

# ENVIRONMENTAL CONCEPT PLAN

## BOLTON PROPERTY

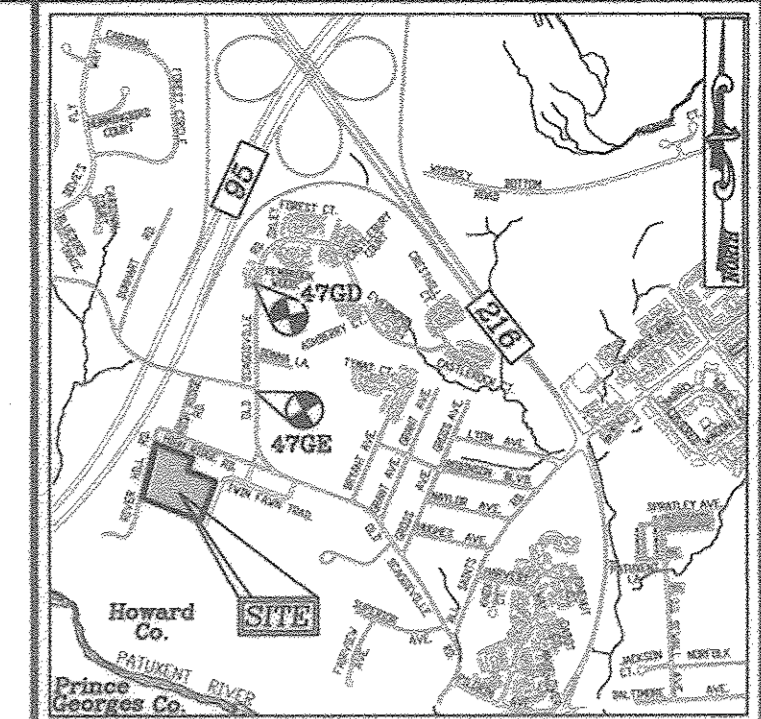
### LOTS 1-31 AND OPEN SPACE LOTS 32-34

9111 RIVER HILL ROAD  
LAUREL, MD 20723

#### BENCHMARKS

HOWARD COUNTY BENCHMARK 47GE (CONC. MON.)  
N 529044.94 E 1350855.03 ELEV. 335.74  
LOCATION: BY #9160 OLD SCAGSVILLE ROAD

HOWARD COUNTY BENCHMARK 47GD (CONC. MON.)  
N 530494.42 E 1350872.37 ELEV. 312.28  
LOCATION: BY #9028 OLD SCAGSVILLE ROAD



VICINITY MAP  
SCALE: 1"=2000'  
ADC MAP: PAGE: 39 GRID: F7

#### SITE DATA

LOCATION: TAX MAP 50, BLOCK 01  
PARCEL: 001  
6TH ELECTION DISTRICT  
PRESENT ZONING: R-SC  
GROSS AREA OF PROJECT: 7.34 AC.  
AREA OF RIGHT-OF-WAY DEDICATION: 1.04 AC.  
LIMIT OF DISTURBANCE: 7.44 AC.  
PROPOSED USE OF SITE: RESIDENTIAL (SFD & SFA)  
NUMBER OF RESIDENTIAL LOTS PROPOSED: 31 LOTS  
AREA OF RESIDENTIAL LOTS PROPOSED: 4.14 AC.  
AREA OF OPEN SPACE LOTS PROPOSED: 2.76 AC.  
IMPERVIOUS AREA: 1.99 AC.  
AREA OF STREAM/BUFFER: 0.00 AC.  
AREA OF WETLANDS/BUFFER: 0.00 AC.  
AREA OF MODERATE SLOPES (15% - 24.99%): 0.00 AC.  
AREA OF STEEP SLOPES (25% OR GREATER): 0.00 AC.  
NET PROJECT AREA: 7.30 AC.  
AREA OF EXISTING FOREST COVER: 0.00 AC.  
AREA OF ERODIBLE SOILS: 0.00 AC.  
AREA MANAGED BY ESDV (\*THIS PLAN): 6.26 AC.  
\*IMPERVIOUS AREA: 1.93 AC.  
\*GREEN AREA: 4.33 AC.

#### GENERAL NOTES

- STORM WATER MANAGEMENT TO BE PROVIDED FOR THIS DEVELOPMENT BY ENVIRONMENTAL SITE DESIGN UTILIZING MICRO-BIORETENTION FACILITIES (M-6), RAIN GARDEN STRUCTURES (M-7) AND A BIO-SWALE (M-8). THE FACILITIES WILL BE PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNERS ASSOCIATION OR THE PRIVATE LOT OWNER. REFERENCE 2010 MDE STORMWATER DESIGN MANUAL (CHAPTER 5).
- THE SUBJECT PROPERTY IS ZONED "R-SC" IN ACCORDANCE WITH THE OCTOBER 6, 2013 COMPREHENSIVE ZONING PLAN.
- THIS SITE IS NOT LOCATED IN A HISTORIC DISTRICT.
- 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. 47GE AND 47GD WERE USED FOR THIS PROJECT.
- NO RARE, THREATENED OR ENDANGERED SPECIES OR THEIR HABITATS WERE OBSERVED ON THE PROPERTY. THERE IS NO 100-YR FLOODPLAIN LOCATED WITHIN THE LIMITS OF THIS SITE.
- SEDIMENT AND EROSION CONTROL WILL BE PROVIDED FOR THIS SITE.
- THERE ARE NO WETLANDS, STREAMS, OR ASSOCIATED BUFFERS LOCATED WITHIN THE LIMITS OF THIS SITE.
- A FOREST STAND DELINEATION AND ENVIRONMENTAL RESOURCES ASSESSMENT WAS PERFORMED BY JOHN CANALES OF ECO-SCIENCE PROFESSIONALS, INC., DATED APRIL 16, 2017.
- A TOTAL OF 31 BUILDABLE LOTS ARE PROPOSED UNDER THIS PLAN.
- APPROVAL OF THIS 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 SHALL OCCUR AT THE SUBDIVISION PLAN/PLAT AND/OR SITE DEVELOPMENT PLAN STAGES 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.
- PUBLIC WATER AND SEWER SERVICE TO BE PROVIDED THROUGH CONTRACT 30-3253.
- WAIVERS MAY BE REQUIRED FOR REMOVAL OF SPECIMEN TREES.

