APPENDIX F

SMALL PROJECT APPLICATION AND STORMWATER MANAGEMENT DESIGN ASSISTANCE MANUAL

FOR SMALL PROJECTS IN JACKSON TOWNSHIP DAUPHIN COUNTY, PENNSYLVANIA

SMALL PROJECTS SIMPLIFIED APPROACH

Prepared By:

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Small Projects Stormwater Control Application

Application is hereby made to Jackson Township for the issuance of a Storm Water Management Plan approval for Land Disturbance as defined in the Jackson Township Storm Water Management Ordinance. December 8, 2010 shall be a starting point from which the impervious or disturbed areas for small project activity shall be cumulatively considered.

General Information from the Applicant

Name of Owner: _____ Date: _____
Address of Owner: _____
Name of Applicant (if different than owners): _____
Address of Applicant: _____
Contact Phone Number: _____ Email Address: _____
Address of Project: _____
Brief Description of Project: _____
_____
_____

Did the Applicant meet with the Township Staff concerning this project?
Yes ☐ No ☐ When? _____

Distance from the proposed project to the nearest water feature (stream, pond, lake, wetlands). Check one: ☐ 50 feet or less ☐ More than 50 feet

The amount of impervious cover (sq. ft.) _____
Area of earth to be disturbed with this project including storm water management facilities (sq. ft.) _____

Is the applicant proposing to use a stone lined trench or dry well to control stormwater from the proposed impervious areas? ☐ Yes ☐ No.

Has the applicant dug any test pits in the areas where the stone lined trench or dry well are proposed to be used in order to see if there is shallow bedrock, an elevated water table or other limiting zone limitations that would make the use of these storm water control BMPs infeasible? ☐ Yes ☐ No

Is the applicant proposing to use a cistern/tank to control storm water from the proposed impervious areas? ☐ Yes ☐ No

If Yes, how will the cistern be emptied?_____
_____
What will be the use of the cistern water? _____
_____
How much water will be used per day? _____ gal. Per week? _____gal.

Simplified SWM Site Plan

Attach a Simplified SWM Site plan (i.e. sketch plan); an example is shown on the next page.

This sketch plan should include:

1. The approximate location of the property lines.
2. Existing sidewalks, buildings, driveways, or other impervious areas with dimensions in feet and areas in square feet.
3. The location where the proposed impervious area is going to be located with dimensions in feet and areas in square feet.
4. Dimensions from the property line to the proposed impervious areas.
5. Arrows showing the general stormwater flow direction across the project area.
6. The location of the proposed stormwater control facilities with dimensions and distances from the existing/proposed structures.
7. The location of existing utilities (water, sewer, gas, etc.).
8. Pa 1 Call number.
9. The area of disturbance delineated on the plan showing the area in square feet.

I acknowledge the Township's right to review the provided information, at my expense, and to deny this application or to revoke this permit application if any of the above statements are found to be false.

The Applicant assumes all risk and responsibilities for the design submitted. The manual is provided as a guide. However, it provides no specific design for any project.

The undersigned hereby represents that, to the best of his knowledge and belief, all information listed above and on the storm water management plan herewith submitted is true, correct and complete.

