County of Los Angeles, California

HYDROLOGY AND HYDRAULIC ANALYSIS

For:

HWY 210 & Huntington SW County of Los Angeles, California 91016 Grading Permit:

Project Name: Chick - fil - A Restaurant # 4698

Prepared for:

Chick-fil-A, Inc.

15635 Alton Parkway, Suite 350 Irvine, CA 92618



Prepared by:

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Prepared on: October 16, 2020

County of Los Angeles, California

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1.0 PROJECT DESCRIPTION

1.1 PURPOSE

This drainage study provides an analysis of the existing and proposed hydrology characteristics for the improvements of a Chick-fil-A Restaurant. The project site is in a shopping center located at Antonio Parkway and Windmill Avenue. The project site is approximately 2.1 acres. The subject site is bounded on the north by Huntington Drive, on the east by Encino Avenue, and on the south by Alta Street and private property. The west is bounded by private property. See Appendix for Vicinity Map.

1.2 EXISTING SITE CONDITION

The site is zoned as Retail Corridor Mixed Use where restaurants are permitted by right in this zone. The existing site is occupied by a closed Claim Jumper restaurant, asphalt parking and drive lanes of approximately 79,485 square feet and landscaped area of approximately 12,841 square feet. The discharge flow is broken into five drainage subareas. Sub-area 100 sheet flows from the northwest to the southeast to an existing culvert. Sub-area 200 sheet flows from northwest to southeast into an existing culvert. Sub-areas 300 and 400 both drain to onsite area drains. Sub-area 500 drains to landscape areas around the building. Drainage from both culverts exits into Alta Street and is conveyed via gutters into a culvert at the east end of Alta Street. Drainage is then conveyed to Santa Anita Wash, which flows into the Rio Hondo Channel. The Rio Hondo Channel joins the Los Angeles River, ultimately ending in the Pacific Ocean.

1.3 PROPOSED SITE CONDITION

Based on Site plan prepared by CRHO Architecture (Project Architect), the existing building and parking area will be demolished to accommodate the construction of a new Chick-fil-A restaurant # 4698 building (approximately 4,562 square feet) and a new Starbucks restaurant building (approximately 2,200 square feet). The new Chick-fil-A building will be constructed approximately 38 ft. west of the easterly property line and approximately 35 ft south of the northerly property line. The proposed building will be a single-story wood frame structure with no basement or underground level. The new Starbucks building will be constructed approximately 19 ft east of the westerly property line and approximately 38 ft south of the northerly property line. Other planned improvements include for each building, new parking stalls, menu board signs, two new trash enclosures, and new concrete walkways (approximately 68,660 square feet), and new planter areas (approximately 23,666 square feet). The site can be accessed from Huntington Drive, Encino Avenue, or the neighboring property.

In the proposed condition the site has been divided into five drainage sub-areas. The runoff from sub-areas 100, 200, 300, and 400 is collected into onsite catch basins and

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routed via underground storm drainpipes into underground infiltrators on the Chick-fil-A property. Once the system is full water will flow out of the catch basin located at node 401 and into Encino Avenue. The stormwater will flow from Encino Avenue to Alta Street and into the Santa Anita Wash, connect with the Rio Hondo Channel, which will convey the drainage to the Los Angeles River and finally the Pacific Ocean. The runoff from sub-areas 500, 600, and 700 is collected into onsite catch basins and routed via underground storm drainpipes into underground infiltrators on the Starbucks property. Once the system has reached capacity the runoff will flow from the catch basin located at node 501 and exit the site via an existing culvert. The culvert conveys drainage into the Alta Street, which then flows via surface flow into a channel at the end of Alta Street. The drainage is conveyed into the Santa Anita Wash, which connects to the Rio Hondo Channel, then joins the Los Angeles River and ultimately ends in the Pacific Ocean. Subarea 800 is comprised entirely of landscaped area except for an existing wall. This area will be considered a self-treating area.

1.4 METHODOLOGY

This project should be designed for 10-year, 24-hour and 25-year, 24-hour rainfall event. As per the Los Angeles County Department of Public Works, the site is located near rainfall isohyet 6.8 in. as per 1-H1.30 MOUNT WILSON 50-YEAR 24-HOUR ISOYHET (See Appendix)

The total runoff from the site will be computed using the information given by the L.A.C.P.W. Hydrology Manual related to Soil Classification and 10-Year and 25-Year 24-Hour Isohyet for said site. The Isohyet is also utilized to determine the runoff when the Rational Formula is used. The Rational Formula assumes that the effective rainfall intensity over the site is equal to the intensity found at the time of concentration.

From LACDPW Soil Classification Area: 006

Isohyet Events: 10 Year and 25 Year-24-hour

Time of concentration

The time of concentration was computed using the HydroCalc program from LACDPW.

 $Tc = 10^{-0.507} (C_D I_X)^{-0.519} L^{0.483} s^{-0.135}$

 $C_D = (0.9 \text{ x Imp}) + [(1.0 - \text{Imp}) \text{ x } C_U)]$ If $CD < C_U$, use $C_D = C_U$

The discharge Q was computed using the Rational Formula.

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1.5 TOTAL DISCHARGE SUMMARY

TOTAL SITE DISCHARGE			
STORM	EXISTING	PROPOSED	
EVENT	CONDITION	CONDITON	
(YEAR)	(cfs)	(cfs)	
10	5.74	5.72	
25	7.46	7.27	

2.0 HYDROLOGY ANALYSIS

2.1 EXISTING CONDITION

Node 100 to Node 101

Area =1.151 acres

L = 376 ft. s = 0.0159 Tc = 6.00 min.

 $Q_{10} = 3.00 \text{ cfs}.$

 $Q_{25} = 4.06$ cfs.

I = 2.93 in/hr.

1 = 3.93 in/hr.

Node 200 to Node 201

Area =0.654 acres

L = 230 ft. s = 0.0186 Tc = 5.00 min.

 $Q_{10} = 1.87$ cfs.

 $Q_{25} = 2.31 \text{ cfs}.$

I = 3.19 in/hr.

I = 3.93 in/hr.

Node 300 to Node 301

Area =0.047 acres

L = 52 ft. s = 0.0119 Tc = 5.00 min.

 $Q_{10} = 0.13$ cfs.

 $Q_{25} = 0.16 \text{ cfs}.$

I = 3.19 in/hr.

I = 3.93 in/hr.

Node 400 to Node 401

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Area =0.03 acres

L = 33 ft. s = 0.0206 Tc = 5.00 min.

 $Q_{10} = 0.08$ cfs.

 $Q_{25} = 0.10$ cfs.

I = 3.19 in/hr.

I = 3.93 in/hr.

Node 500 to Node 501

Area =0.238 acres

L = 30 ft. s = 0.0613 Tc = 5.00 min.

 $Q_{10} = 0.66$ cfs.

 $Q_{25} = 0.83$ cfs.

I = 3.19 in/hr.

1 = 3.93 in/hr.

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2.2 PROPOSED CONDITION

Node 100 to Node 101

Area =0.581 acres

L = 368 ft. s = 0.007 Tc = 7.00 min.

 $Q_{10} = 1.40 \text{ cfs}.$

 $Q_{25} = 1.87 \text{ cfs}.$

I = 2.73 in/hr. I = 3.60 in/hr.

Node 200 to Node 201

Area =0.27 acres

L = 138 ft. s = 0.0151 Tc = 5.00 min.

 $Q_{10} = 0.77 \text{ cfs.}$ $Q_{25} = 0.95 \text{ cfs.}$

I = 3.19 in/hr.

I = 3.93 in/hr.

Node 300 to Node 301

Area =0.230 acres

L = 162 ft. s = 0.0175 Tc = 5.00 min

 $Q_{10} = 0.66$ cfs.

 $Q_{25} = 0.81 \text{ cfs}.$

I = 3.19 in/hr.

I = 3.93 in/hr.

Node 400 to Node 401

Area =0.119 acres

L = 143 ft. s = 0.02 Tc = 5.00 min

 $Q_{10} = 0.33$ cfs.

 $Q_{25} = 0.42 \text{ cfs}.$

I = 3.19 in/hr.

I = 3.93 in/hr.

Node 500 to Node 501

Area =0.487 acres

L = 2.88 ft. s = 0.0131 Tc = 5.00 min

 $Q_{10} = 1.38$ cfs.

 $Q_{25} = 1.71 \text{ cfs}.$

I = 3.19 in/hr.

I = 3.93 in/hr

Node 600 to Node 601

Area =0.205 acres

L = 180 ft. s = 0.0061 Tc = 5.00 min

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I = 3.19 in/hr.

 $Q_{10} = 0.57$ cfs. $Q_{25} = 0.72$ cfs. $Q_{25} = 0.72$ cfs. $Q_{25} = 0.72$ cfs. I = 3.93 in/hr.

Node 700 to Node 701

Area =0. acres

L = 99 ft. s = 0.0147 Tc = 5.00 min

 $Q_{10} = 0.08 \text{ cfs.}$ $Q_{25} = 0.10 \text{ cfs.}$

I = 3.19 in/hr.

1 = 3.93 in/hr.

Node 800 to Node 801

Area =0.49 acres

L = 125 ft. s = 0.018Tc = 5.00 min

 $Q_{10} = 0.53$ cfs.

 $Q_{25} = 0.69$ cfs.

I = 3.19 in/hr.

I = 3.93 in/hr.

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TOTAL SITE RUNOFF DISCHARGE

EXISTING

$$Q_{10} = 3.00 + 1.87 + 0.13 + 0.08 + 0.66 =$$
5.74 cfs $Q_{25} = 4.06 + 2.31 + 0.16 + 0.10 + 0.83 =$ **7.46 cfs**

PROPOSED

$$Q_{10} = 1.40 + 0.77 + 0.66 + 0.33 + 1.38 + 0.57 + 0.08 + 0.53 =$$
5.72 cfs $Q_{25} = 1.87 + 0.95 + 0.81 + 0.42 + 1.71 + 0.72 + 0.10 + 0.69 =$ **7.27 cfs**

$$Q_{10}$$
 (PROPOSED) – Q_{10} (EXISTING)
5.72 cfs – 5.74 cfs = -0.02 cfs => DECREASE OF 0.02 cfs [0.3%]

$$Q_{25}$$
 (PROPOSED) – Q_{25} (EXISTING)
7.27 cfs – 7.46 cfs = -0.19 cfs => DECREASE OF 0.19 cfs [2.5%]

BUILDING PROTECTION

Chick-fil-A:

For building protection purposes, the water surface elevation NODE 201 will be 467.25' during a 100-yr storm event. This provides a difference of 1.24' below the finished floor of the building.

Starbucks:

For building protection purposes, the water surface elevation NODE 601 will be 468.61' during a 100-yr storm event. This provides a difference of 1.55' below the finished floor of the building.

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2.3 CONCLUSION

The findings of this report show that no significant changes to the drainage of this site will occur. The existing site land use is a Claim Jumper Restaurant and parking lot and the proposed land use is a restaurant with a drive-thru. The amount of impervious surfaces has decreased in the proposed condition (80,117 sf Existing Cond., 68,882 sf Proposed Cond.).

The drainage pattern of the site will be maintained as it drains from northeast to southwest, although due to the addition of the building and drive-thru the subareas that make up the DMA are configured differently than in the existing condition. The site has been designed to allow for drainage to flow away from the building and be conveyed by drainage devices such as curb & gutters south to existing catch basins. The proposed condition of the site will maintain the site discharge into the public storm drain system through the culverts, therefore no re-routing of storm water will occur from this development project.

It was found that in both the 10 yr and 25 yr storm event analyses the peak runoff values were decreased from the existing site condition values by 0.3% and 2.5%.

It shall be noted that the most significant difference to the drainage of this site in the proposed condition is the addition of a storm water treatment system. Per State and County requirements this development project is required to install a Structural BMP for storm water treatment. Both sites will have an underground infiltration systems that will capture the Design Volume and allow for storage and infiltration of the runoff. In high flow storm events, the storm water will first enter the underground storage system, once full the system will back up to the lowest grates, which are located in the drive lane at Node 401 and Node 501. The storm water will then flow into Alta Street. See project WQMP for details.

