



DRY SWALE CONSTRUCTION SEQUENCE

THE FOLLOWING IS A TYPICAL CONSTRUCTION SEQUENCE TO PROPERLY INSTALL A DRY SWALE, ALTHOUGH THE STEPS MAY BE MODIFIED TO ADAPT TO DIFFERENT SITE CONDITIONS.

STEP 1: PROTECTION DURING SITE CONSTRUCTION. THE CONTRACTOR SHALL PERFORM AS LITTLE MOVEMENT OF HEAVY EQUIPMENT ACROSS THE AREAS OF NEW DRY SWALES AS POSSIBLE, DURING THE COURSE OF ROUGH GRADING. THE CONTRACTOR MAY ROUGH GRADE THE SWALES TO SEEP SOLELY AS STORMWATER CONVEYANCE TO THE GRADE NEXT UNIT, SUCH THAT THE EXISTING CONTRIBUTING DRAINAGE AREAS HAVE BEEN STABILIZED SUFFICIENTLY TO ALLOW INSTALLATION OF THE DRY SWALE CONSTRUCTION CONTINUED.

STEP 2: GRADING OF THE DRY SWALE IN PREPARATION OF INSTALLATION OF THE GRAVEL UNDERDRAIN, AND SOIL MEDIA SHALL BEGIN ONLY AFTER THE ENTIRE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED BY VEGETATION OR RUNOFF HAS BEEN DIVERTED AWAY FROM THE AREA. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER AND THE ROANOKe COUNTY INSPECTOR TO DETERMINE THE APPLICABILITY OF A PRE-INSTALLATION ON-SITE MEETING, DURING THE CONSTRUCTION SEASON, TO REVIEW THE STABILIZATION OF TURF AREAS AND AREAS OF ULTIMATE PAVEMENT AND CONCRETE, ETC. IT IS OF THE UTMOST IMPORTANCE THAT THE AREA DRAINING TO THE DRY SWALES IS CONSTRUCTED AS SHOWN HEREIN, INCLUDING CONTROL ELEVATIONS SUCH AS HIGH / LOW POINTS, ETC. IN THE EVENT THAT THESE AREAS ARE CONSTRUCTED OUTSIDE OF NORMAL TOLERANCES, REGRADING OF AREAS WILL BE REQUIRED.

STEP 3: GIVEN THE SMALL AREAS INVOLVED WITH THE PROPOSED DRY SWALES FOR THIS SITE, THE CONTRACTOR SHALL INCLUDE IN HIS PRICE SUFFICIENT SILT FENCE TO LINE THE PERIMETER OF THE TWO DRY SWALE AREAS TO PREVENT SCOUR OF THE DRY SWALE TOPSOIL, UNTIL SUCH TIME THAT THE DRY SWALE TURF IS ESTABLISHED SUFFICIENTLY TO RESIST EROSION. REMOVE SILT FENCE AND RESTORE AFFECTED AREAS AT THIS TIME.

STEP 4: EXCAVATORS OR BACKHOES SHALL WORK FROM THE SIDES TO EXCAVATE THE DRY SWALE AREA TO THE APPROPRIATE DESIGN DEPTH AND DIMENSIONS. EXCAVATING EQUIPMENT SHALL HAVE SCOOPS WITH ADEQUATE REACH SO THAT THEY DO NOT HAVE TO GET INTO THE DRY SWALE AREA.

STEP 5: INSTALL THE IMPERMEABLE LINER MATERIAL, ADHERING TO MANUFACTURER'S RECOMMENDATIONS PERTAINING TO JOINTING AND LAPPING (SEE MATERIAL REQUIREMENTS HEREON). CONTACT THE ENGINEER AND THE ROANOKe COUNTY INSPECTOR PRIOR TO PLACEMENT OF ANYTHING ON THE IMPERMEABLE LINER, SUCH THAT THE ENGINEER MAY VERIFY THE ELEVATIONS AND DEPTHS FOR AS-BUILT PURPOSES.

