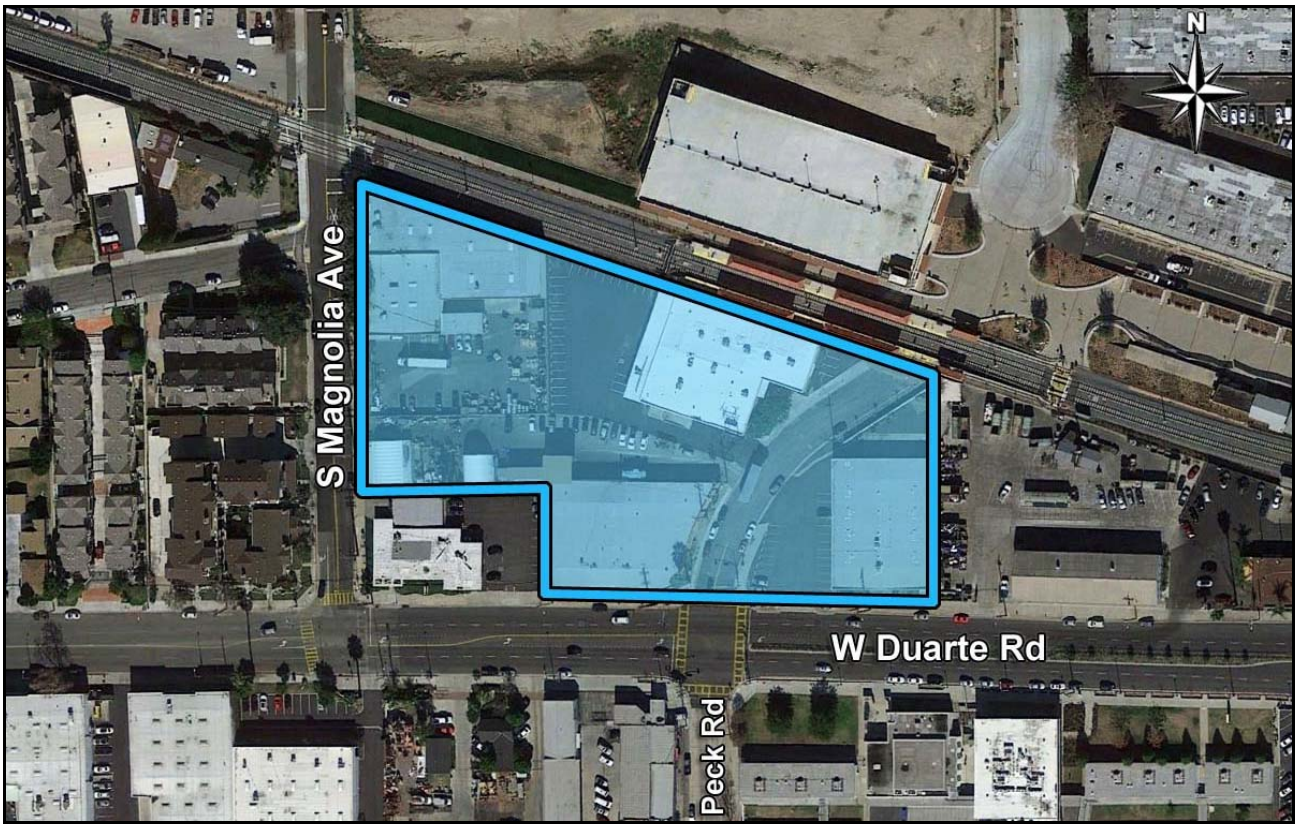
APPENDIX F

Hydrology Report

Hydrology Report

Station Square South

Monrovia, California



January 15, 2018

Prepared for

THE RICHMAN GROUP OF COMPANIES

Prepared by

KHR ASSOCIATES
Consulting Engineers - Surveyors - Planners

ATTESTATION

This report has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.

James H. Kawamura, P.E.
Registered Civil Engineer No. C30560
Exp. 3/31/18

TABLE OF CONTENTS

APPENDIX

Section 1 Purpose and Scope

This drainage study presents an analysis of the hydrology associated with the proposed multi-family residential development located on the northeasterly quadrant of Duarte Road and Magnolia Avenue, in the City of Monrovia, County of Los Angeles. The study details the general project characteristics, the design, criteria and methodology applied to the analysis of the area in terms of drainage and associated conveyance facilities.

The plans and specifications in the drainage study are not for construction purposes; the contractor shall refer to final approved construction documents for plans and specifications.

Section 2 Project Information

2.1 Project Description

The proposed *Station Square South* multi-family residential project entails the demolition of several existing buildings and surface parking lots on six parcels of land totaling approximately 3.4 acres (3.8 acres with Peck Road), and the construction of a 5-story apartment building consisting of 296 dwelling units, partially wrapping around a 6-story parking structure containing 522 parking spaces. The portion of Peck Road between Duarte Road to the south and the Metro Gold Line light rail to the north will be vacated as part of the proposed project.

2.1.1 Project Location

The project site is located at 205 and 225 West Duarte Road, 1725 Peck Road, and 1726 South Magnolia Avenue, in the City of Monrovia, California. The project site is bounded by the Metro Gold Line light rail and Monrovia Station to the north, commercial/industrial uses to the east, Duarte Road to the south, and Magnolia Avenue to the west. An existing animal hospital borders the southwest corner of the project site. Peck Road divides the project site, extending from Duarte Road north to the Metro Gold Line light rail, where it terminates. Figure 1 below illustrates the project vicinity and Figure 2 provides an aerial perspective of the project site and immediate surroundings.

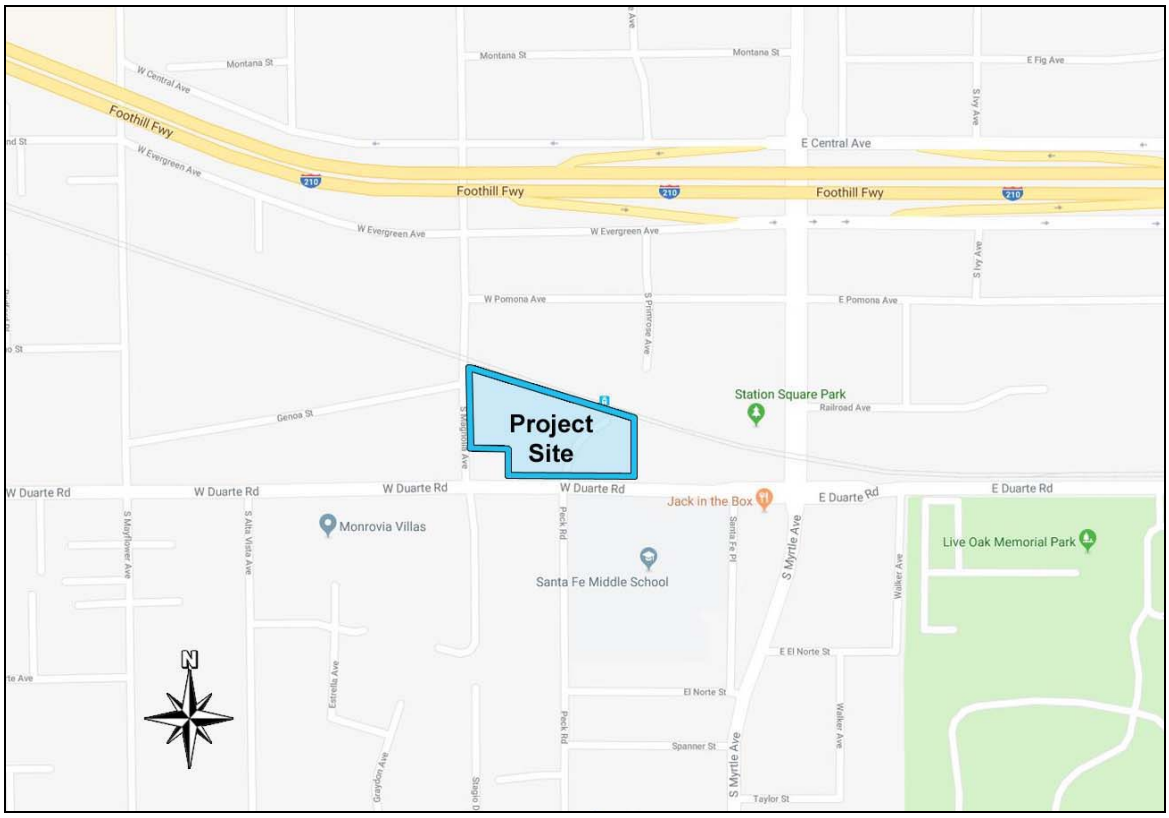


Figure 1 – Project Vicinity Map

Figure 2 – Aerial Perspective of Project Site

2.2 Hydrologic Setting

This section summarizes the project's size and location in the context of the larger watershed perspective, topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features, and other relevant hydrologic and environmental factors to be protected specific to the project area's watershed.

2.2.1 Watershed

The proposed project is located within the 834 square mile Los Angeles River watershed. The receiving waters directly affected by the proposed development include Peck Road Channel, Sawpit Wash, Peck Road Park Lake, Rio Hondo Channel (Reach 1 and Reach 2), Los Angeles River (Reach 1 and Reach 2), Los Angeles River Estuary (Queensway Bay), and San Pedro Bay.

2.2.2 Existing Topography, Drainage Patterns, and Facilities (Narrative)

Site topography is relatively flat with the northerly portion of the site being the highest elevation and the southerly portion of the site being the lowest elevation. The westerly portion of the site drains to Magnolia Avenue. The central and easterly portions of the site drain to Peck Road and Duarte Road. Peck Road and Magnolia Avenue each slope from north to south, draining to Duarte Road, which slopes from east to west. Sheet flows from the site and curb drains discharge to curb face and are collected by catch basis located on Magnolia Avenue and Duarte Road.

There is a 90-inch reinforced concrete pipe (RCP) Los Angeles County Flood Control District (LACFCD) storm drain within Peck Road north of Duarte Road that increases in size to a 96-inch RCP at Duarte Road, and continues westerly within Duarte Road to Magnolia Avenue, where it then turns southwesterly, traversing private property, to discharge into Peck Road Channel. Two catch basins located on the north side of Duarte Road and two on the south side of Duarte Road, east of Peck Road, connect to this LACFCD storm drain, as does a catch basin on the west side of Magnolia Avenue, north of Duarte Road.

Two catch basins on the north side of Duarte Road, east of Magnolia Avenue, and two catch basins on the east side of Magnolia Avenue, north of Duarte Road, connect to an 18-inch City-owned storm drain within Duarte Road, commencing at Magnolia Avenue and continuing westerly.

2.2.3 Adjacent Land Use

The project site is bounded by the Metro Gold Line light rail and Monrovia Station to the north, commercial/industrial uses to the east and south, and residential uses to the west.

2.2.4 Soil Conditions

According to the Geotechnical Investigation report prepared by SCST, Inc. (dated February 24, 2017), alluvium at the site consists of loose to medium dense, poorly graded sand with varying

amounts of silt, gravel and cobbles to silty sand with gravel, underlain by older alluvium consisting of dense silty sand and poorly graded sand.

