

**STORM WATER MANAGEMENT MINOR LAND DISTURBANCE APPLICATION
West Hempfield Township**

Date Received _____ Township File Number _____ Property Account # _____
 Filing Fee = \$ 300.00 O&M Agreement submitted? (yes)____(no)____(Appendix G)
 Escrow Fee = \$1,500.00 O&M Agreement signed? (yes)____(no)____
 Submitted Fee \$ _____ Approval of Application Date _____
 ↑↑↑ (above information to be completed by Township) ↑↑↑

↓↓↓ (below information to be completed by Applicant) ↓↓↓

Application is hereby made to West Hempfield Township for the issuance of a Storm Water Management Plan approval for a Minor Land Disturbance as defined in the West Hempfield Township Storm Water Management Ordinance. April 1, 2014 shall be the starting point from which the impervious or disturbed areas for Minor Land Disturbance activity shall be cumulatively considered.

1. Name of Property Owner(s): _____
 Address: _____ Phone No. _____

2. Name of Applicant (if other than owner): _____
 Address: _____ Phone No. _____

3. Project Location: _____

4. Brief Description of Work to be Performed: _____

5. Amount of Impervious Cover Proposed (sq. ft.): _____
6. Area proposed to be disturbed, including storm water management facilities (sq. ft.):

7. Amount of Impervious Cover (sq. ft.) installed since April 1, 2014 as approved Exemption

8. Area (sq. ft.) Disturbed since April 1, 2014 as approved Minor Land Disturbance

9. If storm water is to be managed through water re-use (such as a cistern), specify what the water will be used for and how many gallons will be used on a daily basis:

10. Public Water or On-lot well?: _____
11. Public Sewer or On-lot sewage disposal?: _____

12. Has the "Storm Water Management Agreement And Declaration Of Easement" for the Minor Land Disturbance been provided?: _____

By my signature below, I certify to the Township that, to the best of my knowledge, the following statements are true:

- The Proposed Activity will not result in the disturbance of land within Floodplains, Wetlands, Environmentally Sensitive Areas, Riparian Forest Buffers, or slopes greater than 15%.
- The Proposed Activity will not be conducted within any existing drainage or storm water easement created by or shown on any recorded plan.
- The Proposed Activity will minimize soil disturbance, take steps to minimize Erosion during construction activity, and promptly reclaim all disturbed areas with topsoil and vegetation.
- The Proposed Activity will not adversely impact any existing known problem areas or downstream property owners or the quality of Runoff entering any Storm Sewer.
- I will minimize soil disturbance, take steps to minimize Erosion during construction activity, and promptly reclaim all disturbed areas with topsoil and vegetation.
- I will take steps to insure that Runoff will be directed to Pervious Areas on the subject property. No Runoff will be directed onto an abutting street or neighboring property.
- 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.

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 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