STEP 6: PLACE AN ACCEPTABLE FILTER FABRIC ON THE IMPERMEABLE LINER (HORIZONTAL SURFACE ONLY, TO SERVE AS A CUSHION FOR PLACEMENT OF THE STONE) WITH A MINIMUM 6 INCH LAP. PLACE THE STONE NEEDED FOR STORAGE LAYER OVER THE FILTER BED. INSTALL THE UNDERDRAIN PIPE AND CHECK ITS SLOPE. ADD THE REMAINING 3 INCHES OF SOIL MEDIA TO HAVE A TOTAL DEPTH TO 3 INCHES ABOVE THE TOP OF THE UNDERDRAIN, AND THEN 3 INCHES OF PE GRAVEL AS A FILTER LAYER.

STEP 7: OBTAIN THE MEDIA FROM A QUALIFIED VENDOR, AND STORE IT ON AN ADJACENT IMPERVIOUS AREA OR ELASTIC SHEETING AFTER VERIFYING THAT THE MEDIA MEETS THE SPECIFICATIONS AND THE SOIL MEDIA IN 12" DIA. LIFTS UNTIL THE DESIRED TOP ELEVATION OF THE MEDIA LAYER IS ACHIEVED. WAIT A FEW DAYS TO CHECK FOR SETTLEMENT, AND ADD ADDITIONAL MEDIA AS NEEDED.

STEP 8: PROVIDE TOPSOIL, PERMANENT SEEDING AND STRAW MULCH MEASURES ON AREAS OF NEW DRY SWALES. WATER IRRIGATION AREAS AS REQUIRED TO PROMOTE GERMINATION AND FOSTER HEALTHY GROWTH. PROVIDE TEMPORARY INFILTRATION MEASURES AS NECESSARY.

CONSTRUCTION INSPECTION:
THE GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING CERTIFICATION AND PROOF TO THE ENGINEER THAT THE FOLLOWING HAVE BEEN ACHIEVED TO:

- **CONDUCT FIELD VISITS TO CONFIRM THAT THE SITES MEETS SPECIFICATIONS AND IS INSTALLED TO THE CORRECT DIMENSIONS AND DEPTH.**
- **ENSURE THAT UNDERDRAINS AND CLEANOUTS ARE INSTALLED PER PLANS**
- **MAKE SURE THE DESIRED COVERAGE OF TURF HAS BEEN ACHIEVED FOLLOWING CONSTRUCTION.**
- **LEACH PIPE AND CATCHMENT ARE CORNERS SHOULD BE LOGGED FOR THE FOUR CORNERS OF EACH DRY SWALE AND SUBMITTED TO THE ENGINEER.**

<u>DRY SWALE MATERIAL SPECIFICATIONS</u>	
<u>MATERIAL</u>	<u>SPECIFICATION</u>
FILTER MEDIA	(SEE REQUIREMENTS, THIS SHEET)
FILTER MEDIA TESTING	(SEE REQUIREMENTS, THIS SHEET)
SURFACE COVER	TURF
TOP SOIL	4 INCH SURFACE DEPTH OF LOAMY SAND OR SANDY LOAM TEXTURE, WITH LESS THAN 5% CLAY CONTENT, A CORRECTED PH OF 6 TO 7, AND AT LEAST 2% ORGANIC MATTER.
FILTER FABRIC	USE AN APPROPRIATE MATERIAL FOR THE APPLICATION BASED ON AASHTO M288--06. FABRIC SHOULD HAVE A FLOW RATE OF ≥ 125 GPM/SQ. FT. (ASTM D4491), AND AN APPARENT OPENING SIZE (AOS) EQUIVALENT TO A US # 70 OR # 80 SIEVE (ASTM D4751). THE GEOTEXTILE AOS SELECTION IS BASED ON THE PERCENT PASSING THE NO. 200 SIEVE IN "A" SOIL SUBGRADE. USUALLY FPMW OR AASHTO SELECTION CRITERIA, FOR HOTSPOTS AND CERTAIN KARST SITES ONLY, USE AN APPROPRIATE LINER ON THE BOTTOM. SEE "IMPERMEABLE LINER REQUIREMENTS" THIS SHEET.
CHOKING LAYER	A 3 INCH LAYER OF CHOKER STONE (TYPICALLY #3 OR #9 WASHED GRAVEL), LAID ABOVE THE UNDERDRAIN STONE.
STORAGE LAYER	12" THICKNESS OF 1 INCH STONE SHALL BE DOUBLE-WASHED AND CLEAN AND FREE OF ALL FINES (E.G., VOID #57 STONE).
UNDERDRAIN SYSTEM	(SAME AS SHOWN HEREON FOR SAND FILTER UNDERDRAIN)