_____ _____

Date Applicant

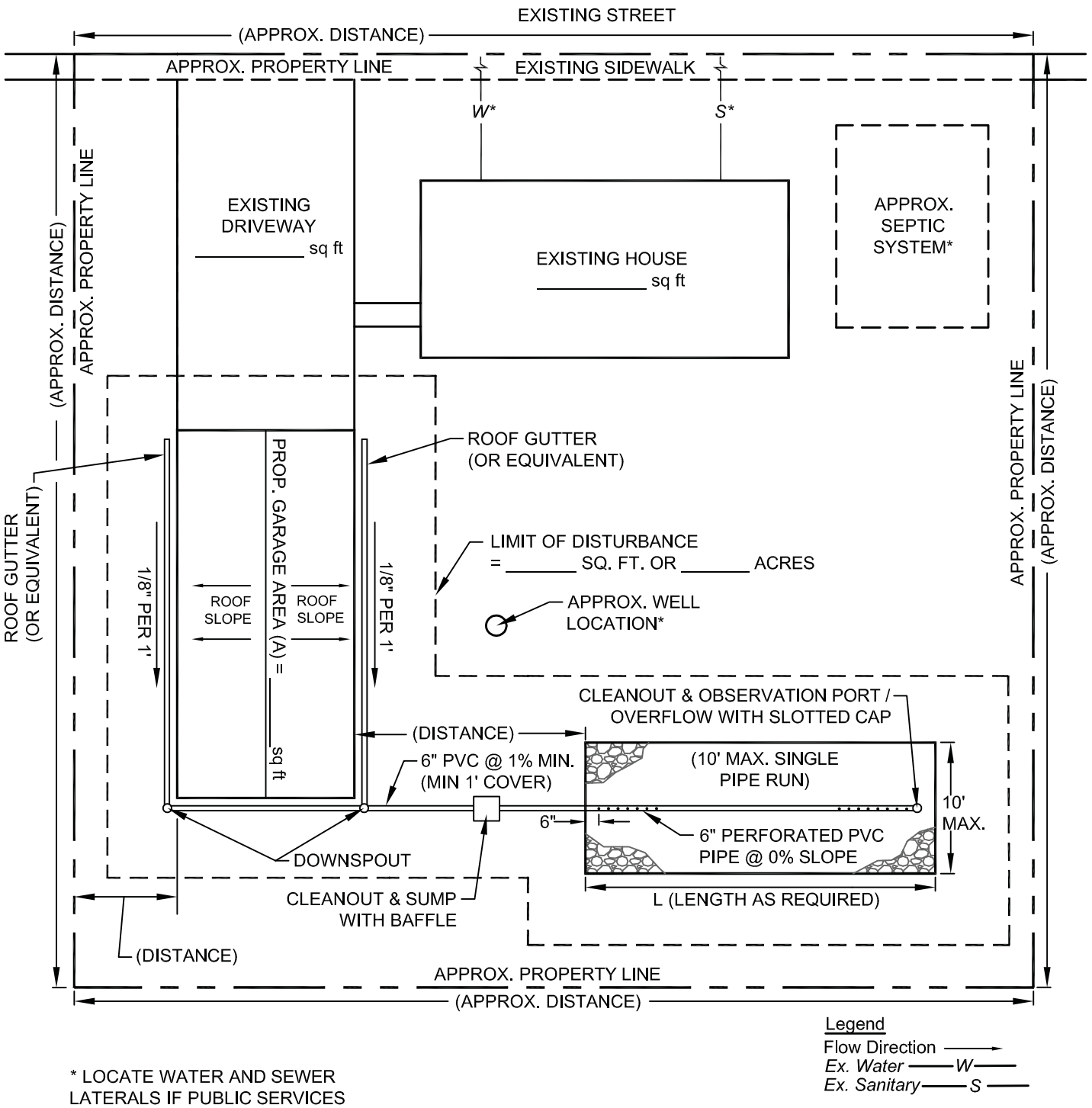
OFFICE USE

Date Received _____ Township File # _____

Property Account # _____

Submission Fee _____

Date of Application Approval _____



Legend

Flow Direction →

Ex. Water ——W——

Ex. Sanitary ——S——

* LOCATE WATER AND SEWER LATERALS IF PUBLIC SERVICES EXIST. LOCATE SEWER SYSTEM AND WELL IF NO PUBLIC SEWER OR WATER IS AVAILABLE

SAMPLE STORMWATER MANAGEMENT SITE PLAN

SHEET 1 OF 5

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SAMPLE WORKSHEET

Proposed Impervious and disturbed areas and Stormwater Control Volume Estimates:

1. What is the total proposed impervious area (A) in square feet? _____
2. What is the total earth disturbance area in square feet? _____
3. Take the total proposed impervious area (A) and determine the required stormwater runoff volume and BMP adjustments as required in the table below.

Stormwater Volume Estimates and Volume Adjustments by BMP (2 inch of rain)		
Proposed Impervious Area (A*) =	sq ft	
Stormwater Runoff Volume (B) =	(A)/6 =	(B) = cu ft
Stormwater BMP	Stormwater Volume Adjustment	Adjusted Stormwater Volume cu ft (C)
Cistern	B(cu ft) x 1.25**x7.50****	Adjusted Volume in Gallons
Rain Gardens/Bioretention Areas/Non-Stone lined dry wells	No Volume Adjustment needed	cu ft
Stone Lined Infiltration Trench or Dry Well	B(cu ft) x 2.5***	cu ft

* From Question 1 above. (Also see Sample Site Plan)
** Conversion factor assuming Cistern is 25% full.
*** Conversion factor assuming volume of voids = 40% i.e. dividing the volume by 0.4 is equivalent to multiplying the volume by 2.5
****1 Cubic ft = 7.5 Gallons

Example: 30'x50' Pole Building
Proposed Impervious Area = 1,500 sq ft

Stormwater Volume Estimates and Volume Adjustments by BMP		
Proposed Impervious Area (A) =	1,500 sq ft	
Stormwater Runoff Volume (B) cu ft =	(A)/6 = 1,500/6 =	(B) = 250 cu ft
Stormwater BMP	Stormwater Volume Adjustment	Adjusted Stormwater Volume cu ft (C)
Cistern	250 x 1.25 x 7.50	312.5 cu ft or 2,343.75 Gal
Rain Gardens/Bioretention Areas/Non-Stone lined dry wells	No Volume Adjustment Needed	250 cu ft
Stone Lined Infiltration Trench or Dry Well	250 cu ft x 2.5 =	625 cu ft

Conclusion:

1. A cistern for water re-use of at least 2,344 gallons could be used to collect the runoff from the new impervious cover.
2. A rain garden/bioretention area for surface water absorption of at least 10' wide x 21' long x 1' deep x SSF***** (10x21x1x1.20=252 cu ft) could be used.
   ***** SSF = Side Slope Factor; Factor is 1.10 for 0.5' deep, 1.20 for 1.0' deep rain gardens
3. An underground infiltration stone lined trench of 10' wide x 32' long by 2' deep (10'x32'x2'=640 cu ft) could be used.

APPLICANT'S WORKSHEET

Stormwater Volume Estimates and Volume Adjustments by BMP		
Proposed Impervious Area (A) =	_____ sq ft	
Stormwater Runoff Volume (B) =	(A)/6 = cu ft	(B) = cu ft
Stormwater BMP	Stormwater Volume Adjustment	Adjusted Stormwater Volume cu ft (C)
Cistern	(B)_____(cu ft) x 1.25 x 7.50	
Rain Gardens/Bioretention Areas/Non-Stone lined dry wells	No Volume Adjustment Needed	(B) _____
Stone Lined Infiltration Trench or Dry Well	(B)_____ (cu ft) x 2.5 =	