#### ENVIRONMENTAL SITE DESIGN NARRATIVE:

##### INTRODUCTION

The subject property is zoned R-SC and is located on the north and west side of Twin Fawn Trail and east of River Hill Road in the North Laurel area of Howard County. The property is approximately 7.3 acres in size and was previously utilized as a farmette. The property is predominantly undeveloped with a residence and various outbuildings. In accordance with the ESDV, the property is predominantly undeveloped with a residence and various outbuildings. In accordance with the ESDV, the property is predominantly undeveloped with a residence and various outbuildings. In accordance with the ESDV, the property is predominantly undeveloped with a residence and various outbuildings.

##### THE PROPERTY

The property slopes from north to south and drains to the storm drain system constructed in conjunction with the Fox Wood Manor subdivision plans. The property ultimately flows to the Potomac River (031110) and is considered a Class 1 watershed. There is a limited surface drainage flowing to the site from the properties to the north (featuring High Ridge Road).

##### THE BOLTON PROPERTY

The Bolton Property was not recently subdivided and there are no other previous development plans on file with Howard County regarding this site. The site is not listed on the Howard County Historic Inventory and it is not on the Maryland Historic Trust inventory. The soils are predominantly Chillum Series soils which are classified as ESK1 C.

##### THE SUBJECT PROPERTY

The subject property is not shown on the DEDM maps and does not constitute a 100-year floodplain utilizing Howard County criteria.

##### WETLANDS, STREAMS AND FOREST RESOURCES

The wetlands, streams and forest resources have been delineated by the environmentalist (Eco-Science Professionals) and their report accompanies this submission. There are two specimen trees located within the proposed forest conservation areas which are intended to remain.

##### UTILITIES

The property will be served by public water and sewer. The proposed water and sewer will be provided to the existing mains located in Twin Fawn Trail right-of-way. The proposed project will not result in any impacts to environmental resources.

##### METHODOLOGY

The site ESDV was completed using the new development criteria for the limit of disturbance and the new impervious areas. The net project area was based on the limit of disturbance. The soils in the development area are predominantly Chillum Series soils (EKS1 C). The site Dv was completed as 1.6' for the development area. A Rv factor of 0.95 was utilized for those areas where the area treated is 100% impervious. Otherwise, the Rv factor was based on the actual impervious area for each subarea. The appendix includes the computations based on the individual subareas and a chart summarizing the ESDV required and provided and the practices utilized for each area.

##### PERMEABLE SURFACES

The total ESDV required for the project is 11,622 of and 11,871 of is provided by the individual practices. The ESDV is provided by a combination of bioretention facilities (B), bio-swales (1), permeable surfaces (limited driveway) and rain gardens (2). The bioretention facilities are based on providing storage in the 1' of above the middle (75% of ESDV) and five to seven below the facility (25% of ESDV). The pre-development drainage patterns have been retained. The drainage from the proposed development will be directed to the existing storm drain system which was recently constructed (respecting existing drainage patterns).

##### REVISIONS

The Rev. volume required is 944 of and will be provided in the stone below the facilities.

##### SEEDING

The 2011 Sediment and Erosion Control Standards will be utilized to protect existing environmental features through the implementation of silt fence and other appropriate practices.

##### ENVIRONMENTAL CONCEPT PLAN

The Environmental Concept Plan computations illustrate that ESD can be adequately accomplished to the maximum extent possible (MEP) for the proposed project. The natural drainage patterns are respected and maintained. The discharge from the site facilities will flow to the storm drain system. There are no on-site environmental features other than the three specimen trees of which one will be retained. All these trees are listed as "poor condition" by the environmentalist.

##### UTILITIES

The facilities proposed for this project will be privately owned and maintained. There are no existing drainage easements located on site. This project is proposing the utilization of various ESD practices to meet the MDC and Howard County requirements.

##### CONCLUSIONS

This project is designed to minimize additional and unnecessary earthwork and utilize existing infrastructure. Final sediment and erosion control approval will be required from the Howard Soil Conservation District.



#### LEGEND:

- PROPERTY LINE
- RIGHT-OF-WAY LINE
- ADJACENT PROPERTY LINE
- EXISTING EDGE OF PAVING
- EXISTING TREE LINE
- EXISTING TREE LINE
- EXISTING SPECIMEN TREES
- EXISTING WOOD FENCE
- EXISTING METAL FENCE
- EXISTING ORNAN
- MBR
- RC
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- ADJACENT PROPERTY LINE
- EXISTING EDGE OF PAVING
- EXISTING TREE LINE
- EXISTING TREE LINE
- EXISTING SPECIMEN TREES
- EXISTING WOOD FENCE
- EXISTING METAL FENCE
- EXISTING ORNAN
- MBR
- RC
- EX. PUBLIC DRAINAGE & UTILITY EASEMENT (PLAT 23768)
- EX. PUBLIC TREE MAINTENANCE EASEMENT (PLATS 23772 & 23768)
- EX. FOREST CONSERVATION EASEMENT (PLATS 14613, 23850-23851 & 23768)
- EX. PRIVATE USE-IN-COMMON ACCESS EASEMENT (PLAT 23768)
- EX. PUBLIC WATER & UTILITY EASEMENT (PLAT 23765)
- EX. PRIVATE SEWER & UTILITY EASEMENT (PLATS 23768)
- EX. PUBLIC SEWER & UTILITY EASEMENT (PLATS 23850-23851)
- PUBLIC WATER & UTILITY EASEMENT
- PRIVATE SWM, DRAINAGE & UTILITY EASEMENT
- PUBLIC SWM, DRAINAGE & UTILITY EASEMENT
- SIGN EASEMENT
- PERMEABLE CONCRETE (A-2)

**OWNER**  
ROBERT LEE BOLTON  
C/O WILLIAM A. BOLTON  
9111 RIVER HILL ROAD  
LAUREL, MD 20723-1781  
(410) 480-0023

**DEVELOPER**  
TRINITY QUALITY HOMES, LLC  
3675 PARK AVE., SUITE 301  
ELlicott CITY, MD 21043  
(410) 480-0023

SHEET INDEX		SHEET NO.
DESCRIPTION		
LAYOUT PLAN	1 OF 4	
SOILS MAP, GRADING, EROSION, AND SEDIMENT CONTROL PLAN	2 OF 4	
STORMWATER MANAGEMENT DRAINAGE AREA MAP	3 OF 4	
STORMWATER MANAGEMENT NOTES AND DETAILS	4 OF 4	

