

C. C. SWM POND RETROFIT CONSTRUCTION SPECIFICATIONS

SHEET 1 OF 3

THESE SPECIFICATIONS ARE APPROPRIATE TO ALL PONDS WITHIN THE SCOPE OF THE STANDARD FOR PRACTICE MD-378. ALL REFERENCES TO ASTM, AASHTO & MARYLAND DEPARTMENT OF TRANSPORTATION, STATE HIGHWAY ADMINISTRATION STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS (MD SHA STD'S & SPECS), AND THE CARROLL COUNTY SUPPLEMENT TO THE 2000 MARYLAND STORMWATER DESIGN MANUAL (THE SUPPLEMENT) APPLY TO THE MOST RECENT VERSION. THESE SPECIFICATIONS ONLY APPLY TO AREAS THAT ARE PART OF OR CONTIGUOUS TO STORMWATER MANAGEMENT PONDS.

SITE PREPARATION

AREAS DESIGNATED FOR BORROW AREAS, EMBANKMENT, AND STRUCTURAL WORKS SHALL BE CLEARED, GRUBBED AND STRIPPED OF TOPSOIL. ALL TREES, VEGETATION, ROOTS AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED. CHANNEL BANKS AND SHARP BREAKS SHALL BE SLOPED TO NO STEEPER THAN 1:1. ALL TREES SHALL BE CLEARED AND GRUBBED WITHIN 15 FEET OF THE TOE OF THE EMBANKMENT UNLESS OTHERWISE SPECIFIED ON THE PLANS.

AREAS TO BE COVERED BY THE RESERVOIR WILL BE CLEARED OF ALL TREES, BRUSH, LOGS, FENCES, RUBBISH AND OTHER OBJECTIONABLE MATERIAL UNLESS OTHERWISE DESIGNATED ON THE PLANS. TREES, BRUSH, AND STUMPS SHALL BE CUT APPROXIMATELY LEVEL WITH THE GROUND SURFACE. FOR DRY STORMWATER MANAGEMENT PONDS, A MINIMUM OF A 25-FOOT RADIUS AROUND THE INLET STRUCTURE SHALL BE CLEARED.

ALL CLEARED AND GRUBBED MATERIAL SHALL BE DISPOSED OF OUTSIDE AND BELOW THE LIMITS OF THE DAM AND RESERVOIR AS DIRECTED BY THE OWNER OR HIS REPRESENTATIVE. WHEN SPECIFIED, A SUFFICIENT QUANTITY OF TOPSOIL WILL BE STOCKPILED IN A SUITABLE LOCATION FOR USE ON THE EMBANKMENT AND OTHER DESIGNATED AREAS.

EARTH FILL (SEE MDE DAM SAFETY MEMO #14 FOR CRITERIA)

MATERIAL - THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED DESIGNATED BORROW AREAS. IT SHALL BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6", FROZEN OR OTHER OBJECTIONABLE MATERIALS. FILL MATERIAL FOR THE CENTER OF THE EMBANKMENT, AND CUT OFF TRENCH SHALL CONFORM TO UNIFIED SOIL CLASSIFICATION GC, SC, CH, OR CL AND MUST HAVE AT LEAST 30% PASSING THE #200 SIEVE. CONSIDERATION MAY BE GIVEN TO THE USE OF OTHER MATERIALS IN THE EMBANKMENT IF DESIGNED BY A GEOTECHNICAL ENGINEER. SUCH SPECIAL DESIGNS MUST HAVE CONSTRUCTION SUPERVISED BY A GEOTECHNICAL ENGINEER.

MATERIALS USED IN THE OUTER SHELL OF THE EMBANKMENT MUST HAVE THE CAPABILITY TO SUPPORT VEGETATION OF THE QUALITY REQUIRED TO PREVENT EROSION OF THE EMBANKMENT.

PLACEMENT - AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED PRIOR TO PLACEMENT OF FILL. FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8 INCH THICK (BEFORE COMPACTION) LAYERS WHICH ARE TO BE CONTINUOUS OVER THE ENTIRE LENGTH OF THE FILL. THE MOST PERMEABLE BORROW MATERIAL SHALL BE PLACED IN THE DOWNSTREAM PORTIONS OF THE EMBANKMENT. THE PRINCIPAL SPILLWAY MUST BE INSTALLED CONCURRENTLY WITH FILL PLACEMENT AND NOT EXCAVATED INTO THE EMBANKMENT.