Signature of Applicant

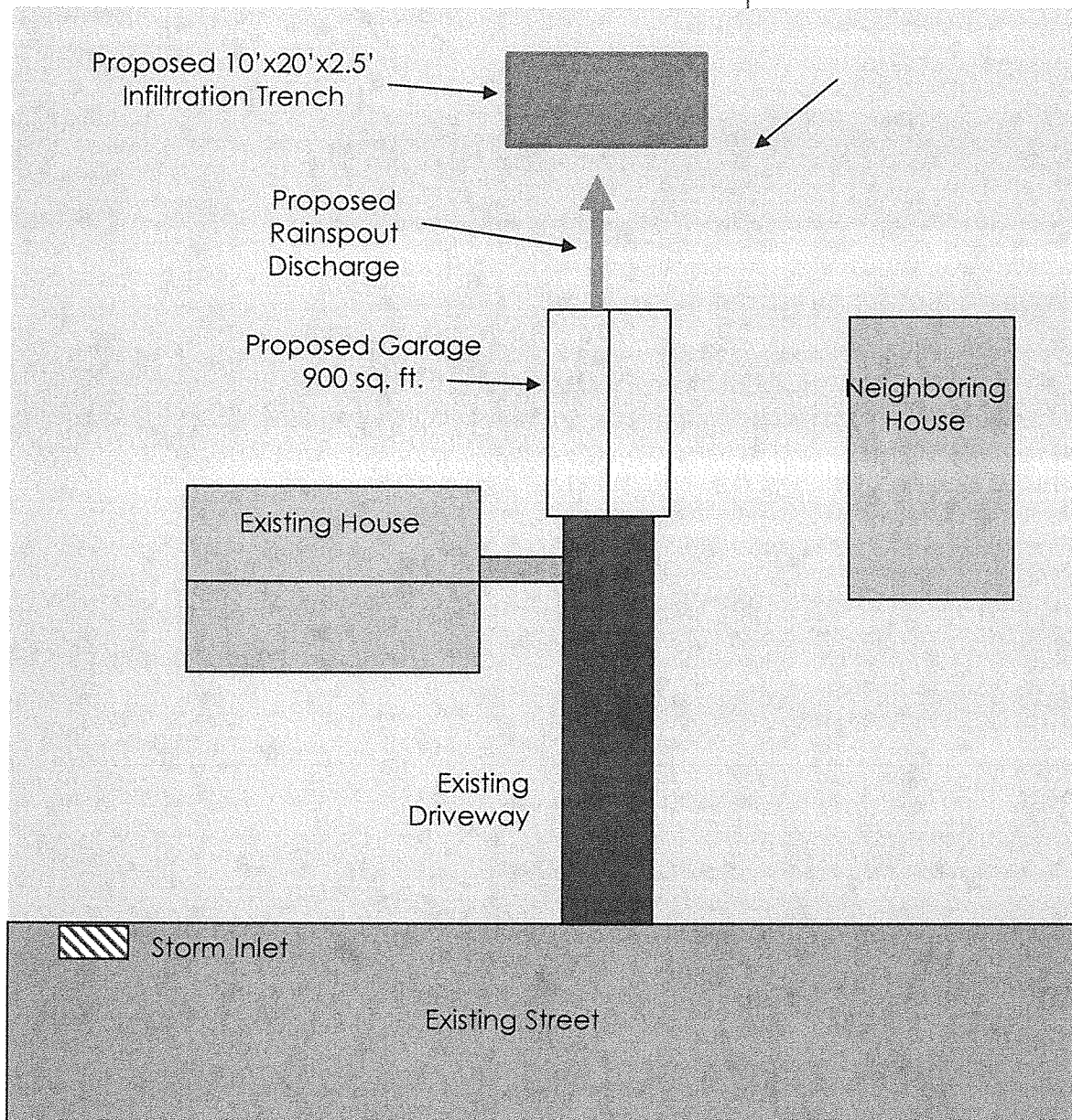
Sketch

Provide a sketch of the proposed additional impervious area or land disturbance associated with the Minor Land Disturbance.

- Show direction of proposed storm water discharges
- Show all structures within 50 feet of site
- Show property lines and existing impervious areas
- If present, show well, existing on-lot sewage disposal system, and replacement area
- If storm sewers or watercourses are present, show approximate location
- Indicate square footage of proposed impervious area or land disturbance, including storm water management facilities

EXAMPLE MINOR LAND DISTURBANCE PROJECT SKETCH

- Show direction of proposed storm water discharges
- Show all structures within 50 feet of site
- Show property lines and existing impervious areas
- If present, show well, existing on-lot sewage disposal system, and replacement area
- If storm sewers or watercourses are present, show approximate location
- Indicate square footage of proposed impervious area or land disturbance, including storm water management facilities



Minor Land Disturbance
Worksheets, Design Tables and Construction Notes

The following guidance has been provided for those regulated activities that qualify as a Minor Land Disturbance. The Retention Volume/Removed Runoff computed below represents the volume required per Section 122-48 of the West Hempfield Township Storm Water Management Ordinance. This volume represents the amount of runoff to be permanently removed (managed onsite through reuse, infiltration, evaporation, or transpiration). The volume does not account for the rate of percolation into the ground.

Variables: A = Impervious Area (Square Foot)
 V = Retention Volume/Removed Runoff

Compute Retention Volume/Removed Runoff:

$$V = 0.2 \times \boxed{} = \underline{\hspace{2cm}} \text{ cu. ft.}$$

A (square feet)

$$V = 1.496 \times \boxed{} = \underline{\hspace{2cm}} \text{ gallons}$$

A (square feet)

Once the Retention Volume/Removed Runoff (V) has been calculated, the following table can be utilized to select the corresponding volume of a variety of BMP options.

Sizing Chart for Various Storm Water BMPs

Impervious Area (sq-ft)	Retention Volume/Removed Runoff (cu-ft)	Cubic Feet of Infiltration Trench Storage (incl. 40% void ratio)	Square Feet of Rain Garden Surface Area (6" Depth)	Gallons of Cistern Storage (1 cubic foot = 7.48 gallons)	Linear Feet of 8' Wide Swale w/ Check Dam (6" Ponding Depth)
500	100	250	200	748	25
750	150	375	300	1122	37.5
1000	200	500	400	1496	50
1250	250	625	500	1870	62.5
1500	300	750	600	2244	75
1750	350	875	700	2618	87.5
2000	400	1000	800	2992	100
2250	450	1125	900	3366	112.5
2500	500	1250	1000	3740	125

Infiltration Trench

Step 1:

Trench volume (cubic feet) = A x 0.5 → A is impervious area in square feet

Step 2:

Depth of Stone (D) = _____ feet Width (W) = _____ feet Length (L) = _____ feet

Trench Volume = D x W x L x 0.4 = _____ (cubic feet)

Note: Depth of Stone x Width x Length x 40% (for voids) must be equal to or greater than (V) Retention Volume/Removed Runoff.

