



2552 WHITE ROAD, SUITE B • IRVINE, CA 92614
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CIVIL ENGINEERS - PLANNERS - LAND SURVEYORS

PRELIMINARY DRAINAGE STUDY

FOR

LAKELAND INDUSTRIAL

12300 LAKELAND ROAD

SANTA FE SPRINGS, CA

MAY 5, 2022

PREPARED BY:

**WALDEN & ASSOCIATES
2552 WHITE ROAD, SUITE B
IRVINE, CA 92614**



JN: 2088-962-001



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SECTION 1

DISCUSSION



PURPOSE:

This preliminary report has been prepared to demonstrate that the proposed project will not increase runoff due to the addition of landscaping and will benefit the tributary area with the addition of the water quality feature. This report includes existing (pre-development) and proposed (post-development) 10, 25 and 50- year storm frequencies and will provide the required storm protection according to the standards of the City of Santa Fe Springs.

PROJECT DESCRIPTION:

The project site is located along the south side of Lakeland Road between Norwalk Boulevard and Getty Drive and is currently developed and is covered with hardscape such as buildings, asphalt concrete, etc. with very little vegetation growth. The site is bounded by Lakeland Road to the north, Getty Drive to the east, existing industrial/ commercial to the south and Norwalk Boulevard to the west. The proposed development will consist of a 185,733-square foot warehouse building with associated landscaping, hardscaping, drives, truck docks and parking areas. There are three proposed driveways for the development; one on Lakeland Road, one on Getty Drive and one on Norwalk Boulevard. The property's acreage is approximately 8.5 acres.

DESCRIPTION OF WATERSHED:

The existing topography of the site is relatively flat and splits into two tributary areas: Area A (7.5-acres) sheet flows towards the southwest corner of the irregular shaped site. Area B (1.0-acres) sheet flows towards an existing driveway along Norwalk Boulevard.

The proposed development's private storm drain system will combine the two subareas and direct the flow through water quality devices and then towards Norwalk Boulevard through a parkway culvert. However, there will be small areas (0.23-acres, 68% pervious) that will be allowed to have its runoff leave the site directly.

The following table presents the existing and proposed runoff Q's for the site during the 10, 25, and 50-year storm events analyzed in this study. With the proposed flows less than the existing, there will be no additional mitigation.

	Acreage	10-Year	25-Year	50-Year
Existing				
Subarea "A" Q's	7.50 ac	10.61 cfs	14.04 cfs	16.68 cfs
Subarea "B" Q's	1.00 ac	1.96 cfs	2.60 cfs	2.96 cfs
Sub Total	8.50 ac	12.57 cfs	16.64 cfs	19.64 cfs
Proposed				
Area "A" Q's	8.50 ac	10.58 cfs	14.09 cfs	17.37 cfs
Difference	-	<1.99> cfs	<2.55> cfs	<2.27> cfs

**METHODOLOGY:**

This Hydrology Study was performed using the HydroCalc Calculator as required by the LA County Department of Public Works. The calculations were done for the 10, 25, and 50-year storm frequencies. The proposed inlets, pipes, and other drainage structures were sized for the 50-year storm event.

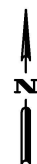
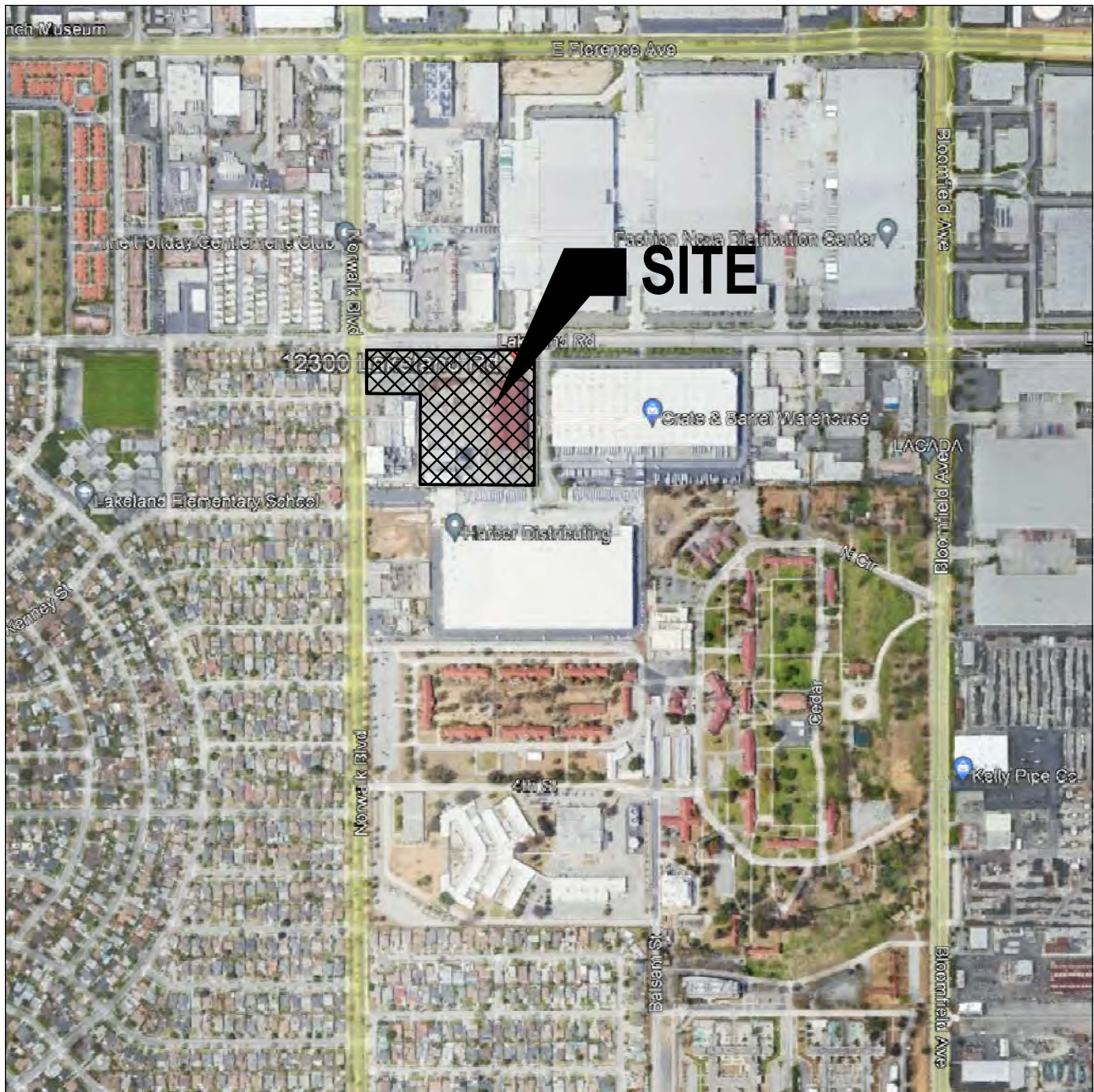
SUMMARY:

Positive overflow for the project site will spill on to the surrounding streets and will provide protection of habitable areas against a 50-year storm, should all the on-site inlets become clogged and/ or inoperable.