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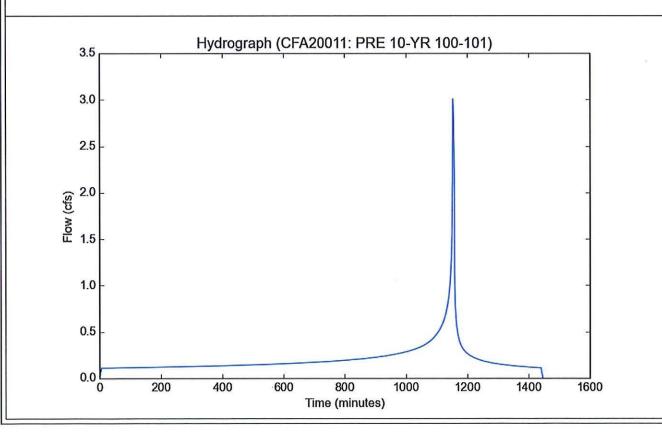
2.4 HYDROCALC CALCULATIONS

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Project Name	CFA20011
Subarea ID	PRE 10-YR 100-101
Area (ac)	1.151
Flow Path Length (ft)	376.0
Flow Path Slope (vft/hft)	0.0159
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.89
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Modeled (10-yr) Rainfall Depth (in)	5.355	
Peak Intensity (in/hr)	2.9326	
Undeveloped Runoff Coefficient (Cu)	0.8175	
Developed Runoff Coefficient (Cd)	0.8909	
Time of Concentration (min)	6.0	
Clear Peak Flow Rate (cfs)	3.0072	
Burned Peak Flow Rate (cfs)	3.0072	
24-Hr Clear Runoff Volume (ac-ft)	0.4193	
24-Hr Clear Runoff Volume (cu-ft)	18266.1644	

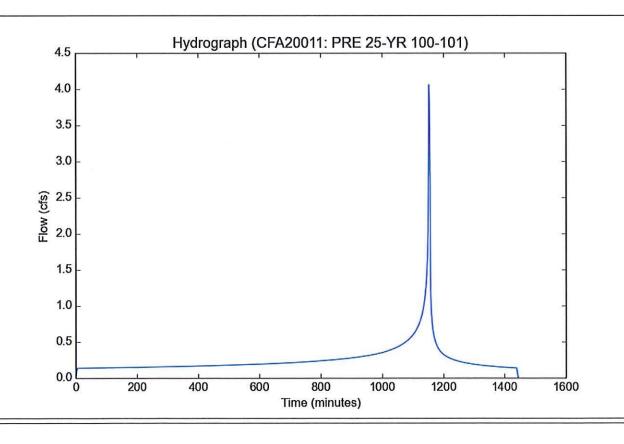


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Project Name	CFA20011
Subarea ID	PRE 25-YR 100-101
Area (ac)	1.151
Flow Path Length (ft)	376.0
Flow Path Slope (vft/hft)	0.0159
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.89
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Modeled (25-yr) Rainfall Depth (in)	6.585	
Peak Intensity (in/hr)	3.9288	
Undeveloped Runoff Coefficient (Cu)	0.8738	
Developed Runoff Coefficient (Cd)	0.8971	
Time of Concentration (min)	5.0	
Clear Peak Flow Rate (cfs)	4.0568	
Burned Peak Flow Rate (cfs)	4.0568	
24-Hr Clear Runoff Volume (ac-ft)	0.5176	
24-Hr Clear Runoff Volume (cu-ft)	22545.3306	

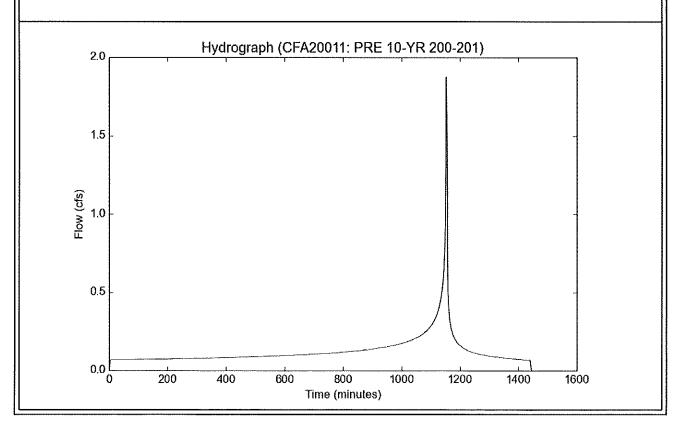


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Input Parameters

Project Name	Austra, Correction CFA20011 (Austroaline a commentaries) in
Subarea ID	PRE 10-YR 200-201
Area (ac) Avantamenta a manantamenta	484848888888888 0.654
Flow Path Length (ft)	230.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type ·	6
Design Storm Frequency	HVERTEN ET ER 10-yr film det et en
Fire Factor	0
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Modeled (10-yr) Rainfall Depth (in)
Peak Intensity (in/hr)	3.1949
Undeveloped Runoff Coefficient (C	Cu) 10.836
Developed Runoff Coefficient (Cd)	
Time of Concentration (min)	
Clear Peak Flow Rate (cfs)	1.8755
	1.8755
24-Hr Clear Runoff Volume (ac-ft)	0.2528
24-Hr Clear Runoff Volume (cu-ft)	11012.7198

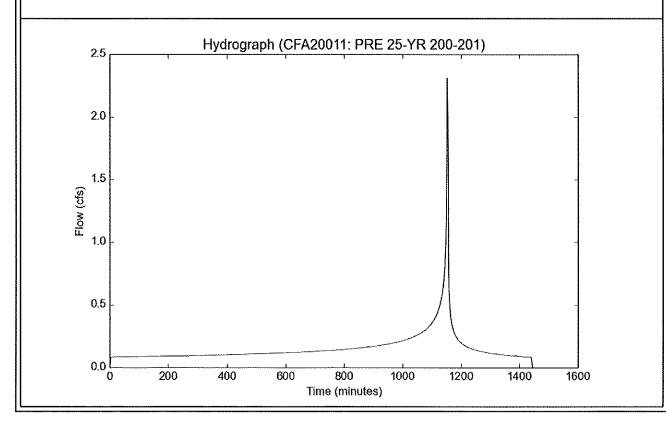


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Input Parameters

Project Name ************************************	Partie B.CFA20011 Partie Parti
Subarea ID	PRE 25-YR 200-201
Area (ac) shika aa a	Hermai 0.654 per banah herbadi kasah keb
Flow Path Length (ft)	230.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type ·	6
Design Storm Frequency	10 10 10 10 10 10 10 10 10 10 10 10 10 1
Fire Factor	0 1
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Modeled (25-yr) Rainfall Depth (in)	6.585
Peak Intensity (in/hr)	3.9288
Undeveloped Runoff Coefficient (Cu)	0.8738
Developed Runoff Coefficient (Cd)	0.899
Time of Concentration (min)	45.0
Clear Peak Flow Rate (cfs)	2.3099
Burned Peak Flow Rate (cfs)	2.3099
24-Hr Clear Runoff Volume (ac-ft)	0.3113
24-Hr Clear Runoff Volume (cu-ft)	13558.4794

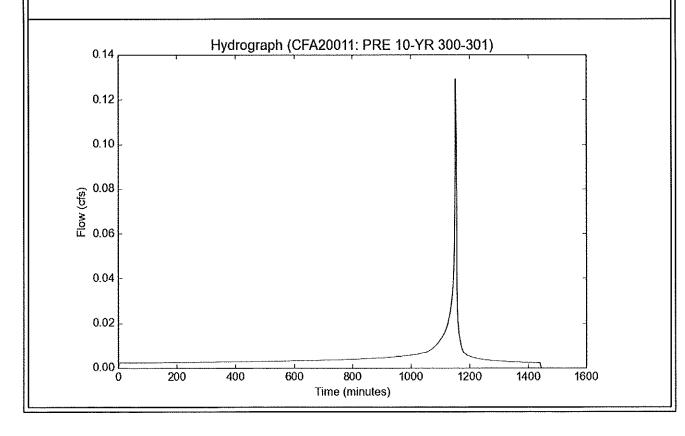


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Input Parameters

Project Name Sanisaisus sa mana ita dalikanimisisa Aug	mi CFA20011 s simulation distinguishmen
Subarea ID	PRE 10-YR 300-301
Area (ac) state this is the feature that the state of the control	6.0.047 (http://doi.org/10.0016/16.16.16.16.16.16.16.16.16.16.16.16.16.1
Flow Path Length (ft)	52.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	dia 10-yr de libraria de la libraria
Fire Factor	<u>. 0</u>
FID ####################################	False in the control of the control

Modeled (10-yr) Rainfall Depth (in)	5.355
Peak Intensity (in/hr)	3.1949
	0.836
Developed Runoff Coefficient (Cd)	0.8599
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.1291
Burned Peak Flow Rate (cfs)	0.1291
24-Hr Clear Runoff Volume (ac-ft)	0.0096
24-Hr Clear Runoff Volume (cu-ft)	419.6685



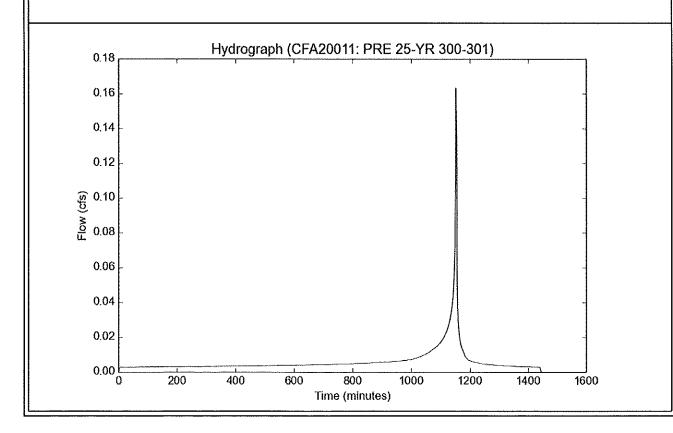
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Project Name (AARAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	A.: CFA20011
Subarea ID	PRE 25-YR 300-301
Area (ac) industribility in the control in the cont	HAM 0.047
Flow Path Length (ft)	52.0
Flow Path Slope (vft/hft)	4440.0119
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.374
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0

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Modeled (25-yr) Rainfall Depth (in)	6.585
Peak Intensity (in/hr)	3.9288
Undeveloped Runoff Coefficient (Cu)	AHAMHAHA 0.8738 AHAMHAHAHAHAHAHAHA
Developed Runoff Coefficient (Cd)	0.8836
Time of Concentration (min)	5.0 See See See See See See See See See Se
Clear Peak Flow Rate (cfs)	0.1632
Burned Peak Flow Rate (cfs)	0.1632
24-Hr Clear Runoff Volume (ac-ft)	0.0123
24-Hr Clear Runoff Volume (cu-ft)	535.2742

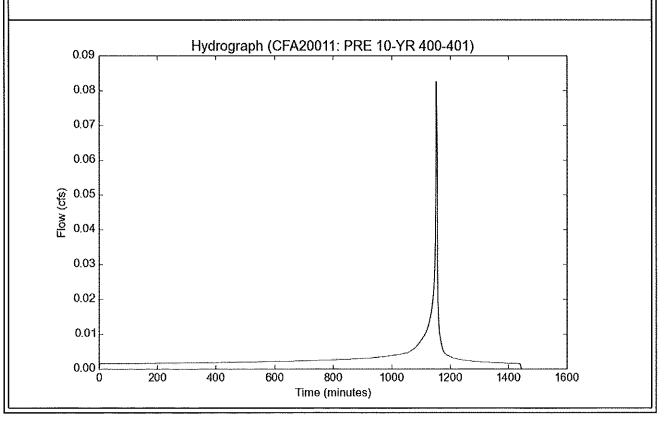


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Input Parameters

Project Name Animalia and Anima	AGAGACFA20011
Subarea ID	PRE 10-YR 400-401
Area (ac) in the lands as a selection of the lands at lands.	
Flow Path Length (ft)	33.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	havidid 10-yr sabidi katalisti tahudi kabida bilindid
Fire Factor	0
	False