COMPACTION - THE MOVEMENT OF THE HAULING AND SPREADING EQUIPMENT OVER THE FILL SHALL BE CONTROLLED SO THAT THE ENTIRE SURFACE OF EACH LIFT SHALL BE TRAVERSED BY NOT LESS THAN ONE TREAD TRACK OF HEAVY EQUIPMENT OR COMPACTION SHALL BE ACHIEVED BY A MINIMUM OF FOUR COMPLETE PASSES OF A SHEEPSFOOT, RUBBER TIERED OR VIBRATORY ROLLER. FILL MATERIAL SHALL CONTAIN SUFFICIENT MOISTURE SUCH THAT THE REQUIRED DEGREE OF COMPACTION WILL BE OBTAINED WITH THE EQUIPMENT USED. THE FILL MATERIAL SHALL CONTAIN SUFFICIENT MOISTURE SO THAT IF FORMED INTO A BALL IT WILL NOT CRUMBLE, YET NOT BE SO WET THAT WATER CAN BE SQUEEZED OUT.

WHEN REQUIRED BY THE REVIEWING AGENCY THE MINIMUM REQUIRED DENSITY SHALL NOT BE LESS THAN 95% OF MAXIMUM DRY DENSITY WITH A MOISTURE CONTENT WITHIN $\pm 2\%$ OF THE OPTIMUM. EACH LAYER OF FILL SHALL BE COMPACTED AS NECESSARY TO OBTAIN THAT DENSITY, AND IS TO BE CERTIFIED BY THE ENGINEER AT THE TIME OF CONSTRUCTION. ALL COMPACTION IS TO BE DETERMINED BY AASHTO METHOD T-99 (STANDARD PROCTOR).

CUT OFF TRENCH (SEE MDE DAM SAFETY MEMO #14 FOR CRITERIA)

THE CUTOFF TRENCH SHALL BE EXCAVATED INTO IMPERVIOUS MATERIAL ALONG OR PARALLEL TO THE CENTERLINE OF THE EMBANKMENT AS SHOWN ON THE PLANS. THE BOTTOM WIDTH OF THE TRENCH SHALL BE GOVERNED BY THE EQUIPMENT USED FOR EXCAVATION, WITH THE MINIMUM WIDTH BEING FOUR FEET. THE DEPTH SHALL BE AT LEAST FOUR FEET BELOW EXISTING GRADE OR AS SHOWN ON THE PLANS. DEPTH AND SUITABILITY OF IMPERVIOUS CUTOFF TRENCH SHALL BE DETERMINED IN THE FIELD BY A GEOTECHNICAL ENGINEER. CUTOFF TRENCH MUST EXTEND A MINIMUM OF 12 INCHES INTO IMPERVIOUS FOUNDATION MATERIAL. THE SIDE SLOPES OF THE TRENCH SHALL BE 1 TO 1 OR FLATTER. THE BACKFILL SHALL BE COMPACTED WITH CONSTRUCTION EQUIPMENT, ROLLERS, OR HAND TAMPERS TO ASSURE MAXIMUM DENSITY AND MINIMUM PERMEABILITY.

EMBANKMENT CORE - THE CORE SHALL BE PARALLEL TO THE CENTERLINE OF THE EMBANKMENT AS SHOWN ON THE PLANS. THE TOP WIDTH OF THE CORE SHALL BE A MINIMUM OF FOUR FEET. THE HEIGHT SHALL EXTEND UP TO AT LEAST THE 10 YEAR WATER ELEVATION OR AS SHOWN ON THE PLANS. THE SIDE SLOPES SHALL BE 1 TO 1 OR FLATTER. THE CORE SHALL BE COMPACTED WITH CONSTRUCTION EQUIPMENT, ROLLERS, OR HAND TAMPERS TO ASSURE MAXIMUM DENSITY AND MINIMUM PERMEABILITY. IN ADDITION, THE CORE SHALL BE PLACED CONCURRENTLY WITH THE OUTER SHELL OF THE EMBANKMENT.

STRUCTURE BACKFILL

BACKFILL ADJACENT TO PIPES OR STRUCTURES SHALL BE OF THE TYPE AND QUALITY CONFORMING TO THAT SPECIFIED FOR THE ADJOINING FILL MATERIAL. THE FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED FOUR INCHES IN THICKNESS AND COMPACTED BY HAND TAMPERS OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT. THE MATERIAL NEEDS TO FILL COMPLETELY ALL SPACES UNDER AND ADJACENT TO THE PIPE. AT NO TIME DURING THE BACKFILLING OPERATION SHALL DRIVEN EQUIPMENT BE ALLOWED TO OPERATE CLOSER THAN FOUR FEET, MEASURED HORIZONTALLY, TO ANY PART OF A STRUCTURE. UNDER NO CIRCUMSTANCES SHALL EQUIPMENT BE DRIVEN OVER ANY PART OF A CONCRETE STRUCTURE OR PIPE, UNLESS THERE IS A COMPACTED FILL OF 24" OR GREATER OVER THE STRUCTURE OR PIPE.