2.2.5 Downstream Conditions

This section summarizes the existing downstream conditions and any conditions of concern with respect to erosion and/or sedimentation due to the proposed project.

Stormwater from the project site will drain to Peck Road Channel, which consists of reinforced concrete box (RCB) storm drain segments of varying size, as well as a portion that is a reinforced cement concrete (RCC) open channel. Peck Road Channel drains into Sawpit Wash, an RCC open channel. Sawpit Wash drains into Peck Road Park Lake, a flood control basin. Peck Road Park Lake flows into the Rio Hondo Channel, an RCC open channel until it passes through the Whittier Narrows Dam, after which it resumes as an RCC open channel. The Rio Hondo Channel flows into the Los Angeles River, which is RCC lined. At Willow Street, the Los Angeles River transitions to a soft bottom channel that flows into Queensway Bay, San Pedro Bay, and ultimately the Pacific Ocean.

The proposed project will have no negative impacts downstream since the improvements will decrease the volume of stormwater being discharged into the public storm drain system. The majority of the stormwater will be stored and infiltrated on-site with overflow being discharge into the County storm drain system.

2.2.6 Impervious Cover

As shown below, the proposed site will see a decrease of 10-percent in impervious area and an increase of 10-percent in pervious area compared to the existing site conditions.

Existing vs. Proposed Pervious and Impervious Area		
	Existing	**Proposed**
Total Site Area (including Peck Road)	3.81 acres	3.81 acres
Pervious Area	0.14 acres	0.52 acres
Impervious Area	3.67 acres	3.29 acres
Pervious Percentage	4%	14%
Impervious Percentage	96%	86%
Change in Pervious Area	10% increase	
Change in Impervious Area	10% decrease	

Section 3 Design Criteria and Methodology

This section summarizes the design criteria and methodology applied during the drainage analysis of the project site. The design criteria and methodology follows the County of Los Angeles Drainage Design Manual (January 2006).

3.1 Design Criteria

3.1.1 Drainage Design Criteria

Local storm drain facilities have been designed to conform to standards found in the County of Los Angeles Drainage Design Manual.

3.2 Methodology

3.2.1 HydroCalc Software

The HydroCalc software, developed and provided by Los Angeles County Public Works, calculates various parameters using the modified rational method, which is an iterative process. The table below shows the input data that is entered into the program and the output data that is produced.

Input Data	Output Data
Area (ac)	Modeled (10-yr) Rainfall Depth (in)
Flow Path Length (ft)	Peak Intensity (in/hr)
Flow Path Slope (vft/hft)	Undeveloped Runoff Coefficient (Cu)
24-hr, 50-yr Rainfall Depth (in)	Developed Runoff Coefficient (Cd)
Percent Impervious (0.01-1.0)	Time of Concentration (min)
Soil Type (2-180)	Clear Peak Flow Rate (cfs)
Design Storm Frequency	Burned Peak Flow Rate (cfs)
Fire Factor	24-Hr Clear Runoff Volume (ac-ft)
	24-Hr Clear Runoff Volume (cu-ft)

Once the input data has been entered, HydroCalc then computes the output data using the following steps:

1. Assumes an initial time of concentration (T_c)

2. Uses the assumed T_c to calculate rainfall intensity (I_t) with the following equation:

$$I_t = I_{1440} \times (1440/t)^{0.47}$$

where... t = assumed initial time of concentration (min)
I_t = rainfall intensity for the duration (in/hr)
I_{1440} = 24-hour rainfall intensity (in/hr)

3. Calculates impervious area and stormwater runoff coefficient using the following equation:

$$IMP = [\sum^{n}_{i=1}(IMP_i \times A_i)/A_T]$$

where... IMP = site percent impervious
IMP_i = impervious area (i)

A_i = area, i (ft^2)
A_T = total project site area (ft^2)

$$C_d = (0.9 \times IMP) + (1.0 - IMP) \times C_u$$

where... C_d = developed site stormwater runoff coefficient
IMP = site percent impervious
C_u = undeveloped site stormwater runoff coefficient
(obtained from soil curve data)

4. Calculates the time of concentration (T_c) and compares it to the initial assumption using the following equation:

$$T_c = [0.31 \times L^{0.483}]/[(C_d \times I_t)^{0.519} \times S^{0.135}]$$

where... T_c = time of concentration (min)
L = longest flow path length
C_d = developed site stormwater runoff coefficient
I_t = rainfall intensity for the duration (in/hr)
S = slope of longest flow path (ft/ft)

If the calculated T_c and the assumed T_c are more than 0.5 minutes apart then the process is repeated by rounding the calculated T_c to the nearest minute and using it as the assumed value. The process is complete once the calculated T_c and the assumed T_c are within 0.5 minutes of each other.

5. Peak flow rate is then calculated using the rational equation, as shown below:

$$Q = C \times I \times A$$

where... Q = Peak discharge (cfs);
C = runoff coefficient, based on land use and soil type;
I = Rainfall intensity (in/hr);
A = watershed area (acre)

The runoff coefficient represents the ratio of rainfall that runs off the watershed versus the portion that infiltrates to the soil or is held in depression storage. The runoff coefficient is dependent on the land use coverage and soil type. The County of Los Angeles Drainage Design Manual methodology assumes hydrologic Soil Type 6 for this project site (See Appendix for Isohyet Map).

Peak discharges were computed for the 10-year hypothetical storm return frequency and the output results of the HydroCalc can be found in the appendix section of this report.

Section 4 Hydrology and Drainage Analysis

This section summarizes the quantitative hydrologic analysis of the existing and proposed conditions of the site.

4.1 Summary of Drainage Delineation

To analyze the existing conditions, the site was broken into four subareas: A, B, C, and D (see Appendix for the Existing Hydrology Map). Runoff from subarea A sheet flows towards Magnolia Avenue and then flows south in the street gutter until it is collected by the catch basins on the east side of Magnolia Avenue and north of Duarte Road. Runoff from subarea B sheet flows east towards Peck Road, south in the street gutter on Peck Road, west in the street gutter on Duarte Road, and then it is collected by the existing catch basins north of Duarte Road at the intersection of Duarte Road and Magnolia Avenue. Runoff from subarea C sheet flows west towards Peck Road, south in the street gutter on Peck Road, east in the street gutter on Duarte Road, and then it is collected by the existing catch basin on the north side of Duarte Road just east of the intersection of Duarte and Peck Road. Lastly, runoff from subarea D travels south towards Duarte Road and then flows west in the street gutter where it is collected by the existing catch basin located north of Duarte Road and to the east of the intersection of Peck Road and Duarte Road. The catch basins that collect runoff from subareas A and B are connected to the City of Monrovia storm drain network, while the catch basins that collect subareas C and D are connected to the County of Los Angeles storm drain network.

The proposed site was broken into seven subareas: P-A, P-B, P-C, P-D, P-E, P-F, and P-G (see Appendix for the Proposed Hydrology Map). The site runoff will be routed to 6 systems which include a CDS unit for pre-treatment, a storage tank, and a drywell for infiltration. The overflow will be diverted through the proposed private storm drain system towards Peck Road where there will be four connections (PT#1, PT#2, PT#3, and PT#4) to the existing LACFCD 90" Storm Drain Project No. 216. As depicted on the drainage map for LACFCD Project No. 216, the connections are within subarea 18 which results in an allowable Q_{10} of 0.91 cfs/acre.

4.2 Summary of Results

For the 10-year storm event, the existing site currently contributes 7.00 cfs of runoff to the City storm drain system and 2.34 cfs to the County storm drain system (see Appendix for Existing Hydrology Map). However, the proposed development will only be connecting to the County storm drain system and will be restricted to a total of 3.45 cfs based on the allowable Q_{10} of 0.91 cfs/acre and a total area of 3.8 acres (see Appendix for Proposed Hydrology Map). The proposed condition will produce 10.37 cfs of stormwater runoff which will be picked up by the private storm drain system and will be routed to pre-treatment, storage, and infiltration. All overflows will connect to the County Storm drain system and will meet allowable flow requirements set by the County. The stormwater runoff produced in the existing and proposed condition is displayed in the tables provided on the next page.

Existing Hydrology		
	Area (acres)	Q_{10} (cfs)
A	1.22	3.36
B	1.75	3.64
C	0.52	1.43
D	0.33	0.91
	Total Q_{10}	9.34

Proposed Hydrology		
	Area (acres)	Q_{10} (cfs)
P-A	0.40	1.08
P-B	0.73	1.98
P-C	0.89	2.45
P-D	0.62	1.69
P-E	0.30	0.82
P-F	0.24	0.65
P-G	0.62	1.70
	Total Q_{10}	10.37

Existing vs. Proposed Flow into Public Storm Drain System		
	Existing	Proposed
City Storm Drain	7 cfs	0 cfs
County Storm Drain	2.34 cfs	3.45 cfs
Total Flow into Public Storm Drain System	9.34 cfs	3.45 cfs

Compared to the existing condition, the use of on-site infiltration in the proposed condition will decrease the amount of stormwater discharging into the public storm drain system by approximately 63%. Based on the contributing subareas, the breakdown of the allowable flow ($Q_{allowable}$) for each connection to the existing LACFCD 90" Storm Drain is summarized below.

$Q_{allowable}$ for County Connections & Storage						
	Contributing Subareas	Total Area (acres)	$Q_{allowable}$ Factor (cfs/acre)	$Q_{allowable}$ (cfs)	Required Storage (cf)	Available Storage (cf)
PT#1	P-C	0.89	0.91	0.81	1,262	3,198
PT#2	P-E & P-F	0.54	0.91	0.49	736	1,925
PT#3	P-G	0.62	0.91	0.56	854	2,236
PT#4	P-A, P-B, & P-D	1.75	0.91	1.59	2,279	6,285
	Total	3.8		3.45	5,131	13,644

Using a conservative analysis and not considering infiltration, the volume of water in excess of the Qallowable restriction that will have to be contained on-site during a 10-year storm event is 5,131 cf (See Appendix for Hydrologic Analysis). There will be adequate space in the 6 proposed storage tanks and 6 drywells on-site which have a combined volume of 13,644 cf.

