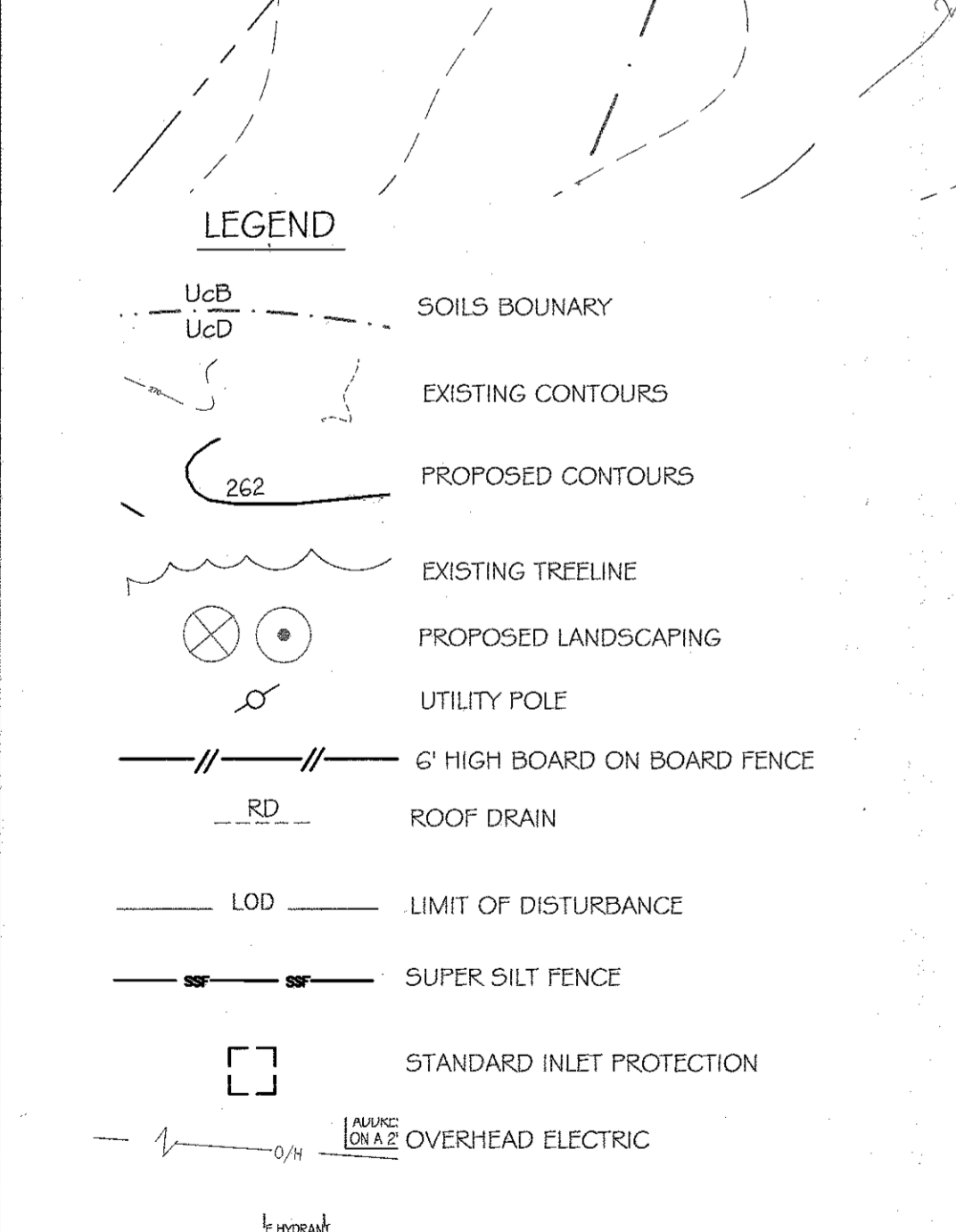
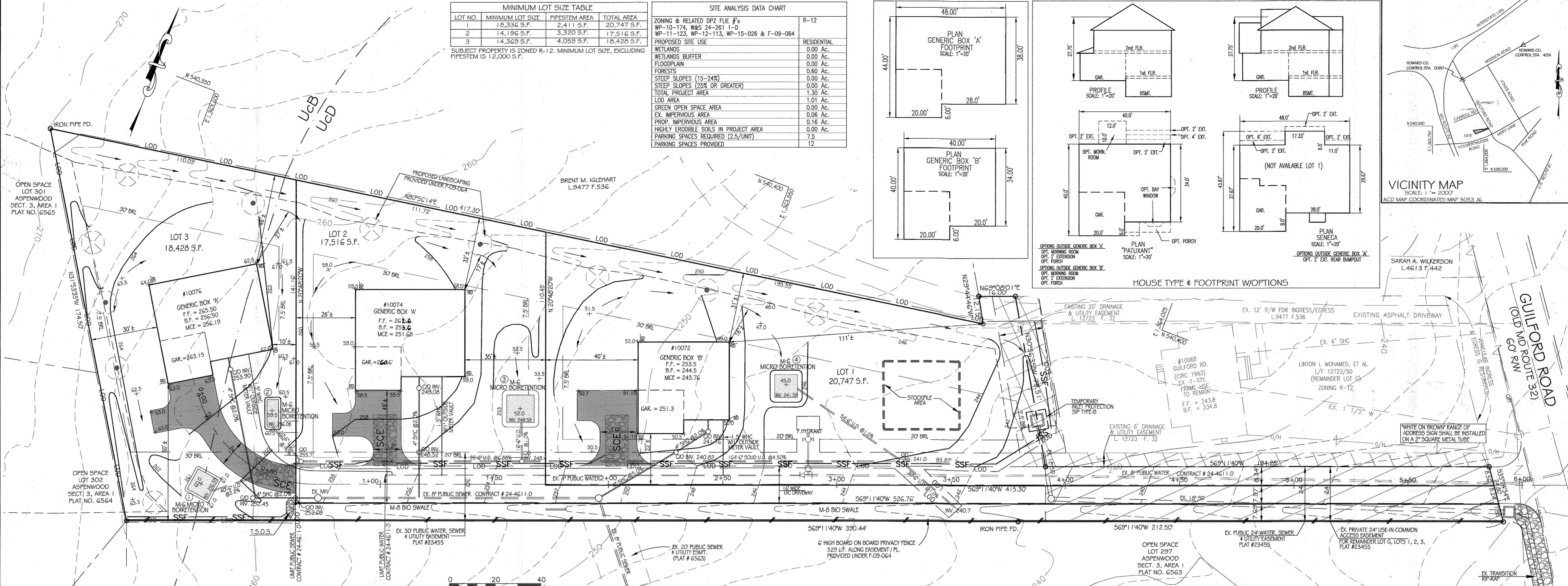
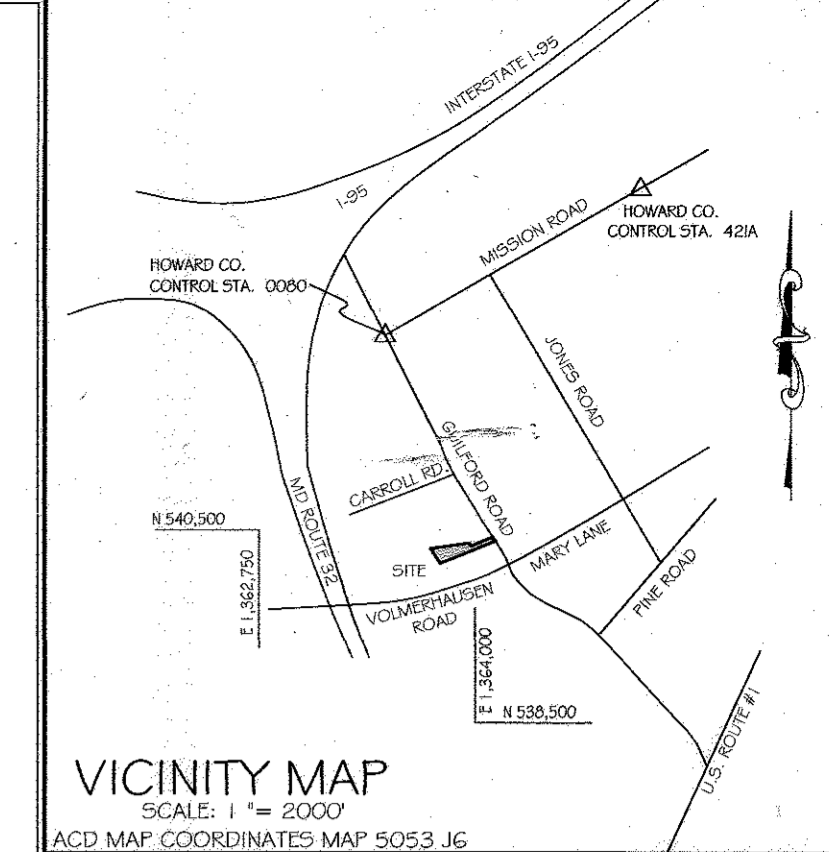
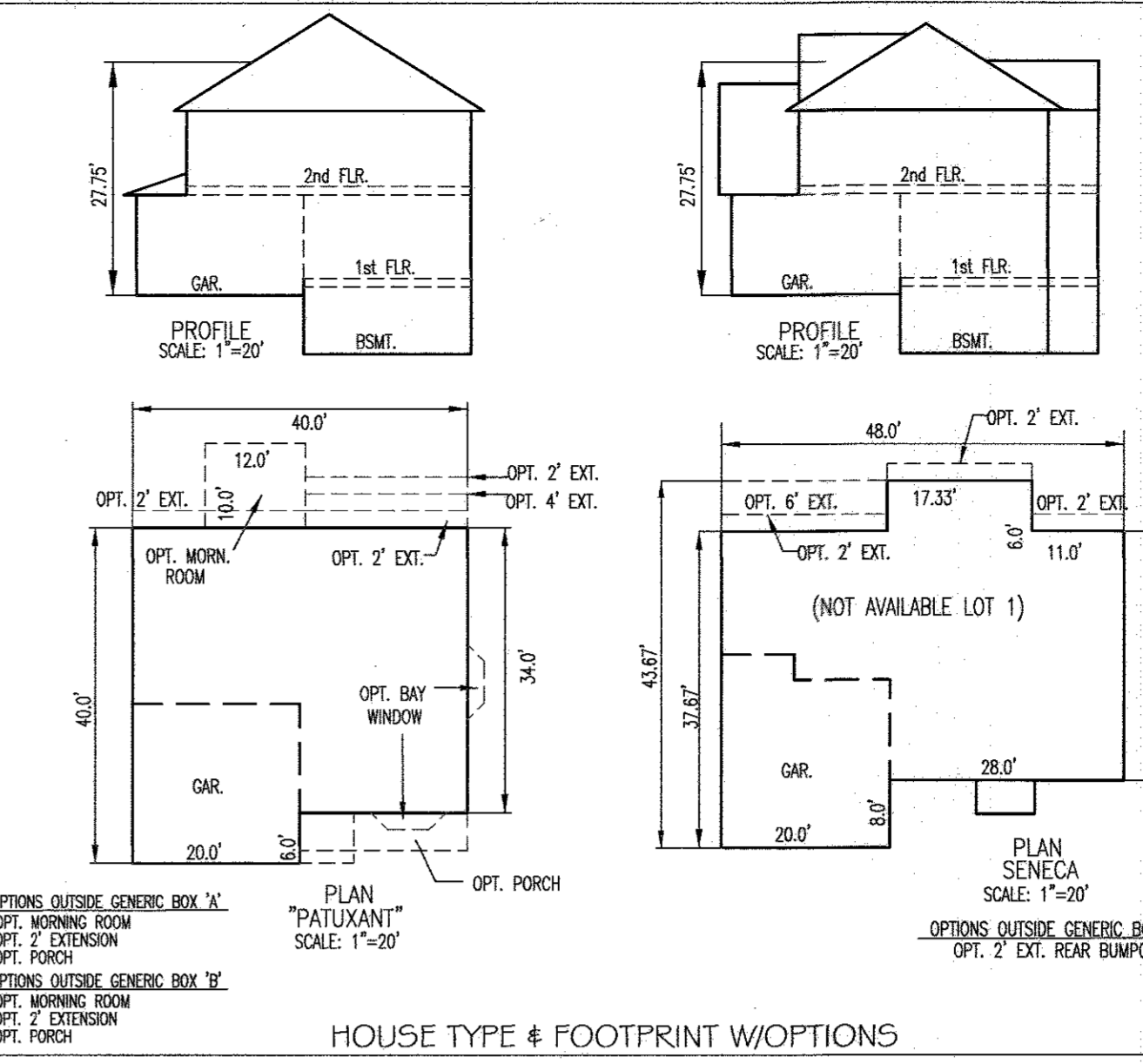
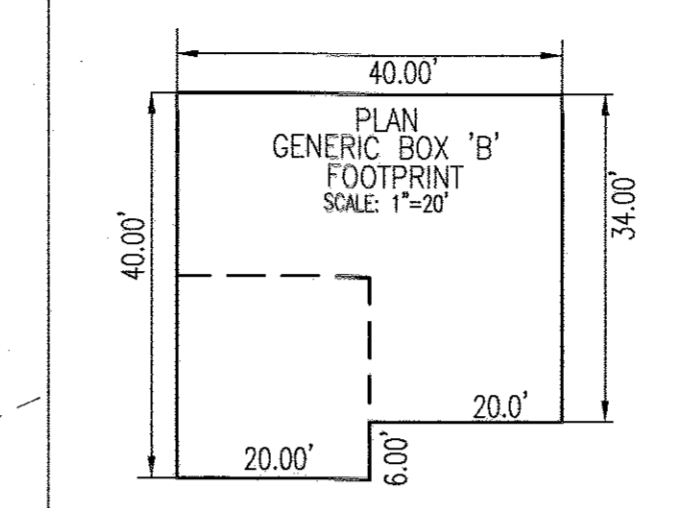
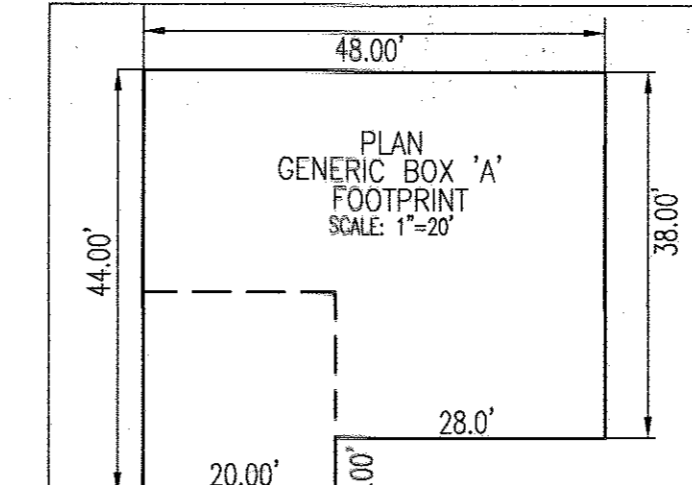