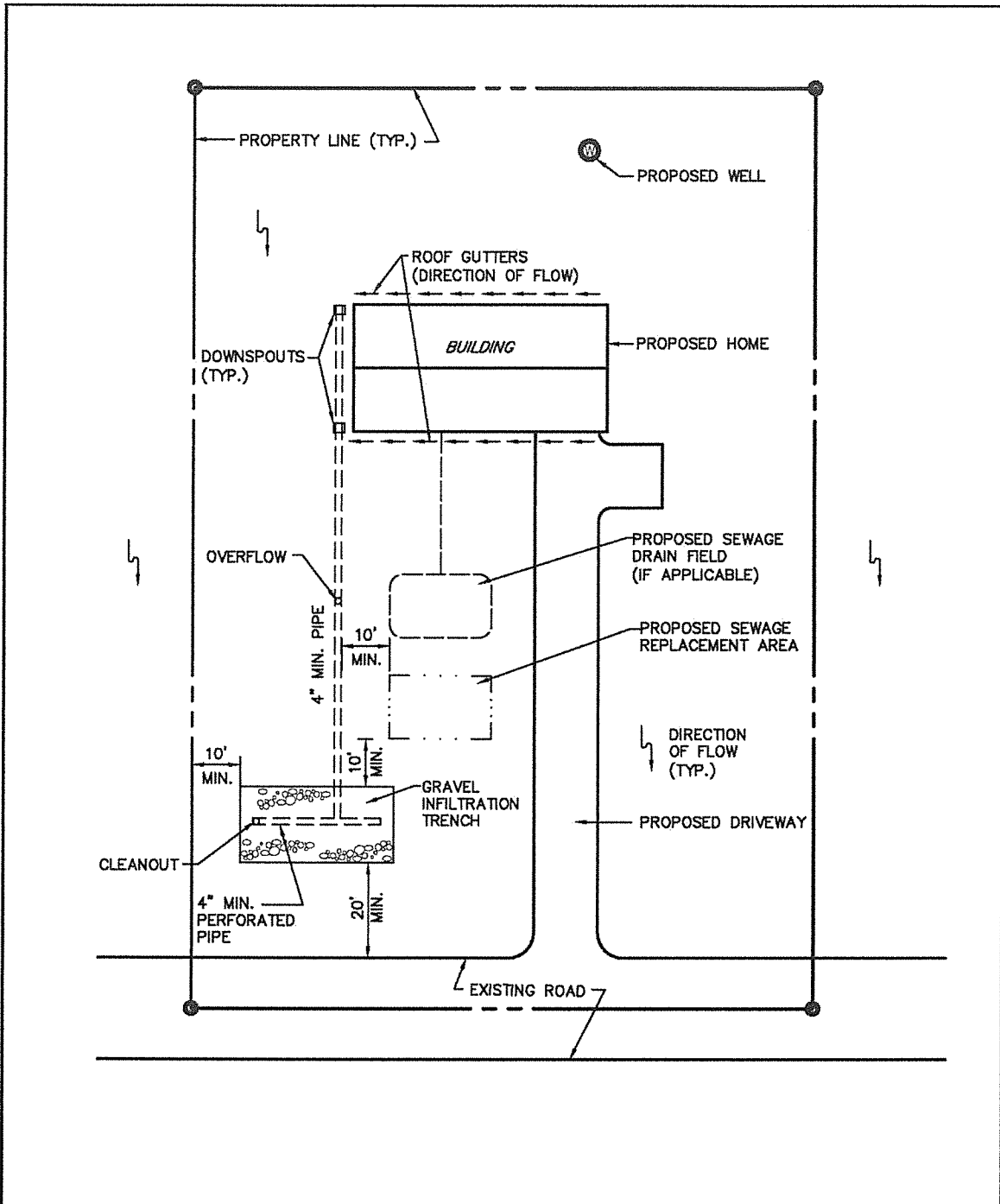
Step 3:

Total Trench Depth = _____ inches of stone + 12 inches of cover = _____ inches*
*must be between 24 inches and 40 inches

Infiltration Trench Construction - General Notes

1. Use the worksheets and table to compute the required volume in the infiltration trench (in cubic feet) for all proposed impervious areas. The calculated total volume is the minimum requirement for on-site construction. The actual horizontal dimensions of the infiltration trench may vary to fit specific site configurations and constraints, but the vertical depth of the infiltration trench must be a minimum of twenty-four (24) inches and a maximum of forty (40) inches. The total volume of the infiltration trench must be equal to or greater than the required minimum Retention Volume/Removed Runoff.
2. Multiple stone infiltration trenches may also be utilized. If multiple infiltration trenches are desired, the volume for each infiltration trench should be a proportional amount of the calculated total storage volume (i.e. utilizing two (2) trenches, if 60 percent of the total roof area is piped to one infiltration trench, then that infiltration trench should be sized for 60 percent of the total required minimum volume. The second infiltration trench would then be sized for the remaining 40 percent of the total required minimum volume.).
3. A PA One Call shall be performed in accordance with state requirements prior to any excavation.
4. Based on the calculations of the required infiltration trench dimensions computed using the worksheet and table, stake out the locations of the infiltration trench corners. Staking is critical and should outline the location of the infiltration trench. The infiltration trench should be located as far as possible downslope from the proposed home (10' min.) while maintaining at least 10' to property lines and 20' to any existing roadways. The infiltration trench should also be located beside or downslope (10' min.) of any proposed on-lot sewage drain field or sewage drain field replacement area, or if that is not possible, as far as possible from any proposed on-lot sewage drain field or sewage drain field replacement area.
5. Excavation of the infiltration trench should be conducted from outside of the infiltration trench perimeter, preferably from the upslope side, using equipment which has a bucket on a reaching arm. If equipment is permitted in the infiltration trench area, it should be limited to lightweight, track vehicles. If wheeled equipment enters the infiltration trench area, or the infiltration trench bottom is smeared as a result of scraping with a bucket, the soil in the bottom of the infiltration trench should be chiseled or ripped to break up any compaction; if necessary, equipment operation on top of some aggregate placed in the infiltration trench will protect the soil beneath.

