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4	STORMWATER MANAGEMENT DETAILS

# ENVIRONMENTAL CONCEPT PLAN MEADOWRIDGE VIEW

LOTS 1 THRU 8 AND  
OPEN SPACE LOT 9 THRU 11

ZONED: R-5C

TAX MAP No. 37 GRID No. 09 PARCEL NO. 78

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

*Vest Sheppard* 10/3/17  
Chief, Division of Land Development 935 Date  
*Chad L. L...* 10/4/17  
Chief, Development Engineering Division NY Date

## DESIGN NARRATIVE

### Introduction:

This report will demonstrate how the criteria set forth in the Maryland Stormwater Design Manual, Volumes I and II (effective October 2000, revised May 2009) will be satisfied on this project. The goal of creating hydrology similar to that of 'Woods in Good Condition' will be accomplished through the use of the practices contained within Chapter 5 of said manual. The achievement of this goal will remove the requirement of providing Channel Protection Volume.

### General Site Conditions:

Meadowridge View is a eight lot single family lot subdivision including one existing house to be removed. Property is zoned R-5C and located on Tax Map 37, Grid 9, Parcel No. 78 of the Howard County, Maryland Tax Map Database System. The property is an existing lot of record located at 6077 Meadowridge Road. Subdivision will utilize a proposed public water and sewer extension. The property is located in the tillage area of Howard County in the watershed of an unnamed tributary of the Lower North Branch of the Patuxent River (02130906). This property is very irregular in shape and runoff on-site is mainly from west to east to a stream running through the rear of the property. The existing house (to be removed) sits at the high point of the site, and existing driveway will be widened to 16 feet with 1 foot flush curb on both sides. Forest exists on-site and forest conservation requirement will be met by retention of forest at the break-even point. Also, according to a field inspection conducted by Eco-Science Professionals (ESP) dated April 2017, wetlands and stream are present on-site in the general area of the county mapped floodplain. The Web Soil Survey shows soils on the site consist of Sassafras and Crom soils (SfD), Type "B" soils, Russett fine sandy loam (R&C), Type "C" soils, and Fallington sandy loam (Fa) & Urban land - Chillum Beltsville complex, Type "D" soils exist on the property. The runoff from the roofs of the proposed houses is to be directed overland and be treated by twenty (20) dry wells to be located on Lots 1 thru 8 in the front and rear of the proposed houses. The majority of the runoff from the proposed driveways will flow overland and be treated by a bioretention.

### I. Natural Resource Protection:

Environmentally sensitive areas do exist on-site (wetlands, stream, their buffers, steep slopes, and floodplain), therefore special effort is required to protect the natural resource on-site.

### II. Maintenance of Natural Flow Patterns:

It is the intent of the proposed design to discharge runoff similar to the characteristics and direction of this site prior to any of the proposed improvements.

### III. Reduction of Impervious Areas through better site design, Alternative Surfaces and Nonstructural Practices

The design of this project utilizes a common driveway and individual driveways for the lots. Non-structural practices as permitted in Chapter 5, twenty (20) Dry Wells (M-5) and Bioretention (F-6) will be used to address ESD to the MEP requirements.