MINIMUM LOT SIZE TABLE			
LOT NO.	MINIMUM LOT SIZE	PIPESTEM AREA	TOTAL AREA
1	18,336 S.F.	2,411 S.F.	20,747 S.F.
2	14,196 S.F.	3,320 S.F.	17,516 S.F.
3	14,369 S.F.	4,059 S.F.	18,428 S.F.

SITE ANALYSIS DATA CHART	
ZONING & RELATED DPZ FILE #'s	R-12
WP-10-174, WAS 24-261 1-D	
WP-11-123, WP-12-113, WP-15-026 & F-09-064	
PROPOSED SITE USE	RESIDENTIAL
WETLANDS	0.00 AC.
WETLANDS BUFFER	0.00 AC.
FLOODPLAIN	0.00 AC.
FORESTS	0.60 AC.
STEEP SLOPES (15-24%)	0.00 AC.
STEEP SLOPES (25% OR GREATER)	0.00 AC.
TOTAL PROJECT AREA	1.30 AC.
LOD AREA	1.01 AC.
GREEN OPEN SPACE AREA	0.00 AC.
EX. IMPERVIOUS AREA	0.06 AC.
PROP. IMPERVIOUS AREA	0.16 AC.
HIGHLY ERODIBLE SOILS IN PROJECT AREA	0.00 AC.
PARKING SPACES REQUIRED (2.5/UNIT)	7.5
PARKING SPACES PROVIDED	12