Modeled (10-yr) Rainfall Depth (in)	5.355
Peak Intensity (in/hr)	3.1949
Undeveloped Runoff Coefficient (Cu)	0.836
Developed Runoff Coefficient (Cd)	0.8609
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.0825
Burned Peak Flow Rate (cfs)	0.0825
24-Hr Clear Runoff Volume (ac-ft)	0.0063
24-Hr Clear Runoff Volume (cu-ft)	274.3305

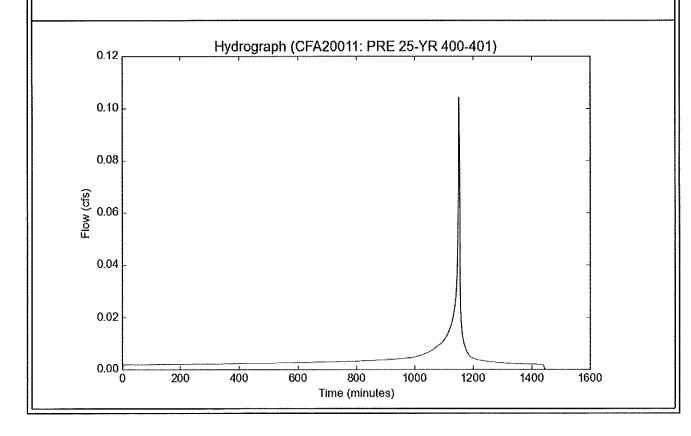


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Input Parameters

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Project Name Additional Additiona	*CFA20011**********************
Subarea ID	PRE 25-YR 400-401
Area (ac) had mineral management of the line is a line in the line in the line is a line in the line in the line is a line in the line is a line in the line in the line is a line in the line in the line is a line in the line in the line is a line in the line in the line is a line in the line in the line is a line in the line in the line is a line in the line in the line is a line in the line in the line is a line in the line in the line is a line in the line in the line is a line in the line i	
Flow Path Length (ft)	33.0
Flow Path Slope (vft/hft)	±0.0206
50-yr Rainfall Depth (in)	7.5
Percent Impervious	a 0.39 - Garaga da karanga kar
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
FID WHERE THE REPORT OF THE PROPERTY OF THE PR	False

Modeled (25-yr) Rainfall Depth (in)	6.585
Peak Intensity (in/hr)	3.9288
Undeveloped Runoff Coefficient (Cu)	0.8738
Developed Runoff Coefficient (Cd)	0.884
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.1042
Burned Peak Flow Rate (cfs)	0.1042
24-Hr Clear Runoff Volume (ac-ft)	0.008
24-Hr Clear Runoff Volume (cu-ft)	349.2912

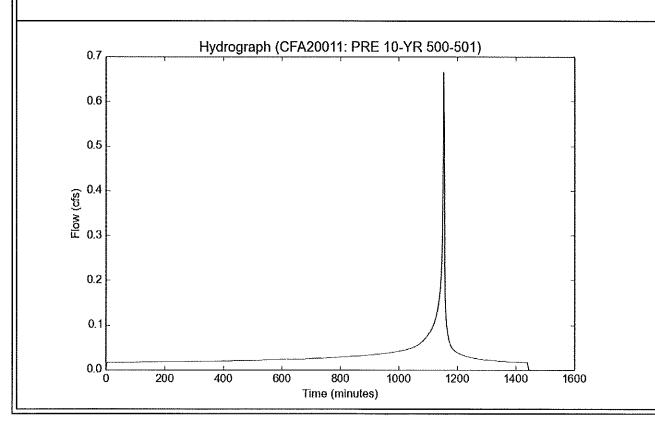


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Input Parameters

Project Name was idealised and the contract of	BANGCFA20011 BANGARANGHANGHANA
Subarea ID	PRE 10-YR 500-501
Area (ac) http://doi.org/10.1011/10.10	
Flow Path Length (ft)	30.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	46 mm 0.595
Soil Type	6
Design Storm Frequency	ilahilil <mark>10-yr</mark> walisaaliwa kalibhili ilahili ka
Fire Factor	
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Modeled (10-yr) Rainfall Depth (in)	3055
Peak Intensity (in/hr)	3.1949
Undeveloped Runoff Coefficient (Cu) \(\text{Mathematical} 0.836 \)
Developed Runoff Coefficient (Cd)	0.8741
	5.0
Clear Peak Flow Rate (cfs)	0.6646
Burned Peak Flow Rate (cfs)	0.6646
24-Hr Clear Runoff Volume (ac-ft)	0.065
24-Hr Clear Runoff Volume (cu-ft)	2832.6895



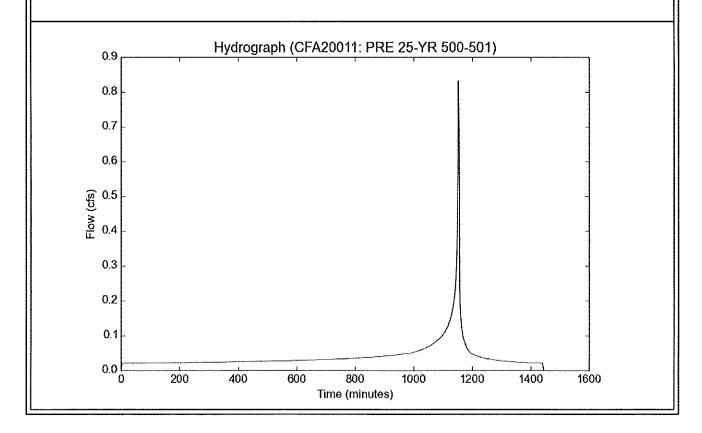
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Input Parameters

Project Name shahadi kada ana sanahada anakan	CFA20011
Subarea ID	PRE 25-YR 500-501
Area (ac) Hill Children and Chi	::0.238
Flow Path Length (ft)	30.0
Flow Path Slope (vft/hft)	0.0613
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.595
Soil Type	6
Design Storm Frequency	25-vr
Fire Factor	0 1

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.585
Peak Intensity (in/hr)	3.9288
	0.8738
Developed Runoff Coefficient (Cd)	0.8894
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.8316
Burned Peak Flow Rate (cfs)	0.8316
24-Hr Clear Runoff Volume (ac-ft)	0.0814
24-Hr Clear Runoff Volume (cu-ft)	3546.2737



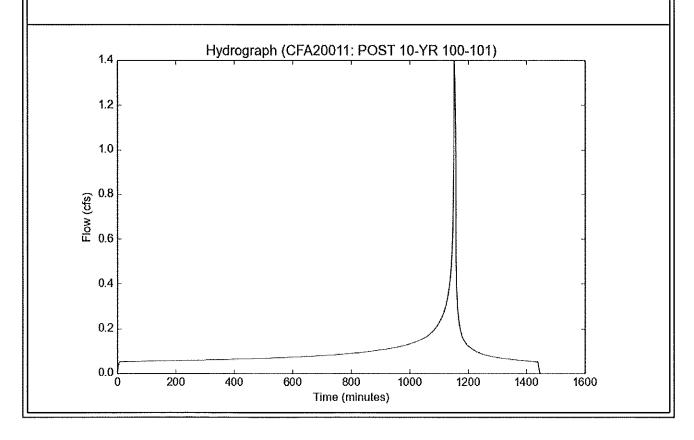
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File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 10-YR 100-101.pdf Version: HydroCalc 1.0.2

Input Parameters

mpat i aramotoro	
Project Name Antibalia and the Antibalia and the Antibalia	13.14.35.1 CFA20011 13.44.45.14.45.14.15.15.15.15.15.15.15.15.15.15.15.15.15.
Subarea ID	POST 10-YR 100-101
Area (ac) white the transfer of the feature of the	
Flow Path Length (ft)	368.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	sincipaliti 10-yr stilichi balan kan kingan kingin
Fire Factor	0
	Ahilibinia False Aliabatani halibini halibini halibi

Modeled (10-yr) Rainfall Depth (in)	#15.355 ##################################
Peak Intensity (in/hr)	2.7276
Undeveloped Runoff Coefficient (Cu)	0.8032
Developed Runoff Coefficient (Cd)	0.8815
Time of Concentration (min)	
Clear Peak Flow Rate (cfs)	1.397
	N 1.397
24-Hr Clear Runoff Volume (ac-ft)	0.1971
24-Hr Clear Runoff Volume (cu-ft)	8586.4879



File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 25-YR 100-101.pdf Version: HydroCalc 1.0.2

Input Parameters

Project Name (Additional Additional Addition

Subarea ID POST 25-YR 100-101

Area (ac)
Flow Path Length (ft)
Flow Path Slope (vft/hft)
50-yr Rainfall Depth (in)
Percent Impervious
0.581
0.581
0.007
0.007
0.007

Soil Type

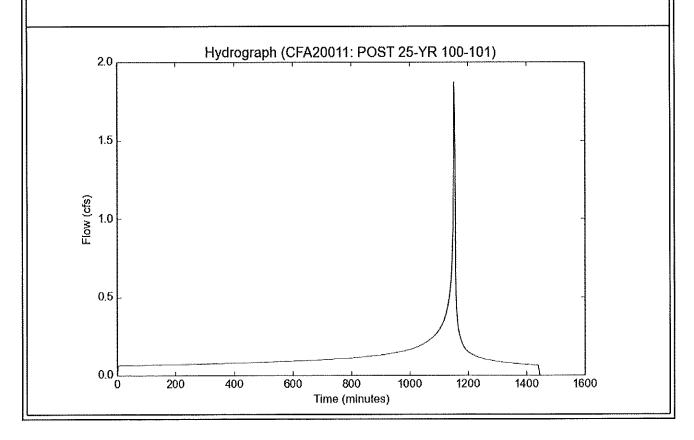
Design Storm Frequency

Fire Factor

ULID

Output Results

Modeled (25-yr) Rainfall Depth (in) 6.585 Peak Intensity (in/hr) 3.6062 Undeveloped Runoff Coefficient (Cu) 0.8614 Developed Runoff Coefficient (Cd) 0.8926 Time of Concentration (min) 6.0 Clear Peak Flow Rate (cfs) 1.8702 Burned Peak Flow Rate (cfs) 1.8702 24-Hr Clear Runoff Volume (ac-ft) 0.2441 24-Hr Clear Runoff Volume (cu-ft) 10632.1601

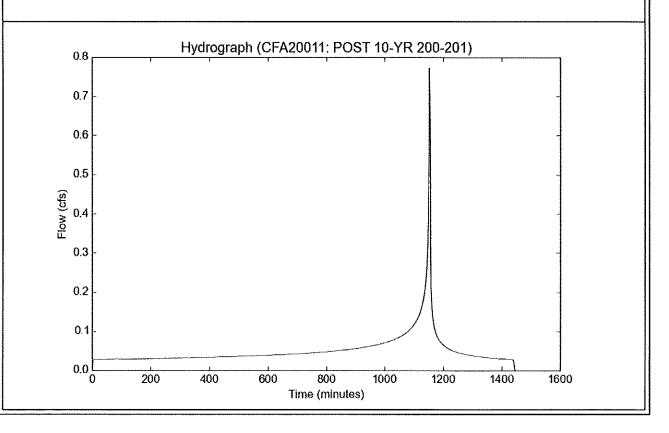


File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 10-YR 200-201.pdf Version: HydroCalc 1.0.2

Input Parameters

Project Name And Andrews And Andrews Andrews	Richard High CFA20011 - Shakara Albarda Albard
Subarea ID	POST 10-YR 200-201
Area (ac) white white miles and the simple simple and the simple	
Flow Path Length (ft)	138.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	4 A Chimae 0.945 Chimae Chim
Soil Type	6
Design Storm Frequency	anda kannuka 10-yr aka kuan mindika kawanin kilika.
Fire Factor	<u> </u>
	Halse Halse Halse

Modeled (10-yr) Rainfall Depth (in)	5.355
Peak Intensity (in/hr)	3.1949
Undeveloped Runoff Coefficient (Cu)	0.836
Developed Runoff Coefficient (Cd)	0.8965
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.7733
Burned Peak Flow Rate (cfs)	0.7733
24-Hr Clear Runoff Volume (ac-ft)	0.103
24-Hr Clear Runoff Volume (cu-ft)	4484.79



