).

Area	Required Volume (cubic feet)	Maximum Depth (feet)	Discharge (cfs)
Building 4	2,574	0.36'	7.5
Building 5	3,355	0.50'	6.0

Hydrograph volumes were determined from the Hydro-Calc Excel spreadsheet. Cumulative volumes are shown up to the allowable peak flow rate before and after the peak occurs. The difference in the volume before and after the peak (along with the volume of the allowable peak flow rate) is the volume to be temporarily detained.

See Appendix "D" for a detailed detention analysis and calculations.

Summary

The following table shows the existing condition and proposed condition peak flow rate to each of the three main drainage areas:

Area	Existing Condition (cfs)	Proposed Condition (cfs)	Proposed W/ Detention (cfs)
Sierra Madre Avenue Catch Basin	1.0	0.7	0.7
Todd Avenue	26.7	23.1	23.1
10th Street Catch Basin	48.5	55.3	33.5

All proposed condition peak flow rates from the project site are lower than the existing condition peak flow rates tributary to the same areas. Therefore, the proposed improvements will not cause any negative downstream hydraulic impacts to any existing drainage facilities.

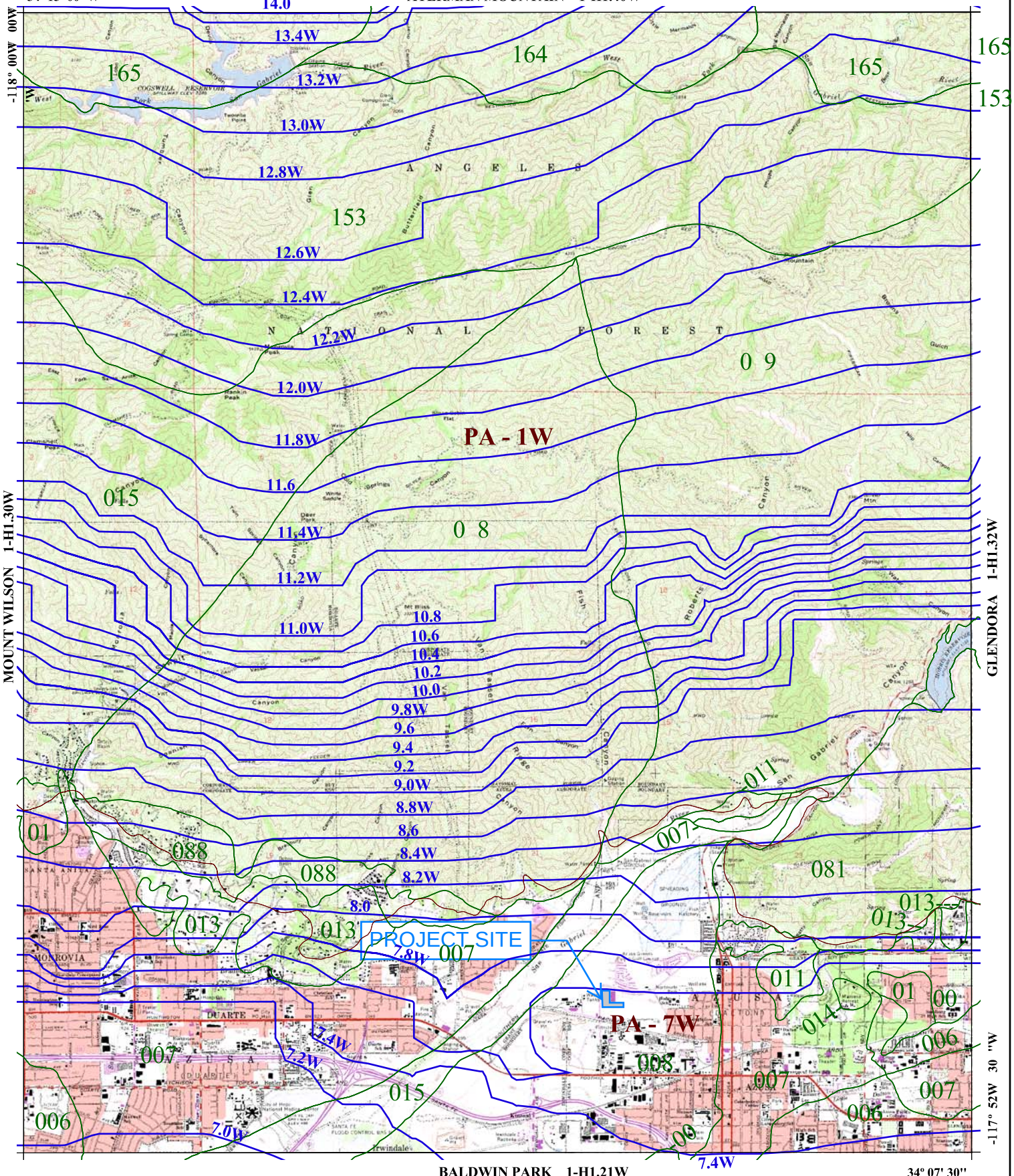
Methodology

Hydrology calculations were computed using the Hydrocalc computer program (by County of Los Angeles). The site soil type is "008" per the Los Angeles County Hydrology Manual. Hydraulic calculations were computed using the Water Surface Pressure Gradient (WSPG) software. See Appendix "A" for reference materials.

APPENDIX	DESCRIPTION
A	REFERENCE MATERIAL
B	HYDROLOGY CALCULATIONS
C	HYDRAULIC CALCULATIONS
D	DETENTION ANALYSIS
E	HYDROLOGY MAPS

APPENDIX A

REFERENCE MATERIALS



N
W E
S

016 SOIL CLASSIFICATIONW AREAW

7.2W INCHES OFW RAINFALLW

PA - 6W EBRISW WENTIALW AREAW

1 0 1 2 Miles

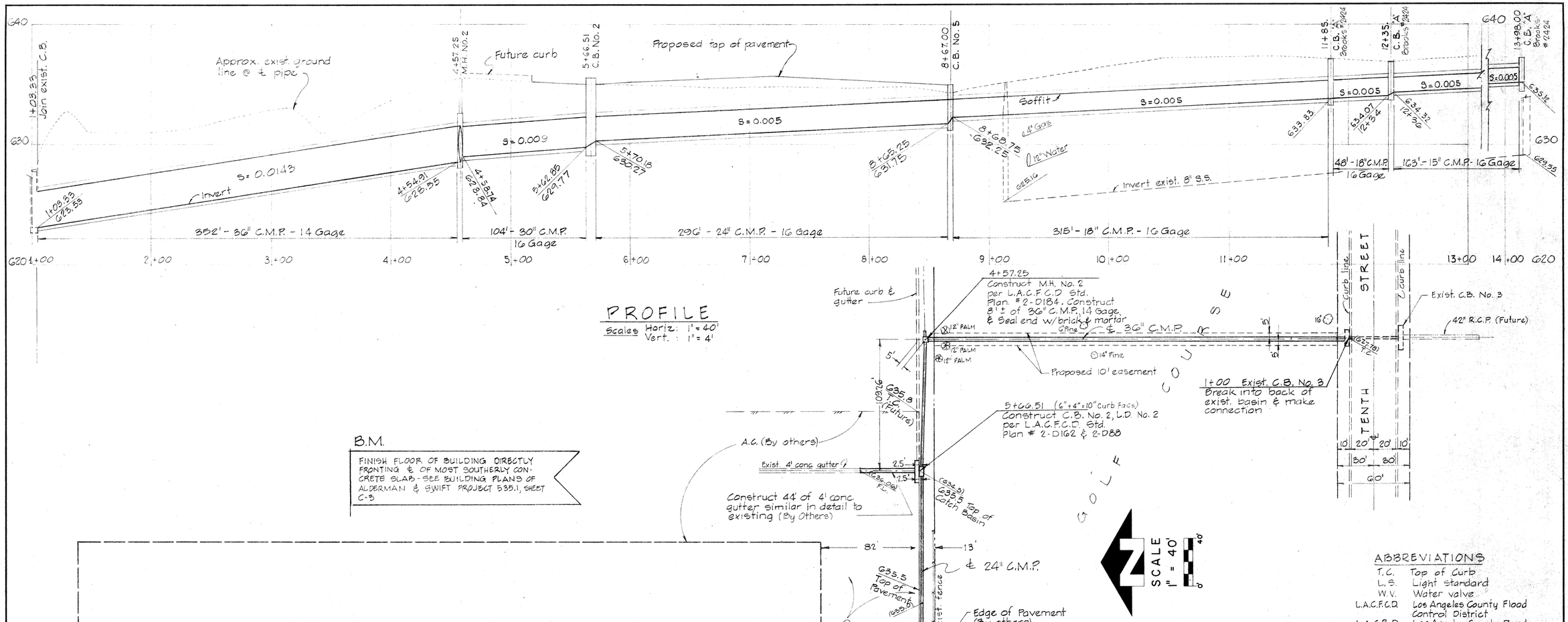
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878W

10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

A Z U S AW
50-YEAR 24-HOUR ISOHYET

1-H1.31W

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works



PROFILE

Scales Horiz.: 1" = 40'
Vert. : 1" = 4'

PLAN

Scale: 1" = 40'

B.M.

FINISH FLOOR OF BUILDING DIRECTLY FRONTING ℄ OF MOST SOUTHERLY CONCRETE SLAB - SEE BUILDING PLANS OF ALDERMAN & SWIFT PROJECT 535.1, SHEET C-3

ABBREVIATIONS

T.C.	Top of Curb
L.S.	Light Standard
W.V.	Water valve
L.A.C.F.C.D.	Los Angeles County Flood Control District
L.A.C.R.D.	Los Angeles County Road Department

GENERAL NOTES

1. All work shall be performed in accordance with the Standard Specifications for Public Works, 1970 edition including all supplements thereto.
2. All corrugated metal pipe and connecting bands shall be protected with a bituminous coating.
3. The owner shall remove the existing parking bumpers between stations 11+00 and 13+98. They shall be reinstalled by the owner upon completion of the construction.
4. All excess dirt may be disposed of on property owned by Rain Bird east of the existing building.
5. Trench backfill shall be compacted by the use of flooding methods.
6. The contractor shall be responsible for the irrigation system within the construction area of the golf course. All landscaping shall be replaced in kind by owner upon completion of construction.
7. Existing A.C. shall be removed by contractor as required. Resurfacing shall be done by others.

CITY OF AZUSA, CALIFORNIA
APPROVED BY: Michael R. Wells DATE: 11-30-72
MICHAEL WELLS RCE 16410 DIRECTOR OF PUBLIC WORKS

NO.	REVISION	INITIAL	DATE
1	Removed curb & sand backfill	W.J.L.	1-5-73

SURVEY REFERENCE

	F.B.	PG.	CLIENT	F.B.	PG.
HORIZONTAL CONTROL					
VERTICAL CONTROL			"		
TOPOGRAPHY	F.B. 8	PG. 120-122	"		
CROSS SECTIONS	F.B. 8	PG. 123-122	"		

DESIGN K.G. DATE 11-22-1972
DRAWN G.D.N. DATE 11-22-1972
CHECKED K.G. DATE 11-29-1972

PREPARED IN THE OFFICE OF
LOCKMAN & ASSOCIATES, CIVIL ENGINEERS
BY R.E. 10250 DATE 11-29 1972

PLAN AND PROFILE OF DRAINAGE SYSTEM
1000 WEST SIERRA MADRE AVENUE
AZUSA, CALIFORNIA
FOR RAIN BIRD SPRINKLER MFG CO

JOB NO. 72-401
SHEET 1 OF 1

SD-38
M.S. 3-401

C-324

APPENDIX B

HYDROLOGY CALCULATIONS

Peak Flow Hydrologic Analysis

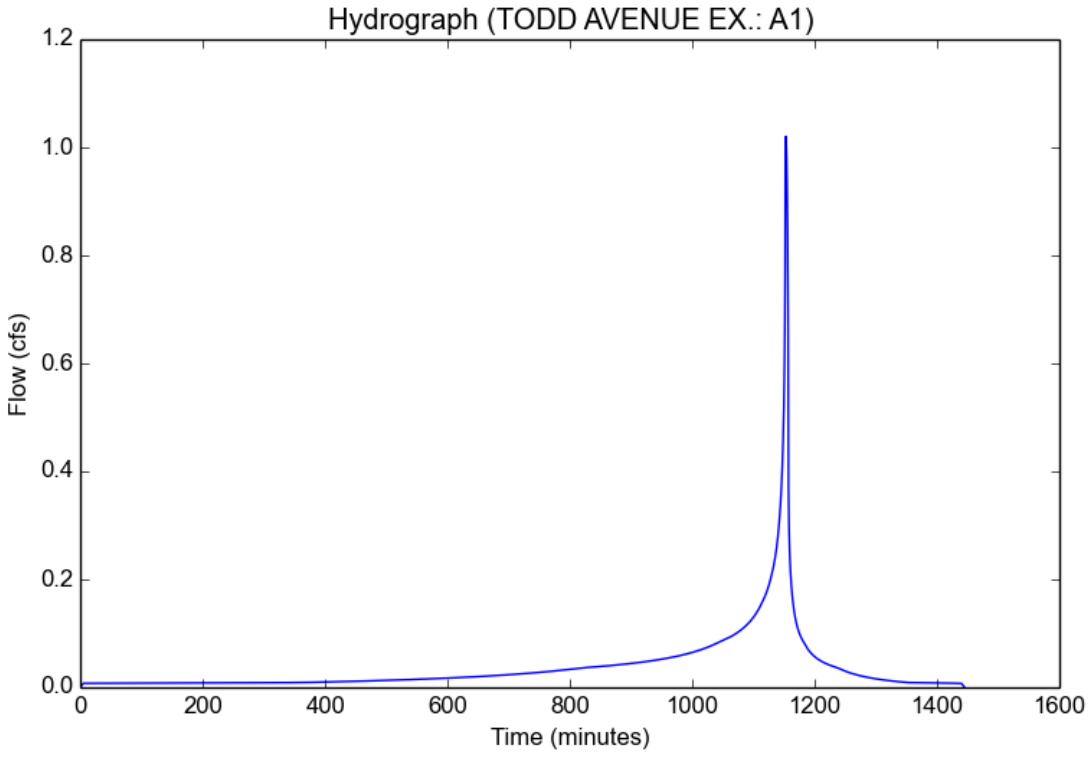
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE EX. Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE EX.
Subarea ID	A1
Area (ac)	0.25
Flow Path Length (ft)	51.0
Flow Path Slope (vft/hft)	0.129
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.1
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.0202
Burned Peak Flow Rate (cfs)	1.0202
24-Hr Clear Runoff Volume (ac-ft)	0.076
24-Hr Clear Runoff Volume (cu-ft)	3310.6791



