

OPERATION AND MAINTENANCE SCHEDULE FOR ANSCAPE INFILTRATION (M-3), MICRO-BIORETENTION (M-6) RAIN GARDENS (M-7), BIORETENTION SWALE (M-8) AND ENHANCED FILTERS (M-9) 1. THE OWNER SHALL MAINTAIN THE PLANT MATERIAL, MULTCH 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 PRUNING. ACCEPTABLE REPLACEMENT PLANT MATERIAL IS LIMITED TO THE FOLLOWING: 2000 MARYLAND STORMWATER DESIGN MANUAL, VOLUME II, TABLE A.4.1 AND 2.

2. THE OWNER SHALL PERFORM A PLANT IN THE SPRING AND IN HE 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 REES AND SHRUBS, AND REPLACE ALL DEFICIENT STAKES AND 3. 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. 4. THE OWNER SHALL CORRECT SOIL EROSION ON AN AS

NEEDED BASIS, WITH A MINIMUM OF ONCE PER MONTH AND

AFTER EACH HEAVY STORM.

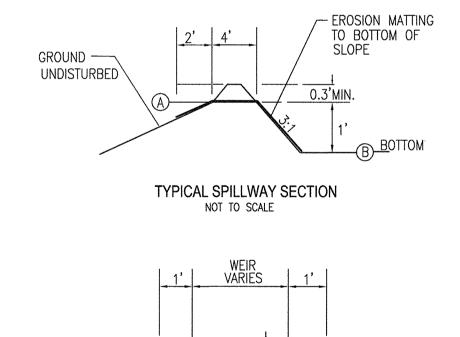
MICROBIORETENTION NOTES:

- 1. ONLY THE SIDES OF MICROBIORETENTION ARE TO BE WRAPPED IN FILTER FABRIC. FILTER FABRIC BETWEEN LAYER OR AT THE BOTTOM OF THE MICROBIORETNTION WILL CAUSE THE MBR TO FAIL, AND THEREFORE
- SHALL NOT BE INSTALLED. 2. WRAP THE PERFORATED MBR UNDERDRAIN PIPE WITH 1/4" MESH (4x4) OR SMALLER GALVANIZED
- 3. PROVIDE 5' MINIMUM SPACING BETWEEN UNDER DRAIN AND PERFORATED PIPE THROUGH STONE RESIVOIR OR SPACE PIPE EQUALLY ACROSS BOTTOM FOR SMALL BIOS. (SEE PLANS)