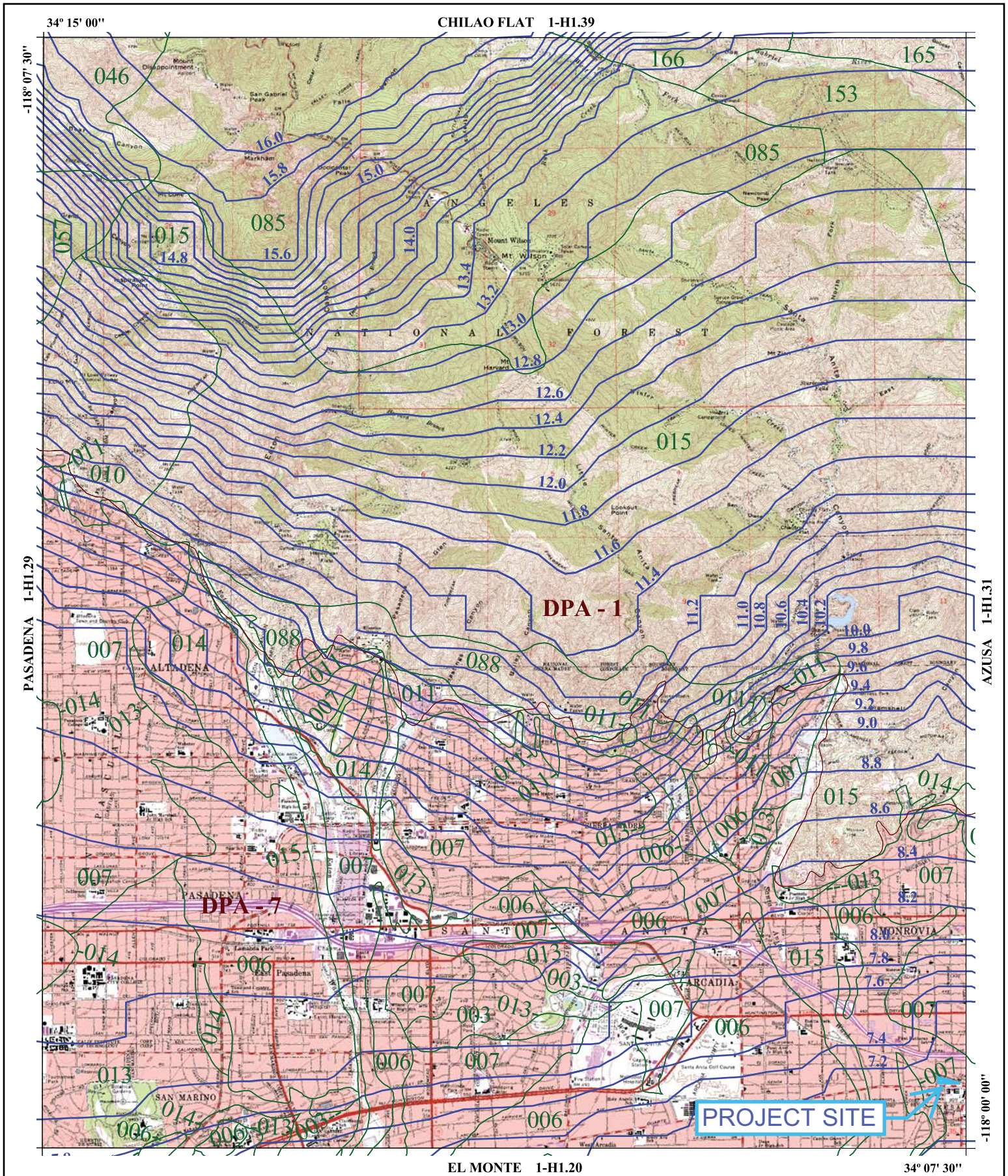
4.3 Conclusion

No negative impacts from the proposed development are anticipated since the contribution to the public storm drain system will be reduced by 63% and the perviousness of the site will increase by 10% compared to that of the existing. All stormwater runoff, excluding overflow, that previously connected to the public storm drain system will be mitigated through on-site infiltration. Overflow will routed to the existing LACFCD 90" Storm Drain located in Peck Road and will be restricted to the allowable flow rate set by the County.

APPENDIX

Appendix 1

50-year 24-Hour Isohyet Map



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

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

MOUNT WILSON
50-YEAR 24-HOUR ISOHYET

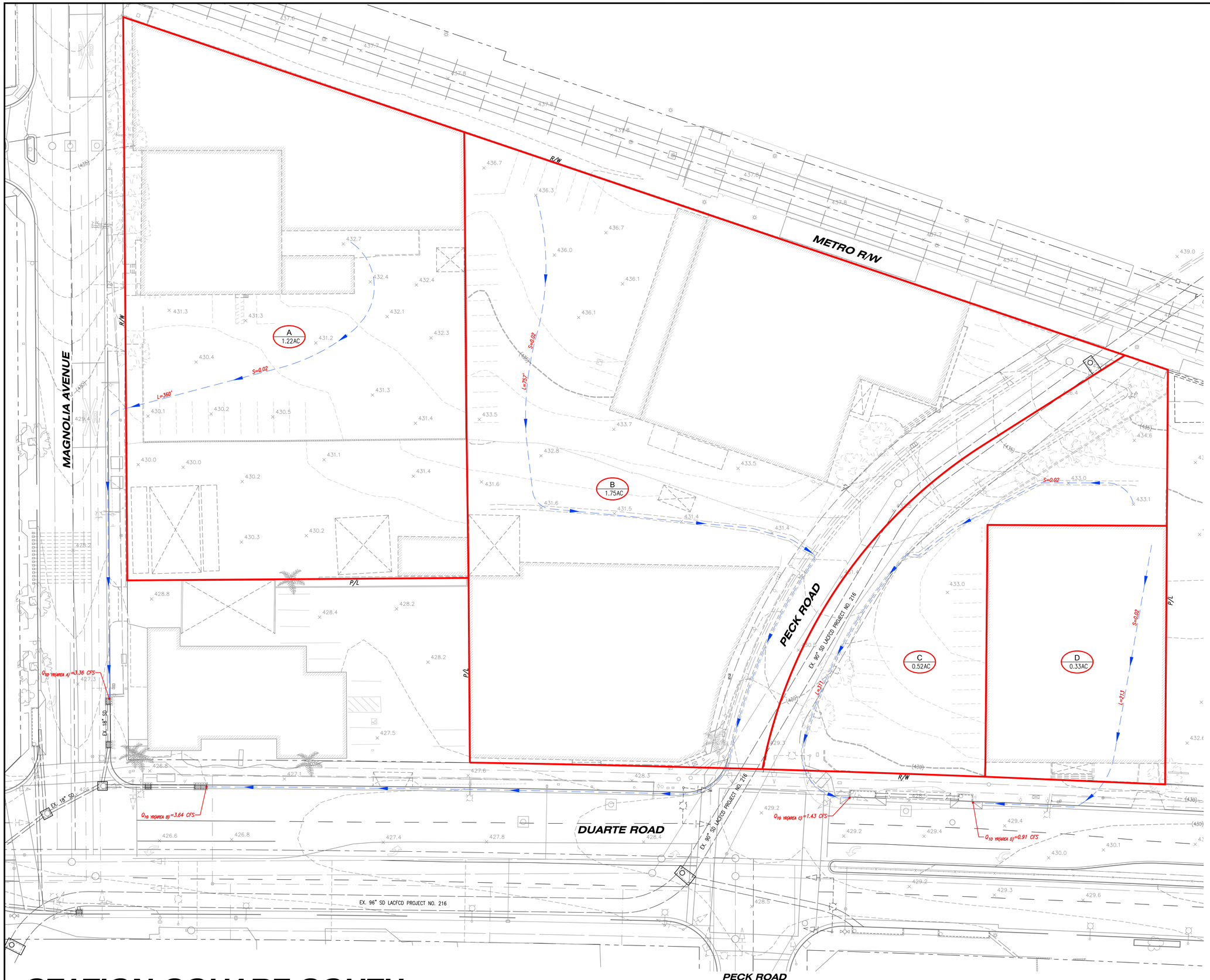
1-H1.30

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

Appendix 2

Existing Conditions Hydrology Map

10 year storm



STATION SQUARE SOUTH

THE RICHMAN GROUP

EXISTING HYDROLOGY MAP - 10 YEAR STORM

MONROVIA, CALIFORNIA

0 10 20 40 60

SCALE:1"=20' DATE: 01/15/18

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Appendix 3

Existing Conditions Peak Flow Hydraulic Analysis

10 year storm

Peak Flow Hydrologic Analysis

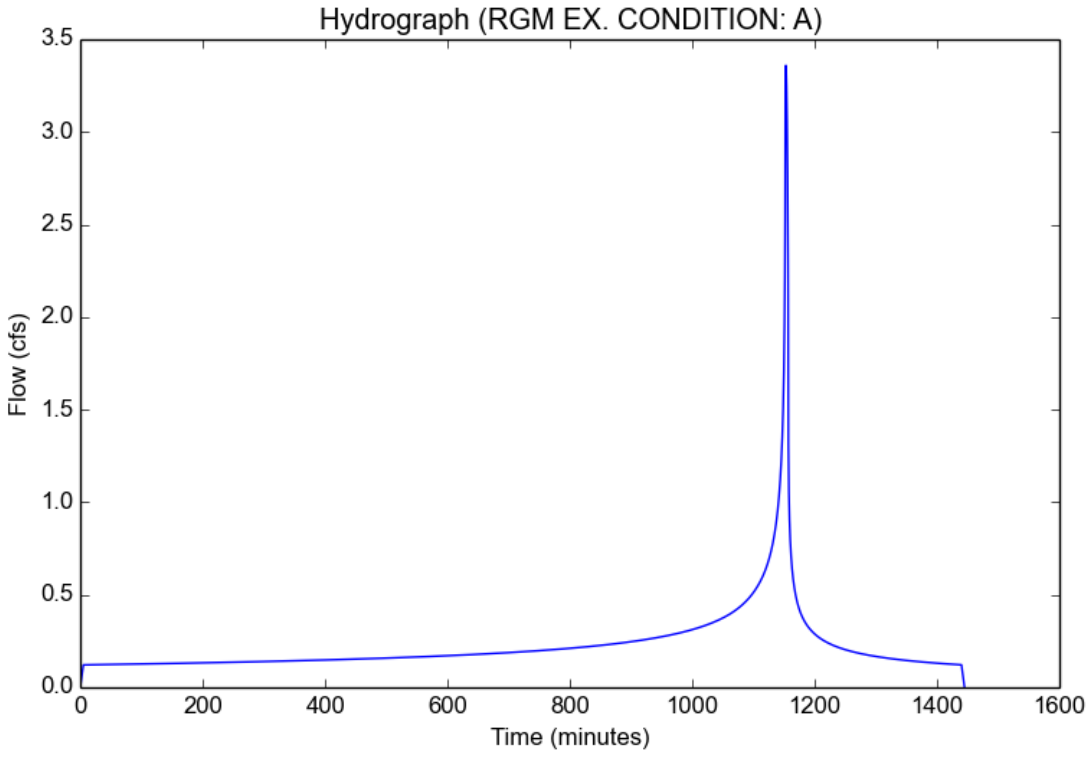
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM EX. CONDITION - A.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM EX. CONDITION
Subarea ID	A
Area (ac)	1.22
Flow Path Length (ft)	360.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.97
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8978
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.3595
Burned Peak Flow Rate (cfs)	3.3595
24-Hr Clear Runoff Volume (ac-ft)	0.4556
24-Hr Clear Runoff Volume (cu-ft)	19844.6939