Peak Flow Hydrologic Analysis

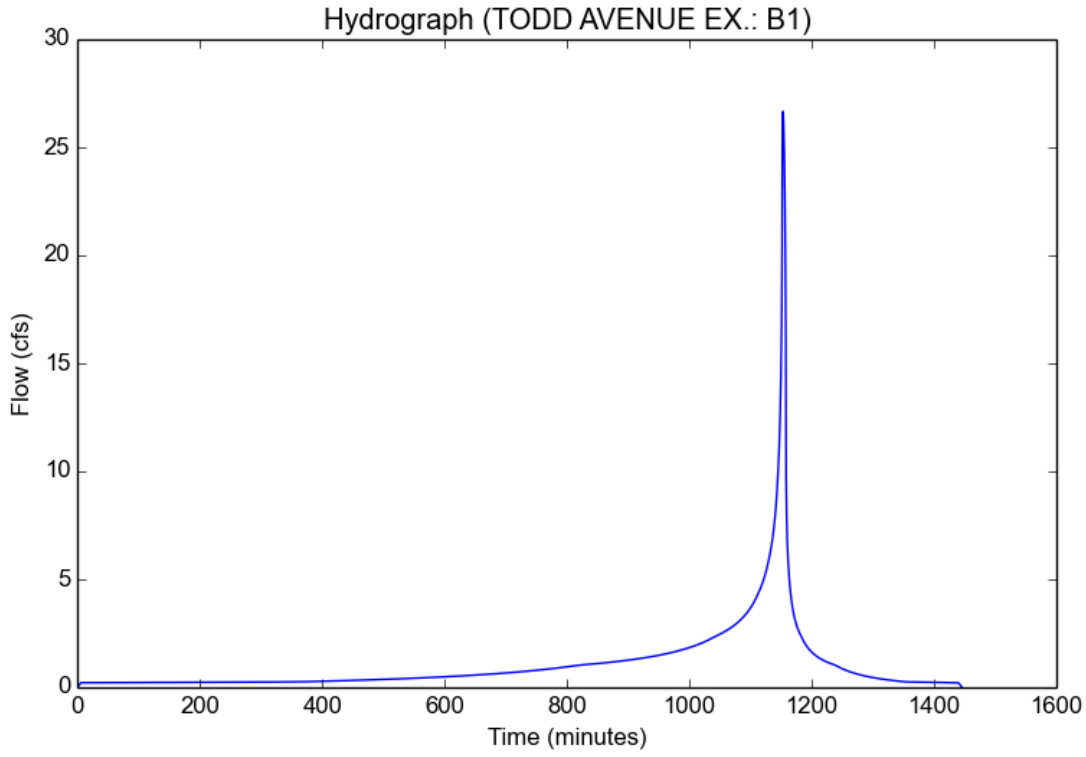
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE EX. Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE EX.
Subarea ID	B1
Area (ac)	7.12
Flow Path Length (ft)	932.0
Flow Path Slope (vft/hft)	0.114
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.1
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.162
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	26.6701
Burned Peak Flow Rate (cfs)	26.6701
24-Hr Clear Runoff Volume (ac-ft)	2.1649
24-Hr Clear Runoff Volume (cu-ft)	94302.7315



Peak Flow Hydrologic Analysis

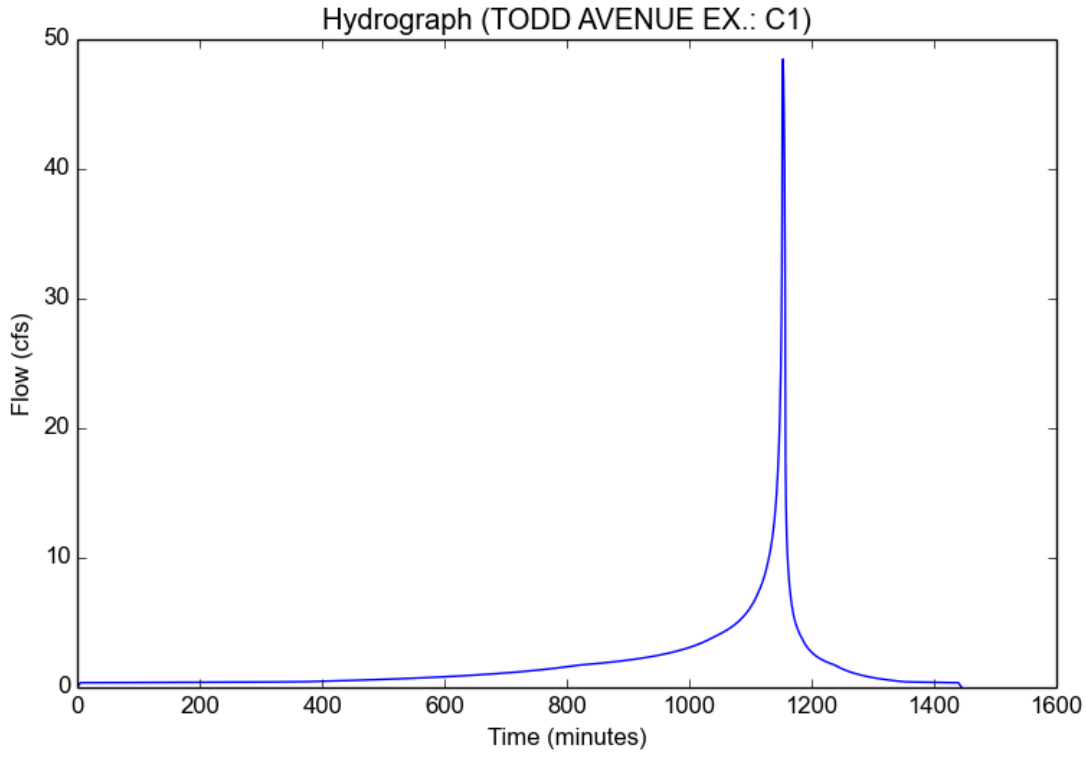
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE EX. Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE EX.
Subarea ID	C1
Area (ac)	11.88
Flow Path Length (ft)	425.0
Flow Path Slope (vft/hft)	0.0143
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.1
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	48.4815
Burned Peak Flow Rate (cfs)	48.4815
24-Hr Clear Runoff Volume (ac-ft)	3.6116
24-Hr Clear Runoff Volume (cu-ft)	157323.4718



Peak Flow Hydrologic Analysis

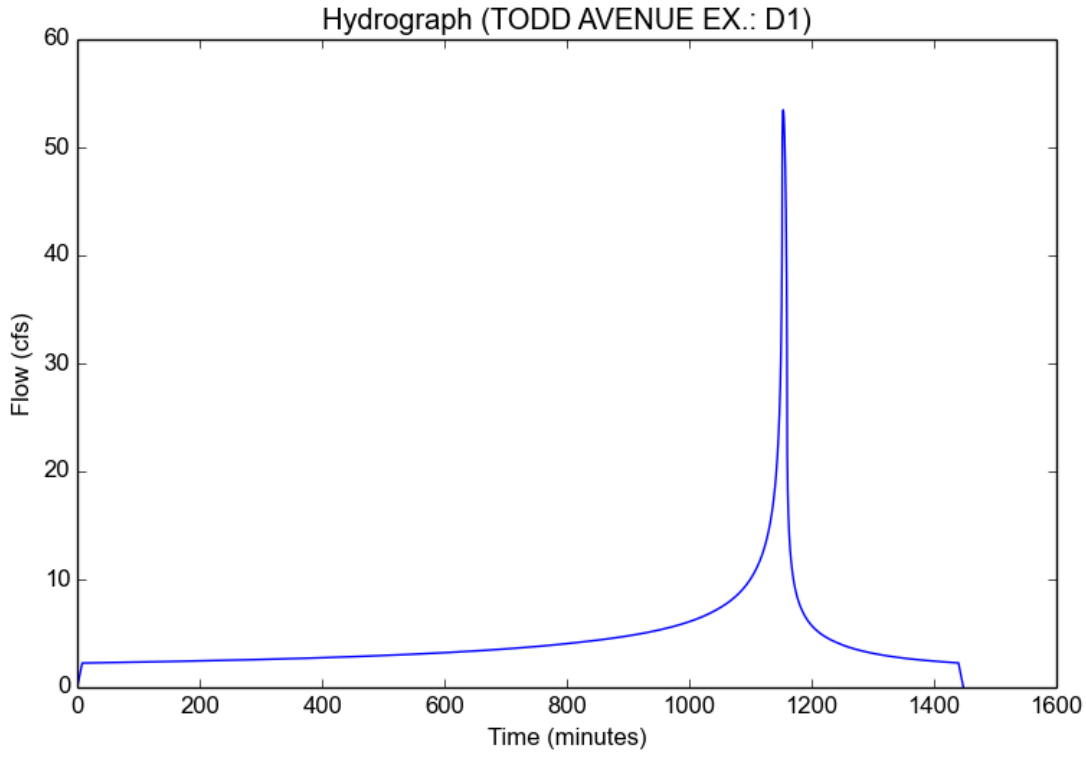
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE EX. Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE EX.
Subarea ID	D1
Area (ac)	16.34
Flow Path Length (ft)	814.0
Flow Path Slope (vft/hft)	0.0071
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	3.6356
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	53.4657
Burned Peak Flow Rate (cfs)	53.4657
24-Hr Clear Runoff Volume (ac-ft)	8.7628
24-Hr Clear Runoff Volume (cu-ft)	381705.7552



Peak Flow Hydrologic Analysis

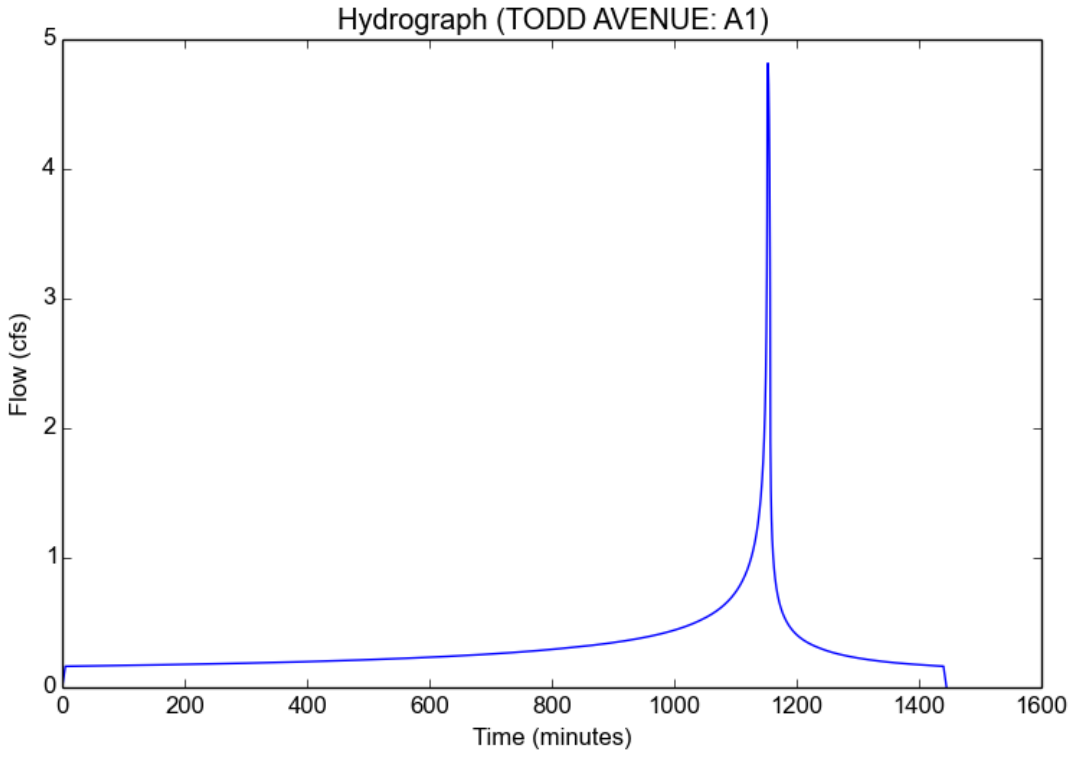
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	A1
Area (ac)	1.18
Flow Path Length (ft)	174.0
Flow Path Slope (vft/hft)	0.022
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	4.8155
Burned Peak Flow Rate (cfs)	4.8155
24-Hr Clear Runoff Volume (ac-ft)	0.6328
24-Hr Clear Runoff Volume (cu-ft)	27564.1154



Peak Flow Hydrologic Analysis

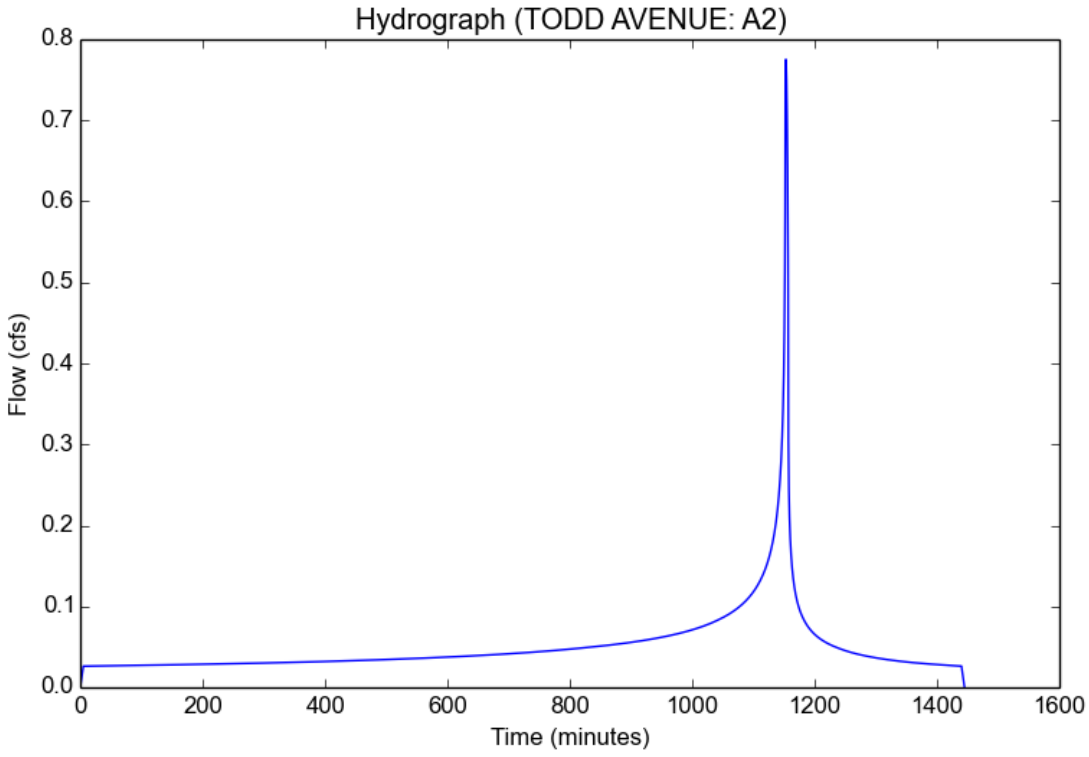
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	A2
Area (ac)	0.19
Flow Path Length (ft)	108.0
Flow Path Slope (vft/hft)	0.012
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.7754
Burned Peak Flow Rate (cfs)	0.7754
24-Hr Clear Runoff Volume (ac-ft)	0.1019
24-Hr Clear Runoff Volume (cu-ft)	4438.2898



Peak Flow Hydrologic Analysis

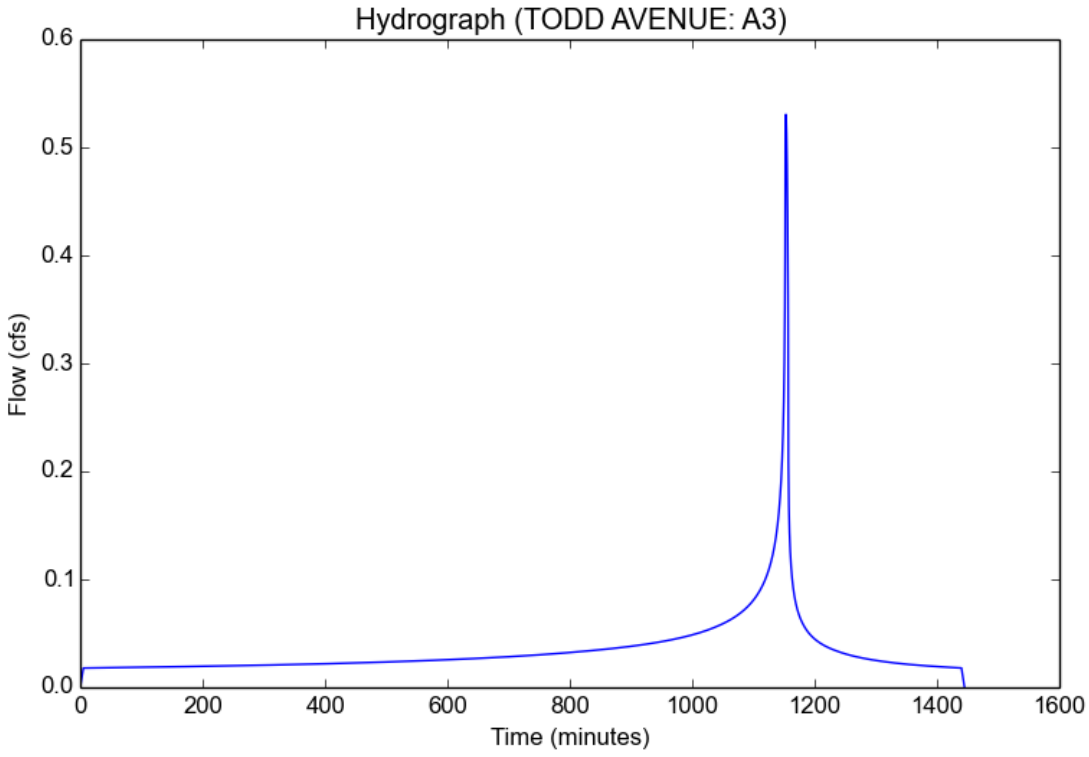
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	A3
Area (ac)	0.13
Flow Path Length (ft)	83.0
Flow Path Slope (vft/hft)	0.017
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.5305
Burned Peak Flow Rate (cfs)	0.5305
24-Hr Clear Runoff Volume (ac-ft)	0.0697
24-Hr Clear Runoff Volume (cu-ft)	3036.7246