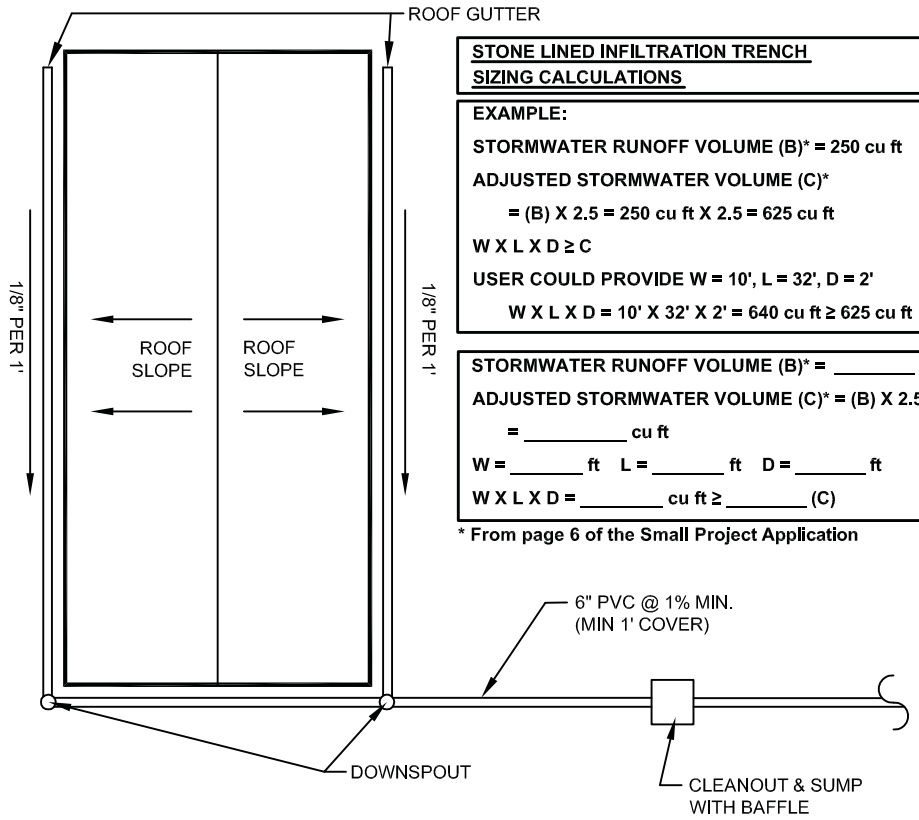
I propose to use a _____ of _____
(size)

for the stormwater control of my small project.

APPENDICES

APPENDIX - A

Stormwater Control BMPs



Plan view

STONE LINED INFILTRATION TRENCH SIZING CALCULATIONS

EXAMPLE:

STORMWATER RUNOFF VOLUME (B)* = 250 cu ft

ADJUSTED STORMWATER VOLUME (C)*

= (B) X 2.5 = 250 cu ft X 2.5 = 625 cu ft

W X L X D ≥ C

USER COULD PROVIDE W = 10', L = 32', D = 2'

W X L X D = 10' X 32' X 2' = 640 cu ft ≥ 625 cu ft

STORMWATER RUNOFF VOLUME (B)* = _____ cu ft

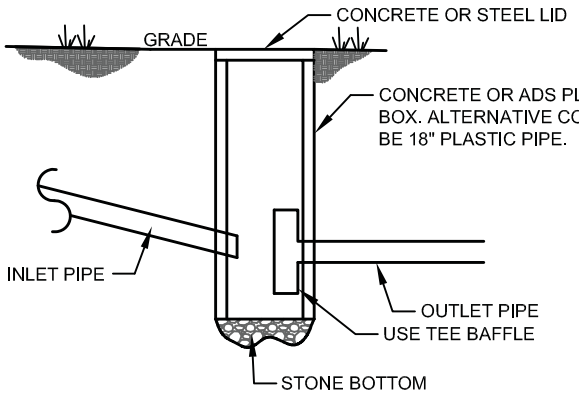
ADJUSTED STORMWATER VOLUME (C)* = (B) X 2.5 =

= _____ cu ft

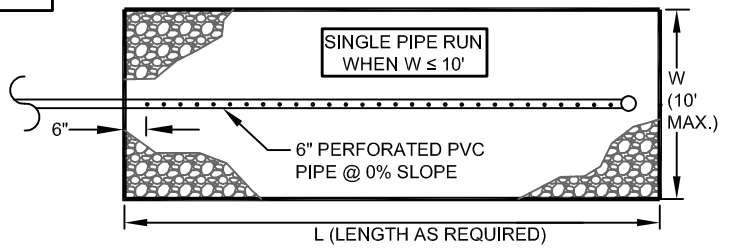
W = _____ ft L = _____ ft D = _____ ft

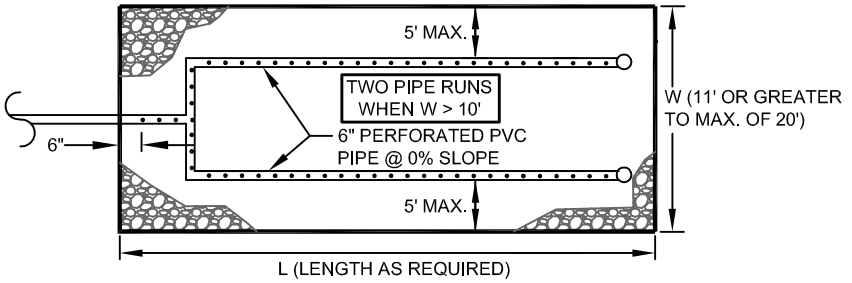
W X L X D = _____ cu ft ≥ _____ (C)

*** From page 6 of the Small Project Application**



Cleanout and Sump with Baffle Detail





Section view

Stone Lined Infiltration Trench

Scale: N.T.S.

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STONE LINED INFILTRATION TRENCH DETAIL

STONE LINED INFILTRATION TRENCH SIZING CALCULATIONS

EXAMPLE:

STORMWATER RUNOFF VOLUME (B)* = 250 cu ft

ADJUSTED STORMWATER VOLUME (C)*

= (B) X 2.5 = 250 cu ft X 2.5 = 625 cu ft

W X L X D ≥ C

USER COULD PROVIDE W = 10', L = 32', D = 2'

