CARNELIAN – MARINE – ST. CROIX WATERSHED DISTRICT

BMP Design Guidance

Companion to *Small Residential Project Stormwater Worksheet*

In order to receive the treatment volume credit identified in **TABLE 1** of the *Small Residential Project Stormwater Worksheet*, the following design requirements must be implemented. Variation from these design requirements may be acceptable for the same or adjusted treatment volume credit subject to review by the District. Additional design considerations are provided as recommendations only.

Native / Adapted Vegetated Buffer

Native / adapted vegetated buffers are a type of stormwater treatment composed of vegetation and a porous soil medium. They are vegetated areas that decrease the rate and volume of stormwater runoff, facilitate infiltration and provide water quality treatment of stormwater pollutants. A mix of trees, shrubs and groundcover are recommended to provide several layers of vegetative protection. Consider native prairie planting for the groundcover portion of any buffer. The deep roots, hardiness, aesthetic appeal, unique habitat character and filtering ability all make prairies an ideal vegetative ecosystem for a conservation buffer. Trees and shrubs can also be used as a vegetative transition from the water body. Trees and shrubs can provide for enhanced infiltration and nutrient uptake while stabilizing soil and dissipating rainfall.

In order qualify for treatment volume credit, existing or created vegetated buffers must meet the following minimum requirements:

- Minimum width of 25 feet in the direction of flow
- Minimum of 80% ground cover; native vegetation if created buffer
- Length of the flow path across buffer must equal or exceed the flow path across impervious areas
- Vegetation and grading of buffer area promotes sheet flow rather than channels and rill flow
- Point discharges are minimized and provided with level spreading

Rain Barrels / Cisterns

Rain barrels / cisterns provide a mechanism to capture and re-use stormwater for applications such as lawn and garden watering. Cisterns have a greater storage capacity than rain barrels and may be located above or below ground. Due to their size and storage capacity, these systems (often large polyethylene drums) typically collect runoff from areas larger than residential rooftops but may be appropriate for stables, pole barns or other outbuildings. The following provides an overview of items to consider for use of these systems.

- The system should be watertight, have a smooth interior surface, be located on level and stable ground, have a tight-fitting lid, durable screens on the inlet and outlet and have an emergency overflow device.
- The system should include an overflow deflection routing runoff away from foundations.
- To prevent the breeding of mosquitoes, water in the system should be emptied in less than five days or enclosed with a fine screen over all openings.
- Systems should be disconnected and drained in the winter to prevent freezing and deformation of the system. When emptied, they can be reconnected to collect spring meltwater.

In order to achieve treatment volume credit, rain barrels and cisterns must receive runoff from rooftops where feasible. In addition, the volume of the rain barrel(s) or cistern(s) qualifies for treatment volume credit for up to 1-inch of runoff from the contributing area.

Amended Soils / Soil Restoration

Amended / restored soils enhance infiltration and provide water quality treatment. In order to achieve treatment volume credit, amended / restored soils must be contiguous to and receive runoff from impervious surfaces equal in area to the surface area used in the calculation of **STEP 3** of the *Small Residential Project Stormwater Worksheet*. In addition, the following requirements apply.