Peak Flow Hydrologic Analysis

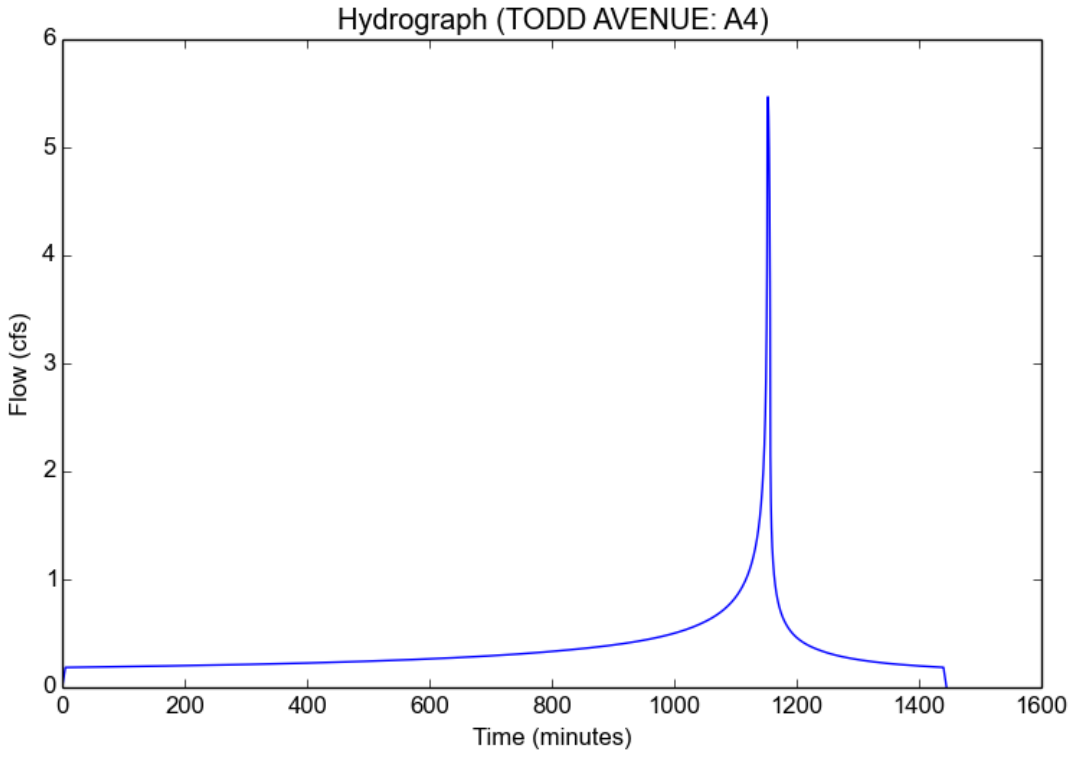
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	A4
Area (ac)	1.34
Flow Path Length (ft)	139.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.4684
Burned Peak Flow Rate (cfs)	5.4684
24-Hr Clear Runoff Volume (ac-ft)	0.7186
24-Hr Clear Runoff Volume (cu-ft)	31301.6225



Peak Flow Hydrologic Analysis

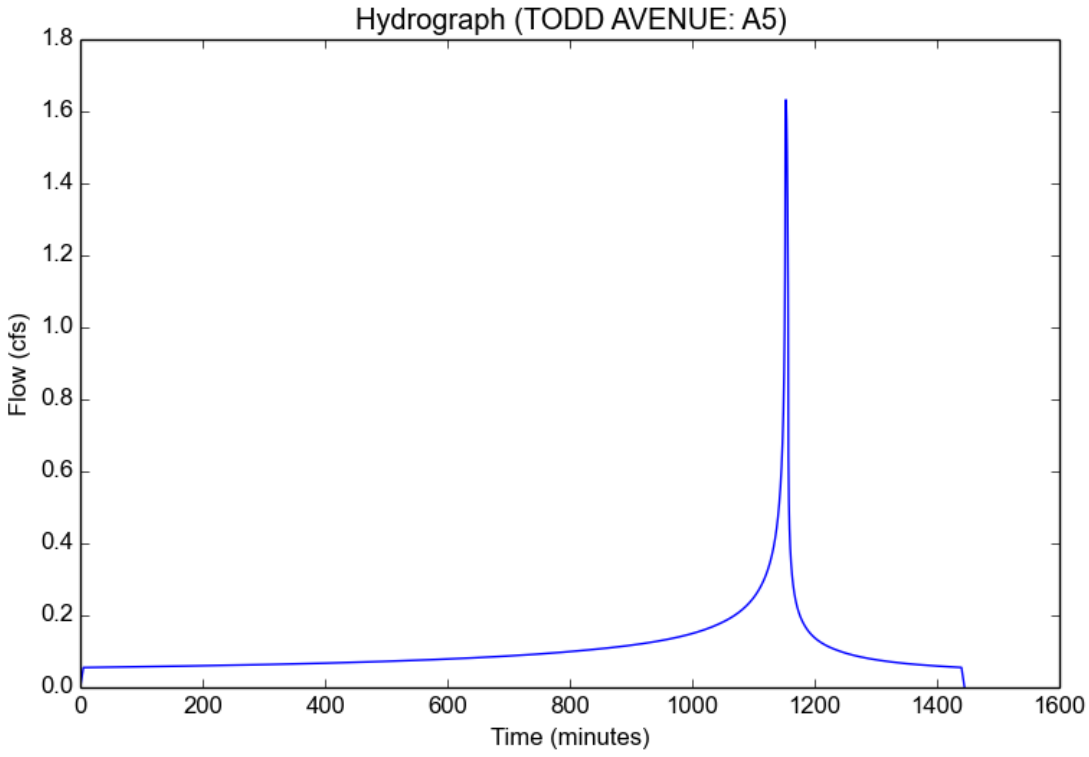
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	A5
Area (ac)	0.4
Flow Path Length (ft)	195.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.6324
Burned Peak Flow Rate (cfs)	1.6324
24-Hr Clear Runoff Volume (ac-ft)	0.2145
24-Hr Clear Runoff Volume (cu-ft)	9343.7679



Peak Flow Hydrologic Analysis

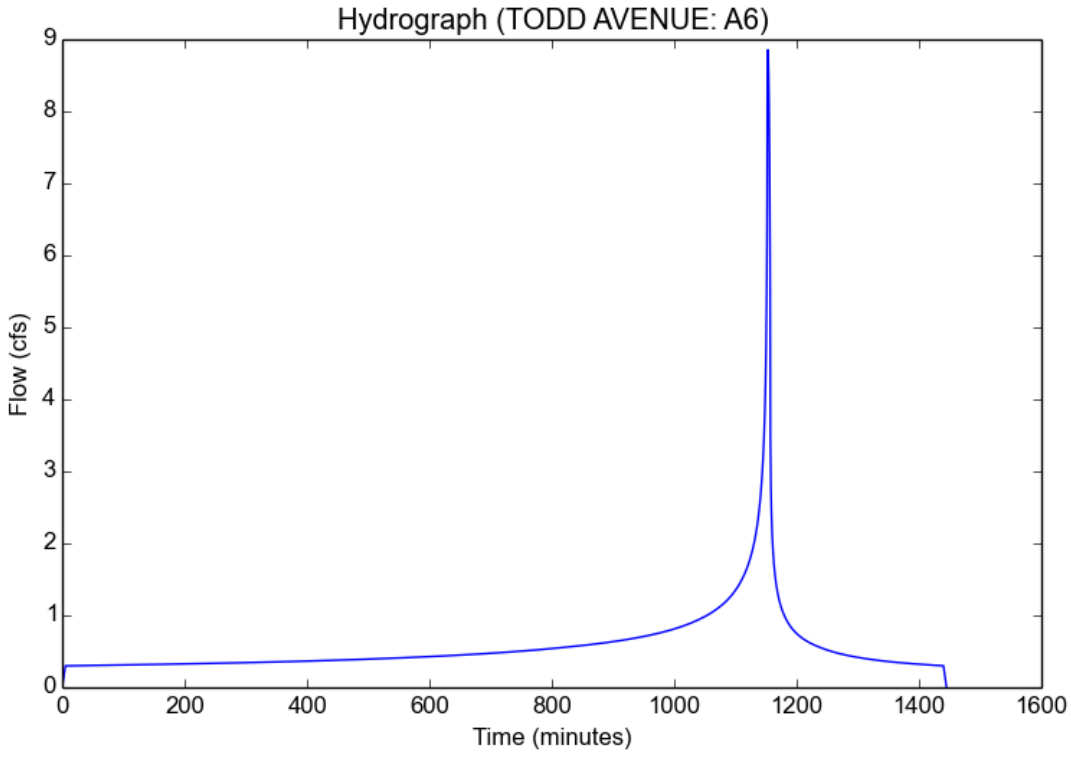
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	A6
Area (ac)	2.17
Flow Path Length (ft)	392.0
Flow Path Slope (vft/hft)	0.013
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	8.8556
Burned Peak Flow Rate (cfs)	8.8556
24-Hr Clear Runoff Volume (ac-ft)	1.1637
24-Hr Clear Runoff Volume (cu-ft)	50689.941



Peak Flow Hydrologic Analysis

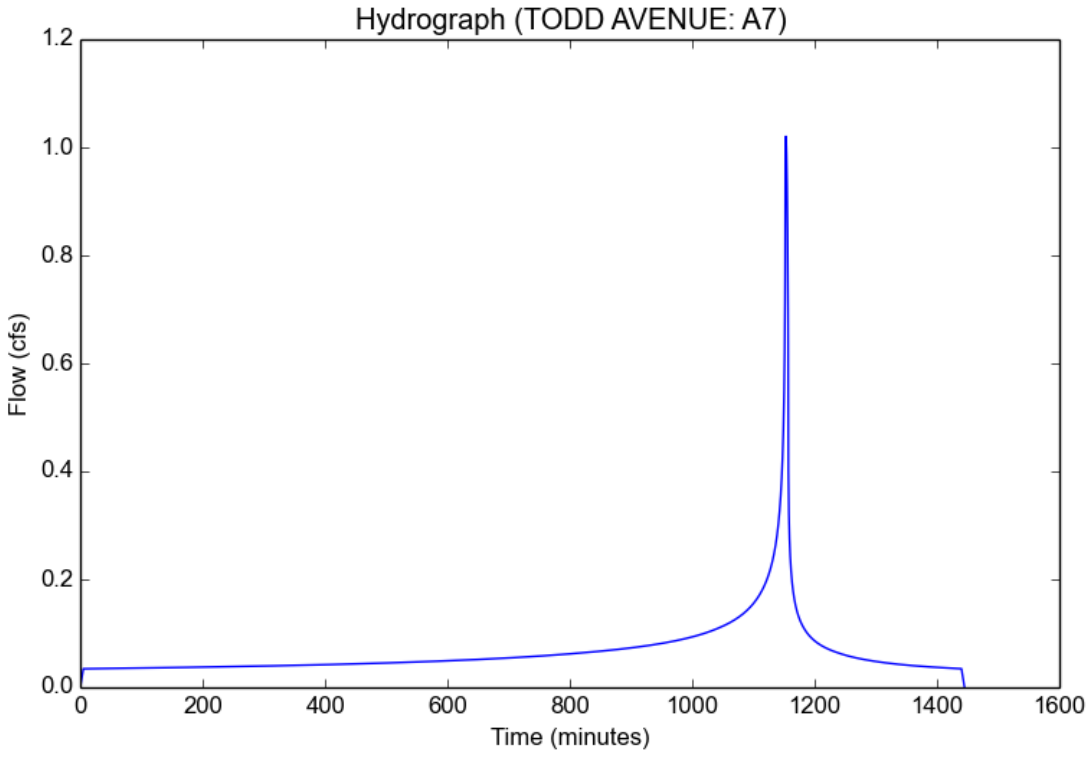
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	A7
Area (ac)	0.25
Flow Path Length (ft)	113.0
Flow Path Slope (vft/hft)	0.029
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.0202
Burned Peak Flow Rate (cfs)	1.0202
24-Hr Clear Runoff Volume (ac-ft)	0.1341
24-Hr Clear Runoff Volume (cu-ft)	5839.855



Peak Flow Hydrologic Analysis

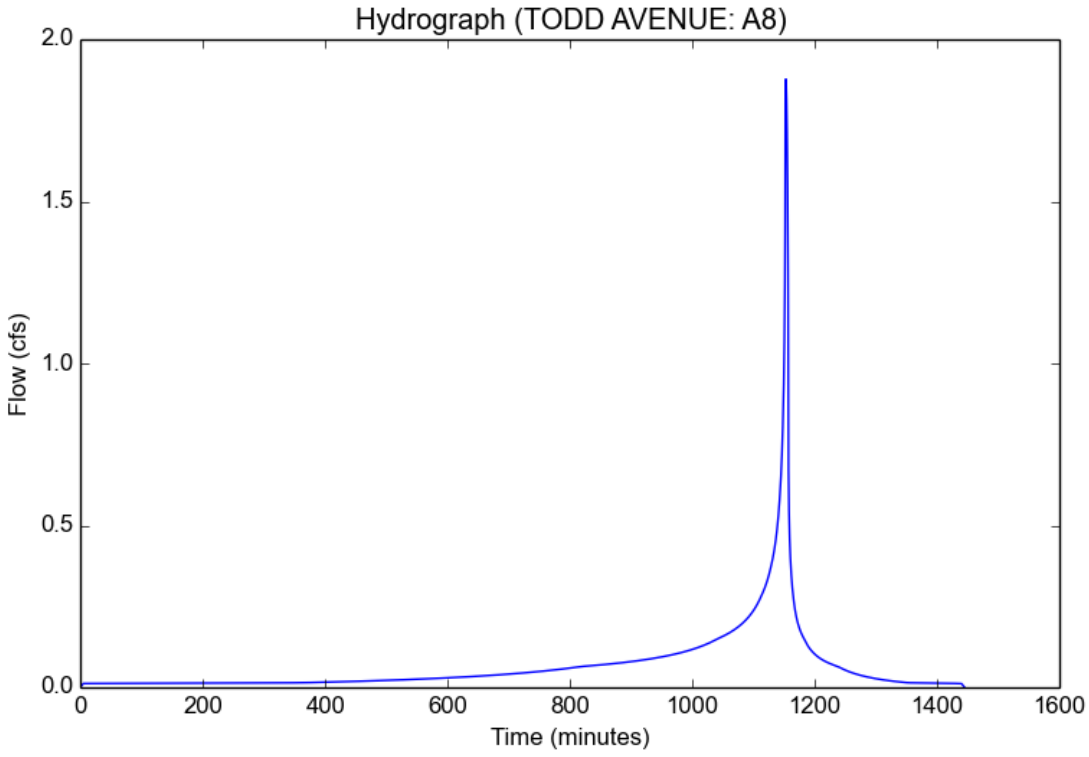
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	A8
Area (ac)	0.46
Flow Path Length (ft)	43.0
Flow Path Slope (vft/hft)	0.0458
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.07
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.8772
Burned Peak Flow Rate (cfs)	1.8772
24-Hr Clear Runoff Volume (ac-ft)	0.1358
24-Hr Clear Runoff Volume (cu-ft)	5917.1365



