

GENERAL NOTES

1. THE PROJECT IS IN CONFORMANCE WITH THE LATEST HOWARD COUNTY STANDARDS UNLESS WAIVERS HAVE BEEN APPROVED.
2. THE EXISTING TOPOGRAPHY SHOWN HEREON IS BASED ON A TOPOGRAPHIC SURVEY COMPILED BY ROBERT H. VOGEL ENGINEERING INC. DATED NOVEMBER 2016. OFFSITE TOPOGRAPHY AND HOWARD COUNTY GIS.
3. THE PROJECT BOUNDARY IS BASED ON A BOUNDARY SURVEY PREPARED BY ROBERT H. VOGEL ENGINEERING, INC., DATED NOVEMBER 2016.
4. THE COORDINATES SHOWN HEREON ARE BASED UPON THE HOWARD COUNTY GEODETIC CONTROL WHICH IS BASED UPON THE MARYLAND STATE PLANE COORDINATE SYSTEM. HOWARD COUNTY MONUMENT NOS. 31A3 AND 31D4 WERE USED FOR THIS PROJECT.
5. THE SUBJECT PROPERTY IS ZONED "R-20" IN ACCORDANCE WITH THE 10/6/13 ZONING REGULATIONS, AND IS SUBJECT TO THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS EFFECTIVE 10/2/03 PER COUNCIL BILL 75-2003.
6. NO GRADING, REMOVAL OF VEGETATIVE COVER OR TREES, PAVING AND NEW STRUCTURES SHALL BE PERMITTED WITHIN THE REQUIRED WETLANDS, STREAM(S) OR THEIR BUFFERS, FOREST CONSERVATION EASEMENT AREAS AND 100-YEAR FLOODPLAIN.
7. THIS PROPERTY IS LOCATED WITHIN THE METROPOLITAN DISTRICT.
8. WATER FOR THIS PROJECT IS TO BE PRIVATE WATER HOUSE CONNECTIONS TO CONTRACT NO. 419-S.
9. SEWER FOR THIS PROJECT WILL BE VIA AN AMENDED SERVICE CONNECTION TO CONTRACT NO. 419-S.
10. EXISTING UTILITIES LOCATED FROM TOPOGRAPHIC SURVEY AND AS-BUILT DRAWINGS, CONTRACTOR SHALL LOCATE EXISTING UTILITIES WELL IN ADVANCE OF CONSTRUCTION ACTIVITIES AND TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE EXISTING UTILITIES AND TO MAINTAIN UNINTERRUPTED SERVICE.
11. NO FLOODPLAIN IS LOCATED ONSITE.
12. NO STEEP SLOPES OVER 20,000 SF ARE LOCATED ON THE PROJECT SITE.
13. THE REPORT COMPILED BY ECO-SCIENCE PROFESSIONALS, INC. C/O MR. JOHN CANOLES, DATED FEBRUARY 2017 CONFIRMED NO WETLANDS, STREAMS OR BUFFERS ARE PRESENT ON OR IMMEDIATELY ADJACENT TO THE PROPERTY AS WELL AS THE FINDINGS RELATED TO FOREST RESOURCES AND THE PRESENCE OF SPECIMEN TREES.
14. IN ACCORDANCE WITH SECTION 16.121(b)(2) OF THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS, THE OPEN SPACE REQUIREMENTS FOR THIS R-20 PROJECT IS TO SATISFY BY PAYMENT OF FEE-IN-LIEU DURING FUTURE PLAN REVIEW.
15. GEOTECHNICAL INVESTIGATIONS SHALL BE COMPLETED AND SUBMITTED WITH THE FUTURE SUBDIVISION PLANS.
16. A NOISE STUDY IS NOT REQUIRED FOR THE SUBJECT PROPERTY.
17. THE SUBJECT PROPERTY IS EXEMPT FROM THE FOREST CONSERVATION ACT PER COUNTY CODE SECTION - 16.1202. (b)(1)(viii).
18. AVOCA AVENUE IS CLASSIFIED AS A PUBLIC LOCAL ROAD - 50' R/W. MONTGOMERY ROAD - MD 103 (60' R/W) IS A MINOR ARTERIAL. A SINGLE USE DRIVEWAY IS PROPOSED FOR ACCESS TO LOT 1. THE EXISTING DRIVEWAY ENTRANCE FROM MONTGOMERY ROAD SHALL REMAIN.
19. TO THE BEST OF THE OWNERS KNOWLEDGE, THERE ARE NO BURIAL GROUNDS, CEMETERIES, OR HISTORIC STRUCTURES LOCATED ON THIS PROPERTY.
20. THE PROPOSED UNITS SHALL HAVE AN AUTOMATIC FIRE PROTECTION SPRINKLER SYSTEM.
21. STORMWATER MANAGEMENT FOR THE PROJECT IS PROVIDED BY THE USE OF MICRO-SCALE PRACTICES IN ACCORDANCE WITH ENVIRONMENTAL SITE DESIGN CRITERIA. THE MICRO-SCALE PRACTICE PROPOSED IS RAINGARDENS. THESE FACILITIES WILL BE PRIVATELY OWNED AND MAINTAINED.
22. APPROVAL OF THIS ENVIRONMENTAL CONCEPT PLAN (ECP) DOES NOT CONSTITUTE AN APPROVAL OF ANY SUBSEQUENT AND ASSOCIATED SUBDIVISION PLAN/PLAT AND/OR SITE DEVELOPMENT PLAN AND/OR RED-LINE REVISION PLAN. REVIEW OF THIS PROJECT FOR COMPLIANCE WITH THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS AND THE HOWARD COUNTY ZONING REGULATIONS SHALL OCCUR AT THE SUBDIVISION PLAN/PLAT AND/OR SITE DEVELOPMENT PLAN AND/OR RED-LINE REVISION PROCESS. THE APPLICANT AND CONSULTANT SHOULD EXPECT ADDITIONAL AND MORE DETAILED REVIEW COMMENTS (INCLUDING COMMENTS THAT MAY ALTER THE OVERALL SITE DESIGN) AS THIS PROJECT PROGRESSES THROUGH THE PLAN REVIEW PROCESS.
23. APPROVAL OF THIS ENVIRONMENTAL CONCEPT PLAN (ECP) BY THE HOWARD SOIL CONSERVATION DISTRICT DOES NOT GRANT APPROVAL OF THE PROPOSED SEDIMENT CONTROL SCHEME. THE FINAL PLAN SHALL INCLUDE A SEQUENCE OF CONSTRUCTION WHICH SHALL DETAIL SEDIMENT & EROSION CONTROLS AND PHASING AND ADDRESS THE PROJECT TEMPORARY STORMWATER MANAGEMENT REQUIREMENTS.