W X L X D = 10' X 32' X 2' = 640 cu ft ≥ 625 cu ft

STORMWATER RUNOFF VOLUME (B)* = _____ cu ft

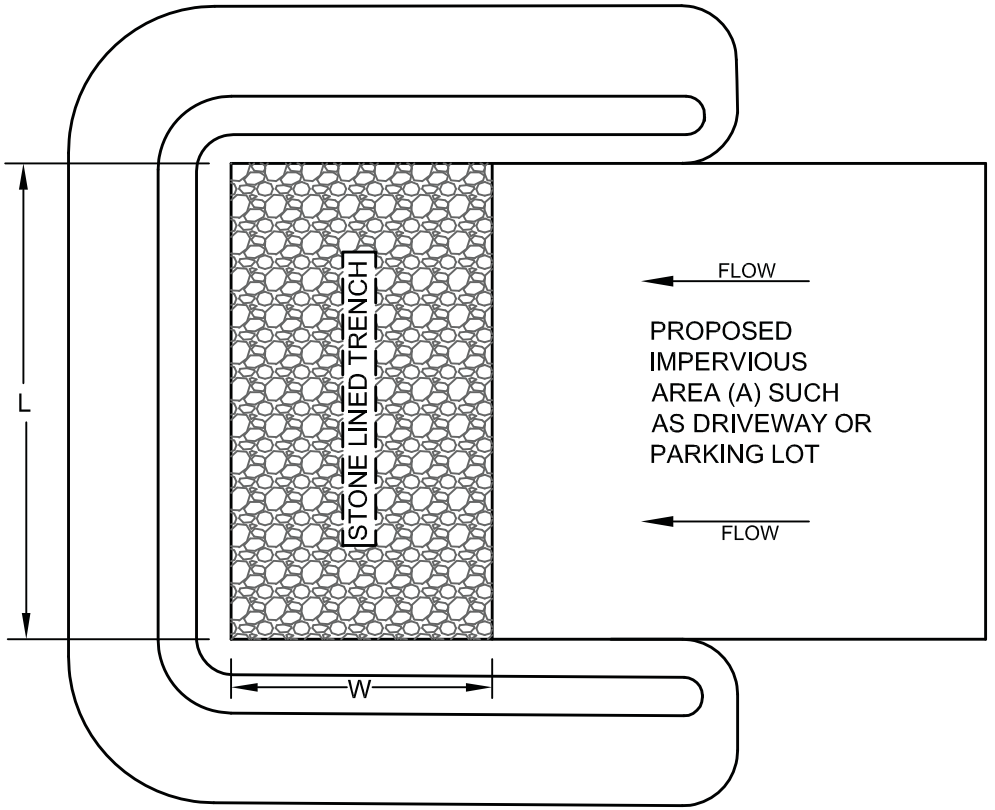
ADJUSTED STORMWATER VOLUME (C)* = (B) X 2.5 =

= _____ cu ft

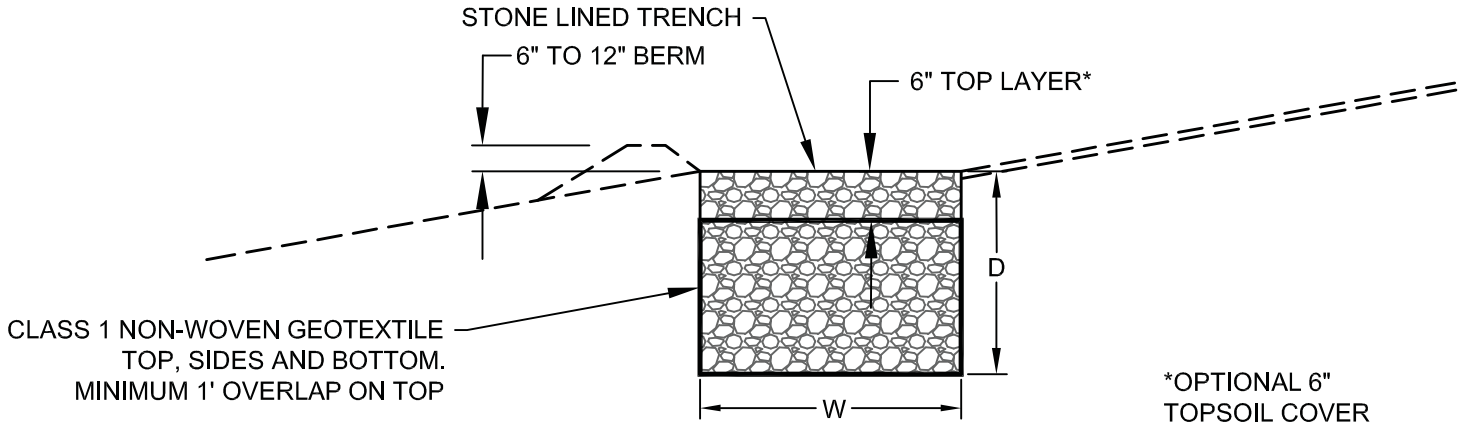
W = _____ ft L = _____ ft D = _____ ft

W X L X D = _____ cu ft ≥ _____ (C)

*** From page 6 of the Small Project Application**



Plan view



Section view (Scale: N.T.S)

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STONE LINED INFILTRATION TRENCH AT GRADE DETAIL

RAIN GARDEN / BIORETENTION AREA SIZING CALCULATIONS

EXAMPLE:

STORMWATER RUNOFF VOLUME (B)* = 250 cu ft
(NO VOLUME ADJUSTMENT NEEDED)

W X L X D X SSF ≥ B

USER COULD PROVIDE W = 10', L = 21', D = 1'