Peak Flow Hydrologic Analysis

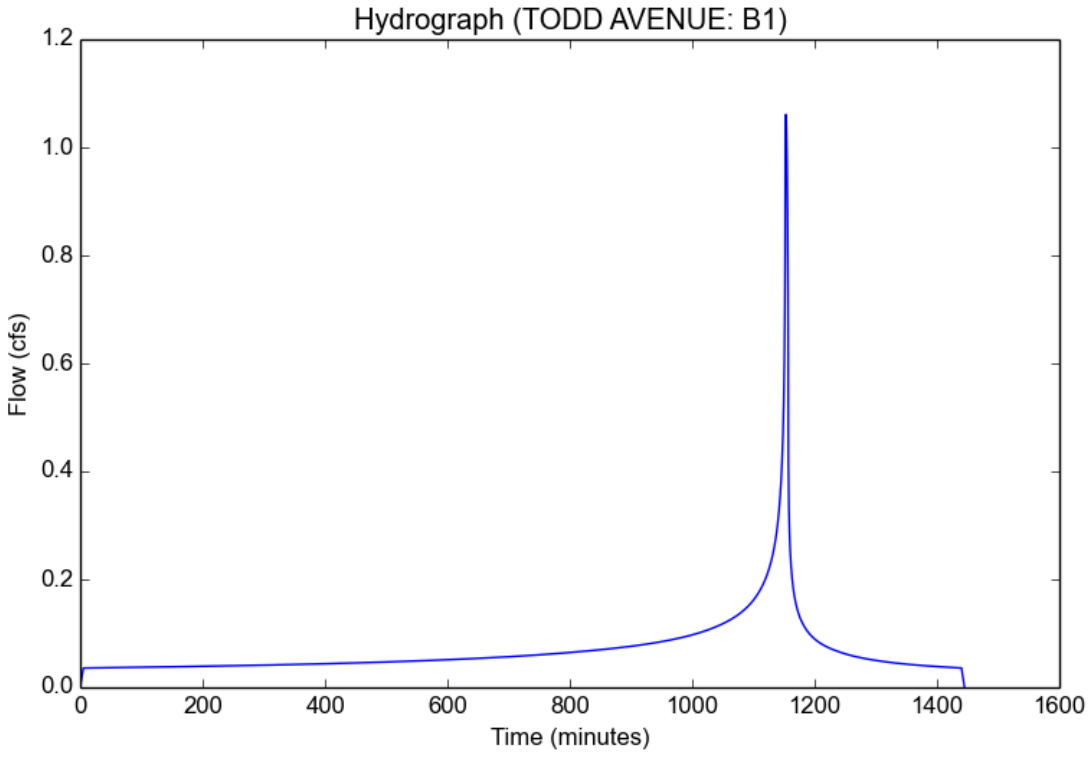
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	B1
Area (ac)	0.26
Flow Path Length (ft)	126.0
Flow Path Slope (vft/hft)	0.016
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.061
Burned Peak Flow Rate (cfs)	1.061
24-Hr Clear Runoff Volume (ac-ft)	0.1394
24-Hr Clear Runoff Volume (cu-ft)	6073.4491



Peak Flow Hydrologic Analysis

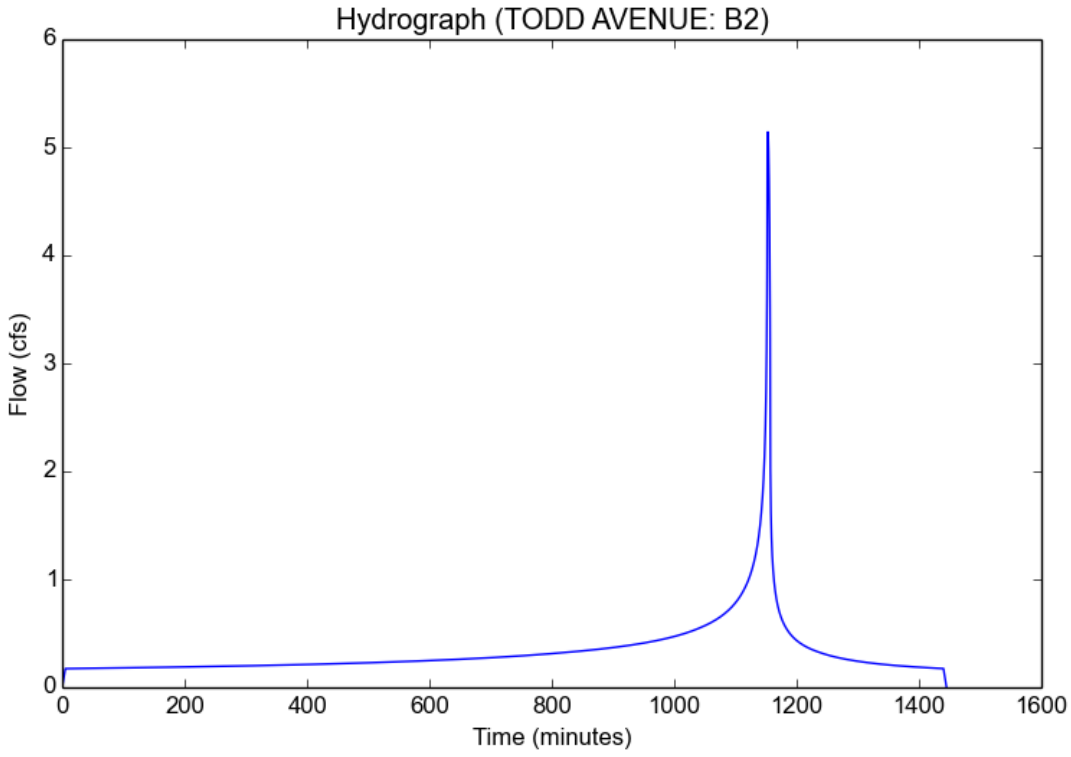
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	B2
Area (ac)	1.26
Flow Path Length (ft)	153.0
Flow Path Slope (vft/hft)	0.0132
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.142
Burned Peak Flow Rate (cfs)	5.142
24-Hr Clear Runoff Volume (ac-ft)	0.6757
24-Hr Clear Runoff Volume (cu-ft)	29432.8689



Peak Flow Hydrologic Analysis

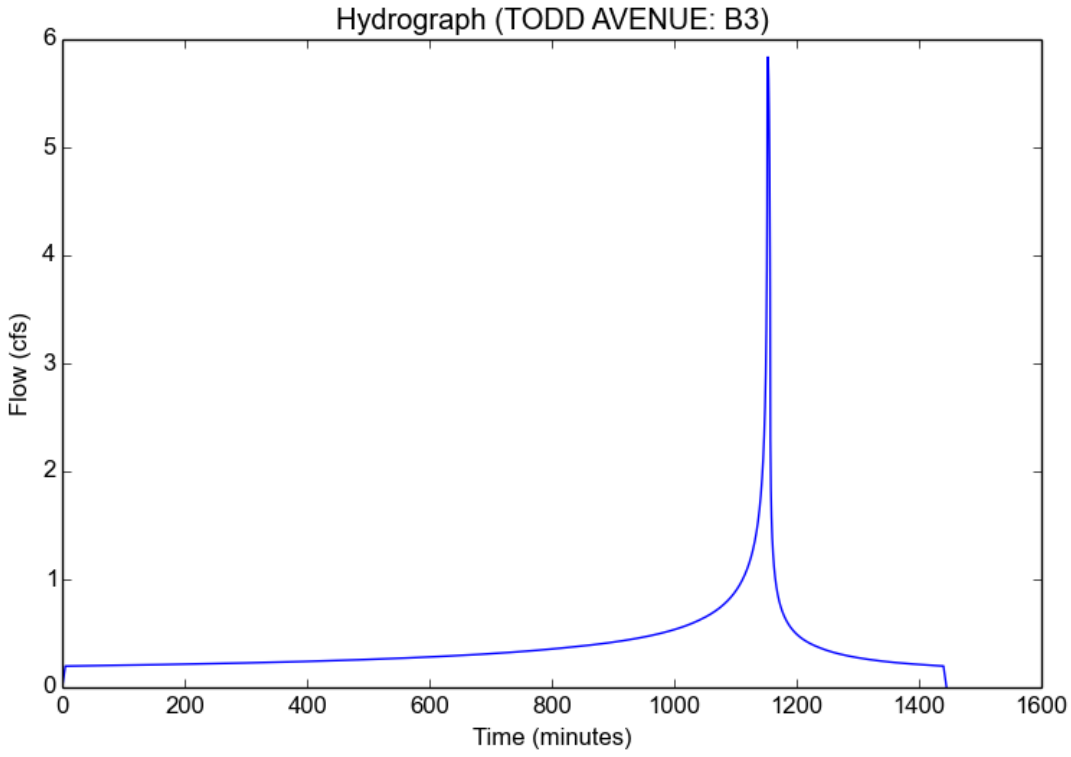
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	B3
Area (ac)	1.43
Flow Path Length (ft)	322.0
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.8357
Burned Peak Flow Rate (cfs)	5.8357
24-Hr Clear Runoff Volume (ac-ft)	0.7668
24-Hr Clear Runoff Volume (cu-ft)	33403.9703



Peak Flow Hydrologic Analysis

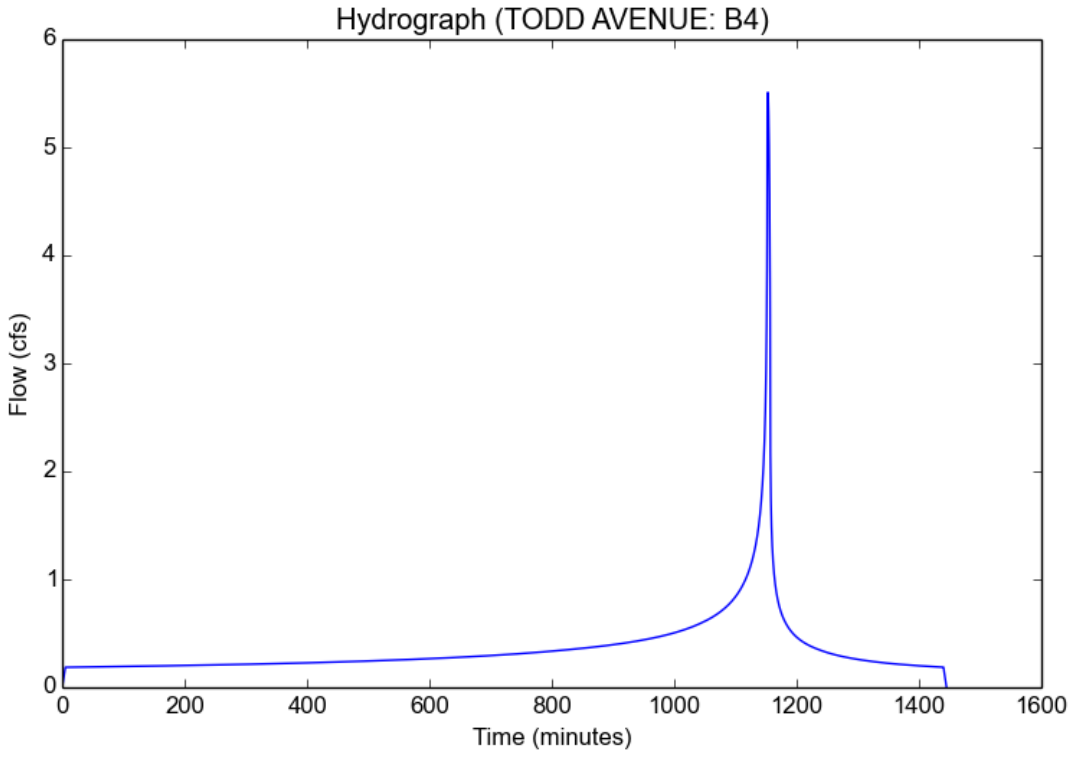
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	B4
Area (ac)	1.35
Flow Path Length (ft)	257.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.5093
Burned Peak Flow Rate (cfs)	5.5093
24-Hr Clear Runoff Volume (ac-ft)	0.7239
24-Hr Clear Runoff Volume (cu-ft)	31535.2167



Peak Flow Hydrologic Analysis

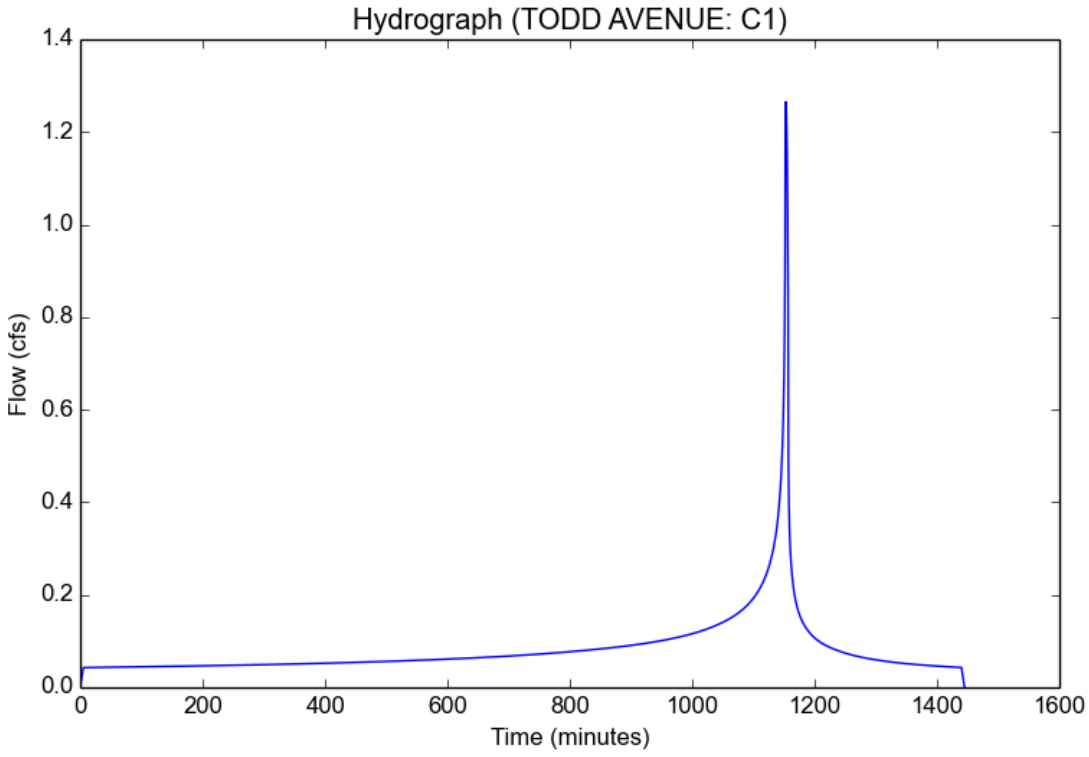
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	C1
Area (ac)	0.31
Flow Path Length (ft)	124.0
Flow Path Slope (vft/hft)	0.002
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.2651
Burned Peak Flow Rate (cfs)	1.2651
24-Hr Clear Runoff Volume (ac-ft)	0.1662
24-Hr Clear Runoff Volume (cu-ft)	7241.4201