FLOWABLE FILL

STRUCTURE BACKFILL MAY BE FLOWABLE FILL MEETING THE REQUIREMENTS OF MD SHA STD'S & SPECS, SECTION 314 AS MODIFIED. THE MIXTURE SHALL HAVE A 100-200PSI; 28 DAY UNCONFINED COMPRESSIVE STRENGTH. THE FLOWABLE FILL SHALL HAVE A MINIMUM PH OF 4.0 AND A MINIMUM RESISTIVITY OF 2,000 OHM-CM. WHEN USED TO FILL THE ANNULAR SPACES IN SLEEVED OR ABANDONED PIPES OR CULVERTS THE FLOWABLE FILL MUST CONTAIN AT LEAST 600 LBS OF FLY ASH PER CUBIC YARD ALONG WITH THE SAND, PORTLAND CEMENT AND WATER. PRIOR TO FLOWABLE FILLING THE CERTIFYING ENGINEER MUST APPROVE THE PLUGS AND VENT/STAND PIPES AS WELL AS ALL BRACING, WEIGHTS, ETC. USED TO HOLD ANY SLEEVES, LINES, OR OTHER UTILITIES TO LINE AND GRADE. WHEN USED IN AN OPEN CUT IN AN EMBANKMENT IN PLACE OF CORE MATERIAL, FLOWABLE FILL MATERIAL SHALL BE PLACED SUCH THAT A MINIMUM OF 6" (MEASURED PERPENDICULAR TO THE OUTSIDE OF THE PIPE) OF FLOWABLE FILL SHALL BE UNDER (BEDDING), OVER AND, ON THE SIDES OF THE PIPE. IT ONLY NEEDS TO EXTEND UP TO THE SPRING LINE FOR RIGID CONDUITS. AVERAGE SLUMP OF THE FILL SHALL BE NO MORE THAN 7" TO ASSURE FLOWABILITY OF THE MATERIAL. ADEQUATE MEASURES SHALL BE TAKEN (SAND BAGS, ETC.) TO PREVENT FLOATING THE PIPE. WHEN USING FLOWABLE FILL, ALL METAL PIPE SHALL BE BITUMINOUS COATED. ANY ADJOINING SOIL FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED FOUR INCHES IN THICKNESS AND COMPACTED BY HAND TAMPERS OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT. THE MATERIAL SHALL COMPLETELY FILL ALL VOIDS ADJACENT TO THE FLOWABLE FILL ZONE. AT NO TIME DURING THE BACKFILLING OPERATION SHALL DRIVEN EQUIPMENT BE ALLOWED TO OPERATE CLOSER THAN FOUR FEET, MEASURED HORIZONTALLY, TO ANY PART OF A STRUCTURE. UNDER NO CIRCUMSTANCES SHALL EQUIPMENT BE DRIVEN OVER ANY PART OF A STRUCTURE OR PIPE UNLESS THERE IS A COMPACTED FILL OF 24" OR GREATER OVER THE STRUCTURE OR PIPE. BACKFILL MATERIAL OUTSIDE THE STRUCTURAL BACKFILL (FLOWABLE FILL) ZONE SHALL BE OF THE TYPE AND QUALITY CONFORMING TO THAT SPECIFIED FOR THE CORE OF THE EMBANKMENT OR OTHER EMBANKMENT MATERIALS.

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C. C. SWM POND RETROFIT CONSTRUCTION SPECIFICATIONS

PIPE CONDUITS

ALL PIPES SHALL BE CIRCULAR IN CROSS SECTION.

NOTE: CORRUGATED METAL PIPE MAY NOT BE USED IN THE CONSTRUCTION OF PONDS IN CARROLL COUNTY.

CORRUGATED METAL PIPE - ALL OF THE FOLLOWING CRITERIA SHALL APPLY FOR CORRUGATED METAL PIPE:

1A. MATERIALS - (POLYMER COATED STEEL PIPE) - STEEL PIPES WITH POLYMERIC COATINGS SHALL HAVE A MINIMUM COATING THICKNESS OF 0.01 INCH (10 MIL) ON BOTH SIDES OF THE PIPE. THIS PIPE AND ITS APPURTENANCES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO SPECIFICATIONS M-245 & M-246 WITH WATERTIGHT COUPLING BANDS OR FLANGES.

