

WATER QUALITY MITIGATION PLAN (WQMP)

For

**La Paz Ranch
23465 Civic Center Way
Malibu, CA 90265**

Psomas Project No.: 1MAR590100
September 19, 2017

Prepared for:

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1.0 Purpose and Scope

The purpose of this study is to demonstrate that the proposed project site can be designed to meet the requirements of the City of Malibu current Municipal Stormwater Sewer System (MS4) permit.

Psomas has been retained by Marmol Radziner to prepare a water quality report for the proposed La Paz Ranch Project. The project site is a 15.27 acres site located in the Malibu area of Los Angeles. The study area is bordered by La Paz Lane to the north, Malibu Road to the south, and Civic Center Way to the west.

2.0 Site Characterization

Current Property Use: Vacant rough graded lot.

Proposed Property Use: 7 one story buildings on Parcel A, and 3 two story buildings on Parcel B. 2 of the one story buildings on Parcel A are on grade. The remaining 5 one story buildings are over the garage.

Availability of Soils Report: The soil of the watershed is classified as Type 029, as shown in the Malibu Beach quadrant of Hydrologic Map figure LACDPW 1-H1.15, found in Appendix 1. The project area site is 15.27 acres in size. The disturbed area totals 12.7 acres. Therefore, the total area to be studied is 12.7 acres in size.

Receiving Waters: Runoff from the project site is conveyed to the Pacific Ocean via the Los Angeles County storm drain and Cross Creek. The outlet is located at Malibu Lagoon.

As shown in Table 1, Amarillo Beach is listed on the 2002 CWA Section 303(d) list (approved by USEPA July 2003) as having fish consumption advisories for DDT and PCBs. Currently, the beneficial uses listed for this waterway are navigation, water contact and non-water contact recreation, commercial and sport fishing, marine and wildlife habitat, and shellfish harvesting.

Table 1: Receiving Waters for Urban Runoff from Site¹

Receiving Waters	303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Uses
Amarillo Beach	DDT, PCBs	Existing: NAV, REC1, REC2, COMM, MAR, WILD, SHELL	Not applicable

¹ California Regional Water Quality Control Board, Los Angeles Region. Water Quality Control Plan Los Angeles Region. June 13, 1994.

3.0 Pollutants of Concern

Site development will consist of 10 two-story retail buildings. Associated site improvements will also include a paved driveway, curb and gutter, walkways, landscaping, grading, and on-site BMPs to achieve applicable water quality-based effluent limitations and/or receiving water limitations established pursuant to TMDLs. Pollutants in storm water discharges will be reduced to the maximum extent practicable.

Table 2 lists the pollutants anticipated to be generated by a proposed land use. Because the project is considered a commercial development with restaurants and parking areas, the following pollutants are anticipated²: heavy metals, trash and debris, oxygen demanding substances, oil and grease.

Table 2: Typical Pollutants of Concern by Land Use ⁽¹⁾

Table 2. Anticipated and Potential Pollutants Generated by Land Use Type

<i>Priority Project Categories</i>	<i>General Pollutant Categories</i>								
	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P ⁽¹⁾	P ⁽²⁾	P	X
Commercial Development >100,000 ft ²	P ⁽¹⁾	P ⁽¹⁾		P ⁽²⁾	X	P ⁽⁵⁾	X	P ⁽³⁾	P ⁽⁵⁾
Automotive service facilities			X	X ⁽⁴⁾⁽⁵⁾	X		X		
Retail Gasoline Outlets			X	X ⁽⁴⁾⁽⁵⁾	X		X		
Restaurants					X	X	X	X	
Hillside development	X	X			X	X	X		X
Parking Lots	P ⁽¹⁾	P ⁽¹⁾	X		X	P ⁽¹⁾	X		P ⁽¹⁾
Streets, Highways & Freeways	X	P ⁽¹⁾	X	X ⁽⁴⁾	X	P ⁽⁵⁾	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site
(2) A potential pollutant if the project includes uncovered parking areas
(3) A potential pollutant if land use involves food or animal waste products
(4) Including petroleum hydrocarbons
(5) Including solvents

² Source: County of Los Angeles Low Impact Development Standards Manual, February 2014

Stormwater best management practices (BMPs) proposed for the project will be designed to address this pollutants of concern produced by the development.

The BMPs will be designed to collect, treat, detain, and release runoff. Any additional stormwater runoff beyond what is required to meet MS4 Permit requirements will be treated and discharged into the public storm drain system. To the maximum extent practical, storm water quality treatment will be provided with biofiltration basins.

Catch basin inserts are designed to remove sediment and debris and floating oils and grease. Once the run-off has been treated through the catch basin insert it will be detained on-site and then reused for landscape irrigation.

4.0 Hydrology

4.1 General Approach

The hydrology study includes an analysis of required storm water quality volume, and pre and post storm water quantity flow rates.

Storm water quality design volume is defined as runoff from the 0.75-inch, 24-hour rain event, or the 85th percentile, 24-hour storm event, whichever is greater, per Regional Water Quality Control Board criteria.

4.2 Data Sources

The primary sources of data were the *LACDPW Low Impact Development Manual (Feb 2014)*.

4.3 Watershed Characteristics

The La Paz Ranch project is located within the County of Los Angeles and in the Malibu Beach quadrant of Isohyetal Map figure LACDPW 1-H1.15, in Appendix 1. The 50-year (24-hour) rainfall Isohyet nearest the project area is 7.00. The project site is tributary to the LACDPW storm drain, which discharges to the Pacific Ocean through Malibu Lagoon.

The *LACDPW HydroCalc* program was used to calculate the time of concentration and peak runoff flow rate for existing and proposed conditions. In accordance with LACDPW requirements, the 100-year storm event was used as the main design storm in this analysis.

4.4 Existing Condition Results

The existing site is made up of a vacant lot and there are no paved surfaces. The whole project site is 15.27 acres. This study will analyze the portions of the site that are to be disturbed by the proposed development, totaling 12.7 acres. Currently, the existing site drains by sheet flow towards the southern end of the property. Storm runoff from the site is currently collected into a storm drain system that is off site on Civic Center Way. The storm drain system drains into an existing Los Angeles County storm drain system that ultimately discharges into the Malibu Lagoon. Water from the undisturbed portion of the site will continue to drain as it does in the existing condition before being collected and routed to the storm drain in Civic Center Way mentioned above.

4.5 Storm Water Quality Design Volume

Storm water quality design volume is defined as runoff from the 0.75-inch, 24-hour storm event, or from the 85th percentile (0.7-inch for project area), 24-hour storm event, whichever is greater, per Regional Water Quality Control Board criteria. In this case the 0.75-inch is the greater volume. The peak mitigation flows and volumes for La Paz Ranch are summarized in Table 3 below.

Table 3: Peak Mitigation Flow and Volume Summary

Area ID	Area [acre]	85th Percentile 24-Hour Storm Event [cu-ft]	0.75-Inch, 24-Hour Storm Event [cu-ft]	Proposed Treatment Volume [cu-ft]
1	1.8	3,902	4,182	
2	0.8	1,703	1,825	
3	3.1	4,407	4,721	8,732
4	0.4	564	606	
5	0.8	1,283	1,378	
6	4.0	4,557	4,882	16,396
7	1.8	1,615	1,731	11,692
Total:	12.7	18,031	19,325	36,820

The 0.75-inch, 24-hour rainfall event provides the greater peak mitigation flows and volumes between the two storm events, and therefore will be used for sizing the biofiltration area. However, since the biofiltration areas will also be used to detain the city of Malibu requirements of 1" over impervious and 0.5" over pervious surfaces, the biofiltration areas exceed the treatment needs of the 0.75-inch, 24-hour storm event. The biofiltration areas are sized to treat 36,820 cu-ft volume. All overflows will be released into the storm drain. The water from areas 1, 2, 4, and 5 will be pumped to the biofiltration areas in areas 6 and 7, while the water generated in areas 3, 6, and 7 will be conveyed to their corresponding biofiltration basins by gravity.

5.0 Best Management Practices

Source and Treatment Control Best Management Practices (BMPs) are required for this project.

5.1 Site Design BMPs

5.1.1 Minimize Stormwater Pollutants of Concern

The project site will minimize pollutants of concern by maximizing the reduction of pollutant loadings to the Maximum Extent Practicable. Pollutants of concern are addressed through filter inserts and biofiltration basins as shown on the La Paz Ranch WQMP Exhibit in *Appendix 4*.

5.1.2 Conserve Natural Areas

The total impervious area for the project site developed as part of these improvements is 7.28 acres (48%) and the total pervious area is 7.99 acres (52%). A significant portion of the project site will remain pervious since natural open space areas will be conserved around the perimeter of the site.

5.2 Source Control BMPs

5.2.1 Protect Slopes and Channels

The existing project site consists of a vacant lot. The natural slopes on the north end of the site will remain undisturbed. Disturbed slopes will be stabilized using retaining walls. Flows will be collected into swales and directed through the on-site storm drain to the storm drain system in Civic Center Way.

5.2.2 Provide Storm Drain System Stenciling and Signage

As a Source Control BMP, Stenciling and Signage will be required for areas with catch basins. Sample stencils are also included in *Appendix 5*. All catch basins draining to the storm drain system will be stenciled with “No Dumping, Drains to Ocean” or equivalent wording approved by the City of Malibu. The owner or the owner’s representative will be responsible for maintaining the legibility of “No Dumping, This Drains to Ocean” stenciling and the inspection of which will be done annually.

5.2.4. Properly Design Trash Storage Areas

Trash enclosures will be walled. Drainage from adjoining roofs and pavement will not enter the trash storage area. The trash bin areas will utilize fox drain diversion, with connections to the storm drain and sewer. The trash bins will be leak proof and have attached covers or lids.

5.3 Treatment Control BMPs

5.3.1 Kristar FloGard Plus Catch Basin Insert

Kristar FloGard Plus catch basin inserts are designed to capture sediment, debris, trash, and oils and grease from low flows. The inserts allow for high flows to bypass through the device while retaining sediment, debris and trash. Filter inserts are used for pre-treatment of the storm water before the treatment in the biofiltration area.

5.3.2 Biofiltration area

The biofiltration areas are sized to treat 36,820 cu-ft volume storm water. The biofiltration areas are designed to detain the volume required by the City of Malibu (1" over impervious area and ½" over pervious area disturbed) for Storm water management plan. The storm water collected in the biofiltration areas will slowly infiltrate through the soil and gravel before being collected by the subdrain and drained into the storm drain system.

The biofiltration area will treat the required volume in less than 4hrs. See calculations on Appendix 3.

BMP design details are shown on the WQMP Site Plan in *Appendix 4*. Operation and Maintenance guidelines and sample storm drain stencils are provided in *Appendix 5*.

6.0 Master Covenant and Agreement (C&A)

6.1 Proof of Ongoing BMP Maintenance

The Operations and Maintenance of the Treatment Control BMPs will be the responsibility of the owner. The current contact information for the responsible party is:

Contact: Tierney Wandler, Malibu Development LLC

Address: 1317 Fifth Street, Suite 200
Santa Monica, CA 90401

Phone: (310) 255-0050

It will be the responsibility of the property owner to provide maintenance, inspection and repair of the Treatment Control BMPs.

The developer accepts responsibility for all structural and treatment control BMP maintenance until the time the property is transferred. The transfer of property to a private entity (owner) will require the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owner's responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. Printed educational materials are required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information is also required with any subsequent sale of the property.

7.0 Limitations

7.0 Limitations

This report was prepared to comply with the guidelines established by the County of Los Angeles and their representatives. Evaluation of the appropriateness of these guidelines and the accuracy of the County data were beyond the scope of this work.

Usage of this report is limited to address the purpose and scope previously defined by the project owner. Psomas shall not be held responsible for any unauthorized application of this report and the contents therein.

The opinions represented in this report have been derived in accordance with current standards of civil engineering practice. No other warranty is expressed or implied.

8.0 References

Los Angeles County Department of Public Works, *LACDPW Hydrology/Sedimentation Manual and Appendices* (1991, 1992, 1993, 2002)

Los Angeles County Department of Public Works, *LACDPW TC v1.0 Manual, TC_calc_depth.xls* (December 1991, June 2002, July 13, 2004)

Los Angeles Regional Water Quality Control Board, *Standard Urban Stormwater Mitigation Plan for Los Angeles County and Cities in Los Angeles County* (March 2000)