Peak Flow Hydrologic Analysis

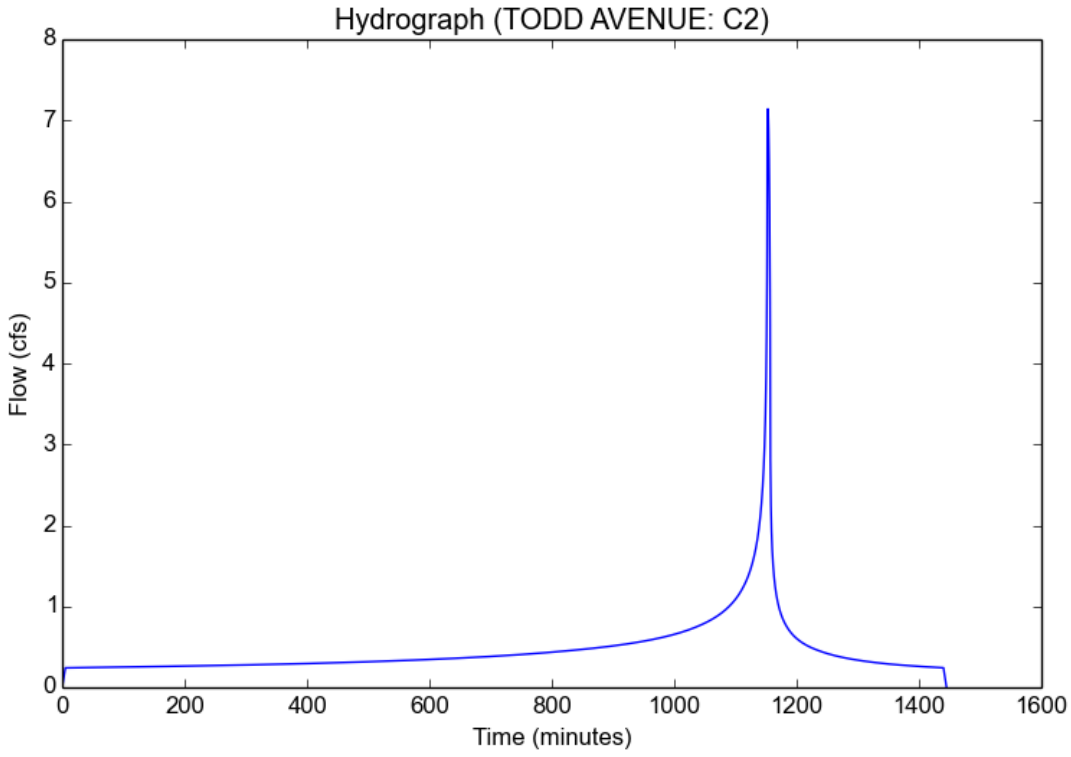
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	C2
Area (ac)	1.75
Flow Path Length (ft)	274.0
Flow Path Slope (vft/hft)	0.012
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	7.1416
Burned Peak Flow Rate (cfs)	7.1416
24-Hr Clear Runoff Volume (ac-ft)	0.9385
24-Hr Clear Runoff Volume (cu-ft)	40878.9847



Peak Flow Hydrologic Analysis

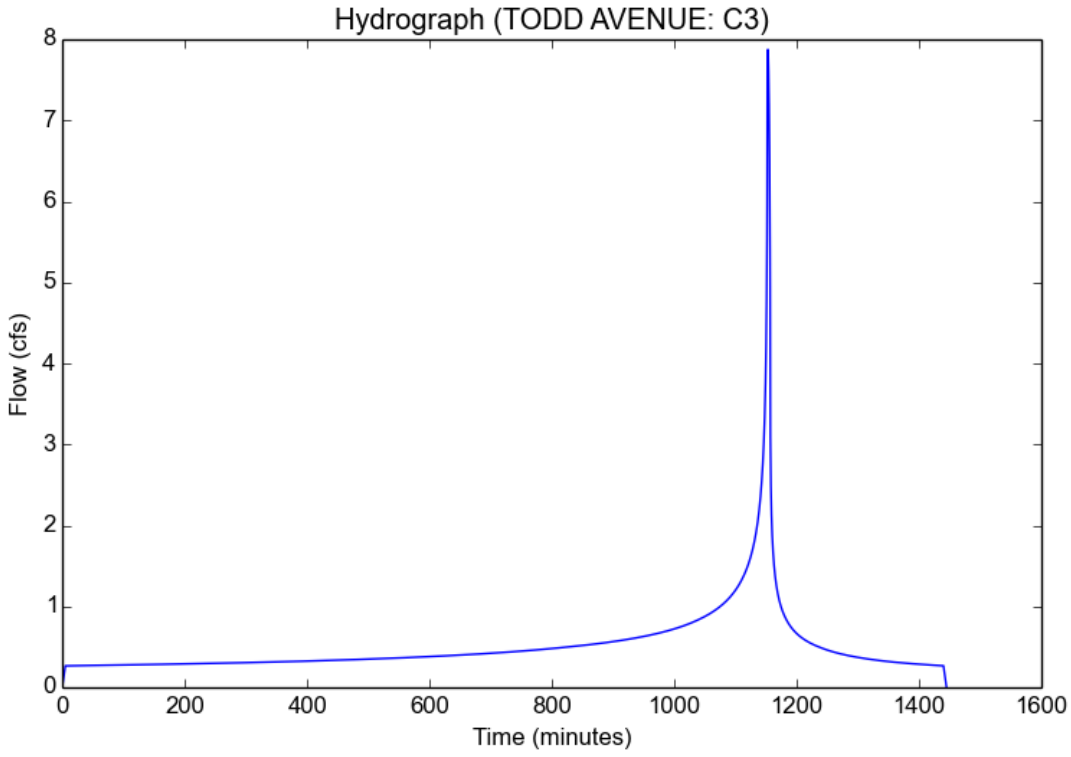
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	C3
Area (ac)	1.93
Flow Path Length (ft)	239.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	7.8762
Burned Peak Flow Rate (cfs)	7.8762
24-Hr Clear Runoff Volume (ac-ft)	1.035
24-Hr Clear Runoff Volume (cu-ft)	45083.6802



Peak Flow Hydrologic Analysis

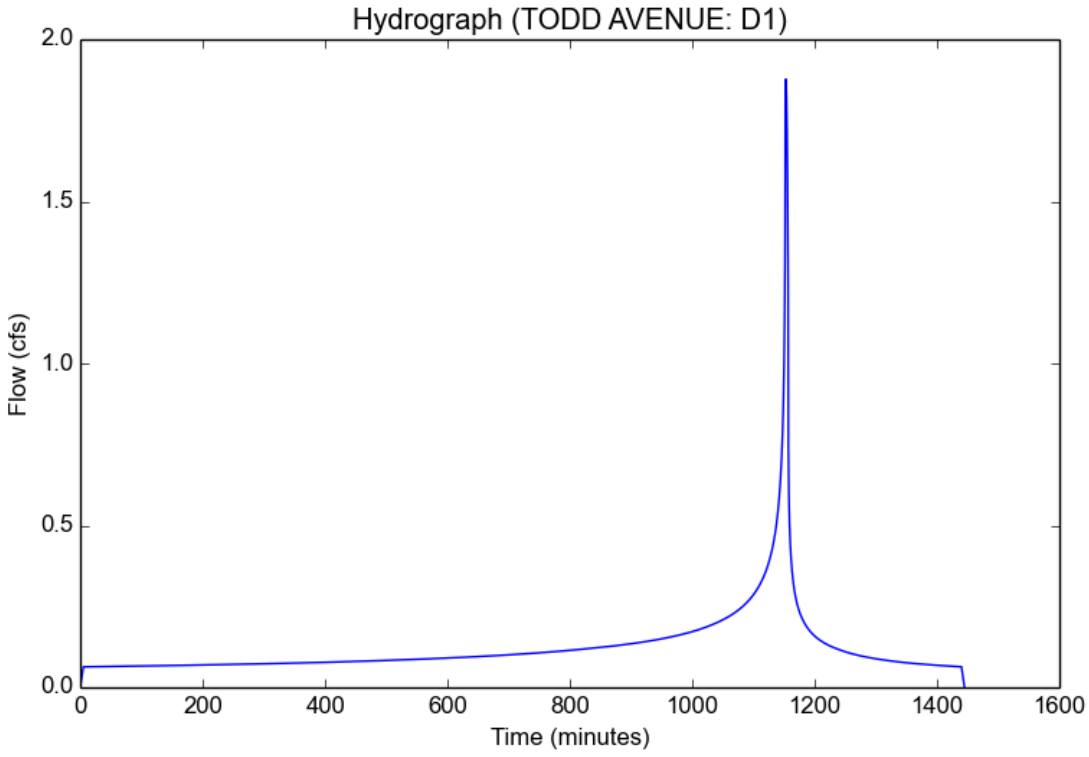
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	D1
Area (ac)	0.46
Flow Path Length (ft)	175.0
Flow Path Slope (vft/hft)	0.024
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.8772
Burned Peak Flow Rate (cfs)	1.8772
24-Hr Clear Runoff Volume (ac-ft)	0.2467
24-Hr Clear Runoff Volume (cu-ft)	10745.3331



Peak Flow Hydrologic Analysis

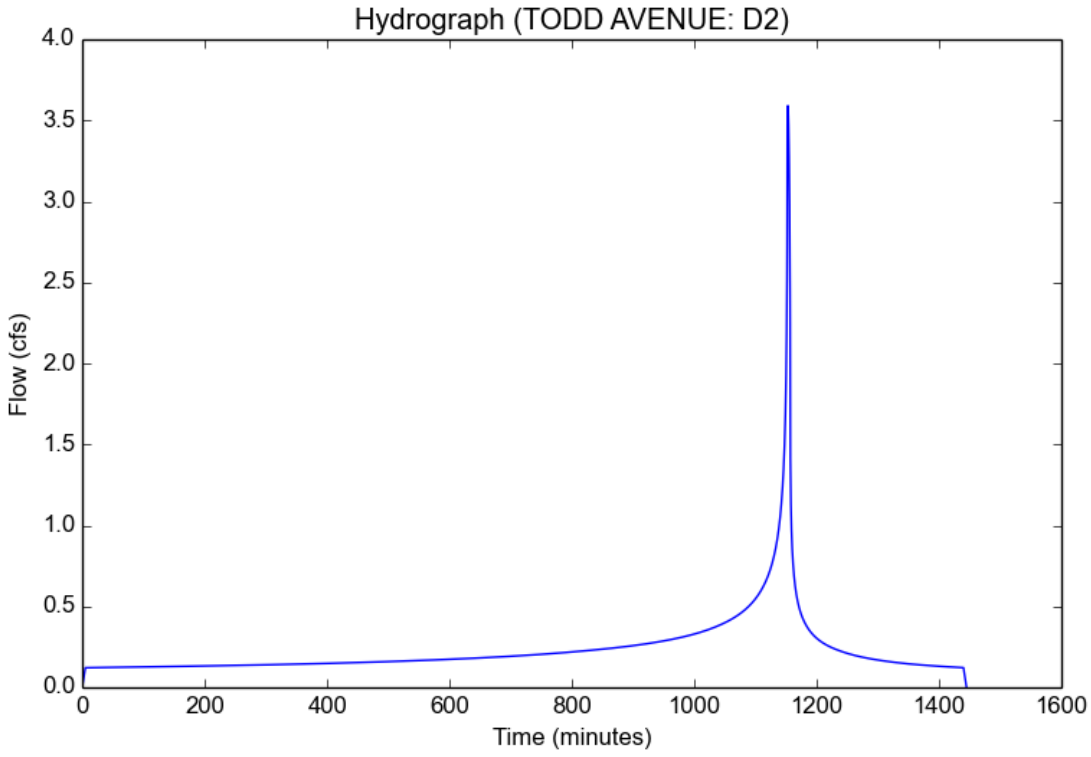
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	D2
Area (ac)	0.88
Flow Path Length (ft)	230.0
Flow Path Slope (vft/hft)	0.019
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.5912
Burned Peak Flow Rate (cfs)	3.5912
24-Hr Clear Runoff Volume (ac-ft)	0.4719
24-Hr Clear Runoff Volume (cu-ft)	20556.2894



Peak Flow Hydrologic Analysis

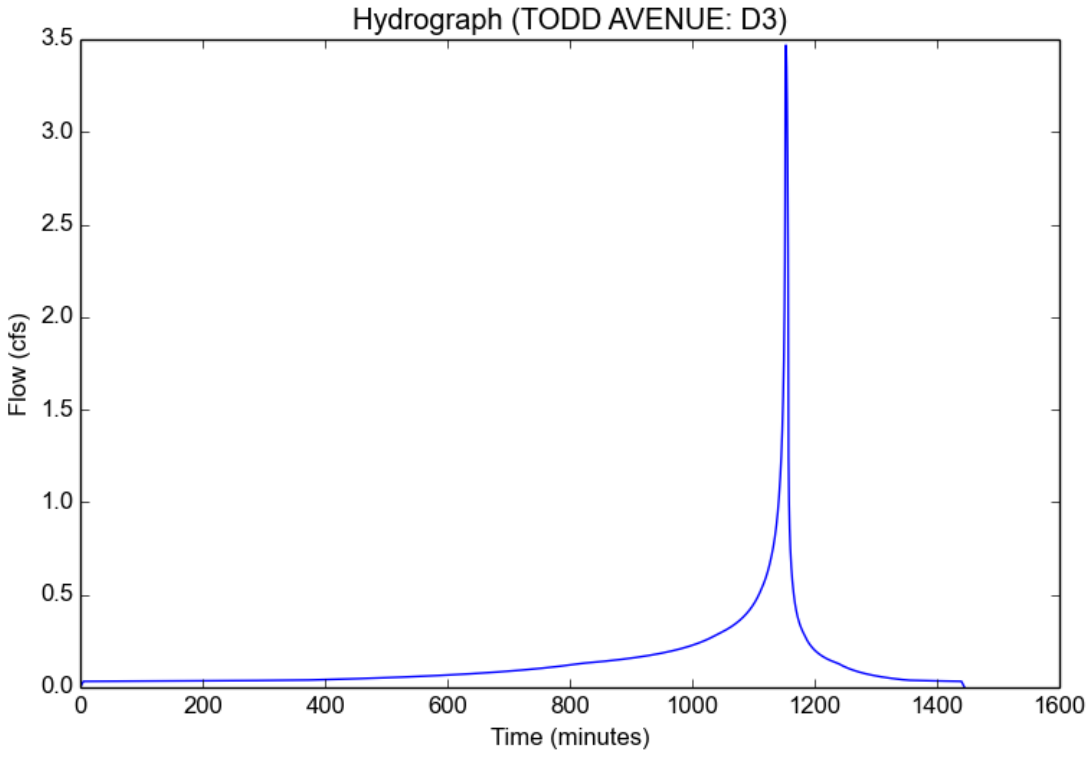
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	D3
Area (ac)	0.85
Flow Path Length (ft)	116.0
Flow Path Slope (vft/hft)	0.053
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.16
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.4688
Burned Peak Flow Rate (cfs)	3.4688
24-Hr Clear Runoff Volume (ac-ft)	0.2732
24-Hr Clear Runoff Volume (cu-ft)	11901.2488



Peak Flow Hydrologic Analysis

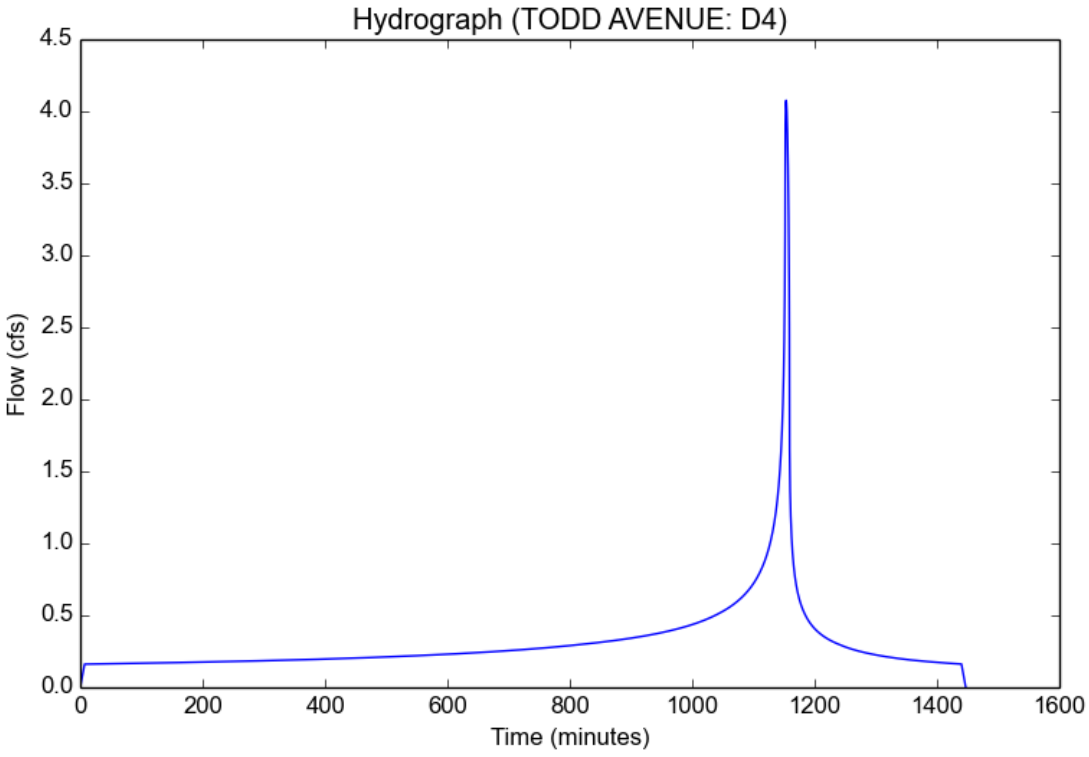
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	D4
Area (ac)	1.17
Flow Path Length (ft)	503.0
Flow Path Slope (vft/hft)	0.0042
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	3.8711
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	4.0763
Burned Peak Flow Rate (cfs)	4.0763
24-Hr Clear Runoff Volume (ac-ft)	0.6274
24-Hr Clear Runoff Volume (cu-ft)	27331.0939