ENVIRONMENTAL CONCEPT PLAN

KEEHN PROPERTY

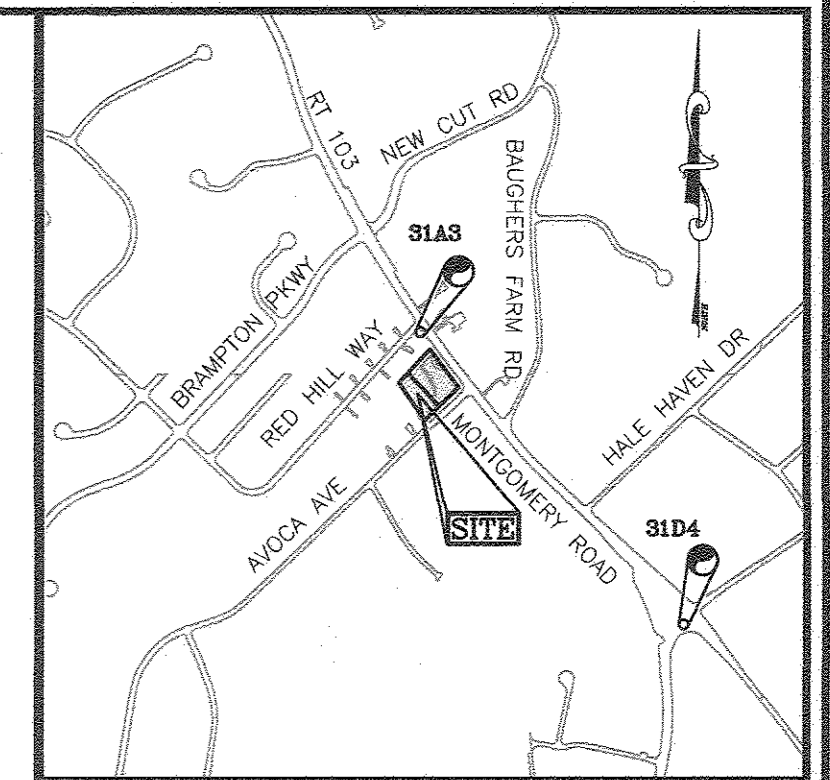
LOTS 1 & 2

L. 16741 / F. 238

HOWARD COUNTY, MARYLAND

BENCHMARKS

HOWARD COUNTY BENCHMARK 31A3	ELEV. 486.905
N 573217.889 E 1368237.788	
HOWARD COUNTY BENCHMARK 31D4	ELEV. 494.445
N 571700.664 E 1369506.417	



VICINITY MAP
SCALE: 1"=1000'
ADC MAP COORDINATE: 28/A5

SHEET INDEX

DESCRIPTION	SHEET NO.
COVER SHEET & CONCEPT LAYOUT PLAN	1 OF 1
CONCEPT GRADING, SOIL EROSION AND SEDIMENT CONTROL PLAN	2 OF 2
SWM DRAINAGE AREA MAP; SWM NOTES AND DETAILS	

SITE ANALYSIS DATA CHART

A. TOTAL PROJECT AREA:	1.35 AC. ±
B. AREA OF PLAN SUBMISSION:	1.35 AC. ±
C. NET TRACT AREA:	1.35 AC. ±
D. AREA OF WETLANDS AND BUFFERS:	WETLAND: 0.00 S.F. BUFFER: 0.00 S.F.
E. AREA OF FLOODPLAIN:	0.00 AC. NONE
F. AREA OF FOREST:	0.00 AC. NONE
G. AREA OF STEEP SLOPES (15% & GREATER):	0 S.F. OR 0.00 AC.
H. ERODIBLE SOILS:	N/A
I. LIMIT OF DISTURBED AREA:	0.50 AC. +/-
J. PROPOSED USES FOR SITE AND STRUCTURES:	RESIDENTIAL SINGLE FAMILY DETACHED HOME
K. GREEN OPEN AREA:	N/A
L. PROPOSED IMPERVIOUS AREA:	4,425 SF.± (SWM COMPUTATIONS)
M. PRESENT ZONING DESIGNATION:	R-20
N. OPEN SPACE REQUIRED:	FEE-IN-LIEU
O. TOTAL NUMBER OF UNITS ALLOWED:	1
P. TOTAL NUMBER OF UNITS PROPOSED:	1
Q. DPZ FILE REFERENCES:	CONT # 419-S