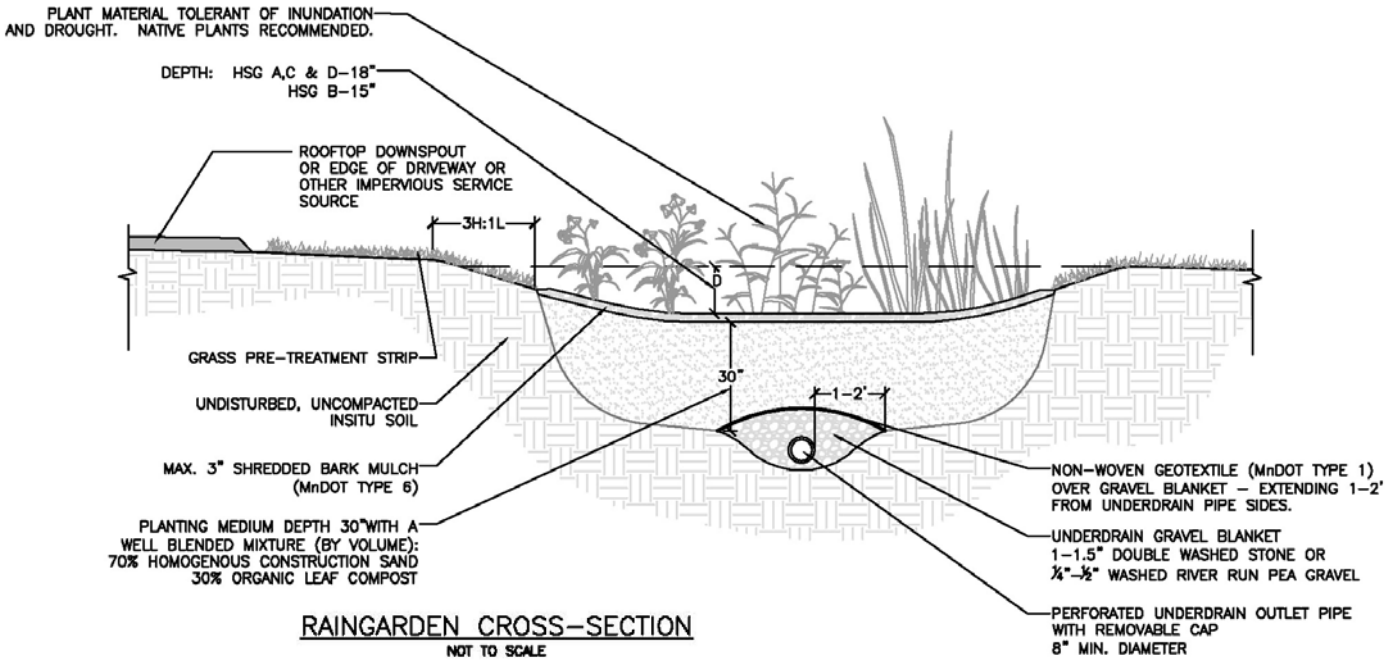
For those areas within the limits of construction follow these steps first:

- Remove topsoil and stockpile prior to grading.
- Once rough grade is achieved and other disturbances are completed, plow or till compacted subsoil at least 2-inches deep or rototill some of the stockpiled topsoil into the subsoil.
- Reapply stockpiled soil to a minimum depth of 8 inches. If necessary to achieve 8-inch depth, import and apply a topsoil mix with 8-13% soil organic matter, which should contain 30-40% compost by volume and clean sand or sandy soil.
- Continue with the steps for '*In-place soil amendment*' below.

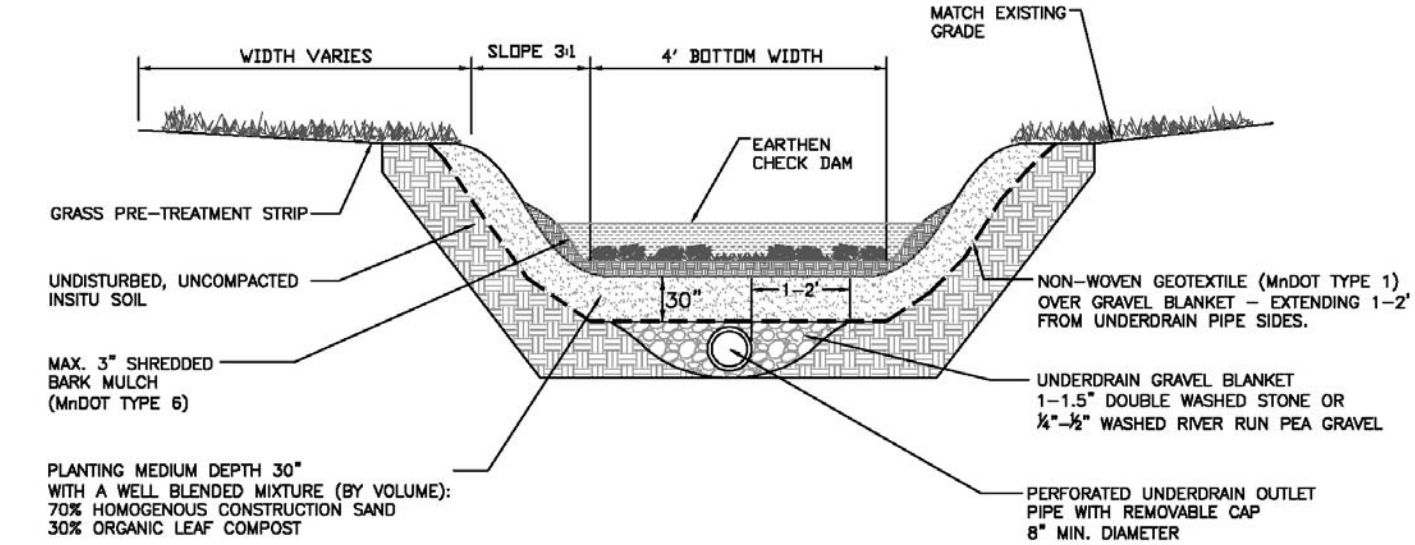
In-place soil amendment:

- Apply a 2.5-inch deep layer of compost to the existing soil.
- Rototill compost into the soil to a depth of at least 8-inches. Note that tilling to this depth will require repeated passes with a large machine, such as a tractor-mounted or heavy reartine rototiller. Avoid plowing or tilling within the drip line of trees.
- Final soil depth should be a minimum of 8 inches.