NOTES A	OUTFLOW AS-BURIT FACULTY WIDTH (A)	
 FACILITY SHALL BE A MINIMUM OF 10FT FROM ANY BUILDING. 		T T
 FACILITY SHALL BE INSTALLED IN EXCAVATED VIRGIN SQIL (NOT FILL). 	DEPTH (C)	//
 FACILITY SHALL BE MINIMUM 2' ABOVE THE SEASONAL HIGH WATER TABLE. 	BOTTOM CONTOUR SLOPE AS-BULLT FACILITY	ELEVATIONS
4. REGULAR INSPECTIONS SHALL BE REQUIRED DURING	CI FT CORN	
FOLLOWING STAGES OF THE CONSTRUCTION. 4.1. DURING EXCAVATION TO SUBGRADE AND PLACEMENT	# RAIN CARDEN CY	
AND BACKFILL OF UNDERDRAIN SYSTEMS. 4.2. DURING PLACEMENT OF PLANTING MEDIA.	PLANTINGS 64 FT COM	
4.3. DURING CONSTRUCTION OF APPURTENANT CONVEYANCE.	68 69 69 65 FT CENT	
4.4. UPON COMPLETION OF FINAL GRADING AND ESTABLISHMENT OF PERMANENT STABILIZATION.	INFLOW E6 FT LOW E7 FT OUT	SIDE AT TOP OF THE SLOPE
5. E1 TO E12 AS-BUILT SPOT ELEVATION LOCATIONS. 6. THIS STANDARD IS A REFERENCE TO SHOW THE Δ		
ELEMENTS AND MINIMUM DIMENSIONS FOR A RAIN	A 28 _ 17 100	
GARDEN. EACH FACILITY SHALL BE DESIGNED AND APPROVED ON A SITE SPECIFIC BASIS.	/* /	
THIS DETAIL PROVIDES BLANK SPACES TO INFORM WHERE 4" SQUARE GRATE OR		
AS-BUILT INFORMATION IS OPTIONAL 4" ATRIUM GRATE REQUIRED FOR SWM CLOSEOUT.	_ 4° 5	QUARE GRATE
ALTERNATE	\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	OPTIONAL TRIUM GRATE
RAIN GARDEN - OVERFLOW PIPE	3:1 (VAX.) RESISTANT COATING	
3:1 (MAX.) PLANTING (TYP.) \ SIE \	INFLOW EG TA" PVC CAP S	-3:1 (MAX.)
CRADE \ SOO STATE COLUMN) B	0.1 (4.0.1.)
INFLOW AND AND INFLOW	The data seem seem the and	<i>y</i>
INFLOW INFLOW	A PLAN	- ALTERNATE
	2" MULCH LAYER \$ 4" PERF. WRAP 7	OVERFLOW PIPE FILTER FABRIC
FILTER FASRIC SIDES ONLY	WITH X" HARDWARE /	SIDES ONLY
	CLAPA WALLEY WALL	-4" PVC PIPE
	.S'-4.0' PLANTING SOIL	UNDERDRAIN COLLECTION
ALTERNATE OVERFLOW PIPE		SYSTEM C 1% MIN. (TO BE
	The second of th	PERFORATED WITHIN AREA OF
4" PVC OSS. PIPE	5" MIN. ABOVE UNDERDRAIN	RAIN GARDEN) - EZ
9 10 10 20 20 20 20 20 1 - 1	* /8 STONE	OUTFLOW JE STABILIZED
	3° MIN. BELOW UNDERDRAIN	OUTFALL
SECTION A-A	* #57 AGGREGATE A" PVC GBS. PIPE SECTION B-B	2" MIN. 4" PVC
Howard County, Maryland		Detail
Department of Public Works Stripton Communication Commu	rain garden 🛆	I n a a a
Revised Brown & X . The	Private For Reference	D-9.02
5/1/2007 Approved 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0	, ,	

SECTION A-A A PVC GSS, PIPE SECTION B-B 12" MIN. 4" PVC	ALTERNATE OVERFLOW PIPE 4* PVC OSS. PIPE 33	X.) B PLAN STANDARE ST	ALTERNATE OVERFLOW PIPE FILTER FABRE SIDES ONLY APPROPRIATE ALTERNATE OVERFLOW PIPE FILTER FABRE SIDES ONLY APPROPRIATE OUDEROMAN COLLECTION SYSTEM O 1X MIN. (TO BE PERFORMED OF RAN GARDEN) FILTER OUTFALL OUTFALL 12" MIN. APPROPRIATE OUTFALL 12" MIN. 12" MIN. 12" MIN. 14" PVG
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Material	pecifications for Micro-Bioret Specification	ention, Rain Gardens &	k Landscape Infiltration-
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; \mathcal{C}_c = 3500 psi @ 28 days, normal weight, air-entrained; reinforcing 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 350.R/89; vertical loading [H-10 or H-20]; allowable horizontal loading (based on soil pressures); and analysis of potential cracking
Sand	AASHTO-M-6 or ASTM-C-33	0.02" to 0.04"	Sand substitutions such as Diabase and Graystone (AASHTO) #10 are not acceptable. No calcium carbonated or dolomitic sand substitutions are acceptable. No "rock dust" can be used for sand