ENVIRONMENTAL SITE DESIGN NARRATIVE:

- IN ACCORDANCE WITH THE DEVELOPMENT ENGINEERING DESIGN ECP CHECKLIST ITEM III.K.
1. NO ENVIRONMENTAL AREAS EXIST ON THE PROJECT SITE.
 2. NO DRAMATIC DISTURBANCE TO THE NATURAL DRAINAGE PATTERNS ARE PROPOSED, PLEASE REFER TO THE PROPOSED GRADING.
 3. THE CONCEPTUAL REDUCTION IN IMPERVIOUS AREA THROUGH BETTER SITE DESIGN IS ACHIEVED THROUGH THE ENVIRONMENTAL SITE DESIGN (ESD) FOR THE PROJECT. THE ESD CONCEPT INCLUDES THE USE OF MICRO-SCALE PRACTICES IN ACCORDANCE WITH ENVIRONMENTAL SITE DESIGN CRITERIA. MICRO-SCALE PRACTICES INCLUDE RAINGARDENS M-7. THESE FACILITIES WILL BE PRIVATELY OWNED AND MAINTAINED.
 4. SEDIMENT CONTROL FOR THIS SPECIFIC SITE PLAN WILL BE PROVIDED THROUGH THE USE OF SILT FENCE TYPE PERIMETER CONTROLS. SEDIMENT CONTROL SHALL BE IN ACCORDANCE WITH CURRENT REQUIREMENTS AND SHALL BE APPROVED BY THE HOWARD SOIL CONSERVATION DISTRICT.
 5. STORMWATER MANAGEMENT FOR THE PROJECT SHALL BE MET THROUGH THE USE OF MICRO-SCALE PRACTICES IN ACCORDANCE WITH ENVIRONMENTAL SITE DESIGN CRITERIA. MICRO-SCALE PRACTICES INCLUDE M-7 RAINGARDEN FACILITIES. THE RESULTS OF THE ENVIRONMENTAL SITE DESIGN FOR THIS PROJECT WILL REFLECT WOODS IN GOOD CONDITION.

TARGET PE = 1.2" PROVIDED PE = 1.2"
TARGET ESDv = 500 CUFT PROVIDED = 520 +/- CUFT

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DEVELOPMENT ENGINEERING DIVISION
DATE: 7/11/17

CHIEF, DIVISION OF LAND DEVELOPMENT
DATE: 6/5/17

Eco-Science Professionals, Inc.
Consulting Ecologists
P.O. Box 5006 Glen Arm, Maryland 21057 Telephone (410) 832-2450 Fax (410) 832-2488

MD DNR Qualified Professional
USACOE Wetland Delimitator
Certification # WDCP93MD0610044B2
John P. Canoles

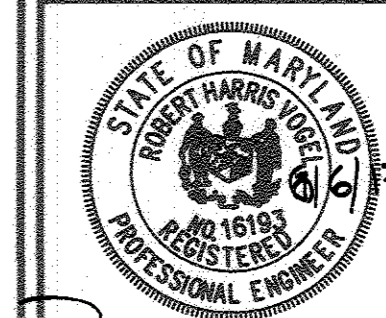
1. NO FOREST RESOURCES ARE PRESENT ON THE SITE.
2. NO WETLANDS, STREAMS OR BUFFERS ARE PRESENT.
3. THE SUBJECT PROPERTY IS EXEMPT FROM THE FOREST CONSERVATION ACT PER COUNTY CODE SECTION - 16.1202.(b)(1)(viii).
4. THE SITE DOES NOT CONTAIN ANY 100 YEAR FLOODPLAIN.

SPECIMEN TREE CHART

NO.	SIZE (IN DBH)	CRZ (FEET RADIUS)	COMMON NAME	CONDITION	COMMENTS
ST-1	4.3"	64.5'	SILVER MAPLE	POOR TO FAIR, LIMB DIEBACK & TRUNK ROT	TO REMAIN
ST-2	3.6"	54'	SILVER MAPLE	POOR TO FAIR, LIMB DIEBACK & TRUNK ROT	TO REMAIN
ST-3	31.5"	47.25'	SILVER MAPLE	POOR TO FAIR, LIMB DIEBACK & TRUNK ROT	TO REMAIN