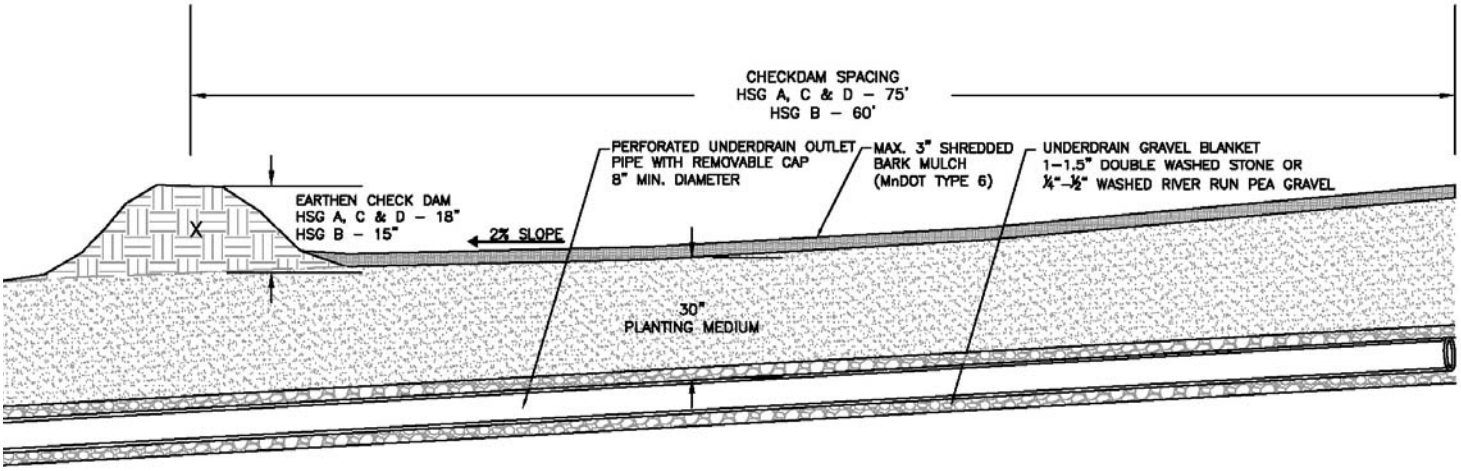
Raingarden[1]



Vegetated Swale with Check Dams[1]



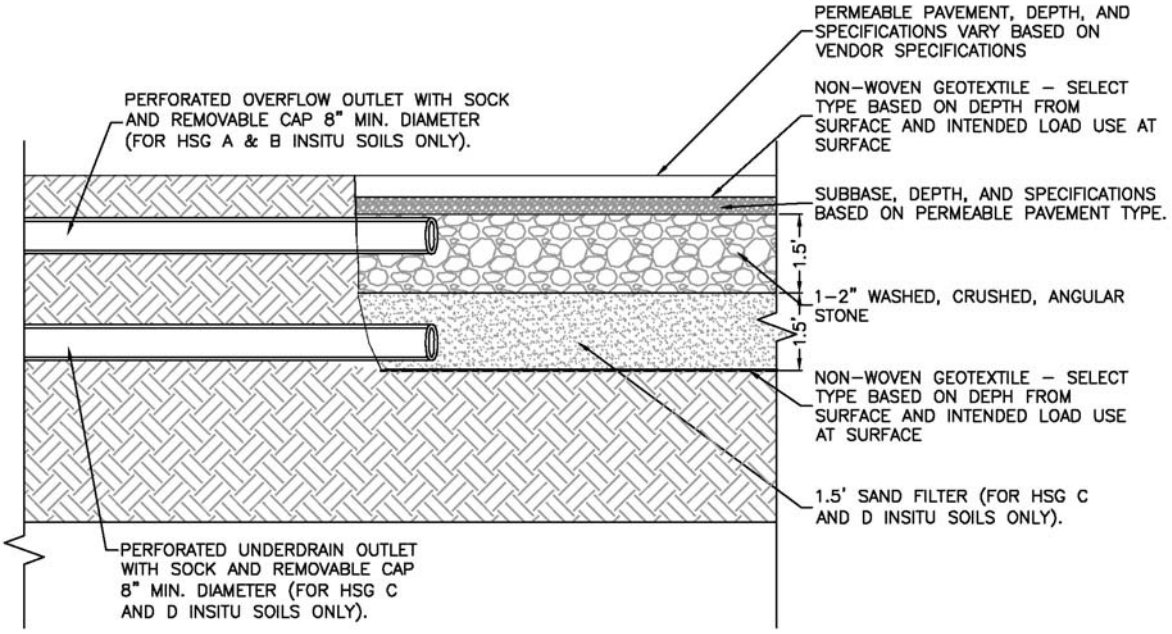
SWALE CROSS-SECTION (WITH CHECKDAM)
NOT TO SCALE