Peak Flow Hydrologic Analysis

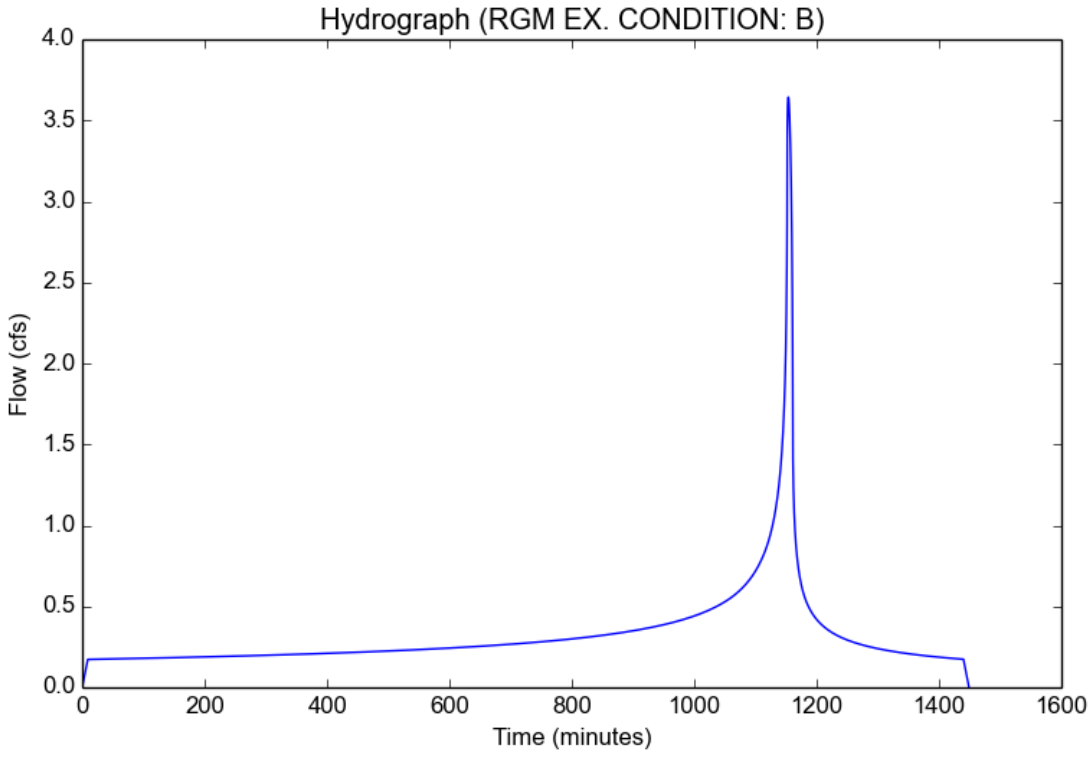
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM EX. CONDITION - B.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM EX. CONDITION
Subarea ID	B
Area (ac)	1.75
Flow Path Length (ft)	757.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.96
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	2.3268
Undeveloped Runoff Coefficient (Cu)	0.7682
Developed Runoff Coefficient (Cd)	0.8947
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	3.6432
Burned Peak Flow Rate (cfs)	3.6432
24-Hr Clear Runoff Volume (ac-ft)	0.6482
24-Hr Clear Runoff Volume (cu-ft)	28236.7616



Peak Flow Hydrologic Analysis

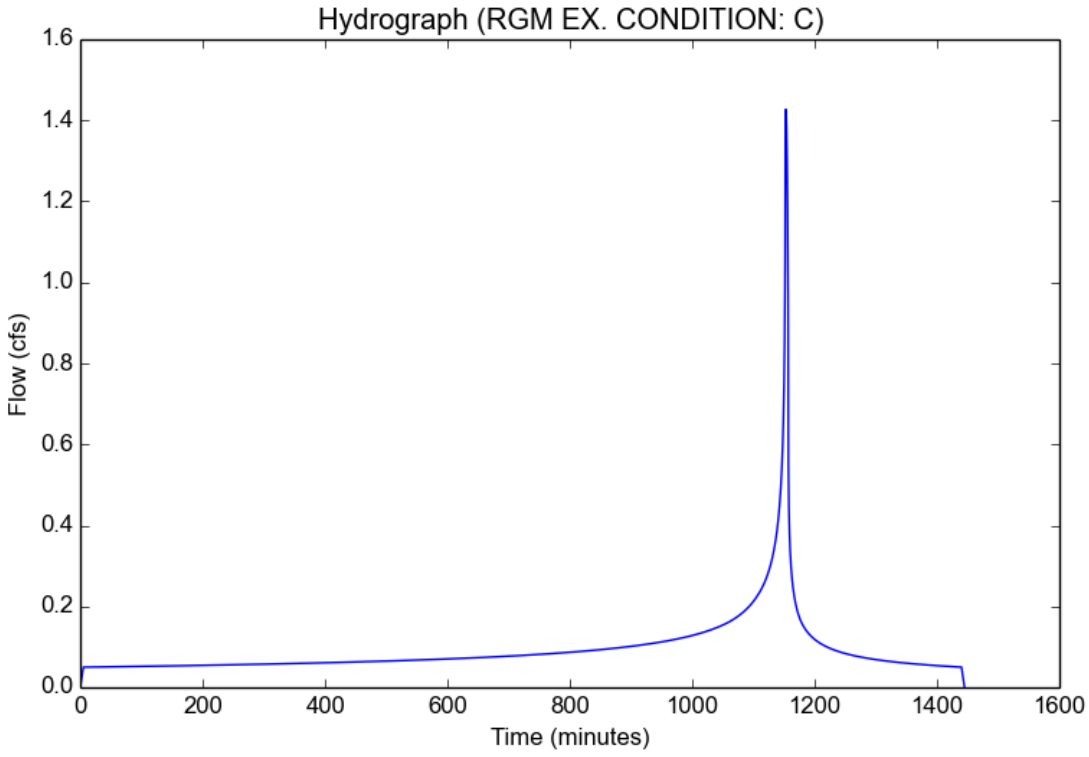
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM EX. CONDITION - C.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM EX. CONDITION
Subarea ID	C
Area (ac)	0.52
Flow Path Length (ft)	311.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.93
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8949
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4273
Burned Peak Flow Rate (cfs)	1.4273
24-Hr Clear Runoff Volume (ac-ft)	0.188
24-Hr Clear Runoff Volume (cu-ft)	8187.9562



Peak Flow Hydrologic Analysis

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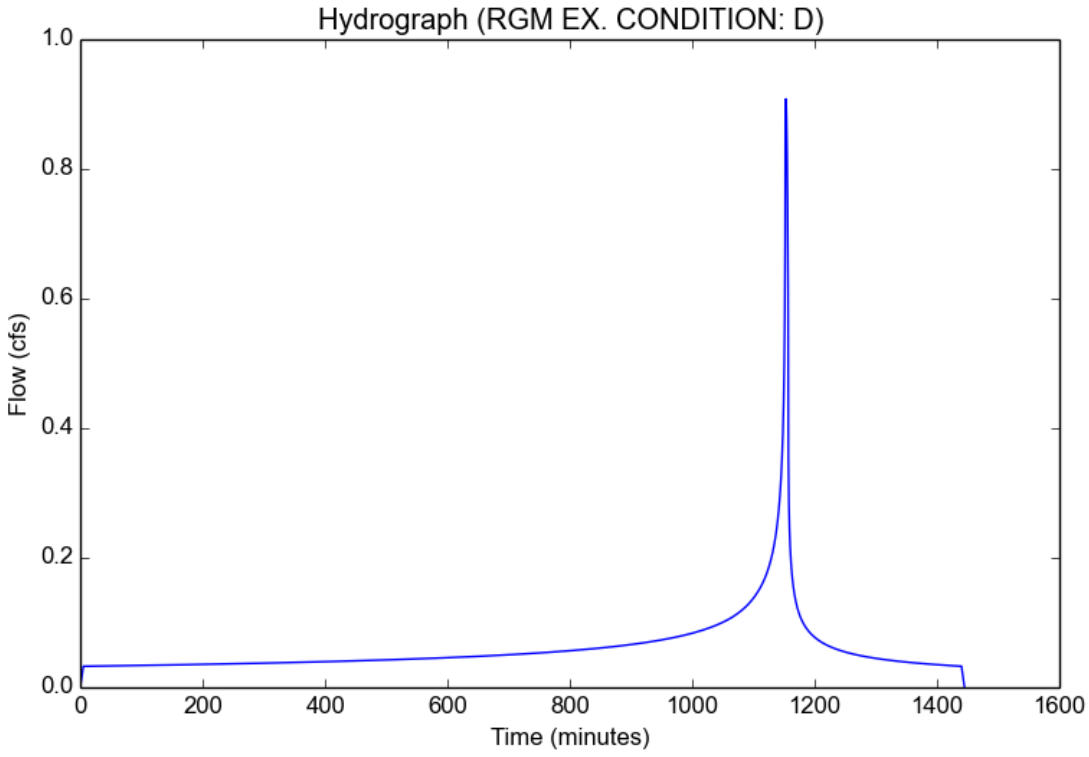
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM EX. CONDITION
Subarea ID	D
Area (ac)	0.33
Flow Path Length (ft)	213.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.96
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

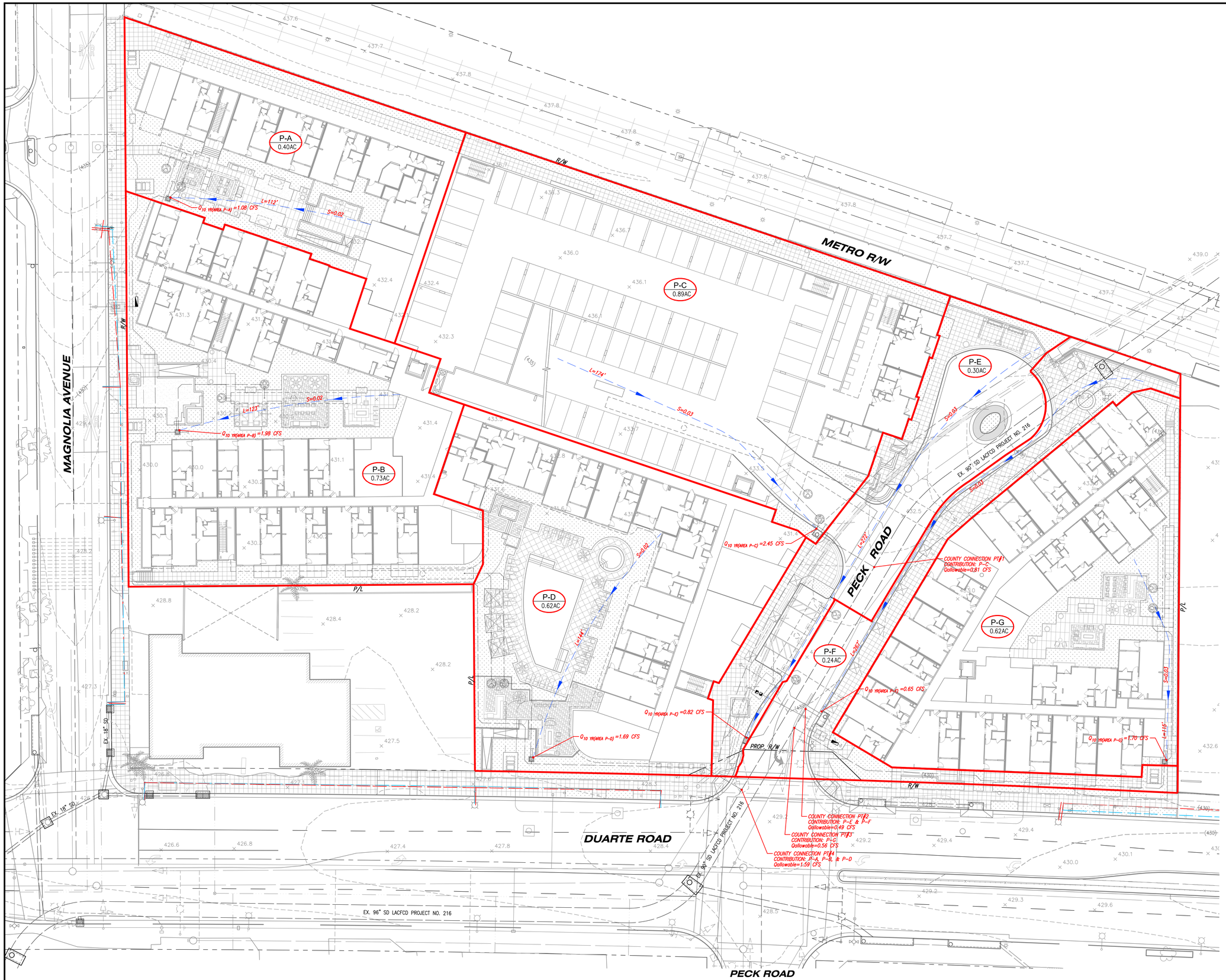
Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8971
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.908
Burned Peak Flow Rate (cfs)	0.908
24-Hr Clear Runoff Volume (ac-ft)	0.1222
24-Hr Clear Runoff Volume (cu-ft)	5324.921