File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 25-YR 200-201.pdf Version: HydroCalc 1.0.2

Input Parameters

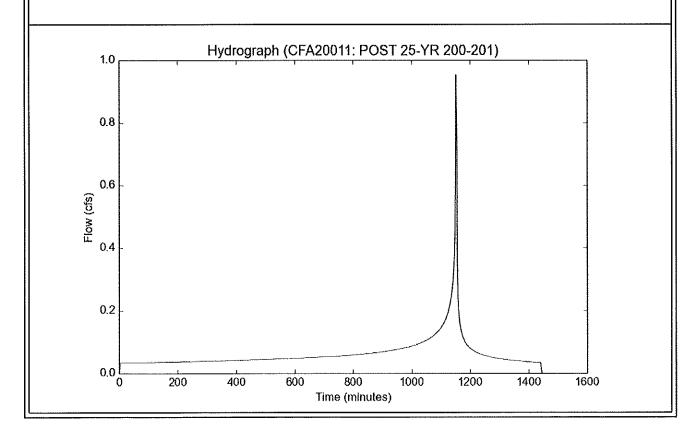
Project Name CFA20011 Subarea ID POST 25-YR 200-201

0.27 Area (ac) Flow Path Length (ft) 138.0 Flow Path Slope (vft/hft) 0.0151 50-yr Rainfall Depth (in) 7.5 Percent Impervious 0.945 Soil Type 6 Design Storm Frequency 25-vr

Fire Factor LID

Output Results

Modeled (25-yr) Rainfall Depth (in) Peak Intensity (in/hr) 3.9288 Undeveloped Runoff Coefficient (Cu) 0.8738 Developed Runoff Coefficient (Cd) 0.8986 Time of Concentration (min) 5.0 Clear Peak Flow Rate (cfs) 0.9532 Burned Peak Flow Rate (cfs) 0.9532 24-Hr Clear Runoff Volume (ac-ft) 0.1268 5524.6063 24-Hr Clear Runoff Volume (cu-ft)

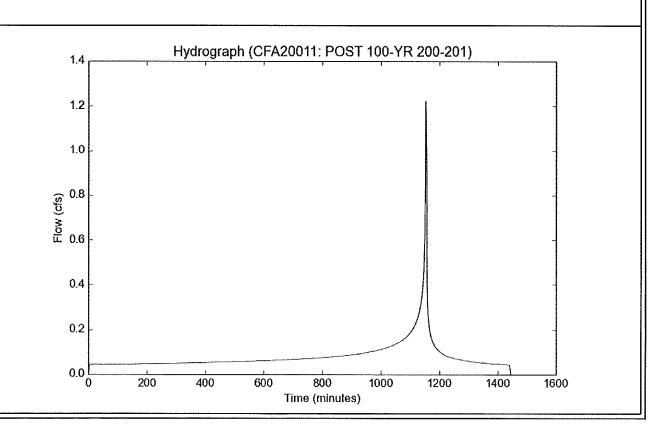


File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 100-YR 200-201.pdf Version: HydroCalc 1.0.2

Input Parameters

Project Name Militarian Anna Anna Anna Anna Anna Anna Anna A	of Books CFA20011 construents before the books and the construents are the construents and the construents are the construents and the construents are the construents
Subarea ID	POST 100-YR 200-201
Area (ac) sindulat amatewanti in bette a distribution in a control in the control of the control	
Flow Path Length (ft)	138.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	##### 0.945
Soil Type	6
Design Storm Frequency	wikiti 100-yr dullamini kaliki kaliki kaliki
Fire Factor	0
FID spages are produced from the production of t	Bilitation False Bilitation and Bilitation and State of the Company of the Compan

Modeled (100-yr) Rainfall Depth (in)	8.415
Peak Intensity (in/hr)	5.0206
Undeveloped Runoff Coefficient (Cu)	0.9151
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	
Clear Peak Flow Rate (cfs)	1.22
Burned Peak Flow Rate (cfs)	As 1.22 A SAME ASSESSED AND ASSESSED
24-Hr Clear Runoff Volume (ac-ft)	0.1625
24-Hr Clear Runoff Volume (cu-ft)	7078.7782
• • • • • • • • • • • • • • • • • • • •	

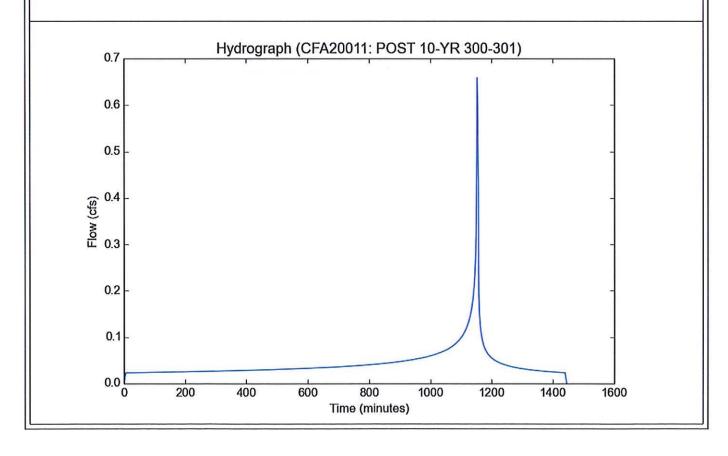


File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 10-YR 300-301.pdf Version: HydroCalc 1.0.2

Input I	Parameters
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Project Name	CFA20011
Subarea ID	POST 10-YR 300-301
Area (ac)	0.23
Flow Path Length (ft)	162.0
Flow Path Slope (vft/hft)	0.0175
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.945
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

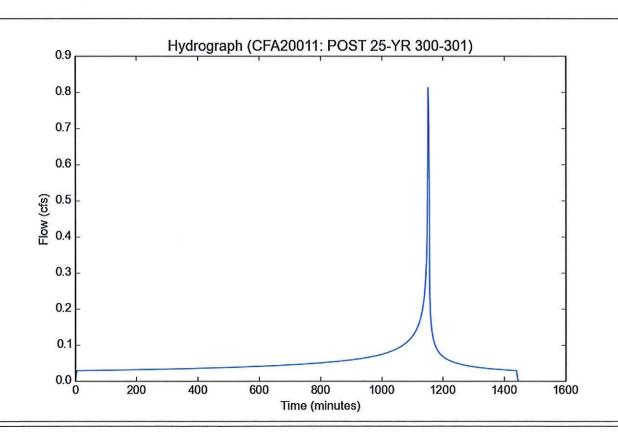
Output Neoutlo		
Modeled (10-yr) Rainfall Depth (in)	5.355	
Peak Intensity (in/hr)	3.1949	
Undeveloped Runoff Coefficient (Cu)	0.836	
Developed Runoff Coefficient (Cd)	0.8965	
Time of Concentration (min)	5.0	
Clear Peak Flow Rate (cfs)	0.6588	
Burned Peak Flow Rate (cfs)	0.6588	
24-Hr Clear Runoff Volume (ac-ft)	0.0877	
24-Hr Clear Runoff Volume (cu-ft)	3820.3767	



File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 25-YR 300-301.pdf Version: HydroCalc 1.0.2

Input Parameters

Modeled (25-yr) Rainfall Depth (in)	6.585	
Peak Intensity (in/hr)	3.9288	
Undeveloped Runoff Coefficient (Cu)	0.8738	
Developed Runoff Coefficient (Cd)	0.8986	
Time of Concentration (min)	5.0	
Clear Peak Flow Rate (cfs)	0.812	
Burned Peak Flow Rate (cfs)	0.812	
24-Hr Clear Runoff Volume (ac-ft)	0.108	
24-Hr Clear Runoff Volume (cu-ft)	4706.1461	

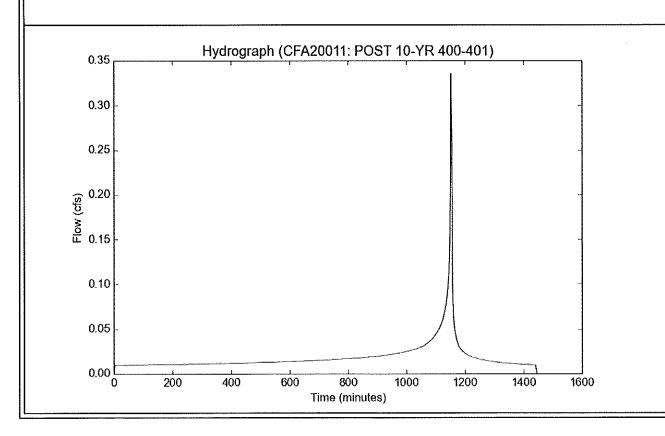


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Input Parameters

Project Name	####### CFA20011
Subarea ID	POST 10-YR 400-401
Area (ac) distinguished the second strain and second secon	
Flow Path Length (ft)	143.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	Haribalian 10-yr billion a barballan barba
Fire Factor	0
FID stage for an exercise the representation of	False

Modeled (10-yr) Rainfall Depth (in)	5.355
Peak Intensity (in/hr)	3.1949
Undeveloped Runoff Coefficient (Cu)	0.836
Developed Runoff Coefficient (Cd)	0.8827
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.3356
Burned Peak Flow Rate (cfs)	0.3356
24-Hr Clear Runoff Volume (ac-ft)	0.0375
24-Hr Clear Runoff Volume (cu-ft)	1632.4546

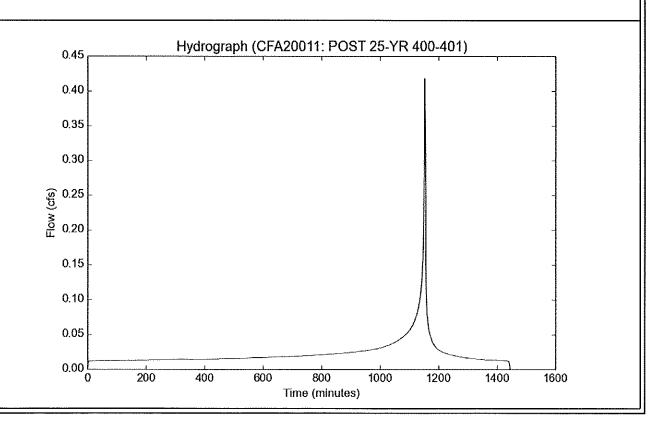


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Input Parameters

Project Name satelli sinatibili e e e e e e e e e e e e e e e e e e	A THE SHEET CFA20011 BEAMAIN AND AND HER CARRE
Subarea ID	POST 25-YR 400-401
Area (ac) ************************************	haviadhi: 0.119 - mahilida bida dhanna halinin dhila
Flow Path Length (ft)	143.0
Flow Path Slope (vft/hft)	the sale of 0.02 shall be a first the sale sale sale sale sale sale sale sal
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	Section 25-yr decide the later which have been a section.
Fire Factor	0
LID ####################################	STATES False Minimum statement from the control of

Modeled (25-yr) Rainfall Depth (in)	6.585
Peak Intensity (in/hr)	3.9288
Undeveloped Runoff Coefficient (Cu)	
Developed Runoff Coefficient (Cd)	0.8929
Time of Concentration (min)	#### 5.0
Clear Peak Flow Rate (cfs)	0.4175
Burned Peak Flow Rate (cfs)	0.4175
24-Hr Clear Runoff Volume (ac-ft)	0.0466
24-Hr Clear Runoff Volume (cu-ft)	2028.3957

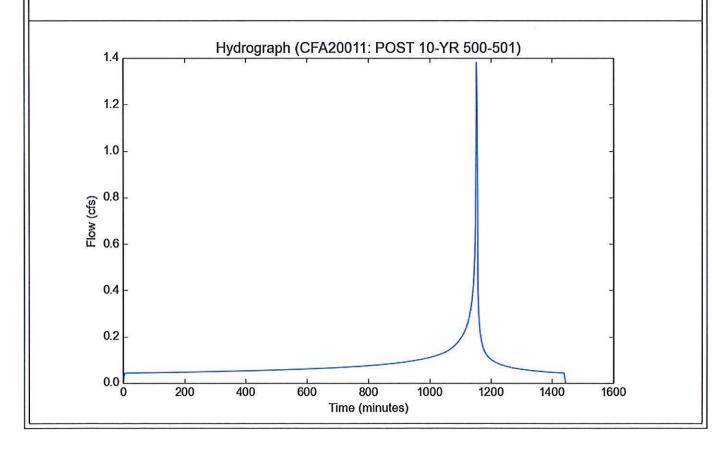


File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 10-YR 500-501.pdf Version: HydroCalc 1.0.2