SECTION 2

VICINITY MAP



NO SCALE



**ALDEN &
ASSOCIATES**

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**LOCATION MAP
12300 LAKELAND RD.
SANTA FE SPRINGS, CA**

W.O. No. 2088-962-001
Engr. SK Chk'd. MV

Date 4/2022
Sheet 1 of 1



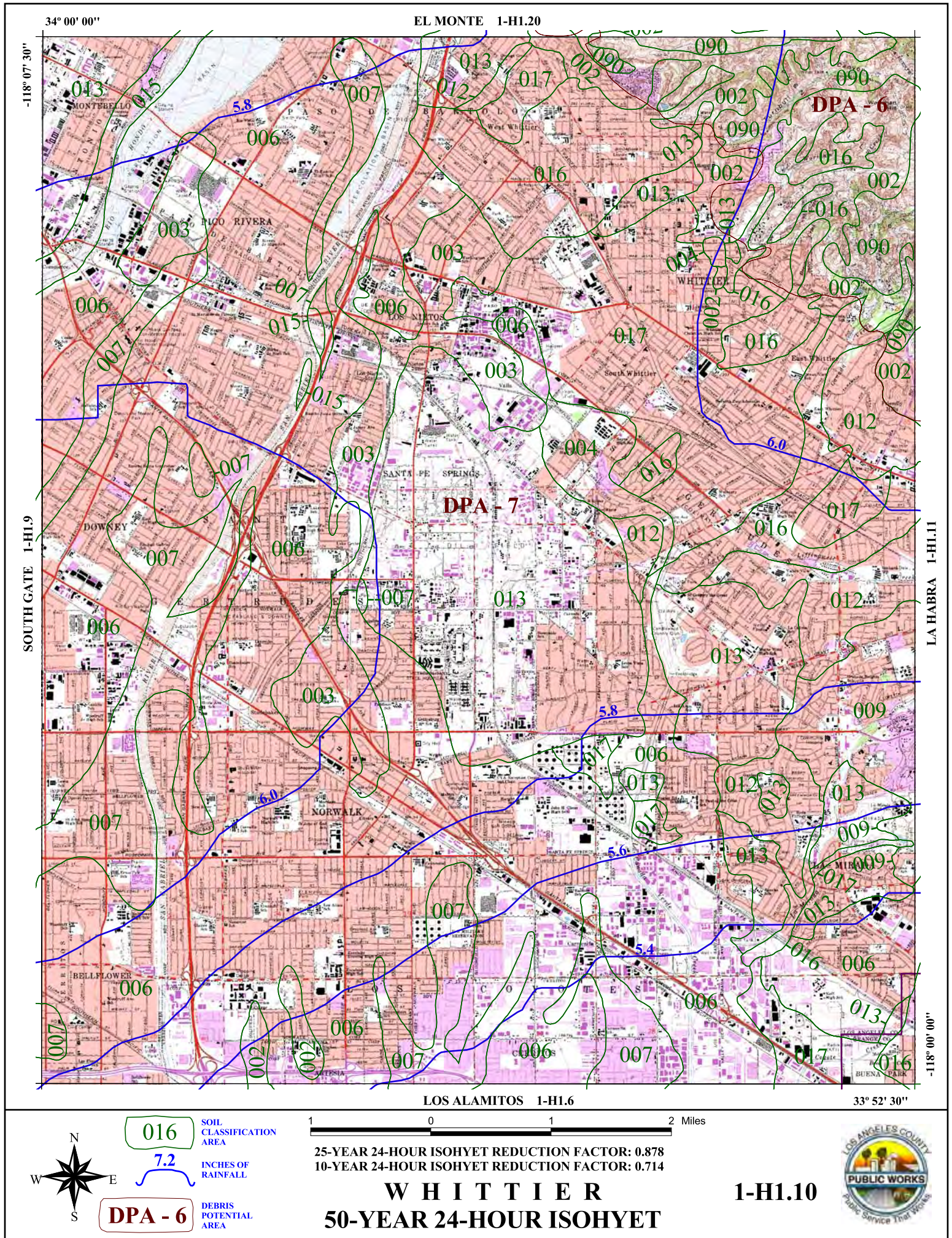
SECTION 3

HYDROLOGIC CLASSIFICATION OF SOILS & ISOHYET

WHITTER 1-H1.10

(50-YEAR 24-HOUR ISOHYET = 6.0")

(SOIL CLASSIFICATION = 013)



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



SECTION 4.1

HYDROLOGY

FREQUENCY:	10-YEAR
ISOHYET:	4.28 IN
SOIL CLASS:	013

Peak Flow Hydrologic Analysis

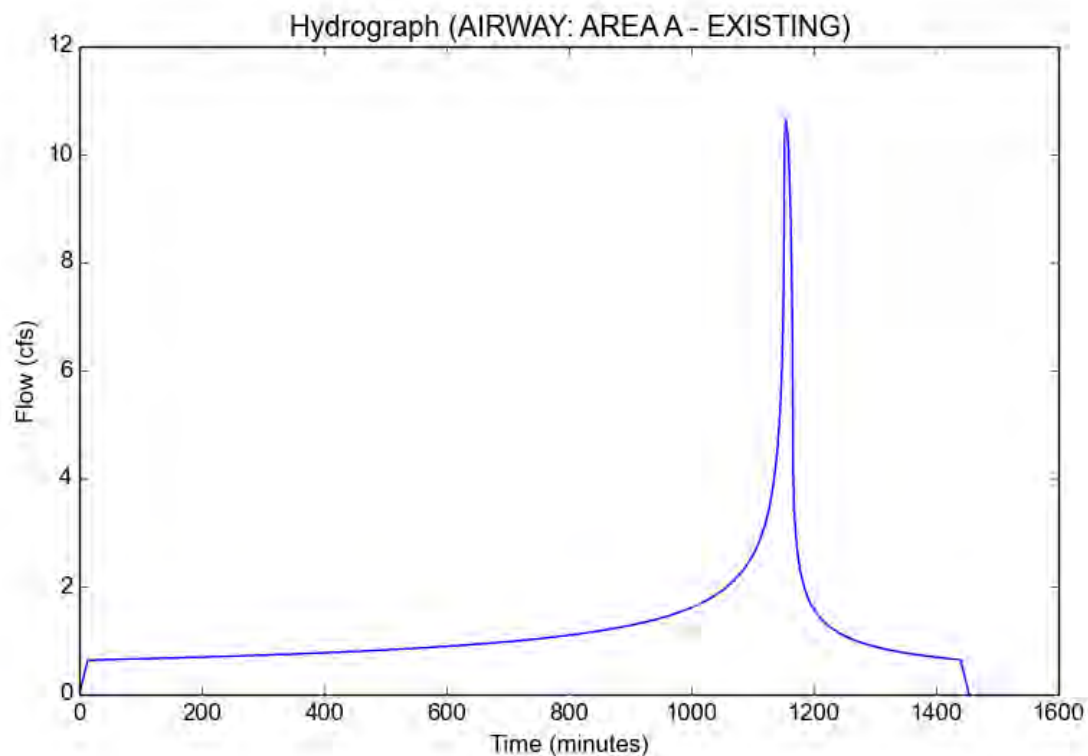
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	AIRWAY
Subarea ID	AREA A - EXISTING
Area (ac)	7.5
Flow Path Length (ft)	960.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.99
Soil Type	13
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.284
Peak Intensity (in/hr)	1.5754
Undeveloped Runoff Coefficient (Cu)	0.7172
Developed Runoff Coefficient (Cd)	0.8982
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	10.6123
Burned Peak Flow Rate (cfs)	10.6123
24-Hr Clear Runoff Volume (ac-ft)	2.3701
24-Hr Clear Runoff Volume (cu-ft)	103239.5444