1B. MATERIALS - ALUMINUM COATED STEEL PIPE (CMP) - THIS PIPE AND ITS APPURTENANCES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO SPECIFICATION M-274 WITH WATERTIGHT COUPLING BANDS OR FLANGES. ALUMINUM COATED STEEL PIPE, WHEN USED WITH FLOWABLE FILL OR WHEN SOIL AND/OR WATER CONDITIONS WARRANT THE NEED FOR INCREASED DURABILITY, SHALL BE FULLY BITUMINOUS COATED PER REQUIREMENTS OF AASHTO SPECIFICATION M-190 TYPE A. ANY ALUMINUM COATING DAMAGED OR OTHERWISE REMOVED SHALL BE REPLACED WITH COLD APPLIED BITUMINOUS COATING COMPOUND. ALUMINUM SURFACES THAT ARE TO BE IN CONTACT WITH CONCRETE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE PRIMER OR TWO COATS OF ASPHALT.

1C. MATERIALS - ALUMINUM PIPE (ALCMP) - THIS PIPE AND ITS APPURTENANCES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO SPECIFICATION M-196 OR M-211 WITH WATERTIGHT COUPLING BANDS OR FLANGES. ALUMINUM PIPE, WHEN USED WITH FLOWABLE FILL OR WHEN SOIL AND/OR WATER CONDITIONS WARRANT FOR INCREASED DURABILITY, SHALL BE FULLY BITUMINOUS COATED PER REQUIREMENTS OF AASHTO SPECIFICATION M-190 TYPE A. ALUMINUM SURFACES THAT ARE TO BE IN CONTACT WITH CONCRETE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE PRIMER OR TWO COATS OF ASPHALT. HOT DIP GALVANIZED BOLTS MAY BE USED FOR CONNECTIONS. THE PH OF THE SURROUNDING SOILS SHALL BE BETWEEN 4 AND 9.

2. COUPLING BANDS, ANTI-SEEP COLLARS, END SECTIONS, ETC., MUST BE COMPOSED OF THE SAME MATERIAL AND COATINGS AS THE PIPE. METALS MUST BE INSULATED FROM DISSIMILAR MATERIALS WITH USE OF RUBBER OR PLASTIC INSULATING MATERIALS AT LEAST 24 MILS IN THICKNESS.

3. CONNECTIONS - ALL CONNECTIONS WITH PIPES MUST BE COMPLETELY WATERTIGHT. THE DRAIN PIPE OR BARREL CONNECTION TO THE RISER SHALL BE WELDED ALL AROUND WHEN THE PIPE AND RISER ARE METAL. ANTI-SEEP COLLARS SHALL BE CONNECTED TO THE PIPE IN SUCH A MANNER AS TO BE COMPLETELY WATERTIGHT. DIMPLE BANDS ARE NOT CONSIDERED TO BE WATERTIGHT.

ALL CONNECTIONS SHALL USE A RUBBER OR NEOPRENE GASKET WHEN JOINING PIPE SECTIONS. THE END OF EACH PIPE SHALL BE RE-ROLLED AN ADEQUATE NUMBER OF CORRUGATIONS TO ACCOMMODATE THE BANDWIDTH. THE FOLLOWING TYPE CONNECTIONS ARE ACCEPTABLE FOR PIPES LESS THAN 24 INCHES IN DIAMETER: FLANGES ON BOTH ENDS OF THE PIPE WITH A CIRCULAR 3/8 INCH CLOSED CELL NEOPRENE GASKET, PRE-PUNCHED TO THE FLANGE BOLT CIRCLE, SANDWICHED BETWEEN ADJACENT FLANGES; A 12-INCH WIDE STANDARD LAP TYPE BAND WITH 12-INCH WIDE BY 3/8-INCH THICK CLOSED CELL CIRCULAR NEOPRENE GASKET; AND A 12-INCH WIDE HUGGER TYPE BAND WITH O-RING GASKETS HAVING A MINIMUM DIAMETER OF 1/2 INCH GREATER THAN THE CORRUGATION DEPTH. PIPES 24 INCHES IN DIAMETER AND LARGER SHALL BE CONNECTED BY A 24 INCH LONG ANNULAR CORRUGATED BAND USING A MINIMUM OF 4 (FOUR) RODS AND LUGS, 2 ON EACH CONNECTING PIPE END. A 24-INCH WIDE BY 3/8-INCH THICK CLOSED CELL CIRCULAR NEOPRENE GASKET WILL BE INSTALLED WITH 12 INCHES ON THE END OF EACH PIPE. FLANGED JOINTS WITH 3/8 INCH CLOSED CELL GASKETS THE FULL WIDTH OF THE FLANGE ARE ALSO ACCEPTABLE. HELICALLY CORRUGATED PIPE SHALL HAVE EITHER CONTINUOUSLY WELDED SEAMS OR HAVE LOCK.

SEAMS WITH INTERNAL CAULKING OR A NEOPRENE BEAD.