	In	out	Par	am	eters
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Project Name	CFA20011
Subarea ID	POST 10-YR 500-501
Area (ac)	0.487
Flow Path Length (ft)	288.0
Flow Path Slope (vft/hft)	0.0131
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.807
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

output recourse		
Modeled (10-yr) Rainfall Depth (in)	5.355	
Peak Intensity (in/hr)	3.1949	
Undeveloped Runoff Coefficient (Cu)	0.836	
Developed Runoff Coefficient (Cd)	0.8876	
Time of Concentration (min)	5.0	
Clear Peak Flow Rate (cfs)	1.3811	
Burned Peak Flow Rate (cfs)	1.3811	
24-Hr Clear Runoff Volume (ac-ft)	0.1649	
24-Hr Clear Runoff Volume (cu-ft)	7185.1625	

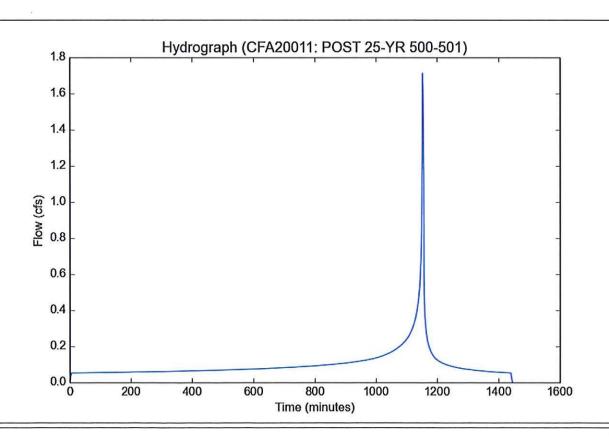


File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 25-YR 500-501.pdf Version: HydroCalc 1.0.2

Input Parameters	In	put	Pa	ram	et	ers
------------------	----	-----	----	-----	----	-----

Project Name	CFA20011
Subarea ID	POST 25-YR 500-501
Area (ac)	0.487
Flow Path Length (ft)	288.0
Flow Path Slope (vft/hft)	0.0131
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.807
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results		
Modeled (25-yr) Rainfall Depth (in)	6.585	
Peak Intensity (in/hr)	3.9288	
Undeveloped Runoff Coefficient (Cu)	0.8738	
Developed Runoff Coefficient (Cd)	0.8949	
Time of Concentration (min)	5.0	
Clear Peak Flow Rate (cfs)	1.7123	
Burned Peak Flow Rate (cfs)	1.7123	
24-Hr Clear Runoff Volume (ac-ft)	0.2042	
24-Hr Clear Runoff Volume (cu-ft)	8896.908	

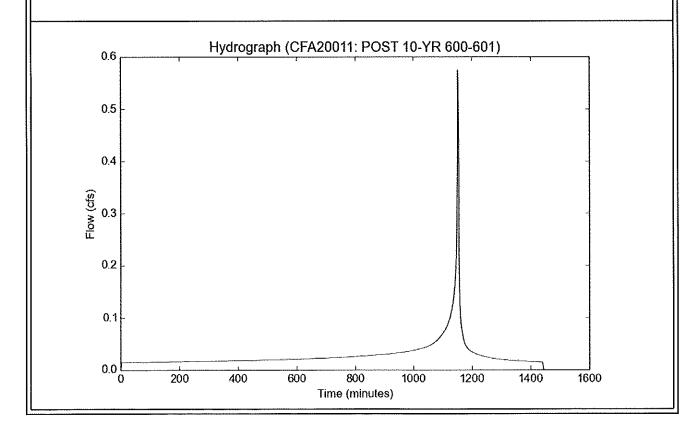


File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 10-YR 600-601.pdf Version: HydroCalc 1.0.2

Input Parameters

Project Name strategies (Strategies (Strat	was an CFA20011 - Panda Amini Amining an
Subarea ID	POST 10-YR 600-601
Area (ac) dentire the limited and the limit of the limit	Reference 205 and the reference and the referenc
Flow Path Length (ft)	180.0
Flow Path Slope (vft/hft)	44 11 11 0.0061
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	Birdini 10-ÿr
Fire Factor	0
- FID is the property of the p	HAMINE False Hamiltonia Hamiltonia Hamiltonia Hamiltonia Hamiltonia Hamiltonia Hamiltonia Hamiltonia Hamiltonia

Output Modulio	
Modeled (10-yr) Rainfall Depth (in)	45.355 A CARLES AND
Peak Intensity (in/hr)	3.1949
Undeveloped Runoff Coefficient (Cu)	0.836
Developed Runoff Coefficient (Cd)	0.8758
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.5736
Burned Peak Flow Rate (cfs)	0.5736
24-Hr Clear Runoff Volume (ac-ft)	0.0577
24-Hr Clear Runoff Volume (cu-ft)	2514.3796

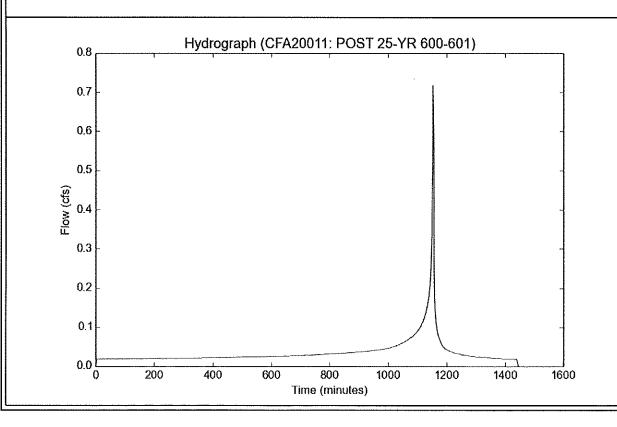


File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 25-YR 600-601.pdf Version: HydroCalc 1.0.2

Input Parameters

Project Name Walderstein Walderstein Walderstein	undeleticFA20011 Alita Auginicalingan en
Subarea ID	POST 25-YR 600-601
Area (ac) Estimation de la colonia de la col	
Flow Path Length (ft)	180.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	indianaha 25-yr dan haliwa ing malaha indian
Fire Factor	0
- FID strategies in entrance and strategies and strategies and strategies.	Yellowin False was entermined the control of

Modeled (25-yr) Rainfall Depth (in)	6.585
Peak Intensity (in/hr)	3.9288
Undeveloped Runoff Coefficient (Cu)	
Developed Runoff Coefficient (Cd)	0.8901
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.7169
Burned Peak Flow Rate (cfs)	0.7169
24-Hr Clear Runoff Volume (ac-ft)	0.0721
24-Hr Clear Runoff Volume (cu-ft)	3142.5098



File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 100-YR 600-601.pdf Version: HydroCalc 1.0.2

Input Parameters

Project Name	The control of the co
Subarea ID	POST 100-YR 600-601

Area (ac)
Flow Path Length (ft)
Flow Path Slope (vft/hft)
50-yr Rainfall Depth (in)
Percent Impervious
Soil Type
Design Storm Frequency

0.205

0.0061

7.5

0.0061

7.5

0.622

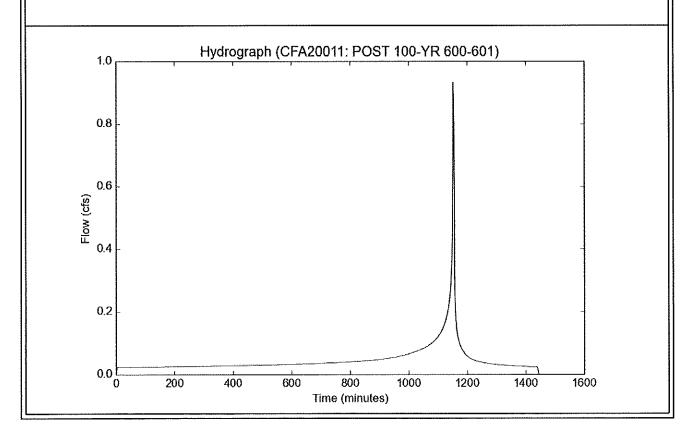
100-yr

Design Storm Frequency
Fire Factor

Character Storm Frequency

False

Output Nesans	
Modeled (100-yr) Rainfall Depth (in)	8.415
Peak Intensity (in/hr)	5.0206
Undeveloped Runoff Coefficient (Cu)	NEW 10.9151
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.9263
Burned Peak Flow Rate (cfs)	0.9263
24-Hr Clear Runoff Volume (ac-ft)	0.0944
24-Hr Clear Runoff Volume (cu-ft)	4114.2415



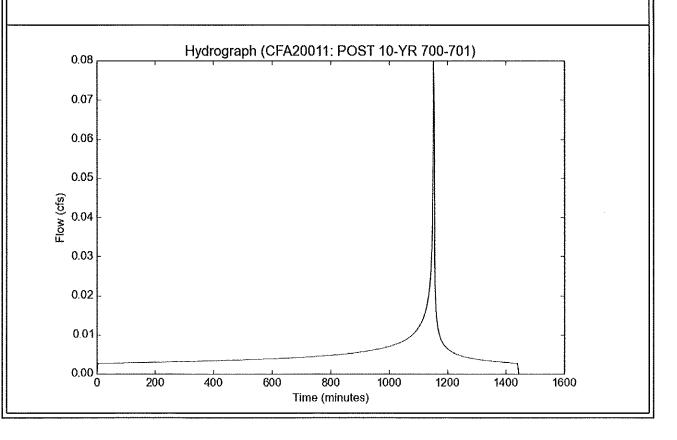
File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 10-YR 700-701.pdf Version: HydroCalc 1.0.2

Input Parameters

Project Name Addition and Addition and Additional Addit	destablished CFA20011 et destablished by the land of the control o
Subarea ID	POST 10-YR 700-701
Area (ac) the hard threather and a rank	Andreas and Hall 0.028 - Andreas Andreas Hall and Andreas

Area (ac) his interestante de antico de la companya del companya de la companya de la companya del companya de la companya del companya de la companya de la companya de la companya de la companya del companya de la companya della companya de la companya de la companya della companya della companya della companya della companya della companya della c	
Flow Path Length (ft)	99.0
Flow Path Slope (vft/hft)	NO.0147
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	Xi 10-yr i Kankhitaina magalimininka
Fire Factor	0
- FID streams are stated and another research of their	False with the transfer of the state of the

Modeled (10-yr) Rainfall Depth (in)	
Peak Intensity (in/hr)	3.1949
Undeveloped Runoff Coefficient (Cu)	
Developed Runoff Coefficient (Cd)	0.8937
Time of Concentration (min)	
Clear Peak Flow Rate (cfs)	0.0799
Burned Peak Flow Rate (cfs)	
24-Hr Clear Runoff Volume (ac-ft)	0.0103
24-Hr Clear Runoff Volume (cu-ft)	######################################



Peak Flow Hydrologic Analysis

File location: P://CFA20011/Reports/Hydrology/HydroCatc/POST/CFA20011 - POST 25-YR 700-701.pdf Version: HydroCatc 1.0.2

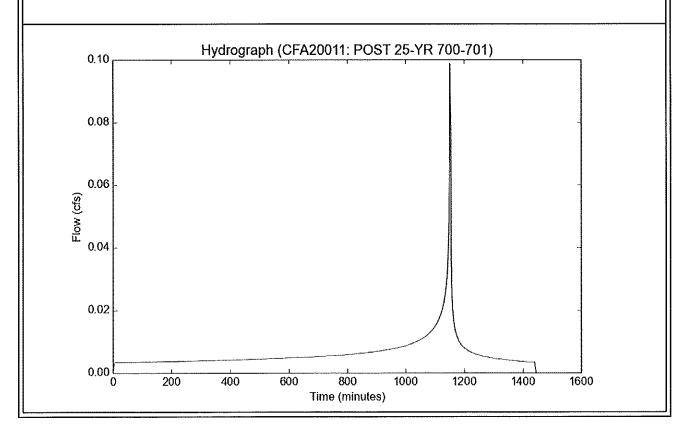
Input Parameters

Project Name	nivi ve indiciologiches CFA20011 in each tempholisidaean
Subarea ID	POST 25-YR 700-701
	and the first of the control of the