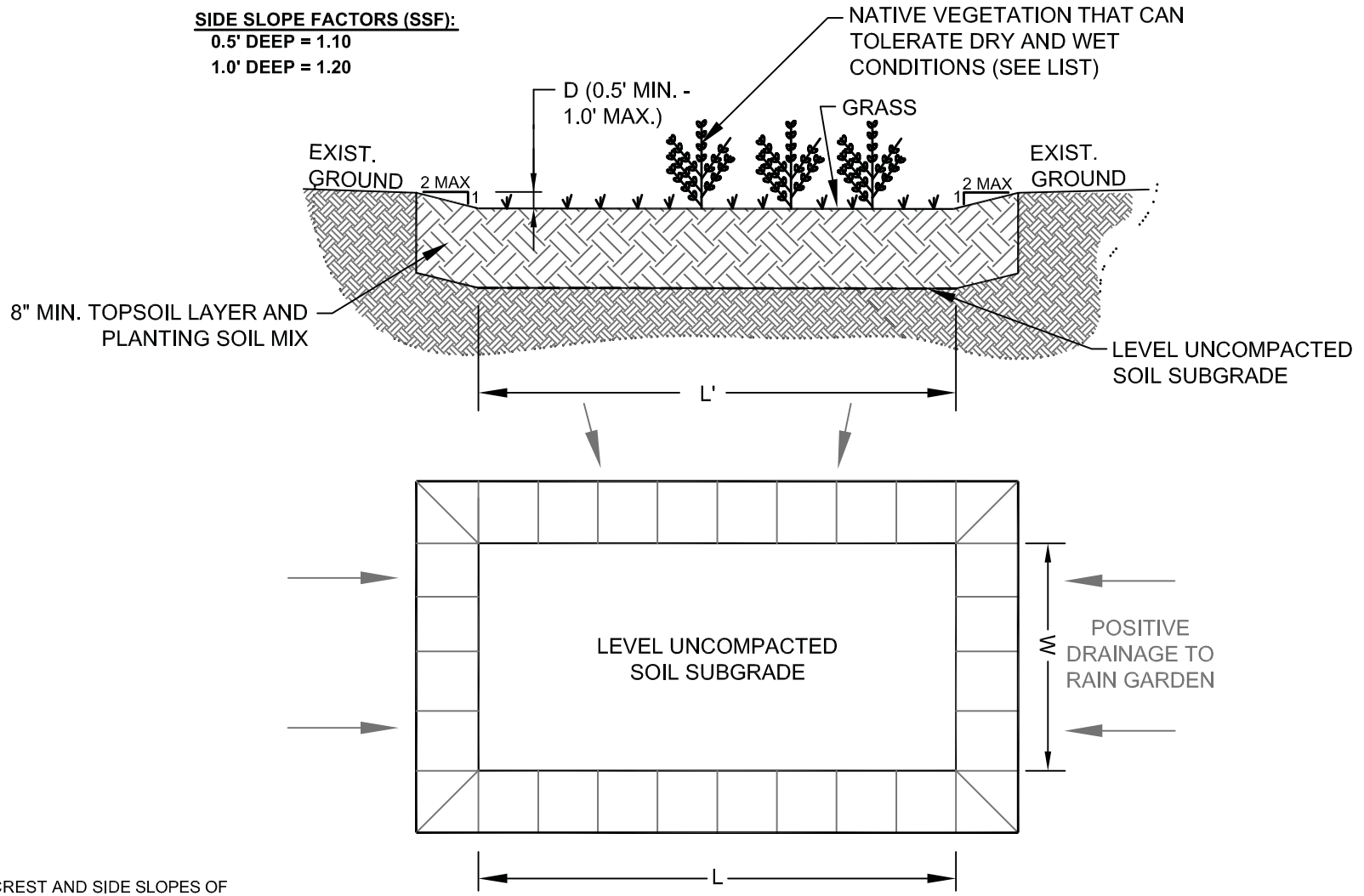
W X L X D X SSF = 10' X 21' X 1' X 1.20 = 252 cu ft ≥ 250 cu ft

STORMWATER RUNOFF VOLUME (B)* = _____ cu ft

W = _____ ft L = _____ ft D = _____ ft SSF = _____

W X L X D X SSF= _____ cu ft ≥ _____ (B)

SIDE SLOPE FACTORS (SSF):
0.5' DEEP = 1.10
1.0' DEEP = 1.20



Rain Garden/Bioretention Area

Scale: N.T.S.

NOTE
LINE CREST AND SIDE SLOPES OF SPILLWAY W/ NORTH AMERICAN GREEN TYPE S75 EROSION CONTROL BLANKET (OR EQUAL).

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RAINGARDEN / BIORETENTION AREA DETAIL

Rain Garden/Bioretention Areas

A Rain Garden (Bioretention Area) is an excavated depression area on the surface of the land in which native vegetation is planted to filter and use stormwater runoff. Runoff ponds on top of the surface of the rain garden and then infiltrates into an enhanced soil/planting mix below the surface where plants can use the water to grow. Bioretention also improves water quality, vegetation filters the water, and the root systems encourage or promote infiltration. Key elements of a rain garden include:

- Ponding depths recommended to **1 foot** or less.
- Native vegetation that can tolerate dry and wet weather.
- An overflow area where, if the bioretention area were to overflow, the overflow would flow over pervious area (i.e. grass, meadow), and would not cause harm to property, or;
- An overflow such as a domed riser to allow excess flow from large storms to travel to other substantial infiltration areas or pervious areas.
- For most areas, maximum 3:1 slopes are recommended, however, where space is limited, 2:1 side slopes may be acceptable with approval from the municipal engineer.
- The soil/planting mix depth should be between 1.5 feet to 6 feet deep.