Appendix 4

Proposed Conditions Hydrology Map

10 year storm



STATION SQUARE SOUTH

THE RICHMAN GROUP

PROPOSED HYDROLOGY MAP - 10 YEAR STORM

MONROVIA, CALIFORNIA

0 10 20 40 60

SCALE:1"=20' DATE: 01/15/18

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Appendix 5

Proposed Conditions Peak Flow Hydraulic Analysis

10 year storm

Peak Flow Hydrologic Analysis

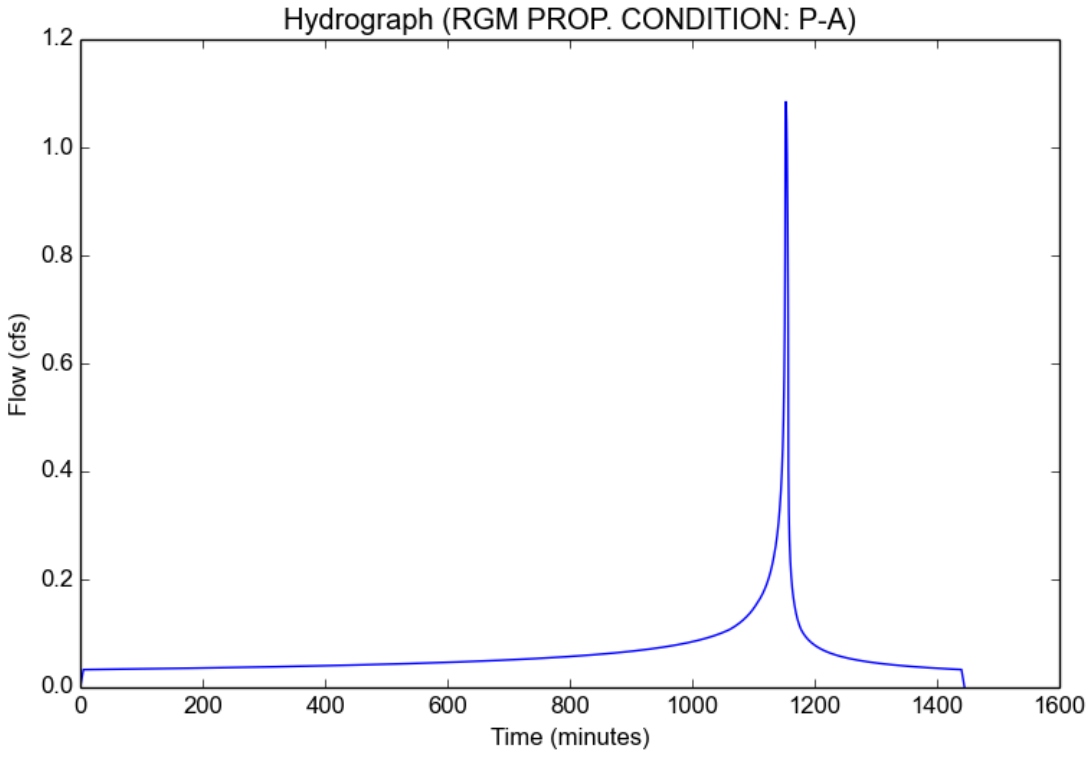
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM PROP. CONDITION - P-A.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM PROP. CONDITION
Subarea ID	P-A
Area (ac)	0.4
Flow Path Length (ft)	112.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.78
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8839
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.0845
Burned Peak Flow Rate (cfs)	1.0845
24-Hr Clear Runoff Volume (ac-ft)	0.1267
24-Hr Clear Runoff Volume (cu-ft)	5518.3184



Peak Flow Hydrologic Analysis

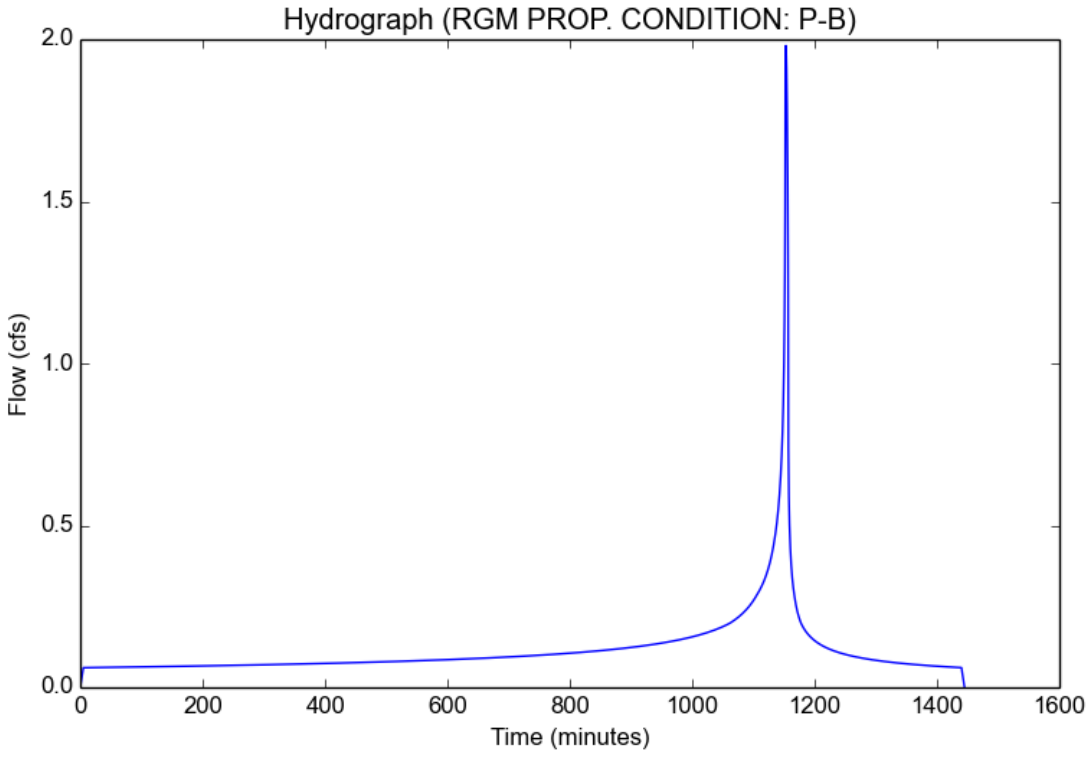
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM PROP. CONDITION - P-B.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM PROP. CONDITION
Subarea ID	P-B
Area (ac)	0.73
Flow Path Length (ft)	123.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.79
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8847
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.9808
Burned Peak Flow Rate (cfs)	1.9808
24-Hr Clear Runoff Volume (ac-ft)	0.2334
24-Hr Clear Runoff Volume (cu-ft)	10165.8444



Peak Flow Hydrologic Analysis

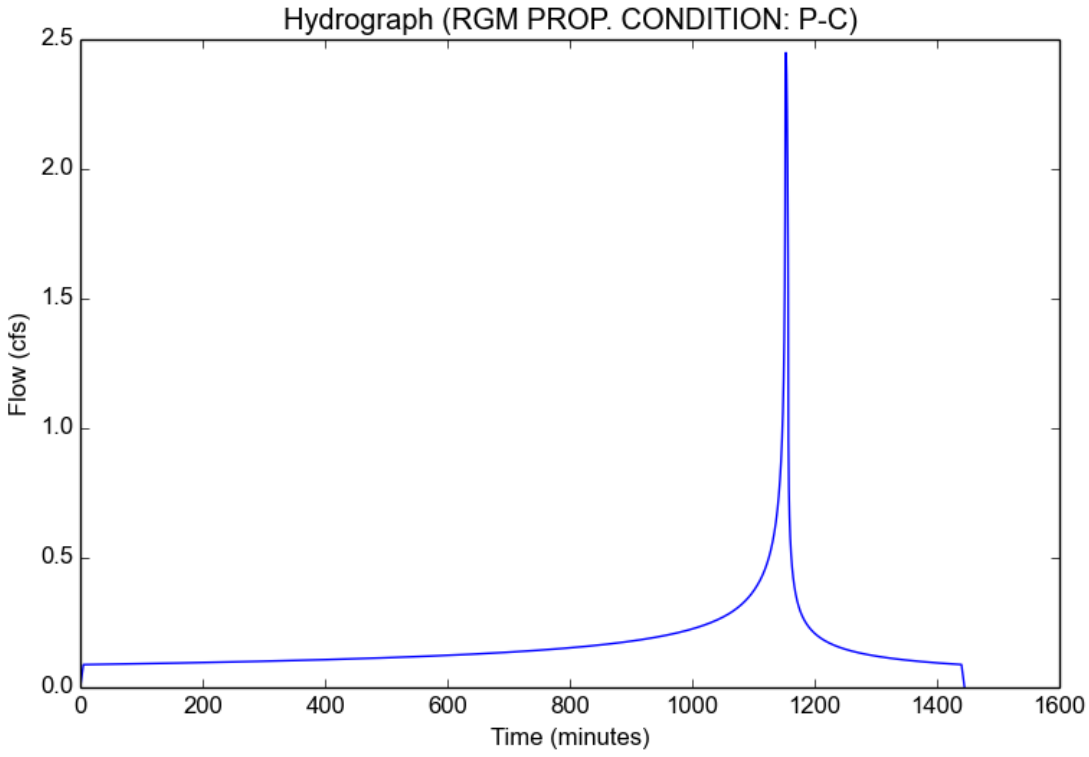
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM PROP. CONDITION - P-C.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM PROP. CONDITION
Subarea ID	P-C
Area (ac)	0.89
Flow Path Length (ft)	174.0
Flow Path Slope (vft/hft)	0.03
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.96
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8971
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.4488
Burned Peak Flow Rate (cfs)	2.4488
24-Hr Clear Runoff Volume (ac-ft)	0.3297
24-Hr Clear Runoff Volume (cu-ft)	14361.1506