**GENERAL NOTES**

- THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS/BUREAU OF ENGINEERING/CONSTRUCTION INSPECTION DIVISION AT 410-313-1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF WORK.
- THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777 AT LEAST 48 HRS. PRIOR TO ANY EXCAVATION WORK BEING DONE.
- TOPOGRAPHY FROM HOWARD COUNTY GIS DATA, SUPPLEMENTED BY FIELD-RUN ELEVATIONS BY VANMAR ASSOCIATES, INC., JUNE 2010. CONTOUR INTERVAL IS 2' VERTICAL DATUM IS NAVD 83.
- THE COORDINATES SHOWN HEREON ARE BASED UPON THE HOWARD COUNTY GEODETIC CONTROL, WHICH IS BASED UPON THE MARYLAND STATE PLAN COORDINATE SYSTEM AS PROVIDED BY HOWARD COUNTY SURVEY CONTROL STATIONS: 0080 N 542,366.9133 E 1,363,075.9515 E 282.35 421A N 543,390.4141 E 1,364,912.615 E 311.314
- STORMWATER MANAGEMENT FOR THIS RESUBDIVISION WILL BE PROVIDED VIA A BIO-SWALE (M-8) AND PRIVATE MICRO BIOTRETION FACILITIES (M-6) TO BE CONSTRUCTED BY THE DEVELOPER UNDER PLAN SDP-16-030.
- EX. UTILITIES ARE BASED ON GULFORD LANDING LOTS 1-3 WATER AND SEWER PLAN CONTRACT NO. 24-4611-D
- ANY DAMAGE TO THE COUNTY'S RIGHT OF WAY SHALL BE CORRECTED AT THE DEVELOPER'S EXPENSE.
- SHC ELEVATIONS SHOWN ARE LOCATED AT THE PROPERTY LINE
- FOR DRIVEWAY ENTRANCE DETAILS REFER TO THE HOWARD COUNTY DESIGN MANUAL, VOLUME IV, STANDARD DETAIL R-606
- PROPERTY OWNER: CINNABAR DRIVE, LLC ADDRESS: 5300 DORSEY HALL DR. #107 ELLICOTT CITY, MD 21042 PH: (443) 387-0422
- PROPERTY INFORMATION: TAX MAP 47, GRID 6, P/O PARCEL 604 TAX ACCOUNT # 06-598643, 06-598644, 06-598645 DEED REFERENCE # 15726 F. 160. TOTAL SITE AREA: 1.3014 ACRES +/-
- WATER AND SEWER SERVICE TO LOTS 1-3 WILL BE GRANTED UNDER THE PROVISIONS OF SECTION 16.122(B) OF THE HOWARD COUNTY CODE. WATER & SEWER CONTRACT # 24-4611-D APPROVED 12/05/10
- PUBLIC WATER & SEWERAGE ALLOCATION WILL BE GRANTED AT THE TIME OF ISSUANCE OF THE BUILDING PERMIT IF CAPACITY IS AVAILABLE AT THAT TIME.
- THIS PLAN IS SUBJECT TO THE AMENDED FIFTH EDITION OF THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS PER COUNCIL BILL 45-2003 AND ZONING REGULATIONS AS AMENDED BY COUNCIL BILL 75-2003. DEVELOPMENT OR CONSTRUCTION ON THESE LOTS MUST COMPLY WITH SETBACK AND BUFFER REGULATIONS IN EFFECT AT THE TIME OF SUBMISSION OF THE SITE DEVELOPMENT PLAN, WAIVER PETITION APPLICATION, OR BUILDING/GRADING PERMIT.
- THE SUBJECT PROPERTY IS ZONED R-12 PER THE OCTOBER 6, 2013 COMPREHENSIVE ZONING PLAN.
- NO HISTORIC STRUCTURES, CEMETERIES OR ENVIRONMENTAL FEATURES (I.E. STREAMS OR THEIR BUFFERS, FLOODPLAIN, STEEP SLOPES, WETLANDS ETC.) WERE FOUND ON THIS SITE.

- DRIVEWAY(S) SHALL BE PROVIDED PRIOR TO ISSUANCE OF A USE AND OCCUPANCY PERMIT FOR ANY NEW DWELLINGS TO ENSURE SAFE ACCESS FOR FIRE AND EMERGENCY VEHICLES PER TO FOLLOWING MINIMUM REQUIREMENTS:
  - Width - 12' (16' serving more than one residence).
  - Surface - 6" of compacted crusher run base with tar and chip coating (1-1/2" min. turning radius).
  - Structures (culvert/bridges) - Capable of supporting 25 gross tons (H25 loading).
  - Drainage Elements - Capable of safely passing 100-year flood with no more than 1 foot depth over driveway surface.
  - Structure clearances - minimum 12 feet.
  - Maintenance - sufficient to ensure all weather use.
- FOR FLAG OR PIPESTEM LOTS, REFUSE COLLECTION, SNOW REMOVAL AND ROAD MAINTENANCE ARE PROVIDED TO THE JUNCTION OF THE FLAG OR PIPESTEM AND ROAD RIGHT-OF-WAY LINE AND NOT ONTO THE PIPESTEM LOT DRIVEWAY.
- THE EXISTING UTILITIES SHOWN HEREON ARE BASED ON EXISTING UTILITY PLANS OF RECORD, INCLUDING CONTRACT NOS. 3-W, 350-5 & 24-1372-D.
- TOTAL LIMIT OF DISTURBANCE = 44,100 S.F. / 1.01 AC +/-
- SITE DEVELOPMENT PLAN APPROVAL BY THE DEPARTMENT OF PLANNING AND ZONING IS REQUIRED PRIOR TO BUILDING PERMITS BEING ISSUED FOR THE CONSTRUCTION OF RESIDENTIAL DWELLINGS ON LOTS 1-3.
- USE-IN-COMMON DRIVEWAY MEETS STOPPING SIGHT DISTANCE (SSD) AND INTERSECTION SIGHT DISTANCE (ISD) REQUIREMENTS A DESIGN MANUAL W/AVENUE TO SECTION 2.5.2.H "INTERSECTION SIGHT DISTANCE" AND THE APPLICABLE DESIGN FIGURES ASSOCIATED WITH THAT SECTION "FIGURE 2.17 AND 2.17A" WAS APPROVED ON JANUARY 14, 2009 UNDER F-09-064. AGREEMENT WAS MADE FOR THE DEVELOPER TO PAY A FEE-IN-LIEU BASED ON THE PERCENTAGE OF THE PROJECTS ROAD FRONTAGE COMPARED TO THE TOTAL LENGTH OF VERTICAL CURVE RECONSTRUCTION.
- A PRIVATE RANGE OF ADDRESS SIGN ASSEMBLY SHALL BE FABRICATED AND INSTALLED BY HOWARD COUNTY BUREAU OF HIGHWAYS AT THE DEVELOPER'S/OWNER'S EXPENSE. CONTACT HOWARD COUNTY TRAFFIC DIVISION AT 410-313-5752 FOR DETAILS AND COST ESTIMATE.
- WAIVER PETITION WP-10-174 WAS CONDITIONALLY APPROVED ON JULY 30, 2010. THIS WAIVER TO SECTION 16.144(M) TO ALLOW REACTIVATION OF FINAL PLAT F-09-064, AND SECTIONS 16.102(C) AND 16.147(A) TO ALLOW A PARCEL RECONFIGURATION BY ADJONER DEED. APPROVAL WAS SUBJECT TO THE RESUBDIVISION OF LOT B BEING IN FULL COMPLIANCE WITH THE ZONING REGULATIONS AND THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS; AND RECORDECTION OF AGREED UPON DEEDS, EASEMENTS AND PLAN EXHIBIT.
- WAIVER PETITION WP-11-123 WAS APPROVED ON FEBRUARY 4, 2011. THIS WAIVER TO SECTIONS 16.144 (P) AND (Q) FOR AN EXTENSION OF TIME FOR DEVELOPER TO PAY ALL FEES, POST FINANCIAL SURETIES AND TO SUBMIT TO THE ORIGINAL MLAR SUBDIVISION PLAN. APPROVAL WAS CONDITIONED ON COMPLIANCE WITH ALL SRC AGENCY COMMENTS, SUBMISSION OF FINAL PLAT ORIGINAL FOR SIGNATURE BY FEBRUARY 4, 2012 AND PAYMENT OF ANY PLAN PROCESSING FEES.
- WAIVER PETITION WP-12-113 WAS APPROVED ON FEBRUARY 14, 2012. THIS WAIVER TO SECTION 16.144 (P) AND (Q) FOR AN EXTENSION OF TIME FOR DEVELOPER TO PAY ALL FEES, POST SURETIES AND TO SUBMIT THE ORIGINAL MLAR SUBDIVISION PLAN. APPROVAL WAS CONDITIONED ON COMPLIANCE WITH ALL SRC AGENCY COMMENTS, SUBMISSION OF FINAL PLAT ORIGINAL FOR SIGNATURES BY FEBRUARY 4, 2012 AND PAYMENT OF ANY PLAN PROCESSING FEES.