6. After excavation of the infiltration trench is complete, ensure that the bottom is graded with a slope that is no greater than two (2) inches per one hundred (100) feet. Then, line the infiltration trench sides with Class 1 Geotextile filter fabric while leaving enough excess filter fabric to cover the infiltration trench before it is backfilled with earthen fill. If multiple runs of filter fabric are required to completely enclose the infiltration trench, a minimum of 12 inches overlapping must be provided. This filter fabric layer keeps the fine particles of the backfilled soil from moving down through the stone and clogging the infiltration trench.
7. Connect roof drain leaders from downspouts to infiltration facility leaving trenches open for inspection. If project involves paved surface (such as driveway or parking) rather than building, perform grading to direct runoff either overland or via storm water collection system and into infiltration trench.
8. Aggregate (clean washed stone with no fines in the range of coarse aggregate sizes from AASHTO #1 to AASHTO #57) is then placed in the infiltration trench. This should be done without permitting heavy equipment, especially trucks, to travel in the infiltration trench area. The stone is deposited in the infiltration trench to a uniform depth of a minimum of six (6) inches which must leave at least eighteen (18) inches of depth between the surface of the stone and the top of the infiltration trench. The perforated pipe (minimum four (4) inch PVC) with cleanout pipe extension should then be placed on the stone.
9. At this time, before more stone is placed in the infiltration trench to cover the pipe, or roof leaders trenches are backfilled, the Township should be notified for inspection of the facility to verify proper pipe installation.
10. Following the Township inspection, add more stone around and over the pipe to a uniform depth a minimum of two (2) inches over the top of the pipe. Carefully cover the top of the stone bed with the remaining Geotextile fabric, being careful to overlap a minimum of twelve (12) inches.
11. The infiltration trench should then be backfilled to the top of the infiltration trench with at least twelve (12) inches of clean earth fill. The fill should be mounded slightly to allow for settling.
12. To ease maintenance of the underground pipes, and prevent clogging of the infiltration trench, consideration should be given to providing screens for all roof gutters. The screens prevent foreign materials from clogging the pipes and stone infiltration trench.



<p style="text-align: center;">EXHIBIT A TYPICAL INFILTRATION TRENCH PLAN</p> <p>WEST HEMPFIELD TOWNSHIP LANCASTER COUNTY</p>	<p style="text-align: center;">RETTEW</p> <p style="font-size: small;">RETTEW Associates, Inc. 3020 Columbia Ave., Lancaster, PA 17603 Phone (717) 394-3721 • Fax (717) 394-1083</p>	<p>DRAWN BY: _____</p> <p>DATE: 4/10/14</p> <p>SCALE: NOT TO SCALE</p> <p>DWG. NO. 011102015</p>
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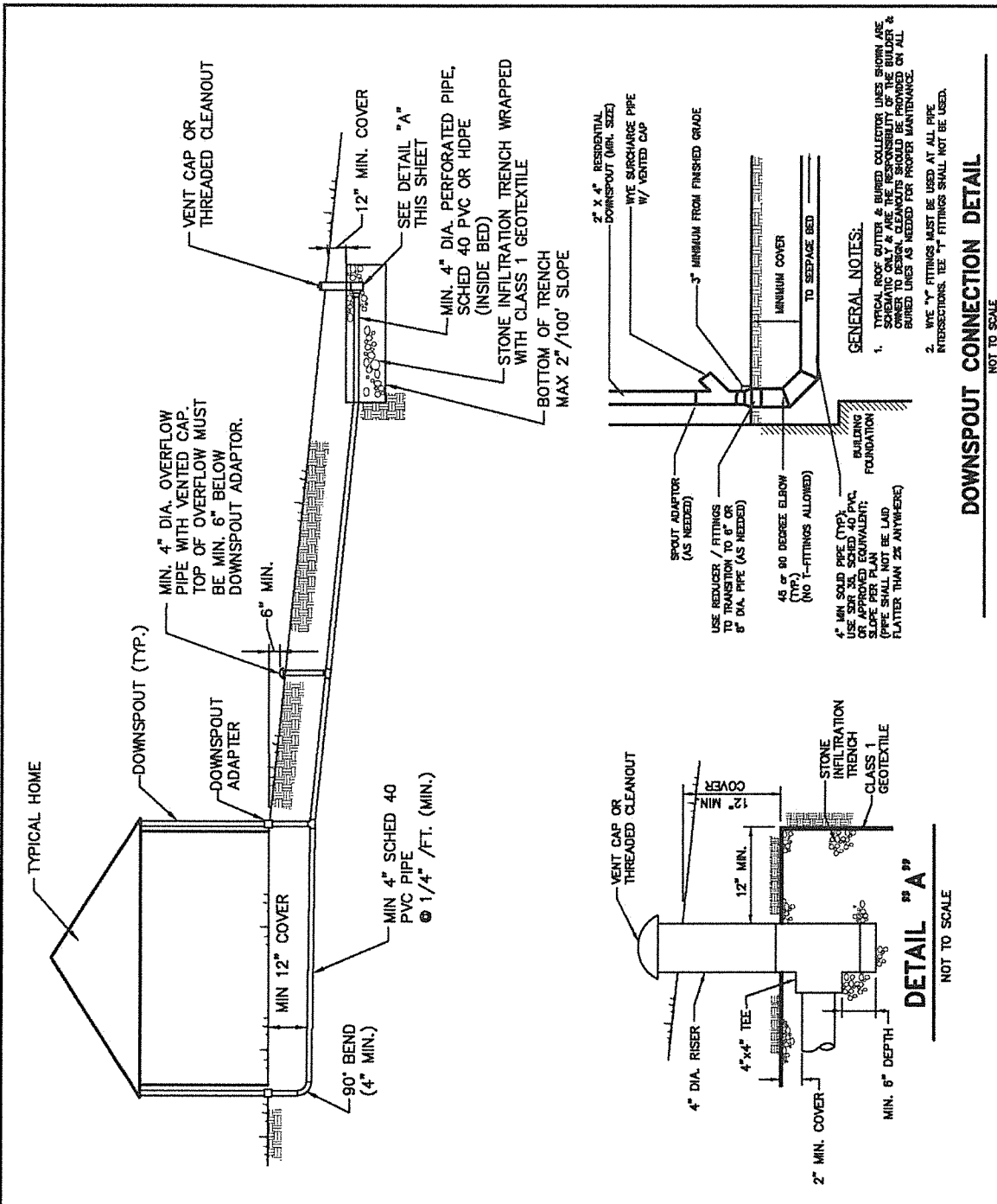