Peak Flow Hydrologic Analysis

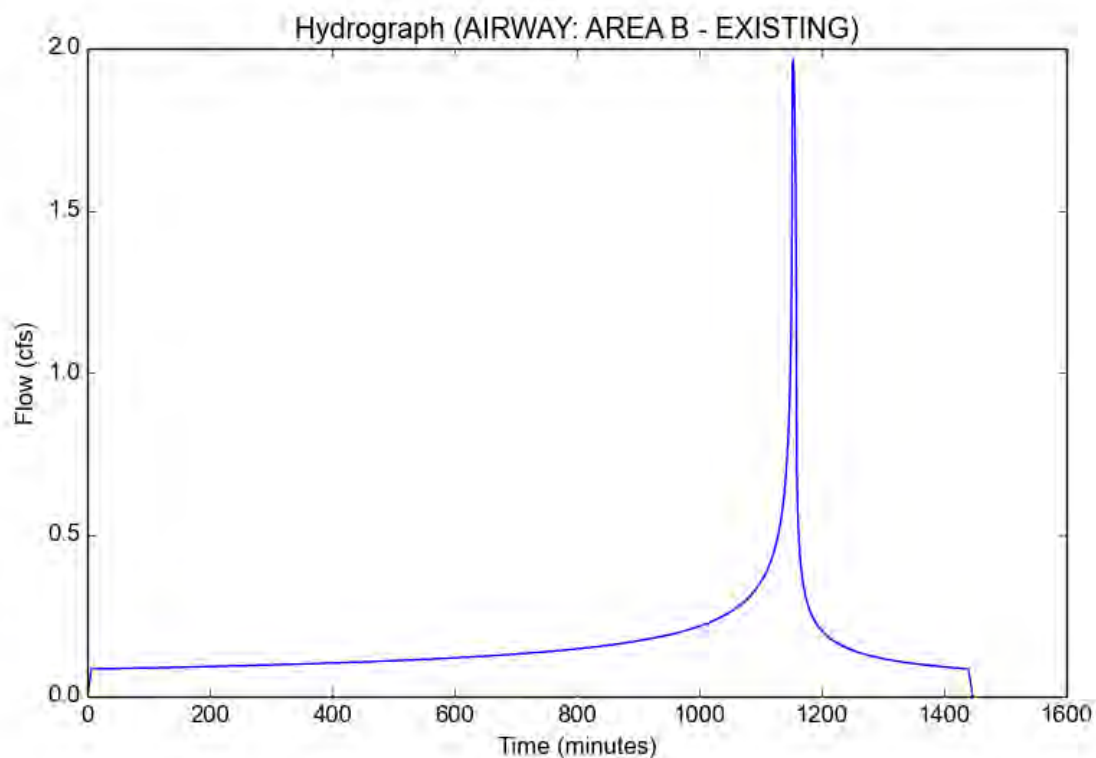
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	AIRWAY
Subarea ID	AREA B - EXISTING
Area (ac)	1.0
Flow Path Length (ft)	375.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.99
Soil Type	13
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.284
Peak Intensity (in/hr)	2.1821
Undeveloped Runoff Coefficient (Cu)	0.8492
Developed Runoff Coefficient (Cd)	0.8995
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	1.9628
Burned Peak Flow Rate (cfs)	1.9628
24-Hr Clear Runoff Volume (ac-ft)	0.316
24-Hr Clear Runoff Volume (cu-ft)	13765.7281



Peak Flow Hydrologic Analysis

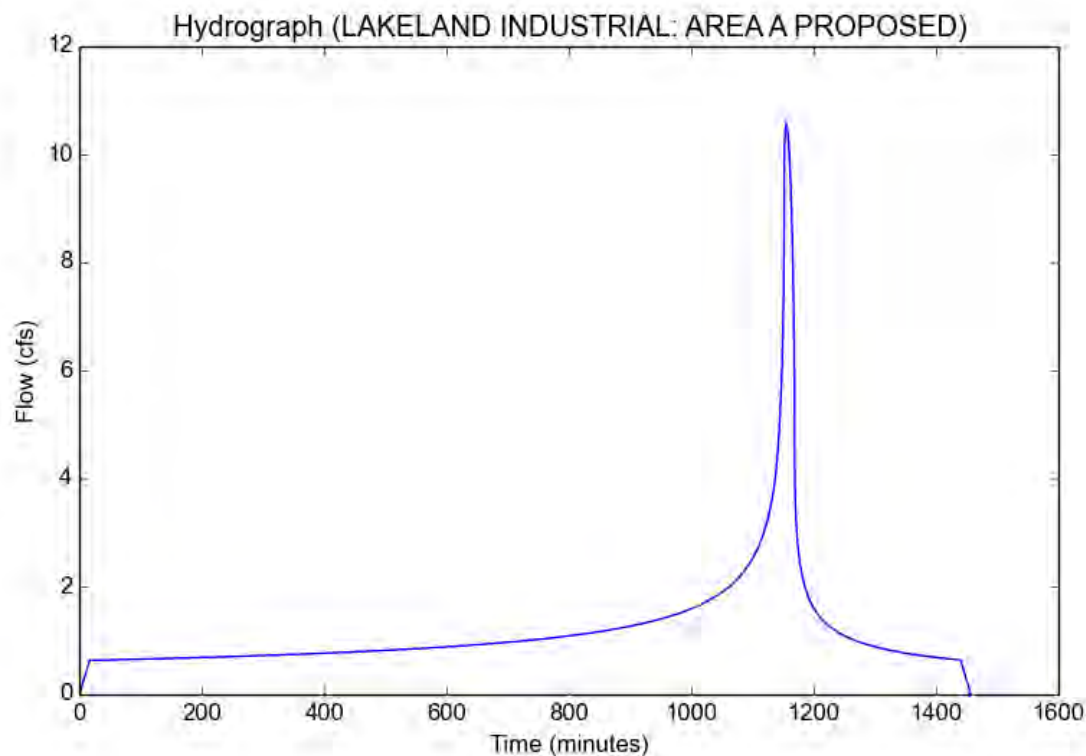
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	LAKELAND INDUSTRIAL
Subarea ID	AREA A PROPOSED
Area (ac)	8.5
Flow Path Length (ft)	1406.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.85
Soil Type	13
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	4.284
Peak Intensity (in/hr)	1.438
Undeveloped Runoff Coefficient (Cu)	0.6688
Developed Runoff Coefficient (Cd)	0.8653
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	10.5768
Burned Peak Flow Rate (cfs)	10.5768
24-Hr Clear Runoff Volume (ac-ft)	2.3712
24-Hr Clear Runoff Volume (cu-ft)	103289.7899