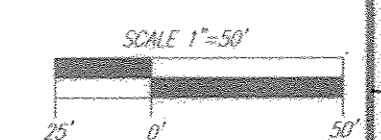
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

*Chief, Development Engineering Division* NY DATE 4-5-18  
*Chief, Division of Land Development* X DATE 4-02-18

SPECIMEN TREE CHART					
NO.	SIZE (DBH/HEIGHT)	CRZ	COMMON NAME	CONDITION	COMMENTS
ST 1	41' 81.5'		SILVER MAPLE	POOR CONDITION, NOTABLE DIEBACK, LIMB DAMAGE	TO BE REMOVED
ST 2	30.5' 45.75'		SILVER MAPLE	POOR CONDITION, WIRE FENCING EMBEDDED, TWIN STEMS AT BREAST HEIGHT	TO BE REMOVED
ST 3	38' 57'		SILVER MAPLE	POOR CONDITION, TRUNK ROT NOTED AND WIRE FENCING EMBEDDED IN TRUNK	TO BE REMOVED

#### LAYOUT PLAN

SCALE: 1"=50'



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

STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER  
ROBERT H. VOGEL, PE No. 16193

DESIGN BY: RVE  
DRAWN BY: MDL  
CHECKED BY: RHY  
DATE: MARCH 2018  
SCALE: AS SHOWN  
W.O. NO.: 17-26

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: 09-27-2018

1 SHEET OF 4

**NOTES:**

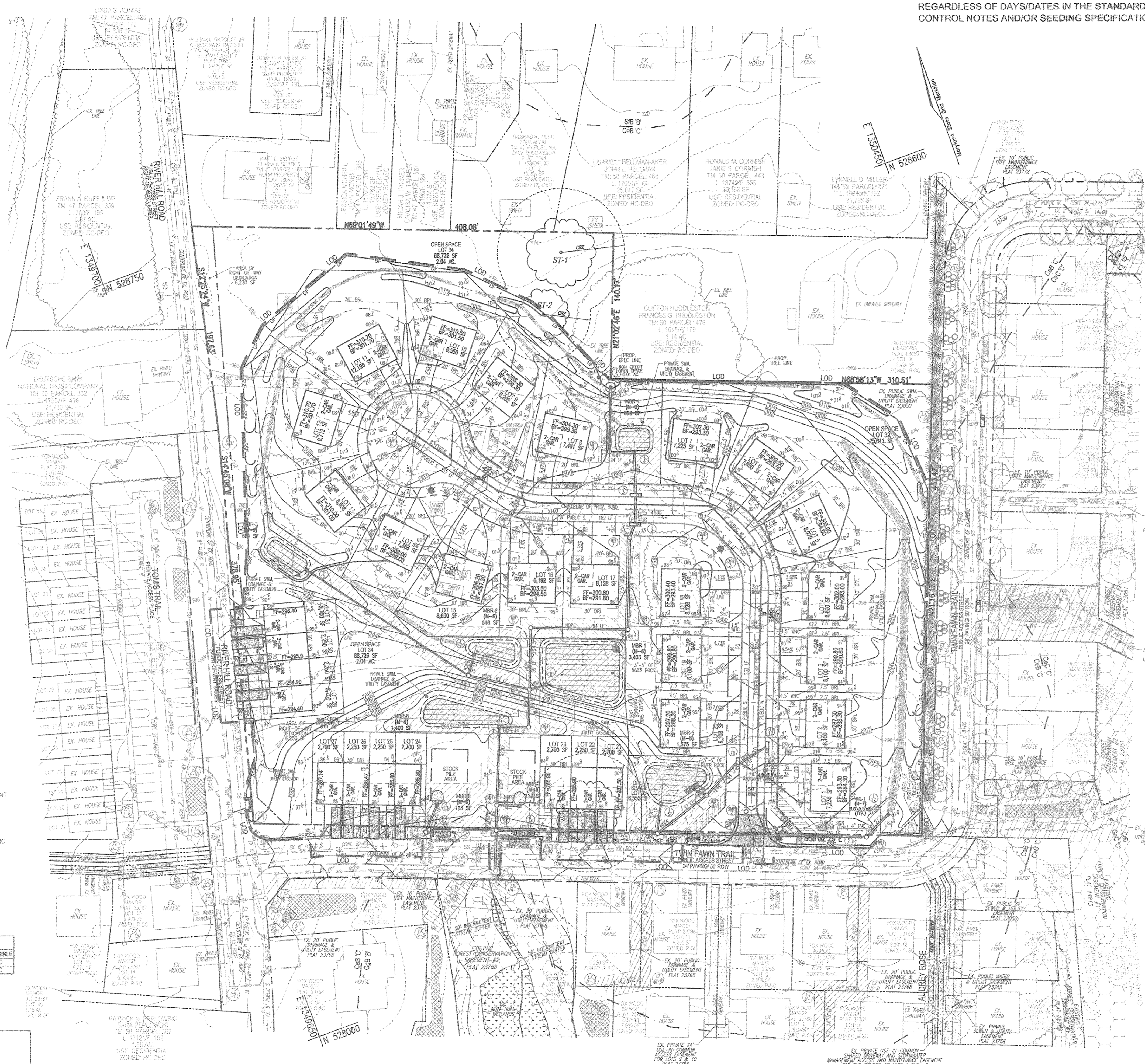
- APPROVAL OF THIS ECP DOES NOT CONSTITUTE AN APPROVAL OF ANY SUBSEQUENT AND ASSOCIATED BUILDING AND/OR GRADING PERMIT
- REVIEW OF THIS PLAN FOR COMPLIANCE WITH ZONING AND SUBDIVISION AND SUBDIVISION AND LAND DEVELOPMENT REGULATIONS SHALL OCCUR AT THE FINAL PLAN AND SITE DEVELOPMENT PLAN STAGES; AND 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:**

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.