- WAIVER PETITION WP-15-026 WAS CONDITIONALLY APPROVED OCTOBER 16, 2014. THIS WAIVER TO SECTION 16.144 (P), (Q) AND (R) TO RE-ACTIVATE THE FINAL PLAT PROCESSING FOR THIS DEVELOPMENT. APPROVAL WAS CONDITIONED ON A REVISED FINAL PLAN SUBMISSION BEFORE NOVEMBER 30, 2014 AND A NEW PRE-SUBMISSION COMMUNITY MEETING BEING HELD PRIOR TO RESUBMISSION OF THE FINAL PLAN.
- PERMETER LANDSCAPING FOR THIS SUBDIVISION IS PROVIDED IN ACCORDANCE WITH A CERTIFIED LANDSCAPE PLAN ON FILE UNDER F-09-064 IN ACCORDANCE WITH SECTION 16.124 OF THE HOWARD COUNTY CODE AND LANDSCAPE MANUAL. FINANCIAL SURETY IN THE AMOUNT OF \$5,590.00 FOR 11 SHADE TREES AND 529 LINEAR FEET OF FENCING HAS BEEN POSTED AS PART OF THE DPW WATER AND SEWER DEVELOPER AGREEMENT #24-4611-D.
- THIS PLAN COMPLIES WITH THE REQUIREMENTS OF SECTION 16.1200 OF THE HOWARD COUNTY CODE FOR FOREST CONSERVATION BY THE PAYMENT OF A FEE-IN-LIEU FOR THE REQUIRED 0.67 ACRES OF REFORESTATION IN THE AMOUNT OF \$21,889.00 (201.85 S.F. X \$0.75/S.F. = \$21,889.00) UNDER F-09-064.
- IN ACCORDANCE WITH SECTION 128 OF THE HOWARD COUNTY ZONING REGULATIONS, BAY WINDOWS, CHIMNEYS OR EXTERIOR STAIRWAYS NOT MORE THAN 16 FEET IN WIDTH MAY PROJECT NOT MORE THAN 4 FEET INTO ANY SETBACKS. PORCHES OR DECKS, OPEN OR ENCLOSED MAY PROJECT NOT MORE THAN 10 FEET INTO THE FRONT OR REAR YARD SETBACK.
- THIS DEVELOPMENT IS DESIGNED TO BE IN ACCORDANCE WITH SECTION 16.127 FOR RESIDENTIAL INFILL DEVELOPMENT OF WITHIN AN EXISTING NEIGHBORHOOD. THE DEVELOPER SHALL CREATE COMPATIBILITY WITH THE EXISTING NEIGHBORHOOD THROUGH THE USE OF ENHANCED LANDSCAPING, BERRIS, FENCES, SIMILAR HOUSING UNIT TYPES AND THE DIRECTIONAL ORIENTATION OF THE PROPOSED HOUSES.
- INDIVIDUAL HOUSE SITES SHALL PROVIDE PRIVATE DRIVEWAYS A MINIMUM 18 FOOT DEPTH FROM THE FACE OF GARAGE TO THE EDGE OF THE USE-IN-COMMON DRIVEWAY SO THAT A CAR IF PARKED IN THE DRIVEWAY, WILL NOT OVERHANG INTO THE PAVED AREA OF THE SHARED DRIVEWAY. THE SHARED DRIVEWAY SHALL PROVIDE ADEQUATE UNOBSTRUCTED ACCESS TO ALL DWELLINGS AT ALL TIMES AS REQUIRED BY HOWARD COUNTY DEPARTMENT OF FIRE AND RESCUE.
- THE TWO (2) CAR GARAGES SHALL BE USED FOR PARKING PURPOSES ONLY AND SHALL NOT BE CONVERTED INTO LIVING SPACE OR STORAGE SPACE. VISITOR AND GUEST PARKING IS RESTRICTED ALONG THE USE-IN-COMMON DRIVEWAY. A MINIMUM OF 4 PARKING SPACES IS PROVIDED FOR EACH RESIDENCE WITH EACH HAVING TWO (2) CAR GARAGE SPACES AND TWO (2) DRIVEWAY SPACES. 2.5 PARKING SPACES ARE REQUIRED PER DWELLING UNIT, WHICH INCLUDES GUEST PARKING.
- IN ACCORDANCE WITH SECTION 16.121(B), (2) OF THE SUBDIVISION REGULATIONS THE OPEN SPACE REQUIREMENT WAS SATISFIED VIA A PAYMENT OF A FEE-IN-LIEU IN THE AMOUNT OF \$4,500.00 AT THE TIME OF SUBDIVISION, F-09-064.
- A DECLARATION OF DRIVEWAY MAINTENANCE, UTILITY AND ACCESS EASEMENT FOR THE 16' SHARED DRIVEWAY WHICH SERVES LOTS 1-3 HAS BEEN RECORDED IN THE LAND RECORDS OF HOWARD COUNTY AS LIBER 16370 FOLD 376.
- A DECLARATION OF COVENANTS AND MAINTENANCE AND RIGHT OF ENTRY AGREEMENT FOR THE PRIVATE STORMWATER MANAGEMENT FACILITIES WHICH SERVE LOTS 1-3 HAS BEEN RECORDED IN THE LAND RECORDS OF HOWARD COUNTY AS LIBER 16384 FOLD 267.

**BENCH MARKS**

#1 CAPPED REBAR	N 539613.7036
N 540374.9840	E 1362194.2860
EL = 231.09	
#2 CAPPED REBAR	N 540160.841
E 1363630.695	EL = 261.96

**HOWARD COUNTY BENCH MARKS**

1" # 47C1 DISK SET ON TOP OF CONCRETE MONUMENT.	N 539613.7036
E 1362608.4439	EL = 260.96
2" # 47C0 DISK SET ON TOP OF CONCRETE MONUMENT.	N 540529.7021
E 1362460.5328	EL = 285.74

**ADDRESS CHART**

LOT/PARCEL #	STREET ADDRESS
1	10072 GULFORD ROAD, JESSUP, MD. 20794-9542
2	10074 GULFORD ROAD, JESSUP, MD. 20794-9542
3	10076 GULFORD ROAD, JESSUP, MD. 20794-9542

**PERMIT INFORMATION CHART**

SUBDIVISION NAME	SECTION/AREA	LOT/PARCEL No.
GULFORD LANDING		LOTS 1-3/ P/O P.604
PLAT #	GRID #	ZONING
23444, 23445	6	R-12
WATER CODE	SEWER CODE	
		47

**CALL "MISS UTILITY" AT**  
1-800-257-7777  
**48 HOURS BEFORE START OF CONSTRUCTION**

**OWNER / DEVELOPER:**  
CINNABAR DRIVE, LLC  
5300 DORSEY HALL DR. #107  
ELLICOTT CITY, MD 21042  
443-367-0422

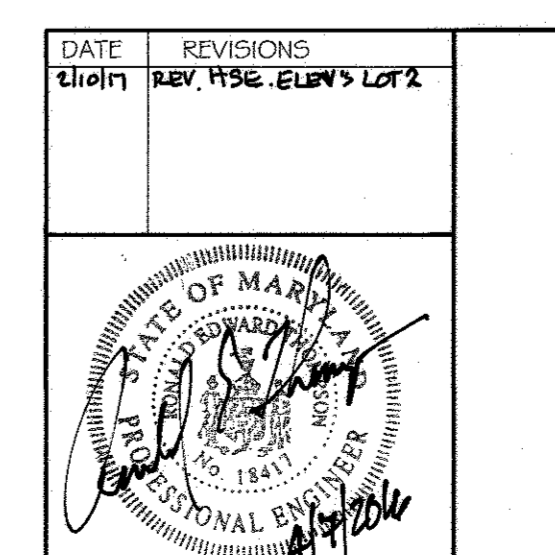
**SHEET INDEX**

NO.	TITLE
1	GRADING, STORMWATER MANAGEMENT, SEDIMENT & EROSION CONTROL PLAN
2	SEDIMENT AND EROSION CONTROL NOTES AND DETAILS
3	PRIVATE MICRO-BIOTRETION & BIO SWALE NOTES, DETAILS AND SPECIFICATIONS

PLEASE NOTE THAT ALL LOTS IN THIS SUBDIVISION ARE SUBJECT TO THE MODERATE INCOME HOUSING UNIT (MIHU) FEE-IN-LIEU REQUIREMENT THAT IS TO BE CALCULATED AND PAID TO THE DEPARTMENT OF INSPECTIONS LICENSES AND PERMITS AT THE TIME OF BUILDING PERMIT ISSUANCE BY THE PERMIT APPLICATION (L 16370 F.379).

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THIS STATE OF MARYLAND, LICENSE NO. 18417, EXPIRATION DATE: 9/18/17  
SIGNED: *Ronald E. Thompson* DATE: 4/4/2016  
RONALD E. THOMPSON, P.E.

