Stormwater Design Examples

The following stormwater design examples shall only be used for projects less than 2,000 square feet of impervious area and less than 5,000 square feet of earth disturbance

Stormwater Best Management Practices Worksheets

Stormwater Management for Minor Land Disturbance Activities addresses the intent of the SWM Ordinance by managing the runoff through infiltration facilities. To determine the size of infiltration facilities required for a site for a Minor Land Disturbance Activity, utilize a factor 0.18 times the impervious area. This approximates the net 2-year increase.

STEP ONE: DETERMINE REQUIRED VOLUME	
TOTAL AREA of IMPERVIOUS COVER Includes all areas of new building, paving, concrete and compacted gravel that are part of the **proposed** work. (Except pervious paver blocks)	**Sq. ft**.
Multiply by 0.18	**x 0.18**
TOTAL WATER QUALITY VOLUME REQUIRED (**WQ_v**)	**Cu. ft.**

Details of the BMPs listed below are provided as part of this Appendix. For additional information on how these BMPs function and ideas of other BMPs refer to the "Pennsylvania Stormwater Best Management Practices Manual" latest edition prepared by the DEP.

STEP TWO: SELECT BMPs TO BE UTILIZED	
BMP NAME	(How Many)
1. Infiltration Basin	
2. Infiltration Bed	
3. Infiltration Trench	
4. Other*	
TOTAL	

* As approved by the Township Engineer. Provide additional information as needed.

The first three BMPs listed are Infiltration BMPs and as such should be located on the site in areas with the most suitable soil. Areas of wet or poorly drained soils should be avoided.

Infiltration BMPs shall also be located with the following setbacks:

- Ten (10) feet down gradient from a building basement
- One hundred (100) feet up gradient from a building basement
- Ten (10) feet from property lines
- One Hundred (100) feet from wells
- Fifty (50) feet from septic system drain fields

Recognizing that Minor Land Disturbance Activities often cannot meet the setback requirements due to the size of the proposed work area, consideration will be made to reduce the setbacks provided.

BMP Installation Notes:

1. BMPs shall be protected during construction to prevent sediment-laden water from entering the facility.

2. Excavation of the BMPs shall be conducted in a manner that will not compact the bottom of the facility.

3. The bottom of the facility shall be scarified immediately prior to the placement of the bottom layer of geotextile for subsurface structures or the topsoil placement for above ground structures.

4. Geotextile shall be placed in accordance with the manufacturer's specifications. Seams shall be overlapped a minimum of 16 inches.

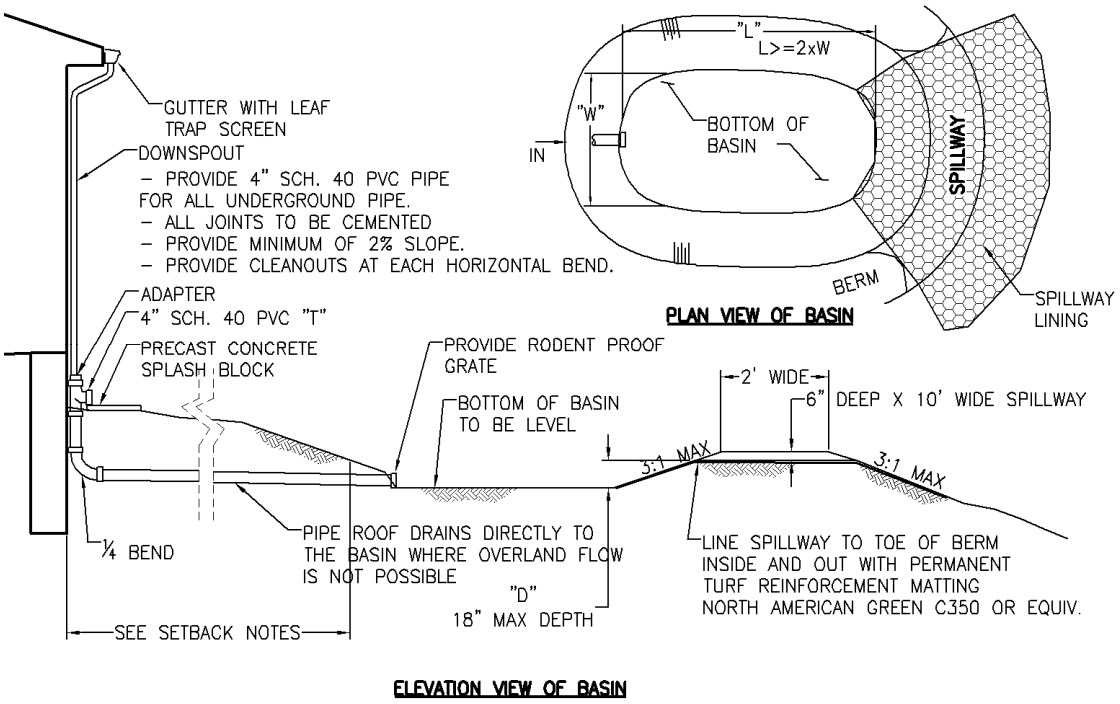
5. The area of the BMP shall be fenced off during construction. Construction equipment shall be prohibited from entering the area to avoid soil compaction.