4. BEDDING - THE PIPE SHALL BE FIRMLY AND UNIFORMLY BEDDED THROUGHOUT ITS ENTIRE LENGTH. WHERE ROCK OR SOFT, SPONGY OR OTHER UNSTABLE SOIL IS ENCOUNTERED, ALL SUCH MATERIAL SHALL BE REMOVED AND REPLACED WITH SUITABLE EARTH COMPACTED TO PROVIDE ADEQUATE SUPPORT.

5. BACKFILLING SHALL CONFORM TO "STRUCTURE BACKFILL".

6. OTHER DETAILS (ANTI-SEEP COLLARS, VALVES, ETC.) SHALL BE AS SHOWN ON THE DRAWINGS.

REINFORCED CONCRETE PIPE - ALL OF THE FOLLOWING CRITERIA SHALL APPLY FOR REINFORCED CONCRETE PIPE:

NOTE: REINFORCED CONCRETE PIPE, ASTM C-361 IS REQUIRED IN CARROLL COUNTY FOR BARRELL PIPE AND LEVEL INCOMING STORM DRAINS AND LEVEL OUTFALLS. SEE PAGE 121 OF THE SUPPLEMENT.

1. MATERIALS - REINFORCED CONCRETE PIPE (RCCP, ASTM C-361) 15'-120' DIAMETER SHALL HAVE BELL AND SPIGOT JOINTS WITH RUBBER GASKETS AND SHALL EQUAL OR EXCEED ASTM C-361.

2. BEDDING - REINFORCED CONCRETE BARRELL PIPE CONDUITS SHALL BE LAID IN A CONCRETE BEDDING / CRADLE FOR THEIR ENTIRE LENGTH. THIS BEDDING / CRADLE SHALL CONSIST OF HIGH SLUMP CONCRETE PLACED UNDER THE PIPE AND UP THE SIDES OF THE PIPE AT LEAST 50% OF ITS OUTSIDE DIAMETER WITH A MINIMUM THICKNESS OF 6 INCHES. WHERE A CONCRETE CRADLE IS NOT NEEDED FOR STRUCTURAL REASONS, FLOWABLE FILL MAY BE USED AS DESCRIBED IN THE "STRUCTURE BACKFILL" SECTION OF THIS STANDARD. GRAVEL BEDDING IS NOT PERMITTED.

3. LAYING PIPE - BELL AND SPIGOT PIPE SHALL BE PLACED WITH THE BELL END UPSTREAM. JOINTS SHALL BE MADE IN ACCORDANCE WITH RECOMMENDATIONS OF THE MANUFACTURER OF THE MATERIAL. AFTER THE JOINTS ARE SEALED FOR THE ENTIRE LINE, THE BEDDING SHALL BE PLACED SO THAT ALL SPACES UNDER THE PIPE ARE FILLED. CARE SHALL BE EXERCISED TO PREVENT ANY DEVIATION FROM THE ORIGINAL LINE AND GRADE OF THE PIPE. THE FIRST JOINT MUST BE LOCATED WITHIN 4 FEET FROM THE RISER.

4. BACKFILLING SHALL CONFORM TO "STRUCTURE BACKFILL".

5. OTHER DETAILS (ANTI-SEEP COLLARS, VALVES, ETC.) SHALL BE AS SHOWN ON THE DRAWINGS.

NOTE: REINFORCED CONCRETE PIPE, CLASS IV IS REQUIRED IN CARROLL COUNTY FOR NON-PRESSURE STORM DRAIN APPLICATIONS IN PAVED AREAS. THIS DOES NOT INCLUDE LEVEL OUTFALLS.

1. MATERIAL - AASHTO SPECIFICATIONS M170 WITH JOINTS PER SHA 303.03.04

2. BEDDING - PER SHA 303.03.02 EXCEPT UNDER EXISTING ROADWAYS WHERE THE "MODIFIED METHOD OF CUTTING AND REPAIRING ROADWAYS" (PAGE 128 OF THE SUPPLEMENT) APPLIES.

3. LAYING PIPE - PER SHA 303.03.03

4. BACKFILL - PER SHA 303.03.07 EXCEPT UNDER EXISTING ROADWAYS WHERE THE "MODIFIED METHOD OF CUTTING AND REPAIRING ROADWAYS" (PAGE 128 OF THE SUPPLEMENT) APPLIES.

PLASTIC PIPE - THE FOLLOWING CRITERIA SHALL APPLY FOR PLASTIC PIPE:

NOTE: PLASTIC PIPE MAY ONLY BE USED IN CARROLL COUNTY STORMWATER MANAGEMENT PONDS AS FOLLOWS.