APPROVED: DEPARTMENT OF PLANNING AND ZONING  
*Chad P. ...* 5-5-16  
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE  
*Kot ...* 5-10-16  
CHIEF, DIVISION OF LAND DEVELOPMENT DATE  
*Nadine ...* 5-11-16  
DIRECTOR DATE



**GENERIC BOX SITE DEVELOPMENT PLAN GRADING & STORMWATER MANAGEMENT PLAN GULFORD LANDING**  
LOTS 1-3 SINGLE FAMILY DETACHED LOTS  
HOWARD COUNTY PLAT NO. 23444-23445  
10072, 10074 AND 10076 GULFORD ROAD  
6TH ELECTION DISTRICT - HOWARD COUNTY, MARYLAND  
T.M. 47, GRID 6, P/O PARCEL 604  
ZONING: R-12 SINGLE FAMILY DETACHED HOMES  
SCALE: 1" = 20' DATE: FEBRUARY 2016  
RELATED DPZ FILES WP-10-174, WAS 24-261 1-D  
WP-11-123, WP-12-113, WP-15-026 & F-09-064  
VANMAR ASSOCIATES, INC.  
ENGINEERS & SURVEYORS PLANNERS  
310 South Main Street Mount Airy, Maryland 21771  
(301) 828-2890 (301) 831-5015 (410) 549-2751  
Fax: (301) 831-5033 ©Copyright, Latest Date Shown

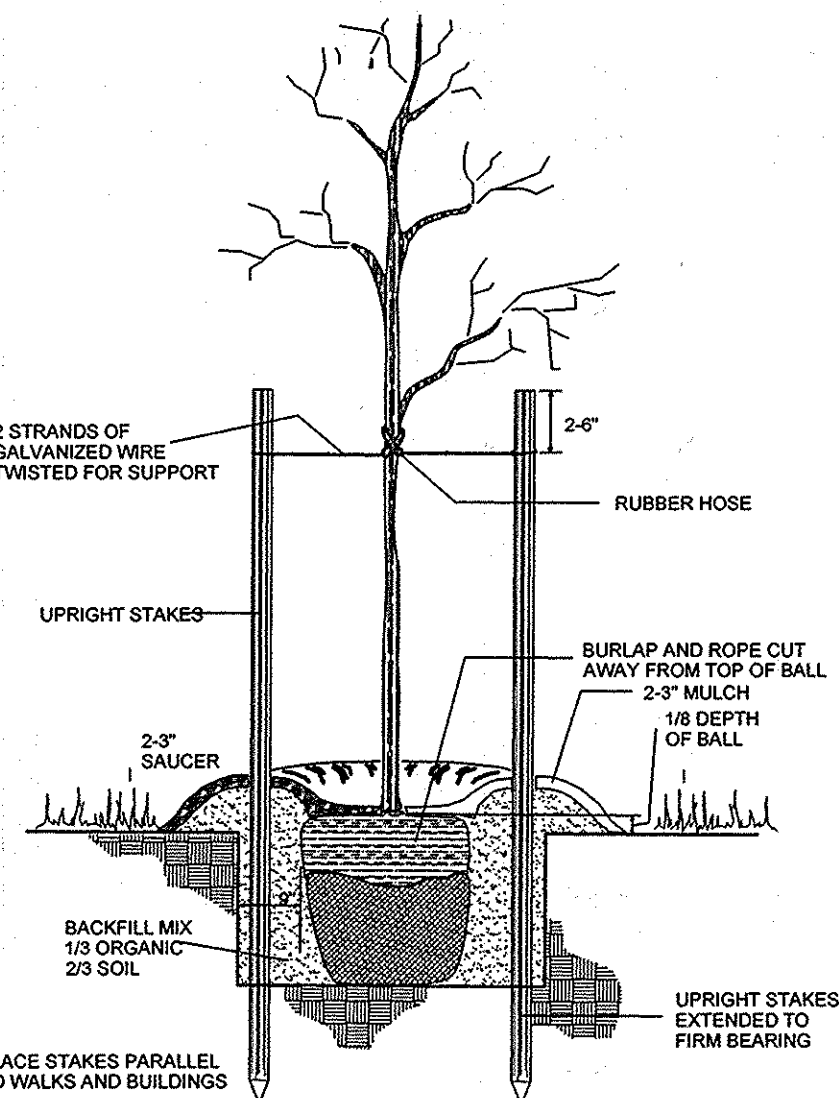




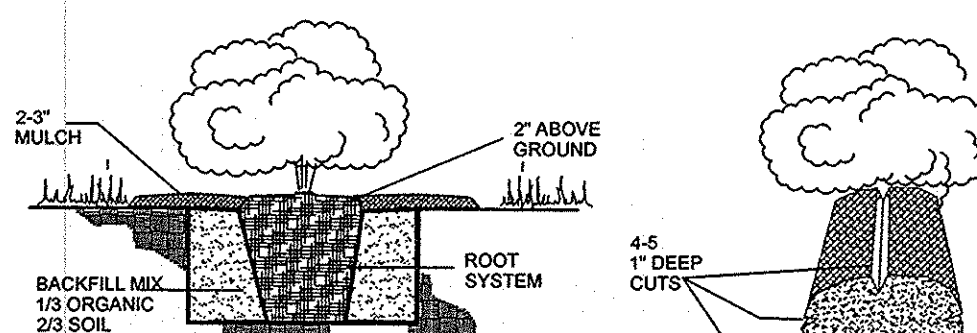


**SPECIFICATIONS FOR BIORETENTION**

- MATERIAL SPECIFICATIONS:**  
THE ALLOWABLE MATERIALS TO BE USED IN BIORETENTION AREA ARE DETAILED IN TABLE B.4.1
- PLANTING SOIL**  
THE SOIL SHALL BE A UNIFORM MIX, FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES. NO OTHER MATERIALS OR SUBSTANCES SHALL BE MIXED OR DUMPED WITHIN THE BIORETENTION AREA THAT MAY BE HARMFUL TO PLANT GROWTH, OR PROVE A HINDRANCE TO THE PLANTING OR MAINTENANCE OPERATIONS. THE PLANTING SOIL SHALL BE FREE OF BERMUDA GRASS, QUACKGRASS, JOHNSON GRASS, OR OTHER NOXIOUS WEEDS AS SPECIFIED UNDER COMAR 15.08.01.05.  
THE PLANTING SOIL SHALL BE TESTED AND SHALL MEET THE FOLLOWING CRITERIA:  
PH RANGE 5.2 - 7.0  
ORGANIC MATTER 15 - 4% (BY WEIGHT)  
MAGNESIUM 35 LB/OC  
PHOSPHORUS (PHOSPHATE - P2O5) 75 LB/OC  
POTASSIUM (POTASH-K2O) 85 LB/OC  
SOLUBLE SOILS NOT TO EXCEED 500 PPM  
ALL BIORETENTION AREAS SHALL HAVE A MINIMUM OF ONE TEST. EACH TEST SHALL CONSIST OF BOTH THE STANDARD SOIL TEST FOR PH, PHOSPHORUS, POTASSIUM AND ADDITIONAL TESTS OF ORGANIC MATTER AND SOLUBLE SOILS. A TEXTURAL ANALYSIS IS REQUIRED FROM THE SITE STOCKPILED TOPSOIL. IF TOPSOIL IS IMPORTED, THEN A TEXTURE ANALYSIS SHALL BE PERFORMED FOR EACH LOCATION WHERE THE TOPSOIL WAS EXCAVATED.  
SINCE DIFFERENT LABS CALIBRATE THEIR TESTING EQUIPMENT DIFFERENTLY, ALL TESTING RESULTS SHALL COME FROM THE SAME TESTING FACILITY.  
SHOULD THE PH FALL OUT OF THE ACCEPTABLE RANGE, IT MAY BE MODIFIED (HIGHER) WITH LIME OR (LOWER) WITH IRON SULFATE PLUS SULFUR.
- COMPACTION:**  
IT IS VERY IMPORTANT TO MINIMIZE COMPACTION OF BOTH THE BASE OF THE BIORETENTION AREA AND THE REQUIRED BACKFILL WHEN POSSIBLE. USE EXCAVATION HOES TO REMOVE ORIGINAL SOIL. IF BIORETENTION RUBBER TIRES WITH LARGE LUGS, OR HIGH PRESSURE TIRES WILL CAUSE EXCESSIVE COMPACTION RESULTING IN REDUCED INFILTRATION RATES, IT IS NOT ACCEPTABLE. COMPACTION WILL SIGNIFICANTLY CONTRIBUTE TO DESIGN FAILURE.  
COMPACTION CAN BE ALLEVIATED AT THE BASE OF THE BIORETENTION FACILITY BY USING A PRIMARY TILLING OPERATION SUCH AS A CHISEL PLOW RIPPER OR SUBSOILER. THESE TILLING OPERATIONS AREA TO REFRACATURE THE SOIL PROFILE THROUGH THE 12 INCH COMPACTION ZONE. SUBSISTE METHODS MUST BE APPROVED BY THE ENGINEER. ROTOTILLERS TYPICALLY DO NOT TILL DEEP ENOUGH TO REDUCE THE EFFECTS OF COMPACTION FOR HEAVY EQUIPMENT.  
ROTOTILL 2 TO 3 INCHES OF SAND INTO THE BASE OF THE BIORETENTION FACILITY BEFORE BACKFILLING THE OPTIONAL SAND LAYER. PUMP ANY PONDED WATER BEFORE PREPARING (ROTOTILLING) BASE.  
WHEN BACKFILLING THE TOPSOIL OVER THE SAND LAYER, FIRST PLACE 3 TO 4 INCHES OF TOPSOIL TO FINAL GRADE. WHEN BACKFILLING THE BIORETENTION FACILITY, PLACE SOIL IN LIFTS 1 1/2" TO 1 1/4". DO NOT USE HEAVY EQUIPMENT WITHIN THE BIORETENTION BASIN. HEAVY EQUIPMENT CAN BE USED AROUND THE PERIMETER OF THE BASIN TO SUPPLY SOILS AND SAND. GRADE BIORETENTION MATERIALS WITH LIGHT EQUIPMENT SUCH AS A COMPACT LOADER OR A DOZER/LOADER WITH MARSH TRACKS.
- PLANT MATERIAL:**  
RECOMMENDED PLANT MATERIAL FOR BIORETENTION AREAS CAN BE FOUND IN APPENDIX 'A', SECTION A.2.3.
- PLANT INSTALLATION:**  
MULCH SHOULD BE PLACED TO A UNIFORM THICKNESS OF 2" TO 3". SHREDDED HARDWOOD MULCH IS THE ONLY ACCEPTED MULCH. PINE MULCH AND WOOD CHIPS WILL FLOAT AND MOVE TO THE PERIMETER OF THE BIORETENTION AREA DURING A STORM EVENT AND ARE NOT ACCEPTABLE. SHREDDED MULCH MUST BE WELL AGED (6 TO 12 MONTHS) FOR ACCEPTANCE. ROOT STOCK OF THE PLANT MATERIAL SHALL BE KEPT MOIST DURING TRANSPORT AND ON-SITE STORAGE. THE PLANT ROOT BALL SHALL BE PLANTED SO THAT 1/3 OF THE BALL IS ABOVE FINAL GRADE SURFACE. THE DIAMETER OF THE PLANTING PIT SHALL BE AT LEAST 6" LARGER THAN THE DIAMETER OF THE PLANTING BALL. SET AND MAINTAIN THE PLANT STRAIGHT DURING THE ENTIRE PLANTING PROCESS. THOROUGHLY WATER GROUND BED COVER AFTER INSTALLATION.  
TREES SHALL BE BRACED USING 2" X 2" STAKES ONLY AS NECESSARY AND FOR THE FIRST GROWING SEASON ONLY. STAKES ARE TO BE EQUALLY SPACED ON THE OUTSIDE OF THE TREE BALL. GRASSES AND LEGUME SEED SHOULD BE DRILLED INTO THE SOIL TO A DEPTH OF AT LEAST ONE INCH. GRASS AND LEGUME PLUGS SHALL BE PLANTED FOLLOWING THE NON-GRASS GROUND COVER PLANTING SPECIFICATIONS.  
THE TOPSOIL SPECIFICATIONS PROVIDE ENOUGH ORGANIC MATERIAL TO ADEQUATELY SUPPLY NUTRIENTS FROM NATURAL CYCLING. THE PRIMARY FUNCTION OF THE BIORETENTION STRUCTURE IS TO IMPROVE WATER QUALITY. ADDING FERTILIZERS DEFEATS, OR AT A MINIMUM, IMPEDES TO GOAL. ONLY ADD FERTILIZER IF WOOD CHIPS OR MULCH ARE USED TO AMEND THE SOIL. ROTOTILL UREA FERTILIZER AT A RATE OF 2 POUNDS PER 1 000 SQUARE FEET.
- UNDERDRAINS:**  
UNDERDRAINS ARE TO BE PLACED ON A 3'-0" WIDE SECTION OF FILTER CLOTH. PIPE IS PLACED NEXT, FOLLOWED BY THE GRAVEL BEDDING. THE ENDS OF UNDERDRAIN PIPES NOT TERMINATING IN AN OBSERVATION WELL SHALL BE CAPPED. THE MAIN COLLECTOR PIPE FOR UNDERDRAIN SYSTEMS SHALL BE CONSTRUCTED AT A MINIMUM SLOPE OF 0.5%. OBSERVATION WELLS AND/OR CLEAN-OUT PIPES MUST BE PROVIDED (ONE MINIMUM PER EVERY 1 000 SQUARE FEET OF SURFACE AREA).
- MISCELLANEOUS:**  
THE BIORETENTION FACILITIES SHALL NOT BE CONSTRUCTED UNTIL ALL CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED.



