

Example
Stormwater Control Plan
For a Residential Subdivision Project

Whispering Pines Lane
Anytown, USA

September 30, 2015

XYZ Corporation
Jane Jones, 707-555-1212

This example prepared by Dan Cloak Environmental Consulting
for the County of Santa Barbara Project Clean Water
to assist users of the *Stormwater Technical Guide*

Table of Contents

I. Project Data	1
II. Setting.....	1
II.A. Project Location and Description	1
II.B. Existing Site Features and Conditions	1
II.C. Opportunities and Constraints for Stormwater Control.....	2
III. Low Impact Development Design Strategies	2
III.A. Optimization of Site Layout	2
III.B. Use of Permeable Pavements.....	2
III.C. Dispersal of Runoff to Pervious Areas.....	2
III.D. Stormwater Control Measures	2
IV. Documentation of Drainage Design	3
IV.A. Descriptions of Each Drainage Management Area.....	3
IV.A.1. Drainage Management Areas	3
IV.A.2. Drainage Management Area Descriptions	5
IV.B. Tabulation and Sizing Calculations.....	6
V. Source Control Measures.....	6
V.A. Site activities and potential sources of pollutants	6
V.B. Potential Pollutant Sources and Source Control Measures	6
VI. Stormwater Facility Maintenance	7
VI.A. Ownership and Responsibility for Maintenance in Perpetuity	7
VI.B. Summary of Maintenance Requirements for Each Stormwater Facility.....	7
VII. Construction Checklist	8
VIII. Certifications	8

Tables

Table 1. Project Data	1
Table 2. Drainage Management Areas	4
Table 3. Sources and Source Control Measures	6
Table 4. Construction Checklist	7

Figures

Figure 1. Vicinity Map	1
Figure 2. Existing Site Conditions	2
Figure 3. Bioretention Cross-Section	3

Attachments

Stormwater Control Plan Exhibit

Central Coast Post-Construction Requirements Calculator Spreadsheet

This Stormwater Control Plan was prepared using the template dated February 18, 2014.

I. Project Data

Table 1. Project Data Form

Project Name/Number	Example Residential Subdivision Project
Application Submittal Date	30 September 2015 [to be verified by municipal staff]
Project Location	Whispering Pines Lane, Anytown, USA
Project Phase No.	Not Applicable
Project Type and Description	Nine single family homes with public street and associated infrastructure
Total Project Site Area (acres)	3.0 acres
Total New Impervious Surface Area	60,054 SF
Total Replaced Impervious Surface Area	0 SF
Total Pre-Project Impervious Surface Area	0 SF
Total Post-Project Impervious Surface Area	60,054 SF
Net Impervious Area	60,054
Watershed Management Zone(s)	1
Design Storm Frequency and Depth	2.1 inches (95 th percentile)
Urban Sustainability Area	The project is not in an Urban Sustainability Area

II. Setting

II.A. Project Location and Description

The project consists of nine single family homes, a new street with a cul-de-sac, and sidewalks. In addition, sidewalks will be constructed along the frontage of Arterial Road. See Figure 1.

II.B. Existing Site Features and Conditions

This 3-acre undeveloped infill site is nearly flat, sloping only 0.15% toward Arterial Road. The site was formerly agricultural, and there are no significant trees. See Figure 2. Soils are silty sands typical of the area (Hydrologic Soil Group “B”). There are no swales or other natural drainage

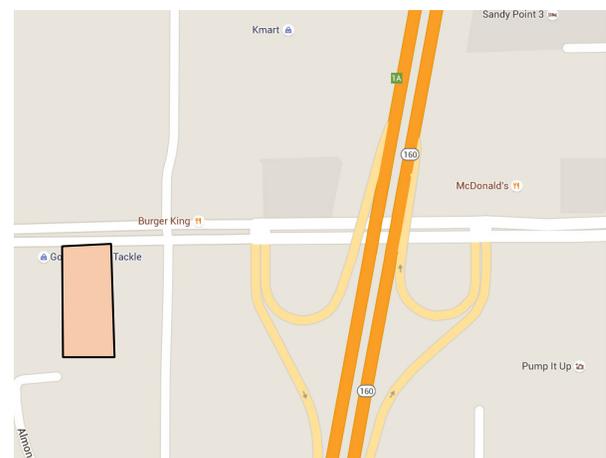


Figure 1. Location of Whispering Pines Lane, Anytown.

features, and there are no storm drains on site. A municipal storm drain exists in Arterial Road bordering the site.