Appendix 1

LACDPW Hydrology Data

Isohyet and Hydrologic Soil Classification Map

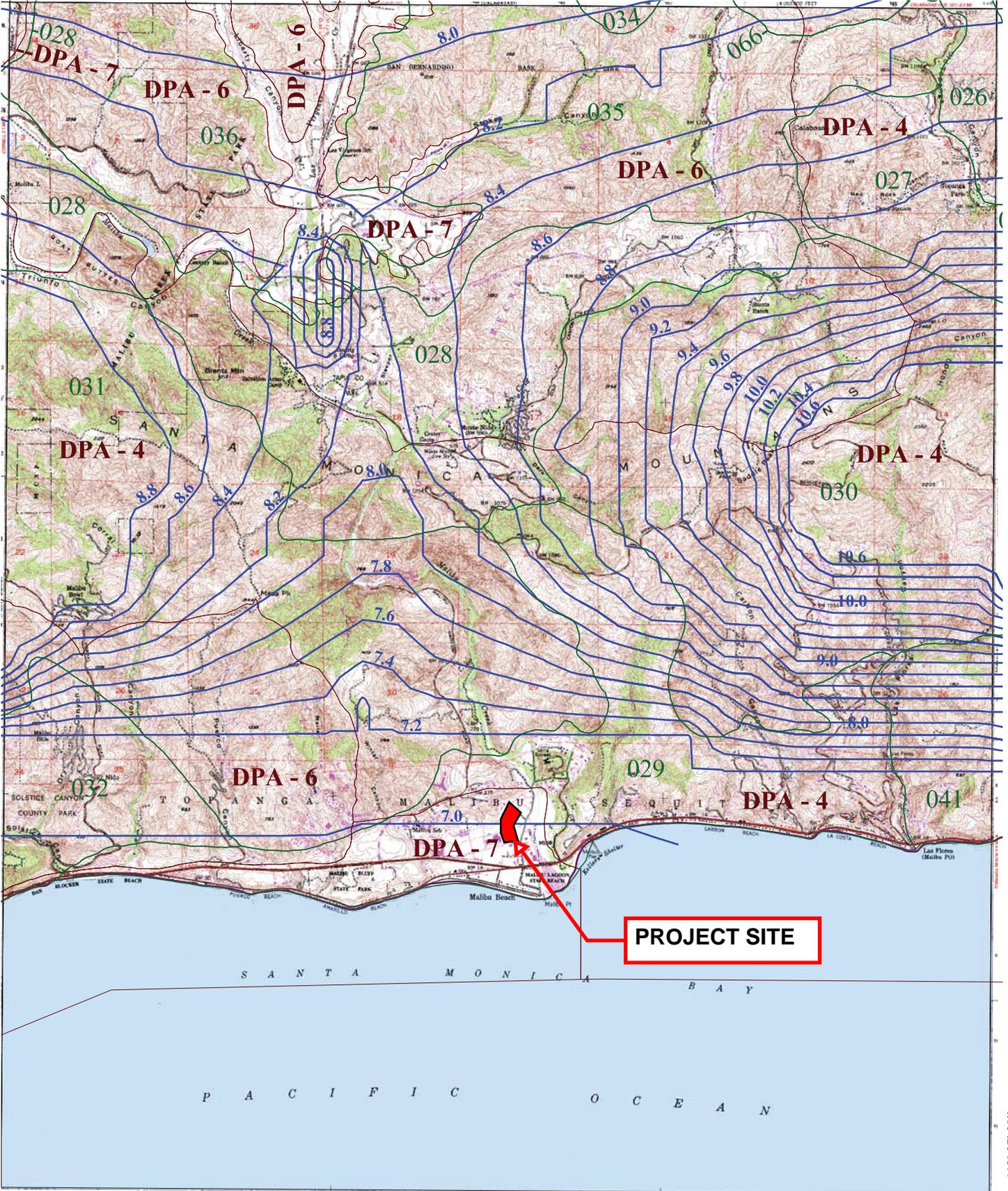
34° 07' 30"

CALABASAS I-HI.25

-118° 45' 00"

POINT DUME I-HI.14

TOPANGA I-HI.16



-118° 37' 30"

34° 00' 00"



016

SOIL CLASSIFICATION AREA

7.2

INCHES OF RAINFALL

DPA - 6

DEBRIS POTENTIAL AREA

1 0 1 2 Miles

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

MALIBU BEACH 50-YEAR 24-HOUR ISOHYET

1-HI.15



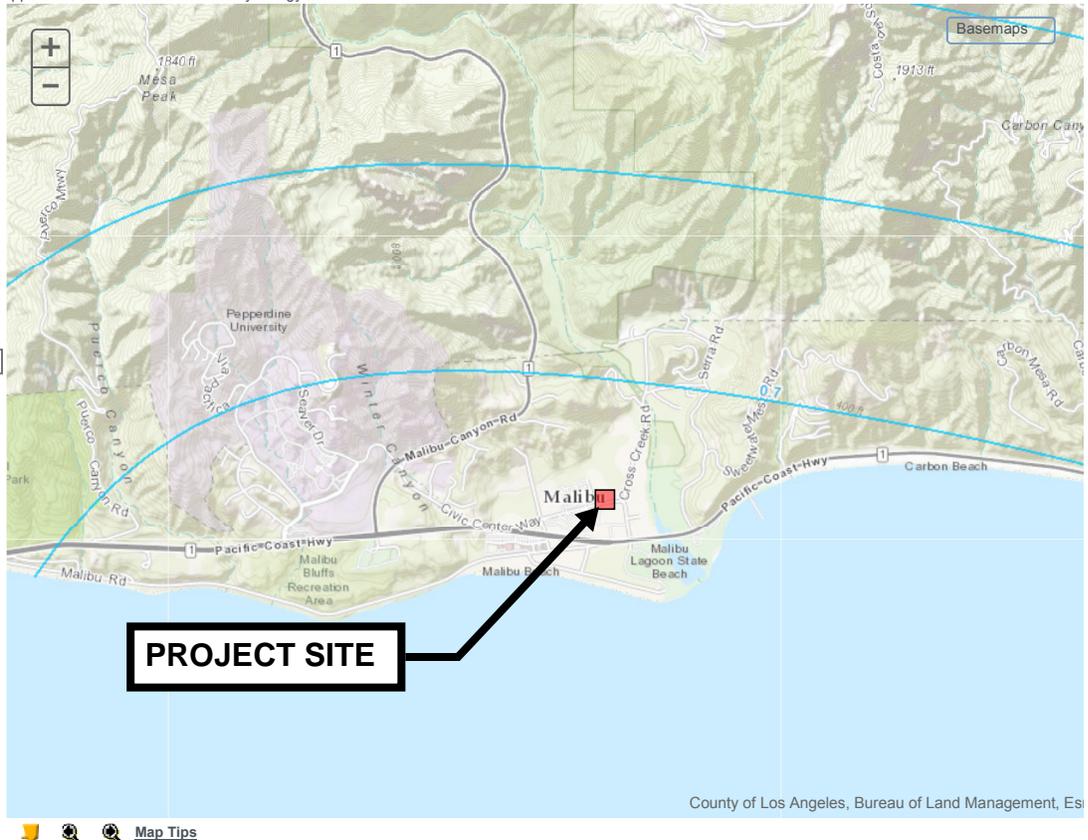


Hydrology Map A GIS viewer application to view the data for the hydrology manual.

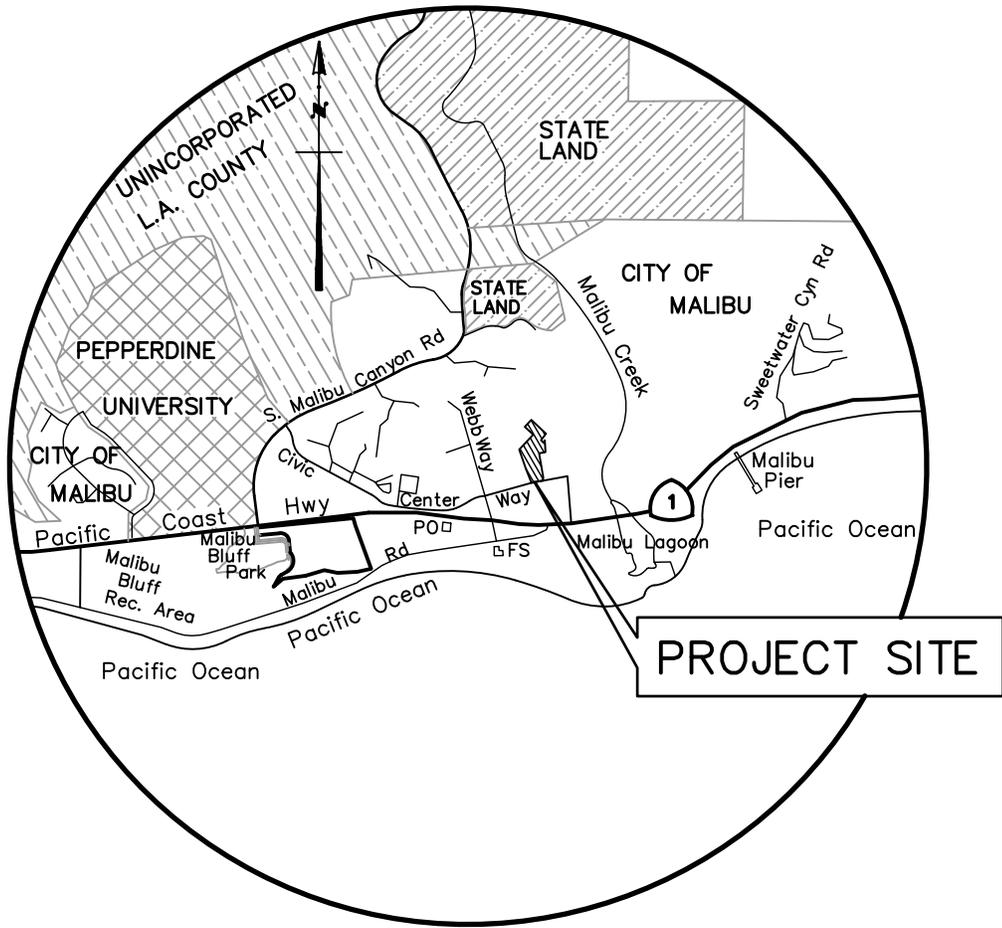
- LAYERS**
- 50yr Two Tenths (Rainfall)
 - DPA Zones
 - Soils 2004
 - Final 85th Percentile, 24-hr Rainfall
 - Final 95th Percentile, 24-hr Rainfall
 - 1-year, 1-hour Rainfall Intensity

SEARCH
 Enter Address, Cross Street, or Parcel No.:
 (ex: 900 S. Fremont Ave., Fremont@Valley, 5342005904)

Search
 Address Search Results:
23465 Civic Center Way



Appendix 2 WQMP Project Site
Location and Vicinity Map



VICINITY MAP

NOT TO SCALE

Appendix 3

WQMP Calculations

Peak Flow Hydrologic Analysis

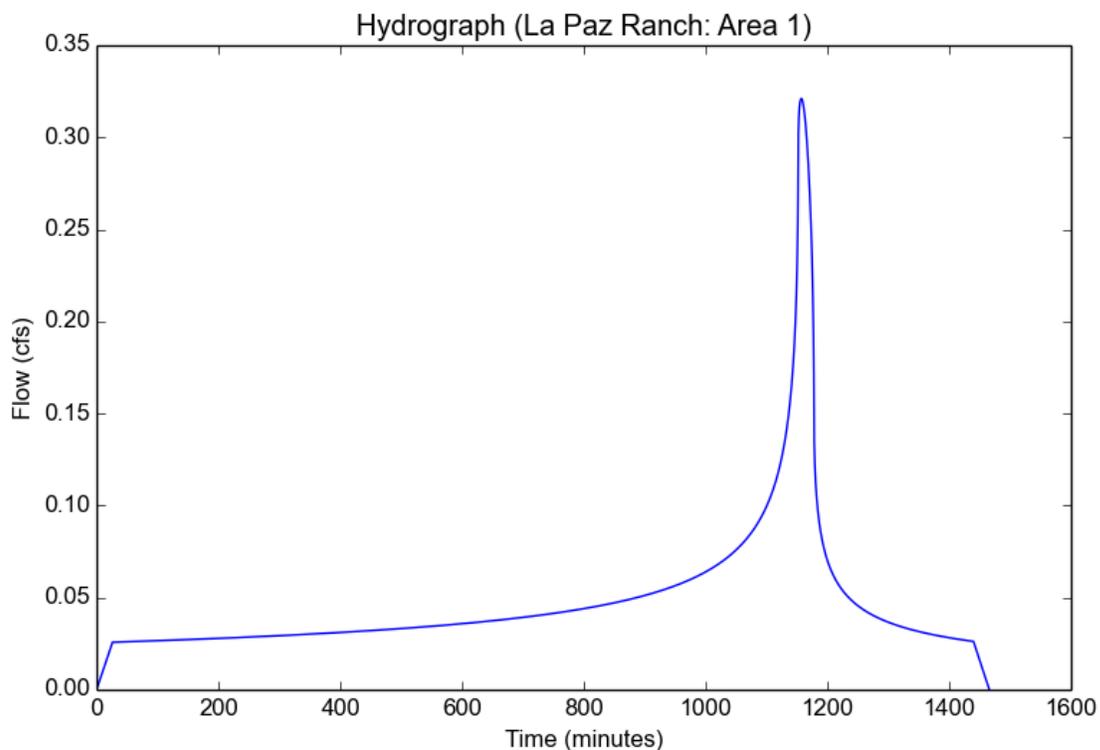
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 1
Area (ac)	1.8
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.02
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.95
Soil Type	29
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.2062
Undeveloped Runoff Coefficient (Cu)	0.2044
Developed Runoff Coefficient (Cd)	0.8652
Time of Concentration (min)	26.0
Clear Peak Flow Rate (cfs)	0.3211
Burned Peak Flow Rate (cfs)	0.3211
24-Hr Clear Runoff Volume (ac-ft)	0.096
24-Hr Clear Runoff Volume (cu-ft)	4181.2228



Peak Flow Hydrologic Analysis

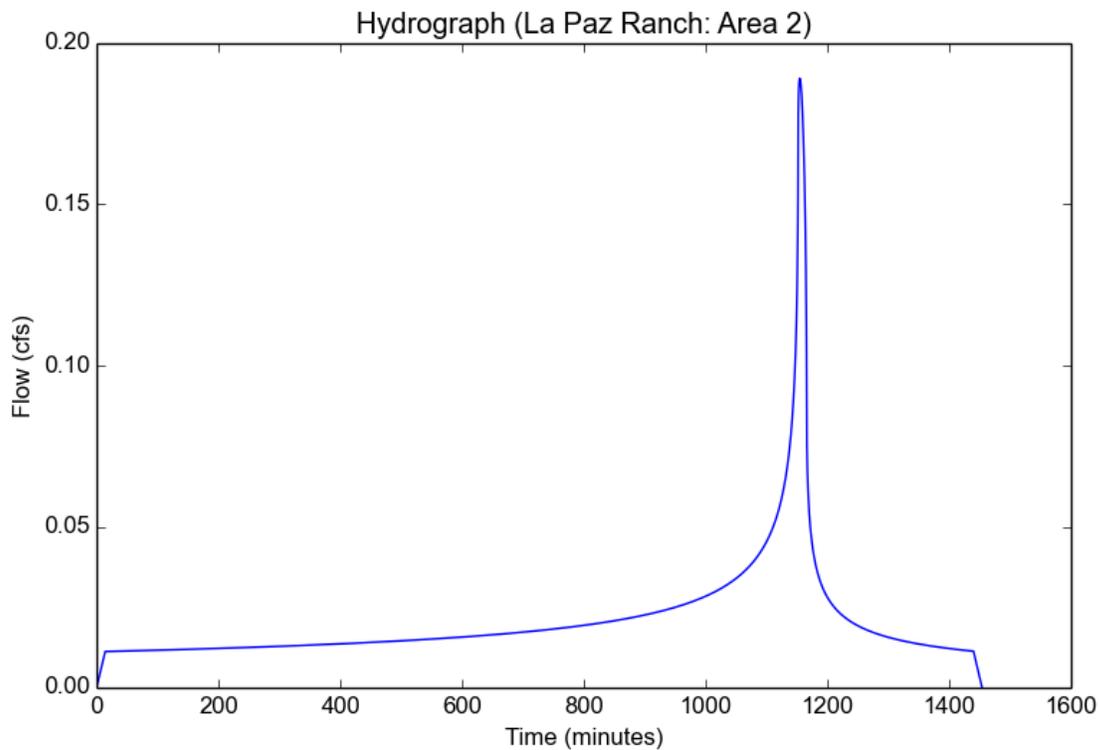
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 2
Area (ac)	0.8
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.02
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.93
Soil Type	29
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.2758
Undeveloped Runoff Coefficient (Cu)	0.289
Developed Runoff Coefficient (Cd)	0.8572
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	0.1891
Burned Peak Flow Rate (cfs)	0.1891
24-Hr Clear Runoff Volume (ac-ft)	0.0419
24-Hr Clear Runoff Volume (cu-ft)	1824.953