LAKELAND INDUSTRIAL

PROPOSED MAIN AREA COMPUTATIONS*

Project	Area	Area (acres)	%imp	Freq.	Soil Type	Length (ft.)	Slope (ft./ft.)	Isohyet (in.)	Tc (min.)	Flow rate (cfs)	Fire Factor	Volume (cu.ft.)
LAKELAND	A TOTAL	8.50	0.85	10-Year	13	1406	0.010	4.28	15	10.58	0	103,290

PROPOSED SUB-AREA COMPUTATIONS**

Project	Subarea	Area (acres)	%imp	Freq.	Soil Type	Length (ft.)	Slope (ft./ft.)	Isohyet (in.)	Tc (min.)	Flow rate (cfs)	Fire Factor	Volume (cu.ft.)
LAKELAND	A-1	1.76	0.95	10-Year	13	661	0.010	4.28		2.19	0	21,387
LAKELAND	A-2	1.23	1.00	10-Year	13	300	0.018	4.28		1.53	0	14,947
LAKELAND	A-3	1.58	0.99	10-Year	13	372	0.014	4.28		1.97	0	19,200
LAKELAND	A-4	2.82	0.71	10-Year	13	864	0.012	4.28		3.51	0	34,268
LAKELAND	A-5	0.66	0.40	10-Year	13	220	0.007	4.28		0.82	0	8,020
LAKELAND	A-6	0.22	0.90	10-Year	13	305	0.018	4.28		0.27	0	2,673
LAKELAND	A-7	0.05	0.73	10-Year	13	32	0.050	4.28		0.06	0	608
LAKELAND	A-8	0.08	0.53	10-Year	13	48	0.011	4.28		0.10	0	972
LAKELAND	A-9	0.10	0.00	10-Year	13	40	0.035	4.28		0.12	0	1,215
	A TOTAL	8.50								10.58		103,290

*Total area calculation performed using the Los Angeles County HydroCalc Calculator v0.3.0-beta.

**Subareas were apportioned using Section 7.4 of the Los Angeles County Hydrology Manual.

$Q_{subarea} = A_{subarea} / A_{total} \times Q_{total}$



SECTION 4.2

HYDROLOGY

FREQUENCY:	25-YEAR
ISOHYET:	5.27 IN
SOIL CLASS:	013

Peak Flow Hydrologic Analysis

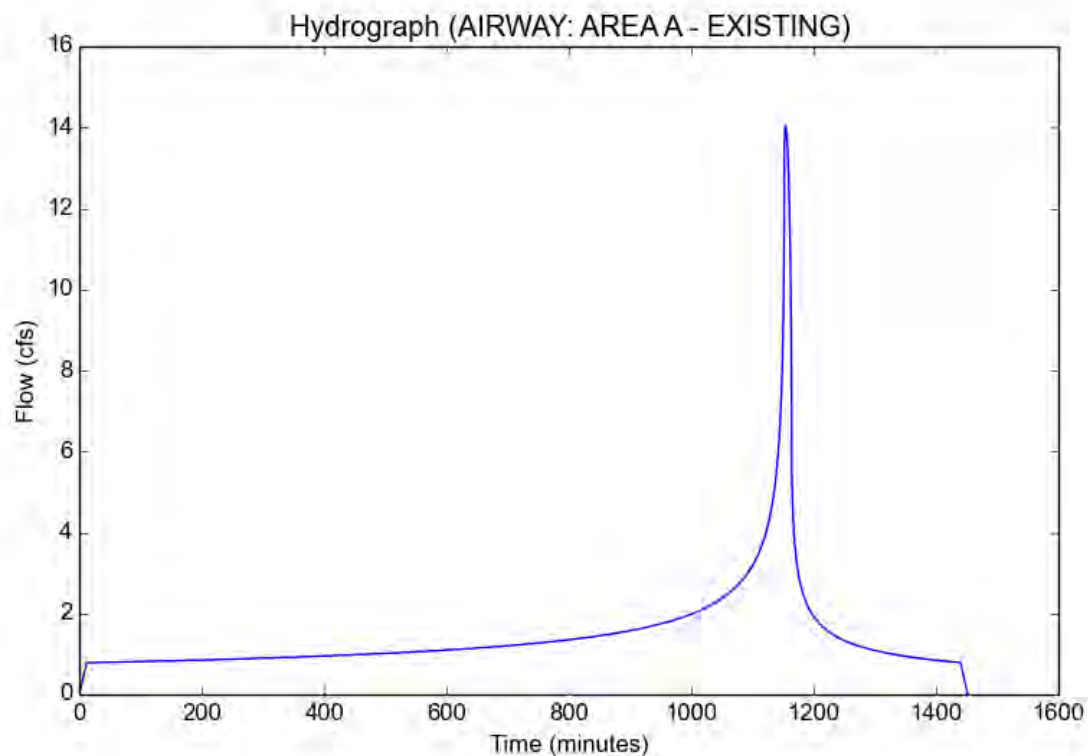
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	AIRWAY
Subarea ID	AREA A - EXISTING
Area (ac)	7.5
Flow Path Length (ft)	960.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.99
Soil Type	13
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.268
Peak Intensity (in/hr)	2.0828
Undeveloped Runoff Coefficient (Cu)	0.8361
Developed Runoff Coefficient (Cd)	0.8994
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	14.049
Burned Peak Flow Rate (cfs)	14.049
24-Hr Clear Runoff Volume (ac-ft)	2.915
24-Hr Clear Runoff Volume (cu-ft)	126978.516



Peak Flow Hydrologic Analysis

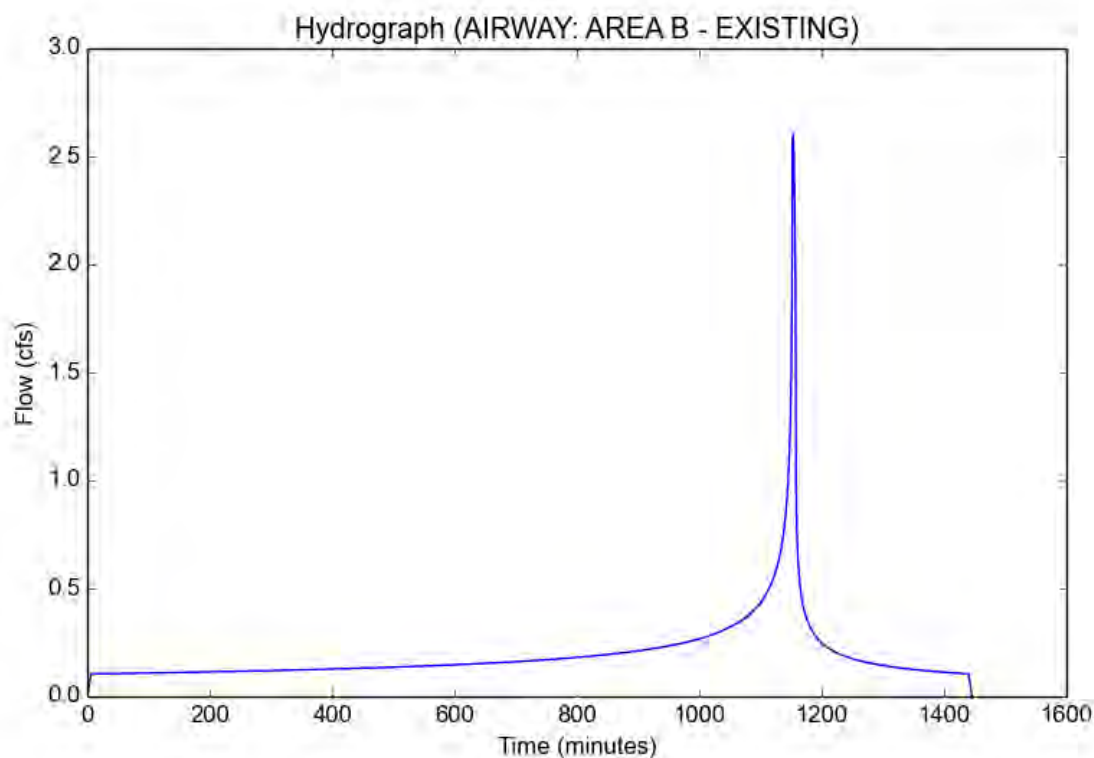
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	AIRWAY
Subarea ID	AREA B - EXISTING
Area (ac)	1.0
Flow Path Length (ft)	375.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.99
Soil Type	13
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)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	2.5964
Burned Peak Flow Rate (cfs)	2.5964
24-Hr Clear Runoff Volume (ac-ft)	0.3887
24-Hr Clear Runoff Volume (cu-ft)	16930.4911