TYPICAL SPILLWAY PROFILE

_ EX. GROUND

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

LOPMENT ENGINEERING DIVISION \ CHIEF, DIVISION OF LAND DEVELOPMENT **ENVIRONMENTAL CONCEPT PLAN NOTES:** 1. APPROVAL OF THIS ECP DOES NOT CONSTITUTE AN APPROVAL OF ANY

- SUBSEQUENT AND ASSOCIATED BUILDING AND/OR GRADING PERMIT 2. REVIEW OF THIS PLAN FOR COMPLETE COMPLIANCE WITH ZONING AND SUBDIVISION AND LAND DEVELOPMENT REGULATIONS SHALL OCCUR AT THE SUBDIVISION PLAN OR SITE DEVELOPMENT PLAN STAGE AND THEREFORE, THIS PLAN IS SUBJECT TO ADDITIONAL AND MORE DETAILED COMMENTS AS THE PLAN PROGRESSES THROUGH
- THE SITE DEVELOPMENT PROCESS. 3. THIS SITE HAS STREAMS, WETLANDS, AND STEEP SLOPES ON THE PROPERTY. THESE FEATURES AND THEIR ASSOCIATED BUFFERS CONSTRIAIN THE DEVELOPABLE AREA ON THE MIDDLE PART OF THE PROJECT.

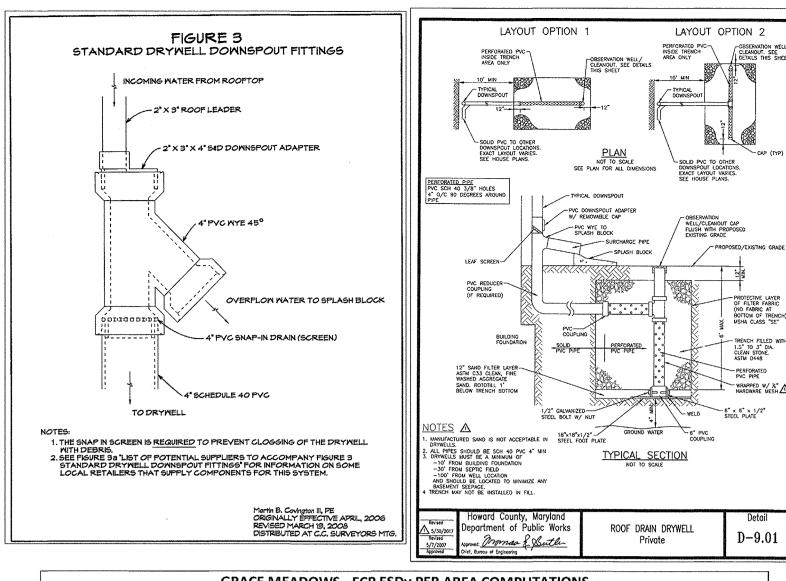
OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED STORMWATER DRY WELLS (M-5)

THE MONITORING WELLS AND STRUCTURES SHALL BE INSPECTED ON A QUARTERLY BASIS AND AFTER EVERY LARGE STORM EVENT. WATER LEVELS AND SEDIMENT BUILD UP IN THE MONITORING WELLS SHALL BE RECORDED OVER A PERIOD OF SEVERAL DAYS TO INSURE 3. A LOG BOOK SHALL BE MAINTAINED TO DETERMINE THE RATE AT WHICH THE FACILITY DRAINS.

4. WHEN THE FACILITY BECOMES CLOGGED SO THAT IT DOES NOT DRAIN DOWN WITHIN THE 72 HOUR TIME PERIOD, CORRECTIVE ACTION SHALL DOWN WITHIN THE 72 HOUR TIME PERIOD, CORRECTIVE ACTION OF DEEDE TAKEN.

5. THE MAINTENANCE LOG BOOK SHALL BE AVAILABLE TO HOWARD COUNTY FOR INSPECTION TO INSURE COMPLIANCE WITH OPERATION AND MAINTENANCE CRITERIA.