Peak Flow Hydrologic Analysis

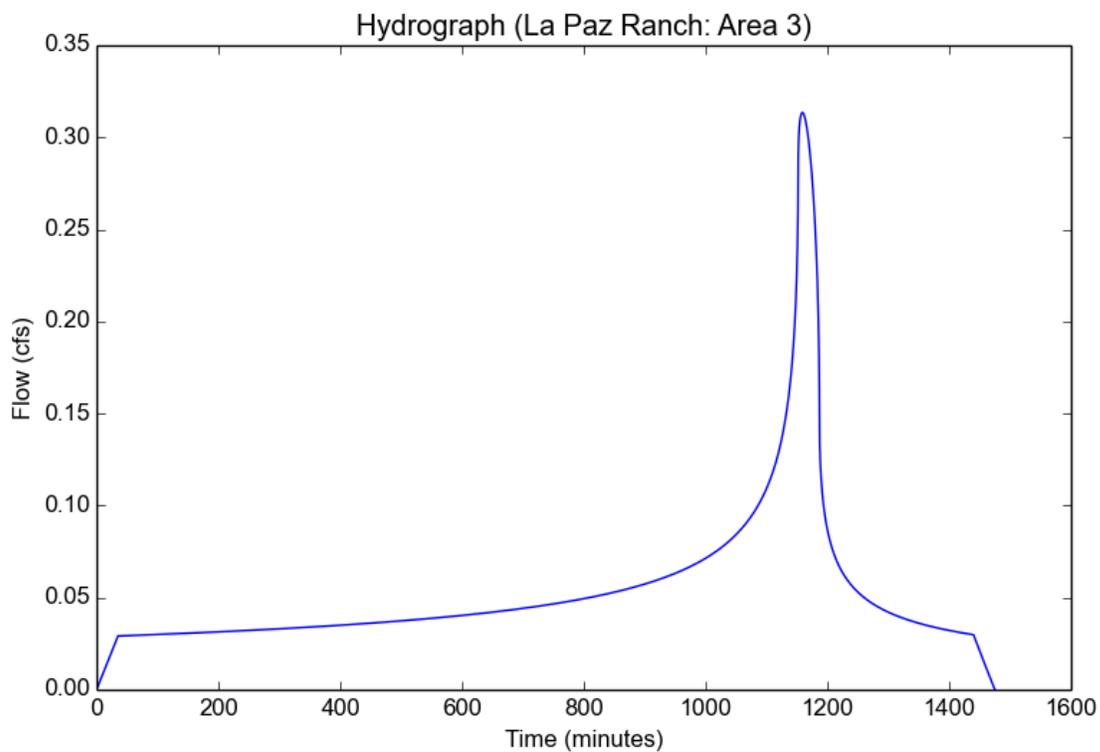
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 3
Area (ac)	3.1
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.02
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.58
Soil Type	29
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1793
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.564
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.3135
Burned Peak Flow Rate (cfs)	0.3135
24-Hr Clear Runoff Volume (ac-ft)	0.1084
24-Hr Clear Runoff Volume (cu-ft)	4720.754



Peak Flow Hydrologic Analysis

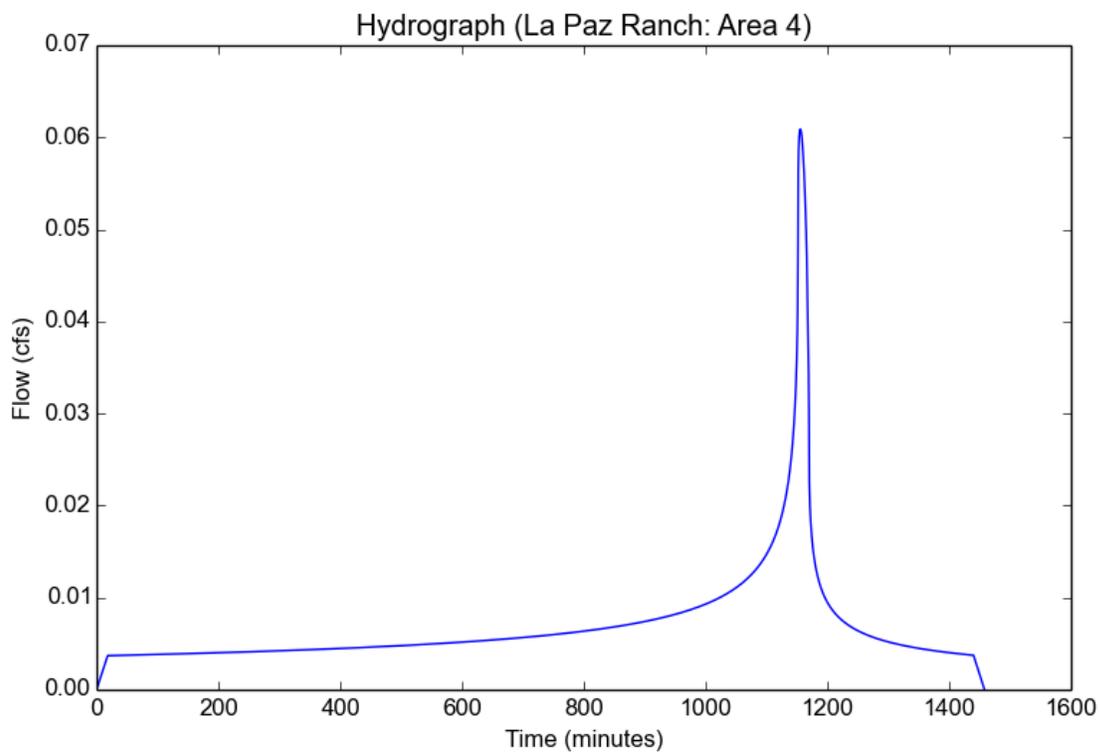
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 4
Area (ac)	0.4
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.02
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.57
Soil Type	29
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.2451
Undeveloped Runoff Coefficient (Cu)	0.2517
Developed Runoff Coefficient (Cd)	0.6212
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	0.0609
Burned Peak Flow Rate (cfs)	0.0609
24-Hr Clear Runoff Volume (ac-ft)	0.0139
24-Hr Clear Runoff Volume (cu-ft)	605.4026



Peak Flow Hydrologic Analysis

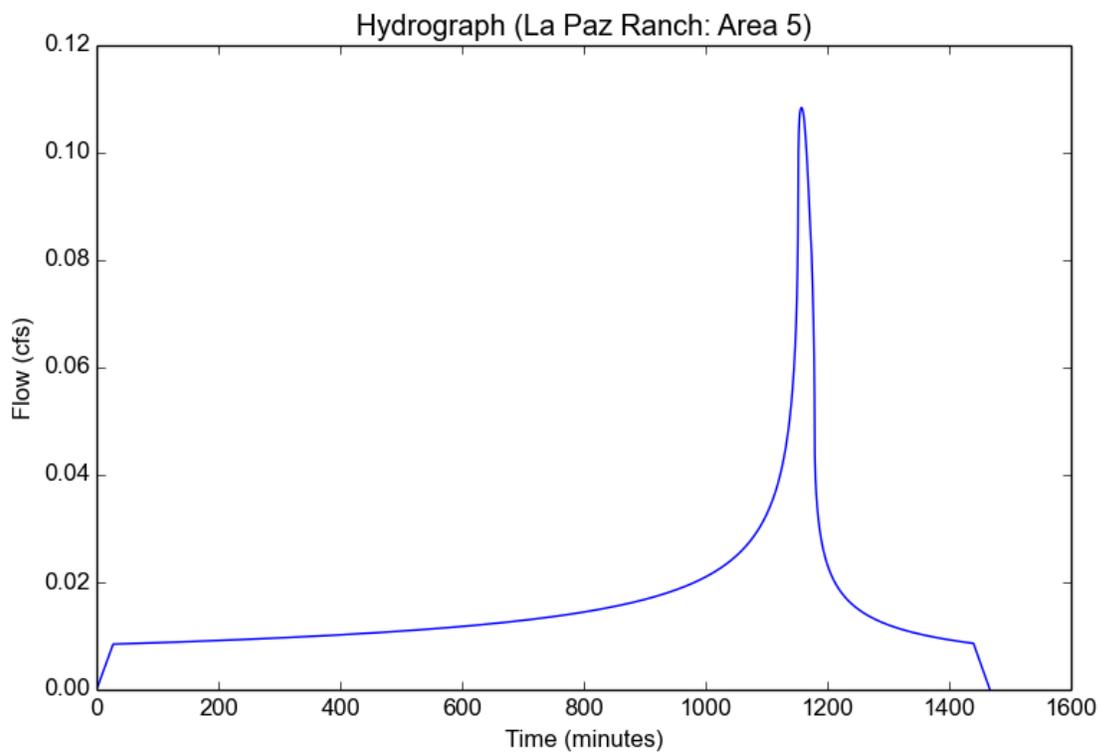
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 5
Area (ac)	0.8
Flow Path Length (ft)	400.0
Flow Path Slope (vft/hft)	0.02
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.67
Soil Type	29
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.2026
Undeveloped Runoff Coefficient (Cu)	0.2
Developed Runoff Coefficient (Cd)	0.669
Time of Concentration (min)	27.0
Clear Peak Flow Rate (cfs)	0.1084
Burned Peak Flow Rate (cfs)	0.1084
24-Hr Clear Runoff Volume (ac-ft)	0.0316
24-Hr Clear Runoff Volume (cu-ft)	1377.9274



Peak Flow Hydrologic Analysis

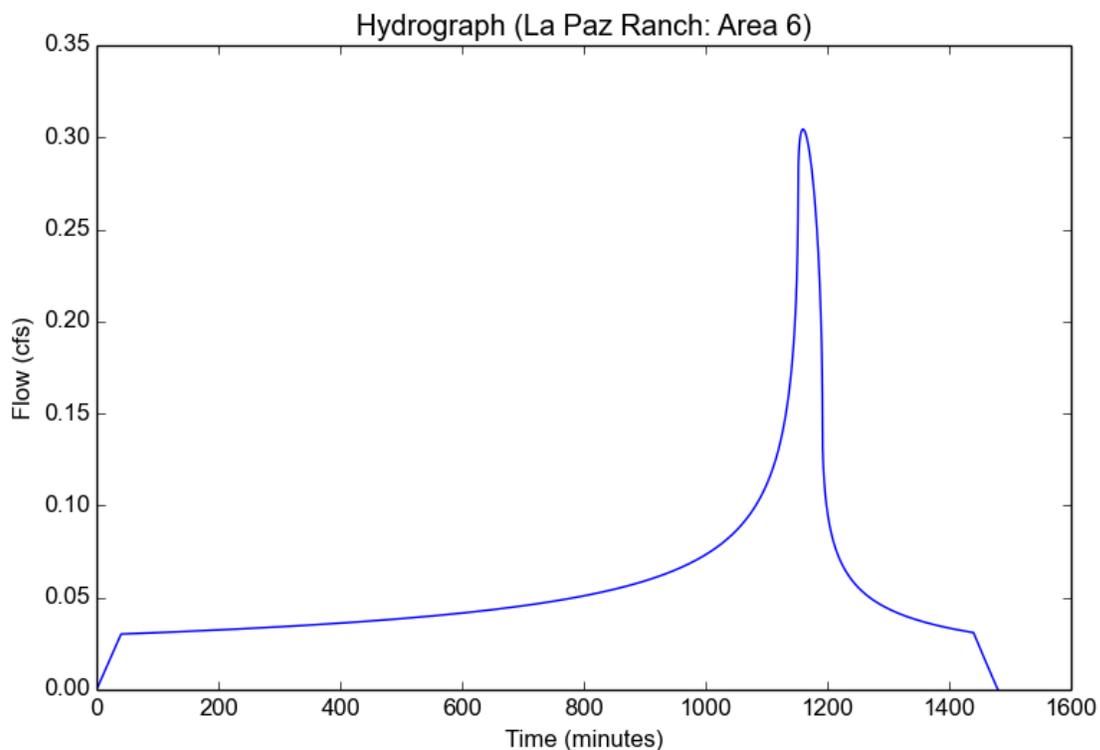
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 6
Area (ac)	4.0
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.02
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.44
Soil Type	29
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1684
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.452
Time of Concentration (min)	40.0
Clear Peak Flow Rate (cfs)	0.3044
Burned Peak Flow Rate (cfs)	0.3044
24-Hr Clear Runoff Volume (ac-ft)	0.1121
24-Hr Clear Runoff Volume (cu-ft)	4881.7003