Area (ac) salas attalians a salas anticidades anticidades anticidades	0.028
Flow Path Length (ft)	99.0
Flow Path Slope (vft/hft)	0.0147
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.901
Soil Type ·	6
Design Storm Frequency	25-yr
Fire Factor	0 '
	False

Output Results

Modeled (25-yr) Rainfall Depth (in) Peak Intensity (in/hr)	6.585 3.9288
Undeveloped Runoff Coefficient (Cu)	
Developed Runoff Coefficient (Cd)	0.8974
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.0987
Burned Peak Flow Rate (cfs)	0.0987
24-Hr Clear Runoff Volume (ac-ft)	0.0127
	553.3467



Peak Flow Hydrologic Analysis

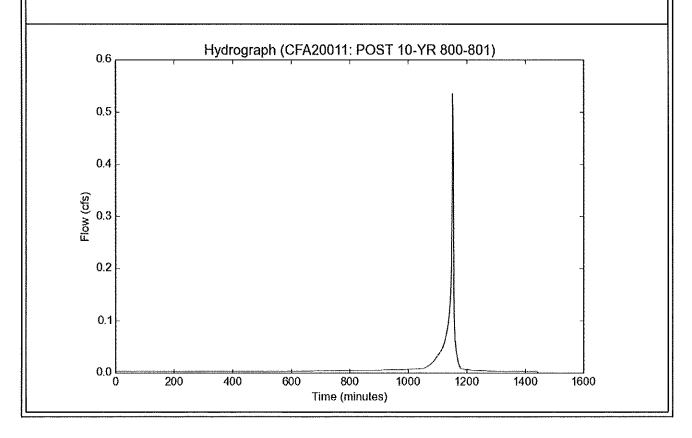
File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 10-YR 800-801.pdf Version: HydroCalc 1.0.2

Input Parameters

mpar i arametero	
Project Name Amadementation Colored	with the CFA20011 states the intermitted.
Subarea ID	POST 10-YR 800-801
Area (ac) infrantisca antiqua una contract the	
Flow Path Length (ft)	125.0
Flow Path Slope (vft/hft)	
50-yr Rainfall Depth (in)	7.5
Percent Impervious	
Soil Type	6
Design Storm Frequency	
Fire Factor	0
	with the first the state of the

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.355
Peak Intensity (in/hr)	3.1949
Undeveloped Runoff Coefficient (Cu)	0.836
Developed Runoff Coefficient (Cd)	0.8366
Time of Concentration (min)	5.0 Bir
Clear Peak Flow Rate (cfs)	0.5346
Burned Peak Flow Rate (cfs)	0.5346
24-Hr Clear Runoff Volume (ac-ft)	0.0185
24-Hr Clear Runoff Volume (cu-ft)	806.5016



Peak Flow Hydrologic Analysis

File location: P:/CFA20011/Reports/Hydrology/HydroCalc/POST/CFA20011 - POST 25-YR 800-801.pdf Version: HydroCalc 1.0.2

Input Parameters

Project Name State Description of the Community of the CFA20011 state of the CFA20011 st

Subarea ID POST 25-YR 800-801 Area (ac)

Flow Path Length (ft)

Flow Path Slope (vft/hft)

50-yr Rainfall Depth (in)

Percent Impervious

50il Type

125.0

7.5

0.018

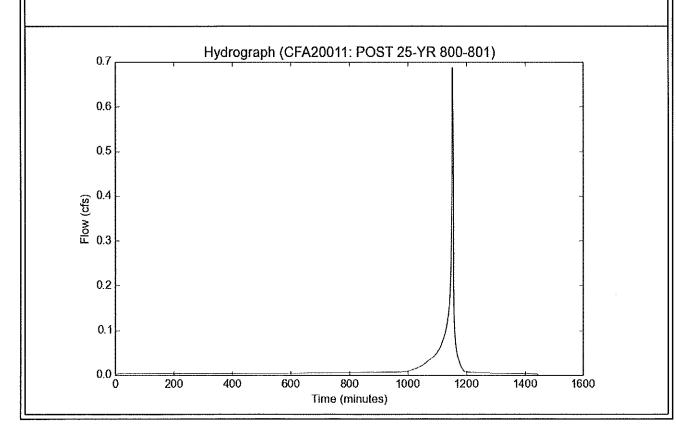
0.01

Design Storm Frequency Storm Frequency Of Storm Fre

LID

Output Results

Modeled (25-yr) Rainfall Depth (in) 6.585 Peak Intensity (in/hr)
Undeveloped Runoff Coefficient (Cu) 3.9288 0.8738 Developed Runoff Coefficient (Cd) 0.874 Time of Concentration (min) 5.0 Clear Peak Flow Rate (cfs) 0.6868 Burned Peak Flow Rate (cfs) 0.6868 24-Hr Clear Runoff Volume (ac-ft) 0.0257 1121.034 24-Hr Clear Runoff Volume (cu-ft)



County of Los Angeles, California

3.0 HYDRAULICS ANALYSIS

3.1 DEPTH OF PONDING OVER PROPOSED GRATE GRATED INLET# 1 – NODE 101

 $Q_{25} = C A \sqrt{2Gh}$

A = Area of proposed 24" by 24" opening \rightarrow 50% opening = 4 /2 = 2 sq-ft.

Assumed 50% clogging factor \rightarrow 2 / 2 = 1.0 sf.

A = 1.0 sf

G = 32.2

C = 0.67

h = depth of water over the grated inlet

 $Q_{25} = 1.87 \text{ cfs}$

 $1.87 = 0.67 \times 1.0 \sqrt{2X 32.2 \times h}$

h = 0.12 ft. = 1.45" ← Depth of ponding over grated inlet # 1.

3.2 DEPTH OF PONDING OVER PROPOSED GRATE GRATED INLET# 2 – NODE 201

 $Q_{25} = C A \sqrt{2Gh}$

A = Area of proposed 24" by 24" opening \rightarrow 50% opening = 4 /2 = 2 sq-ft.

Assumed 50% clogging factor \rightarrow 2 / 2 = 1.0 sf.

A = 1.0 sf

G = 32.2

C = 0.67

h = depth of water over the grated inlet

 $Q_{25} = 0.95 \text{ cfs}$

 $0.95 = 0.67 \times 1.0 \sqrt{2 \times 32.2 \times h}$

h = 0.03 ft. = 0.37" \leftarrow Depth of ponding over grated inlet # 2.

3.3 DEPTH OF PONDING OVER PROPOSED GRATE GRATED INLET# 3 – NODE 301

$$Q_{25} = C A \sqrt{2Gh}$$

A = Area of proposed 24" by 24" opening \rightarrow 50% opening = 4 /2 = 2 sq-ft.

Assumed 50% clogging factor \Rightarrow 2 / 2 = 1.0 sf.

A = 1.0 sf

G = 32.2

C = 0.67

h = depth of water over the grated inlet

 $Q_{25} = 0.81 \text{ cfs}$

 $0.81 = 0.67 \times 1.0 \sqrt{2X \cdot 32.2 \times h}$

h = 0.023 ft. = 0.27" ← Depth of ponding over grated inlet # 3.

3.4 DEPTH OF PONDING OVER PROPOSED GRATE GRATED INLET# 4 – NODE 401

 $Q_{25} = C A \sqrt{2Gh}$

A = Area of proposed 24" by 24" opening \rightarrow 50% opening = 4 /2 = 2 sq-ft.

Assumed 50% clogging factor \rightarrow 2 / 2 = 1.0 sf.

A = 1.0 sf

G = 32.2

C = 0.67

h = depth of water over the grated inlet

 $Q_{25} = 0.42 \text{ cfs}$

 $0.42 = 0.67 \times 1.0 \sqrt{2 \times 32.2 \times h}$

h = 0.006 ft. = 0.07" \leftarrow Depth of ponding over grated inlet # 4.

3.5 DEPTH OF PONDING OVER PROPOSED GRATE GRATED INLET# 5 – NODE 501

 $Q_{25} = C A \sqrt{2Gh}$

A = Area of proposed 24" by 24" opening \rightarrow 50% opening = 4 /2 = 2 sq-ft.

Assumed 50% clogging factor \rightarrow 2 / 2 = 1.0 sf.

A = 1.0 sf

G = 32.2

C = 0.67

h = depth of water over the grated inlet

 $Q_{25} = 1.71 \text{ cfs}$

 $1.71 = 0.67 \times 1.0 \sqrt{2 \times 32.2 \times h}$

h = 0.10 ft. = 1.21" ← Depth of ponding over grated inlet # 5.

3.6 DEPTH OF PONDING OVER PROPOSED GRATE GRATED INLET# 6 – NODE 501

 $Q_{25} = C A \sqrt{2Gh}$

A = Area of proposed 24" by 24" opening \rightarrow 50% opening = 4 /2 = 2 sq-ft.

Assumed 50% clogging factor \rightarrow 2 / 2 = 1.0 sf.

A = 1.0 sf

G = 32.2

C = 0.67

h = depth of water over the grated inlet

 $Q_{25} = 0.72 \text{ cfs}$

 $0.72 = 0.67 \times 1.0 \sqrt{2X \cdot 32.2 \times h}$

h = 0.02 ft. = 0.21" \leftarrow Depth of ponding over grated inlet # 6.

3.7 DEPTH OF PONDING OVER PROPOSED GRATE GRATED INLET# 7 – NODE 701

 $Q_{25} = C A \sqrt{2Gh}$

A = Area of proposed 24" by 24" opening \rightarrow 50% opening = 4 /2 = 2 sq-ft.

Assumed 50% clogging factor \rightarrow 2 / 2 = 1.0 sf.

A = 1.0 sf

G = 32.2

C = 0.67

h = depth of water over the grated inlet

 $Q_{25} = 0.10 \text{ cfs}$

 $0.10 = 0.67 \times 1.0 \sqrt{2 \times 32.2 \times h}$

h = 0.0003 ft. = 0.004" \leftarrow Depth of ponding over grated inlet # 7.

3.8 PIPE SIZE ANALYSIS FOR PIPE 1

```
>>>PIPEFLOW HYDRAULIC INPUT INFORMATION <<<<
 PIPE DIAMETER(FEET) = 0.670
 PIPE SLOPE(FEET/FEET) = 0.0230
 PIPEFLOW(CFS) =
                0.95
 MANNINGS FRICTION FACTOR = 0.011000
______
 CRITICAL-DEPTH FLOW INFORMATION:
 CRITICAL DEPTH(FEET) = 0.46
 CRITICAL FLOW AREA(SQUARE FEET) = 0.260
 CRITICAL FLOW TOP-WIDTH(FEET) = 0.620
 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =
                                           8.89
 CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.673
 CRITICAL FLOW VELOCITY HEAD(FEET) =
                                  0.21
 CRITICAL FLOW HYDRAULIC DEPTH(FEET) =
                                 0.42
 CRITICAL FLOW SPECIFIC ENERGY(FEET) =
NORMAL-DEPTH FLOW INFORMATION:
 NORMAL DEPTH(FEET) = 0.31
 FLOW AREA(SQUARE FEET) = 0.16
 FLOW TOP-WIDTH(FEET) = 0.668
 FLOW PRESSURE + MOMENTUM(POUNDS) =
                                    12.38
 FLOW VELOCITY(FEET/SEC.) =
                          6.006
 FLOW VELOCITY HEAD(FEET) =
                           0.560
 HYDRAULIC DEPTH(FEET) = 0.24
 FROUDE NUMBER = 2.171
 SPECIFIC ENERGY(FEET) =
                        0.87
```