Peak Flow Hydrologic Analysis

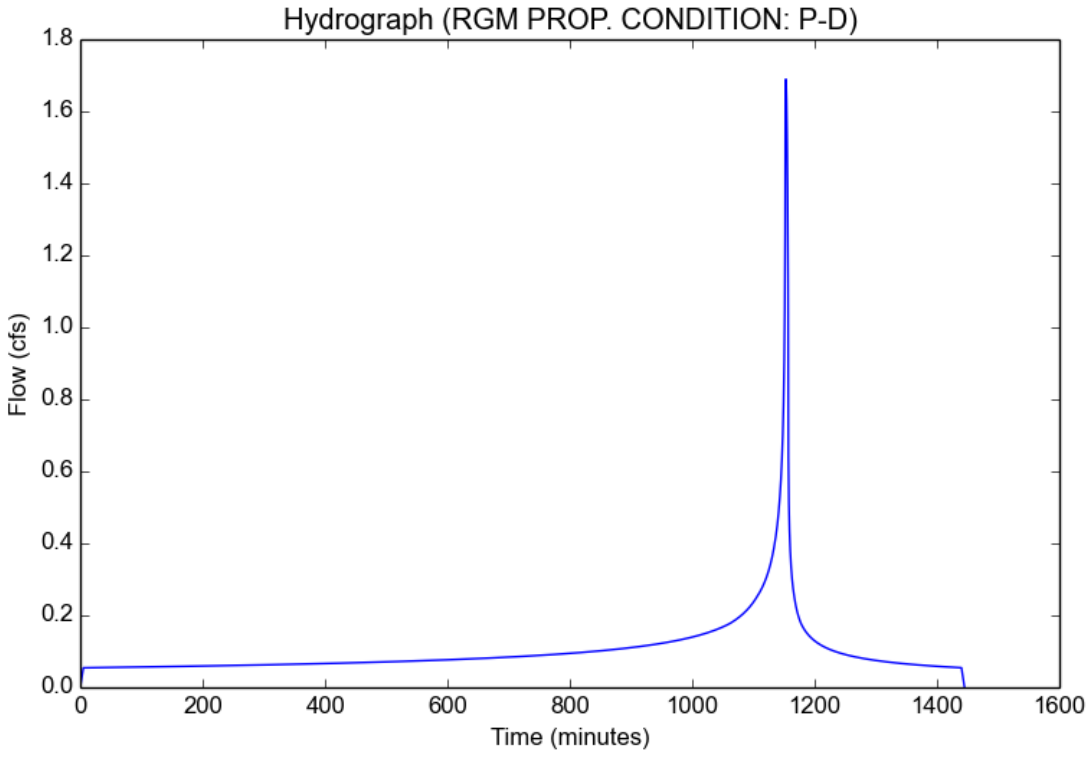
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM PROP. CONDITION - P-D.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM PROP. CONDITION
Subarea ID	P-D
Area (ac)	0.62
Flow Path Length (ft)	144.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.84
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8883
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.6893
Burned Peak Flow Rate (cfs)	1.6893
24-Hr Clear Runoff Volume (ac-ft)	0.2075
24-Hr Clear Runoff Volume (cu-ft)	9037.0614



Peak Flow Hydrologic Analysis

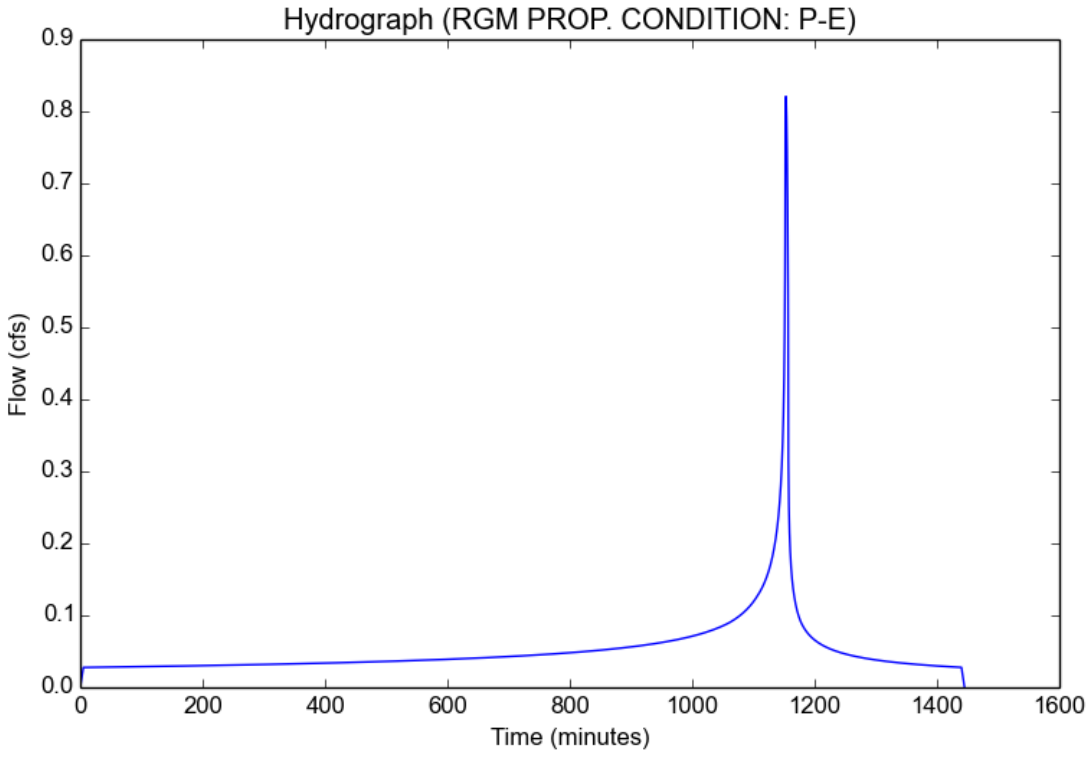
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM PROP. CONDITION - P-E.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM PROP. CONDITION
Subarea ID	P-E
Area (ac)	0.3
Flow Path Length (ft)	272.0
Flow Path Slope (vft/hft)	0.03
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.89
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.892
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.8207
Burned Peak Flow Rate (cfs)	0.8207
24-Hr Clear Runoff Volume (ac-ft)	0.1049
24-Hr Clear Runoff Volume (cu-ft)	4567.799



Peak Flow Hydrologic Analysis

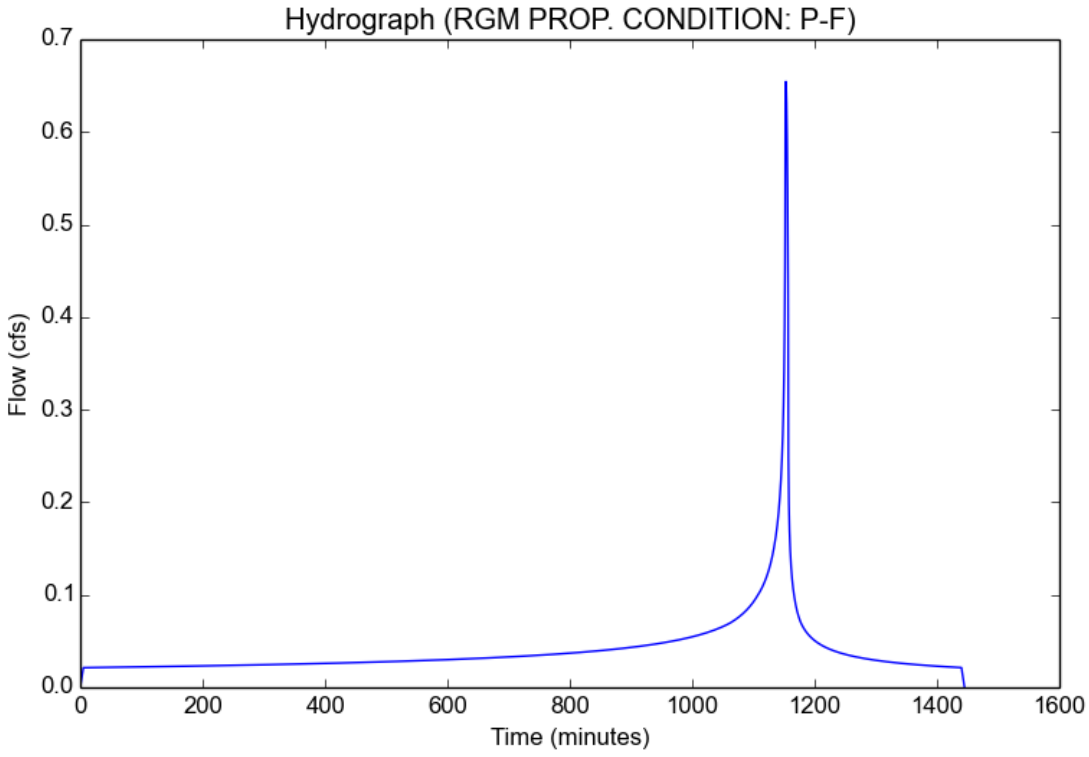
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM PROP. CONDITION - P-F.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM PROP. CONDITION
Subarea ID	P-F
Area (ac)	0.24
Flow Path Length (ft)	267.0
Flow Path Slope (vft/hft)	0.03
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.85
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.889
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.6544
Burned Peak Flow Rate (cfs)	0.6544
24-Hr Clear Runoff Volume (ac-ft)	0.081
24-Hr Clear Runoff Volume (cu-ft)	3529.4217