Peak Flow Hydrologic Analysis

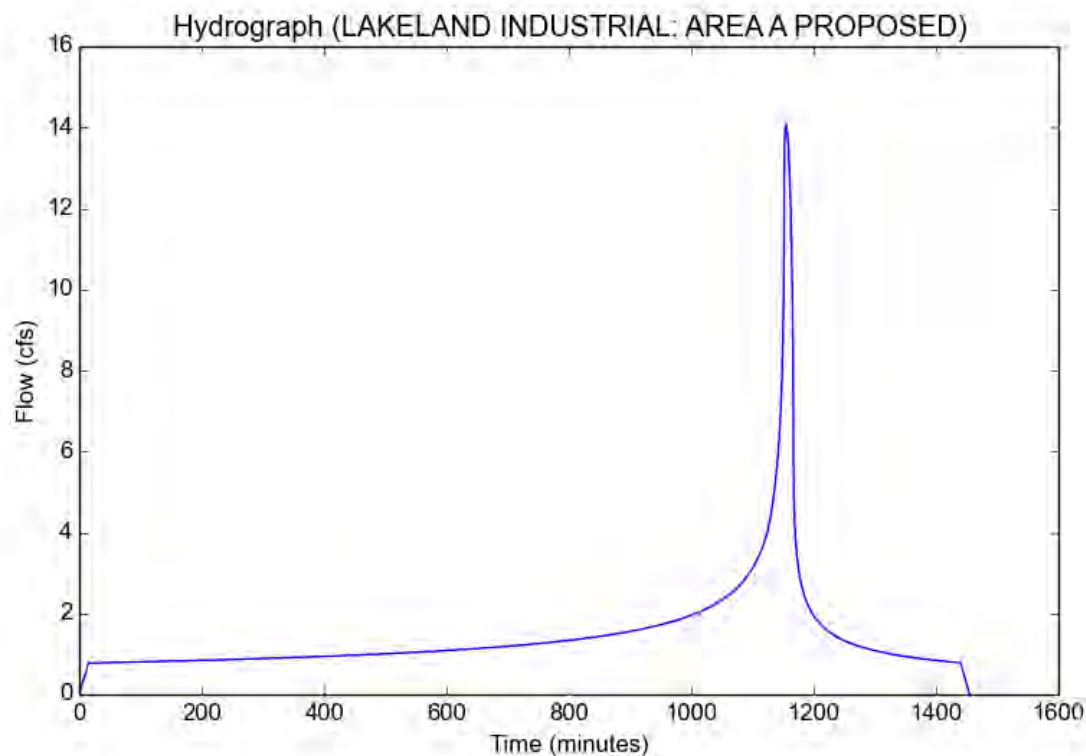
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	LAKELAND INDUSTRIAL
Subarea ID	AREA A PROPOSED
Area (ac)	8.5
Flow Path Length (ft)	1406.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.85
Soil Type	13
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.268
Peak Intensity (in/hr)	1.8754
Undeveloped Runoff Coefficient (Cu)	0.7936
Developed Runoff Coefficient (Cd)	0.884
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	14.0925
Burned Peak Flow Rate (cfs)	14.0925
24-Hr Clear Runoff Volume (ac-ft)	2.9264
24-Hr Clear Runoff Volume (cu-ft)	127472.1215



LAKELAND INDUSTRIAL

PROPOSED MAIN AREA COMPUTATIONS*

Project	Area	Area (acres)	%imp	Freq.	Soil Type	Length (ft.)	Slope (ft./ft.)	Isohyet (in.)	Tc (min.)	Flow rate (cfs)	Fire Factor	Volume (cu.ft.)
LAKELAND	A TOTAL	8.50	0.85	25-Year	13	1406	0.010	5.27	15	14.09	0	127,472

PROPOSED SUB-AREA COMPUTATIONS**

Project	Subarea	Area (acres)	%imp	Freq.	Soil Type	Length (ft.)	Slope (ft./ft.)	Isohyet (in.)	Tc (min.)	Flow rate (cfs)	Fire Factor	Volume (cu.ft.)
LAKELAND	A-1	1.76	0.95	25-Year	13	661	0.010	5.27		2.92	0	26,394
LAKELAND	A-2	1.23	1.00	25-Year	13	300	0.018	5.27		2.04	0	18,446
LAKELAND	A-3	1.58	0.99	25-Year	13	372	0.014	5.27		2.62	0	23,695
LAKELAND	A-4	2.82	0.71	25-Year	13	864	0.012	5.27		4.67	0	42,291
LAKELAND	A-5	0.66	0.40	25-Year	13	220	0.007	5.27		1.09	0	9,898
LAKELAND	A-6	0.22	0.90	25-Year	13	305	0.018	5.27		0.36	0	3,299
LAKELAND	A-7	0.05	0.73	25-Year	13	32	0.050	5.27		0.08	0	750
LAKELAND	A-8	0.08	0.53	25-Year	13	48	0.011	5.27		0.13	0	1,200
LAKELAND	A-9	0.10	0.00	25-Year	13	40	0.035	5.27		0.17	0	1,500
	A TOTAL	8.50								14.09		127,472

*Total area calculation performed using the Los Angeles County HydroCalc Calculator v0.3.0-beta.