II.C. Opportunities and Constraints for Stormwater Control

Soils are relatively permeable, reducing the area needed to achieve the required amount of infiltration.

The planned development includes large front yards and rear yards, allowing runoff from some impervious areas to be managed by dispersal to landscaping.

There is a storm drain in Arterial Road; however, it is at a shallow depth, limiting the potential for connecting underdrains from bioretention facilities located more than a short distance from Arterial Road.

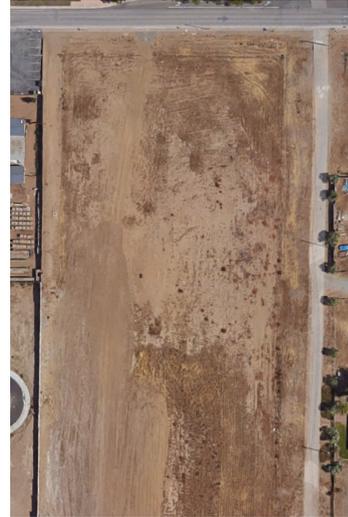


Figure 2. Existing Site Conditions.

III. Low Impact Development Design Strategies

III.A. Optimization of Site Layout

The site is infill within the existing urbanized area. Density reflects that of surrounding developments and is consistent with zoning.

To minimize street length and pavement area, the street is double loaded (driveways on each side). Street widths, sidewalk widths, and the radius of the cul-de-sac (with mountable curbs) are the minimum allowable consistent with City public works standards and fire district requirements.

The planned location of bioretention facilities along Arterial Road provides a buffer between the residences and the street.

III.B. Use of Permeable Pavements

Conventional concrete and conventional asphalt are to be used to construct the street, sidewalks, and driveways. Permeable pavements could be used, given the relatively permeable and competent soils, but are not cost-effective when compared to the option of using conventional pavements and draining paved areas to bioretention facilities.

III.C. Dispersal of Runoff to Pervious Areas

Runoff from the rear portion of each house (about 50% of roof area) will be dispersed to rear yards, which will be graded concave to retain runoff resulting from the first inch of rainfall. In addition, the landscaped front yards will be graded to retain runoff.

III.D. Stormwater Control Measures

Runoff from the front portion of each house roof and from driveways will be routed to the street gutters. The combined runoff from lots and streets will be routed to two bioretention facilities located in separate parcels along Arterial Road. See Exhibit. The facilities will be designed and constructed to the criteria in the *Stormwater Technical Guide* (February 2014), and will include the following features:

- Surrounded by a concrete curb.
- Each layer built flat, level, and to the elevations specified in the plans:

- Bottom of Gravel Layer (BGL)
- Top of Gravel Layer (TGL)
- Top of Soil Layer (TSL)
- Overflow Grate
- Facility Rim

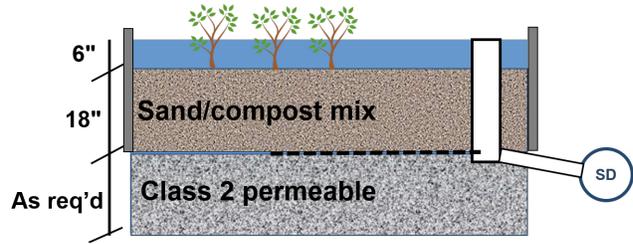


Figure 3. Bioretention Facility Cross-Section (Schematic)

- Class 2 permeable, Caltrans specification 68-2.02F(3), depth as specified in the Stormwater Control Measure Sizing Calculator output
- 18 inches sand/compost mix meeting BASMAA specifications
- 4 in. dia. PVC SDR 35 perforated pipe underdrain, installed with the invert at the top of the Class 2 permeable layer with holes facing down, and connected to the overflow structure at that same elevation
- 6-inch-deep reservoir between top of soil elevation and overflow grate elevation
- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain in Arterial Road
- Plantings selected for water conservation
- Irrigation system on a separate zone, with drip emitters and “smart” irrigation controllers
- Sign identifying the facility as a stormwater treatment facility.

IV. Documentation of Drainage Design

IV.A. Descriptions of Each Drainage Management Area

IV.A.1. Drainage Management Areas

Table 2. Drainage Management Areas (DMAs) as shown on the Exhibit.

	DMA ID	Description	Surface Type	SF
Lot 1	1-RF	Roof, front	Roof	1846
	1-RR	Roof, rear	Roof	1388
	1-DW	Driveway	Paved	805
	1-FY-1	Front Yard	Landscaped	780
	1-FY-2	Front Yard	Landscaped	1625
	1-RY	Rear Yard	Landscaped	4910
	Lot 2	2-RF	Roof, front	Roof
2-RR		Roof, rear	Roof	2550
2-DW		Driveway	Paved	400
2-FY-1		Front Yard	Landscaped	1620
2-FY-2		Front Yard	Landscaped	370
2-RY		Rear Yard	Landscaped	3580
Lot 3		3-RF	Roof, front	Roof
	3-RR	Roof, rear	Roof	1388
	3-DW	Driveway	Paved	1000
	3-FY-1	Front Yard	Landscaped	1145
	3-FY-2	Front Yard	Landscaped	1665
	3-RY	Rear Yard	Landscaped	3775
	Lot 4	4-RF	Roof, front	Roof
4-RR		Roof, rear	Roof	1753
4-DW		Driveway	Paved	520
4-FY-1		Front Yard	Landscaped	730
4-FY-2		Front Yard	Landscaped	1575
4-RY		Rear Yard	Landscaped	8045
Lot 5		5-RF	Roof, front	Roof
	5-RR	Roof, rear	Roof	1388
	5-DW	Driveway	Paved	955
	5-FY-1	Front Yard	Landscaped	1045
	5-FY-2	Front Yard	Landscaped	1790
	5-RY	Rear Yard	Landscaped	5390
	Lot 6	6-RF	Roof, front	Roof
6-RR		Roof, rear	Roof	1753
6-DW		Driveway	Paved	555
6-FY-1		Front Yard	Landscaped	1615
6-FY-2		Front Yard	Landscaped	615
6-RY		Rear Yard	Landscaped	8235
Lot 7		7-RF	Roof, front	Roof
	7-RR	Roof, rear	Roof	2550
	7-DW	Driveway	Paved	670

	7-FY-1	Front Yard	Landscaped	1845
	7-FY-2	Front Yard	Landscaped	920
	7-RY	Rear Yard	Landscaped	2760
Lot 8	8-RF	Roof, front	Roof	1792
	8-RR	Roof, rear	Roof	1753
	8-DW	Driveway	Paved	480
	8-FY-1	Front Yard	Landscaped	870
	8-FY-2	Front Yard	Landscaped	1715
	8-RY	Rear Yard	Landscaped	4190
Lot 9	9-RF	Roof, front	Roof	2204
	9-RR	Roof, rear	Roof	2550
	9-DW	Driveway	Paved	370
	9-FY-1	Front Yard	Landscaped	460
	9-FY-2	Front Yard	Landscaped	1670
	9-RY	Rear Yard	Landscaped	4150
Street	S-1	Street	Paved	9330
	S-2	Street	Paved	10370

IV.A.2. Drainage Management Area Descriptions

Front Roofs (DMAs 1-RF, 2-RF, 3-RF, 4-RF, 5-RF, 6-RF, 7-RF, 8-RF, and 9-RF, totaling 17,526 square feet), drain via gutters to driveways or swales adjacent to the driveways and from there to the street gutters.