OWNER/DEVELOPER

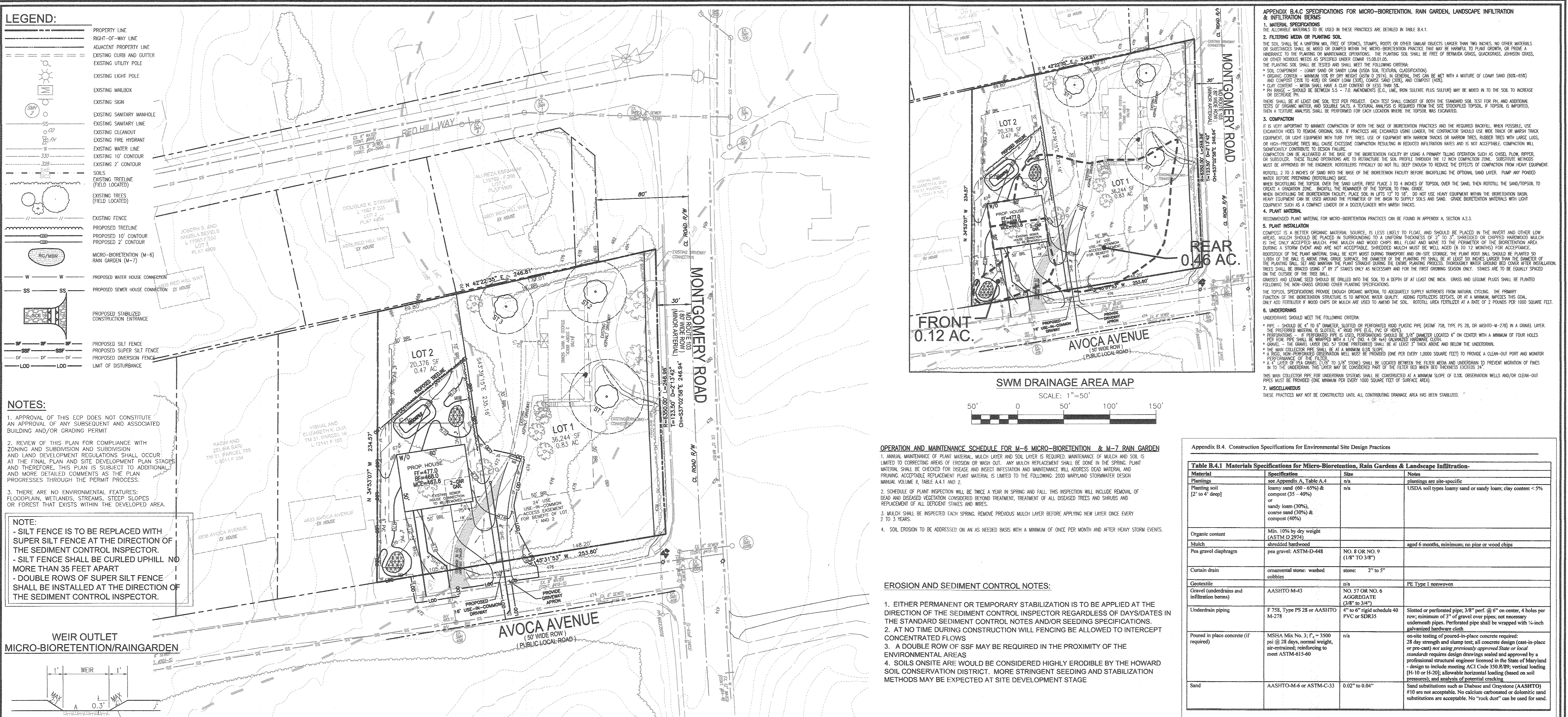
THOMAS KEEHN
13509 PATERNAL GIFT DRIVE
HIGHLAND, MARYLAND 20777
301-370-3460



DESIGN BY: EDS
DRAWN BY: RVE
CHECKED BY: RHV
DATE: JUNE 2017
SCALE: AS SHOWN
W.O. NO.: 16-21

PROFESSIONAL CERTIFICATE
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 16193, EXPIRATION DATE: 09-27-2018

1 SHEET OF 2



LEGEND:

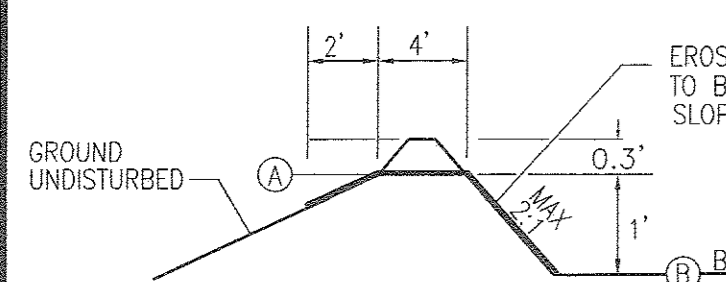
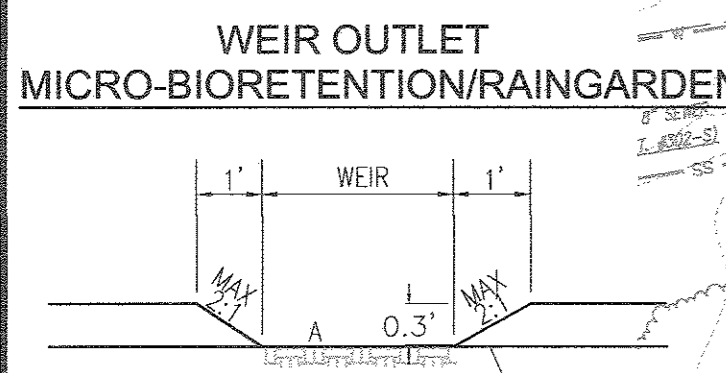
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- ADJACENT PROPERTY LINE
- EXISTING CURB AND GUTTER
- EXISTING UTILITY POLE
- EXISTING LIGHT POLE
- EXISTING MAILBOX
- EXISTING SIGN
- EXISTING SANITARY MANHOLE
- EXISTING CLEANOUT
- EXISTING FIRE HYDRANT
- EXISTING WATER LINE
- EXISTING 10" CONTOUR
- EXISTING 2" CONTOUR
- SOILS
- EXISTING TREELINE (FIELD LOCATED)
- EXISTING TREES (FIELD LOCATED)
- EXISTING FENCE
- PROPOSED TREELINE
- PROPOSED 10" CONTOUR
- PROPOSED 2" CONTOUR
- MICRO-BIORETENTION (M-6) RAIN GARDEN (M-7)
- PROPOSED WATER HOUSE CONNECTION
- PROPOSED SEWER HOUSE CONNECTION
- PROPOSED STABILIZED CONSTRUCTION ENTRANCE
- PROPOSED SILT FENCE
- PROPOSED SUPER SILT FENCE
- PROPOSED DIMENSION FENCE
- LIMIT OF DISTURBANCE