**Subareas were apportioned using Section 7.4 of the Los Angeles County Hydrology Manual.

$Q_{subarea} = A_{subarea} / A_{total} \times Q_{total}$



SECTION 4.3

HYDROLOGY

FREQUENCY:	50-YEAR
ISOHYET:	6.0 IN
SOIL CLASS:	013

Peak Flow Hydrologic Analysis

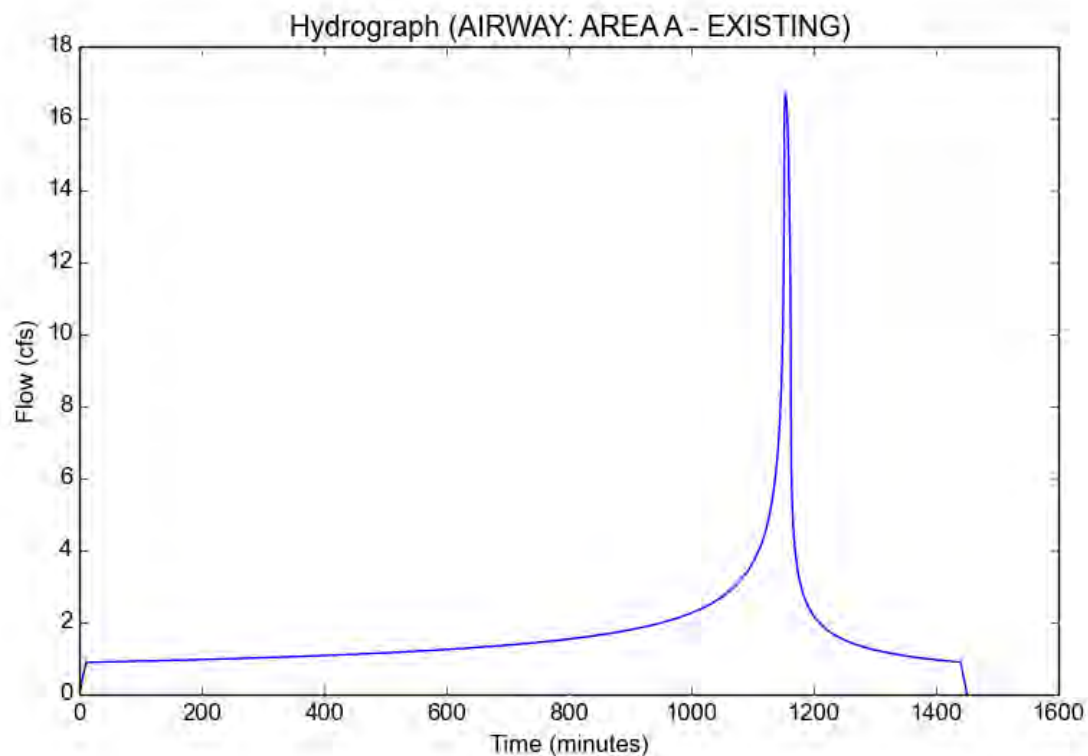
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	AIRWAY
Subarea ID	AREA A - EXISTING
Area (ac)	7.5
Flow Path Length (ft)	960.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.99
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.4712
Undeveloped Runoff Coefficient (Cu)	0.8871
Developed Runoff Coefficient (Cd)	0.8999
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	16.6785
Burned Peak Flow Rate (cfs)	16.6785
24-Hr Clear Runoff Volume (ac-ft)	3.3205
24-Hr Clear Runoff Volume (cu-ft)	144642.2873



Peak Flow Hydrologic Analysis

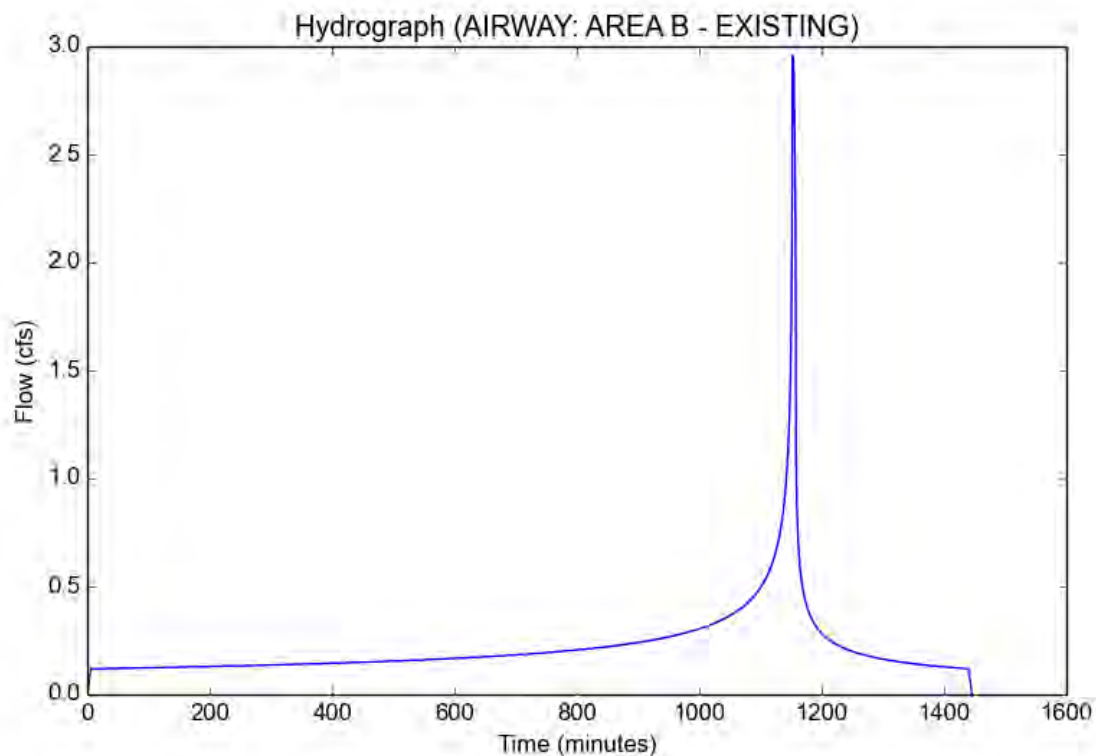
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	AIRWAY
Subarea ID	AREA B - EXISTING
Area (ac)	1.0
Flow Path Length (ft)	375.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.99
Soil Type	13
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)	0.9
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	2.9572
Burned Peak Flow Rate (cfs)	2.9572
24-Hr Clear Runoff Volume (ac-ft)	0.4427
24-Hr Clear Runoff Volume (cu-ft)	19285.3064