DRY SWALE FILTER MEDIA REQUIREMENTS
 FILTER MEDIA INFORMATION SHOWN BELOW TAKEN DIRECTLY FROM TABLE 10.5 OF STORMWATER DESIGN SPEC. NO. 10: DRY SWALE (2013 VERSION)
FILTER MEDIA COMPOSITION:
 SPECIFICATION: FILTER MEDIA TO CONTAIN (SPECIFIC MEDIA COMPONENT COMPOSITION IS DESCRIBED IN SECTION 6.6 OF THE 2013 VADOT SPECIFICATION NO. 9):
 85 - 88% SAND
 8 - 12% SOIL FINES
 5 - 10% ORGANIC MATTER

NOTES: THE VOLUME OF FILTER MEDIA REQUIRED FOR CONSTRUCTION IS BASED ON 110% OF THE PLAN VOLUME TO ACCOUNT FOR SETTLING.

FILTER MEDIA TESTING:

SPECIFICATION: AVAILABLE P BETWEEN 7 AND 23 mg/kg; CEC GREATER THAN 10 (TO THE EXTENT POSSIBLE)

NOTES: THE MEDIA SHOULD BE CERTIFIED BY THE SUPPLIER AS MEETING THE INTENT OF THESE SPECIFICATIONS (REFER TO STORMWATER DESIGN SPEC NO. 9 BIORETENTION (12" VERSION), FOR ADDITIONAL SOLID MEDIA INFORMATION.

PLACEMENT: PLACE BIORETENTION SOLID MEDIA IN LIFTS OF 12" OR LESS AND LIGHTLY COMPACT BY TAMPING.

OBSERVATION WELL REQUIREMENTS
THE NEW UNDERDRAIN CLEANOUTS WILL SERVE AS OBSERVATION WELLS, TO ALLOW PERIODIC INSPECTION IN ACCORDANCE WITH THE MAINTENANCE AGREEMENT ON FILE WITH THE COUNTY.

➔ 1 SHEET REVISED TO ADD REQUIREMENTS FOR DRY SWALES AND SAND FILTER

➔ 2 CONSTRUCTION SEQUENCINGS REVISED TO INCLUDE COUNTY REVIEW ENGINEER

➔ 3A CONSTRUCTION SEQUENCINGS REVISED TO EXCLUDE COUNTY ENGINEER / INCLUDE COUNTY INSPECTOR

IMPERMEABLE LINER REQUIREMENTS

AS THE GEOLOGICAL REPORT INDICATES THAT THE SITE GEOLOGY IS INDICATIVE OF KARST, AND OBVIOUS KARST FORMATIONS ARE IN CLOSE PROXIMITY TO THE SITE, IT IS REQUIRED THAT AN IMPERMEABLE LINER BE INSTALLED BELOW THE NEW WATER QUALITY "DIRY SHED" AND BELOW THE EXISTING "DIRY SHED". THE IMPERMEABLE LINER SHALL BE MADE OF POLYETHYLENE (PE) OR POLYPROPYLENE (PP). THE LINER SHALL ENCOMPASS ALL SIDES AND BOTTOM OF DIRTY CHUTES, TRENCHES, AND SAND PITS, AND SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS, INCLUDING LAP LENGTH AND SEALING OF JOINED SHEETS OF LINER.

- LINER SHALL BE 60 MIL THICK AND SHALL HAVE A MINIMUM IN-GROUND SERVICE LIFE OF 20 YEARS
- LINER SHALL BE ULTRAVIOLET RESISTANT
- LINER SHALL BE CAPABLE OF WITHSTANDING LEAKAGE RATES OUTLINED IN STEP 6 OF THE SAND PIT CONSTRUCTION SEQUENCING SHOWN HEREON.
- A GEOTEXTILE FABRIC SHALL BE INSTALLED OVER THE LINER TO PROTECT THE LINER FROM PUNCTURE.

16 REVERSED MATERIAL

(SEE SHEET C-16 FOR JELLYFISH FILTER DETAILS (BMP #3))