Peak Flow Hydrologic Analysis

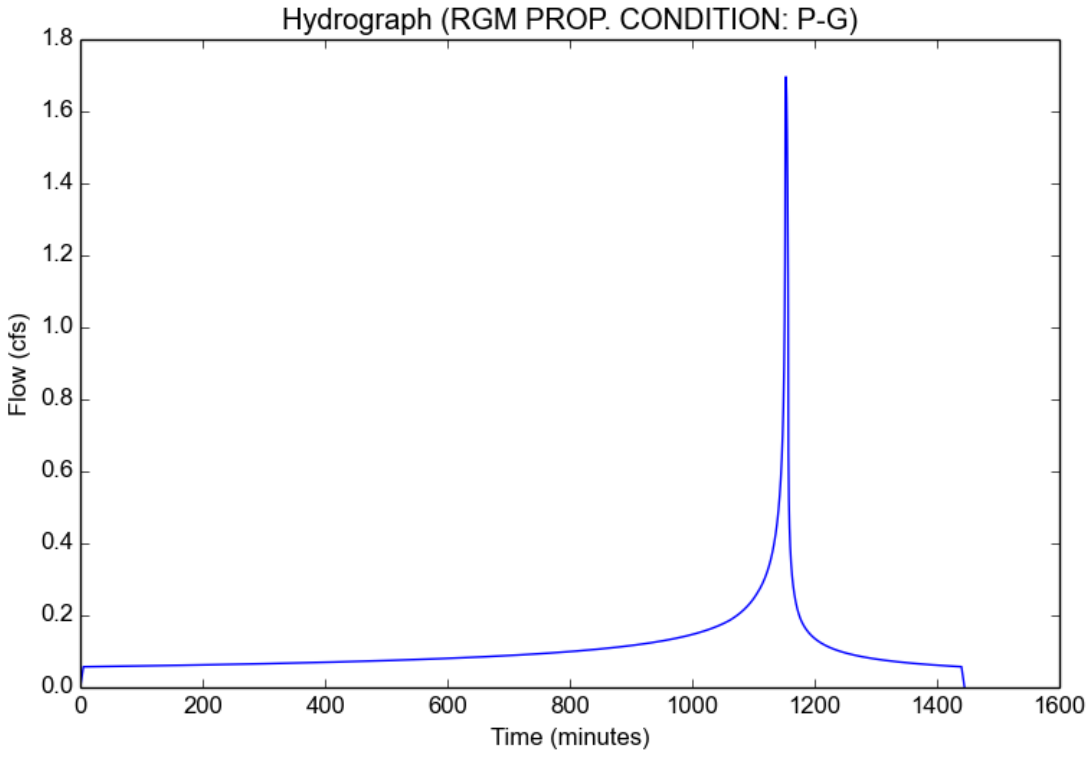
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM PROP. CONDITION - P-G.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM PROP. CONDITION
Subarea ID	P-G
Area (ac)	0.62
Flow Path Length (ft)	115.0
Flow Path Slope (vft/hft)	0.03
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.89
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.892
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.6962
Burned Peak Flow Rate (cfs)	1.6962
24-Hr Clear Runoff Volume (ac-ft)	0.2167
24-Hr Clear Runoff Volume (cu-ft)	9440.1179



Appendix 6

Allowable Q and Contained Volume Analysis

10 year storm

Peak Flow Hydrologic Analysis

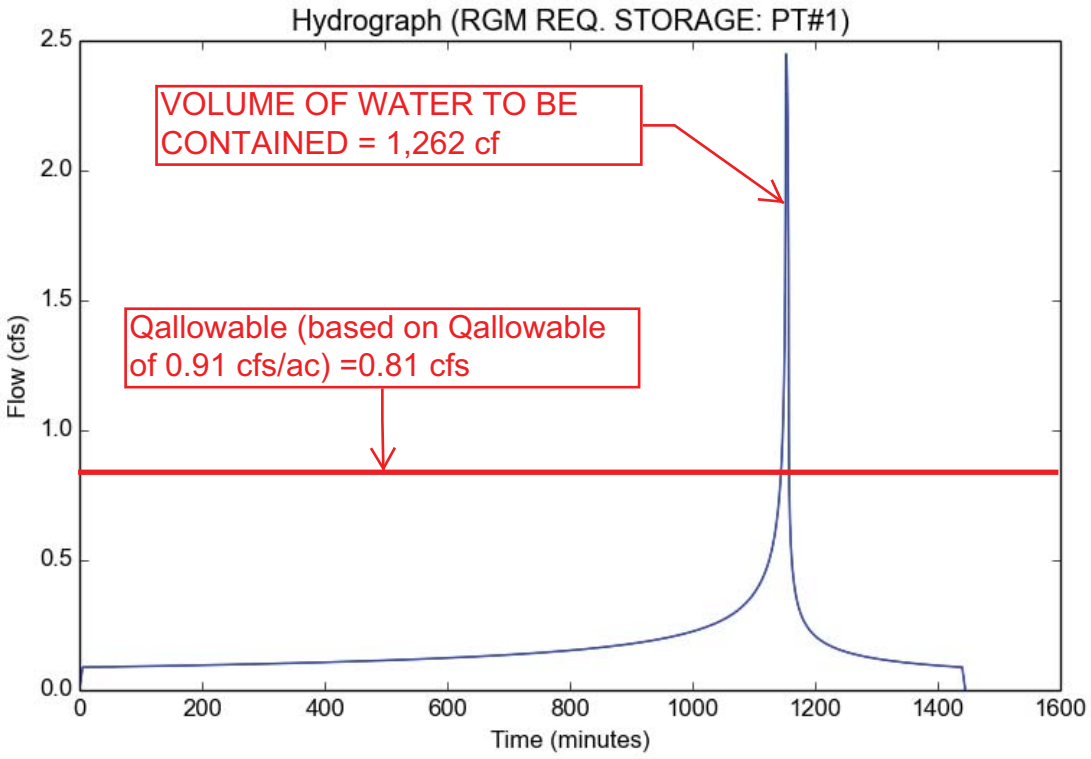
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM REQ. STORAGE - PT#1.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM REQ. STORAGE
Subarea ID	PT#1
Area (ac)	0.89
Flow Path Length (ft)	174.0
Flow Path Slope (vft/hft)	0.03
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.96
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8971
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.4488
Burned Peak Flow Rate (cfs)	2.4488
24-Hr Clear Runoff Volume (ac-ft)	0.3297
24-Hr Clear Runoff Volume (cu-ft)	14361.1506



Peak Flow Hydrologic Analysis

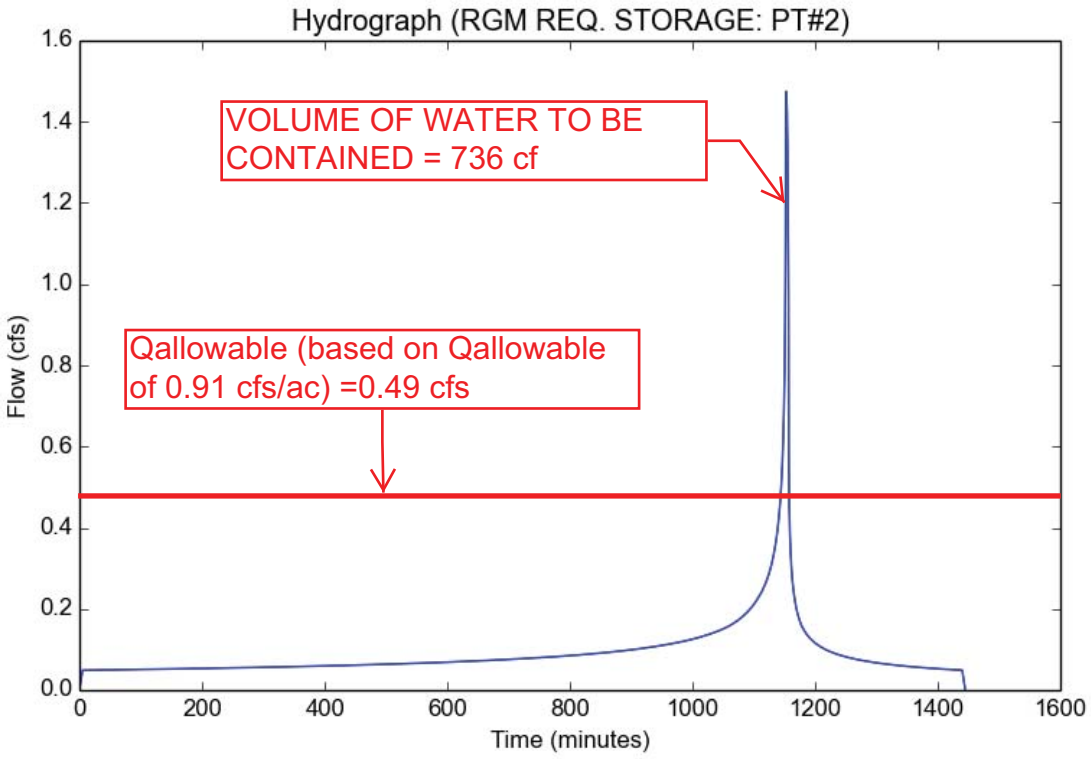
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM REQ. STORAGE - PT#2.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM REQ. STORAGE
Subarea ID	PT#2
Area (ac)	0.54
Flow Path Length (ft)	270.0
Flow Path Slope (vft/hft)	0.03
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.87
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8905
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4749
Burned Peak Flow Rate (cfs)	1.4749
24-Hr Clear Runoff Volume (ac-ft)	0.1855
24-Hr Clear Runoff Volume (cu-ft)	8081.6185



Peak Flow Hydrologic Analysis

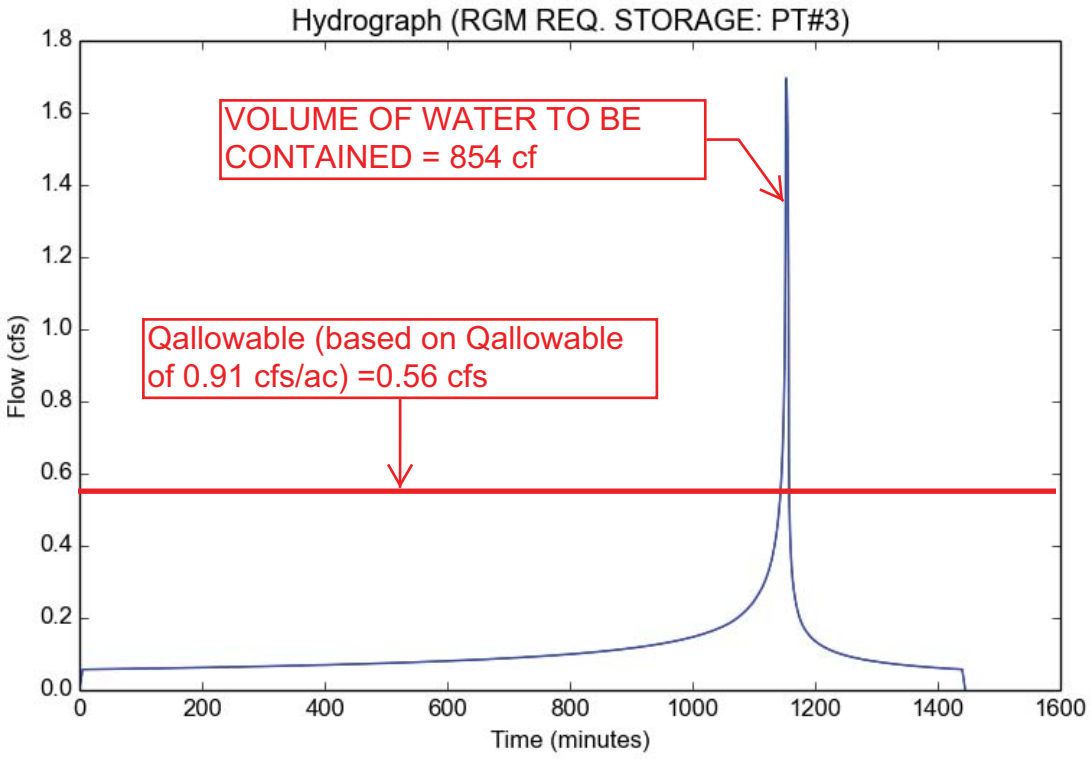
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM REQ. STORAGE - PT#3.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM REQ. STORAGE
Subarea ID	PT#3
Area (ac)	0.62
Flow Path Length (ft)	115.0
Flow Path Slope (vft/hft)	0.03
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.89
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.892
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.6962
Burned Peak Flow Rate (cfs)	1.6962
24-Hr Clear Runoff Volume (ac-ft)	0.2167
24-Hr Clear Runoff Volume (cu-ft)	9440.1179