1A. MATERIALS - POLYVINYL CHLORIDE (PVC PIPE) FOR USE AS UNDERDRAIN PIPE PER PAGE 87 OF THE SUPPLEMENT. 4'-15' DIAMETER PVC PIPE SHALL BE PVC-1120 OR PVC-1220 CONFORMING TO ASTM D-1785 OR ASTM D-2241.

1B. MATERIALS - CORRUGATED HIGH DENSITY POLYETHYLENE (HDPE) PIPE FOR UNDERDRAIN PIPE PER PAGE 87 OF THE SUPPLEMENT. DOUBLE WALL HDPE PIPE, COUPLINGS AND FITTINGS SHALL CONFORM TO THE FOLLOWING: 4'-10" DIAMETER PIPE SHALL MEET THE REQUIREMENTS OF AASHTO M-252 TYPE S, AND 12' THROUGH 15' DIAMETER SHALL MEET THE REQUIREMENTS OF AASHTO M-294 TYPE S.

1C. MATERIALS - HIGH PERFORMANCE POLYPROPYLENE (HPPP) PIPE FOR LEVEL INCOMING STORM DRAINS. 15'-30' DIAMETER DOUBLE WALLED PIPE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM F2736 WITH WATERTIGHT JOINTS MEETING OR EXCEEDING ASTM D3212 TO 25-FEET OF HEAD. 36" TO 60" DIAMETER TRIPLE WALLED PIPE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM F2764 WITH WATERTIGHT JOINTS MEETING OR EXCEEDING ASTM D3212 TO 25-FEET OF HEAD (10.8 PSI)

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1D. MATERIALS- STEEL REINFORCED POLYETHYLENE RIBBED (SRPE) PIPE FOR LEVEL INCOMING STORM DRAINS. 24"-72" DIAMETER PIPE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM F2562 WITH WATERTIGHT JOINTS MEETING OR EXCEEDING ASTM D3212 TO 25-FEET OF HEAD.

2. JOINTS AND CONNECTIONS TO ANTI-SEEP COLLARS SHALL BE COMPLETELY WATERTIGHT.

3. BEDDING - THE PIPE SHALL BE FIRMLY AND UNIFORMLY BEDDED THROUGHOUT ITS ENTIRE LENGTH. WHERE ROCK OR SOFT, SPONGY OR OTHER UNSTABLE SOIL IS ENCOUNTERED, ALL SUCH MATERIAL SHALL BE REMOVED AND REPLACED WITH SUITABLE EARTH COMPACTED TO PROVIDE ADEQUATE SUPPORT.

4. BACKFILLING SHALL CONFORM TO "STRUCTURE BACKFILL".

5. OTHER DETAILS (ANTI-SEEP COLLARS, VALVES, ETC.) SHALL BE SHOWN ON THE DRAWINGS.

NOTE: CORRUGATED SMOOTH CORE HDPE AND PVC PIPE MAY BE USED IN CARROLL COUNTY FOR NON-PRESSURE STORM DRAINS IN UNPAVED AREAS. THIS DOES NOT INCLUDE LEVEL OUTFALLS.

1. MATERIAL- HDPE AASHTO SPECIFICATION M294 AND PVC AASHTO SPECIFICATION M304 WITH JOINTS PER SHA 303.03.04.

2. BEDDING & BACKFILL- PER THE "MODIFIED METHOD OF FLEXIBLE PIPE INSTALLATION IN UNPAVED AREAS" (PAGE 129 OF THE SUPPLEMENT).

3. LAYING PIPE- PER SHA 303.03.03.

ANTI-SEEP COLLARS AND FILTER DIAPHRAGMS (SEE MDE DAM SAFETY MEMO #21 FOR CRITERIA)
WHEN A FILTER DIAPHRAGM IS USED, A REGISTERED PROFESSIONAL ENGINEER WILL SUPERVISE THE DESIGN AND CONSTRUCTION INSPECTION.

INDIVIDUAL FILTER MATERIAL COMPATIBILITY WITH EMBANKMENT SOILS IS NOT REQUIRED FOR "SMALL PONDS"

3 FEET OF WASHED C-33 NATURAL SAND, WITH LESS THAN 5% PASSING THE NO. 200 SIEVE AND A 1 FOOT SQUARE ENVELOPE OF WASHED NO. 8 STONE IN THE CENTER OF THE SAND SURROUNDING A SLOTTED DRAIN PIPE AT THE INVERT OF THE BARREL PIPE IS AN ACCEPTABLE FILTER FOR SMALL PONDS. THE OUTLET PIPE MUST BE DESIGNED.

CONCRETE

MATERIALS

CONCRETE SHALL MEET THE REQUIREMENTS OF MD SHA STD'S & SPECS, SECTION 902, MIX NO. 6. MIX NO. 3 MAY BE USED FOR MUD MAPS, PIPE CRADLES AND ANCHOR BLOCKS.