Peak Flow Hydrologic Analysis

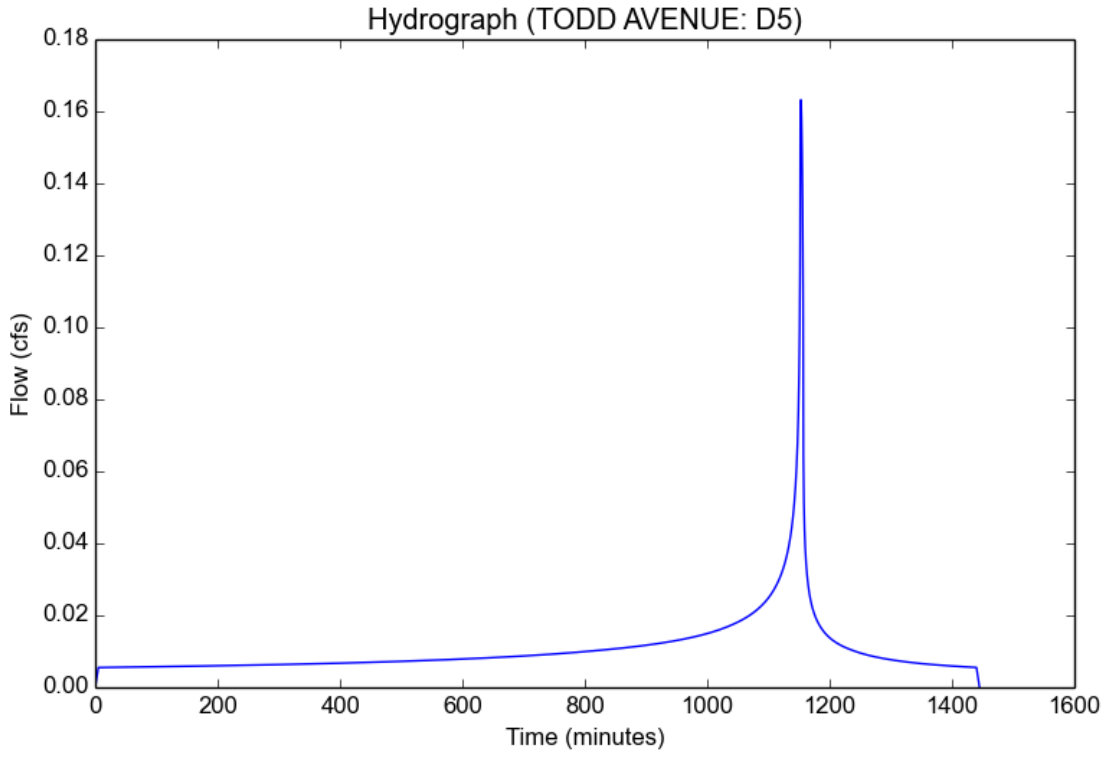
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	D5
Area (ac)	0.04
Flow Path Length (ft)	63.0
Flow Path Slope (vft/hft)	0.013
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.1632
Burned Peak Flow Rate (cfs)	0.1632
24-Hr Clear Runoff Volume (ac-ft)	0.0215
24-Hr Clear Runoff Volume (cu-ft)	934.3768



Peak Flow Hydrologic Analysis

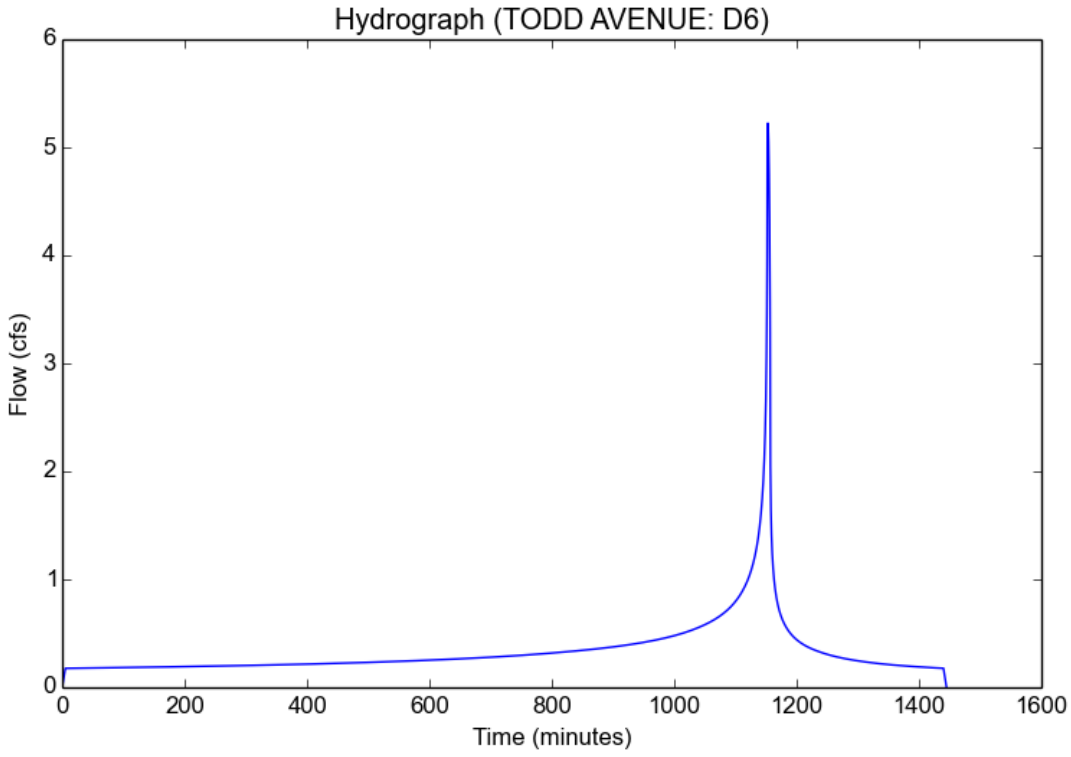
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	D6
Area (ac)	1.28
Flow Path Length (ft)	136.0
Flow Path Slope (vft/hft)	0.0187
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.2236
Burned Peak Flow Rate (cfs)	5.2236
24-Hr Clear Runoff Volume (ac-ft)	0.6864
24-Hr Clear Runoff Volume (cu-ft)	29900.0573



Peak Flow Hydrologic Analysis

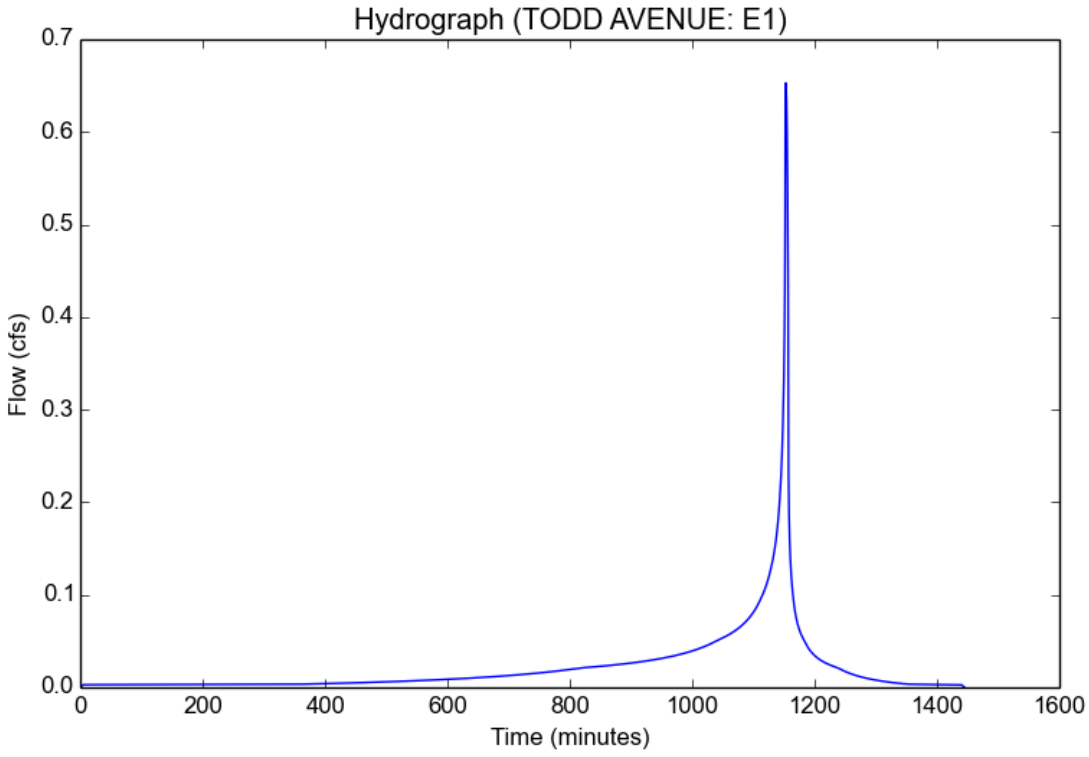
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX B RATIONAL METHOD/TODD AVENUE Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	E1
Area (ac)	0.16
Flow Path Length (ft)	29.0
Flow Path Slope (vft/hft)	0.0131
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.01
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.6529
Burned Peak Flow Rate (cfs)	0.6529
24-Hr Clear Runoff Volume (ac-ft)	0.0445
24-Hr Clear Runoff Volume (cu-ft)	1936.734



APPENDIX C

HYDRAULIC CALCULATIONS

DATE: 4/19/2023
TIME: 8:45

F0515P

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	36	4			3.00														
CD	30	4			2.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

JOB NO 4081

HEADING LINE NO 2 IS -

EXISTING 36" CMP

HEADING LINE NO 3 IS -

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	103.33	623.59	36	627.60

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	136.02	626.04	36	0.024	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	362.83	629.64	36	0.024	0.00	0.00	0.00	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	455.00	630.96	36	0.024	0.00	0.00	0.00	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	455.00	630.96	36	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE 1

WATER SURFACE PROFILE LISTING

JOB NO 4081
EXISTING 36" CMP

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR

L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
103.33	623.59	4.010	627.600	53.5	7.57	0.889	628.489	0.00	2.377	3.00	0.00	0.00	0	0.00
17.45	0.07495					.021929	0.38		1.571			0.00		
120.78	624.90	3.091	627.989	53.5	7.57	0.889	628.878	0.00	2.377	3.00	0.00	0.00	0	0.00
HYDRAULIC JUMP												0.00		
120.78	624.90	1.771	626.669	53.5	12.32	2.356	629.025	0.00	2.377	3.00	0.00	0.00	0	0.00
4.38	0.07495					.048699	0.21		1.571			0.00		
125.16	625.23	1.828	627.054	53.5	11.86	2.184	629.238	0.00	2.377	3.00	0.00	0.00	0	0.00
3.96	0.07495					.043694	0.17		1.571			0.00		
129.12	625.52	1.903	627.426	53.5	11.31	1.986	629.412	0.00	2.377	3.00	0.00	0.00	0	0.00
2.75	0.07495					.038759	0.11		1.571			0.00		
131.87	625.73	1.984	627.713	53.5	10.78	1.805	629.518	0.00	2.377	3.00	0.00	0.00	0	0.00
1.92	0.07495					.034459	0.07		1.571			0.00		
133.79	625.87	2.070	627.943	53.5	10.28	1.641	629.584	0.00	2.377	3.00	0.00	0.00	0	0.00
1.27	0.07495					.030714	0.04		1.571			0.00		
135.06	625.97	2.163	628.131	53.5	9.80	1.492	629.623	0.00	2.377	3.00	0.00	0.00	0	0.00
0.73	0.07495					.027473	0.02		1.571			0.00		
135.79	626.02	2.264	628.287	53.5	9.34	1.356	629.643	0.00	2.377	3.00	0.00	0.00	0	0.00
0.23	0.07495					.024684	0.01		1.571			0.00		
136.02	626.04	2.377	628.417	53.5	8.91	1.232	629.649	0.00	2.377	3.00	0.00	0.00	0	0.00
2.03	0.01587					.022332	0.05		3.000			0.00		
138.05	626.07	2.502	628.574	53.5	8.49	1.120	629.694	0.00	2.377	3.00	0.00	0.00	0	0.00
9.86	0.01587					.020456	0.20		3.000			0.00		

WATER SURFACE PROFILE LISTING

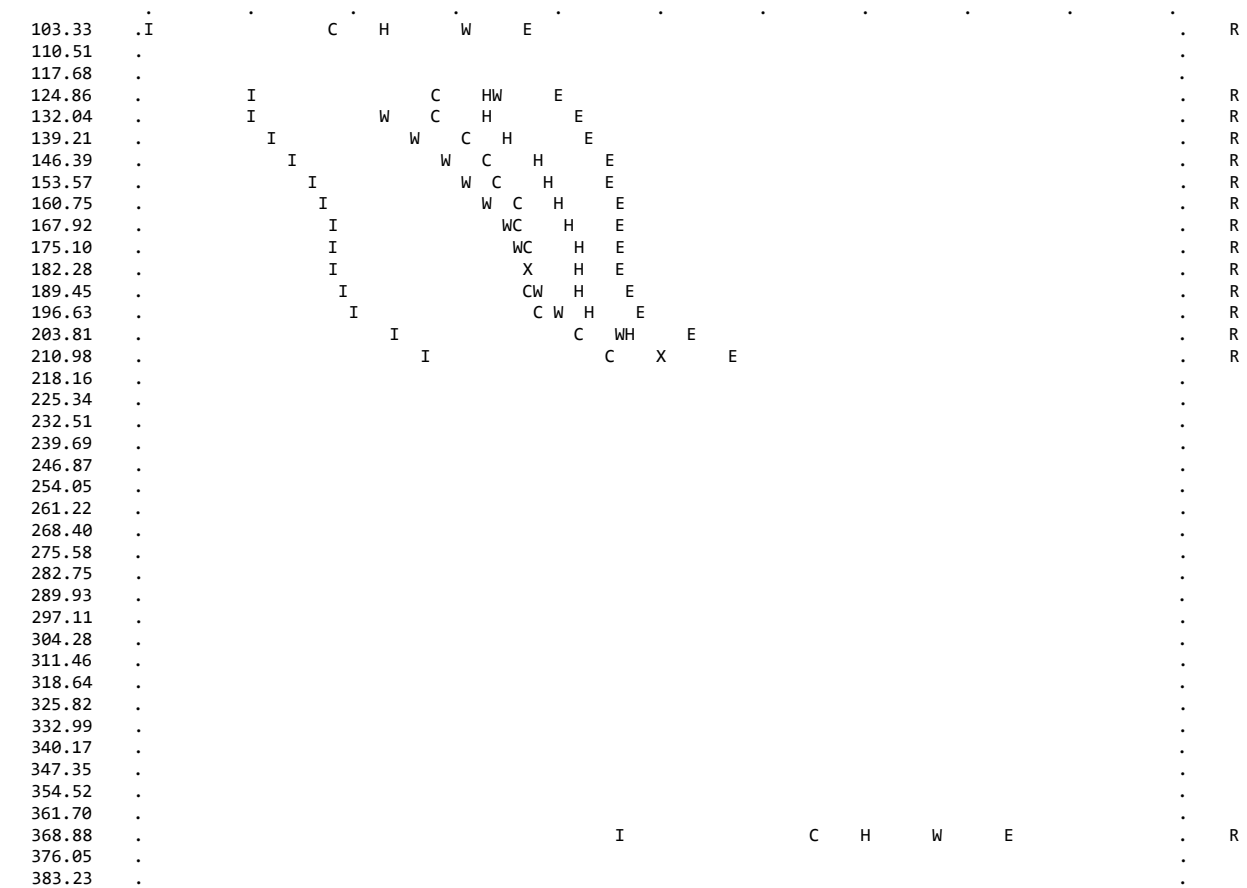
JOB NO 4081
EXISTING 36" CMP

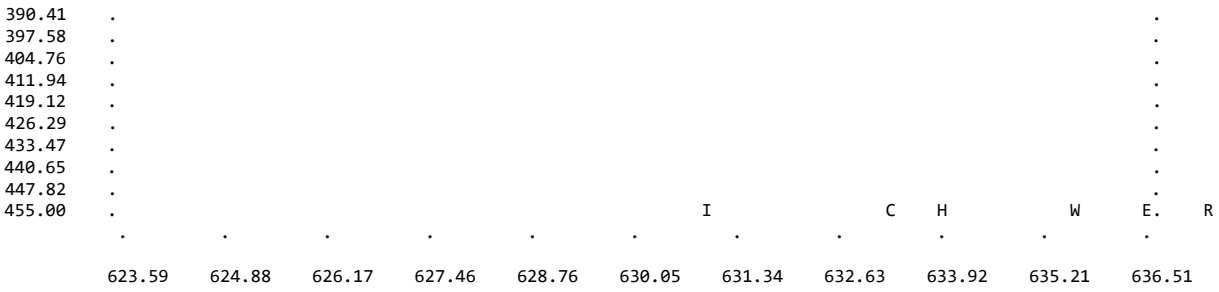
STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR

L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
147.91	626.23	2.649	628.878	53.5	8.10	1.018	629.896	0.00	2.377	3.00	0.00	0.00	0	0.00
29.83	0.01587					.019307	0.58		3.000			0.00		

```
177.74   626.70    2.844   629.546      53.5    7.72    0.925   630.471   0.00    2.377            3.00    0.00  0.00   0   0.00

 27.20  0.01587                                      .020280     0.55                   3.000                 0.00

204.94   627.13    3.000   630.134      53.5    7.57    0.889   631.023   0.00    2.377            3.00    0.00  0.00   0   0.00

157.89  0.01587                                      .021760     3.44                   3.000                 0.00

362.83   629.64    3.956   633.596      53.5    7.57    0.889   634.485   0.00    2.377            3.00    0.00  0.00   0   0.00

 92.17  0.01432                                      .021929     2.02                   3.000                 0.00

455.00   630.96    4.657   635.617      53.5    7.57    0.889   636.506   0.00    2.377            3.00    0.00  0.00   0   0.00
```

JOB NO 4081
EXISTING 36" CMP





N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

DATE: 4/19/2023
TIME: 8:54

F0515P

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	36	4			3.00														
CD	30	4			2.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

JOB NO 4081

HEADING LINE NO 2 IS -

EXISTING 36" CMP

HEADING LINE NO 3 IS -

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	103.33	623.59	36	627.60

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	136.02	626.04	36	0.012	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	264.53	628.04	36	0.012	0.00	0.00	0.00	0

ELEMENT NO 4 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	269.42	628.11	36	24	24	0.012	13.0	13.0	628.36	628.36	45.00	45.00

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	362.83	629.64	36	0.012	0.00	0.00	0.00	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	455.00	630.96	36	0.024	0.00	0.00	0.00	0

ELEMENT NO 7 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	455.00	630.96	36	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE 1

WATER SURFACE PROFILE LISTING

JOB NO 4081
EXISTING 36" CMP

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
103.33	623.59	1.769	625.359	79.5	18.33	5.218	630.577	0.00	2.766	3.00	0.00	0.00	0	0.00
7.93	0.07495					.026727	0.21		1.322			0.00		
111.26	624.18	1.837	626.021	79.5	17.51	4.764	630.785	0.00	2.766	3.00	0.00	0.00	0	0.00
6.95	0.07495					.023741	0.16		1.322			0.00		
118.21	624.71	1.914	626.619	79.5	16.70	4.330	630.949	0.00	2.766	3.00	0.00	0.00	0	0.00
5.80	0.07495					.021069	0.12		1.322			0.00		
124.01	625.14	1.995	627.135	79.5	15.92	3.937	631.072	0.00	2.766	3.00	0.00	0.00	0	0.00
4.82	0.07495					.018735	0.09		1.322			0.00		
128.83	625.50	2.082	627.583	79.5	15.18	3.578	631.161	0.00	2.766	3.00	0.00	0.00	0	0.00
3.97	0.07495					.016706	0.07		1.322			0.00		
132.80	625.80	2.176	627.975	79.5	14.47	3.253	631.228	0.00	2.766	3.00	0.00	0.00	0	0.00
3.22	0.07495					.014953	0.05		1.322			0.00		
136.02	626.04	2.279	628.319	79.5	13.80	2.957	631.276	0.00	2.766	3.00	0.00	0.00	0	0.00
47.49	0.01556					.013768	0.65		2.187			0.00		
183.51	626.78	2.335	629.114	79.5	13.47	2.816	631.930	0.00	2.766	3.00	0.00	0.00	0	0.00
48.59	0.01556					.012765	0.62		2.187			0.00		
232.10	627.53	2.455	629.990	79.5	12.84	2.559	632.549	0.00	2.766	3.00	0.00	0.00	0	0.00
24.09	0.01556					.011633	0.28		2.187			0.00		
256.19	627.91	2.593	630.503	79.5	12.24	2.326	632.829	0.00	2.766	3.00	0.00	0.00	0	0.00
8.34	0.01556					.010815	0.09		2.187			0.00		
264.53	628.04	2.766	630.806	79.5	11.67	2.114	632.920	0.00	2.766	3.00	0.00	0.00	0	0.00
JUNCT STR	0.01431					.007990	0.04					0.00		

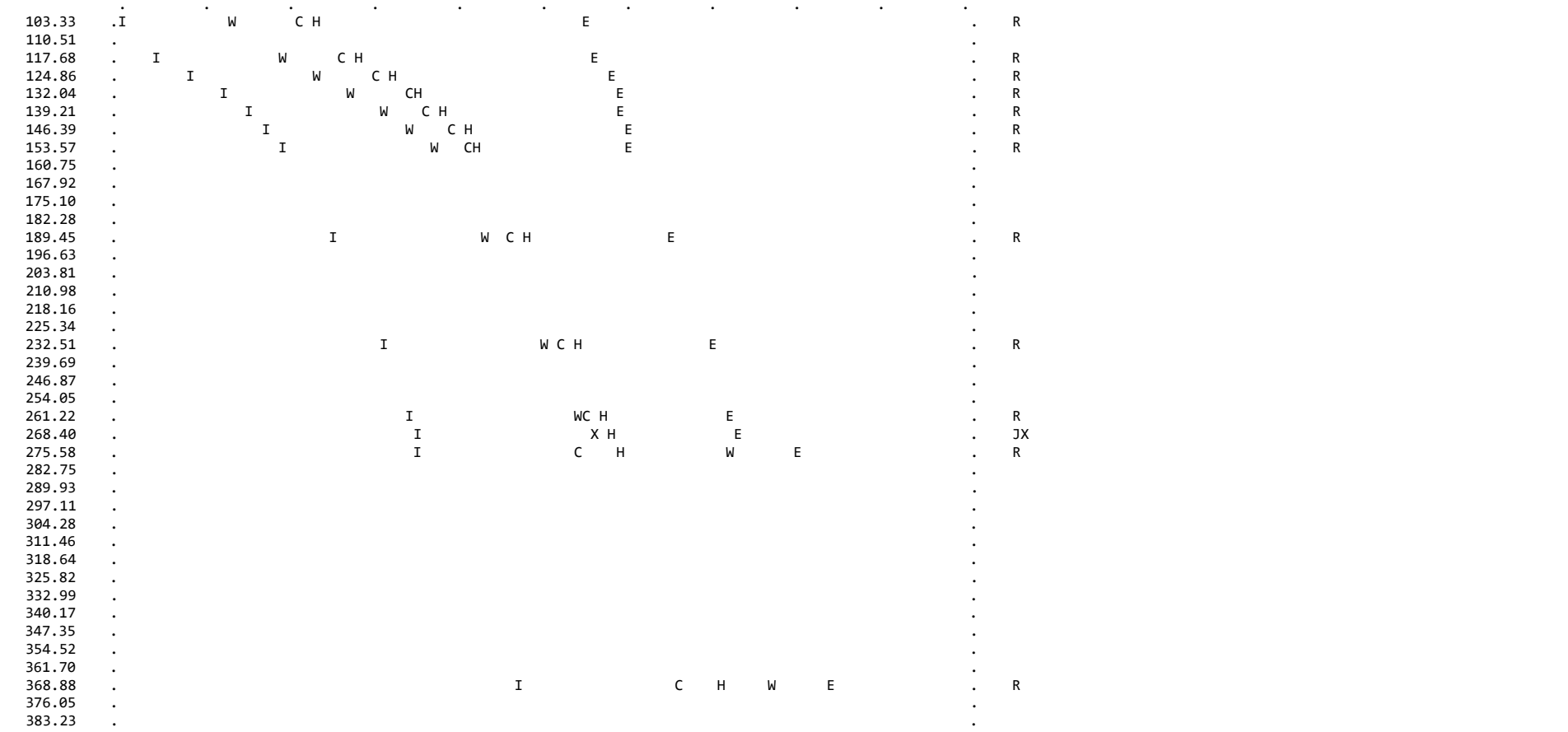
WATER SURFACE PROFILE LISTING

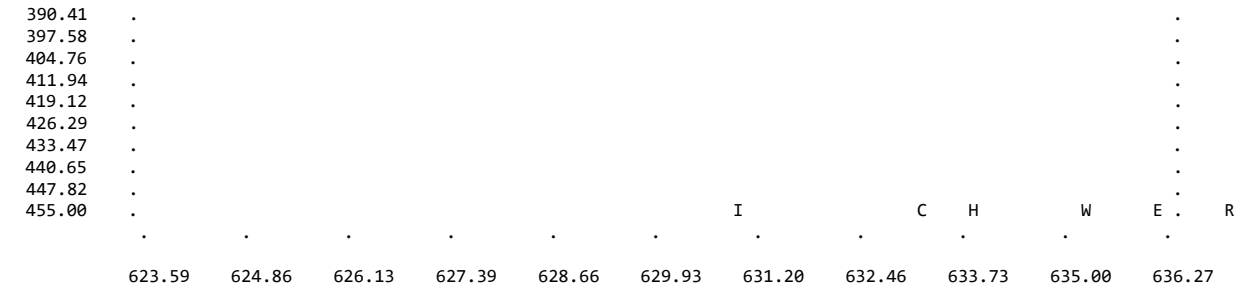
JOB NO 4081
EXISTING 36" CMP

STATION	INVERT	DEPTH	W.S.	Q	VEL	VEL	ENERGY	SUPER	CRITICAL	HGT/	BASE/	ZL	NO	AVBPR

L/ELEM	ELEV SO	OF FLOW	ELEV		HEAD SF AVE	GRD.EL. HF	ELEV	DEPTH NORM DEPTH		DIA ZR	ID NO.	PIER		
269.42	628.11	4.733	632.843	53.5	7.57	0.889	633.732	0.00	2.377	3.00	0.00	0.00	0	0.00
93.41	0.01638				.005482	0.51		1.637		0.00				
362.83	629.64	3.715	633.355	53.5	7.57	0.889	634.244	0.00	2.377	3.00	0.00	0.00	0	0.00
92.17	0.01432				.021929	2.02		3.000		0.00				
455.00	630.96	4.417	635.377	53.5	7.57	0.889	636.266	0.00	2.377	3.00	0.00	0.00	0	0.00

JOB NO 4081
EXISTING 36" CMP





N O T E S
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   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

APPENDIX D

DETENTION ANALYSIS

TODD AVENUE
PONDING FOR BUILDING 4 RUNOFF

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
633.44	0.00	0			
			14	0	0.00
633.50	0.06	479			
			204	204	0.00
633.60	0.16	3603			
			651	855	0.02
633.70	0.26	9409			
			1317	2,172	0.05
633.80	0.36	16939			
			2120	4,292	0.10
633.90	0.46	25468			
			2949	7,241	0.17
634.00	0.56	33505			
			3718	10,959	0.25
634.10	0.66	40848			
			4446	15,404	0.35
634.20	0.76	48063			

Peak Flow Hydrologic Analysis

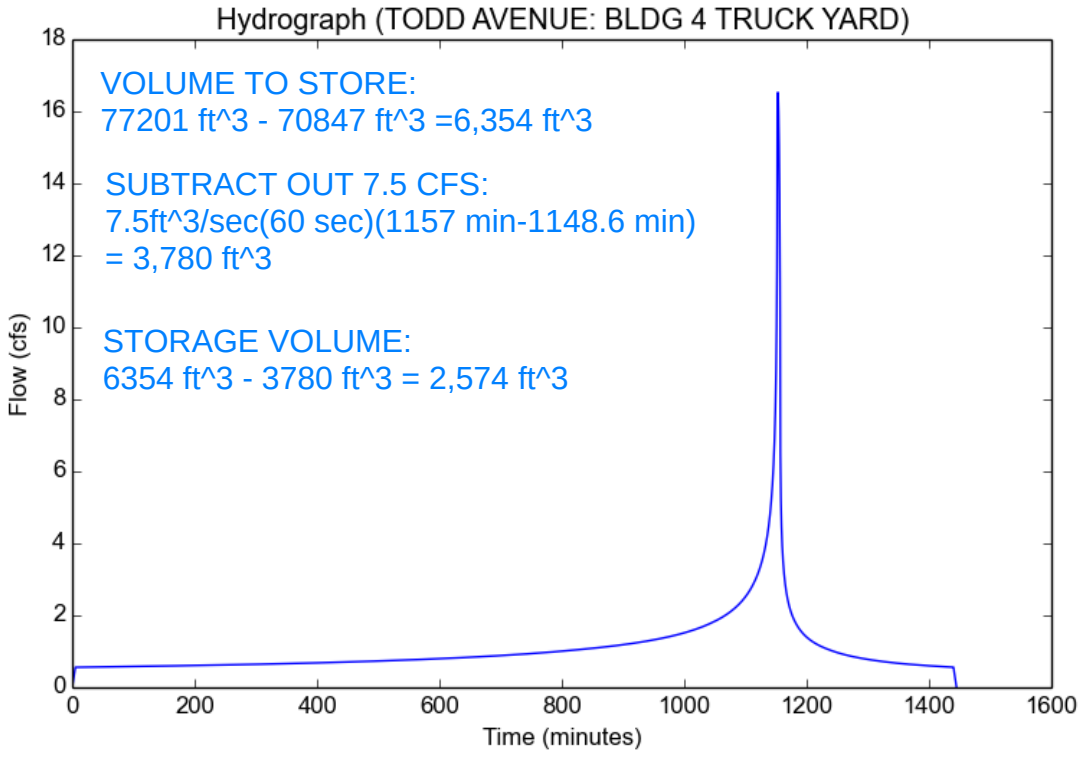
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX C DETENTION CALCULATIONS/TODD AVENUE - BLDG 4 TRUCK YARD.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	BLDG 4 TRUCK YARD
Area (ac)	4.05
Flow Path Length (ft)	230.0
Flow Path Slope (vft/hft)	0.017
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	16.5278
Burned Peak Flow Rate (cfs)	16.5278
24-Hr Clear Runoff Volume (ac-ft)	2.1718
24-Hr Clear Runoff Volume (cu-ft)	94605.6502