**TREE PLANTING / STAKING DETAIL (N.T.S)**



**TYPICAL CONTAINER-GROWN PLANTING DETAIL (N.T.S)**

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

*Walter J. Pice* 5-11-16  
Director Date

*Kurt Shindler* 5-10-16  
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

*Phil Edwards* 5-5-16  
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

**Appendix B.3. Construction Specifications for Sand Filters, Bioretention and Open Channels**

**B.3.C Specifications for Open Channels and Filter Strips**

**1. Material Specifications**

The recommended construction materials for open channels and filter strips are detailed in Table B.3.3.

**2. Dry Swales**

Permeable soil mixture (20" to 30" deep) should meet the bioretention "planting" soil specifications.

Check dams, if required, shall be placed as specified.

System to have 6" of freeboard, minimum above 2 year water surface elevation.

Side slopes to be 3:1 maximum; (4:1 or flatter is preferred).

No gravel or perforated pipe is to be placed under driveways.

Bottom of facility to be above the seasonally high water table per Table 2 of Appendix D.1.

Seed with flood/drought resistant grasses; see Appendix A, Section 2.4.

Longitudinal slope to be 4%, maximum.

Bottom width to be 8" maximum to avoid braiding; larger widths may be used if proper berming is supplied. Width to be 2' minimum.

**3. Wet Swales**

Follow above information for dry swales, with the following exceptions: the seasonally high water table may inundate the swale; but not above the design bottom of the channel [NOTE: if the water table is stable within the channel, the WQ<sub>2</sub> storage may start at this point - see Figure 3.19]

Excavate into undisturbed soils; do not use an underdrain system.

**4. Filter Strips**

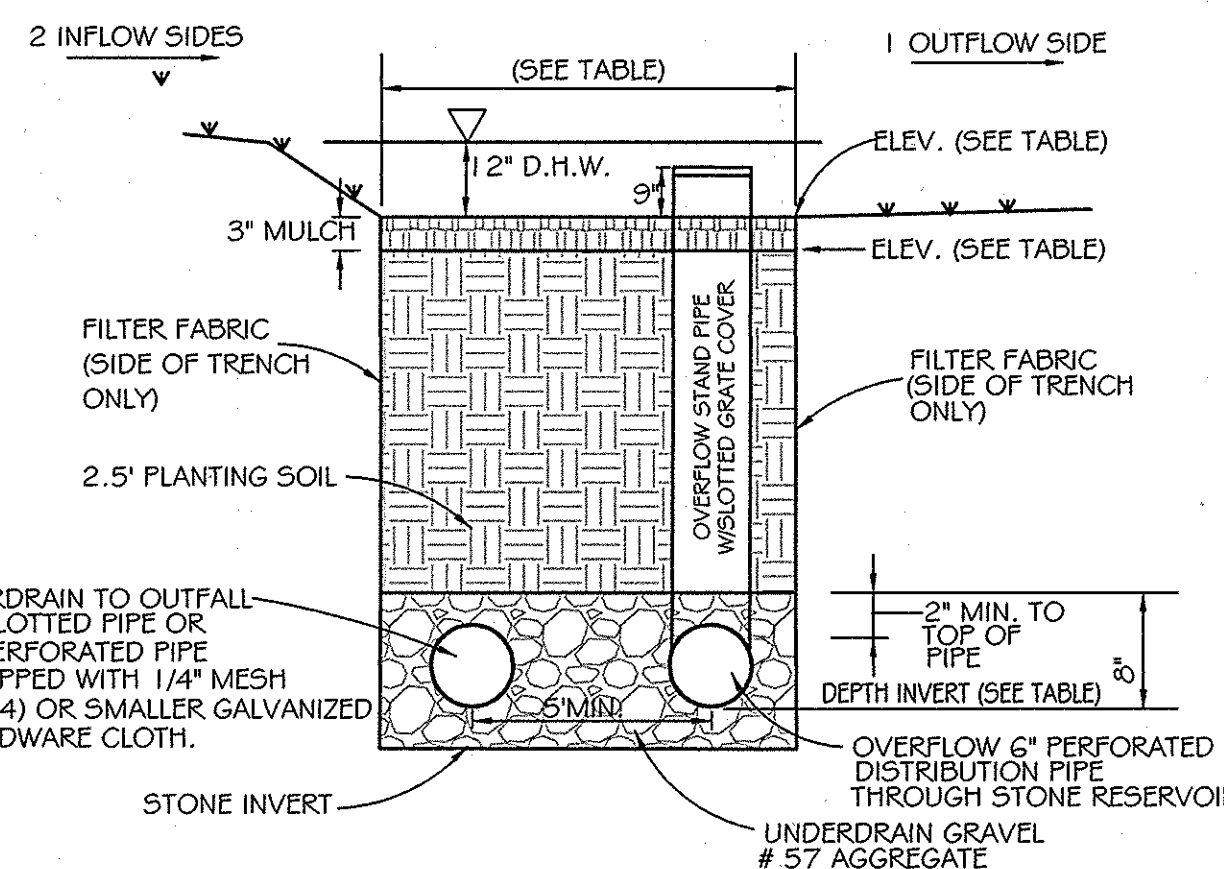
Construct pea gravel diaphragms 12" wide, minimum, and 24" deep minimum.