STRUCTURES (SEE MDE DAM SAFETY MEMO #12 FOR CRITERIA)

ALL CONCRETE STRUCTURES SHALL BE CONSTRUCTED AS SHOWN ON THE PLANS. WHERE STANDARD OR MODIFIED CARROLL COUNTY OR STATE HIGHWAY ADMINISTRATION STRUCTURES ARE CALLED FOR, ALL STANDARD SPECIFICATIONS APPLY UNLESS OTHERWISE NOTED ON THE PLANS. ALL EXPOSED EDGES ON CONCRETE STRUCTURES SHALL HAVE 1" x 1" CHAMFERS OR AS DIRECTED.

CAST IN PLACE STRUCTURES

PLACE CONCRETE IN ONE CONTINUOUS OPERATION IN A SMOOTH FLOW WITHOUT SEGREGATION. CONCRETE MAY BE DROPPED INSIDE THE FORMS UP TO 4 FEET PROVIDING THAT FORMS AND REINFORCING STEEL ARE SUFFICIENTLY STRONG TO WITH STAND THE IMPACT WITHOUT BUCKLING. MECHANICAL VIBRATION MUST BE PERFORMED, INSIDE THE FORMS, THROUGHOUT THE FILLING OPERATION TO CONSOLIDATE THE ENTIRE MASS OF CONCRETE FROM BOTTOM TO TOP. USE CHUTES, TREMIES OR PUMPING WHERE A DROP OF MORE THAN 4 FEET IS REQUIRED.

A YEAR BUILT DATE MUST BE CAST INTO THE LARGEST CAST IN PLACE STRUCTURE ON EACH PROJECT. PER MD SHA STANDARDS AND SPECIFICATIONS SECTION 420.03.02 (P). A COUNTY SUPPLIED SURVEY MARKER MUST BE CAST INTO THE TOP OF ONE UNOBSTRUCTED CAST IN PLACE STRUCTURE ON EACH PROJECT.

PRECAST STRUCTURES

FOR SMALL PONDS, PRECAST CONSTRUCTION IS ACCEPTABLE PROVIDED THAT THE ENTIRE RISER (BASE/WALLS) IS CAST IN ONE PIECE. SEPARATE PRE-CAST TOP SLABS ARE ACCEPTABLE. GRAVEL PODS UNDER PRECAST STRUCTURES ARE ACCEPTABLE AS LONG AS THE BED IS LIMITED TO THE EXTENT OF THE STRUCTURE AND DOES NOT EXTEND UNDER THE EMBANKMENT. THIS MUST BE SPECIFIED ON THE PLANS INSPECTED AND ENGINEER CERTIFIED.

ROCK RIP-RAP
ROCK RIP-RAP SHALL MEET THE REQUIREMENTS OF MD SHA STD'S & SPECS, SECTION 311.

GEOTEXTILE SHALL BE PLACED UNDER RIP-RAP WHERE SHOWN ON THE PLANS AND SHALL MEET THE REQUIREMENTS OF MD SHA STD'S & SPECS, SECTION 921.09, CLASS SD.

FILTER MEDIA (STANDARD)
SAND: SHALL MEET THE GRADATION REQUIREMENTS OF ASTM C-33. NATURAL OR MANUFACTURED SAND MAY BE USED.

SOIL: SHALL BE SANDY LOAM OR SILTY LOAM AS DEFINED BY THE USDA TEXTURAL TRIANGLE WITH 20% OR LESS CLAY CONTINGENT.

GREEN WOOD CHIPS: SHALL BE UNTREATED LIVE WOOD GROUND TO MAXIMUM CHIP DIMENSION OF 2".

MIXTURE: UNLESS OTHERWISE NOTED ON THE PLANS THE FILTER MEDIA SHALL BE THOROUGHLY MIXED AT A 4:1:1 SAND, SOIL, GREEN WOOD CHIP RATIO.

FILTER MEDIA (NUTRIENT REMOVAL)

ENHANCED NITROGEN REMOVAL FILTER

SUBSTITUTE GREEN WOOD CHIPS FOR STONE IN THE RECHARGE RESERVOIR BELOW THE NO. 8 STONE CHOKER COURSE. CALCULATIONS REMAIN AS PER PAGE 70 SECTION 1 (A) OF THE SUPPLEMENT.

ENHANCED PHOSPHORUS REMOVAL FILTER

THOROUGHLY MIX IRON INTO THE FILTER MEDIA AT A 6:2:1:1 SAND, SOIL, GREEN WOOD CHIP, IRON RATIO.