County of Los Angeles, California

3.9 PIPE SIZE ANALYSIS FOR PIPE 2

************************ >>>PIPEFLOW HYDRAULIC INPUT INFORMATION<><< PIPE DIAMETER(FEET) = 0.670PIPE SLOPE(FEET/FEET) = 0.0090 PIPEFLOW(CFS) = 0.83 MANNINGS FRICTION FACTOR = 0.011000 CRITICAL-DEPTH FLOW INFORMATION: CRITICAL DEPTH(FEET) = CRITICAL FLOW AREA(SQUARE FEET) = 0.239 CRITICAL FLOW TOP-WIDTH(FEET) = 0.642 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 8.37 CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.465 CRITICAL FLOW VELOCITY HEAD(FEET) = 0.19 CRITICAL FLOW HYDRAULIC DEPTH(FEET) = CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.62 ______ NORMAL-DEPTH FLOW INFORMATION: NORMAL DEPTH(FEET) = 0.38FLOW AREA(SQUARE FEET) = 0.20 FLOW TOP-WIDTH(FEET) = 0.665 FLOW PRESSURE + MOMENTUM(POUNDS) = 8.59 FLOW VELOCITY(FEET/SEC.) = 4.077 FLOW VELOCITY HEAD(FEET) = 0.258 HYDRAULIC DEPTH(FEET) = 0.31 FROUDE NUMBER = 1.299 SPECIFIC ENERGY(FEET) = 0.63

County of Los Angeles, California

3.10 PIPE SIZE ANALYSIS FOR PIPE 3

```
***************************
>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<
 PIPE DIAMETER(FEET) = 0.670
 PIPE SLOPE(FEET/FEET) = 0.0120
 PIPEFLOW(CFS) = 0.69
 MANNINGS FRICTION FACTOR = 0.011000
CRITICAL-DEPTH FLOW INFORMATION:
 CRITICAL DEPTH(FEET) = 0.39
 CRITICAL FLOW AREA(SQUARE FEET) = 0.214
 CRITICAL FLOW TOP-WIDTH(FEET) = 0.661
 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =
                                            6.56
 CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.228
 CRITICAL FLOW VELOCITY HEAD(FEET) =
                                   0.16
 CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.32
 CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.55
______
 NORMAL-DEPTH FLOW INFORMATION:
 NORMAL DEPTH(FEET) = 0.31
 FLOW AREA(SQUARE FEET) = 0.16
 FLOW TOP-WIDTH(FEET) = 0.668
 FLOW PRESSURE + MOMENTUM(POUNDS) =
                                     7.10
 FLOW VELOCITY(FEET/SEC.) =
                           4.341
 FLOW VELOCITY HEAD(FEET) =
                           0.293
 HYDRAULIC DEPTH(FEET) =
                       0.24
 FROUDE NUMBER = 1.568
 SPECIFIC ENERGY(FEET) =
                         0.60
```

3.11 PIPE SIZE ANALYSIS FOR PIPE 4

```
********************************
>>>PIPEFLOW HYDRAULIC INPUT INFORMATION <<<<
PIPE DIAMETER(FEET) = 0.830
 PIPE SLOPE(FEET/FEET) = 0.0090
 PIPEFLOW(CFS) = 1.52
 MANNINGS FRICTION FACTOR = 0.011000
CRITICAL-DEPTH FLOW INFORMATION:
 CRITICAL DEPTH(FEET) = 0.55
 CRITICAL FLOW AREA(SQUARE FEET) = 0.383
 CRITICAL FLOW TOP-WIDTH(FEET) = 0.783
 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =
                                       17.49
 CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.969
 CRITICAL FLOW VELOCITY HEAD(FEET) =
 CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.49
 CRITICAL FLOW SPECIFIC ENERGY(FEET) =
                               0.80
______
 NORMAL-DEPTH FLOW INFORMATION:
 NORMAL DEPTH(FEET) = 0.48
 FLOW AREA(SQUARE FEET) = 0.32
 FLOW TOP-WIDTH(FEET) = 0.821
 FLOW PRESSURE + MOMENTUM(POUNDS) =
                                18.04
 FLOW VELOCITY(FEET/SEC.) =
                        4.740
 FLOW VELOCITY HEAD(FEET) =
                         0.349
 HYDRAULIC DEPTH(FEET) = 0.39
 FROUDE NUMBER = 1.337
 SPECIFIC ENERGY(FEET) =
                      0.82
```

3.12 PIPE SIZE ANALYSIS FOR PIPE 5

************************* >>>PIPEFLOW HYDRAULIC INPUT INFORMATION<><< PIPE DIAMETER(FEET) = 1.500PIPE SLOPE(FEET/FEET) = 0.0100 PIPEFLOW(CFS) = 3.39 MANNINGS FRICTION FACTOR = 0.011000 CRITICAL-DEPTH FLOW INFORMATION: CRITICAL DEPTH(FEET) = 0.70CRITICAL FLOW AREA(SQUARE FEET) = 0.811 CRITICAL FLOW TOP-WIDTH(FEET) = 1.497 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 42.45 CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.178 CRITICAL FLOW VELOCITY HEAD(FEET) = 0.27 CRITICAL FLOW HYDRAULIC DEPTH(FEET) = CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.97 NORMAL-DEPTH FLOW INFORMATION: NORMAL DEPTH(FEET) = 0.54FLOW AREA(SQUARE FEET) = 0.57 FLOW TOP-WIDTH(FEET) = 1.437 FLOW PRESSURE + MOMENTUM(POUNDS) = 47.20 FLOW VELOCITY(FEET/SEC.) = 5.984 FLOW VELOCITY HEAD(FEET) = 0.556 HYDRAULIC DEPTH(FEET) = 0.39 FROUDE NUMBER = 1.680

1.09

SPECIFIC ENERGY(FEET) =

County of Los Angeles, California

3.13 PIPE SIZE ANALYSIS FOR PIPE 6

```
*************************
>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<
 PIPE DIAMETER(FEET) = 1.500
 PIPE SLOPE(FEET/FEET) = 0.0100
 PIPEFLOW(CFS) =
                4.34
 MANNINGS FRICTION FACTOR = 0.011000
______
 CRITICAL-DEPTH FLOW INFORMATION:
 CRITICAL DEPTH(FEET) = 0.80
 CRITICAL FLOW AREA(SQUARE FEET) = 0.957
 CRITICAL FLOW TOP-WIDTH(FEET) = 1.497
 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =
                                            58.45
 CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.537
 CRITICAL FLOW VELOCITY HEAD(FEET) =
                                   0.32
 CRITICAL FLOW HYDRAULIC DEPTH(FEET) =
                                   0.64
 CRITICAL FLOW SPECIFIC ENERGY(FEET) =
                                    1.12
NORMAL-DEPTH FLOW INFORMATION:
 NORMAL DEPTH(FEET) = 0.61
 FLOW AREA(SQUARE FEET) =
                        0.68
 FLOW TOP-WIDTH(FEET) = 1.474
 FLOW PRESSURE + MOMENTUM(POUNDS) =
                                     64.66
 FLOW VELOCITY(FEET/SEC.) =
                           6.401
 FLOW VELOCITY HEAD(FEET) =
                            0.636
 HYDRAULIC DEPTH(FEET) = 0.46
 FROUDE NUMBER = 1.663
 SPECIFIC ENERGY(FEET) =
                         1.25
```

County of Los Angeles, California

3.14 PIPE SIZE ANALYSIS FOR PIPE 7

***************************** >>>PIPEFLOW HYDRAULIC INPUT INFORMATION< PIPE DIAMETER(FEET) = 0.670PIPE SLOPE(FEET/FEET) = 0.0150 PIPEFLOW(CFS) = 0.72 MANNINGS FRICTION FACTOR = 0.011000 ______ CRITICAL-DEPTH FLOW INFORMATION: CRITICAL DEPTH(FEET) = 0.40CRITICAL FLOW AREA(SQUARE FEET) = 0.220 CRITICAL FLOW TOP-WIDTH(FEET) = 0.657 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 6.94 CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.280 CRITICAL FLOW VELOCITY HEAD(FEET) = 0.17 CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.33 CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.57 ___________ NORMAL-DEPTH FLOW INFORMATION: NORMAL DEPTH(FEET) = 0.30FLOW AREA(SQUARE FEET) = 0.15 FLOW TOP-WIDTH(FEET) = 0.666FLOW PRESSURE + MOMENTUM(POUNDS) = 7.83 FLOW VELOCITY(FEET/SEC.) = 4.767 FLOW VELOCITY HEAD(FEET) = 0.353 HYDRAULIC DEPTH(FEET) = 0.23 FROUDE NUMBER = 1.764

0.65

SPECIFIC ENERGY(FEET) =

County of Los Angeles, California

3.15 PIPE SIZE ANALYSIS FOR PIPE 8

```
>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<
 PIPE DIAMETER(FEET) = 0.500
 PIPE SLOPE(FEET/FEET) = 0.0050
 PIPEFLOW(CFS) =
                 0.10
 MANNINGS FRICTION FACTOR = 0.011000
______
 CRITICAL-DEPTH FLOW INFORMATION:
 CRITICAL DEPTH(FEET) = 0.16
 CRITICAL FLOW AREA(SQUARE FEET) = 0.052
 CRITICAL FLOW TOP-WIDTH(FEET) = 0.463
 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =
                                             0.58
 CRITICAL FLOW VELOCITY(FEET/SEC.) = 1.908
 CRITICAL FLOW VELOCITY HEAD(FEET) =
                                   0.06
 CRITICAL FLOW HYDRAULIC DEPTH(FEET) =
                                   0.11
 CRITICAL FLOW SPECIFIC ENERGY(FEET) =
                                     0.21
NORMAL-DEPTH FLOW INFORMATION:
 NORMAL DEPTH(FEET) = 0.16
 FLOW AREA(SQUARE FEET) =
                         0.05
 FLOW TOP-WIDTH(FEET) = 0.464
 FLOW PRESSURE + MOMENTUM(POUNDS) =
                                      0.58
 FLOW VELOCITY(FEET/SEC.) =
 FLOW VELOCITY HEAD(FEET) =
                            0.056
 HYDRAULIC DEPTH(FEET) = 0.11
 FROUDE NUMBER = 0.993
 SPECIFIC ENERGY(FEET) =
                         0.21
```

County of Los Angeles, California

3.16 PIPE SIZE ANALYSIS FOR PIPE 9

>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<

PIPE DIAMETER(FEET) = 0.670

PIPE SLOPE(FEET/FEET) = 0.0150

PIPEFLOW(CFS) = 0.82

MANNINGS FRICTION FACTOR = 0.011000

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.43

CRITICAL FLOW AREA(SQUARE FEET) = 0.238

CRITICAL FLOW TOP-WIDTH(FEET) = 0.644

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 8.25

CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.449

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.18

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.37

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.61

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.32

FLOW AREA(SQUARE FEET) = 0.17

FLOW TOP-WIDTH(FEET) = 0.669

FLOW PRESSURE + MOMENTUM(POUNDS) = 9.24

FLOW VELOCITY(FEET/SEC.) = 4.930

FLOW VELOCITY HEAD(FEET) = 0.377

HYDRAULIC DEPTH(FEET) = 0.25

FROUDE NUMBER = 1.743

SPECIFIC ENERGY(FEET) = 0.70

County of Los Angeles, California

3.17 PIPE SIZE ANALYSIS FOR PIPE 10

******************************* >>>PIPEFLOW HYDRAULIC INPUT INFORMATION <<< PIPE DIAMETER(FEET) = 0.833PIPE SLOPE(FEET/FEET) = 0.0120PIPEFLOW(CFS) = 1.72 MANNINGS FRICTION FACTOR = 0.011000 CRITICAL-DEPTH FLOW INFORMATION: CRITICAL DEPTH(FEET) = 0.59 CRITICAL FLOW AREA(SQUARE FEET) = 0.412 CRITICAL FLOW TOP-WIDTH(FEET) = 0.759 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 20.61 CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.179 CRITICAL FLOW VELOCITY HEAD(FEET) = 0.27 CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.54 CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.86 ______ NORMAL-DEPTH FLOW INFORMATION: NORMAL DEPTH(FEET) = 0.47FLOW AREA(SQUARE FEET) = 0.32 FLOW TOP-WIDTH(FEET) = 0.826FLOW PRESSURE + MOMENTUM(POUNDS) = 22.10 FLOW VELOCITY(FEET/SEC.) = 5.449 FLOW VELOCITY HEAD(FEET) = 0.461 HYDRAULIC DEPTH(FEET) = 0.38 FROUDE NUMBER = 1.554 SPECIFIC ENERGY(FEET) = 0.93