Pervious berms to be a sand/gravel mix [sand (35-60%), silt (30-55%), and gravel (10-25%)]. Berms to have overflow weirs with 6 inch minimum head.

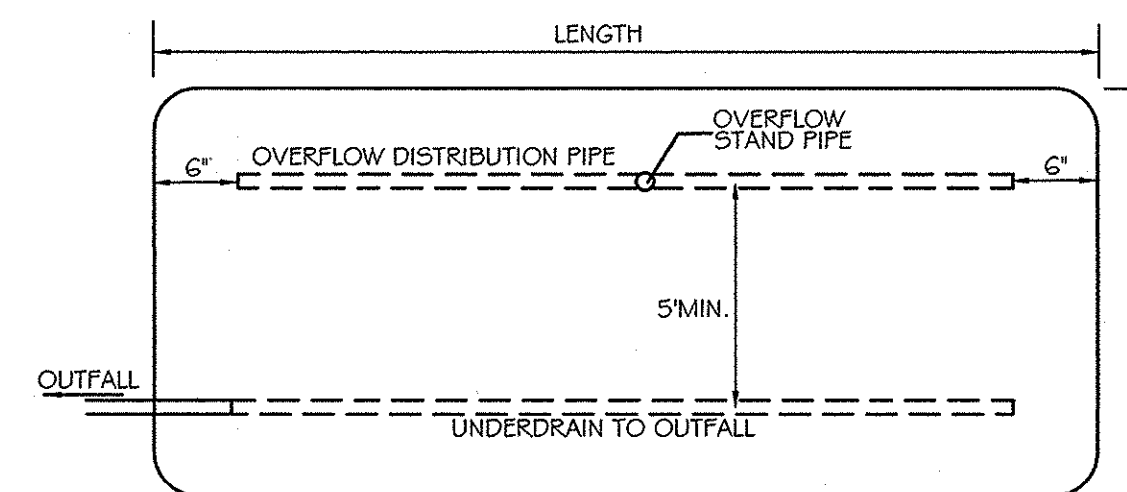
Slope range to be 2% minimum to 6% maximum.

**5. Plant Selection**

Recommended grass species for use in establishing permanent ground cover are provided in Section 2.4 of Appendix A.



**TYPICAL SECTION FOR PROPOSED PRIVATE MICRO-BIORETENTION FACILITIES (N.T.S.)**



**TYPICAL PLAN VIEW PRIVATE MICRO-BIORETENTION FACILITY (N.T.S.)**

**MICRO-BIORETENTION FACILITY DIMENSION TABLE**

FACILITY NO.	LOCATION	WIDTH	LENGTH	SQUARE FEET	DEPTH INVERT *	STONE INVERT **	INV. OUT	TOP MULCH ELEV.	GROUND ELEV. OUTFLOW SIDE	GROUNDWATER DEPTH
1	LOT 3	10'	10'	100	3.42'	11"	256.58	260.00	261.00	6"
2	LOT 3	10'	6'	60	3.42'	10"	256.08	259.50	260.50	6"
3	LOT 2	10'	11'	110	3.42'	11"	248.58	252.00	253.00	5"
4	LOT 1	10'	10'	100	3.42'	12"	241.58	245.00	246.00	5"

INVERT = OUTFALL PIPE INVERT

\* DEPTH OF FACILITY FROM TOP OF MULCH TO INVERT OF 6" UNDERDRAIN  
\*\* DEPTH OF STONE BELOW UNDERDRAIN

**Table B.3.3 Open Channel Systems and Filter Strip Materials Specifications**

Material	Specification	Size	Notes
dry swale soil	USCS; ML, SM, SC	n/a	soil with a higher percent organic content is preferred
dry swale sand	ASTM C-33 fine aggregate concrete sand	0.02" to 0.04"	
check dam (pressure treated)	AWPA Standard C6	6" by 6" or 8" by 8"	do not coat with creosote; embed at least 3" into side slopes
check dam (natural wood)	Black Locust, Red Mulberry, Cedars, Catalpa, White Oak, Chestnut Oak, Black Walnut	6" to 12" diameter; notch as necessary	do not use the following, as these species have a predisposition towards rot: Ash, Beech, Birch, Elm, Hackberry, hemlock, Hickories, Maples, Red and Black Oak, Pines, Poplar, Spruce, Sweetgum, Willow
filter strip sand/gravel pervious berm	sand: per dry swale sand gravel; AASHTO M-43	sand: 0.02" to 0.04" sand gravel: 1/2" to 1"	mix with approximately 25% loam soil to support grass cover crop; sand (35-60%), silt (30-55%), and gravel (10-25%) see Bioretention planting soil notes for more detail.
pea gravel diaphragm and curtain drain	ASTM D 448	varies (No. 6) or (1/8" to 3/8")	use clean bank-run gravel
underdrain gravel	AASHTO M-43	0.25" to 0.75"	
underdrain	F 758 Type PS 28 or AASHTO M-278	4" to 6" rigid schedule 40 PVC or SDR35	3/8" perf. @ 6" on center, 4 holes per row; minimum of 3" of gravel over pipes; not necessary underneath pipes
geotextile	Class "C" - apparent opening size (ASTM-D-4751), grab tensile strength (ASTM-D-4632), puncture resistance (ASTM-D-4833)	n/a	
rip rap	per county criteria; if none given, use MSHA Standards and Specs Section 905	size per county DOT requirements based on 10-year design flows	

B.3.10

**Table B.4.1 Materials Specifications for Micro-Bioretention, Rain Gardens & Landscape Infiltration-**

Material	Specification	Size	Notes
Plantings	see Appendix A, Table A.4	n/a	plantings are site-specific
Planting soil (2" to 4" deep)	loamy sand (60 - 65%) & compost (35 - 40%) or sandy loam (30%), coarse sand (30%) & compost (40%)	n/a	USDA soil types loamy sand or sandy loam; clay content < 5%
Organic content	Min. 10% by dry weight (ASTM D 2974)		
Mulch	shredded hardwood		aged 6 months, minimum; no pine or wood chips
Pea gravel diaphragm	pea gravel: ASTM-D-448	NO. 8 OR NO. 9 (1/8" TO 3/8")	
Curtain drain	ornamental stone: washed cobbles	stone: 2" to 5"	
Geotextile		n/a	PE Type 1 nonwoven
Gravel (underdrains and infiltration berms)	AASHTO M-43	NO. 57 OR NO. 6 AGGREGATE (3/8" TO 3/4")	
Underdrain piping	F 758, Type PS 28 or AASHTO M-278	4" to 6" rigid schedule 40 PVC or SDR35	Slotted or perforated pipe; 3/8" perf. @ 6" on center, 4 holes per row; minimum of 3" of gravel over pipes; not necessary underneath pipes. Perforated pipe shall be wrapped with 1/4-inch galvanized hardware cloth
Poured in place concrete (if required)	MSHA Mix No. 3; f <sub>c</sub> = 3500 psi @ 28 days, normal weight, air-entrained, minimum to meet ASTM-615-60	n/a	on-site testing of poured-in-place concrete required: 28 day strength and slump test; all concrete design (cast-in-place or pre-cast) not using previously approved State or local standards requires design drawings sealed and approved by a professional structural engineer licensed in the State of Maryland - design to include meeting ACI Code 308 R/89; vertical loading (H-10 or H-20); allowable horizontal loading (based on soil pressure); and analysis of potential cracking
Sand	AASHTO-M-6 or ASTM-C-33	0.02" to 0.04"	Sand substitutions such as Diabase and Gneissstone (AASHTO) #10 are not acceptable. No calcium carbonated or dolomitic sand substitutions are acceptable. No "rock dust" can be used for sand.