**LEGEND:**

- PROPERTY LINE
- RIGHT-OF-WAY LINE
- ADJACENT PROPERTY LINE
- EXISTING EDGE OF PAVING
- EXISTING TREELINE
- PROPOSED TREELINE
- EXISTING SPECIMEN TREES
- EXISTING WOOD FENCE
- EXISTING METAL FENCE
- STORM DRAIN
- MBR
- RG
- ▨ EX. PUBLIC DRAINAGE & UTILITY EASEMENT (PLAT 23768)
- ▩ EX. PUBLIC TREE MAINTENANCE EASEMENT (PLATS 23772 & 23768)
- ▧ EX. FOREST CONSERVATION EASEMENT (PLATS 14613, 23050-23051 & 23768)
- ▦ EX. PRIVATE USE-IN-COMMON ACCESS EASEMENT (PLAT 23768)
- ▥ EX. PUBLIC WATER & UTILITY EASEMENT (PLAT 23060)
- ▤ EX. PRIVATE SEWER & UTILITY EASEMENT (PLATS 23768)
- ▣ EX. PUBLIC SEWER & UTILITY EASEMENT (PLATS 23050-23051)
- ▢ PUBLIC WATER & UTILITY EASEMENT
- PRIVATE SWM, DRAINAGE & UTILITY EASEMENT
- PUBLIC SWM, DRAINAGE & UTILITY EASEMENT
- ▧ SIGN EASEMENT
- 330 EXISTING 10' CONTOUR
- 228 EXISTING 2' CONTOUR
- SOILS
- 10' CONTOUR
- 2' CONTOUR
- LOD LIMIT OF DISTURBANCE
- ▣ SCE STABILIZED CONSTRUCTION ENTRANCE
- SBF SUPER SILT FENCE
- SF SILT FENCE
- DF DIVERSION FENCE



**NOTES:**

- APPROVAL OF THIS ENVIRONMENTAL CONCEPT PLAN (ECP) BY THE HOWARD COUNTY 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
  - THE PROJECT SHALL ADDRESS ANY TEMPORARY STORMWATER MANAGEMENT REQUIREMENTS.
  - THE FINAL PLAN SUBMISSION SHALL PROVIDE A DRAINAGE AREA MAP SPECIFIC TO CHOSEN SEDIMENT CONTROLS
  - THE FINAL PLAN SUBMISSION SHALL PROVIDE COMPUTATIONS TO VERIFY VELOCITIES ALONG DIKES, SWALES AND AT DIKES OUTLET LOCATIONS

**SOILS LEGEND**

SYMBOL	NAME / DESCRIPTION	GROUP	K-FACTOR	ERODIBLE
CH	CHILLUM LOAM, 2 TO 5 PERCENT SLOPES	C	.24	NO
CS	GLENELO LOAM, 3 TO 8 PERCENT SLOPES	B	.24	NO

-SOILS INFORMATION FROM LISA WEBB SOIL SURVEY WEBSITE  
-HOWARD COUNTY SOILS MAP NUMBER 28 - LAUREL NW

**NOTE:**  
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

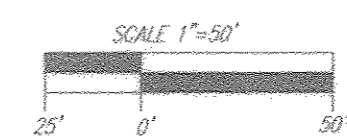
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

*Phil Chen* 4.5.18  
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

*Kate DeLoach* 4.02.18  
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

**GRADING PLAN**

SCALE: 1"=50'



**OWNER**  
ROBERT LEE BOLTON  
C/O WILLIAM A. BOLTON  
911 RIVER HILL ROAD  
LAUREL, MD 20723-1781  
(410) 480-0023

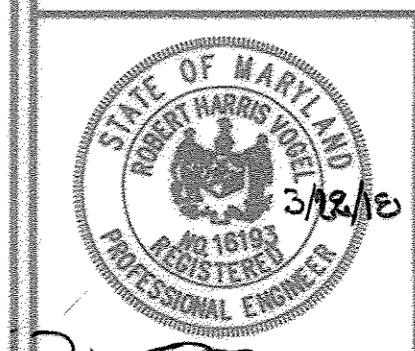
**DEVELOPER**  
TRINITY QUALITY HOMES, LLC  
3675 PARK AVE., SUITE 301  
ELlicott CITY, MD 21043  
(410) 480-0023

NO.	REVISION	DATE

**ENVIRONMENTAL CONCEPT PLAN  
SOILS MAP, GRADING, EROSION,  
AND SEDIMENT CONTROL PLAN**

**BOLTON PROPERTY**  
LOTS 1-31 AND OPEN SPACE LOTS 32-34  
9111 RIVER HILL ROAD  
LAUREL, MD 20723

**ROBERT H. VOGEL ENGINEERING, INC.**  
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TEL: 410.461.7666  
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**PROFESSIONAL CERTIFICATE**

DESIGN BY: RVE  
DRAWN BY: MDL  
CHECKED BY: RHV  
DATE: MARCH 2018  
SCALE: AS SHOWN  
W.O. NO.: 17-26

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: 09-27-2018.

SOILS LEGEND				
SYMBOL	NAME / DESCRIPTION	GROUP	K-FACTOR	ERODIBLE
CeB	CHILLUM LOAM, 2 TO 5 PERCENT SLOPES	C	.24	NO
CeP	CLENELO LOAM, 3 TO 8 PERCENT SLOPES	B	.24	NO

NOTE: 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

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	EXISTING SPECIMEN TREES
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	STORM DRAIN
	MICRO-BIORETENTION FACILITY (M-6)
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	EX. PUBLIC SEWER & UTILITY EASEMENT (PLATS 23050-23051)
	PUBLIC WATER & UTILITY EASEMENT
	PRIVATE SWM, DRAINAGE & UTILITY EASEMENT
	PUBLIC SWM, DRAINAGE & UTILITY EASEMENT
	SKIN EASEMENT
	EXISTING 10' CONTOUR
	EXISTING 2' CONTOUR
	SOILS
	10' CONTOUR
	2' CONTOUR
	BIO-SWALE (M-8)
	DRAINAGE AREA DIVIDE
	PERMEABLE CONCRETE (A-2)

SWM PRACTICE CHART	
ESD PRACTICES BY LOT	
AREA	ESD PRACTICE
LOT 1	BIO-SWALE (M-8), PRIVATELY OWNED AND MAINTAINED BY THE HOA, RAIN GARDEN STRUCTURE (M-7), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER, PERMEABLE SURFACE (A-2)
LOT 2	BIO-SWALE (M-8), PRIVATELY OWNED AND MAINTAINED BY THE HOA, RAIN GARDEN STRUCTURE (M-7), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 3	BIO-SWALE (M-8) AND MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 4	BIO-SWALE (M-8) AND MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 5	BIO-SWALE (M-8) AND MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 6	BIO-SWALE (M-8) AND MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 7	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 8	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 9	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 10	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 11	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 12	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 13	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 14	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 15	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 16	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 17	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 18	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 19	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 20	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.
LOT 21	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 22	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 23	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 24	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 25	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 26	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 27	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 28	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 29	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 30	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
LOT 31	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA, PERMEABLE PAVEMENTS (A-2), PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNER.
PROPOSED ROAD	MICRO BIO-RETENTION (M-6), PRIVATELY OWNED AND MAINTAINED BY THE HOA.