Peak Flow Hydrologic Analysis

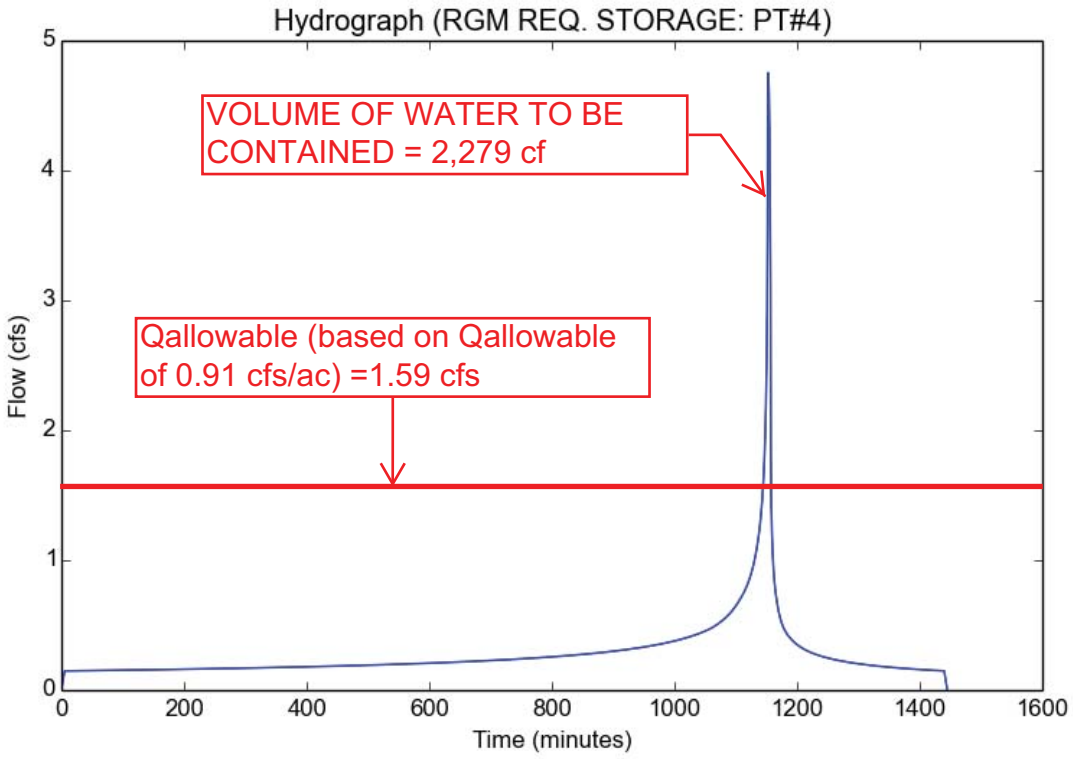
File location: R:/Richman Group/Monrovia/Documents/Hydrology/Hydrology Calcs/18.01.18/RGM REQ. STORAGE - PT#4.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	RGM REQ. STORAGE
Subarea ID	PT#4
Area (ac)	1.75
Flow Path Length (ft)	126.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.8
Soil Type	6
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	5.1408
Peak Intensity (in/hr)	3.0671
Undeveloped Runoff Coefficient (Cu)	0.827
Developed Runoff Coefficient (Cd)	0.8854
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	4.7524
Burned Peak Flow Rate (cfs)	4.7524
24-Hr Clear Runoff Volume (ac-ft)	0.5647
24-Hr Clear Runoff Volume (cu-ft)	24597.7069



Appendix 7

Los Angeles County Allowable Q Information Sheet

10 year storm

Office Use Only
☐ Sent Initials: _____
☐ Fax ☐ Email ☐ Other: _____
Date: _____ Time: _____

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION – HYDRAULIC ANALYSIS UNIT

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL RECORD DOCUMENT
Issued By Calvin T
Date: 4/6/17
Public Service That Works

INFORMATION REQUEST SUMMARY

INFORMATION REQUESTED BY

*Requester's Name: Tatsiana Bondar
Company: KHR Associates
*Phone Number: (949) 756-6440 Fax Number: (949) 756-6444
*Email: tbondar@khrdesign.com

Method of Contact: ☐ Walk-in ☐ Phone ☐ Fax ☒ Email ☐ Prelim. Mtg. Date: 03/30/2017

Intended Use: Duarte Road Apartments storm drain connection

Proposed Project Type: multi-family apartment project Acreage Involved: 3.8

*Will information be used in any litigation? ☐ YES ☒ NO
Case Info. Name: _____ No: _____ Location: _____

INFORMATION REQUESTED (Attach Assessor Map)

LACFCD Facility: Name: Project No. 216 Ruby Canyon Storm Drain
Unit: _____ Line: _____ Station: 9+00 to 12+50
City: City of Monrovia
*Street/Cross-street: Peck Road/Duarte Road
*Thomas Guide: Page: 567 Grid: G6 ☒ Site Map/Plans Submitted
Info. Requested: Allowable Q with frequency (Discharge flow), HGL, Hydrologic Data, Hydraulic Calculation, Design Capacity

***Required Information. See Page 2 of 2 for Instructions.**

BELOW SECTION TO BE COMPLETED BY THE HYDRAULIC ANALYSIS UNIT

INFORMATION PROVIDED: ALLOWABLE Q, HYDROLOGY, AND HGL.

REFERENCES SEARCHED: PROJECT NO. 216

COMMENTS, ETC:
ALLOWABLE Q FOR SUBAREA 18 = 0.91 CFS/AC
ALLOWABLE Q FOR SUBAREA 19 = 0.86 CFS/AC

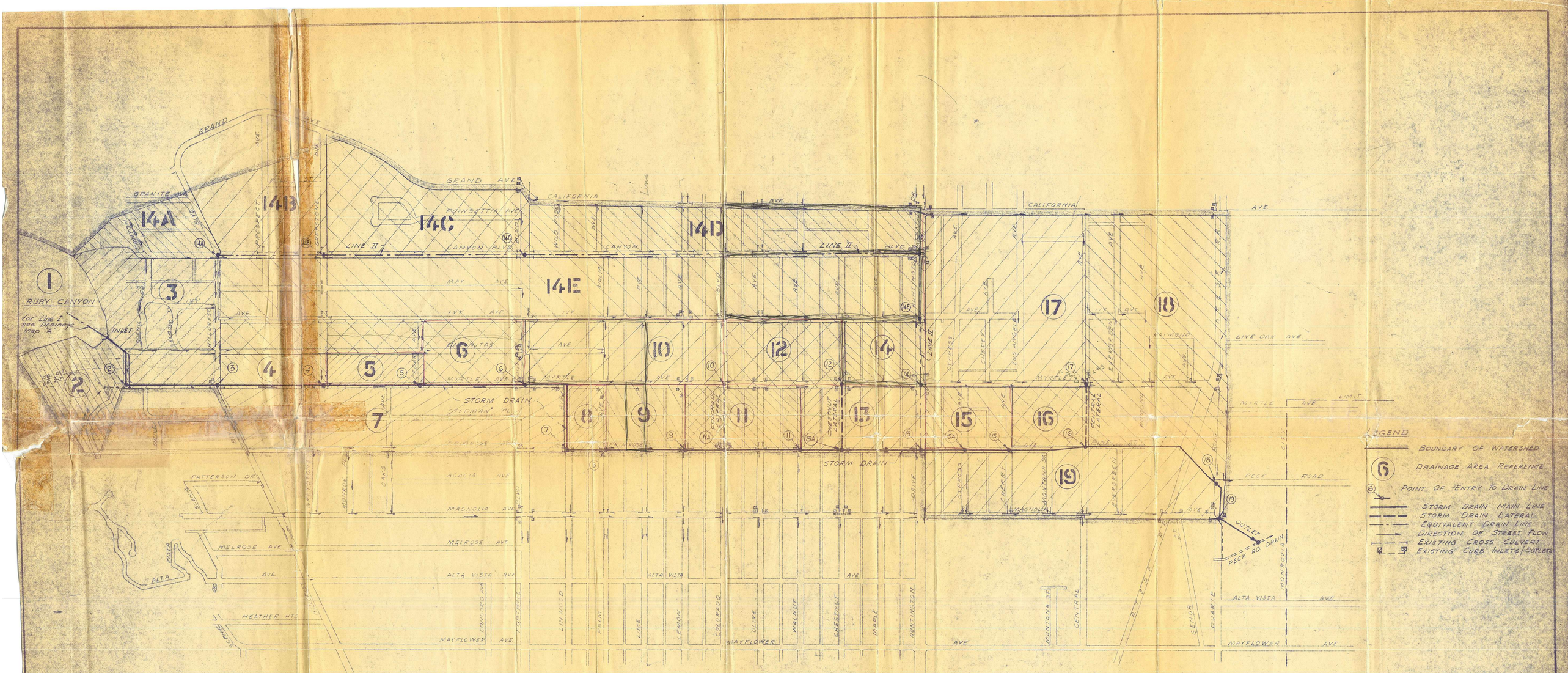
AFTER A DILIGENT SEARCH, I WAS UNABLE TO FIND THE HYDRAULIC CALCULATIONS. PLEASE SEE THE INFORMATION PROVIDED REGARDING THE HGL.

INFORMATION PROVIDED BY: Calvin Tran Date: 4/6/17
INFORMATION REVIEWED BY: Date:

Print Save a Copy

Appendix 8

LACFCD Project No. 216 Ruby Canyon Storm Drain Drainage Map



LEGEND

- BOUNDARY OF WATERSHED
- (6) DRAINAGE AREA REFERENCE
- (6) POINT OF ENTRY TO DRAIN LINE
- STORM DRAIN MAIN LINE
- STORM DRAIN LATERAL
- EQUIVALENT DRAIN LINE
- DIRECTION OF STREET FLOW
- EXISTING CROSS CULVERT
- EXISTING CURB INLETS | OUTLETS

ARCHITECTS & ENGINEERS
DANIEL, MANN, JOHNSON & MENDENHALL
4201 SUNSET BOULEVARD
LOS ANGELES, CALIF. - Olympic 5992

APPROVED

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT

STORM DRAIN BOND ISSUE
PROJECT NO. 216

RUBY CANYON STORM DRAIN
DRAINAGE MAP "B"

APPROVED BY
CHIEF ENGINEER

SCALE	DATE	NO.
1" = 400'	11-13-53	SHEET 2 OF 2