Peak Flow Hydrologic Analysis

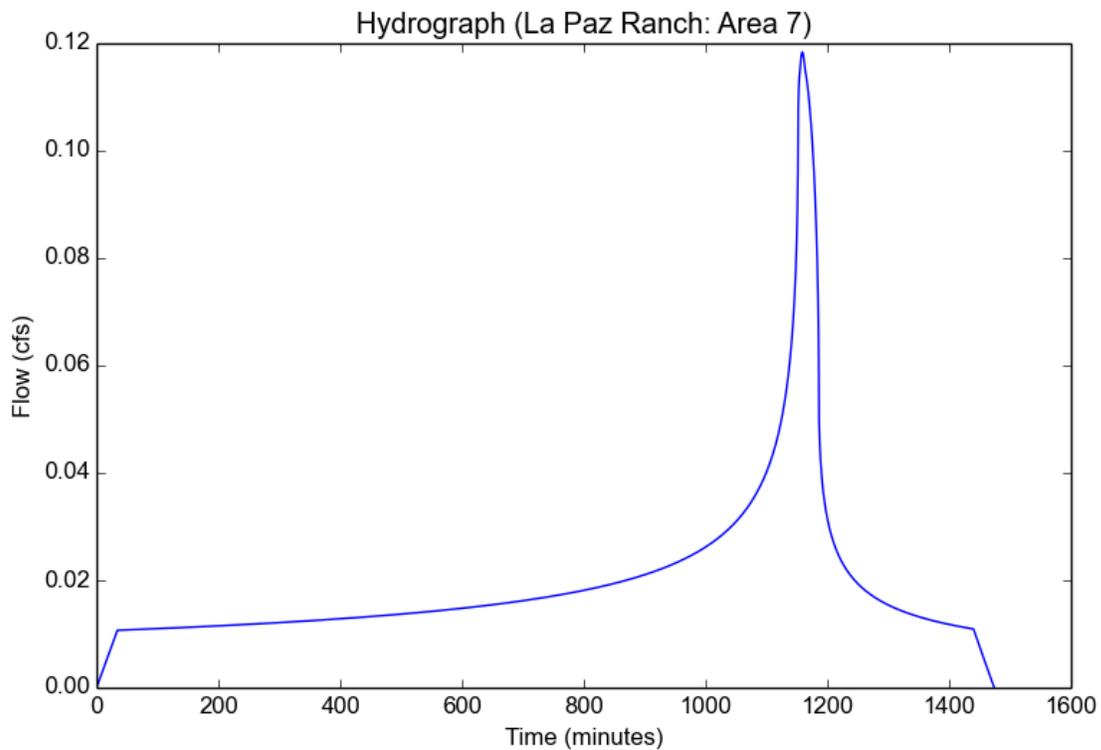
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 7
Area (ac)	1.8
Flow Path Length (ft)	300.0
Flow Path Slope (vft/hft)	0.02
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.32
Soil Type	29
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1818
Undeveloped Runoff Coefficient (Cu)	0.1085
Developed Runoff Coefficient (Cd)	0.3618
Time of Concentration (min)	34.0
Clear Peak Flow Rate (cfs)	0.1184
Burned Peak Flow Rate (cfs)	0.1184
24-Hr Clear Runoff Volume (ac-ft)	0.0397
24-Hr Clear Runoff Volume (cu-ft)	1730.7531



Peak Flow Hydrologic Analysis

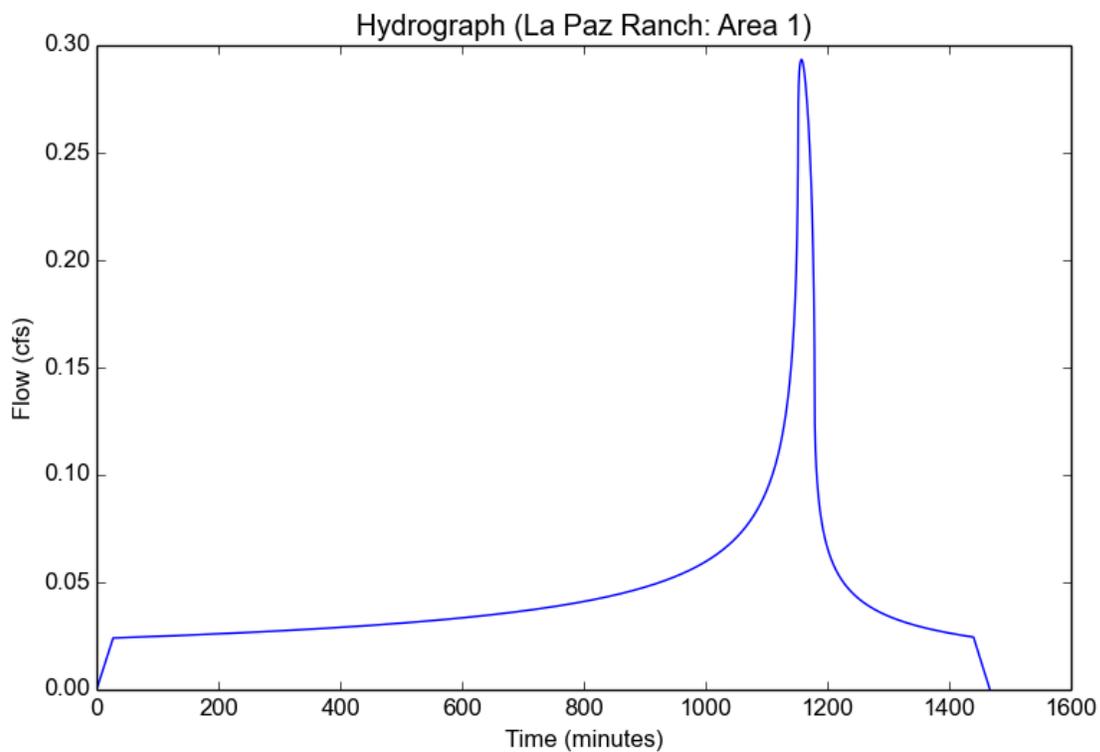
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 1
Area (ac)	1.8
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.95
Soil Type	29
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.189
Undeveloped Runoff Coefficient (Cu)	0.1438
Developed Runoff Coefficient (Cd)	0.8622
Time of Concentration (min)	27.0
Clear Peak Flow Rate (cfs)	0.2934
Burned Peak Flow Rate (cfs)	0.2934
24-Hr Clear Runoff Volume (ac-ft)	0.0896
24-Hr Clear Runoff Volume (cu-ft)	3901.3778



Peak Flow Hydrologic Analysis

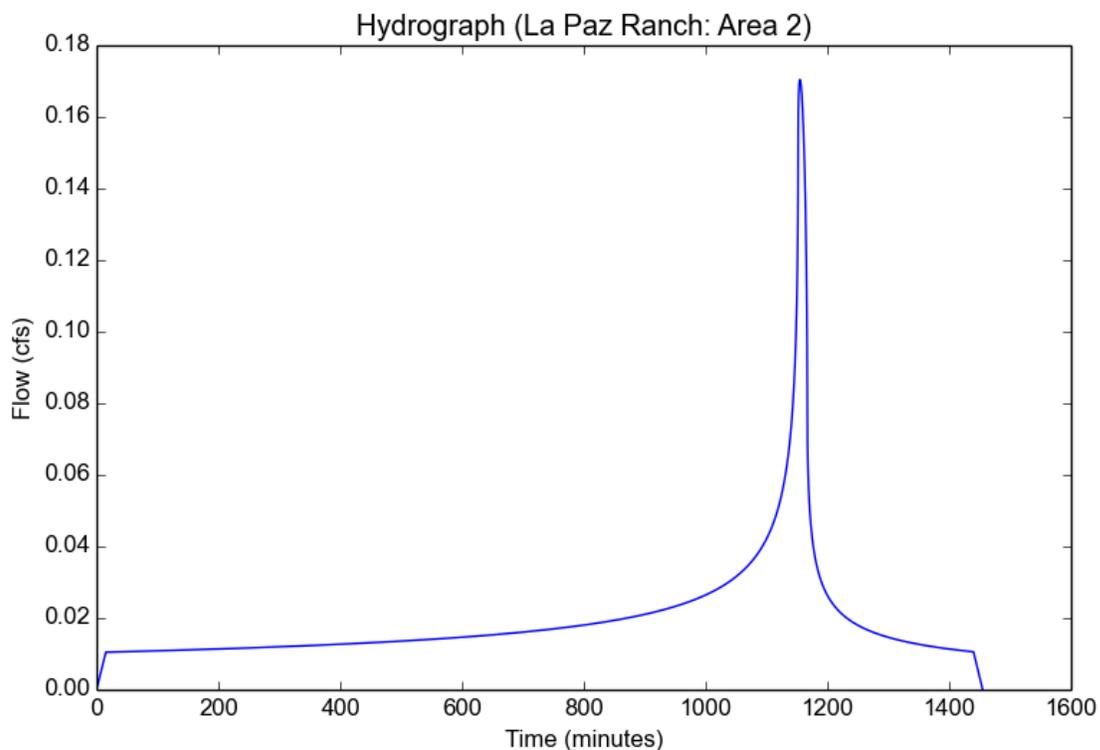
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 2
Area (ac)	0.8
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.93
Soil Type	29
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.2492
Undeveloped Runoff Coefficient (Cu)	0.2567
Developed Runoff Coefficient (Cd)	0.855
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	0.1704
Burned Peak Flow Rate (cfs)	0.1704
24-Hr Clear Runoff Volume (ac-ft)	0.0391
24-Hr Clear Runoff Volume (cu-ft)	1702.9322



Peak Flow Hydrologic Analysis

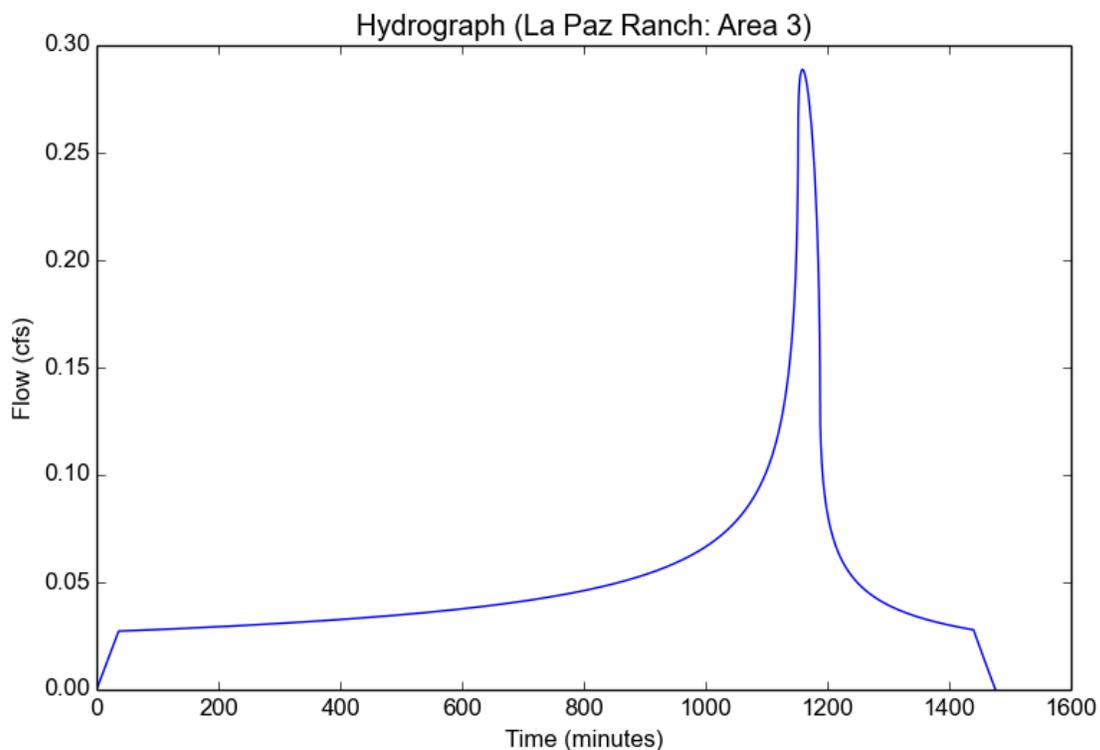
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 3
Area (ac)	3.1
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.58
Soil Type	29
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1651
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.564
Time of Concentration (min)	36.0
Clear Peak Flow Rate (cfs)	0.2887
Burned Peak Flow Rate (cfs)	0.2887
24-Hr Clear Runoff Volume (ac-ft)	0.1011
24-Hr Clear Runoff Volume (cu-ft)	4406.0411



Peak Flow Hydrologic Analysis

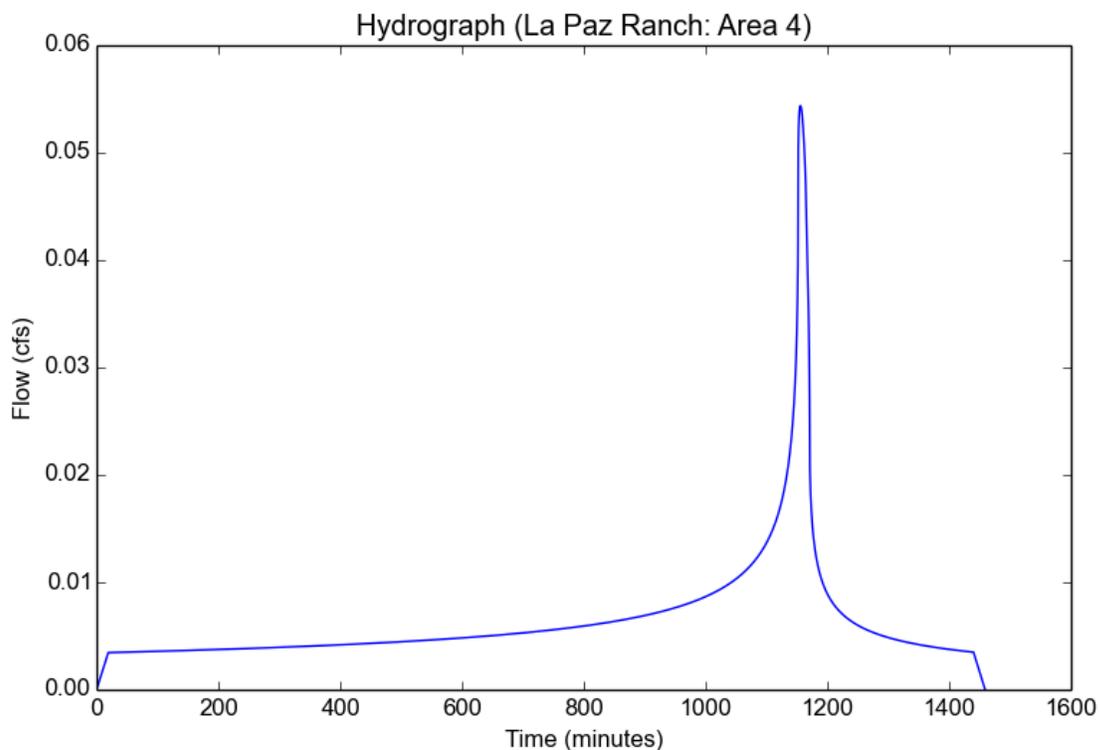
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 4
Area (ac)	0.4
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.57
Soil Type	29
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.223
Undeveloped Runoff Coefficient (Cu)	0.2248
Developed Runoff Coefficient (Cd)	0.6097
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	0.0544
Burned Peak Flow Rate (cfs)	0.0544
24-Hr Clear Runoff Volume (ac-ft)	0.0129
24-Hr Clear Runoff Volume (cu-ft)	563.9306