**OWNER**  
ROBERT LEE BOLTON  
C/O WILLIAM A. BOLTON  
9111 RIVER HILL ROAD  
LAUREL, MD 20723-1781  
(410) 480-0023

**DEVELOPER**  
TRINITY QUALITY HOMES, LLC  
3675 PARK AVE., SUITE 301  
ELICOTT CITY, MD 21043  
(410) 480-0023

NO.	REVISION	DATE

ENVIRONMENTAL CONCEPT PLAN  
STORMWATER MANAGEMENT  
DRAINAGE AREA MAP  
BOLTON PROPERTY  
LOTS 1-31 AND OPEN SPACE LOTS 32-34  
9111 RIVER HILL ROAD  
LAUREL, MD 20723

PARCEL: 001  
TAX MAP: 50 GRID: 1  
8TH ELECTION DISTRICT

ZONED: R-3C  
L 1271 / E 106  
HOWARD COUNTY, MARYLAND

**ROBERT H. VOGEL ENGINEERING, INC.**  
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8407 MAIN STREET  
ELICOTT CITY, MD 21043  
TEL: 410.461.7666  
FAX: 410.461.8961

PROFESSIONAL CERTIFICATE

DESIGN BY: RVE  
DRAWN BY: MRL  
CHECKED BY: RRV  
DATE: MARCH 2018  
SCALE: AS SHOWN  
W.O. NO.: 17-26

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. 18183, EXPIRATION DATE 09-27-2018.

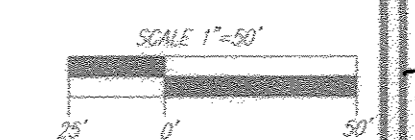
3 SHEET OF 4

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

*Chad Edwards* 4-5-18  
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

*Walter Anderson* 4-02-18  
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

SWM PLAN  
SCALE: 1"=50'



**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, FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES. NO OTHER MATERIALS OR SUBSTANCES SHALL BE MIXED OR EMBEDDED WITHIN 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 NOODUS WEEDS AS SPECIFIED UNDER COMAR 15.08.01.05.  
THE PLANTING SOIL SHALL MEET THE FOLLOWING CRITERIA:  
• **SOIL COMPONENT** - LOAMY SAND OR SANDY LOAM (FROM 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 (10% 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 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 HOES TO REMOVE ORIGINAL SOIL. IF PRACTICES ARE EXCAVATED USING LOADERS, THE CONSTRUCTOR SHOULD USE WIDE TRACK OR MARSH TRACK EQUIPMENT, OR LIGHT EQUIPMENT WITH TURF TIRE 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 SIGNIFICANTLY CONTRIBUTE TO DESIGN FAILURE.  
COMPACTION CAN BE AVOIDED AT THE BASE OF THE BIORETENTION FACILITY BY USING A PRIMARY TILLING OPERATION SUCH AS CHESEL FLOW, 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.  
ROTOTILL 2 TO 3 INCHES OF SAND INTO THE BASE OF THE BIORETENTION FACILITY BEFORE BACKFILLING THE OPTIONAL SAND LAYER. PUMP ANY PONDING 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 16". 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 APPLIED 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 1/2" 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 PLOTS 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, DEFECATS, 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 (ASTM F758, TYPE PS 28, OR AASHTO-M-278) IN A GRAVEL LAYER.  
• PERFORATIONS - 4" HOLE SIZE, 12" SPACING.  
• PERFORMANCE - 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 44) GALVANIZED HARDWARE CLOTH.  
• GRAVEL - THE GRAVEL PREPARED SHALL BE AT LEAST 3" THICK ABOVE AND BELOW THE UNDERDRAIN.  
• THE MAIN COLLECTOR PIPE SHALL BE AT A MINIMUM 0.5% SLOPE.  
• A RIGID, NON-PERFORATED OBSERVATION WELL MUST BE PROVIDED (ONE PER EVERY 1,000 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 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**

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; 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 Dolomite and Craystone (AASHTO) #10 are not acceptable. No calcium carbonated or dolomitic sand substitutions are acceptable. No "rock dust" can be used for sand.

**A-2. PERMEABLE PAVEMENTS**

**CONSTRUCTION CRITERIA:**

- THE FOLLOWING ITEMS SHOULD BE ADDRESSED DURING CONSTRUCTION OF PROJECTS WITH PERMEABLE PAVEMENT:
  - EROSION AND SEDIMENT CONTROL: FINAL GRADING FOR INSTALLATION SHOULD NOT TAKE PLACE UNTIL THE SURROUNDING SITE IS STABILIZED. IF THIS CANNOT BE ACCOMPLISHED, RUNOFF FROM DISTURBED AREAS SHALL BE DIVERTED AROUND PROPOSED PAVEMENT LOCATIONS.
  - SOIL COMPACTION: SUB SOILS SHALL NOT BE COMPACTED. CONSTRUCTION SHOULD BE PERFORMED WITH LIGHTWEIGHT, WIDE TRACKED EQUIPMENT TO MINIMIZE COMPACTION. EXCAVATED MATERIALS SHOULD BE PLACED IN A CONTAINED AREA.
  - DISTRIBUTION SYSTEMS: OVERDRAIN, UNDERDRAIN, AND DISTRIBUTION PIPES SHALL BE CHECKED TO ENSURE THAT BOTH THE MATERIAL AND PERFORATIONS MEET SPECIFICATIONS (SEE APPENDIX B.4). THE UPSTREAM ENDS OF PIPES SHOULD BE CAPPED PRIOR TO INSTALLATION. ALL UNDERDRAIN OR DISTRIBUTION PIPES USED SHOULD BE INSTALLED FLAT ALONG THE BED BOTTOM.
  - SUBBASE INSTALLATION: SUBBASE AGGREGATE SHALL BE CLEAN AND FREE OF FINES. THE SUBBASE SHALL BE PLACED IN LIFTS AND LIGHTLY ROLLED ACCORDING TO THE SPECIFICATIONS (SEE APPENDIX B.4).