6. ONCE THE PERFORMANCE CHARACTERISTICS OF THE INFILTRATION FACILITY HAVE BEEN VERIFIED, THE MONITORING SCHEDULE CAN BE REDUCED TO AN ANNUAL BASIS UNLESS THE PERFORMANCE DATA INDICATES THAT A MORE FREQUENT SCHEDULE IS REQUIRED.



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DA	0/ 13 45 50 1/					MAXIMUM	1 501				00554	REMARKS	
#	% IMPERV	Rv	DA (SF)	DA (AC)	VOLUME	VOLUME	A STRUCTURE CONTRACTOR OF STRUCTURE	VOLUME PROVIDED*	IMPERV (SF)	(AC)	GREEN AREA	REMARKS	-
AREA 1 ROAD R/W	47.96	0.4816	18267	0.42	733	1906	1173	1906	8761	0.20	0.22	MICROSCALE MICRO-BIO RETENTION	
& USE-IN-COMMON DRIVE AREA 2			The state of the s		2 m 16 1 m 20 m 16 m 10 m		to and control to a to a total at the fact of	hel and took helm constitutions of party	and the state of the factor of the state of the			1906 1430 SF MICRO BIO	
LOT 13	100.00	0.9500	1564	0.04	124	322	198	134	1564	0.04	0.00	MICROSCALE PRAC. (DRY WELL) 67 CF FOR EACH (6x7x4) DRYWI	LL
AREA 3	100.00	0.9500	3.004	0.04	434	200	4.00	424	4 50 70 4		0.00		
LOI 16	TOO:OO	U.9500	1564	0.04	124	322	198	134	1564	0.04	0.00	MICROSCALE PRAC. (DRY WELL) 67 CF FOR EACH (6x7x4) DRYWI	LL
AREA 4 LOT 17	100.00	0.9500	1564	0.04	124	322	198	134	1564	0.04	0.00	MICROSCALE PRAC. (DRY WELL)	
AREA 5					Commission and of soline and the following of the first soline and the f	and the second s		to and the other late (place later and the larger as a) was		Andrea of Anna Control of the Anna Control of	and the singular deficient in the legal annual conservation in	67 CF FOR EACH (6x7x4) DRYWI	LL
O.S. LOT 22, LOT 5 + ROAD R/W	32.51	0.3426	19865	0.46	567	1475	908	628	6459	0.15	0.31	MICROSCALE MICRO-BIO RETENTION 628 471 SF MICRO BIO	1
AREA 6													
HALF LOT 6 HOUSE	40.06	0.4106	1952	0.04	67	174	107	171	782	0.02	0.03	MICROSCALE RAIN GARDEN 171 128.25 SF RAIN GARDEN	
AREA 7 HALF LOT 7 HOUSE	39.36	0.4042	1987	0.05	67	174	107	171	782	0.02	0.03	MICROSCALE RAIN GARDEN	
AREA 8				Aprovious in the day of Artist Angus 1111	N 1 2 1 10 1 10 10 10 10 10 10 10 10 10 10 10	The second of the second of the second		CONTRACTOR OF CO	And the second second second second		The state of the s	171 128.25 SF RAIN GARDEN	
HALF LOT 8 HOUSE	42.23	0.4301	1951	0.04	70	182	112	171 ,,,,,,	824	0.02	0.03	MICROSCALE RAIN GARDEN 171 128.25 SF RAIN GARDEN	
AREA 9													_
LOTS 9-11	17.60	0.2084	19864	0.46	345	897	552	725	3496	0.08	0.38	MICROSCALE MICRO-BIO RETENTION 725 543.75 SF MICRO BIO	
AREA 10					that of headers of section of the contribution and	Annual State of the State of th		Salda Andres Colo Madrid Anto Colo Manager					
ROAD R/W	52.09	0.5188	19747	0.45	854	2220	1366	1825	10286	0.24	0.22	MICROSCALE MICRO-BIO RETENTION 1825 1368.75 SF MICRO BIO	