EXHIBIT B
TYPICAL INFILTRATION TRENCH PROFILE

WEST HEMPFIELD TOWNSHIP LANCASTER COUNTY

RETTEW

RETTEW Associates, Inc.
3220 Columbia Ave., Lancaster, PA 17603
Phone (717) 394-3721 • Fax (717) 394-1063

DRAWN BY: _____
DATE: 4/10/14
SCALE: NOT TO SCALE
DWG. NO. 011102015

DOWNSPOUT CONNECTION DETAIL
NOT TO SCALE

GENERAL NOTES:

1. TYPICAL ROOF GUTTERS & BURIED COLLECTORS, LEAKS, BLOCKS, ARE SPECIFIC ONLY & ARE THE RESPONSIBILITY OF THE BUILDER & OWNER TO DESIGN. CLEANOUTS SHOULD BE PROVIDED ON ALL BURIED LINES AS NEEDED FOR PROPER MAINTENANCE.
2. WYE "Y" FITTINGS MUST BE USED AT ALL PIPE INTERSECTIONS. Tee "T" FITTINGS SHALL NOT BE USED.

Rain Garden

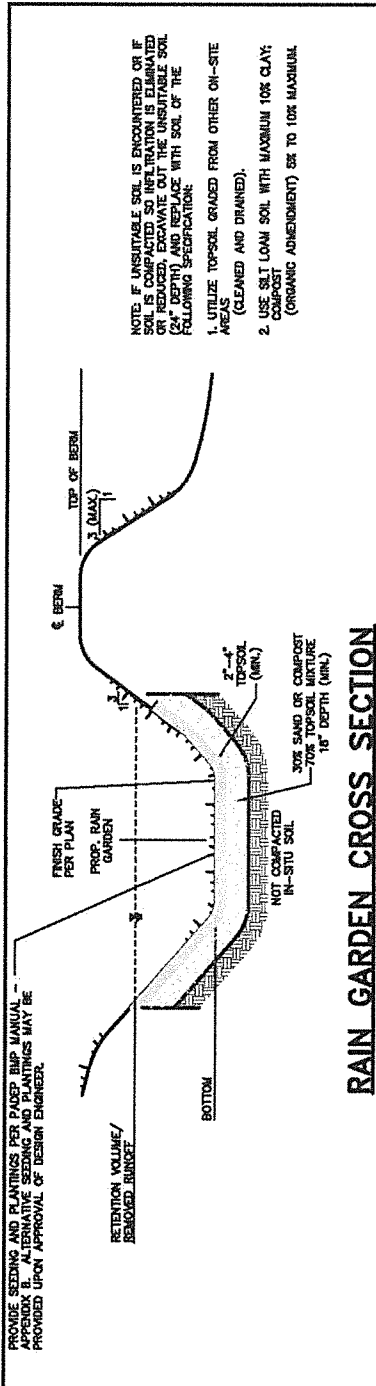
Depth (D) = _____ feet Width (W) = _____ feet Length (L) = _____ feet

Note: Storage volume provided must be equal to or greater than the Retention Volume/Removed Runoff.

Storage Volume = $L \times W \times D$ = _____ or Surface Area $\times D$ = _____
for irregular shapes

Rain Garden Construction - General Notes

1. Use the worksheet and table to compute the required volume in the rain garden (in cubic feet) for all proposed impervious areas. The calculated total volume is the minimum requirement for on-site construction. The actual horizontal dimensions of the rain garden may vary to fit specific site configurations and constraints, but the vertical depth of the rain garden should not exceed six (6) inches. The total volume of the rain garden must be equal to or greater than the required minimum Retention Volume/Removed Runoff.
2. Multiple rain gardens may also be utilized. If multiple rain gardens are desired, the volume for each rain garden should be a proportional amount of the calculated total storage volume (i.e. utilizing two (2) rain gardens, if 60 percent of the total roof area is piped to one rain garden, then that rain garden should be sized for 60 percent of the total required minimum volume. The second rain garden would then be sized for the remaining 40 percent of the total required minimum volume.).
3. A PA One Call shall be performed in accordance with state requirements prior to any excavation.
4. Based on the calculations of the required rain garden dimensions computed using the worksheets and table, stake out the locations of the rain garden corners. Staking is critical and should outline the location of the rain garden. The rain garden should be located as far as possible downslope from the proposed home while maintaining at least 10' to property lines and 20' to any existing roadways. The rain garden should also be located beside or downslope (10' min.) of any proposed on-lot sewage drain field or sewage drain field replacement area, or if that is not possible, as far as possible from any proposed on-lot sewage drain field or sewage drain field replacement area.
5. Excavation of the rain garden should be conducted from outside of the rain garden perimeter, preferably from the upslope side, using equipment which has a bucket on a reaching arm. The existing subsurface soils should be scarified but not compacted. The side slopes of the rain garden should be no steeper than 3:1. The planting soil depth in the rain garden should be at least 18 inches deep below the bottom of the elevation of the rain garden and should be a mixture of 30% organic material (compost) and 70% topsoil. Soil amendments typically consist of topsoil relocated from other on-site areas containing 20% to 30% compost or manufactured silt loam mix containing 20% to 30% compost.
6. Backfill rain garden with amended soils as noted above to the proposed bottom elevation of facility. Connect roof drain leaders from downspouts or perform grading to direct runoff from overland impervious areas to rain garden and notify for inspection.
7. At this time, before planting and placement of compost layer, the Township should be notified for inspection of the facility to verify proper installation.
8. Following the Township inspection, plant vegetation in the rain garden and add a two (2) inch to three (3) inch layer of shredded mulch or leaf compost. The amended soils should be overfilled to allow for settlement and lightly hand tamped in place. Presoaking the amended soils is recommended prior to planting. The plant selection should be suited to a variety of wet and dry weather conditions.