NOTES:

- APPROVAL OF THIS ECP DOES NOT CONSTITUTE AN APPROVAL OF ANY SUBSEQUENT AND ASSOCIATED BUILDING AND/OR GRADING PERMIT.
- REVIEW OF THIS PLAN FOR COMPLIANCE WITH ZONING AND SUBDIVISION AND SUBDIVISION AND LAND DEVELOPMENT REGULATIONS SHALL OCCUR AT THE FINAL PLAN AND SITE DEVELOPMENT PLAN STAGES AND THEREFORE, THIS PLAN IS SUBJECT TO ADDITIONAL AND MORE DETAILED COMMENTS AS THE PLAN PROGRESSES THROUGH THE PERMIT PROCESS.
- THERE ARE NO ENVIRONMENTAL FEATURES: FLOODPLAIN, WETLANDS, STREAMS, STEEP SLOPES OR FOREST THAT EXISTS WITHIN THE DEVELOPED AREA.

NOTE:

- SILT FENCE IS TO BE REPLACED WITH SUPER SILT FENCE AT THE DIRECTION OF THE SEDIMENT CONTROL INSPECTOR.
- SILT FENCE SHALL BE CURLED UPHILL NO MORE THAN 35 FEET APART.
- DOUBLE ROWS OF SUPER SILT FENCE SHALL BE INSTALLED AT THE DIRECTION OF THE SEDIMENT CONTROL INSPECTOR.



MICRO-BIORETENTION / RAIN GARDEN NOTES:

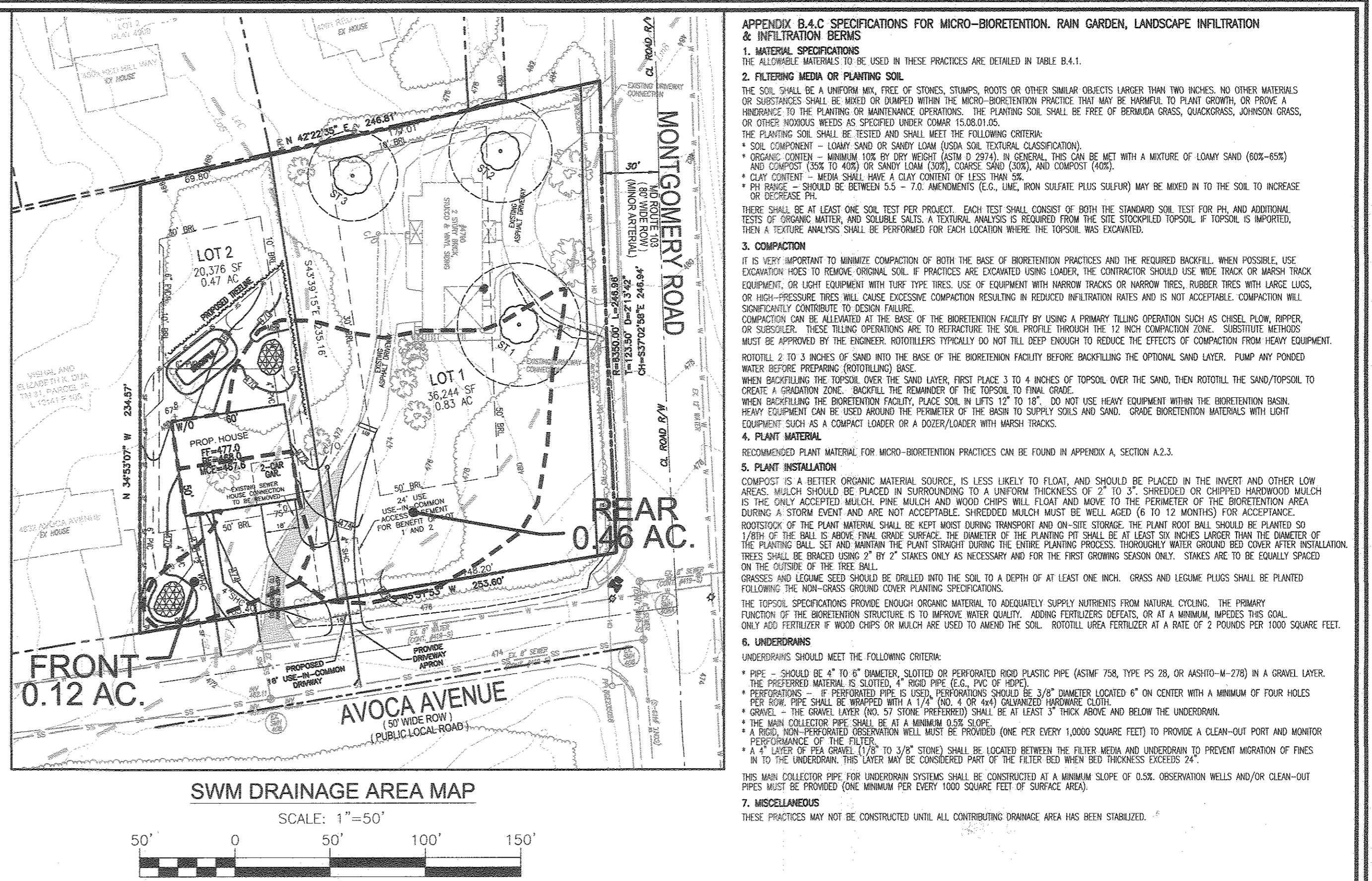
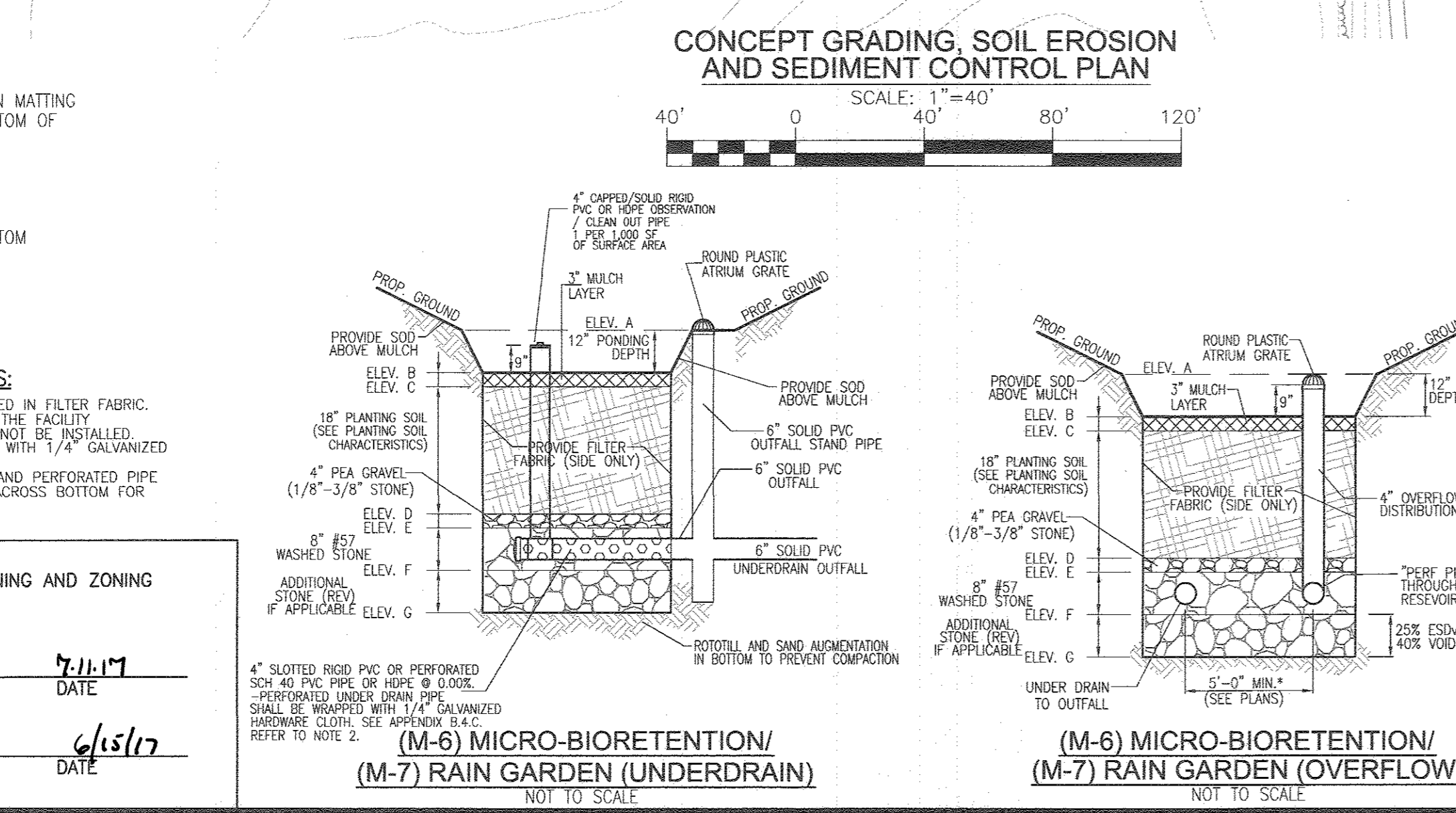
- ONLY THE SIDES OF RAIN GARDENS ARE TO BE WRAPPED IN FILTER FABRIC. FILTER FABRIC BETWEEN LAYERS OR AT THE BOTTOM OF THE FACILITY WILL CAUSE THE MBR TO FAIL AND THEREFORE SHALL NOT BE INSTALLED.
- PERFORATED PVC UNDER DRAIN PIPE TO BE WRAPPED WITH 1/4" GALVANIZED HARDWARE CLOTH OR EQUAL SEE APPENDIX B.4.C.
- PROVIDE MINIMUM SPACING BETWEEN UNDER DRAIN AND PERFORATED PIPE THROUGH STONE RESERVOIR OR SPACE PIPE EQUALLY ACROSS BOTTOM FOR SMALL BIOS. (SEE PLANS)

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

Chief, Development Engineering Division
 Chief, Division of Land Development

7/11/17
 DATE

7/15/17
 DATE



OPERATION AND MAINTENANCE SCHEDULE FOR M-6 MICRO-BIORETENTION & M-7 RAIN GARDEN

- ANNUAL MAINTENANCE OF PLANT MATERIAL, MULCH LAYER AND SOIL LAYER IS REQUIRED. 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 2.
- SCHEDULE OF PLANT INSPECTION WILL BE TWICE A YEAR IN SPRING AND FALL. THIS INSPECTION WILL INCLUDE REMOVAL OF DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, TREATMENT OF ALL DISEASED TREES AND SHRUBS AND REPLACEMENT OF ALL DEFICIENT STAKES AND WIPES.
- MULCH SHALL BE INSPECTED EACH SPRING. REMOVE PREVIOUS MULCH LAYER BEFORE APPLYING NEW LAYER. ONCE EVERY 2 TO 3 YEARS.
- SOIL EROSION TO BE ADDRESSED ON AN AS NEEDED BASIS WITH A MINIMUM OF ONCE PER MONTH AND AFTER HEAVY STORM EVENTS.