AREA 11	gart and fifty parties and should be assessed and in the short are a supera which is								and the sale of annual adjustments, a speciment (see for sale of partial or for			AUGUST AUGUSTA SE MICRO BIO	1
LOTS 1-2 + ROAD R/W	45.26	0.4574	13028	0.30	497	1291	794	508	5897	0.14	0.16	MICROSCALE MICRO-BIO RETENTION	
			.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ATT - 100 -		Antonio de la material de la companio de la compani	** 10°11 00° 1°111 1111 11111 11111 11111 11111	Administration and the second second second				508 381 SF MICRO BIO	1
AREA 12 HALF LOT 2 HOUSE	49.84	0.4986	1569	0.04	65	169	104	169	782	0.02	0.02	MICROSCALE RAIN GARDEN	
		ertantistamenten artista amata et	The state of the s	***************************************							4-11-11-11-11-11-11-11-11-11-11-11-11-11	171 128.25 SF RAIN GARDEN	a
AREA 13 HALF OF LOT 1 HOUSE	56.79	0.5611	1377	0.03	64	167	103	167	782	0.02	0.01	MICROSCALE RAIN GARDEN	
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AREA 14 HALF OF LOT 4 HOUSE	39.10	0.4019	2000	0.05	67	174	107	171	782	0.02	0.03	MICROSCALE RAIN GARDEN	
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AREA 15 HALF OF LOT 4 HOUSE	40.02	0.4102	977	0.02	33	87	53	83	391	0.01	0.01	MICROSCALE RAIN GARDEN	
		AMERICA CONT. NO. TONOTES OF ESTABLISHED	THE PARTY NAMED IN COLUMN TWO IS NOT THE OWNER.	THE STREET AND ADMINISTRATION OF THE SECURITION OF		The transference the facility systems			Marketin A. C. and C. S. 195 (A) (Financial of		A APT A STATE OF THE STATE OF T	83 62.25 SF RAIN GARDEN	
AREA 16 HALF OF LOT 3 HOUSE	52.24	0.5201	1497	0.03	65	169	104	169	782	0.02	0.02	MICROSCALE RAIN GARDEN	-
											l	171 128.25 SF RAIN GARDEN	·
AREA 17 LOT 15 HOUSE	42.62	0.4335	3670	0.08	133	345	212	163	1564	0.04	0.05	MICROSCALE MICRO-BIO RETENTION	
									a de la primeira de la participa de la partici			163 122.25 SF MICRO BIO	
AREA 18 LOT 18 &	42.41	0.4317	19595	0.45	705	1833	1128	705	8310	0.19	0.26	MICROSCALE MICRO-BIO RETENTION	
USE-IN-COMMON DRIVE		eramente de Police des el 1000 en		Character of management of the contract of the		Marian Marianana (1997)		MARKET PROPERTY AND A CONTRACTOR			AND THE PROPERTY OF THE PARTY O	705 528.75 SF MICRO BIO	
AREA 19 HALF OF LOT 14 HOUSE	8.35	0.1252	10562	0.24	110	286	176	190	882	0.02	0.22	MICROSCALE MICRO-BIO RETENTION	
& OFFSITE RUNOFF		enderstadijanjaning hat nebenje sig sistemate in Galent side is terrene den resistem stillerestelle en	Anthony St. C. and C. a	Angletjack and risk to a trimingle part of a figure, against								190 142.5 SF MICRO BIO	