SWALE PROFILE (WITH CHECKDAM)
NOT TO SCALE

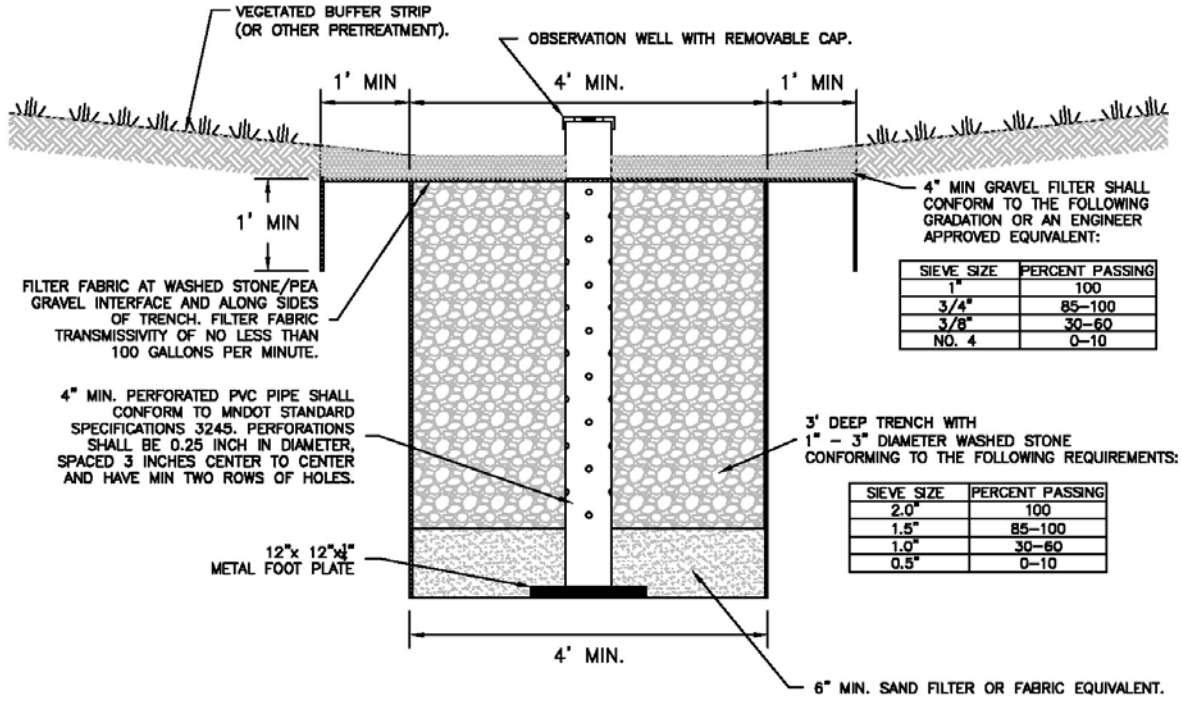
[1] Underdrains with removable caps facilitate management of water levels during establishment of vegetation. For HSG A and B soils, the underdrain is intended to be capped for long-term operation. For HSG C and D soils, the underdrain is intended to be open to allow drawdown of the feature, precluding retention and infiltration while still providing filtration of stormwater.

Permeable Hard Surfaces (e.g. Permeable Pave Patio, Porous Concrete Driveway)



PERMEABLE HARD SURFACES
NOT TO SCALE

Infiltration Trench / French Drain



SIEVE SIZE	PERCENT PASSING
1"	100
3/4"	85–100
3/8"	30–60
NO. 4	0–10

SIEVE SIZE	PERCENT PASSING
2.0"	100
1.5"	85–100
1.0"	30–60
0.5"	0–10

INFILTRATION TRENCH/FRENCH DRAIN CROSS–SECTION
NOT TO SCALE