EROSION AND SEDIMENT CONTROL NOTES:

- EITHER PERMANENT OR TEMPORARY STABILIZATION IS TO BE APPLIED AT THE DIRECTION OF THE SEDIMENT CONTROL INSPECTOR REGARDLESS OF DAYS/DATES IN THE STANDARD SEDIMENT CONTROL NOTES AND/OR SEEDING SPECIFICATIONS.
- AT NO TIME DURING CONSTRUCTION WILL FENCING BE ALLOWED TO INTERCEPT CONCENTRATED FLOWS.
- A DOUBLE ROW OF SSF MAY BE REQUIRED IN THE PROXIMITY OF THE ENVIRONMENTAL AREAS.
- SOILS ON SITE ARE WOULD BE CONSIDERED HIGHLY ERODIBLE BY THE HOWARD SOIL CONSERVATION DISTRICT. MORE STRINGENT SEEDING AND STABILIZATION METHODS MAY BE EXPECTED AT SITE DEVELOPMENT STAGE

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.

2. FILTERING MEDIA OR PLANTING SOIL

THE SOIL SHALL BE A UNIFORM MIX OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES. NO OTHER MATERIALS OR SUBSTANCES SHALL BE MIXED OR DUMPED INTO THE MICRO-BIORETENTION PRACTICE THAT MAY BE HARMFUL TO PLANT GROWTH OR PROVIDE A HINDERANCE TO THE PLANTING OR MAINTENANCE OPERATIONS. THE PLANTING SOIL SHALL BE FREE OF BERMUDA GRASS, QUACKGRASS, JOHNSON GRASS, OR OTHER INVASIVE WEEDS AS SPECIFIED UNDER CONWAY IS 03-03-01.

THE PLANTING SOIL MUST BE TESTED AND SHALL MEET THE FOLLOWING CRITERIA:

- SOIL COMPONENT - LOAMY SAND OR SANDY LOAM (USDA SOIL TEXTURAL CLASSIFICATION)
- ORGANIC CONTENT - MINIMUM 10% BY DRY WEIGHT (ASTM D 2974). IN GENERAL, THIS CAN BE MET WITH A MIXTURE OF LOAMY SAND (60%-65%) AND COMPOST (35-40%) OR SANDY LOAM (LOAM, 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 TEXTURAL ANALYSIS SHALL BE PERFORMED FOR EACH LOCATION WHERE THE TOPSOIL WAS EXCAVATED.

3. COMPACTION

IT IS VERY IMPORTANT TO MINIMIZE COMPACTION OF BOTH THE BASE OF BIORETENTION PRACTICES AND THE REQUIRED BACKFILL. WHEN POSSIBLE, USE EXCAVATION WIPES TO REMOVE ORIGINAL SOIL. IF PRACTICES ARE EXCAVATED USING LOADERS, THE CONTRACTOR SHOULD USE MUD TRACK OR MARCH TRACK EQUIPMENT, OR LIGHT EQUIPMENT WITH TUFF TYPE TIRES. USE OF EQUIPMENT WITH HARBOR TRACKS OR HARBOR 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 SIGNIFICANTLY CONTRIBUTE TO DESIGN FAILURE.

COMPACTION CAN BE AVOIDED 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 RESTRUCTURE THE SOIL PROFILE THROUGHOUT 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.

ROTILLER 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 (ROTILLING) BASE.

WHEN BACKFILLING THE TORSION OVER THE SAND LAYER, FIRST PLACE 3 TO 4 INCHES OF TOPSOIL OVER THE SAND, THEN ROTILLER THE SAND/TOPSOIL TO CREATE A SANDATION 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 SURVEY SOILS AND SAND. CROSS DIRECTION MATERIALS WITH LIGHT EQUIPMENT SUCH AS A DOZER/LOADER OR A TRACTOR.

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. FINE 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.

ROTTENNESS OF THE PLANT MATERIAL SHALL BE KEPT MOST DURING TRANSPORT AND ON-SITE STORAGE. THE PLANT ROOT BALL SHOULD BE PLANTED SO 1/4" OF THE BALL IS ABOVE FINAL FINAL 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 SIGHT DURING THE ENTIRE PLANTING PROCESS. THOROUGHLY WATER GARDEN 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 GRADUALLY SPACED ON THE OUTSIDE OF THE TREE BALL.

GRASSES AND LEGUME SEED SHOULD BE GRILLED 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, NOT TO IMPROVE FERTILITY. EITHER, OR AT A MINIMUM, MIXES THE SOIL. ONLY ADD FERTILIZER IF WOOD CHIPS OR MULCH ARE USED TO AMEND THE SOIL. ROTILLER LEGUMES 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 (ASTM F 758, TYPE PS 28, OR AASHTO M-278) IN A GRAVEL LAYER.
- PERFORATIONS - IF PERFORATED PIPE IS USED, PERFORATIONS SHOULD BE 3/8" DIAMETER LOCATED 6" ON CENTER WITH A MINIMUM OF FOUR HOLES PER FOOT. PIPE SHALL BE WRAPPED WITH 1/4" (NO. 4) OR 1/2" (NO. 10) GALVANIZED HARDWARE CLOTH.
- GRAVEL - THE GRAVEL LAYER (NO. 57 STONE PREFERRED) SHALL BE AT LEAST 3" THICK ABOVE AND BELOW THE UNDERDRAIN.
- THE MAIN COLLECTOR PIPE SHALL BE AT A MINIMUM 1/8" BELOW THE UNDERDRAIN.
- A RIGID, NON-PERFORATED OBSERVATION WELL MUST BE PROVIDED (ONE PER EVERY 1,000 SQUARE FEET) TO PROVIDE A CLEAN-OUT PORT AND MONITOR PERFORMANCE OF THE FILTER.
- A 1/4" LAYER OF PEA GRAVEL (1/8" TO 3/16" STONE) SHALL BE LOCATED BETWEEN THE FILTER MEDIA AND UNDERDRAIN TO PREVENT MIGRATION OF FINES INTO THE UNDERDRAIN. THIS LAYER MAY BE CONSIDERED PART OF THE FILTER BED WHEN BED THICKNESS IS 12" OR GREATER.
- 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 1000 SQUARE FEET OF SURFACE AREA).