County of Los Angeles, California

3.18 PIPE SIZE ANALYSIS FOR PIPE 11

************************* >>>PIPEFLOW HYDRAULIC INPUT INFORMATION< PIPE DIAMETER(FEET) = 1.000PIPE SLOPE(FEET/FEET) = 0.0150 PIPEFLOW(CFS) = 2.54 MANNINGS FRICTION FACTOR = 0.011000 ______ CRITICAL-DEPTH FLOW INFORMATION: CRITICAL DEPTH(FEET) = 0.68 CRITICAL FLOW AREA(SQUARE FEET) = 0.571 CRITICAL FLOW TOP-WIDTH(FEET) = 0.931 CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 32.59 CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.446 CRITICAL FLOW VELOCITY HEAD(FEET) = 0.31 CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.61 CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.99 __________ NORMAL-DEPTH FLOW INFORMATION: NORMAL DEPTH(FEET) = 0.50FLOW AREA(SQUARE FEET) = 0.39 FLOW TOP-WIDTH(FEET) = 1.000FLOW PRESSURE + MOMENTUM(POUNDS) = 37.29 FLOW VELOCITY(FEET/SEC.) = 6.541 FLOW VELOCITY HEAD(FEET) = 0.664 HYDRAULIC DEPTH(FEET) = 0.39 FROUDE NUMBER = 1.850

1.16

SPECIFIC ENERGY(FEET) =

County of Los Angeles, California

3.19 PIPE SIZE SUMMARY

	Hydraulic Analysis						
Pipe Node	Diameter (ft)	Slope (%)	Pipe Flow (cfs)	Flow Velocity (ft/s)	Flow Hydraulic Depth (ft)		
1	0.67	2.30	0.95	6.01	0.24		
2	0.67	0.90	0.83	4.08	0.31		
3	0.67	1.20	0.69	4.34	0.24		
4	0.83	0.90	1.52	4.74	0.39		
5	1.50	1.00	3.39	5.98	0.39		
6	1.50	1.00	4.34	6.40	0.46		
7	0.67	1.50	0.72	4.77	0.23		
8	0.50	0.50	0.10	1.90	0.11		
9	0.67	1.50	0.82	4.93	0.25		
10	0.83	1.20	1.72	5.45	0.38		
11	1.0	1.50	2.54	6.54	0.39		

County of Los Angeles, California

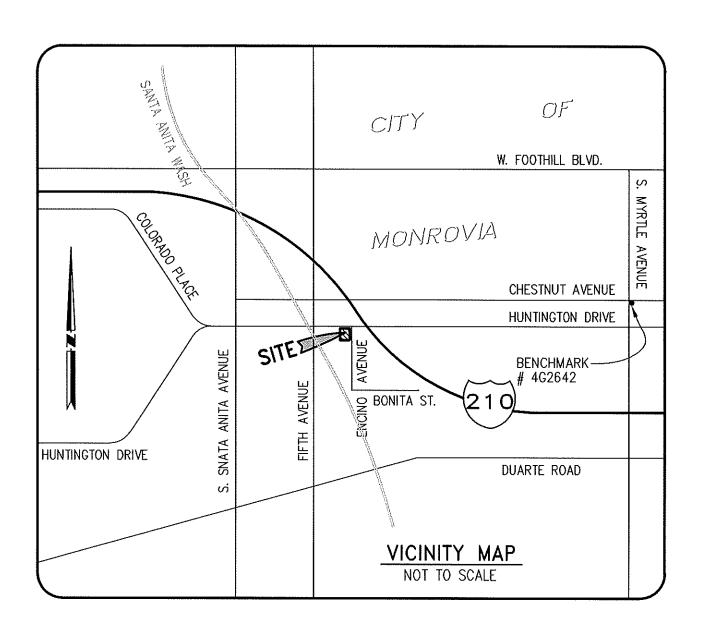
4.0 APPENDIX "A"

County of Los Angeles, California

4.1 REFERENCE MAPS

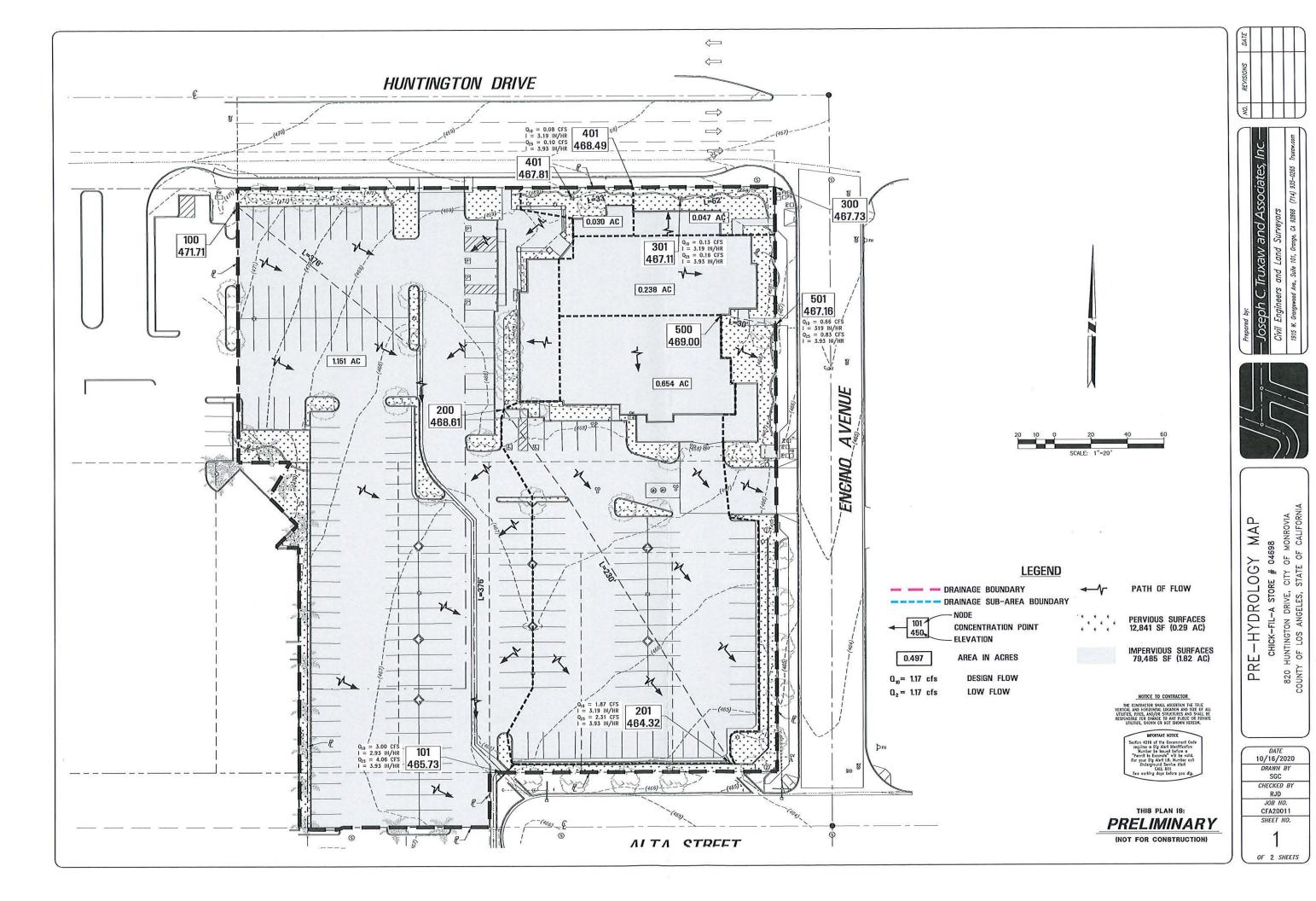
County of Los Angeles, California

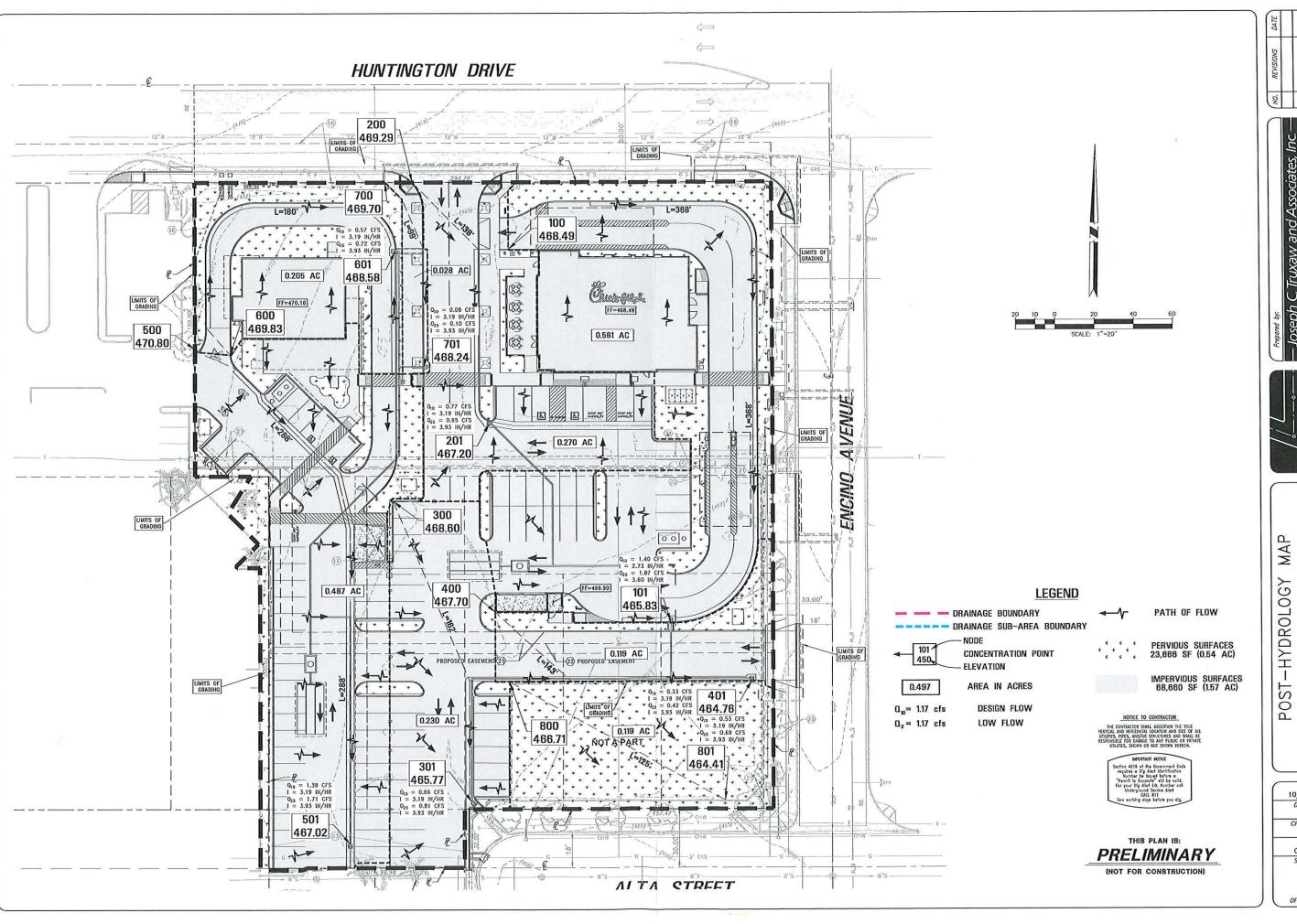
VICINITY MAP



County of Los Angeles, California

5.0 HYDROLOGY MAPS







HUNTINGTON DRIVE, CITY OF MONROVIA OF LOS ANGELES, STATE OF CALIFORN CHICK-FIL-A STORE # 04698

10/16/2020 DRAWN BY

CHECKED BY JOB NO.

CFA20011 SHEET NO.

OF 2 SHEETS