AREA 20 USE-IN-COMMON DRIVE	36.12	0.3750	11084	0.25	346	901	554	880	4003	0.09	0.16	MICROSCALE MICRO-BIO RETENTION	1
												880 660 SF MICRO BIO	
AREA 21 HALF OF LOT 13 HOUSE	47.11	0.4740	1660	0.04	66	170	105	165	792	0.02	0.02	MICROSCALE RAIN GARDEN	
ANG OF LOT 15 HOUSE	7/. LL	U.4/4U	4000	U.U4	00	1/0	105	105	782	0.02	0.02	165 123.75 SF RAIN GARDEN	
AREA 22	THE PART OF THE PART OF	A AND	A A	A 4-		and the second s							
HALF OF LOT 7 HOUSE	42.09	0.4289	1967	0.05	70	183	112	128	828	0.02	0.03	MICROSCALE RAIN GARDEN 128 96 SF RAIN GARDEN	
AREA 23						N. M. STATE OF STREET, AS P. STREET,			Chamber (Schausbergerande and Arthur Sch				1
HALF OF LOT 8 HOUSE	52.74	0.5247	1915	0.04	84	218	134	128	1010	0.02	0.02	MICROSCALE RAIN GARDEN 128 96 SF RAIN GARDEN	
AREA 24													-
HALF OF LOT 9 HOUSE	60.81	0.5973	1674	0.04	83	217	133	153	1018	0.02	0.02	MICROSCALE RAIN GARDEN 153 114.75 SF RAIN GARDEN	
AREA 25		jobnost, ment elle ga ferlylen, queligifen sel . som d'		gelande og programje og ongolys ov	and the second s			wint have reporting manner.			78000 1000 00000000000000000000000000000		1
HALF OF LOT 10 HOUSE	61.79	0.6061	1984	0.05	100	261	160	153	1226	0.03	0.02	MICROSCALE RAIN GARDEN 153 114.75 SF RAIN GARDEN	
AREA 26			,,		ye mare's ma' ouettean								
HALF OF LOT 11 HOUSE	86.09	0.8249	1877	0.04	129	335	206	129	1616	0.04	0.01	MICROSCALE RAIN GARDEN 129 96.75 SF RAIN GARDEN	
AREA 27				and the art of the art of the fire and the second				and have ever and a second first first first					
HALF OF LOT 3 HOUSE & DRIVEWAY	66.48	0.6483	1411	0.03	76	198	122	171	938	0.02	0.01	MICROSCALE RAIN GARDEN 171 128.25 SF RAIN GARDEN	
AREA 28			TO A PARTIE OF THE RESIDENCE OF	PARTIES PARTIES TANES IN				The state of the s					_
USE IN COMMON DRIVEWAY	35.76	0.3718	8412	0.19	261	678	417	417	3008	0.07	0.12	MICROSCALE MBR 4U 417 312.75 SF RAIN GARDEN	
AREA 29	ernerrundene onteren er en en er		M-1447 01100 1 17110 1 1 171	er cana accessor Spinisher construing and	***************************************			engana tananga mengan tahun daga ta	V = 10°0 dama ** 1 dan * 1 dan			Jan Jan Jar Rain Garden	
LOT 4 DRIVE HANOVER DRIVEWAY	47.34	0.4760	18950	0.44	752	1954	1203	1203	8970	0.21	0.23	MICROSCALE MBR 4D 1203 902.25 SF RAIN GARDEN	
AREA 30			<u> </u>				-			and the second s		1203 902.25 SF RAIN GARDEN	-
LOT 12 1/2HSE & DRIVEWAY	28.35	0.3051	7320	0.17	186	484	298	298	2075	0.05	0.12	MICROSCALE MBR 12D	
1/2000 & UKIVEWAY				***************************************								298 223.5 SF RAIN GARDEN	4
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APPENDIX B.4.C SPECIFICATIONS FOR MICRO-BIORETENTION. RAIN GARDEN, LANDSCAPE INFILTRATION & INFILTRATION BERMS