RAIN GARDEN CROSS SECTION
NOT TO SCALE

RAIN GARDEN AREA TO BE SEDED AND PLANTED AS SPECIFIED PER APPENDIX B OF THE PENNSYLVANIA STORMWATER BEST MANAGEMENT PRACTICES MANUAL. WE SUGGEST THE USE OF ERNST CONSERVATION SEED MIX ERNMIX-180, WHICH CONTAINS MANY OF THE PLANTS LISTED IN THIS APPENDIX SECTION.

WHILE VEGETATION IS BEING ESTABLISHED IN THE RAIN GARDEN, PRUNING AND WEEDING MAY BE REQUIRED. DETRIUS MATERIAL MAY NEED TO BE REMOVED ANNUALLY OR AS NEEDED TO MAINTAIN PROPER FUNCTION OF THE RAIN GARDEN. PERENNIAL PLANTINGS (IF PRESENT) MAY BE CUT DOWN AT THE END OF THE THIRD GROWING SEASON. THE RAIN GARDEN SHOULD BE INSPECTED AT LEAST TWO TIMES PER YEAR FOR WEEDS, EXCESSIVE VEGETATION, CLOGGING, EROSION, AND FLOODING. ANY DEAD OR DISEASED VEGETATION SHALL BE REMOVED IMMEDIATELY DURING PERIODS OF EXTENDED DROUGHT. RAIN GARDEN AREAS MAY REQUIRE WATERING.

RETENTION VOLUME/REMOVED RUNOFF

FINISH GRADE PER PLAN

PROP. RAIN GARDEN

TOPSOIL (MIN.)

70% TOPSOIL MIXTURE 18" DEPTH (MIN.)

NOT COMPACTED IN-SITU SOIL

BOTTOM

€ BERM

TOP OF BERM

2" (MAX.)

1"

WEST HEMPFIELD TOWNSHIP LANCASTER COUNTY

EXHIBIT C
TYPICAL RAIN GARDEN DETAIL

RETTEW
RETTEW Associates, Inc.
3222 Columbia Ave. Lancaster, PA 17603
Phone (717) 394-3721 • Fax (717) 394-1063

DRAWN BY: _____
DATE: 4/10/14
SCALE: NOT TO SCALE
DWG. NO. 011102015

RAIN GARDEN MIX - FRNMIX-180

- | | |
|--|--|
| ERNST CONSERVATION SEED MIX | ERNST CONSERVATION SEED MIX |
| 20.00% <i>Asclepias tuberosa</i> , PA ecotype | 20.00% <i>Asclepias tuberosa</i> , PA ecotype |
| 20.00% <i>Schizanthus luteus</i> , Eastern ecotype | 20.00% <i>Schizanthus luteus</i> , Eastern ecotype |
| 10.00% <i>Elymus virginicus</i> | 10.00% <i>Elymus virginicus</i> |
| 5.00% <i>Carex vaginifolia</i> | 5.00% <i>Carex vaginifolia</i> |
| 5.00% <i>Erigeron philadelphicus</i> | 5.00% <i>Erigeron philadelphicus</i> |
| 5.00% <i>Echinochloa purpurea</i> | 5.00% <i>Echinochloa purpurea</i> |
| 5.00% <i>Liatris spicata</i> | 5.00% <i>Liatris spicata</i> |
| 5.00% <i>Rudbeckia hirta</i> | 5.00% <i>Rudbeckia hirta</i> |
| 3.00% <i>Monarda mollis</i> | 3.00% <i>Monarda mollis</i> |
| 3.00% <i>Aster multiflorus</i> | 3.00% <i>Aster multiflorus</i> |
| 2.00% <i>Andropogon gerardii</i> , NY ecotype* | 2.00% <i>Andropogon gerardii</i> , NY ecotype* |
| 2.00% <i>Aster novae-angliae</i> | 2.00% <i>Aster novae-angliae</i> |
| 2.00% <i>Asplenium platyneuron</i> | 2.00% <i>Asplenium platyneuron</i> |
| 2.00% <i>Asplenium platyneuron</i> | 2.00% <i>Asplenium platyneuron</i> |
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| 2.00% <i>Asplenium platyneuron</i> | 2.00% <i>Asplenium platyneuron</i> |
| 1.00% <i>Asplenium platyneuron</i> | 1.00% <i>Asplenium platyneuron</i> |
| 100.00% | 100.00% |

SEEDING RATE: 15LB. PER ACRE OR 1/3 - 1/2 LB. PER 1,000 SQ. FT.