**SWM TREATMENT SUMMARY**

Practice	Area Treated	Methodology	ESDv Volume (cft)	
			Required	Provided
M-6: Micro Bioretention Facility #1	Lot 3 Driveway	75% storage above filter media	149	159
M-6: Micro Bioretention Facility #2	Lot 3 Rooftop	75% storage above filter media	83	99
M-6: Micro Bioretention Facility #3	Lot 2 Rooftop	75% storage above filter media	165	174
M-6: Micro Bioretention Facility #4	Lot 2 Rooftop	75% storage above filter media	158	161
M-8: BIO Swale	UIC Drive and driveways	ESDv = Rv*Pe*A/12	1,033	1,033

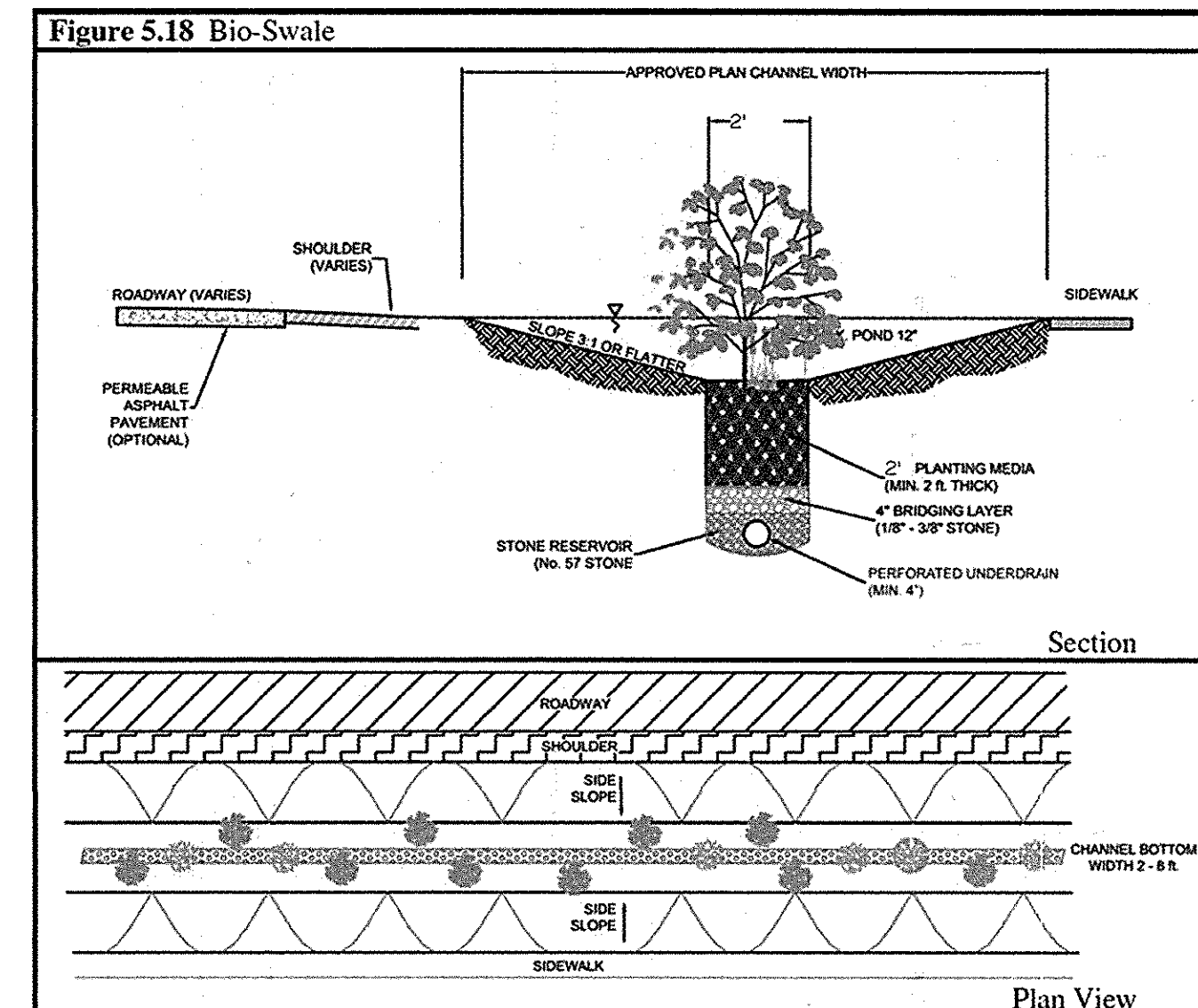
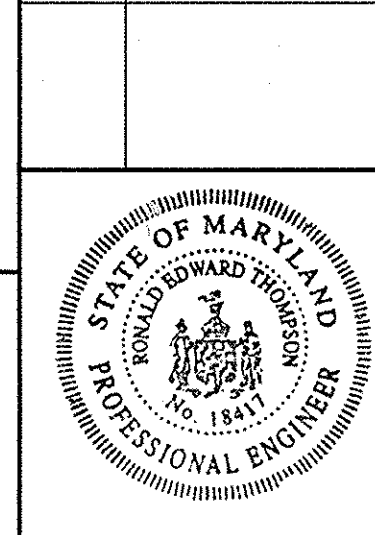


CALL "MISS UTILITY" AT  
1-800-257-7777  
48 HOURS BEFORE START OF CONSTRUCTION

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 18417, EXPIRATION DATE: 9/18/17

SIGNED *Ronald E. Thompson* DATE 4/7/2016  
RONALD E. THOMPSON, P.E.

DATE REVISIONS



**Maintenance Criteria:**

The following items should be addressed to ensure proper maintenance and long-term performance of swales:

- For grassed swales, regular mowing (at least bi-annually) is critical in order to reduce competition from weeds and irrigation may be needed during dry weather to establish vegetation. Sparsely vegetated areas need to be re-seeded to maintain dense coverage.
- If water does not drain within 48 hours, the bottom soil should be tilled and revegetated.
- Inspections should be performed once a year to assess slope integrity, vegetative health, soil stability, compaction, erosion, ponding, and sedimentation. Periodic removal of sediment, litter, or obstructions should be done as needed. Eroded side slopes and the swale bottom should be repaired and stabilized where needed.

**OPERATION AND MAINTENANCE SCHEDULE FOR MICRO-BIORETENTION (M-6) & BIORETENTION SWALE (M-8)**

- THE OWNER SHALL MAINTAIN THE PLANT MATERIAL, MULCH LAYER AND SOIL LAYER ANNUALLY. MAINTENANCE OF MULCH AND SOIL IS LIMITED TO CORRECTING AREAS OF EROSION OR WASH OUT. ANY MULCH REPLACEMENT SHALL BE DONE IN THE SPRING. PLANT MATERIAL SHALL BE CHECKED FOR DISEASE AND INSECT INFESTATION AND MAINTENANCE WILL ADDRESS DEAD MATERIAL AND PRUNING. ACCEPTABLE REPLACEMENT PLANT MATERIAL IS LIMITED TO THE FOLLOWING: 2000 MARYLAND STORMWATER DESIGN MANUAL VOLUME II, TABLE A.4.1 AND 4.2.
- THE OWNER SHALL PERFORM A PLANT IN THE SPRING AND IN THE FALL OF EACH YEAR. DURING THE INSPECTION, THE OWNER SHALL REMOVE DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, REPLACE DEAD PLANT MATERIAL WITH ACCEPTABLE REPLACEMENT PLANT MATERIAL, TREAT DISEASED TREES AND SHRUBS, AND REPLACE ALL DEFICIENT STAKES AND WIRES.
- THE OWNER SHALL INSPECT THE MULCH EACH SPRING. THE MULCH SHALL BE REPLACED EVERY TWO TO THREE YEARS. THE PREVIOUS MULCH LAYER SHALL BE REMOVED BEFORE THE NEW LAYER IS APPLIED.
- THE OWNER SHALL CORRECT SOIL EROSION ON AN AS NEEDED BASIS, WITH A MINIMUM OF ONCE PER YEAR AFTER EACH HEAVY STORM.

**BIO-RETENTION FACILITY PLANT SIZING AND SPACING**

**PLANT SPACING**

- PERENNIALS - 12" ON CENTER FOR QUART SIZE  
18" ON CENTER FOR GALLON SIZE
- SHRUBS - 3'-4" ON CENTER FOR QUART / GALLON SIZE

**PLANT SPECIES**

PLANT SPECIES SHALL BE SELECTED FROM "PLANT SPECIES APPROPRIATE FOR USE IN BIORETENTION AREAS", PRINCE GEORGE COUNTY DEP. MD. (www.lomvmpackdevelopment.org)

OWNER / DEVELOPER:  
CINNABAR DRIVE, LLC  
5300 DORSEY HALL DR. #107  
ELLICOTT CITY, MD 211042  
443-367-0422

**GENERIC BOX SITE DEVELOPMENT PLAN PRIVATE MICRO-BIORETENTION FACILITY & BIO-SWALE NOTES, DETAILS AND SPECIFICATIONS GUILFORD LANDING LOTS 1 - 3**

HOWARD COUNTY PLAT No. 23444-23445  
1 0074 AND 1 0074 AND 1 0076 GUILFORD ROAD  
6TH ELECTION DISTRICT - HOWARD COUNTY, MARYLAND  
T.M. 47, GRID 6, P/O PARCEL 604  
ZONING: R-12 SINGLE FAMILY HOMES  
DATE: FEBRUARY 2016  
RELATED DPZ FILES WP-10-174, W45 24-261 I-D  
WP-11-123, WP-12-113, WP-15-026 & F-09-064

VANMAR ASSOCIATES, INC.  
Engineers Surveyors Planners  
310 South Main Street Mount Airy, Maryland 21771  
(301) 629-2800 (301) 831-2015 (410) 549-2761  
Fax: (301) 831-5003. Copyright, Latest Date Shown