7. MISCELLANEOUS

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

Appendix B.4. Construction Specifications for Environmental Site Design Practices

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

Material	Specification	Size	Notes
Planting soil	See Appendix A, Table A.4	n/a	alternatives 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)	n/a	
Mulch	shredded hardwood	NO. 8 OR NO. 9 (1/8" TO 3/8")	aged 6 months, minimum; no pine or wood chips
Pea gravel diaphragm	pea gravel: ASTM-D-448	NO. 57 OR NO. 6 (1/8" TO 3/8")	
Curtain drain	ornamental stone: washed cobbles	stone: 2" to 5"	
Geotextile	n/a	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 pipe; not necessary underdrain pipes. Perforated pipe shall be wrapped with 1/4-inch galvanized hardware cloth.
Poured in place concrete (if required)	MSHA Mix No. 3; F _c = 3500 psi @ 28 days, normal weight, air-entrained; reinforcing to meet ASTM-A615-40	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 350.8(R9); vertical loading (15-10 or 15-20); 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 carbonate or dolomitic sand substitutions are acceptable. No "rock dust" can be used for sand.

MAPPED SOILS TYPES - SAVAGE NE - MAP #19

SYMBOL/NAME / DESCRIPTION	GROUP/K-FACTOR/HYDRO	HYDRO INCLUSIONS	FARMLAND	<15% SLOPE / EROSION POTENTIAL
LoC LEGOIRE SILT LOAM, 8 TO 15 PERCENT SLOPES	C 0.28	NO	NOT PRIME FARMLAND	NO
LmB LEGOIRE-MONTALTO SILT LOAMS, 3 TO 8 PERCENT SLOPES	C 0.02/0.32	NO	NOT PRIME FARMLAND	NO
LoB LEGOIRE-MONTALTO-URBAN LAND COMPLEX, 0 TO 8 PERCENT SLOPES	C 0.02/0.32	NO	NOT PRIME FARMLAND	NO

KEEHN PROPERTY - ECP ESDv COMPUTATIONS

NOTE: TAKEN FROM USDA, SCS-WEB SOIL SURVEY, HOWARD COUNTY. HIGHLY ERODIBLE SOILS ARE THOSE SOILS WITH A SLOPE GREATER THAN 15 PERCENT OR THOSE SOILS WITH A SOIL ERODIBILITY FACTOR K GREATER THAN 0.35 AND WITH A SLOPE GREATER THAN 5 PERCENT.

DA	% IMPERV	Rv	DA (AC)	DA (AC)	MINIMUM VOLUME	MAXIMUM VOLUME	1.27 VOLUME PROVIDED*	VOLUME IMPERV (SF)	IMPERV (SF)	GREEN AREA (AC)	REMARKS	
FRONT HOUSE & DRIVEWAY	54.65	0.5418	5078	0.12	229	596	275	275	2775	0.06	0.05	MICROSCALE RAIN GARDEN (M-7) 275 200 SF RG
REAR HOUSE & OFFSITE AREA	7.44	0.1170	20160	0.46	197	511	236	245	1500	0.03	0.43	MICROSCALE MICRO-BIORETENTION (M-6) 245 184 SF MICRO BIO
PROJECT TOTALS	16.9	0.2024	25238	0.58	426	1107	511	520	4275	0.10	0.48	

NO. _____ REVISION _____ DATE _____

ENVIRONMENTAL CONCEPT PLAN
 CONCEPT GRADING, SOIL EROSION & SEDIMENT CONTROL PLAN,
 SWM DRAINAGE AREA MAP, NOTES & DETAILS

KEEHN PROPERTY
 LOTS 1 & 2
 LIBER - 16741 - FOLIO 238

TAX MAP 31 GRID 7 ZONED: R-20 PARCEL 16
 2ND ELECTION DISTRICT HOWARD COUNTY, MARYLAND

ROBERT H. VOGEL ENGINEERING, INC.
 ENGINEERS • SURVEYORS • PLANNERS
 8407 MAIN STREET TEL: 410.461.7666
 ELLICOTT CITY, MD 21043 FAX: 410.461.8961

DESIGN BY: EDS
 DRAWN BY: RVE
 CHECKED BY: RHW
 DATE: JUNE 2017
 SCALE: AS SHOWN
 W.O. NO.: 16-21

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. 15193 EXPIRATION DATE: 09-27-2018

PROFESSIONAL CERTIFICATE

2 SHEET OF 2

OWNER/DEVELOPER
 THOMAS KEEHN
 13509 PATERNAL GIFT DRIVE
 HIGHLAND, MARYLAND 20777
 301-370-3460

STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER