Example
Stormwater Control Plan
For a Commercial Project
123 Main Street
Anytown, USA

December 2, 2015

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This example prepared by Dan Cloak Environmental Consulting
to assist users of the BASMAA Post-Construction Manual

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This Stormwater Control Plan was prepared using the template dated July 11, 2014.

I. Project Data

Table 1. Project Data Form

Project Name/Number	Example Commercial Project
Application Submittal Date	8 May 2015 [to be verified by municipal staff]
Project Location	123 Main St., Anytown, USA
Project Phase No.	Not Applicable
Project Type and Description	4,680 SF Retail Building with drive-through lane and parking
Total Project Site Area (acres)	0.6 acres
Total New and Replaced Impervious Surface Area	21,050 SF
Total Pre-Project Impervious Surface Area	24,000 SF±
Total Post-Project Impervious Surface Area	21,050 SF

II. Setting

II.A. Project Location and Description

This project involves the demolition of an existing restaurant building and parking lot and replacement with a new restaurant/retail building and parking lot. The parcel fronts an arterial roadway. See Figure 1.

The proposed use is consistent with current commercial zoning. The project will include a drive-through lane for a planned coffee shop, plus two additional retail spaces within the same building.

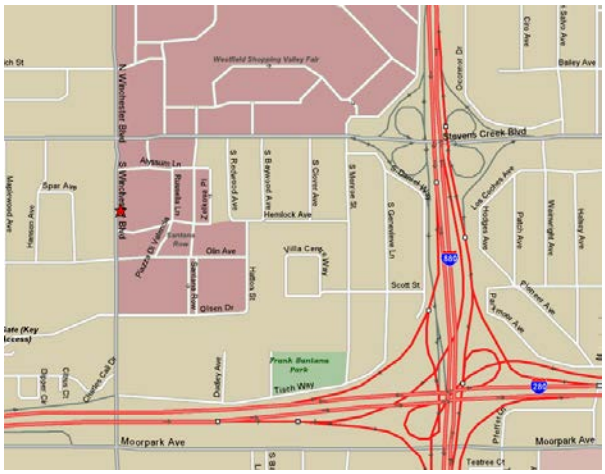


Figure 1. Location of 123 Main Street, Anytown.

II.B. Existing Site Features and Conditions

The site nearly square and generally flat. Most of the site is covered with buildings or is paved. The perimeter of the site (except for the frontage on Main Street) is landscaped with mature trees. See Figure 2. Soils are silty clays typical of the area (Hydrologic Soil Group "D"). The existing drainage system is connected to a municipal storm drain in the southbound lanes of Main Street in front of the site.

II.C. Opportunities and Constraints for Stormwater Control

Constraints include impermeable soils (hydrologic soil group D), very high intensity land use, and flat slopes. Disposal of runoff to deep infiltration is not feasible on this site due to the low permeability of the clay soils. High land values, the objective of creating a dense retail area, and parking requirements limit opportunities to reduce site imperviousness.

Figure 2. Existing Site Conditions.

Setback areas—five feet on each side of the site and ten feet at the back of the site—might be usable as locations for treatment BMPs; however, these areas include significant trees which must be protected. The City storm drain system in Main Street is deep enough to provide sufficient hydraulic head is to route runoff across the surface of the site to a stormwater treatment facility, through the facility, and then to drain treated runoff to the City storm drain.

III. Low Impact Development Design Strategies

III.A. Optimization of Site Layout

The site is densely developed infill within the existing urbanized area. Future retail areas have been included in the development plan, in addition to the initial use of a portion of the building as a drive-through coffee shop. Existing significant trees around the perimeter of the site are to be preserved. The landscaped setback areas surrounding the trees will be expanded to the extent practicable, given project parking and circulation requirements, to reduce impervious area of the project. Landscaping in these areas will be upgraded to maximize aesthetic value and ensure the continued health of the mature trees.

III.B. Use of Permeable Pavements

Conventional concrete and conventional asphalt are to be used to construct the circulation and parking areas. Permeable pavements are not cost-effective for this site, in part because the pavements overlie expansive clay soils. This condition would necessitate a very deep gravel base course, which would, in turn, require large quantities of excavation and off-haul.

III.C. Dispersal of Runoff to Pervious Areas

Landscaped areas at the perimeter of the site could be used to disperse runoff from some portions of the parking lot; however, the areas are at a slightly higher elevation and can't be re-graded without removing or damaging the existing trees.

III.D. Stormwater Control Measures

Runoff from all impervious areas on the site, including roofs and paved areas, will be routed to three bioretention facilities (see Exhibit). The facilities will be designed and constructed to the criteria in the BASMAA *Post-Construction Manual* (July 2014), including the following features:

- Surrounded by a concrete curb. Where adjacent to pavement, curbs will be thickened and an impermeable vertical cutoff wall will be included
- 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

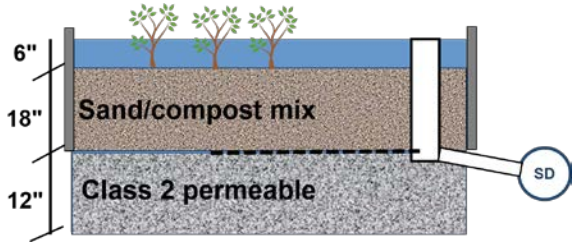


Figure 3. Bioretention Cross-Section (schematic)

- 12 inches of Class 2 permeable, Caltrans specification 68-2.02F(3)
- 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 Main Street
- Vertical cutoff walls to protect adjacent pavement
- 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.

The only areas on the site which do not drain to a bioretention facility are small portions of the two entrances from South Winchester Boulevard. These areas drain toward the street. The size of these areas has been minimized by designing the grading and drainage to place the grade break as close to the street as practicable.

The pervious setback areas are higher in elevation than the parking area. Drainage from these areas to the parking lot will be controlled by concrete curbs. Because these areas cannot be regraded to a concave profile, and cannot be made to drain directly to the storm drain system, they are classified as pervious areas draining to the bioretention facilities and have been accounted for with the designated runoff factor of 0.1.

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 Name	Surface Type	Area (SF)
DMA-1	Paving	2805
DMA-2	Paving	6130
DMA-3	Roof	4680
DMA-4	Landscape	1770
DMA-5	Landscape	155
DMA-6	Landscape	550
DMA-7	Landscape	4275
DMA-8	Paving	6369

IV.A.2. Drainage Management Area Descriptions

DMA 1, totaling 2,805 square feet, drains the northwest section of the parking area, the roof of the trash enclosure, and a portion of a paved traffic island. DMA-1 drains to Bioretention Facility #1. Runoff will enter the facility through curb cuts.

DMA 2, totaling 6,130 square feet, drains the northeast section of the parking area and a portion of the plaza surrounding the building. DMA-2 drains to Bioretention Facility #2.

DMA 3, totaling 4,680 square feet, drains the roof of the building. DMA 3 drains to Bioretention Facility #3, and will be connected via a tight-lined downspout and bubble-up.

DMA 4, totaling 1,770 square feet, is a landscaped area with existing trees. The trees will be retained and the area reconfigured. DMA 4 will drain over a surrounding curb to DMA-1 and then to Bioretention Facility #1.

DMA 5, totaling 155 square feet, is a landscaped area with existing trees. The trees will be retained and the area reconfigured. DMA 5 will drain over a surrounding curb to DMA-1 and then to Bioretention Facility #1.

DMA 6, totaling 550 square feet, is a landscaped area with some existing trees, as well as some new landscaping adjacent to Main St. DMA 4 will drain over a surrounding curb to DMA-2 and then to Bioretention Facility #2.

DMA 7, totaling 4,285 square feet, is a landscaped area with existing trees on the west and south sides of the site. DMA 4 will drain over a surrounding curb to DMA-8 and then to Bioretention Facility #3.

DMA 8, totaling 6.369 square feet, drains the drive-through and travel lanes on the south side of the site and parking on the west side of the site, as well as walkway and plaza areas on the west, south, and east sides of the building. DMA 8 drains to Bioretention Facility #3, with runoff entering via curb cuts.

IV.B. Tabulation and Sizing Calculations

See the attached spreadsheet. The project does not include any self-treating or self-retaining areas.

V. Source Control Measures

V.A. Site activities and potential sources of pollutants

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

- Driveways and parking lots
- Food Service
- Trash Management

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**
Inlets (bioretention overflows)	All inlets will be marked with "No Dumping! Flows to Local Waterways" or similar	Markings will be regularly inspected and repainted or replaced as needed. Lessees will receive stormwater pollution prevention brochures. Lease agreements will include the following provision: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
Indoor and structural pest control		Owner will retain only companies that are certified in Integrated Pest Management (IPM) for on-site pest-management.
Landscape maintenance	Existing mature trees to be retained. 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.	Landscaping will be maintained using minimum or no pesticides. IPM information will be provided to new owners, lessees, and operators.

Food service.	Coffee shop will include a floor sink for cleaning floor mats, containers, and equipment. The floor sink will be connected to a grease interceptor before discharging to the sanitary sewer.	
Refuse area.	Refuse and recycled materials will be handled in the refuse area shown on the Exhibit. This area is to be roofed, bermed, and equipped with a drain to a grease interceptor and then to the sanitary sewer.	All dumpsters will be posted with signs stating "Do not dump hazardous materials here" or similar.
Plazas, sidewalks, and parking lots		Trash receptacles to be provided in plaza area and on drive-through and emptied daily. Site to be policed at least twice daily for trash. Plazas, sidewalks, and parking lots will be swept regularly. Debris and washwater from periodic pressure washing will be collected and disposed of to the sanitary sewer.

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

Maintenance of stormwater facilities will be the responsibility of the property owner and will be performed by the owner's contractors or employees as part of routine maintenance of buildings, grounds, and landscaping. The applicant has reviewed the Anytown, USA, standard agreement regarding the maintenance of stormwater facilities and commits to execute any necessary agreements prior to completion of construction. 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 a subsequent owner.

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

The three 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.

Daily: 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 or 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 Plan E.12 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
3 and Exhibit	DMA 1 drains to Bioretention Facility #1; facility is designed as specified	
3 and Exhibit	DMA 2 drains to Bioretention Facility #2; facility is designed as specified	
3 and Exhibit	DMA 3 is connected via tight-lined downspout to Bioretention Facility #3	
3 and Exhibit	DMA 8 drains to Bioretention Facility #3; facility is designed as specified	
5	Bioretention Facility #1, #2, #3 overflows are marked with "No Dumping" message	
5	Existing mature trees are preserved	
6	Coffee shop/food service facility is equipped with a floor sink connected to a grease interceptor and then to sanitary sewer	
6	Trash receptacles are located in plaza area and are accessible to drive-through lane	