Peak Flow Hydrologic Analysis

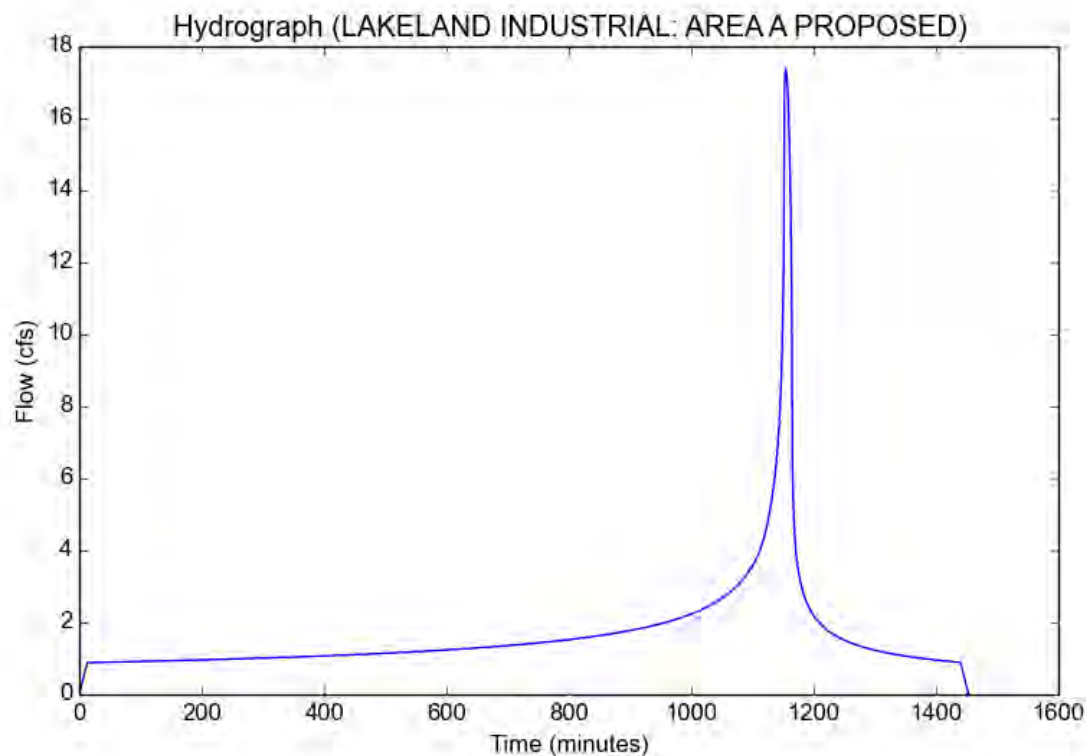
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	LAKELAND INDUSTRIAL
Subarea ID	AREA A PROPOSED
Area (ac)	8.5
Flow Path Length (ft)	1406.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.0
Percent Impervious	0.85
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.0
Peak Intensity (in/hr)	2.2846
Undeveloped Runoff Coefficient (Cu)	0.8626
Developed Runoff Coefficient (Cd)	0.8944
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	17.3686
Burned Peak Flow Rate (cfs)	17.3686
24-Hr Clear Runoff Volume (ac-ft)	3.3413
24-Hr Clear Runoff Volume (cu-ft)	145547.1006



LAKELAND INDUSTRIAL

PROPOSED MAIN AREA COMPUTATIONS*

Project	Area	Area (acres)	%imp	Freq.	Soil Type	Length (ft.)	Slope (ft./ft.)	Isohyet (in.)	Tc (min.)	Flow rate (cfs)	Fire Factor	Volume (cu.ft.)
LAKELAND	A TOTAL	8.50	0.85	50-Year	13	1406	0.010	6.00	13	17.37	0	145,547

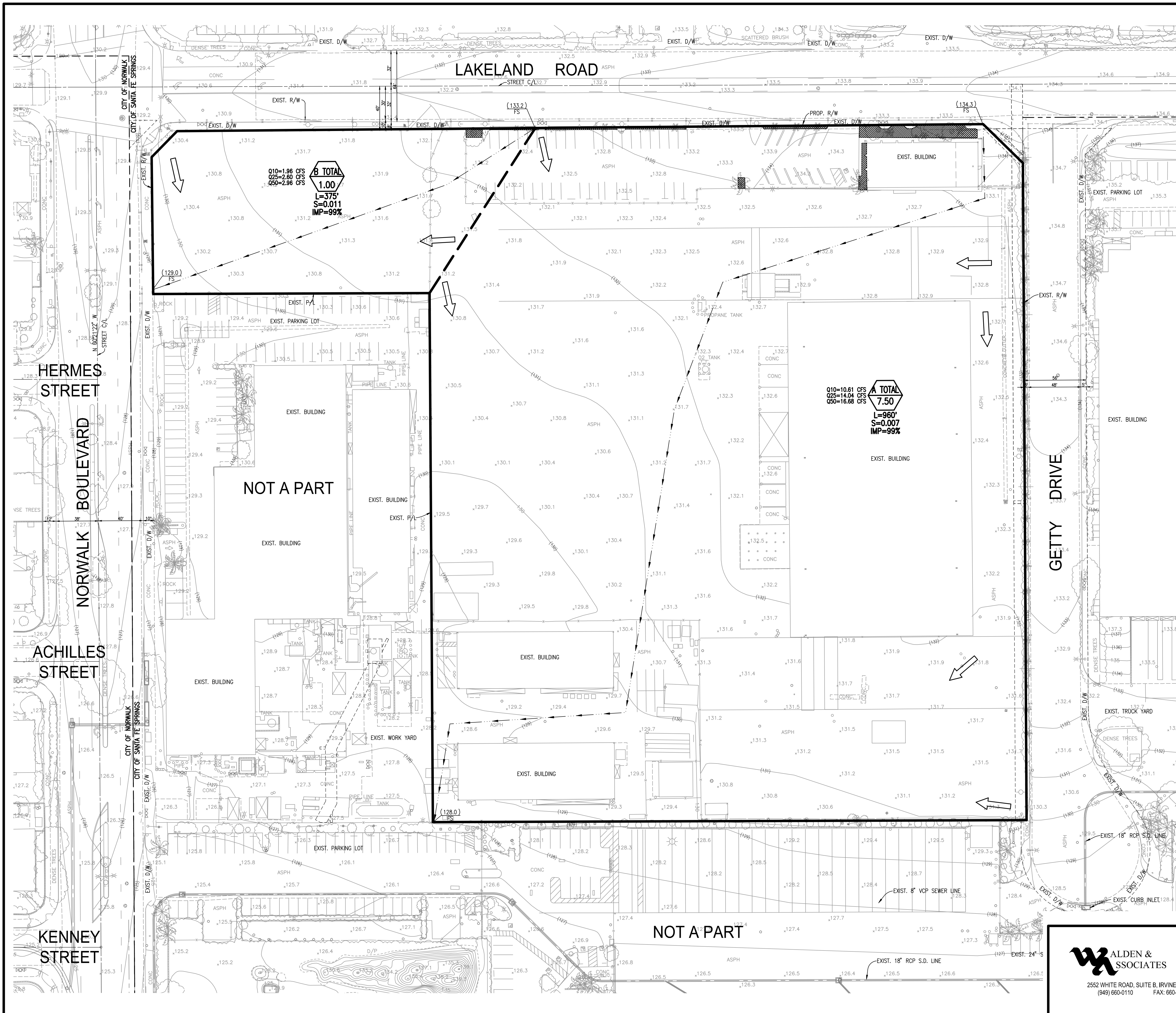
PROPOSED SUB-AREA COMPUTATIONS**

Project	Subarea	Area (acres)	%imp	Freq.	Soil Type	Length (ft.)	Slope (ft./ft.)	Isohyet (in.)	Tc (min.)	Flow rate (cfs)	Fire Factor	Volume (cu.ft.)
LAKELAND	A-1	1.76	0.95	50-Year	13	661	0.010	6.00		3.60	0	30,137
LAKELAND	A-2	1.23	1.00	50-Year	13	300	0.018	6.00		2.51	0	21,062
LAKELAND	A-3	1.58	0.99	50-Year	13	372	0.014	6.00		3.23	0	27,055
LAKELAND	A-4	2.82	0.71	50-Year	13	864	0.012	6.00		5.76	0	48,287
LAKELAND	A-5	0.66	0.40	50-Year	13	220	0.007	6.00		1.35	0	11,301
LAKELAND	A-6	0.22	0.90	50-Year	13	305	0.018	6.00		0.45	0	3,767
LAKELAND	A-7	0.05	0.73	50-Year	13	32	0.050	6.00		0.10	0	856
LAKELAND	A-8	0.08	0.53	50-Year	13	48	0.011	6.00		0.16	0	1,370
LAKELAND	A-9	0.10	0.00	50-Year	13	40	0.035	6.00		0.20	0	1,712
	A TOTAL	8.50								17.37		145,547

*Total area calculation performed using the Los Angeles County HydroCalc Calculator v0.3.0-beta.