Peak Flow Hydrologic Analysis

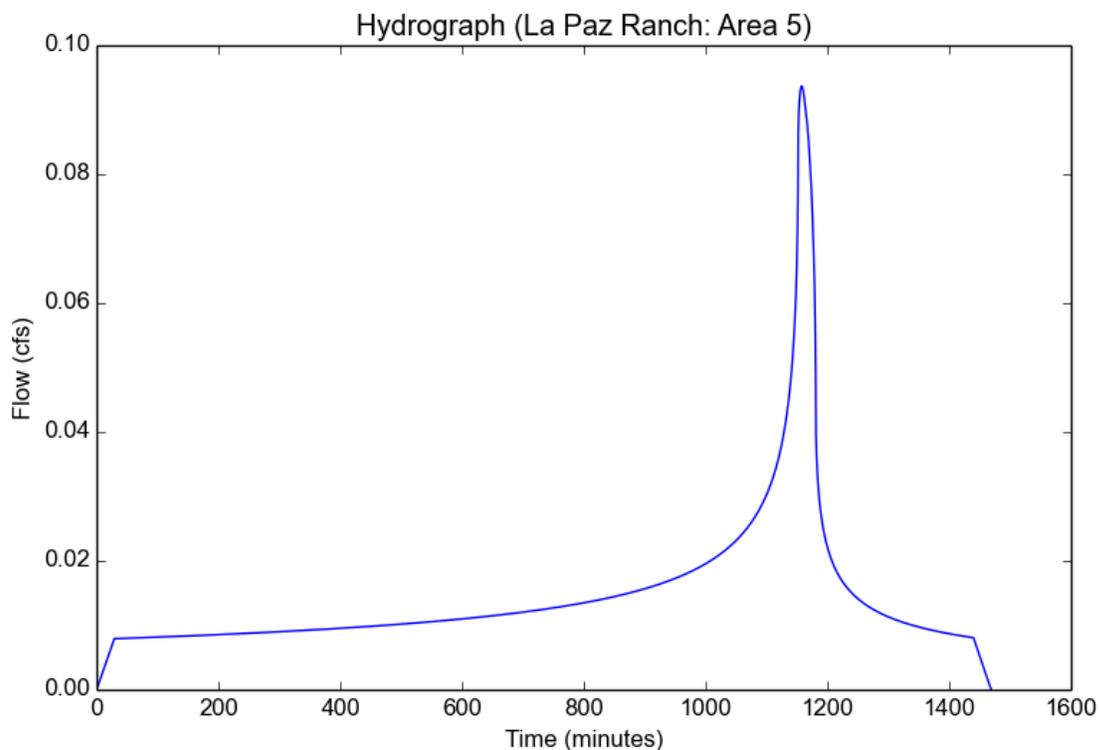
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 5
Area (ac)	0.8
Flow Path Length (ft)	400.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.67
Soil Type	29
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1828
Undeveloped Runoff Coefficient (Cu)	0.1136
Developed Runoff Coefficient (Cd)	0.6405
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.0937
Burned Peak Flow Rate (cfs)	0.0937
24-Hr Clear Runoff Volume (ac-ft)	0.0294
24-Hr Clear Runoff Volume (cu-ft)	1282.4004



Peak Flow Hydrologic Analysis

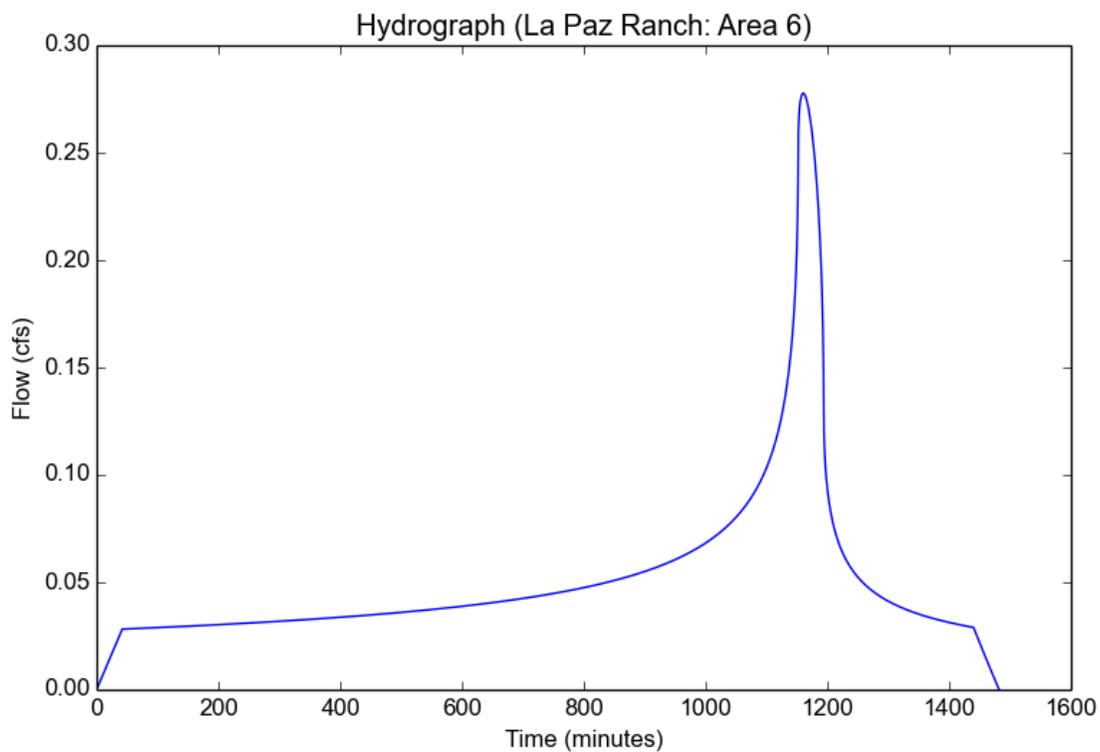
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 6
Area (ac)	4.0
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.44
Soil Type	29
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1536
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.452
Time of Concentration (min)	42.0
Clear Peak Flow Rate (cfs)	0.2777
Burned Peak Flow Rate (cfs)	0.2777
24-Hr Clear Runoff Volume (ac-ft)	0.1046
24-Hr Clear Runoff Volume (cu-ft)	4556.2633



Peak Flow Hydrologic Analysis

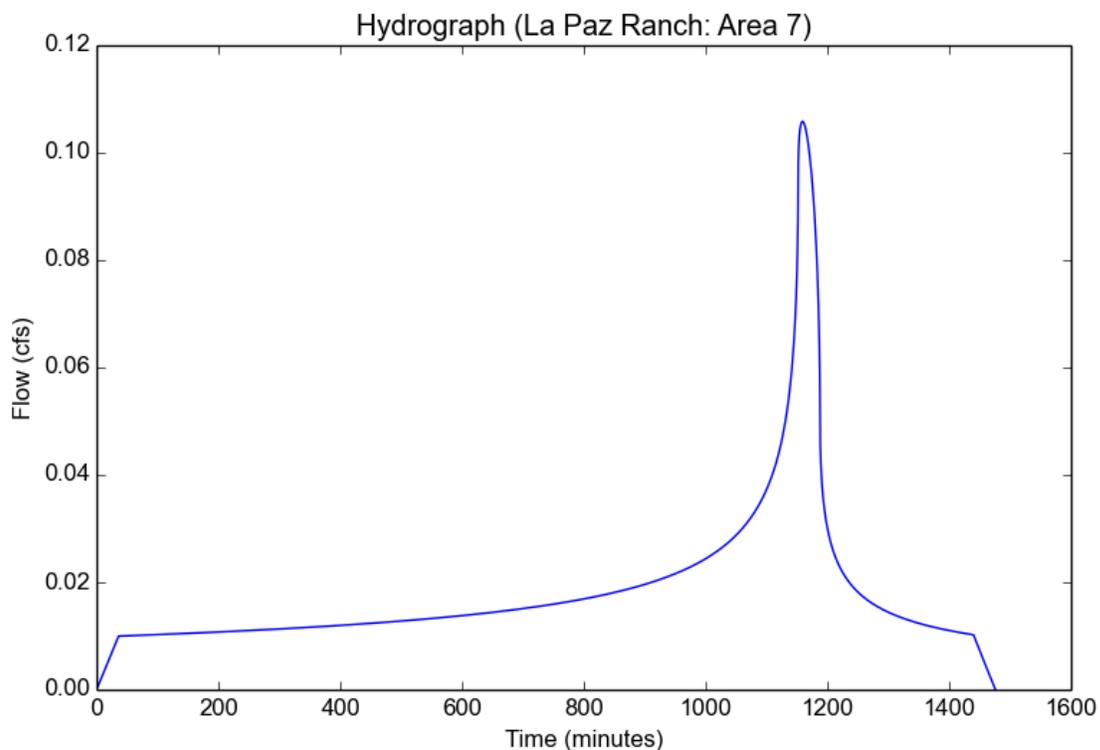
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Version: HydroCalc 0.3.1

Input Parameters

Project Name	La Paz Ranch
Subarea ID	Area 7
Area (ac)	1.8
Flow Path Length (ft)	300.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.32
Soil Type	29
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1651
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.356
Time of Concentration (min)	36.0
Clear Peak Flow Rate (cfs)	0.1058
Burned Peak Flow Rate (cfs)	0.1058
24-Hr Clear Runoff Volume (ac-ft)	0.0371
24-Hr Clear Runoff Volume (cu-ft)	1614.8428

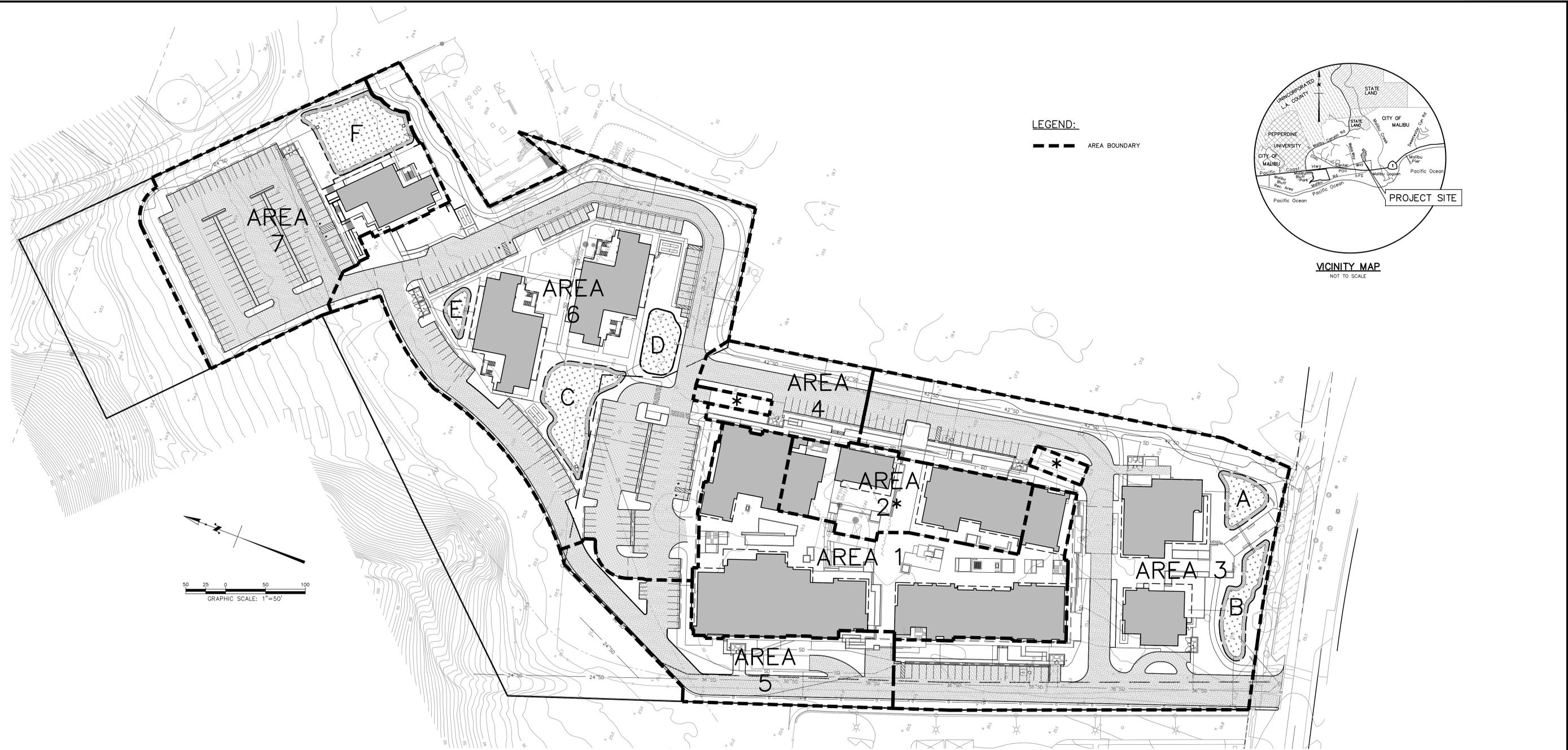


Appendix 4 Site Plans

Existing Condition

Proposed Condition

WQMP Site Plan – See Binder Pocket



Area ID	Area [ft ²]	Area [acre]	Impervious Area [ft ²]	Pervious Area [ft ²]	Percent Impervious [%]	Malibu Required Detention [cf]	85th Percentile Storage Volume [cf]	0.75" Storm Event Storage Volume [cf]
1	76,876	1.8	72,983	3,893	95	6,244	3,902	4,182
2	33,379	0.8	30,877	2,502	93	2,678	1,703	1,825
3	132,896	3.1	76,515	56,381	58	8,726	4,407	4,721
4	19,290	0.4	10,996	8,294	57	1,262	564	606
5	35,085	0.8	23,493	11,592	67	2,441	1,283	1,378
6	173,396	4.0	77,068	96,328	44	10,436	4,557	4,882
7	77,975	1.8	25,049	52,926	32	4,293	1,615	1,731
TOTAL:						36,080	18,031	19,325

Biofiltration	Storage Volume (1.5' ponding) [cf]
A	3,598
B	5,134
C	10,116
D	4,701
E	1,579
F	11,692
TOTAL:	36,820

WQMP EXHIBIT P S O M A S

DATE: 9-19-2017 REVISED ON:
JOB No:1MAR590100

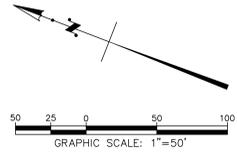
C2.4
C3.4

C2.1
C3.1

C2.3
C3.3

C2.2
C3.2

CIVIC CENTER WAY



PSOMAS
 555 South Flower Street, Suite 4400
 Los Angeles, CA 90071
 (213) 223-4000 (213) 223-1444 fax
 www.psomas.com

LA PAZ RANCH
 23465 CIVIC CENTER WAY
 MALIBU, CA 90265

KEY MAP

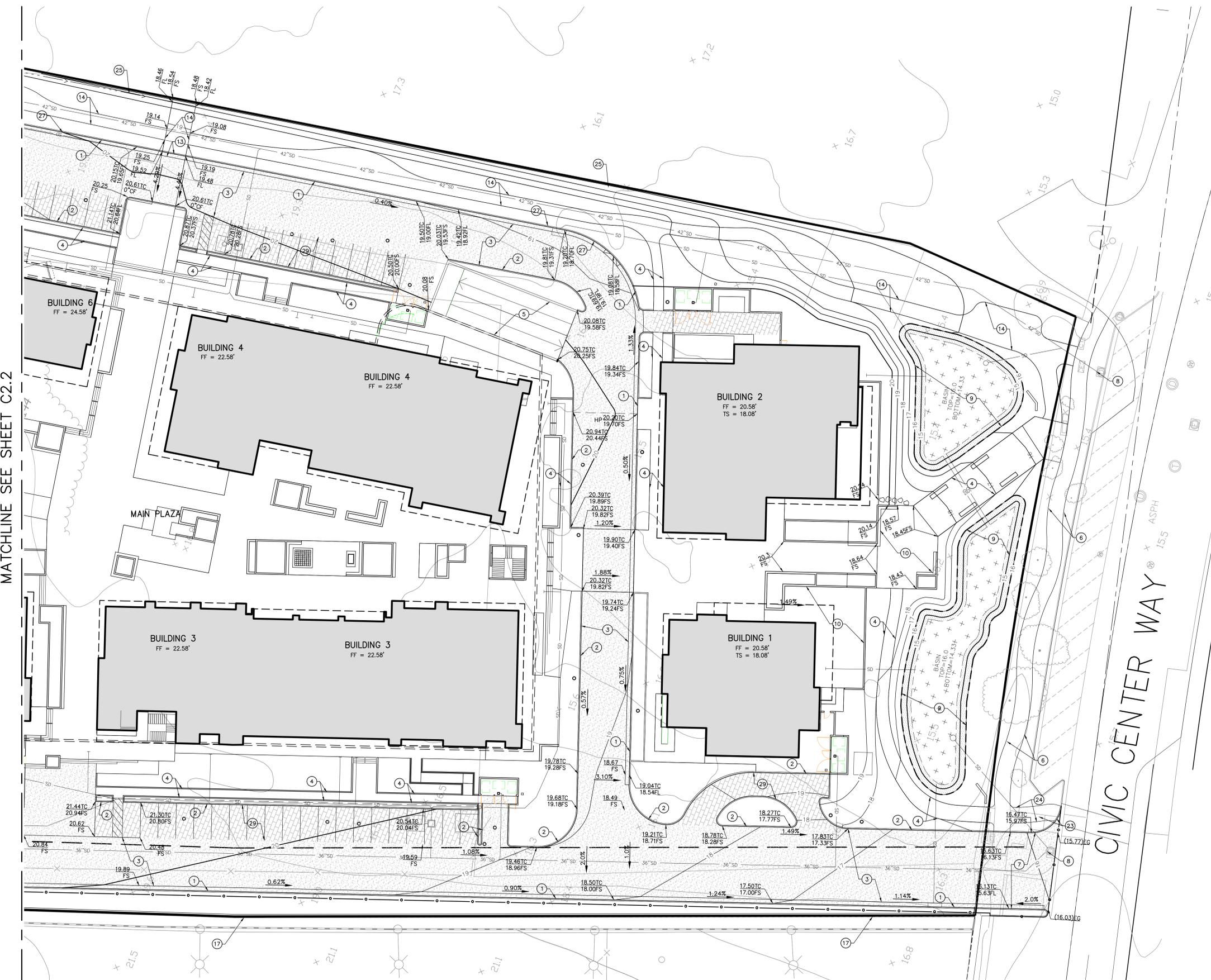
12/09/16 100% SD
 9/19/17



C2.0

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MATCHLINE SEE SHEET C2.2



CONSTRUCTION NOTES:

- 1 CONSTRUCT CONCRETE CURB AND GUTTER.
- 2 CONSTRUCT CONCRETE CURB.
- 3 CONSTRUCT ASPHALT CONCRETE PAVEMENT PER DETAIL 6 ON SHEET C2.5.
- 4 CONSTRUCT WALKWAY.
- 5 CONSTRUCT RAMP TO UNDERGROUND PARKING.
- 6 EXISTING PUBLIC WALK.
- 7 PROPOSED DRIVEWAY PER STREET IMPROVEMENT PLAN.
- 8 RECONSTRUCT EXISTING CATCH BASIN PER STREET IMPROVEMENT PLAN.
- 9 BIOFILTRATION AREA PER DETAIL 1 ON SHEET C2.5.
- 10 CONSTRUCT CONCRETE PATIO.
- 11 CONSTRUCT RETAINING WALL.
- 13 CONSTRUCT CONCRETE LONGITUDINAL GUTTER.
- 14 CONSTRUCT HORSE TRAIL PER LANDSCAPE PLANS.
- 17 EXISTING WALL. PROTECT IN PLACE.
- 18 CONSTRUCT CONCRETE STAIRS.
- 20 CONSTRUCT CONCRETE SWALE.
- 22 GRADED BERM FOR DRAINAGE PROTECTION.
- 23 CONSTRUCT CURB RAMP PER STREET IMPROVEMENT PLAN.
- 24 CONSTRUCT WALKWAY IMPROVEMENT PLAN.
- 25 CONSTRUCT DIRT SWALE.
- 26 CONSTRUCT ADA RAMP WITH RAILING PER ARCHITECTURAL PLANS.
- 27 CONSTRUCT RETAINING CURB PER DETAIL 5 ON SHEET C2.5.
- 29 PERMEABLE AC PAVEMENT.

LEGEND:

-  AC PAVEMENT
-  PERMEABLE AC PAVEMENT

PSOMAS
 23465 Civic Center Way
 Malibu, CA 90265
 (310) 223-1400
 www.psomas.com

LA PAZ RANCH
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 MALIBU, CA 90265

GRADING PLAN

12/09/16 100% SD
 9/19/17

C2.1

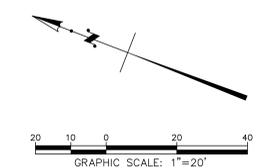
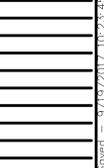


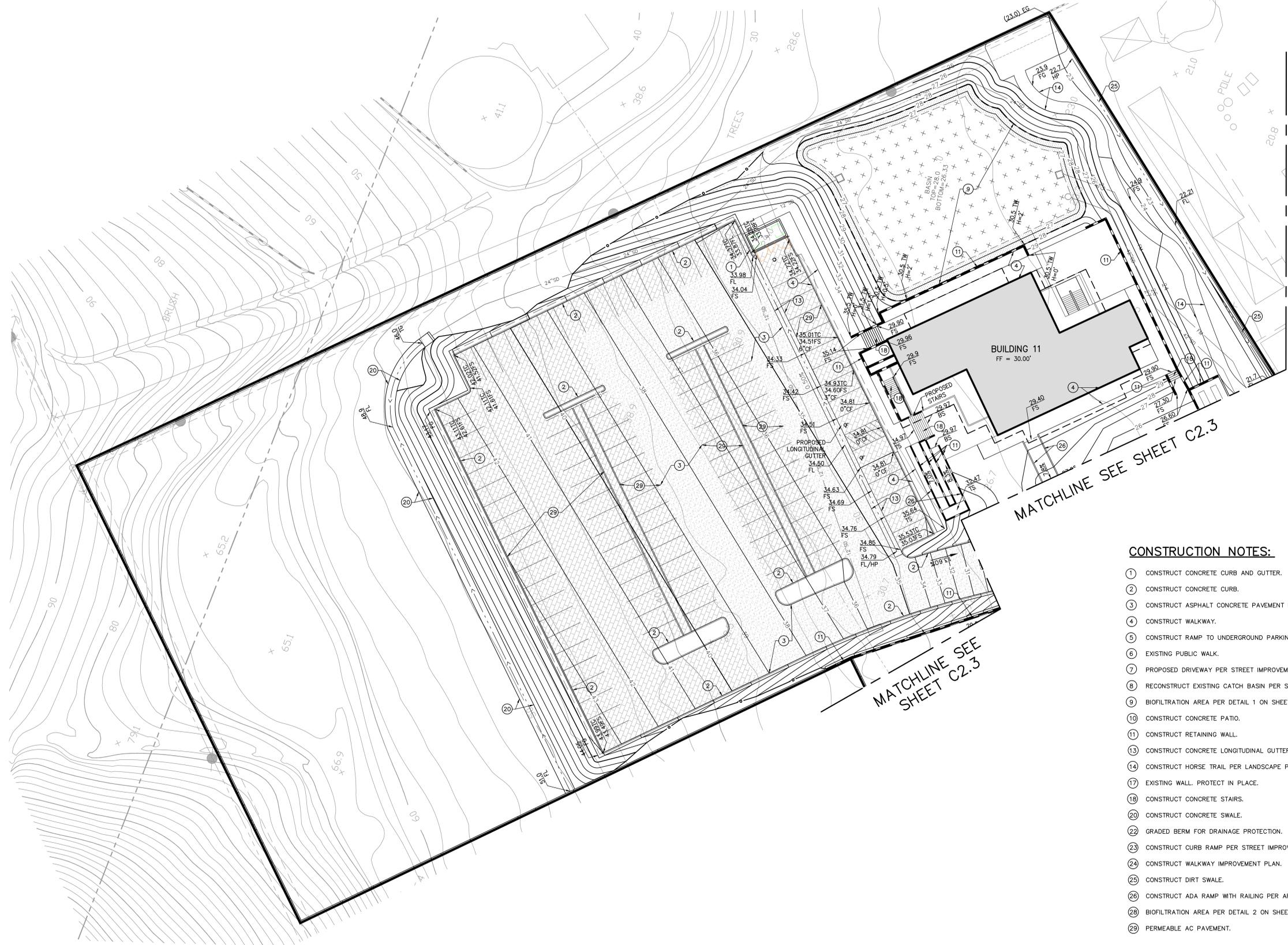
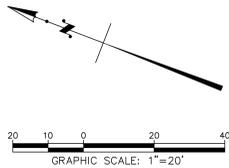
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- ⑨ BIOFILTRATION AREA PER DETAIL 1 ON SHEET C2.5.
- ⑩ CONSTRUCT CONCRETE PATIO.
- ⑪ CONSTRUCT RETAINING WALL.
- ⑬ CONSTRUCT CONCRETE LONGITUDINAL GUTTER.
- ⑭ CONSTRUCT HORSE TRAIL PER LANDSCAPE PLANS.
- ⑰ EXISTING WALL. PROTECT IN PLACE.
- ⑱ CONSTRUCT CONCRETE STAIRS.
- ⑳ CONSTRUCT CONCRETE SWALE.
- ㉑ GRADED BERM FOR DRAINAGE PROTECTION.
- ㉒ CONSTRUCT CURB RAMP PER STREET IMPROVEMENT PLAN.
- ㉔ CONSTRUCT WALKWAY IMPROVEMENT PLAN.
- ㉕ CONSTRUCT DIRT SWALE.
- ㉖ CONSTRUCT ADA RAMP WITH RAILING PER ARCHITECTURAL PLANS.
- ㉘ BIOFILTRATION AREA PER DETAIL 2 ON SHEET C2.5.
- ㉙ PERMEABLE AC PAVEMENT.

LEGEND:

-  AC PAVEMENT
-  PERMEABLE AC PAVEMENT





MATCHLINE SEE SHEET C2.3

MATCHLINE SEE SHEET C2.3

MATCHLINE SEE SHEET C2.3

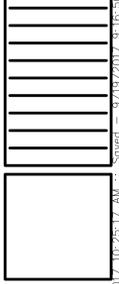
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- ① CONSTRUCT CONCRETE CURB AND GUTTER.
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- ㉖ BIOFILTRATION AREA PER DETAIL 2 ON SHEET C2.5.
- ㉗ PERMEABLE AC PAVEMENT.

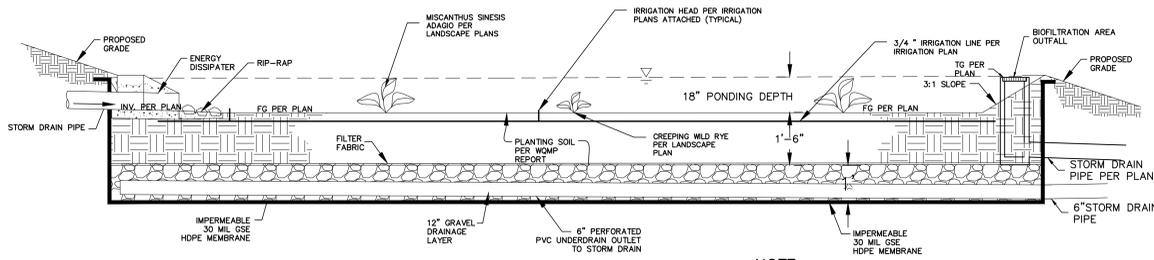
LEGEND:

-  AC PAVEMENT
-  PERMEABLE AC PAVEMENT

12/09/16 100% SD
 9/19/17



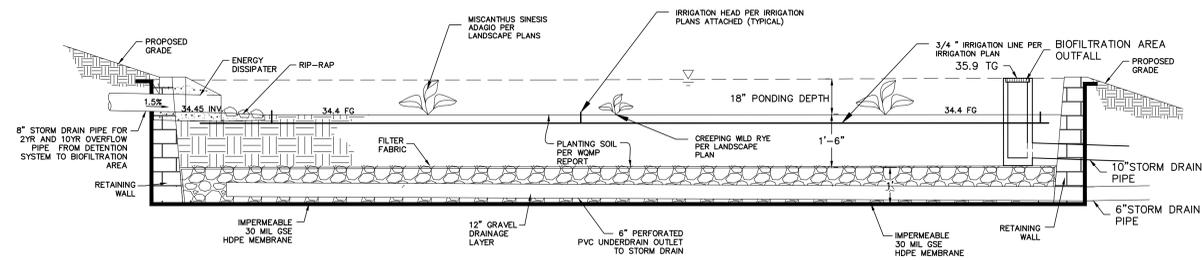
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1 BIOFILTRATION AREA DETAIL
NOT TO SCALE

NOTE:

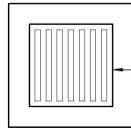
1. BIOFILTRATION PLANTER SOIL WILL CONSIST OF A MIX OF 60 TO 80% SAND, 20 TO 40% COMPOST, AND 10 TO 20% CLEAN TOPSOIL. THE ORGANIC CONTENT OF THE SOIL MIXTURE SHALL BE 8% TO 12%. BIOFILTRATION PLANTER SOIL WILL ACHIEVE A LONG-TERM, IN-PLACE INFILTRATION OF AT LEAST 5 INCHES PER HOUR.
2. PLANTING DETAILS PER IRRIGATION PLANS ATTACHED.
3. IRRIGATION DETAILS PER IRRIGATION PLANS ATTACHED.



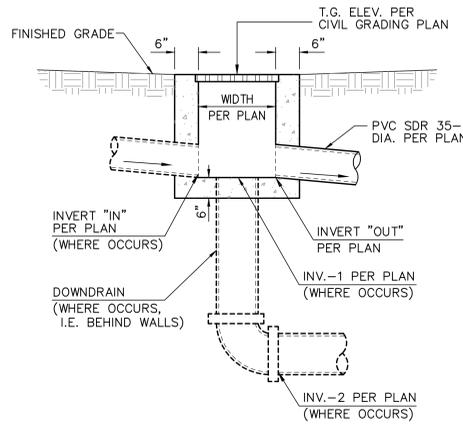
2 BIOFILTRATION AREA DETAIL
NOT TO SCALE

NOTE:

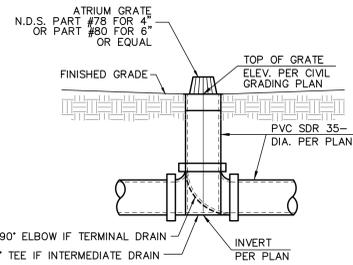
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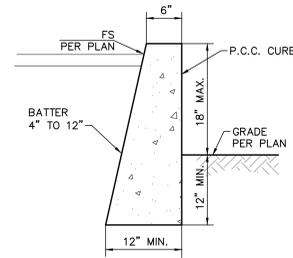
AREA DRAIN WITH GRATE PER ALHAMBRA FOUNDRY, MODEL NO. A-2010 WHERE NON-TRAFFIC OR MODEL NO. A-2012 WHERE TRAFFIC, OR APPROVED EQUALS. SIZE PER PLAN



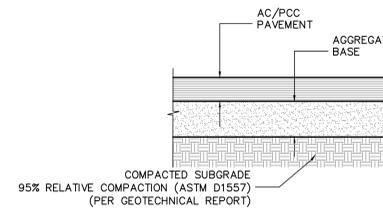
3 AREA DRAIN DETAIL
NOT TO SCALE



4 ATRIUM PLANTER DRAIN DETAIL
NOT TO SCALE



5 RETAINING CURB DETAIL
NOT TO SCALE



6 ASPHALT CONCRETE PAVEMENT DETAIL
NOT TO SCALE

Appendix 5 Covenant and Agreement (C & A)

Master C&A

WHEN RECORDED, RETURN TO:

City of Malibu
Attention: City Clerk
23825 Stuart Ranch Road
Malibu, California 90265

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

COVENANT TO IMPLEMENT WATER QUALITY MITIGATION PLAN AND TO MAINTAIN DRAINAGE FACILITIES

Malibu Development Company, LLC (Owner) owns certain real property commonly known as 23465 Civic Center Way, Malibu, California 90265, APN _____ which is legally described in Exhibit A, attached hereto and incorporated herein by this reference (Property).

Owner has applied to the City of Malibu for entitlements necessary to develop agricultural and/or confined animal improvements on the Property.

The City has approved, subject to certain conditions, development permit(s) commercial that require(s) the provision of a Water Quality Mitigation Plan for Agricultural and Confined Animal Facility Development (WQMP-Ag) incorporated herein by this reference (Plan) addressing appropriate best management practices and site design as outlined in the City of Malibu Local Coastal Plan (LCP) Local Implementation Plan (LIP) Section 17.3.5(A) and may include a storm drain retention system and/or drainage treatment facilities on the Property.

As a condition of the above-referenced development permit(s), the Owner has agreed to execute and record a covenant to implement best management practices and site design in order to minimize or prevent polluted runoff and water quality impacts potentially resulting from the development and maintain any applicable storm drain retention system or drain treatment facilities on the Property, as hereinafter defined, in good working order into perpetuity.

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, the Owner agrees as follows:

1. Owner hereby accepts full responsibility for implementing the Plan and maintaining any drainage facilities depicted on Exhibit B, attached hereto (Facilities), in good working order, in perpetuity.
2. Owner hereby acknowledges and understands that the failure to properly implement the Plan and maintain the Facilities may result in flooding, property damage, unlawful discharge of pollutants to a downstream watershed, and other potentially serious problems.
3. Owner Obligations. Owner covenants and agrees to:
 - a. Take all necessary steps to ensure that the Plan is implemented and Facilities are maintained in good working order at all times.

- b. Perform routine inspection of and maintenance on the Facilities including, but not limited to, a full site inspection of the property and its points of discharge for runoff to determine effectiveness of the Plan including determination whether amendments need to be made to the Plan, and cleaning and removal of accumulated sediment and annual maintenance during the 90-days prior to the beginning of the rainy season (July 1st to October 1st).
 - c. Dispose of any accumulated sediment in an approved landfill.
 - d. Clean and flush the drainage pipes, as necessary, within the Facilities.
 - e. Have the Facilities inspected annually by a qualified licensed contractor, familiar with water quality issues and the Plan as approved by the City, who shall certify that the Facilities have been inspected and are in good working order, or, if not, list the remedial work recommended to be undertaken to place the Facilities in good working order. In the event any such work is recommended by the licensed contractor, Owner shall notify the City's Public Works Director of the precise nature of the recommended remedial work and Owner shall cause such work to be completed by a qualified licensed contractor within 30 days of the discovery of the need for remedial work or amendments. IF the Public Works Director determines that the condition of the Facilities poses an imminent threat to public health and safety, or to the environment generally, shorter time limits may be imposed. The facility to complete all required amendments and/or remedial work within the allotted time period will constitute an ongoing violation of the Coastal Act and this covenant.
 - f. Annually submit to the City Engineer, using the Certification Form attached hereto as Exhibit C, such certifications by a qualified licensed contractor prior to October 15th.
 - g. Provide any transferee of the Property with the plans of the Facilities and records of inspection in escrow upon transfer of the Property.
4. The foregoing covenants and agreements shall run with the land and be binding on the heirs, successors and assigns of Owner and inure the benefit of the City.
 5. In the event that Owner fails to timely perform any of the Owner Obligations set forth in this Covenant, City may, at its option, perform or cause to be performed any and all work required to bring the Facilities into compliance with the Owner Obligations, including, but not limited to, any maintenance, upgrades, repairs or inspections. What constitutes "timely" performance by Owner shall be left to the sole discretion of the City's Public Works Director. In the event that City exercises its authority to perform any of Owner's obligations hereunder, Owner agrees to reimburse City in full for all costs incurred in the performance of those obligations within 30 days of receiving a written itemized demand for payment from the City. If not paid in full within the 30-day period, the full amount of the City's demand left outstanding shall constitute a lien on the Property. The City may also cause the amount due to the City together with interest at a maximum legal rate to be charged to the Owner on the next regular tax bill.
 6. Owner agrees to indemnify and hold harmless the City from any and all liability arising from Owner's failure to timely perform any of the Owner Obligations identified herein. City shall have its choice of counsel in any such action or proceeding.
 7. In addition to any other available remedy at law or in equity, this Covenant may be enforced by the City in an action for specific performance. Owner agrees to pay attorney's fees and costs incurred by the City in any action proceeding brought to enforce this Covenant.

OWNER:

Malibu Development Company, LLC

Print Owner's Name

Owner's Signature

Date

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA

County of _____

On _____, before me, _____
(insert name and title of officer)

personally appeared _____
who provided to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, execute the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (SEAL)

CITY OF MALIBU

By: Rob DuBoux
Assistant Public Works Director

Date

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
County of Los Angeles

On _____, before me, Heather Glaser, City Clerk for the City of Malibu, personally appeared Rob DuBoux, Assistant Public Works Director, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

HEATHER GLASER, City Clerk
(seal)

EXHIBIT C

CERTIFICATE OF ANNUAL INSPECTION AND MAINTENANCE OF
STORM DRAIN DETENTION/TREATMENT FACILITY

Property Address: 23465 Civic Center Way

Name of Property Owner: _____

Type of Development: _____

Type of Drainage Facility: _____

Inspected by: _____

California Contractor's License No.: _____

Date of Inspection: _____

Condition of Facility: _____

Recommended Maintenance: _____

Recommended Date of Completion: _____

Approximate quantity of sediment/debris removed: _____

WQMP-Ag Implementation Findings: _____

WQMP-Ag Proposed Amendments: _____

I hereby certify that the WQMP-Ag and Facility, including any Storm Drain Treatment/Detention Facility was inspected, cleaned (as necessary), and put in good working order.

Signature of Licensed Contractor: _____ Date: _____

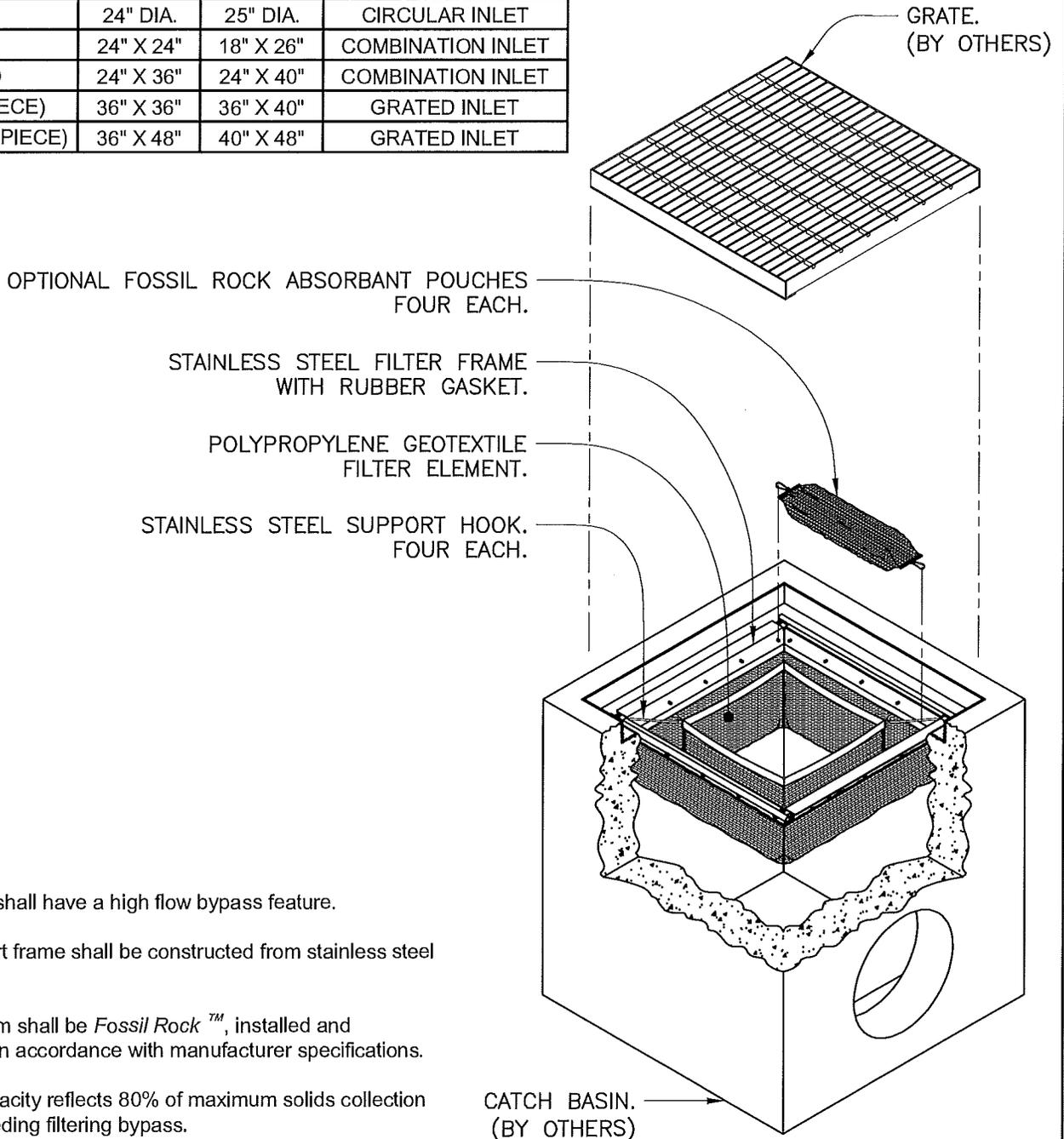
Print Name of Contractor: _____

NOTE: SUBMIT THIS FORM TO THE CITY OF MALIBU, Attention City Engineer, prior to October 15th annually.