IRON

IRON AGGREGATE BYPRODUCT MATERIAL CONTAINING AT LEAST 50% IRON OXIDES BY WEIGHT WITH THE REMAINDER OTHER METALS SUBSTITUTING FOR IRON IN THE OXIDE STRUCTURE. THE AGGREGATE CANNOT BE COARSER THAN THE GRADATION REQUIREMENTS OF NO. 7 STONE AS DEFINED IN SECTION 901 OF THE MD SHA STD'S AND SPECS. A REPRESENTATIVE CHEMICAL AND SIZE DISTRIBUTION ANALYSIS OF THE MATERIAL MUST BE APPROVED BY THE ENGINEER PRIOR TO DELIVERY. THE PRESENCE OF TOXIC COMPOUNDS OR COARSER MATERIAL WILL BE GROUNDS FOR REJECTION.

CARE OF WATER DURING CONSTRUCTION

ALL WORK ON PERMANENT STRUCTURES SHALL BE CARRIED OUT IN AREAS FREE FROM WATER. THE CONTRACTOR SHALL CONSTRUCT AND MAINTAIN ALL TEMPORARY DIKES, LEVEES, COFFERDAMS, DRAINAGE CHANNELS, AND STREAM DIVERSIONS NECESSARY TO PROTECT THE AREAS TO BE OCCUPIED BY THE PERMANENT WORKS. THE CONTRACTOR SHALL ALSO FURNISH, INSTALL, OPERATE, AND MAINTAIN ALL NECESSARY PUMPING AND OTHER EQUIPMENT REQUIRED FOR REMOVAL OF WATER FROM VARIOUS PARTS OF THE WORK AND FOR MAINTAINING THE EXCAVATIONS, FOUNDATION, AND OTHER PARTS OF THE WORK FREE FROM WATER AS REQUIRED OR DIRECTED BY THE ENGINEER FOR CONSTRUCTING EACH PART OF THE WORK. AFTER HAVING SERVED THEIR PURPOSE, ALL TEMPORARY PROTECTIVE WORKS SHALL BE REMOVED OR LEVELED AND GRADED TO THE EXTENT REQUIRED TO PREVENT OBSTRUCTION IN ANY DEGREE WHATSOEVER OF THE FLOW OF WATER TO THE SPILLWAY OR OUTLET WORKS AND SO AS NOT TO INTERFERE IN ANY WAY WITH THE OPERATION OR MAINTENANCE OF THE STRUCTURE. STREAM DIVERSIONS SHALL BE MAINTAINED UNTIL THE FULL FLOW CAN BE PASSED THROUGH THE PERMANENT WORKS. THE REMOVAL OF WATER FROM THE REQUIRED EXCAVATION AND THE FOUNDATION SHALL BE ACCOMPLISHED IN A MANNER AND TO THE EXTENT THAT WILL MAINTAIN STABILITY OF THE EXCAVATED SLOPES AND BOTTOM OF REQUIRED EXCAVATIONS AND THAT WILL ALLOW SATISFACTORY PERFORMANCE OF ALL CONSTRUCTION OPERATIONS. DURING THE PLACING AND COMPACTING OF MATERIAL IN REQUIRED EXCAVATIONS, THE WATER LEVEL AT THE LOCATIONS BEING REFILLED SHALL BE MAINTAINED BELOW THE BOTTOM OF THE EXCAVATION. AT SUCH LOCATIONS THE WATER SHALL BE PUMPED FROM EXCAVATED SUMPS.

STABILIZATION

ALL BORROW AREAS SHALL BE GRADED TO PROVIDE PROPER DRAINAGE AND LEFT IN A SLIGHTLY CONDITION. ALL EXPOSED SURFACES OF THE EMBANKMENT, SPILLWAY, SPOIL AND BORROW AREAS, AND BERMS SHALL BE STABILIZED BY SEEDING, LIMING, FERTILIZING AND MULCHING IN ACCORDANCE WITH THE NATURAL RESOURCES CONSERVATION SERVICE STANDARDS AND SPECIFICATIONS FOR CRITICAL AREA PLANTING (MD-342) OR AS SHOWN ON THE ACCOMPANYING DRAWINGS.

EROSION AND SEDIMENT CONTROL

CONSTRUCTION OPERATIONS WILL BE CARRIED OUT IN SUCH A MANNER THAT EROSION WILL BE CONTROLLED AND WATER AND AIR POLLUTION MINIMIZED. STATE AND LOCAL LAWS CONCERNING POLLUTION ABATEMENT WILL BE FOLLOWED. CONSTRUCTION PLANS SHALL DETAIL EROSION AND SEDIMENT CONTROL MEASURES.

Martin B. Covington III, PE

C.C. SWM PROGRAM ENGINEER

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