**Subareas were apportioned using Section 7.4 of the Los Angeles County Hydrology Manual.

$Q_{\text{subarea}} = A_{\text{subarea}} / A_{\text{total}} \times Q_{\text{total}}$



LEGEND:

- A TOTAL 7.50** INDICATES TRIBUTARY AREA DESIGNATION
INDICATES TRIBUTARY AREA ACREAGE
- L=960'** INDICATES FLOW DISTANCE THRU AREA
- S=0.007** INDICATES SLOPE OF AREA
- IMP.=99%** INDICATES IMPERVIOUS SURFACE PERCENTAGE
- INDICATES DRAINAGE AREA BOUNDARY
- INDICATES DRAINAGE SUBAREA BOUNDARY
- Q10=0.87CFS DENOTES 10-YEAR RUN-OFF FROM SUB-AREA
- Q25=1.20CFS DENOTES 25-YEAR RUN-OFF FROM SUB-AREA
- Q50=1.48CFS DENOTES 50-YEAR RUN-OFF FROM SUB-AREA
- INDICATES MAIN FLOW PATH
- ➔ INDICATES DIRECTION OF SHEET FLOW

AREA TABULATION					
DESIGNATION	AREA (AC)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	
A	7.50	10.61	14.04	16.68	
B	1.00	1.96	2.60	2.96	
TOTAL	8.50	12.57	16.64	19.64	



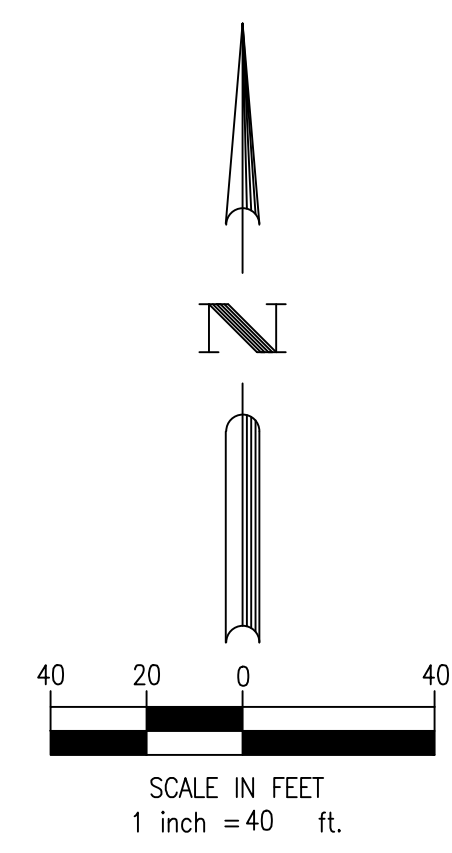
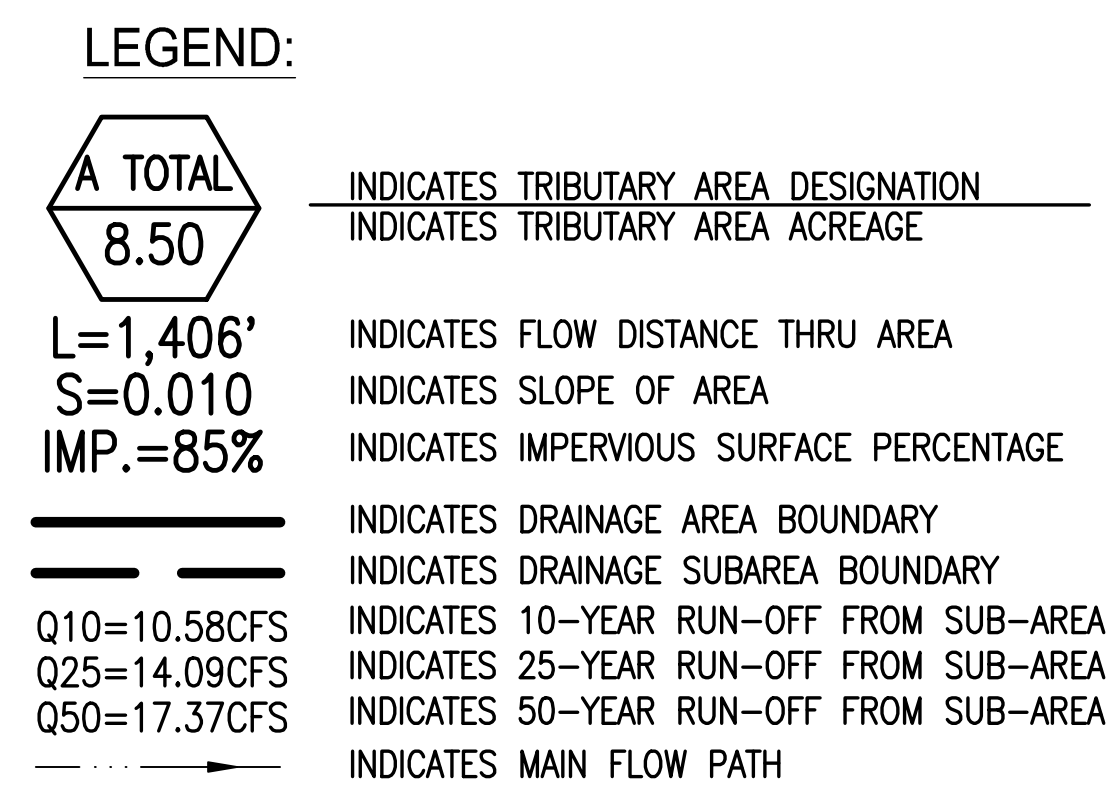
CIVIL ENGINEERS
LAND SURVEYORS
PLANNERS

2652 WHITE ROAD, SUITE B, IRVINE, CA 92614
(949) 660-0110 FAX: 660-0418

HYDROLOGY MAP - EXISTING

FOR
LAKELAND INDUSTRIAL
12300 LAKELAND ROAD
SANTA FE SPRINGS, CALIFORNIA

JOB NUMBER
2088-962-001
DATE: 4/22
DRAWN: SK
CHECKED: MV
SHEET
1
OF
1

[illegible]

WALDEN & ASSOCIATES

CIVIL ENGINEERS
LAND SURVEYORS
PLANNERS

2552 WHITE ROAD, SUITE B, IRVINE, CA 92614
(949) 860-0110 FAX: 660-0418

HYDROLOGY MAP - PROPOSED
FOR
LAKELAND INDUSTRIAL
12300 LAKELAND ROAD
SANTA FE SPRINGS, CALIFORNIA

JOB NUMBER	2088-962-001
DATE:	5/5/2022
DRAWN:	SK
CHECKED:	MV
SHEET	
1	
OF	
1	