TODD AVENUE
PONDING IN BUILDING 5 TRUCK YARD

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
634.20	0.00	0			
			39	0	0.00
634.30	0.10	788			
			197	197	0.00
634.40	0.20	3150			
			505	702	0.02
634.50	0.30	6951			
			894	1,596	0.04
634.60	0.40	10928			
			1281	2,877	0.07
634.70	0.50	14690			
			1600	4,477	0.10
634.80	0.60	17319			
			1797	6,274	0.14
634.90	0.70	18624			
			1931	8,206	0.19
635.00	0.80	20003			
			2073	10,279	0.24
635.10	0.90	21455			
			2222	12,500	0.29
635.20	1.00	22981			
			2378	14,878	0.34
635.30	1.10	24579			
			2542	17,420	0.40
635.40	1.20	26252			
			2712	20,132	0.46
635.50	1.30	27997			
			2897	23,029	0.53
635.60	1.40	29942			

Peak Flow Hydrologic Analysis

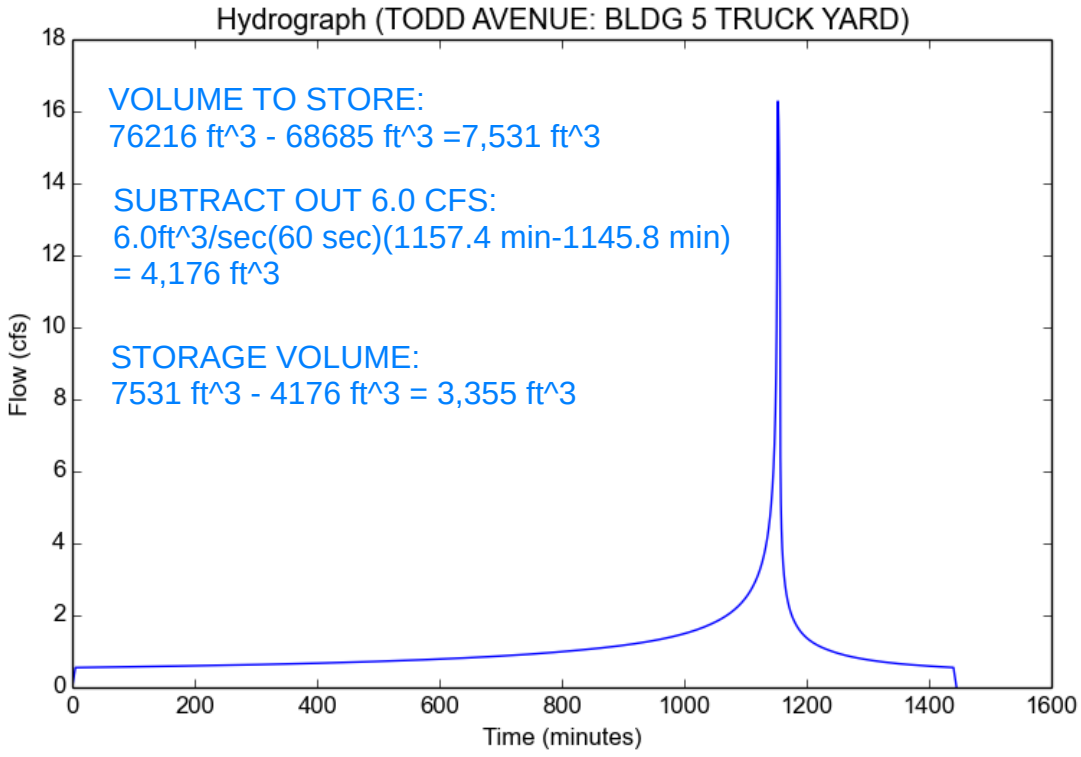
File location: O:/4000-4099/4081/HYDROLOGY/APPENDIX D DETENTION CALCULATIONS/TODD AVENUE - BLDG 5 TRUCK YARD.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TODD AVENUE
Subarea ID	BLDG 5 TRUCK YARD
Area (ac)	3.99
Flow Path Length (ft)	274.0
Flow Path Slope (vft/hft)	0.012
50-yr Rainfall Depth (in)	7.6
Percent Impervious	0.9
Soil Type	8
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.6
Peak Intensity (in/hr)	4.5344
Undeveloped Runoff Coefficient (Cu)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	16.2829
Burned Peak Flow Rate (cfs)	16.2829
24-Hr Clear Runoff Volume (ac-ft)	2.1397
24-Hr Clear Runoff Volume (cu-ft)	93204.085



APPENDIX E

HYDROLOGY MAPS

Last Update: 4/13/23
O:\4000-4099\4081\4081VicMap.dwg

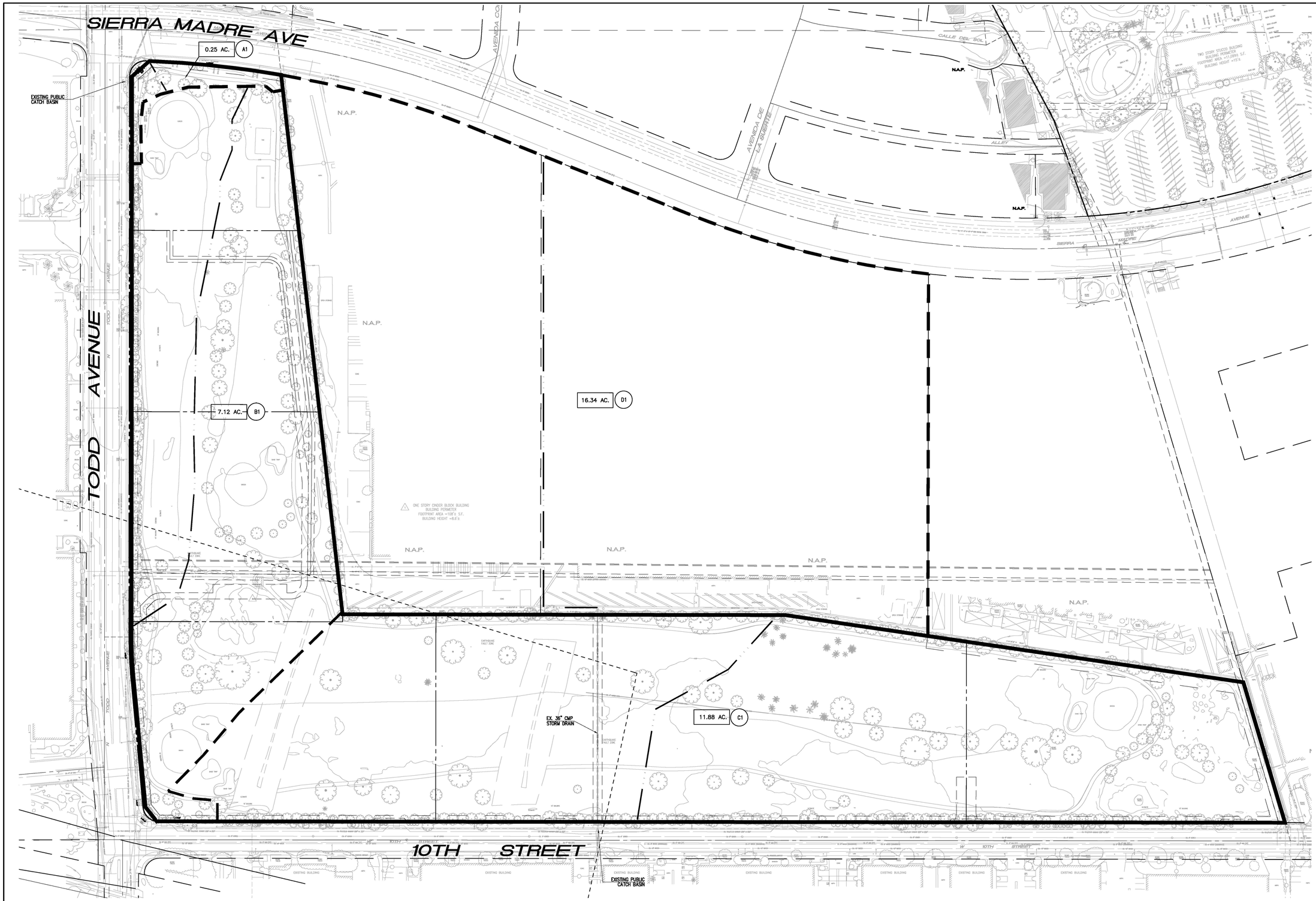
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

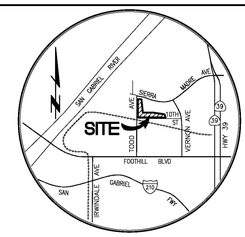
"VICINITY MAP"

FOR

NEC OF 10TH ST AND TODD AVE, AZUSA

NTS





VICINITY MAP
N.T.S.

LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- 4.10 AC. — SUBAREA AREA
- 100 — NODE NUMBER
- FLOW DIRECTION

0 30 60 120 180
SCALE:1"=60'

SUBAREA DATA SUMMARY

SUBAREA	AREA (ACRES)	LENGTH (FEET)	SLOPE	IMPERVIOUS (%)	Tc (MINUTES)	Q50 (CFS)
A1	0.25	51	0.129	10	5.0	1.0
B1	7.12	932	0.114	10	6.0	26.7
C1	11.88	425	0.014	10	5.0	48.5
D1	16.34	814	0.007	90	8.0	53.5

50-YEAR FREQUENCY
SOIL TYPE 8
ISOHYET 7.6
BURN FACTOR 0
BULKING FACTOR 0

Last Update: 4/19/23
D:\4000-4099\4081\4081HYD-EX.dwg

CITY OF AZUSA
PUBLIC WORKS DEPARTMENT

EXISTING CONDITION HYDROLOGY MAP

NEC OF TODD AVE AND 10TH STREET

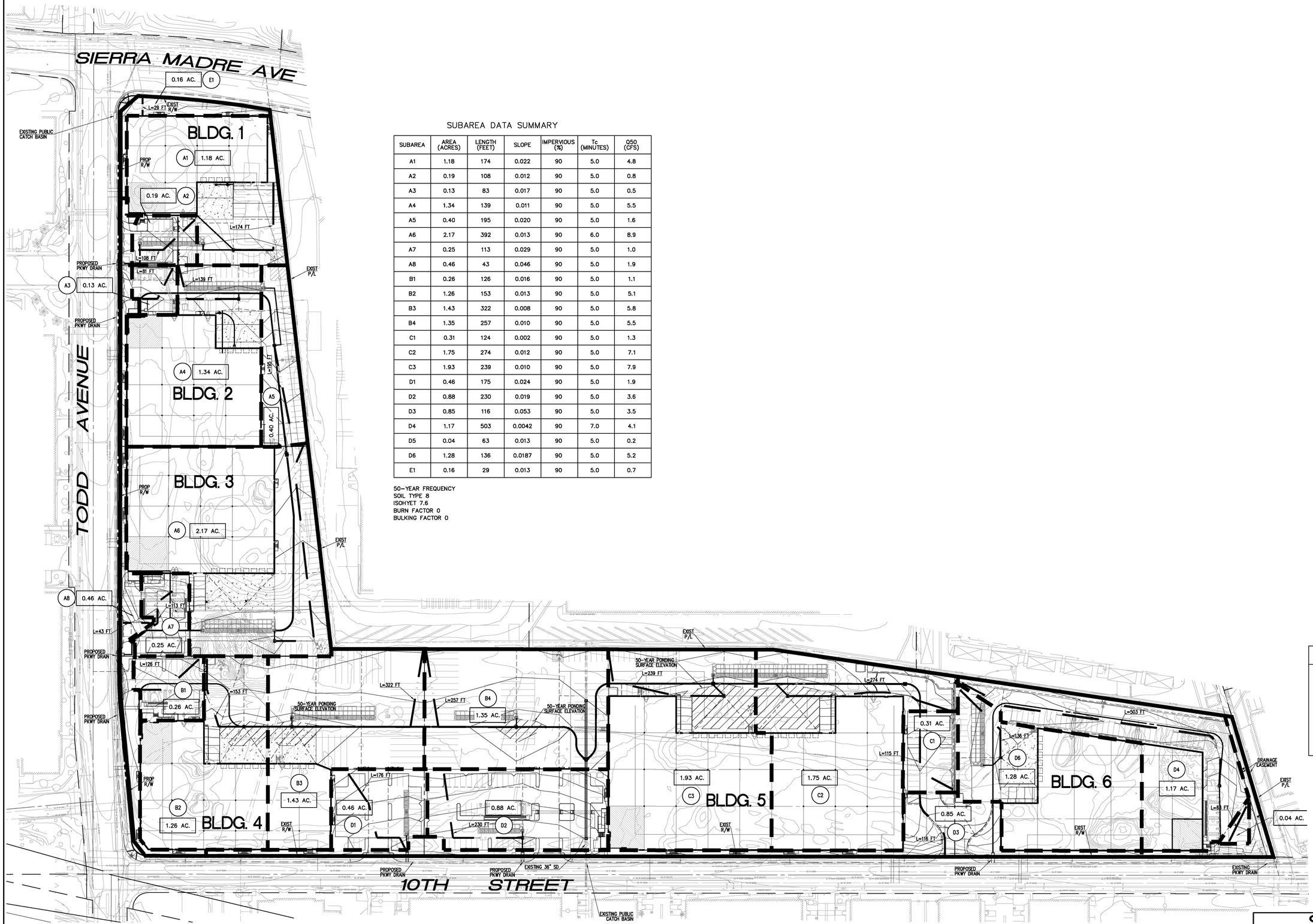
4081 1 OF 1 SHEET

PREPARED FOR:
OVERTON MOORE – PROPERTIES
19700 S. VERMONT AVE., SUITE 1010
TORRANCE, CA 90502
PHONE: (949) 922-7143
CONTACT: MONTANA KANEN

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14.7340 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by _____ Date _____
Checked by _____ Date _____
Approved by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____
Public Works Director _____ R.C.E. XXXXX

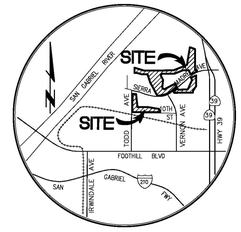
Sheet 1 of 1 Sheets



SUBAREA DATA SUMMARY

SUBAREA	AREA (ACRES)	LENGTH (FEET)	SLOPE	IMPERVIOUS (%)	Tc (MINUTES)	Q50 (CFS)
A1	1.18	174	0.022	90	5.0	4.8
A2	0.19	108	0.012	90	5.0	0.8
A3	0.13	83	0.017	90	5.0	0.5
A4	1.34	139	0.011	90	5.0	5.5
A5	0.40	195	0.020	90	5.0	1.6
A6	2.17	392	0.013	90	6.0	8.9
A7	0.25	113	0.029	90	5.0	1.0
A8	0.46	43	0.046	90	5.0	1.9
B1	0.26	126	0.016	90	5.0	1.1
B2	1.26	153	0.013	90	5.0	5.1
B3	1.43	322	0.008	90	5.0	5.8
B4	1.35	257	0.010	90	5.0	5.5
C1	0.31	124	0.002	90	5.0	1.3
C2	1.75	274	0.012	90	5.0	7.1
C3	1.93	239	0.010	90	5.0	7.9
D1	0.46	175	0.024	90	5.0	1.9
D2	0.88	230	0.019	90	5.0	3.6
D3	0.85	116	0.053	90	5.0	3.5
D4	1.17	503	0.0042	90	7.0	4.1
D5	0.04	63	0.013	90	5.0	0.2
D6	1.28	136	0.0187	90	5.0	5.2
E1	0.16	29	0.013	90	5.0	0.7

50-YEAR FREQUENCY
SOIL TYPE 8
ISOHYET 7.6
BURN FACTOR 0
BULKING FACTOR 0



VICINITY MAP
N.T.S.

LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- X.XX AC. — SUBAREA AREA
- PONDING LIMITS

0 30 60 120 180
SCALE: 1"=60'

Last Update:8/6/24
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CITY OF AZUSA
PUBLIC WORKS DEPARTMENT

PROPOSED CONDITION HYDROLOGY MAP

NEC OF TODD AVE AND 10TH STREET

4081 1 OF 1 SHEET

PREPARED FOR:
OVERTON MOORE – PROPERTIES
19700 S. VERMONT AVE., SUITE 1010
TORRANCE, CA 90502
PHONE: (949) 922-7143
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Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH:(714)521-4811 FAX(714)521-4173

Designed by _____ Date _____
Checked by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____

Approved by _____ Date _____
Public Works Director _____ R.C.E. XXXXX

Sheet 1 of 1 Sheets