**INSPECTION:**

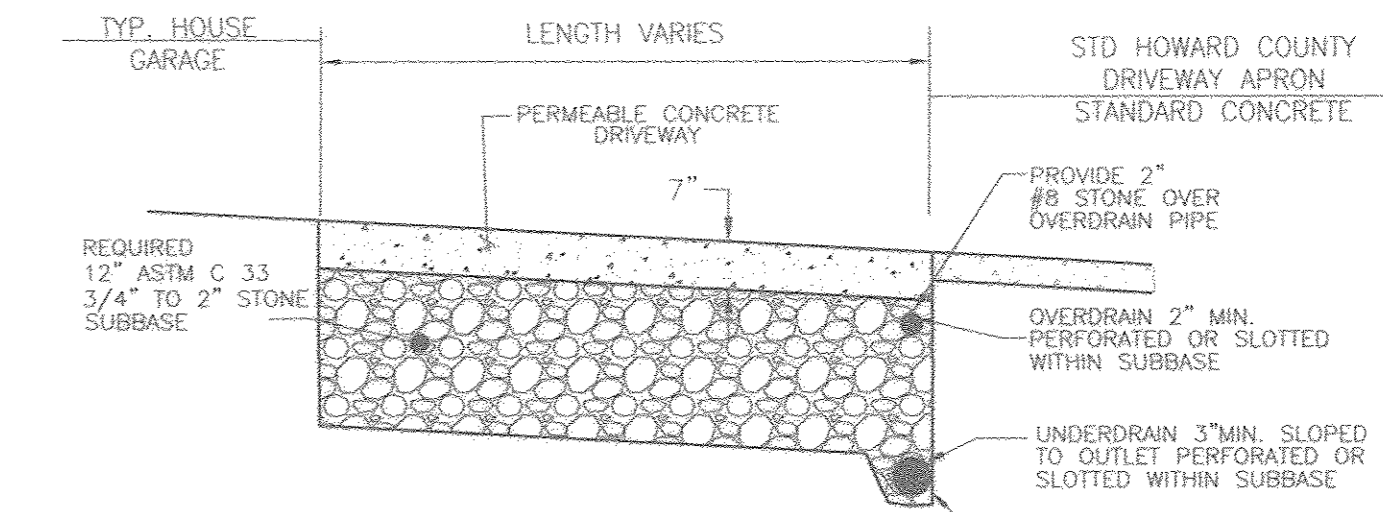
- REGULAR INSPECTIONS SHALL BE MADE DURING THE FOLLOWING STAGES OF CONSTRUCTION:
  - DURING EXCAVATION TO SUB GRADE.
  - DURING PLACEMENT AND BACKFILL OF ANY DRAINAGE OR DISTRIBUTION SYSTEM(S).
  - DURING PLACEMENT OF THE CRUSHED STONE SUBBASE MATERIAL.
  - UPON COMPLETION OF FINAL GRADING AND ESTABLISHMENT OF PERMANENT STABILIZATION.

**MAINTENANCE CRITERIA:**

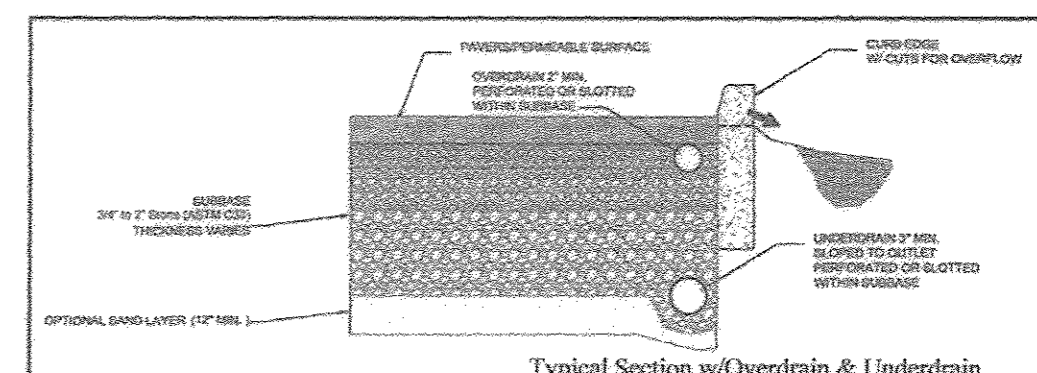
- THE FOLLOWING PROCEDURES SHOULD BE CONSIDERED ESSENTIAL FOR MAINTAINING PERMEABLE PAVEMENT SYSTEMS:
  - PAVEMENTS SHOULD BE USED ONLY WHERE REGULAR MAINTENANCE CAN BE PERFORMED. MAINTENANCE AGREEMENTS SHOULD CLEARLY SPECIFY HOW TO CONDUCT ROUTINE TASKS TO ENSURE LONG-TERM PERFORMANCE.
  - PAVEMENT SURFACES SHOULD BE SWEEPED AND VACUUMED TO REDUCE SEDIMENT ACCUMULATION AND ENSURE CONTINUED SURFACE POROSITY. SWEEPING SHOULD BE PERFORMED AT LEAST TWICE ANNUALLY WITH A COMMERCIAL CLEANING UNIT. WASHING SYSTEMS AND COMPRESSED AIR UNITS SHOULD NOT BE USED TO PERFORM SURFACE CLEANING.
  - DRAINAGE PIPES, INLETS, STONE EDGE DRAINS, AND OTHER STRUCTURES WITHIN OR DRAWING TO THE SUBBASE SHOULD BE CLEANED OUT AT REGULAR INTERVALS.
  - TRUCKS AND OTHER HEAVY VEHICLES CAN GRIND DIRT AND GRIT INTO THE POROUS SURFACES, LEADING TO CLOGGING AND PREMATURE FAILURE. THESE VEHICLES SHOULD BE PREVENTED FROM TRACKING AND SPILLING MATERIAL ONTO THE PAVEMENT.
  - DEICERS SHOULD BE USED IN MODERATION. WHEN USED, DEICERS SHOULD BE NON-TOXIC AND ORGANIC AND CAN BE APPLIED EITHER AS CALCIUM MAGNESIUM ACETATE OR AS PRETREATED SALT. SNOW PLOWING SHOULD BE DONE CAREFULLY WITH BLADES SET ONE-INCH HIGHER THAN NORMAL. PLOWED SNOW PILES AND SNOW MELT SHOULD NOT BE DIRECTED TO PERMEABLE PAVEMENT.

**OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED PERMEABLE PAVEMENT (A-2)**

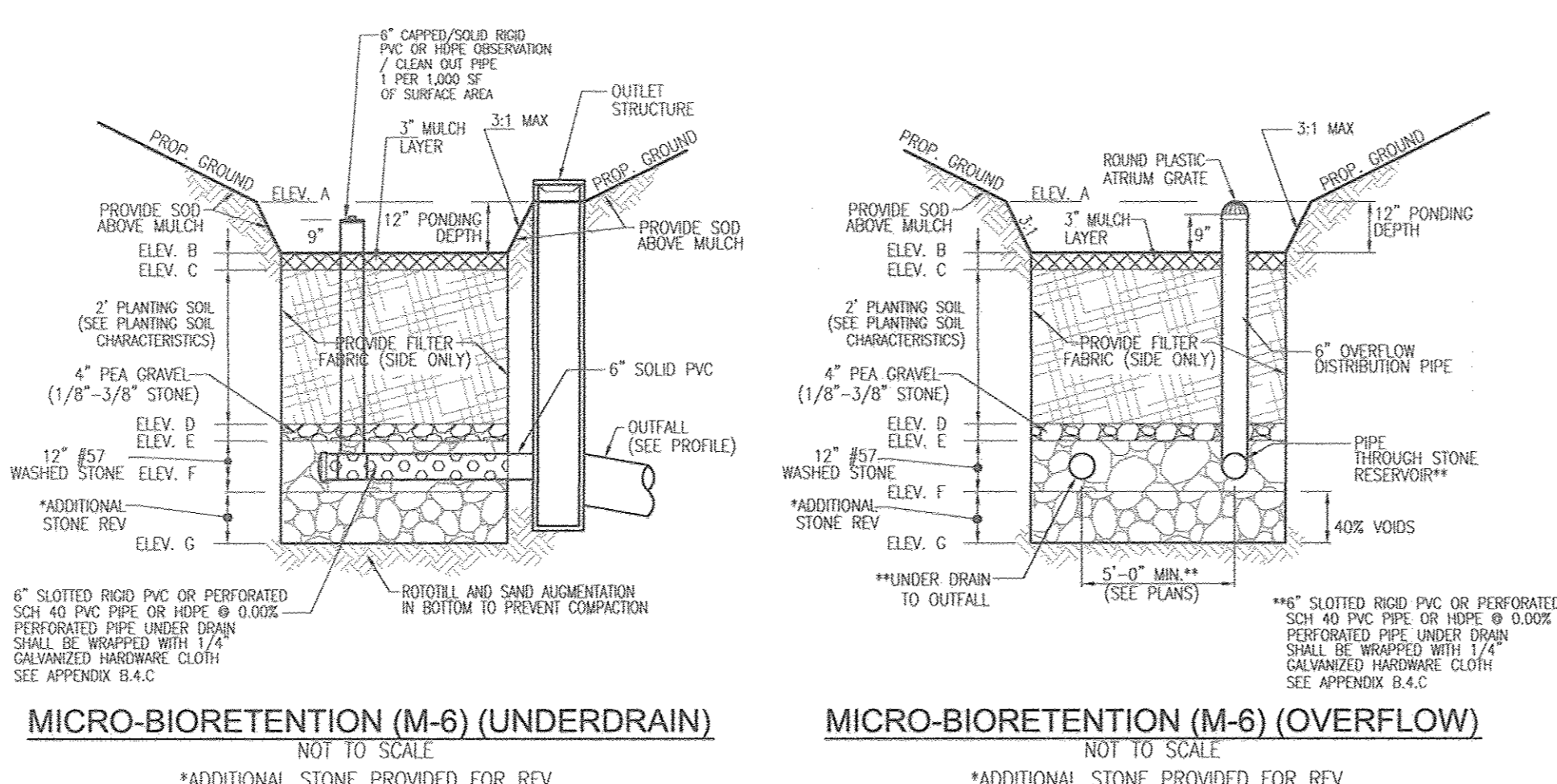
- THE INDIVIDUAL LOT OWNER SHALL PERIODICALLY SWEEP (OR VACUUM POROUS CONCRETE PAVEMENT) THE PAVEMENT SURFACES TO REDUCE SEDIMENT ACCUMULATION AND ENSURE CONTINUED SURFACE POROSITY. SWEEPING SHOULD BE PERFORMED AT LEAST TWICE ANNUALLY WITH A COMMERCIAL CLEANING UNIT. WASHING OR COMPRESSED AIR UNITS SHOULD NOT BE USED TO PERFORM SURFACE CLEANING.
- THE INDIVIDUAL LOT OWNER SHALL PERIODICALLY CLEAN DRAINAGE PIPES, INLETS, STONE EDGE DRAINS AND OTHER STRUCTURES WITHIN OR DRAINING TO THE SUBBASE
- THE INDIVIDUAL LOT OWNER SHALL USE DEICERS IN MODERATION. DEICERS SHOULD BE NON-TOXIC AND BE APPLIED EITHER AS CALCIUM MAGNESIUM ACETATE OR AS PRETREATED SALT.
- THE INDIVIDUAL LOT OWNER SHALL ENSURE SNOW PLOWING IS PERFORMED CAREFULLY WITH BLADES SET ONE-INCH ABOVE THE SURFACE. PLOWED SNOW PILES AND SNOW MELT SHOULD NOT BE DIRECTED TO PERMEABLE PAVEMENT.