Driveways (DMAs 1-DW, 2-DW, 3-DW, 4-DW, 5-DW, 6-DW, 7-DW, 8-DW, and 9-DW, totaling 5,755 square feet, drain to the street gutters.

Sidewalks and Whispering Pines Lane, (DMAs S-1 and S-2, totaling 19,700 square feet) drain to Bioretention Facilities 1 and 2, respectively.

Rear Roofs (DMAs 1-RR, 2-RR, 3-RR, 4-RR, 5-RR, 6-RR, 7-RR, 8-RR, and 9-RR totaling 4,680 square feet), each drain to the associated rear yards.

Rear Yards (DMAs 1-RY, 2-RY, 3-RY, 4-RY, 5-RY, 6-RY, 7-RY, 8-RY, and 9-RY totaling 46,485 square feet) will be graded slightly concave to promote runoff retention. Each will receive runoff from rear roofs on the same lot.

Front Yards (DMAs 1-FY-1, 1-FY-2, 2-FY-1, 2-FY-2, 3-FY-1, 3-FY-2, 4-FY-1, 4-FY-2, 5-FY-1, 5-FY-2, 6-FY-1, 6-FY-2, 7-FY-1, 7-FY-2, 8-FY-1, 8-FY-2, and 9-FY-1 and 9-FY-2, totaling 23,105 square feet will be graded slightly concave to promote runoff retention.

IV.B. Tabulation and Sizing Calculations

IV.B.1. Information Summary for LID Facility Design

Total Project Area (Square Feet) 130,680 SF

Design Storm Depth 2.1 inches

Applicable Requirements Tier 3

See the attached entries and results in the Central Coast Region Stormwater Control Measure Sizing Calculator.

V. Source Control Measures

V.A. Site activities and potential sources of pollutants

On-site activities that could potentially produce stormwater pollutants include:

- Indoor and structural pest control
- Landscape maintenance

V.B. Potential Pollutant Sources and Source Control Measures

Table 3. Pollutant Sources and Source Control Measures

Potential source of runoff pollutants	Permanent source control BMPs	Operational source control BMPs
Indoor and structural pest control	New construction minimizes potential for pest entry.	Integrated Pest Management (IPM) information will be provided to new homeowners.
Landscape maintenance	Developer-installed landscaping will minimize irrigation and runoff and be selected for pest resistance, and will minimize the need for fertilizers and pesticides. Plants will be selected appropriate to site soils, slopes, climate, sun, wind rain, land use, air movement, ecological consistency, and plant interactions.	IPM information will be provided to new homeowners. Landscaping will be maintainable using minimum or no pesticides.

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The two bioretention facilities will each be located on a jointly owned parcel, with easy access to the public street. Owners of parcels 1, 2, 3, and 4 will jointly own the parcel on which Bioretention Facility 1 is located, and will be jointly responsible for the maintenance of that facility, subject to provisions in the subdivision map and Conditions, Covenants, and Restrictions (CC&Rs) recorded against the subdivision. Similarly, owners of parcels 5, 6, 7, 8, and 9 will jointly own the parcel on which Bioretention Facility 2 is located, and will be jointly responsible for the maintenance of that facility. The applicant has reviewed the map provisions and CC&Rs provided by Anytown, USA, for applicant's review, and commits to execute any additional agreements necessary to ensure uninterrupted maintenance of the facilities. Applicant accepts responsibility for interim operation and maintenance of stormwater treatment and flow-control facilities until such time as this responsibility is formally transferred to subsequent owners.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

The two bioretention facilities will be maintained on the following schedule at a minimum. Details of maintenance responsibilities and procedures will be included in a Stormwater Facility Operation and Maintenance Plan to be submitted for approval prior to the completion of construction.

At no time will synthetic pesticides or fertilizers be applied, nor will any soil amendments, other than aged compost mulch or sand/compost mix, be introduced.