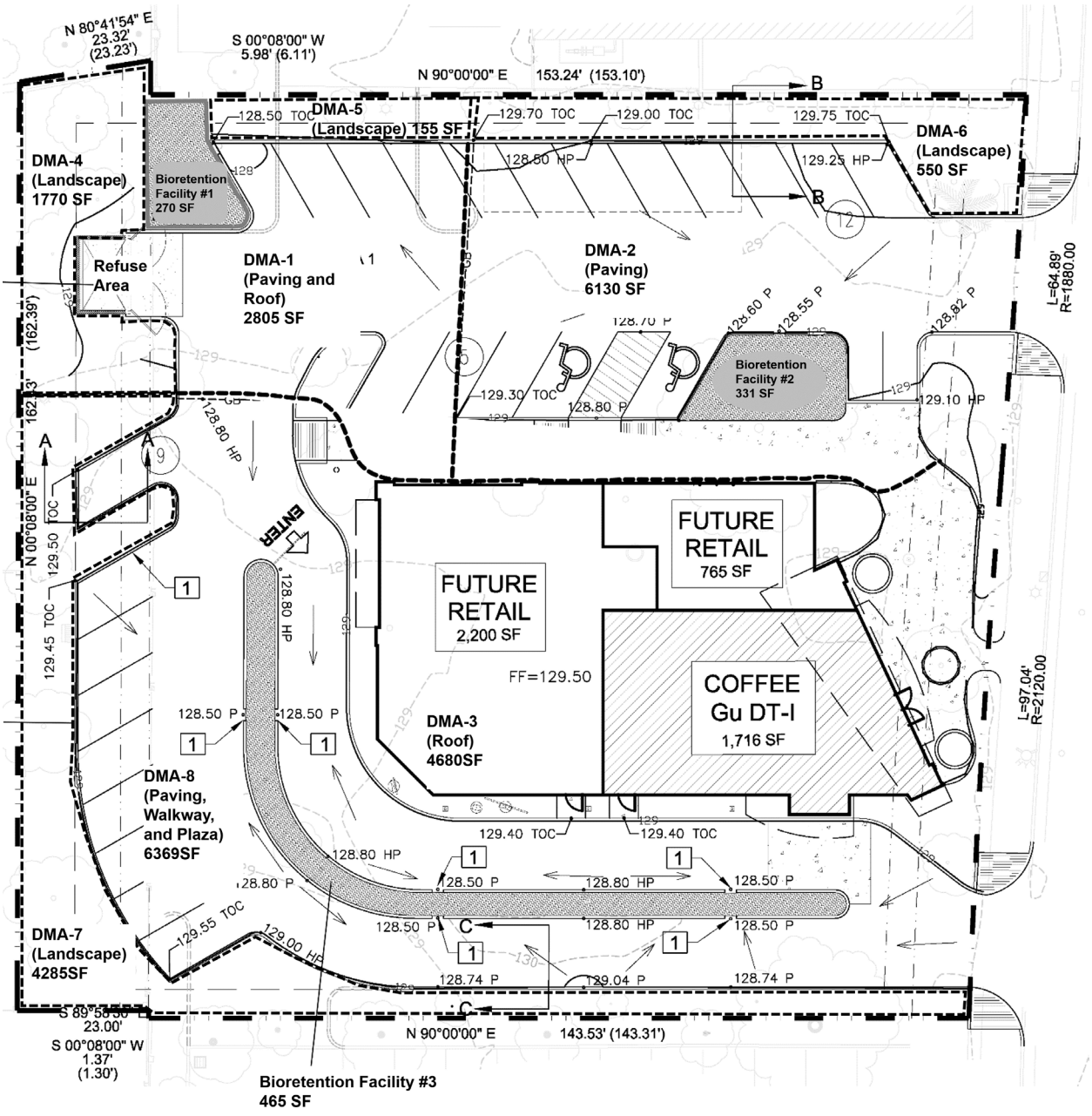
VIII. Certifications

The preliminary design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the BASMAA *Post-Construction Manual*

Stormwater Control Plan Exhibit

Example Commercial Site
123 Main Street
Anytown, USA

No Scale



Provision E.12 Sizing Calculator

See the instructions and the BASMAA Post-Construction Manual

Step 1: Enter Total Site Area	**Step 2:** List names of all DMAs and square footage of each	**Step 3:** If DMA is "Self-Treating" or "Self-Retaining," **copy** square footage to appropriate column	**Step 4:** If the DMA is "Drains to Self Retaining" or "Drains to Bioretention" enter runoff factor from Table 4-1		**Step 6:** For "Drains to Self-Retaining" DMAs, enter the **name of receiving DMA**	**Step 5:** Slide (move) number from this column to correct column (F or H-Q)

Version 0.3. 2015-12-02.

Total Site Area: 27800

							BIORETENTION FACILITIES									
DMA Names	**Square Feet**	**Self-Treating**	**Self-Retaining**	**Runoff Factor**	**Drains to Self-Retaining**	**Name of Receiving DMA**	**Facility 1**	**Facility 2**	**Facility 3**	**Facility 4**	**Facility 5**	**Facility 6**	**Facility 7**	**Facility 8**	**Facility 9**	**Facility 10**
DMA-1	2805			1			2805									
DMA-2	6130			1				6130								
DMA-3	4680			1					4680							
DMA-4	1770			1			1770									
DMA-5	155			0.1			15.5									
DMA-6	550			0.1			55									
DMA-7	4275			0.1					427.5							
DMA-8	6369			1					6369							
DMA-9																
DMA-10																
DMA-11																
DMA-12																
DMA-13																
DMA-14																
DMA-15																
DMA-16																
DMA-17																
DMA-18																
DMA-19																
DMA-20																
Total DMAs	26734	0	0		0		4646	6130	11477	0	0	0	0	0	0	0
						Sizing Factor	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
						Minimum Size	186	245	459	0	0	0	0	0	0	0
Total Facilities	1066	**Step 7:** Enter Facilty Footprints				**Footprint on Exhibit**	270	331	465							
DMAs + Facilities	27800						OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
	OK	**Step 8:** Iterate sizes of facility footprints and DMAs until all footprints are at least the minimum **AND** DMAs + Facilities equals Total Site Area														
		Step 9: Check to make sure Areas Draining to each Receiving Self-Retaining Area do not exceed maximum 2:1 ratio.														
		Step 10: Check results on this spreadsheet are consistent with what is shown on the SCP Exhibit.														