1. MATERIAL SPECIFICATIONS THE ALLOWABLE MATERIALS TO BE USED IN THESE PRACTICES ARE DETAILED IN TABLE B.4.1.

SIGNIFICANTLY CONTRIBUTE TO DESIGN FAILURE.

2. FILTERING MEDIA OR 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 MICRO-BIORETENTION PRACTICE

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: * SOIL COMPONENT - LOAMY SAND OR SANDY LOAM (USDA SOIL TEXTURAL CLASSIFICATION).

OF LOAMY SAND (60%-65%) AND COMPOST (35% TO 40%) OR SANDY LOAM (30%), COARSE SAND (30%), AND COMPOST (40%). * CLAY CONTENT - MEDIA SHALL HAVE A CLAY CONTENT OF LESS THAN 5%. * PH RANGE - SHOULD BE BETWEEN 5.5 - 7.0. AMENDMENTS (E.G., LIME, IRON SULFATE PLUS SULFUR) MAY BE MIXED IN TO THE SOIL TO INCREASE OR DECREASE PH. THERE SHALL BE AT LEAST ONE SOIL TEST PER PROJECT. EACH TEST SHALL CONSIST OF BOTH THE STANDARD SOIL TEST FOR PH, AND ADDITIONAL TESTS OF ORGANIC MATTER, AND SOLUBLE SALTS. 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

* ORGANIC CONTEN - MINIMUM 10% BY DRY WEIGHT (ASTM D 2974). IN GENERAL, THIS CAN BE MET WITH A MIXTURE

COMPACTION IT IS VERY IMPORTANT TO MINIMIZE COMPACTION OF BOTH THE BASE OF BIORETENTION PRACTICES AND THE REQUIRED BACKFILL. WHEN POSSIBLE, USE EXCAVATION HOES TO REMOVE ORIGINAL SOIL. IF PRACTICES ARE EXCAVATED USING LOADER, THE CONTRACTOR SHOULD USE WIDE TRACK OR MARSH TRACK EQUIPMENT, OR LIGHT EQUIPMENT WITH TURF TYPE TIRES. USE OF EQUIPMENT WITH NARROW TRACKS OR NARROW TIRES, RUBBER TIRES WITH LARGE LUGS, OR HIGH-PRESSURE TIRES WILL CAUSE EXCESSIVE COMPACTION RESULTING IN REDUCED INFILTRATION RATES AND IS NOT ACCEPTABLE. COMPACTION WILL

COMPACTION CAN BE ALLEVIATED AT THE BASE OF THE BIORETENTION FACILITY BY USING A PRIMARY TILLING OPERATION SUCH AS CHISEL PLOW, RIPPER, OR SUBSOILER. THESE TILLING OPERATIONS ARE TO REFRACTURE THE SOIL PROFILE THROUGH THE 12 INCH COMPACTION ZONE. SUBSTITUTE METHODS MUST BE APPROVED BY THE ENGINEER. ROTOTILLERS TYPICALLY DO NOT TILL DEEP ENOUGH TO REDUCE THE EFFECTS OF COMPACTION FROM HEAVY EQUIPMENT.

ROTOTILL 2 TO 3 INCHES OF SAND INTO THE BASE OF THE BIORETENION 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 OVER THE SAND, THEN ROTOTILL THE SAND/TOPSOIL TO CREATE A GRADATION ZONE. BACKFILL THE REMAINDER OF THE TOPSOIL TO FINAL GRADE. WHEN BACKFILLING THE BIORETENTION FACILITY, PLACE SOIL IN LIFTS 12" TO 18". 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. 4. PLANT MATERIAL

RECOMMENDED PLANT MATERIAL FOR MICRO-BIORETENTION PRACTICES CAN BE FOUND IN APPENDIX A, SECTION A.2.3. 5. PLANT INSTALLATION COMPOST IS A BETTER ORGANIC MATERIAL SOURCE, IS LESS LIKELY TO FLOAT, AND SHOULD BE PLACED IN THE INVERT AND OTHER LOW AREAS. MULCH SHOULD BE PLACED IN SURROUNDING TO A UNIFORM THICKNESS OF 2" TO 3". SHREDDED OR CHIPPED 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.