**NOTE:**  
1. PAVEMENT CROSS SECTION TO BE CONFIRMED BY GEOTECHNICAL ENGINEER  
2. UNDERDRAIN SHALL BE LOCATED SUCH THAT IT CAN DAYLIGHT TO THE CURB INLET OR INTO A BIO-RETENTION FACILITY  
3. OVERDRAIN SHALL COMBINE WITH UNDERDRAIN OR DAYLIGHT AS DETAILED FOR UNDERDRAIN, SEE NOTE 2.  
**DETAIL - PERMEABLE CONCRETE DRIVEWAY - 5% OR LESS**  
NOT TO SCALE  
ALL PERMEABLE CONCRETE THICKNESS, MIX AND SUB-BASE TO BE DETERMINED BY GEOTECHNICAL ENGINEER ONSITE.



**PERMEABLE SURFACE TYPICAL SECTION**  
NOT TO SCALE

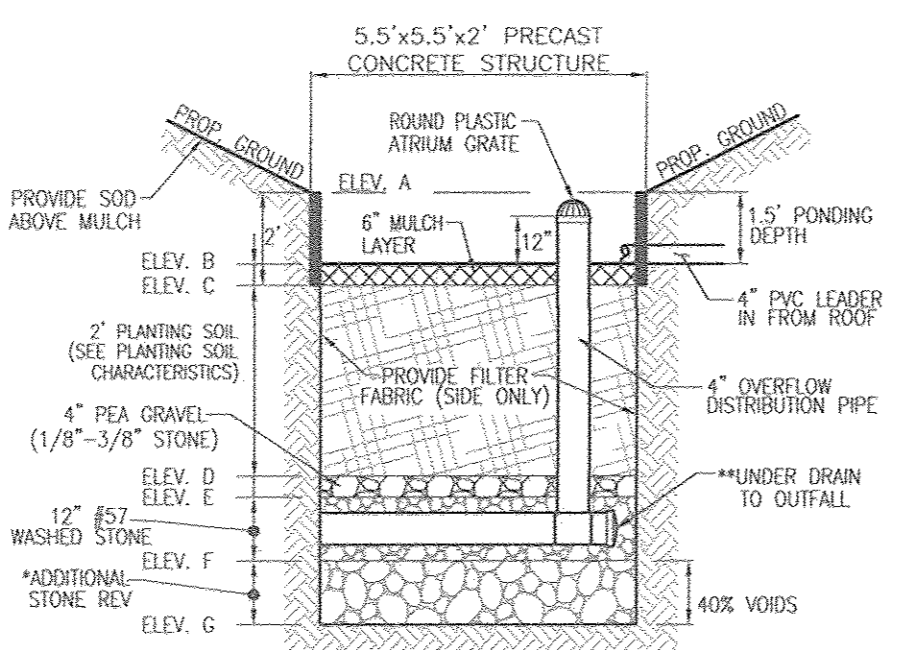


**MICROBIORETENTION NOTES:**  
1. ONLY THE SIDES OF MICROBIORETENTION ARE TO BE WRAPPED IN FILTER FABRIC. FILTER FABRIC BETWEEN LAYER OR AT THE BOTTOM OF THE MICROBIORETENTION WILL CAUSE THE MBR TO FAIL, AND THEREFORE SHALL NOT BE INSTALLED.  
2. WRAP THE PERFORATED MBR UNDERDRAIN PIPE WITH 1/4" MESH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

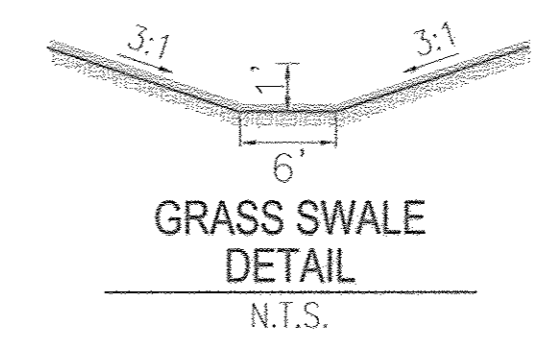
**OPERATION AND MAINTENANCE SCHEDULE FOR LANDSCAPE INFILTRATION (M-3), MICRO-BIORETENTION (M-6), RAIN GARDENS (M-7), BIORETENTION SWALE (M-8), AND ENHANCED FILTERS (M-9)**

- 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 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 MONTH AND AFTER EACH HEAVY STORM.

LOT #	FACILITY	FACILITY SIZE
LOT 34	MBR-1	3,463 SF
LOT 34	MBR-2	618 SF
LOT 34	MBR-3	601 SF
LOT 34	MBR-4	608 SF
LOT 33	MBR-5	1,575 SF
LOT 34	MBR-6	1,400 SF
LOT 34	MBR-7	113 SF
LOT 34	MBR-8	113 SF
LOT 1	RC-1	43 SF
LOT 2	RC-2	22 SF
LOT 21-31	PERMEABLE PAVEMENTS	2000 SF



**RAIN GARDEN PRECAST STRUCTURE (M-7)**  
NOT TO SCALE  
\*ADDITIONAL STONE PROVIDED FOR REV



**GRASS SWALE DETAIL**  
N.T.S.

**OPERATION AND MAINTENANCE SCHEDULE FOR 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 2.
- THE OWNER SHALL PERFORM A PLANT INSPECTION 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 OR 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 MONTH AND AFTER EACH HEAVY STORM.

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING  
 [Signature] 4.5.18  
 CHIEF, DEVELOPMENT ENGINEERING DIVISION  
 [Signature] 4.2.18  
 CHIEF, DIVISION OF LAND DEVELOPMENT

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**DEVELOPER**  
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(410) 480-0023

NO.	REVISION	DATE

**ENVIRONMENTAL CONCEPT PLAN**  
**STORMWATER MANAGEMENT**  
**NOTES AND DETAILS**  
**BOLTON PROPERTY**  
**LOTS 1-31 AND OPEN SPACE LOTS 32-34**  
9111 RIVER HILL ROAD  
LAUREL, MD 20723

PARCEL: 001  
TAX MAP: 50  
6TH ELECTION DISTRICT

ZONED: R-3C  
L 1271 / 16  
HOWARD COUNTY, MARYLAND

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FAX: 410.461.8961

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

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4 SHEET OF 4