RAIN GARDEN SEQUENCE OF CONSTRUCTION

1. INSTALL TEMPORARY SEDIMENT CONTROL BIRPS AS SHOWN ON THE PLANS.
2. COMPLETE SITE GRADING IF APPLICABLE. CONSTRUCT CURB CUTS OR OTHER EROSION CONTROL MEASURES. EROSION CONTROL MEASURES DRAINAGE IS PROHIBITED FROM EXTENDING THE CONSTRUCTION AREA.
3. STABILIZE GRADING WITHIN THE LIMIT OF DISTURBANCE EXCEPT WITHIN THE RAIN GARDEN AREA. RAIN GARDEN BED AREAS MAY BE USED AS TEMPORARY SEDIMENT TRAPS PROVIDED THAT THE PROPOSED FINISHED ELEVATION OF THE STORMWATER TRAP IS 12" LOWER THAN THE BOTTOM ELEVATION OF THE STORMWATER TRAP.
4. EXCAVATE RAIN GARDEN TO PROPOSED, INVERT DEPTH AND SCARIFY THE EXISTING SOIL SURFACES. DO NOT COMPACT IN-SITU SOILS.
5. BACKFILL RAIN GARDEN WITH AMENDED SOIL AS SHOWN ON PLANS AND SETTLE FOR 48 HOURS. AMENDED SOIL IS COMPOSTABLE IF AVAILABLE FOR SETTLEMENT. LEAST 18" DEPTH OF AMENDED SOIL IS REQUIRED.
6. PREPARE THE PLANTING SOIL PRIOR TO PLANTING VEGETATION TO AVOID COMPLETE FINAL GRADING TO ACHIEVE PROPOSED DESIGN ELEVATIONS.
7. COMPLETE FINAL GRADING TO ACHIEVE PROPOSED DESIGN ELEVATIONS AS SHOWN ON PLANS. UPPER LAYER OF COMPOST, MULCH OR TOPSOIL AS SPECIFIED ON PLANS.
8. PLANT VEGETATION USING ERNST CONSERVATION SEED MIX ERNMIX-180.
9. MULCH AND INSTALL EROSION PROTECTION AT SURFACE FLOW ENTRANCES WHERE NECESSARY.

OPERATION AND MAINTENANCE SCHEDULE

1. THE PROPERTY OWNER SHALL OWN, MAINTAIN AND BE RESPONSIBLE FOR ALL STORMWATER MANAGEMENT AND SEDIMENT CONTROL MEASURES (BIRPS, CURB CUTS, SPREADERS) THAT ARE LOCATED OUTSIDE OF STREET RIGHT-OF-WAYS AS PROPOSED ON THE PLANS.
2. THE OWNER SHALL CONDUCT A VISUAL INSPECTION OF ALL STORMWATER MANAGEMENT AND PERMANENT BMP FACILITIES AT LEAST ONCE EVERY THREE MONTHS AND IMMEDIATELY AFTER STORM EVENTS. SUCH VISUAL EXAMINATION SHALL AT LEAST INVOLVE AN EXAMINATION OF THE STORMWATER COLLECTION, CONVEYANCE AND BMP FACILITIES FOR DEBRIS DEPOSITION (SUCH DEBRIS MAY INCLUDE, BUT SHALL NOT BE LIMITED TO AGGREGATE MATERIAL, SAND, SILT, LEAVES, TWIGS, BRUSH, LIMBS, AND AN EXAMINATION OF THE STORMWATER BMP FACILITIES FOR SOIL EROSION, STRUCTURAL DAMAGE, CLOGGING, EROSION OF FOUNDATION MOVEMENT, BURROWS, EXCESSIVE VEGETATION, CLOGGING, EROSION OF DEBRIS AND REPAIR ANY DAMAGE TO THE STORMWATER MANAGEMENT AND PERMANENT BMP FACILITIES. REPAIRS SHALL BE MADE USING MATERIAL THAT MEETS OR EXCEEDS THE REQUIREMENTS STATED ON THE PLANS.
3. THE OWNER SHALL REMOVE ANY ACCUMULATION OF DEBRIS AND REPAIR ANY DAMAGE TO THE STORMWATER MANAGEMENT AND PERMANENT BMP FACILITIES. REPAIRS SHALL BE MADE USING MATERIAL THAT MEETS OR EXCEEDS THE REQUIREMENTS STATED ON THE PLANS.
4. ASSOCIATED WITH THE STORMWATER MANAGEMENT AND PERMANENT BMP FACILITIES AT THIS PROJECT SITE, THE OWNER SHALL IMMEDIATELY NOTIFY THE TOWNSHIP AND THE CHESTER COUNTY CONSERVATION DISTRICT PRIOR TO INITIATING ANY MAJOR REPAIR ACTIVITIES (SUCH AS REPAIRS THAT MAY BE REQUIRED BECAUSE OF SETTLEMENT, SINKHOLES, SEEPS, STRUCTURAL CRACKING OR FOUNDATION MOVEMENT).
5. THE OWNER SHALL ALSO COMPLY WITH ANY OTHER MAINTENANCE NOTES INCLUDED ON THE LAND DEVELOPMENT PLANS.

RAIN GARDENS

1. MULCH AND INSTALL EROSION PROTECTION AT SURFACE FLOW ENTRANCES WHERE NECESSARY.
2. WHILE VEGETATION IS BEING ESTABLISHED, PRUNING AND WEEDING MAY BE REQUIRED.
3. MULCH SHOULD BE REMOVED EVERY YEAR. PERENNIAL PLANTINGS MAY BE CUT DOWN AT THE END OF THE GROWING SEASON.
4. MULCH SHOULD BE RE-Spread WHEN EROSION IS EVIDENT AND BE REPLISHED AS NEEDED. ONCE EVERY 2 TO 3 YEARS THE ENTIRE AREA MAY REQUIRE MULCH REPLACEMENT.
5. DROUGHT PERIODS SHOULD BE INSPECTED AT LEAST TWO TIMES PER YEAR FOR SEDIMENT BUILDUP, EROSION, BURROWS, EXCESSIVE VEGETATION, CLOGGING, EROSION OF FOUNDATION MOVEMENT.
6. DURING PERIODS OF EXTENDED DROUGHT, BORESTATION AREAS MAY REQUIRE WATERING.
7. WEEDING WILL BE NEEDED THE FIRST COUPLE OF YEARS. REMOVE BY HAND ONLY THOSE PLANTS THAT ARE POSITIVELY IDENTIFIED AS WEEDS. IN THE THIRD YEAR AND BEYOND, THE NATIVE GRASSES, SEDGES, RUSHES, AND WOODRUFFS SHOULD BE MAINTAINED. WEEDING ISOLATED PATCHES SHOULD ALWAYS BE REMOVED.