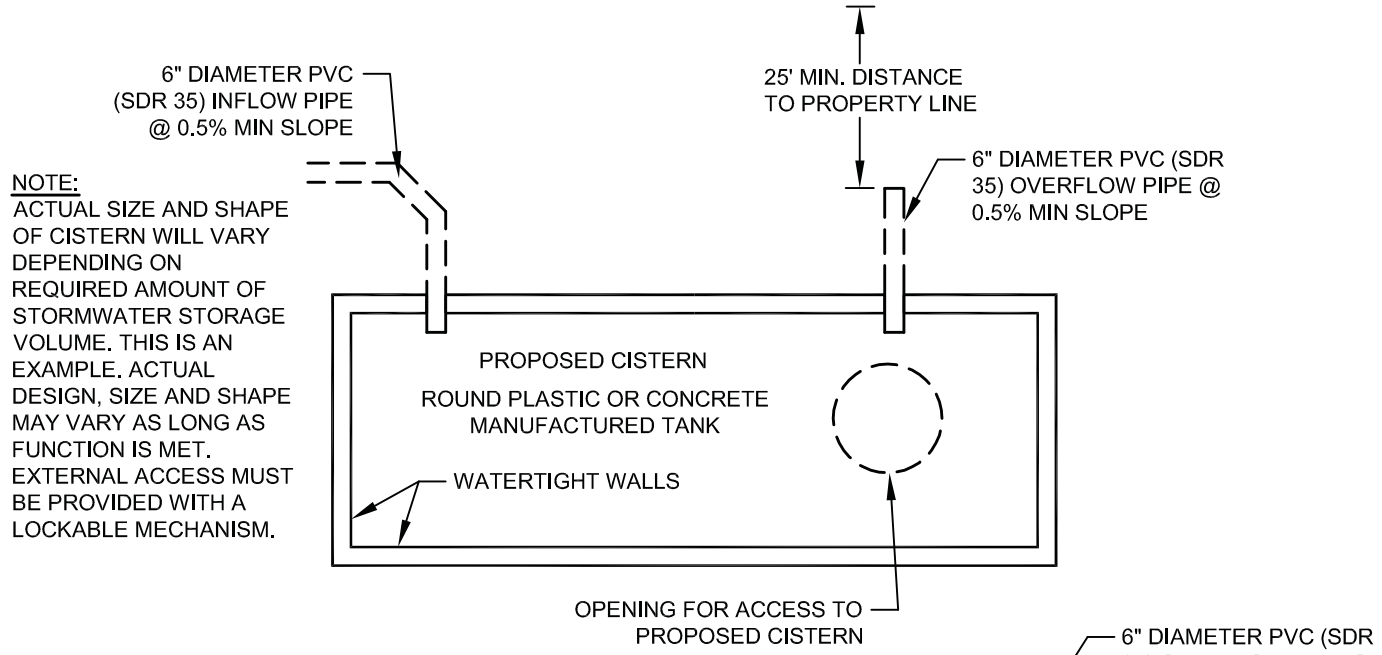
Rain Garden Native Planting List

Perennials and Ferns:

Blue false indigo (Baptisia australis)
Blue flag iris (Iris versicolor)
Blue star (Amsonia tabernaemontana)
Blue vervain (Verbena hastata)
Boltonia (Boltonia asteroides)
Boneset (Eupatorium perfoliatum)
Bottlebrush grass (Hystrix patula)
Broomsedge (Andropogon virginicus)
Cardinal flower (Lobelia cardinalis)
Cinnamon fern (Osmunda cinnamomea)
Culvers root (Veronicastrum virginicum)
Golden ragwort (Senecio aureus)
Goldenrod (Solidago patula, S. rugosa)
Great blue lobelia (Lobelia siphlitica)
Green bullrush (Scirpus atrovirens)
Horsetail (Equisetum species)
Marsh marigold (Caltha palustris)
Mistflower (Eupatorium colestinum)
Monkey flower (Mimulus ringens)
New England aster (Aster novae-anglia)
New York aster (Aster novi-belgii)
Obedient plant (Physotegia virginiana)
Royal fern (Osmunda regalis)
Seedbox (Ludwigia alternifolia)
Sensitive fern (Onoclea sensibilis)
Sneezeweed (Helenium autumnale)
Soft rush (Juncus effusus)
Swamp milkweed (Asclepias incarnata)
Swamp rose mallow (Hibiscus moscheutos)
Swamp sunflower (Helianthus angustifolius)
Switchgrass (Panicum virgatum)
Threadleaf coreopsis (Coreopsis verticillata)
Tussock sedge (Carex stricta)
White turtlehead (Chelone glabra)
Woolgrass (Scirpus cyperinus)

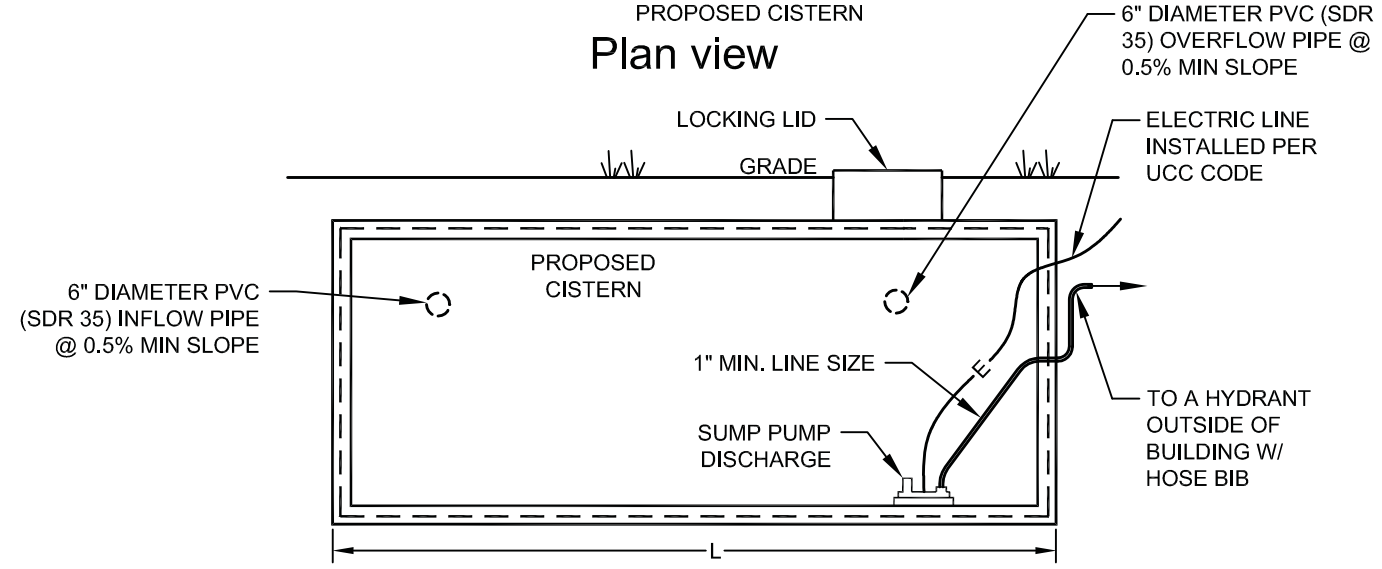
Shrubs:

American beautyberry (Calicarpa americana)
Arrowwood (Viburnum dentatum)
Black chokeberry (Aronia melanocarpa)
Broad-leaved meadowsweet (Spirea latifolia)
Buttonbush (Cephalanthus occidentalis)
Elderberry (Sambucus canadensis)
Inkberry (Ilex glabra)
Narrow-leaved meadowsweet (Spirea alba)
Ninebark (Physocarpus opulifolius)
Possumhaw (Viburnum nudum)
Red-osier dogwood (Cornus sericea)
St. Johnswort (Hypericum densiflorum)
Silky dogwood (Cornus amomum)
Smooth alder (Alnus serrulata)
Spicebush (Lindera benzoin)
Swamp azalea (Rhododendron viscosum)
Swamp rose (Rosa palustris)
Sweet pepperbush (Clethra alnifolia)
Wild raisin (Viburnum cassinoides)
Winterberry (Ilex verticillata)
Virginia sweetspire (Itea virginica)



NOTE:
ACTUAL SIZE AND SHAPE OF CISTERN WILL VARY DEPENDING ON REQUIRED AMOUNT OF STORMWATER STORAGE VOLUME. THIS IS AN EXAMPLE. ACTUAL DESIGN, SIZE AND SHAPE MAY VARY AS LONG AS FUNCTION IS MET. EXTERNAL ACCESS MUST BE PROVIDED WITH A LOCKABLE MECHANISM.

Plan view



Interior Elevation

CISTERN SIZING CALCULATIONS

EXAMPLE:

STORMWATER RUNOFF VOLUME (B) = 250 cu ft

ADJUSTED STORMWATER VOLUME (C)

= (B) X 1.25 = 250 cu ft X 1.25 = 312.5 cu ft

= 312.5 cu ft X 7.5 GAL/cu ft = 2,343.75 GAL.

W X L X D ≥ C

USER COULD PROVIDE W = 12', L = 10', D = 3'

W X L X D = 12' X 10' X 3' = 360 cu ft ≥ 312.5 cu ft (2,343.75 GAL.)

STORMWATER RUNOFF VOLUME (B)* = _____ cu ft

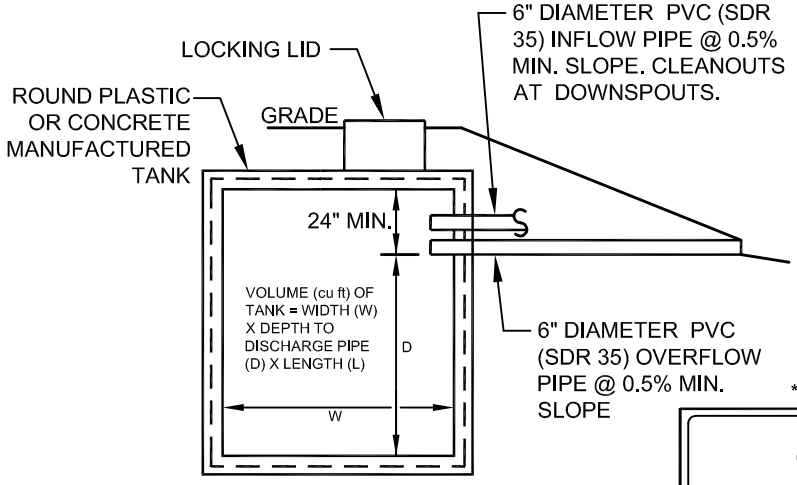
ADJUSTED STORMWATER VOLUME (C)* = (B) X 1.25 =

_____ cu ft X 7.5 GAL/cu ft = _____ GAL.

W = _____ ft L = _____ ft D = _____ ft

W X L X D = _____ cu ft ≥ _____ (C) (OR _____ GAL.)

*** From page 6 of the Small Project Application**



Section View

CISTERN DETAILS

SHEET 5 OF 5

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APPENDIX - B

Stormwater Control BMPs Operation, Maintenance, and Inspection Plan and Agreement

Sizing and design considerations for Stormwater Control BMPs

There are several different types of Stormwater Control BMPs the applicant can choose from for their projects needs. A combination of Stormwater Control BMPs may be needed to control stormwater runoff from the proposed impervious areas. The following is only a partial list of more common storm water Control BMPs and does not cover all of the BMPs available.

These BMPs are:

1. Cisterns
2. Rain Garden/Bioretention Areas
3. Stone Lined Trench or Stone Filled Dry Well

Cisterns

Cisterns are large containers that collect drainage from roof leaders and temporarily store water to be released to lawns, gardens, and other landscaped areas after the rainfall event has ended. Cisterns can have volumes of 200 gallons (27 cu ft) or more, and can be placed either on the surface or underground. Figure 1 shows examples of cisterns that could be used to manage stormwater from a project. Cisterns are manufactured in a variety of shapes and sizes. All of these facilities must make provisions for the following items:

- There must be a means to release the water stored in the container between storm events in order for the necessary storage volume to be available for the next storm.
- Stormwater must be kept from entering other potable systems, and pipes and storage units must be clearly marked "Do Not Drink".
- An overflow outlet should be placed a few inches below the top of the storage container with an overflow pipe to divert flow away from structures once the storage containers are filled.
- Use screens to filter debris, and covers (lids) placed over the containers to prevent insects and debris from entering the storage chamber.
- Make sure cisterns are watertight and do not leak.
- Rain barrels are typically assumed to be 25% full to calculate volume since they are not always emptied before each storm.