Weekly: The facilities will be examined for visible trash during regular policing of the site, and trash will be removed.

After Significant Rain Events: A significant rain event is one that produces approximately a half-inch or more rainfall in a 24-hour period. Within 24 hours after each such event, the following will be conducted:

The surface of the facility will be observed to confirm there is no ponding.

- Inlets will be inspected, and any accumulations of trash or debris will be removed.
- The surface of the mulch layer will be inspected for movement of material. Mulch will be replaced and raked smooth if needed.

Prior to the Start of the Rainy Season: In September of each year, the facility will be inspected to confirm there is no accumulation of debris that would block flow, and that growth and spread of plantings does not block inlets or the movement of runoff across the surface of the facility.

Annual Landscape Maintenance: In December - February of each year, vegetation will be cut back as needed, debris removed, and plants and mulch replaced as needed. The concrete work will be inspected for damage. The elevation of the top of soil and mulch layer will be confirmed to be consistent with the 6-inch reservoir depth.

VII. Construction Checklist

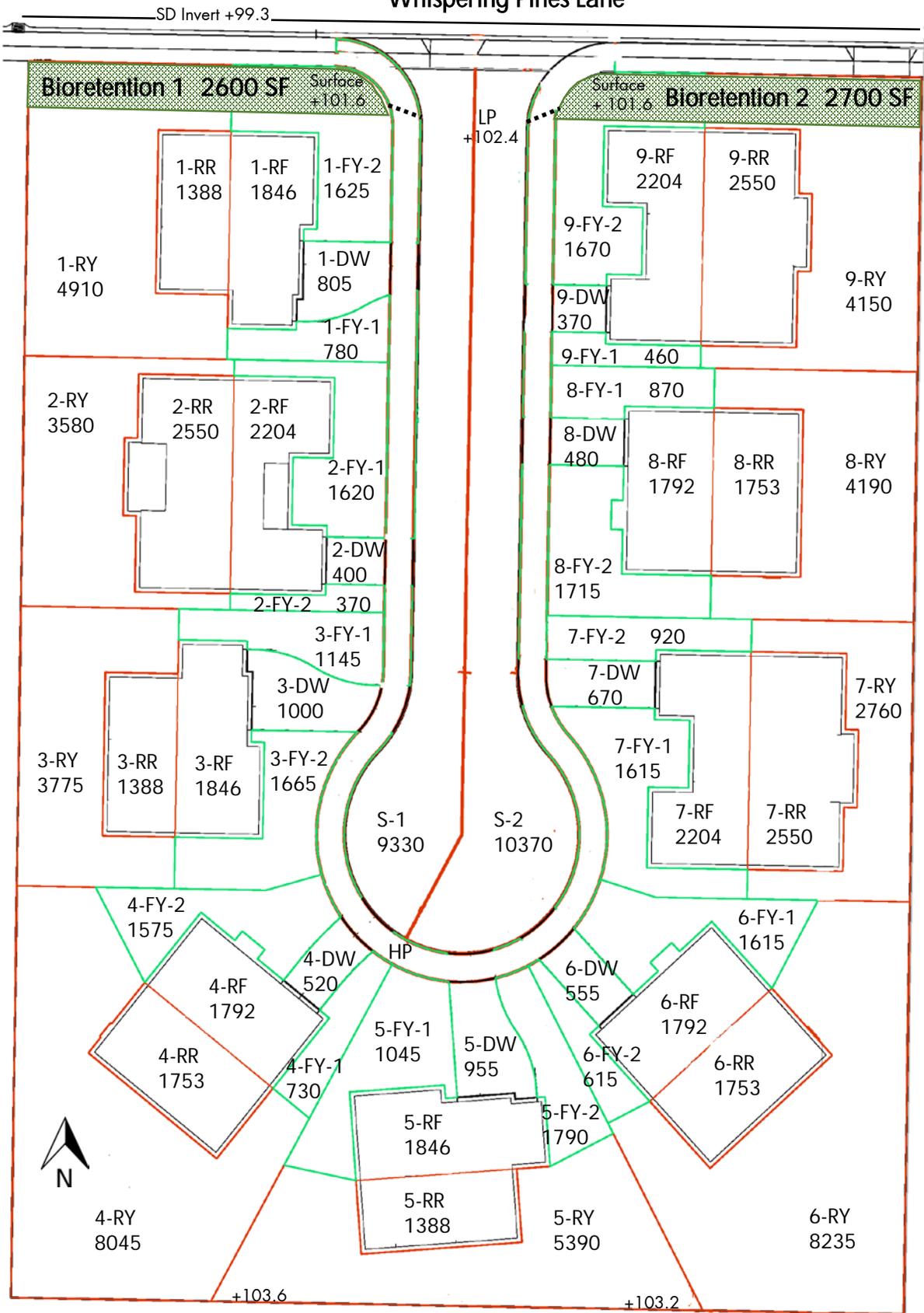
Table 4. Construction Checklist Table to be incorporated in Construction Drawings