STEP THREE: DETERMINE VOLUME PROVIDED	
BMP (See details for volume calculations)	**Volume (cu. ft.)**
1. Infiltration Basin	
2. Infiltration Bed	
3. Infiltration Trench	
4. Other*	
TOTAL (must be greater than WQ_v in Step One)	

* As approved by the Township Engineer. Provide additional information as needed.

SWM BMP #1 –INFILTRATION BASIN

An Infiltration Basin provides an aboveground area for water to be stored and infiltrate into the ground. Roof Drains and overland runoff are directed into an aboveground basin to infiltrate. A spillway is provided to release the larger storm volumes. The spillway should be located to avoid any down slope problems when water is flowing over the spillway. The spillway shall be lined with a permanent erosion mat to prevent deterioration. The spillway should be located as far away as possible from any inflow pipes to promote infiltration and settling of runoff contaminants. The basin shall also be planted with vegetation that is tolerant of the wet conditions that will occur during infiltration. The depth of the basin may be increased with the approval of the Township Engineer.

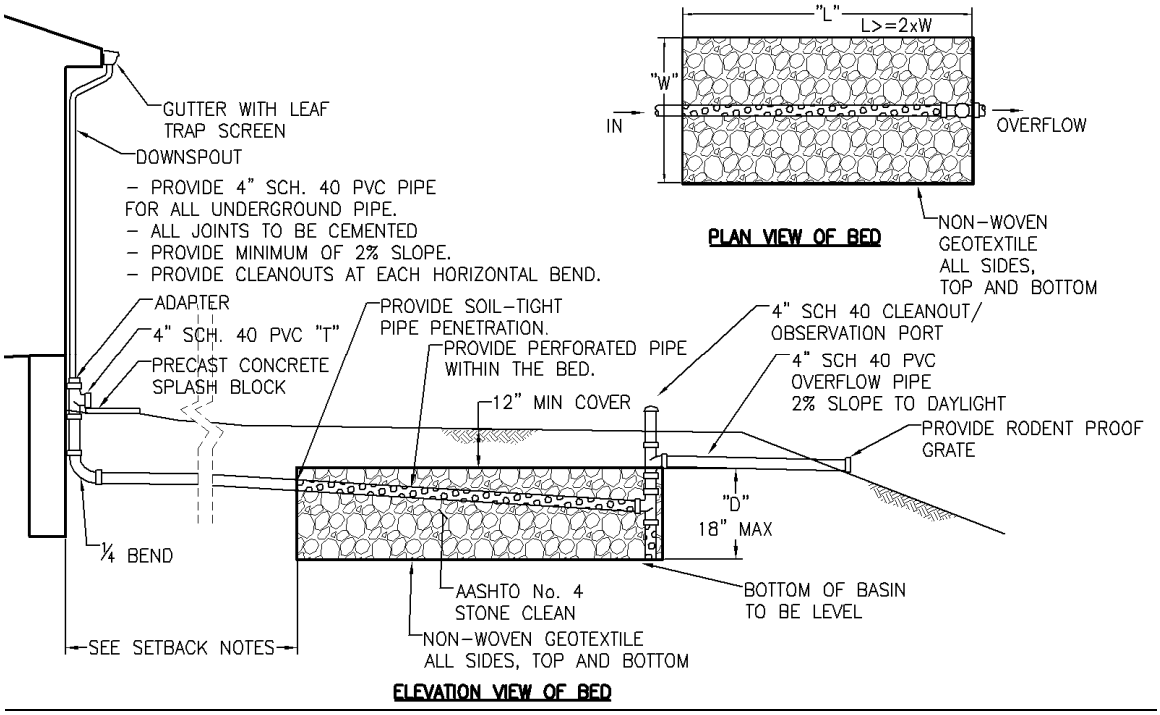


Determination of Water Quality Volume provided:

1	Bottom Area – for rectangular basins use L x W, estimate for irregular shaped Basin	Sq. ft.
2	Depth of Basin = D	Ft.
3	Basic Volume = L x W x D (Line 1 x Line 2)	Cu. Ft.
4	Side Slope Factor "Z" – Use 3 for 3:1 slope, 4 for 4:1 slope, etc	
5	Approx. Additional Volume = (L+W) x Z x D x D	Cu. Ft.
6	TOTAL VOLUME ($\mathbf{WQ_v}$) (Line 3 + Line 5) (Use this number in Step Three)	Cu. Ft.

SWM BMP #2 –INFILTRATION BED

An infiltration bed can be used where surface runoff is not to be captured. Roof Drains from the proposed structure are piped into an underground basin to infiltrate into the ground. An overflow pipe is provided to release the larger storm volumes. A cleanout is provided to facilitate maintenance and provide an inspection port for the bed. The pipe within the bed is perforated and should be run through the basin to the fullest extent to promote infiltration and distribution of the runoff. The soil over the basin shall also be planted with vegetation that will not interfere with the operation of the bed. The depth of the bed may be increased with the approval of the Township Engineer.

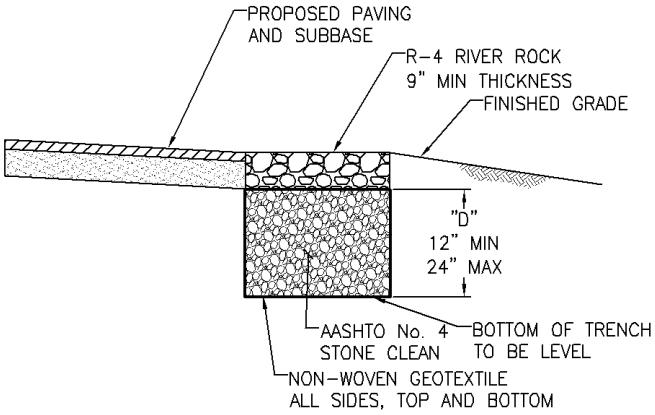


Determination of Water Quality Volume provided:

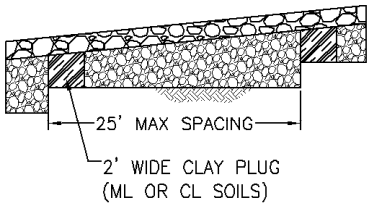
1	Bottom Area – for rectangular basins use L x W	Sq. ft.
2	Depth of Basin = D	Ft.
3	Basic Volume = L x W x D (Line 1 x Line 2)	Cu. Ft.
4	Actual Void Volume in Stone Bed ($\mathbf{WQ_v}$) = 0.4 x Line 3 (Use this number in Step Three)	Cu. Ft.

SWM BMP #3 –INFILTRATION TRENCH

Infiltration trenches are utilized along the perimeter of impervious surfaces to collect, store and infiltrate runoff. River rock will be placed on the bed to allow the runoff to enter the trench; alternately the bed may utilize a perforated pipe with inlets to get the runoff into the trench. The trench is constructed as a terraced system with clay dikes to promote infiltration. The depth of the trench may be increased with the approval of the Township Engineer. Pipe can be utilized within the trench to increase the available storage volume. Because the trench is installed along paved area that needs to be compacted during construction, extra attention needs to be paid to avoid compaction in the area of the trench or loosen the material under the trench prior to installation.



SECTION AT EDGE OF PAVING



LONGITUDINAL SECTION OF TRENCH

Determination of Water Quality Volume provided:

1	Bottom Area = Length of Trench x Width	Sq. ft.
2	Depth of Basin = D	Ft.
3	Basic Volume = L x W x D (Line 1 x Line 2)	Cu. Ft.
4	Actual Void Volume in Stone Bed ($\mathbf{WQ_v}$) = 0.4 x Line 3 (Use this number in Step Three)	Cu. Ft.

If perforated pipe is used in the bed, adjust volume accordingly.