ROOTSTOCK OF THE PLANT MATERIAL SHALL BE KEPT MOIST DURING TRANSPORT AND ON-SITE STORAGE. THE PLANT ROOT BALL SHOULD BE PLANTED SO 1/8TH OF THE BALL IS ABOVE FINAL GRADE SURFACE. THE DIAMETER OF THE PLANTING PIT SHALL BE AT LEAST SIX INCHES 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" BY 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 THIS 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 1000 SQUARE FEET 6. UNDERDRAINS UNDERDRAINS SHOULD MEET THE FOLLOWING CRITERIA:

* PIPE - SHOULD BE 4" TO 6" DIAMETER, SLOTTED OR PERFORATED RIGID PLASTIC PIPE (ASTMF 758, TYPE PS 28, OR AASHTO-M-278) IN A GRAVEL LAYER. THE PREFERRED MATERIAL IS SLOTTED, 4" RIGID PIPE (E.G., PVC OF HDPE). * PERFORATIONS - IF PERFORATED PIPE IS USED, PERFORATIONS SHOULD BE 3/8" DIAMETER LOCATED 6" ON CENTER WITH A MINIMUM OF FOUR HOLES PER ROW. PIPE SHALL BE WRAPPED WITH A 1/4" (NO. 4 OR 4x4) GALVANIZED HARDWARE CLOTH.

* GRAVEL - THE GRAVEL LAYER (NO. 57 STONE PREFERRED) SHALL BE AT LEAST 3" THICK ABOVE AND BELOW THE * THE MAIN COLLECTOR PIPE SHALL BE AT A MINIMUM 0.5% SLOPE.

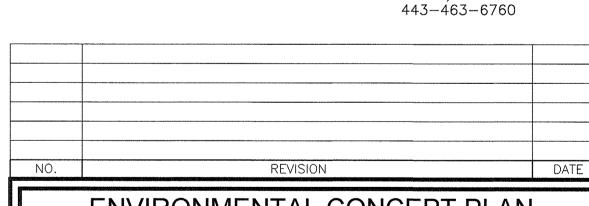
* A RIGID, NON-PERFORATED OBSERVATION WELL MUST BE PROVIDED (ONE PER EVERY 1,0000 SQUARE FEET) TO

PROVIDE A CLEAN-OUT PORT AND MONITOR PERFORMANCE OF THE FILTER. * A 4" LAYER OF PEA GRAVEL (1/8" TO 3/8" STONE) SHALL BE LOCATED BETWEEN THE FILTER MEDIA AND UNDERDRAIN TO PREVENT MIGRATION OF FINES IN TO THE UNDERDRAIN. THIS LAYER MAY BE CONSIDERED PART OF THE FILTER

BED WHEN BED THICKNESS EXCEEDS 24". THIS 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 1000 SQUARE FEET OF SURFACE AREA).

THESE PRACTICES MAY NOT BE CONSTRUCTED UNTIL ALL CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED.

OWNER/DEVELOPER GRACE TAYLOR SCHUTT 6132 HANOVER ROAD HANOVER, MD 21076



ENVIRONMENTAL CONCEPT PLAN

LOTS 1 - 18 AND OPEN SPACE LOTS 19 - 29

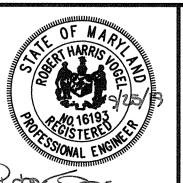
STORMWATER MANAGEMENT DRAINAGE AREA NOTES AND DETAILS **GRACE MEADOWS**

TAX MAP 38 BLOCK 09 1ST ELECTION DISTRICT

A SUBDIVISION OF TAX MAP 38 - PARCEL 731 ZONED R-12 PARCEL 73 HOWARD COUNTY, MARYLAND



ROBERT H. VOGEL ENGINEERING, INC. ENGINEERS . SURVEYORS . PLANNERS 3300 N. RIDGE ROAD, SUITE 110 TEL: 410.461.7666 ELLICOTT CITY, MD 21043 FAX: 410.461.8961



DESIGN BY: ___LAG/KG DRAWN BY: CHECKED BY: DATE: <u>SEPTEMBER 2019</u> SCALE: W.O. NO.: 40077

ROFESSIONAL CERTIFICATE 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. 16193 EXPIRATION DATE: 09-27-2020

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