Stormwater Control Plan Page #	Source Control or Treatment Control Measure	See Plan Sheet #s
p. 5 and Exhibit	Drainage from rear roofs is directed and dispersed to rear yards	
p.5 and Exhibit	Rear yards are graded concave	
p. 5 and Exhibit	Front yards are graded concave	
p. 5 and Exhibit	Front roofs and driveways drain to street	
p. 5 and Exhibit	Street drains to bioretention facilities. High point/grade break as shown on Exhibit	
p. 3, Exhibit, and Stormwater Control Measure Sizing Calculator Output	Bioretention facilities are detailed per specifications in the <i>Stormwater Technical Guide for Low Impact Development</i> with areas and gravel depths as shown in the attached results from the Stormwater Control Measure Sizing Calculator	

VIII. Certifications

The preliminary design of Stormwater Control Measures and other stormwater pollution control measures in this plan are in accordance with the current edition of the Santa Barbara County Project Clean Water's Stormwater Technical Guide.

Stormwater Control Plan Exhibit Whispering Pines Lane



50 feet

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	Whispering Pines Subdivision	
Project location:	Arterial Road, Anytown, USA	
Tier 2/Tier 3:	Tier 3 - Retention	
Design rainfall depth (in):	2.1	
Total project area (ft2):	130680	
Total new impervious area (ft2):	60054	
Total replaced impervious in a USA (ft2):	0	
Total replaced impervious not in a USA (ft2):	0	
Total pervious/landscape area (ft2):	70626	

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
1-RF	Drains to SCM	1846	Roof	New	Bioretention-1
1-RR	Drains to Self-Retaining	1388	Roof		1-RY
1-DW	Drains to SCM	805	Concrete or asphalt	New	Bioretention-1
1-FY-1	Self-Retaining	780			
1-FY-2	Self-Retaining	1625			
1-RY	Self-Retaining	4910			
2-RF	Drains to SCM	2204	Roof	New	Bioretention-1
2-RR	Drains to Self-Retaining	2550	Roof		2-RY
2-DW	Drains to SCM	400	Concrete or asphalt	New	Bioretention-1
2-FY-1	Self-Retaining	1620			
2-FY-2	Self-Retaining	370			
2-RY	Self-Retaining	3580			
3-RF	Drains to SCM	1846	Roof	New	Bioretention-1
3-RR	Drains to Self-Retaining	1388	Roof		3-RY
3-DW	Drains to SCM	1000	Concrete or asphalt	New	Bioretention-1
3-FY-1	Self-Retaining	1145			
3-FY-2	Self-Retaining	1665			
3-RY	Self-Retaining	3775			
4-RF	Drains to SCM	1792	Roof	New	Bioretention-1
4-RR	Drains to Self-Retaining	1753	Roof		4-RY
4-DW	Drains to SCM	520	Concrete or asphalt	New	Bioretention-1
4-FY-1	Self-Retaining	730			
4-FY-2	Self-Retaining	1575			
4-RY	Self-Retaining	8045			
5-RF	Drains to SCM	1846	Roof	New	Bioretention-2
5-RR	Drains to Self-Retaining	1388	Roof		5-RY
5-DW	Drains to SCM	955	Concrete or asphalt	New	Bioretention-2
5-FY-1	Self-Retaining	1045			
5-FY-2	Self-Retaining	1790			
5-RY	Self-Retaining	5390			
6-RF	Drains to SCM	1792	Roof	New	Bioretention-2
6-RR	Drains to Self-Retaining	1753	Roof		6-RY
6-DW	Drains to SCM	555	Concrete or asphalt	New	Bioretention-2
6-FY-1	Self-Retaining	1615			
6-FY-2	Self-Retaining	615			
6-RY	Self-Retaining	8235			
7-RF	Drains to SCM	2204	Roof	New	Bioretention-2
7-RR	Drains to Self-Retaining	2550	Roof		7-RY