### IV. Integration of Erosion and Sediment Controls into Stormwater Strategy:

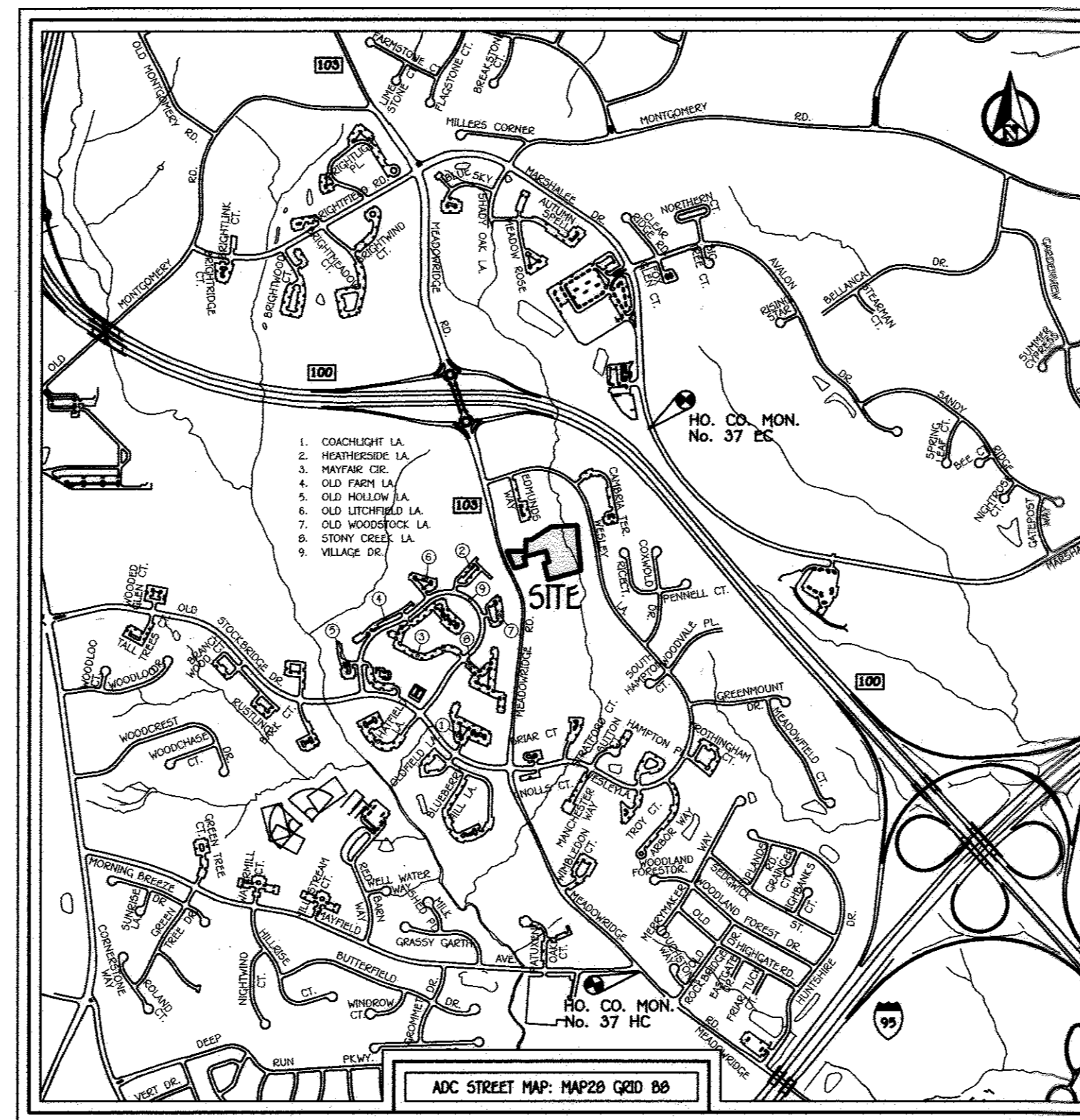
Silt fence, silt fence, permanent soil stabilization control matting, and a sediment trap will be utilized for erosion & sediment control. Sediment control measures have been plan so that there is no direct discharge of runoff to a stream that is not controlled. Drainage easements will be required for the culvert under the driveway as well as the drainage pipe going to and from the bioretention facility. It is anticipated that all cut will be utilized on-site for construction at time of Site Development Plans.

### V. Implementation of ESD Planning Techniques and practices to the Maximum Extent Practicable (MEP)

The full required ESD volume is being provided.

### VI. Request for a Design Manual Waiver:

No Waivers related to stormwater management are being requested in this project.