Figure 1: Source (for both photographs): Pennsylvania Stormwater BMP Manual (PADEP, 2006)

Stone Lined Infiltration Trench

An infiltration trench is a long, narrow, rock-filled trench with or without a perforated pipe that receives stormwater runoff, and has no outlet. Runoff is stored in the void space between the stones and in the pipe, and infiltrates through the bottom and into the underlying soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Infiltration trenches shall incorporate or make provisions for the following elements:

- Perforated pipe is to be set level.
- The width is limited to between 3 to 8 feet, and the depth ranges from 2 to 6 feet.
- Trench should be wrapped in nonwoven geotextile (top, sides, and bottom).
- There should be a positive overflow that allows stormwater that cannot be stored or infiltrated to be discharged into a nearby vegetated area.
- Roof downspouts may be connected to infiltration trenches, but should contain a cleanout to collect sediment and debris before entering the infiltration area.
- Infiltration testing is recommended to ensure soil is capable of infiltrating stormwater.
- It is recommended that there be a 2 foot clearance above the regularly occurring seasonal high water table, and have a minimum depth to bedrock of 2 feet.
- The infiltration trench should be at least 50 feet from individual water supply wells, 100 feet from community or municipal water supply wells, and 50 feet from any septic system component. It should not be located near hotspots which are areas where land use or activities generate highly contaminated runoff, with concentrations of pollutants that are higher than those that are typically found in stormwater (e.g. vehicle salvage yards, recycling facilities, vehicle fueling stations, maintenance facilities, etc.).
- The infiltration trench should be located so that it presents no threat to sub-surface structures such as building foundations and basements.
- Protect infiltration areas from compaction by heavy equipment during and after construction.
- The ratio of the collected area to the footprint of the facility should be as small as possible with a ratio of less than 5:1 preferred.

Dry Wells

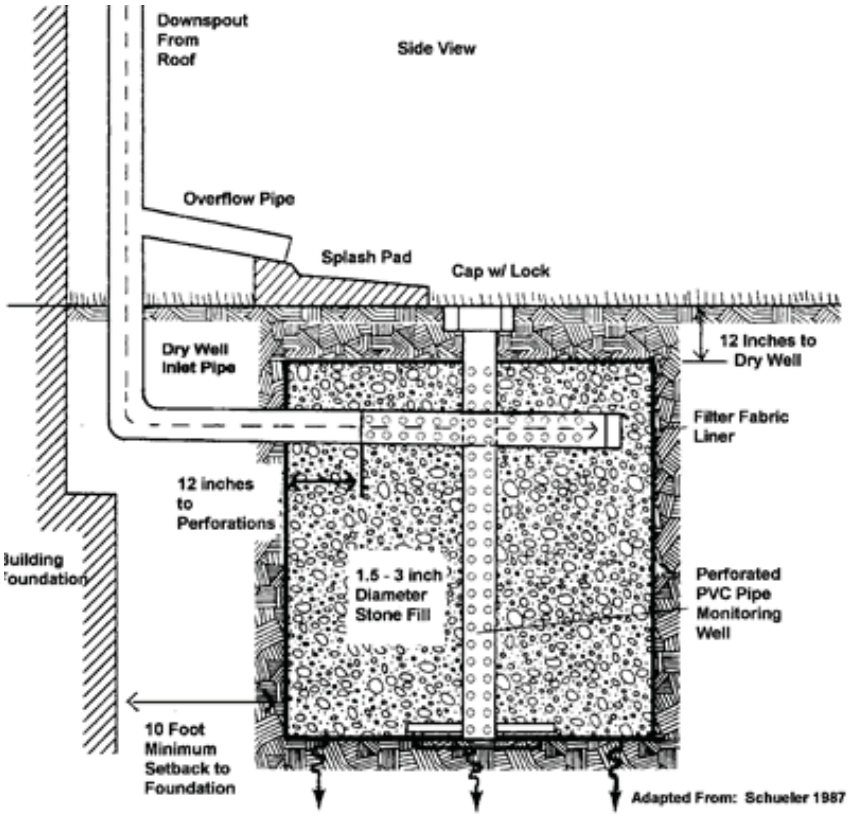
A dry well, also referred to as a seepage pit, is a subsurface storage facility that temporarily stores and infiltrates runoff from the roofs of buildings or other impervious surfaces. A dry well can be either a structural prefabricated chamber (Dry Well #1) or an excavated pit filled with stone fill (Dry Well #2). Dry Wells discharge the stored runoff via infiltration into the surrounding or underlying soils. Figure 4 shows a typical prefabricated dry well and a typical dry well configuration with stone fill. The following elements shall be incorporated into all dry well designs:

- These facilities should be located a minimum of ten (10) feet from the building foundation to avoid foundation seepage problems, and are not recommended if their installation would create a risk for basement flooding.
- Construction of a dry well should be performed after surface soils in all other areas of the site are stabilized to avoid clogging.
- During construction, compaction of the subgrade soil in the bottom of the dry well should be avoided, and construction should be performed only with light machinery.

- For Dry Well #2 designs, the depth of dry well should be between **1.5 feet to 4 feet**. Gravel fill should consist of stone with an average of one and one half to three (1.5 – 3.0) inches in diameter with the gravel fill wrapped in a nonwoven geotextile that separates the stone fill from the surrounding soil.
- At least 1 foot of soil needs to be placed over the top of the dry well.
- Dry wells should be inspected at least four (4) times annually as well as after large storm events.
- Dry wells should have overflow pipes to allow high volumes of runoff to connect to other on-site substantial infiltration areas or pervious areas.
- Every dry well needs to have at least one monitoring well.
- Infiltration testing is recommended to ensure the underlying soil is capable of infiltrating the needed volume of stormwater.



Dry Well #1
Source (for photograph): http://www.copelandconcreteinc.net/1800652.html



Dry Well #2

Source (for photograph): http://www.seagrant.sunysb.edu/cprocesses/pdfs/BMPsForMarinas.htm

Figure 4: Typical Dry Well Structural Prefabricated Chamber (Dry Well #1) and Typical Dry Well Configuration filled with Stone Fill (Dry Well #2)

Operation, Maintenance, Inspection Plan, and Agreement

Regardless to which stormwater control BMPs the applicant chooses to use an Operation, Maintenance, and Inspection Plan and Agreement will need to be signed, notarized, and submitted to the Municipality.

Following approval and signature by the Jackson Township, the landowner must have the agreement recorded at the Dauphin County Office of the Recorder of Deeds, so that the agreement will be applicable to future landowners, with a copy of the recorded agreement submitted to the Township.

See Ordinance for the Operation, Maintenance, and Inspection Plan and Agreement.