Appendix 6 Supplemental Information
Operations and Maintenance Plan

SPECIFIER CHART

MODEL	INLET ID	GRATE OD	COMMENTS
FF-12D	12" X 12"	15" X 15"	GRATED INLET
FF-16D	16" X 16"	18" X 18"	GRATED INLET
FF-18D	18" X 18"	20" X 20"	GRATED INLET
FF-1836SD	18" X 36"	18" X 40"	GRATED INLET
FF-1836DGO	18" X 36"	18" X 40"	COMBINATION INLET
FF-24D	24" X 24"	26" X 26"	GRATED INLET
FF-2436D	24" X 36"	24" X 40"	GRATED INLET
FF-RF24D	24" DIA.	25" DIA.	CIRCULAR INLET
FF-24DGO	24" X 24"	18" X 26"	COMBINATION INLET
FF-2436DGO	24" X 36"	24" X 40"	COMBINATION INLET
FF-36D (2 PIECE)	36" X 36"	36" X 40"	GRATED INLET
FF-3648D (2 PIECE)	36" X 48"	40" X 48"	GRATED INLET



NOTES:

1. Filter insert shall have a high flow bypass feature.
2. Filter support frame shall be constructed from stainless steel Type 304.
3. Filter medium shall be *Fossil Rock™*, installed and maintained in accordance with manufacturer specifications.
4. Storage capacity reflects 80% of maximum solids collection prior to impeding filtering bypass.



FloGard®
 Catch Basin Insert Filter
 Grated Inlet Style

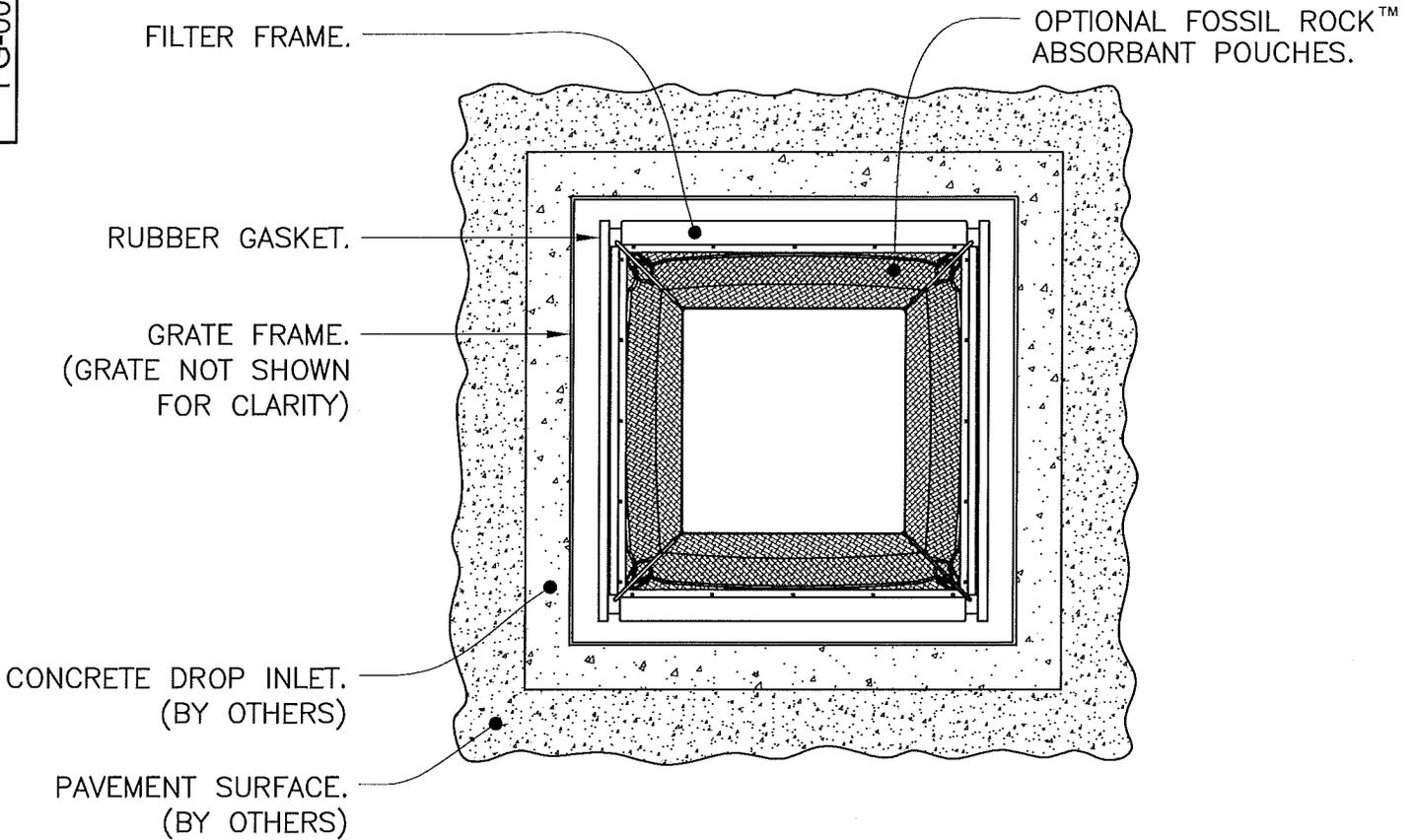


Oldcastle®
 Stormwater Solutions

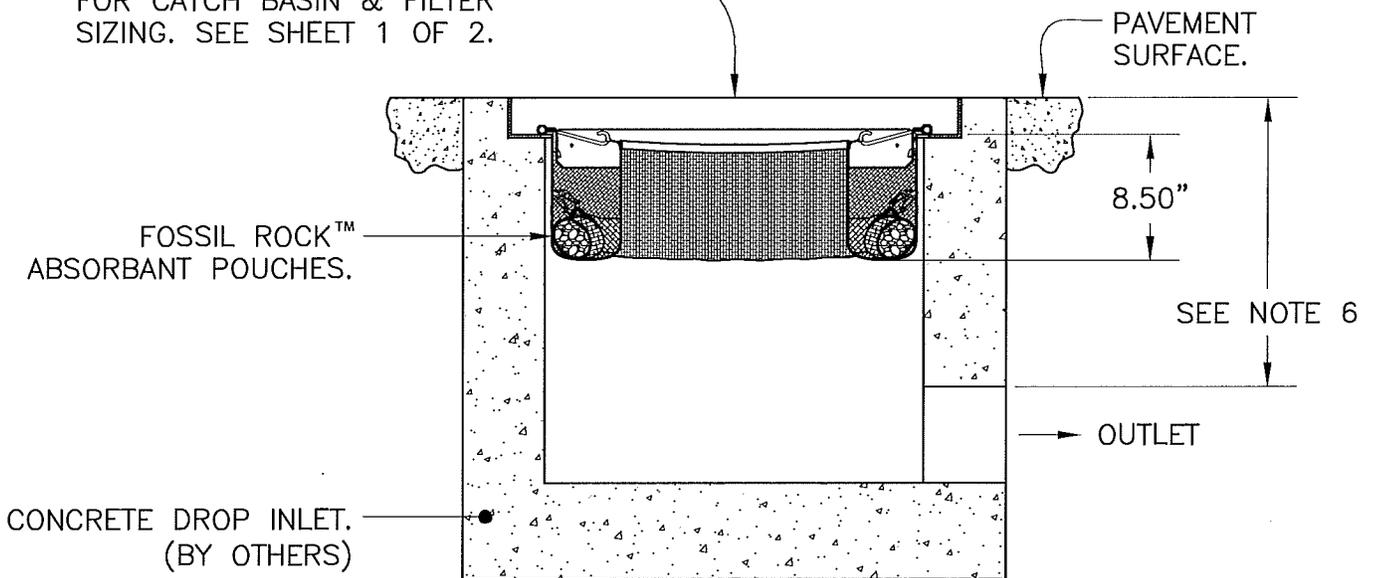
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com
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DRAWING NO. FG-0001	REV D	ECO ECO-0127 JPR 5/18/15	DATE JPR 12/18/06	SHEET 1 OF 2
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FG-0001



REFER TO SPECIFIER CHART FOR CATCH BASIN & FILTER SIZING. SEE SHEET 1 OF 2.



SECTION VIEW



Inlet Filtration

FloGard®
Catch Basin Insert Filter
Grated Inlet Style



Oldcastle®
Stormwater Solutions

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DRAWING NO. FG-0001	REV D	ECD JPR	ECO-0127 5/18/15	DATE JPR 12/18/06	SHEET 2 OF 2
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GENERAL SPECIFICATIONS FOR MAINTENANCE OF *FLO-GARD+PLUS*[®] CATCH BASIN INSERT FILTERS

SCOPE:

Federal, State and Local Clean Water Act regulations and those of insurance carriers require that stormwater filtration systems be maintained and serviced on a recurring basis. The intent of the regulations is to ensure that the systems, on a continuing basis, efficiently remove pollutants from stormwater runoff thereby preventing pollution of the nation's water resources. These specifications apply to the FloGard+Plus[®] Catch Basin Insert Filter.

RECOMMENDED FREQUENCY OF SERVICE:

Drainage Protection Systems (DPS) recommends that installed Flo-Gard+Plus[®] Catch Basin Insert Filters be serviced on a recurring basis. Ultimately, the frequency depends on the amount of runoff, pollutant loading and interference from debris (leaves, vegetation, cans, paper, etc.); however, it is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. DPS technicians are available to do an on-site evaluation, upon request.

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

1. For areas with a definite rainy season: Prior to, during and following the rainy season.
2. For areas subject to year-round rainfall: On a recurring basis (at least three times per year).
3. For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
4. For installed devices not subject to the elements (washracks, parking garages, etc.): On a recurring basis (no less than three times per year).

SERVICE PROCEDURES:

1. The catch basin grate shall be removed and set to one side. The catch basin shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities and property owner representative shall be notified as soon as practicable.
2. Using an industrial vacuum, the collected materials shall be removed from the liner. (Note: DPS uses a truck-mounted vacuum for servicing Flo-Gard+Plus[®] catch basin inserts.)
3. When all of the collected materials have been removed, the filter medium pouches shall be removed by unsnapping the tether from the D-ring and set to one side. The filter liner, gaskets, stainless steel frame and mounting brackets, etc. shall be inspected for continued serviceability. Minor damage or defects found shall be corrected on-the-spot and a notation made on the Maintenance Record. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.), if approved by the customer representative, will be corrected and an invoice submitted to the representative along with the Maintenance Record.
4. The filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary and the pouch tethers re-attached to the liner's D-ring. See below.
5. The grate shall be replaced.

REPLACEMENT AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

The frequency of filter medium pouch exchange will be in accordance with the existing DPS-Customer Maintenance Contract. DPS recommends that the medium be changed at least once per year. During the appropriate service, or if so determined by the service technician during a non-scheduled service, the filter medium pouches will be replaced with new pouches. Once the exposed pouches and debris have been removed, DPS has possession and must dispose of it in accordance with local, state and federal agency requirements.

DPS also has the capability of servicing all manner of catch basin inserts and catch basins without inserts, underground oil/water separators, stormwater interceptors and other such devices. All DPS personnel are highly qualified technicians and are confined space trained and certified. Call us at (888) 950-8826 for further information and assistance.

Operations and Maintenance Plan

To allow uniform percolation of stormwater throughout the biofiltration area and ensure that it will continue to function adequately as stormwater treatment BMPs, the following maintenance steps are required:

1. Debris from sheet flow should be removed routinely and upon discovery to allow unimpeded flow to the biofiltration area.
2. Any deficiencies in energy dissipater structure such as cracking, rotting, and failure should be repaired.
3. If clogging occurs in biofiltration area reservoir, sources of clogging should be identified and corrected. Topsoil may need to be amended with sand or replaced.
4. If low infiltration rates occur, the planter should be excavated and cleaned, and gravel or soil should be replaced.
5. Accumulated sediment should be removed by hand with minimum damage to vegetation. Sediment should be removed if it is more than 4 inches or so thick as to damage or kill vegetation. Litter and debris should be removed routinely and upon discovery.
6. Mulch should be replenished at least annually.
7. Vegetation, large shrubs, or trees that interfere with planter operation or access should be pruned or removed.
8. Fallen leaves and debris from deciduous plant foliage should be raked and removed.
9. Dead vegetation should be removed to maintain less than 10% of area coverage or when planter function is impaired.

Biofiltration areas should be inspected annually for standing water, structural deficiencies, and visual contaminants prior to the wet season, and after major storm events (>0.75" in 24 hours) if spot checks of basins indicate maintenance needs. Vegetation and inlet/outlet structures should be inspected monthly (or as dictated by agreement between the owner and the landscape contractor) for weeds, excessive plant growth, dead or dying plants, and trash and debris.