VICINITY MAP

SCALE: 1" = 1200'

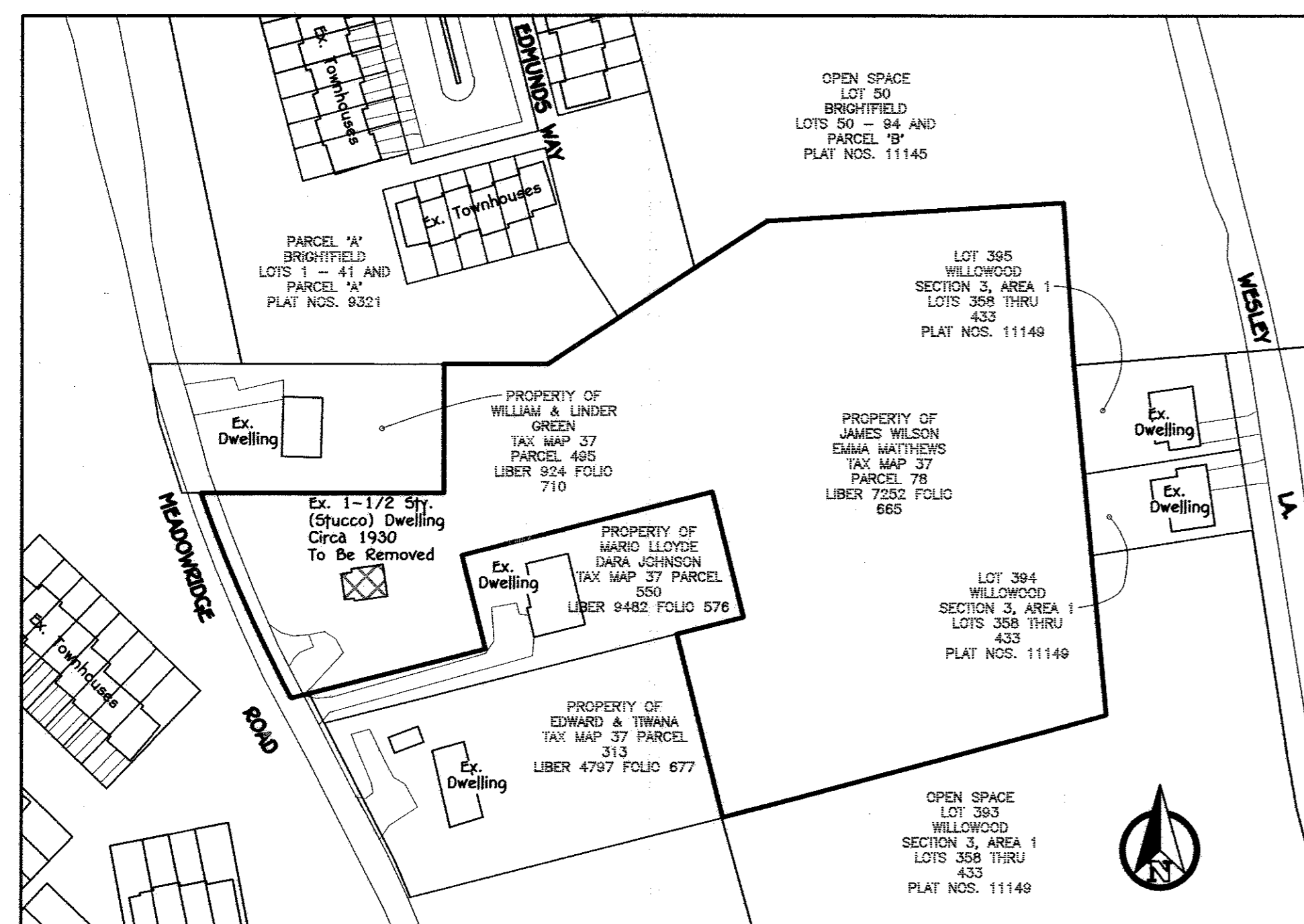
SECOND ELECTION DISTRICT  
HOWARD COUNTY, MARYLAND