Cistern

Storage Volume Provided in Circular Cistern (gal) = $[\text{Radius (ft)}]^2 \times [\text{Height(ft)}] \times (3.14) \times (7.48)$

Radius of Cistern (R) = _____ feet

Height (H) = _____ feet

Note: Storage volume provided must be equal to or greater than the Retention Volume/Removed Runoff.

Storage Volume Provided in Circular Cistern (cu-ft) = $[\text{R}]^2 \times [\text{H}] \times (3.14) =$ _____

Storage Volume Provided in Circular Cistern (gal) = $[\text{R}]^2 \times [\text{H}] \times (3.14) \times (7.48) =$ _____

Cistern - General Notes

1. Use the worksheet and table to compute the required volume in the cistern (in cubic feet) for all proposed impervious areas. The calculated total volume is the minimum requirement for on-site construction. The total volume of the cistern must be equal to or greater than the required minimum Retention Volume/Removed Runoff. The applicant needs to consider the usage requirements for the water stored in the cistern so that the necessary storm water storage volume is available for use.
2. Multiple cisterns may also be utilized. If multiple cisterns are desired, the volume for each cistern should be a proportional amount of the calculated total storage volume (i.e. utilizing two (2) cisterns, if 60 percent of the total roof area is piped to one cistern, then that cistern should be sized for 60 percent of the total required minimum volume. The second cistern would then be sized for the remaining 40 percent of the total required minimum volume.).
3. A PA One Call shall be performed in accordance with state requirements prior to any excavation.
4. The cistern and any associated conveyance piping should be marked as "Reclaimed Water, Do Not Drink" and shall not be connected to domestic or commercial potable water systems
5. Cisterns should be protected from direct sunlight as much as possible to reduce the risk of algae growth. Cisterns should be emptied during winter to reduce the risk of freezing.
6. Cisterns should be watertight with overflow outlets located several inches below the top of the cistern for emergency overflow purposes. The location of the cistern relative to any buildings should be considered in terms of potential overflow. The overflow shall be designed to discharge away from buildings and other structures and toward existing nature or manmade channels, other stormwater facilities or vegetated slopes.
7. Water storage facilities for use with capture and reuse facilities include, but are not limited to, cisterns and rain barrels.
8. The reuse of water should not be less than five percent (5%) of the total storage volume to be drawn out of the tank on a daily basis.

Vegetated Swale w/ Check Dam

Storage Volume Provided = (Length) x (Bottom Width) x (Ponding Depth)

Ponding
Depth (D) = _____ feet Width (W) = _____ feet Length (L) = _____ feet

Note: Ponding Depth is measured from the bottom of the swale to the top of the check dam. Storage volume provided must be equal to or greater than the Retention Volume/Removed Runoff.

Storage Volume = L x W x D = _____ cubic feet

Vegetated Swale Construction - General Notes

1. Use the worksheet and table to compute the required volume in the swale (in cubic feet) for all proposed impervious areas. The calculated total volume is the minimum requirement for on-site construction. The total volume of the swale must be equal to or greater than the required minimum Retention Volume/Removed Runoff.
2. Multiple swales may also be utilized. If multiple rain gardens are desired, the volume for each rain garden should be a proportional amount of the calculated total storage volume (i.e. utilizing two (2) swales, if 60 percent of the total roof area is piped to one swale, then that swale should be sized for 60 percent of the total required minimum volume. The second swale would then be sized for the remaining 40 percent of the total required minimum volume.).
3. A PA One Call shall be performed in accordance with state requirements prior to any excavation.
4. Based on the calculations of the required swale dimensions computed using the worksheets and table, stake out the locations of the swale. Staking is critical and should outline the location of the swale. The swale should be located as far as possible downslope from the proposed home while maintaining at least 10' to property lines and 20' to any existing roadways. The swale should also be located beside or downslope (10' min.) of any proposed on-lot sewage drain field or sewage drain field replacement area, or if that is not possible, as far as possible from any proposed on-lot sewage drain field or sewage drain field replacement area.
5. Excavation of the swale should be conducted from outside of the swale perimeter, preferably from the side, using equipment which has a bucket on a reaching arm. The existing subsurface soils should be scarified but not compacted. The side slopes of the swale should be no steeper than 3:1 for a trapezoidal shape. A parabolic swale shape may also be utilized. The planting soil depth in the swale should be at least 18 inches deep below the bottom of the elevation of the swale and should be a mixture of 30% organic material (compost) and 70% topsoil. Soil amendments typically consist of topsoil relocated from other on-site areas containing 20% to 30% compost or manufactured silt loam mix containing 20% to 30% compost.
6. Backfill swale with amended soils as noted above to the proposed bottom elevation of facility. Install check dams at a minimum height of six (6) inches using materials such as natural wood, stone, or earth. The check dams are intended to promote infiltration, improve filtering, and decrease the runoff rate. Direct roof drain leaders from downspouts or perform grading to direct runoff from overland impervious areas to swale and notify for inspection.
7. At this time, before planting and seeding, the Township should be notified for inspection of the facility to verify proper installation.

8. Following the Township inspection, seed and vegetate the swale. Presoaking the amended soils is recommended prior to planting. The plant selection should be suited to a variety of wet and dry weather conditions.