7-DW	Drains to SCM	670	Concrete or asphalt	New	Bioretention-2
7-FY-1	Self-Retaining	1615			
7-FY-2	Self-Retaining	920			
7-RY	Self-Retaining	2760			
8-RF	Drains to SCM	1792	Roof	New	Bioretention-2
8-RR	Drains to Self-Retaining	1753	Roof		8-RY
8-DW	Drains to SCM	480	Concrete or asphalt	New	Bioretention-2
8-FY-1	Self-Retaining	870			
8-FY-2	Self-Retaining	1715			
8-RY	Self-Retaining	4190			
9-RF	Drains to SCM	2204	Roof	New	Bioretention-2
9-RR	Drains to Self-Retaining	2550	Roof		9-RY
9-DW	Drains to SCM	370	Concrete or asphalt	New	Bioretention-2
9-FY-1	Self-Retaining	460			
9-FY-2	Self-Retaining	1670			
9-RY	Self-Retaining	4150			
S-1	Drains to SCM	9330	Concrete or asphalt	New	Bioretention-1
S-2	Drains to SCM	10370	Concrete or asphalt	New	Bioretention-2

DMA Summary Area	
Total project impervious area (ft2):	60054
New impervious area (ft2):	42981
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	0

3. SCM Characterization					
Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)
Bioretention-1	Bioretention	1	HSG A/B	0.75	2600
Bioretention-2	Bioretention	1	HSG A/B	0.75	2700

4. Run SBUH Model

5. SCM Minimum Sizing Requirements			
SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)
Bioretention-1	1194	1.15	2.9
Bioretention-2	1490	1.38	5.1

6. Self-Retaining Area Sizing Checks				
Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name	Tributary DMA Area (ft2)	Tributary / SRA Area Ratio
1-FY-1	780		0	0.00
1-FY-2	1625		0	0.00
1-RY	4910	1-RR	1388	0.28
2-FY-1	1620		0	0.00
2-FY-2	370		0	0.00
2-RY	3580	2-RR	2550	0.71
3-FY-1	1145		0	0.00
3-FY-2	1665		0	0.00
3-RY	3775	3-RR	1388	0.37
4-FY-1	730		0	0.00
4-FY-2	1575		0	0.00
4-RY	8045	4-RR	1753	0.22
5-FY-1	1045		0	0.00

5-FY-2	1790		0	0.00
5-RY	5390	5-RR	1388	0.26
6-FY-1	1615		0	0.00
6-FY-2	615		0	0.00
6-RY	8235	6-RR	1753	0.21
7-FY-1	1615		0	0.00
7-FY-2	920		0	0.00
7-RY	2760	7-RR	2550	0.92
8-FY-1	870		0	0.00
8-FY-2	1715		0	0.00
8-RY	4190	8-RR	1753	0.42
9-FY-1	460		0	0.00
9-FY-2	1670		0	0.00
9-RY	4150	9-RR	2550	0.61