## GENERAL NOTES

- PROPERTY ZONED R-5C PER 10/6/13 COMPREHENSIVE ZONING PLAN.
- AREA TABULATION:  
A. TOTAL TRACT AREA = 4.129 AC.  
B. AREA OF PROPOSED ROAD R/W = 0.192 AC.  
C. AREA OF PROPOSED BUILDABLE LOTS = 1.991 AC.  
D. AREA OF PROPOSED OPEN SPACE LOTS = 2.346 AC.
- NUMBER OF LOTS/PARCELS PROPOSED:  
A. BUILDABLE LOTS = 8, INCLUDING ONE EXISTING  
B. OPEN SPACE LOTS = 3  
C. MODERATE INCOME HOUSING UNITS REQUIRED = 0.7 MHU (7 UNITS x 10% = 0.7 MHU)
- DPZ FILE NO.: N/A
- SOILS INFORMATION TAKEN FROM NRCS WEB SOIL SURVEY MAP #19.
- FOREST STAND & WETLANDS DELINEATION REPORT DATED MARCH, 2017 WAS PREPARED BY ECO-SCIENCE PROFESSIONAL, INC.
- THERE ARE STEEP SLOPES OF 25% OR GREATER ON SITE OF 0.18 ACRES.
- NO CEMETERIES EXIST ON SITE BY VISUAL OBSERVATION OR LISTED IN AVAILABLE HOWARD COUNTY CEMETERY INVENTORY MAP.
- THERE IS AN EXISTING HOUSE LOCATED ON THE PROPERTY THAT WILL BE RAZED. ALTHOUGH THIS HOUSE DATES BACK TO THE 1930s, IT IS NOT SUBJECT TO HISTORIC PRESERVATION REVIEW OR COMMENTS, PER THE DPZ HISTORIC PRESERVATION PLANNER.
- THE TRAFFIC STUDY FOR THIS PROJECT WAS PREPARED BY M&S GROUP, INC. DATED FEBRUARY, 2017.
- ALL LOTS AREAS ARE MORE OR LESS.
- DRIVEWAYS 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 THE FOLLOWING MINIMUM REQUIREMENTS:  
A) WIDTH - 12 FEET (16 FEET) SERVING MORE THAN ONE RESIDENCE;  
B) SURFACE - SIX (6) INCHES OF COMPACTED CRUSHER RUN BASE WITH T&E AND CHIP COATING (1 - 1/2" MINIMUM);  
C) GEOMETRY - MAXIMUM 15% GRADE, MAXIMUM 10% SLOPE CHANGE AND 45-FOOT TURNING RADIUS;  
D) STRUCTURES (CULVERTS/BRIDGES) - CAPABLE OF SUPPORTING 25 GROSS TONS (H2S-LOADING);  
E) DRAINAGE ELEMENTS - CAPABLE OF SAFELY PASSING 100 YEAR FLOOD WITH NO MORE THAN 1 FOOT DEPTH OVER SURFACE;  
F) STRUCTURE CLEARANCES - MINIMUM 12 FEET;  
G) 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 TO THE PIPESTEM LOT DRIVEWAY.
- ARTICLES OF INCORPORATION FOR THE HOMEOWNERS ASSOCIATION, INC. WILL BE FILED WITH THE STATE DEPARTMENT OF ASSESSMENTS AND TAXATION PRIOR TO RECORDATION OF THE FINAL PLAT.
- THE LOTS SHOWN HEREON COMPLY WITH THE MINIMUM OWNERSHIP WIDTH AND LOT AREA AS REQUIRED BY THE MARYLAND STATE DEPARTMENT OF THE ENVIRONMENT.
- NO GRADING, REMOVAL OF VEGETATIVE COVER OR TREES, PAVING AND NEW STRUCTURES SHALL BE PERMITTED WITHIN THE LIMITS OF WETLANDS, STREAMS, OR THEIR REQUIRED BUFFERS, FLOODPLAIN AND FOREST CONSERVATION EASEMENT AREAS.
- BOUNDARY OUTLINE BASED ON A FIELD RUN SURVEY PERFORMED BY FISHER, COLLINS & CARTER, INC. DATED ON OR ABOUT FEBRUARY, 2017.
- THE EXISTING TOPOGRAPHY INFORMATION SHOWN IS BASED ON FIELD RUN TOPOGRAPHY SURVEY PERFORMED ON OR ABOUT FEBRUARY, 2017 BY FISHER, COLLINS & CARTER, INC. AND SUPPLEMENTED WITH HOWARD COUNTY AERIAL CONTOURS.
- STREAM, WETLANDS, THEIR BUFFERS, STEEP SLOPES, AND FLOODPLAIN EXIST ON-SITE. FLOODPLAIN SHOWN HEREON IS BASED ON HOWARD COUNTY FEMA MAPS.
- DISTURBANCE INTO THE WETLANDS, STREAM, AND THEIR BUFFERS FOR THE EXTENSION OF THE SEWER MAIN AND EASEMENT IS CONSIDERED ESSENTIAL DISTURBANCE BY DPZ PER SECTION 16.116(c)(1) OF THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS.
- THE PROJECT IS IN CONFORMANCE WITH THE LATEST HOWARD COUNTY STANDARDS UNLESS WAIVERS HAVE BEEN APPROVED.
- COORDINATES BASED ON NAD83 MARYLAND COORDINATE SYSTEM AS PROJECTED BY HOWARD COUNTY GEODETIC CONTROL STATIONS NO. 37 HC AND NO. 37 EC  
HOWARD COUNTY MONUMENT NO. 37 HC - N 556,364.071 E 1,375,513.253 ELEV. (NAVD83) = 270.062  
HOWARD COUNTY MONUMENT NO. 37 EC - N 561,099.806 E 1,375,590.480 ELEV. (NAVD83) = 346.154
- THIS PROPERTY IS LOCATED WITHIN THE METROPOLITAN DISTRICT.
- STORM WATER MANAGEMENT IS IN ACCORDANCE WITH THE H.O.E. STORM WATER DESIGN MANUAL VOLUMES I & II, REVISED 2009; STORMWATER MANAGEMENT IS BEING PROVIDED BY THE USE OF (22) DRYWELLS (M-5) & (1) MICRO S&D-RETENTION FACILITY (M-6) TO MEET AND EXCEED THE REQUIRED ESD VOLUME.
- STORMWATER MANAGEMENT DEVICES LOCATED ON INDIVIDUAL LOTS WILL BE OWNED AND MAINTAINED BY THAT PARTICULAR LOT OWNER AND SUBJECT TO THE REQUIREMENTS OF A RECORDED DECLARATION OF COVENANT, SWM DEVICES LOCATED WITHIN THE PUBLIC R/W WILL BE PRIVATELY OWNED AND JOINTLY MAINTAINED, AND SWM DEVICES LOCATED ON PARCELS WILL BE OWNED AND MAINTAINED BY THE H.O.A. SWM FACILITIES SERVING PUBLIC ROADS, BUT LOCATED ON PRIVATE LOTS WILL BE PRIVATELY OWNED AND JOINTLY MAINTAINED.
- A NOISE STUDY PREPARED BY M&S GROUP, INC. DATED FEBRUARY, 2017.
- 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 AND THE HOWARD COUNTY ZONING 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.

## SITE ANALYSIS DATA CHART

- |    |   |
|----|---|
| A. | TOTAL AREA OF THIS SUBMISSION = 4.13 AC.*                                       |
| B. | LIMIT OF DISTURBED AREA = 1.92 AC.*   |
| C. | PRESENT ZONING DESIGNATION: R-5C (PER 10/06/2013 COMPREHENSIVE ZONING PLAN)     |
| D. | PROPOSED USE: RESIDENTIAL   |
| E. | PREVIOUS HOWARD COUNTY FILES: N/A   |
| F. | TOTAL AREA OF FLOODPLAIN LOCATED ON SITE = 0.04 AC.                             |
| G. | TOTAL AREA OF SLOPES IN EXCESS OF 15% = 1.05 AC. (0.24 AC. 25% OR GREATER)      |
| H. | TOTAL AREA OF WETLANDS (INCLUDING BUFFER) = 2.03 AC. (INCLUDES FLOODPLAIN AREA) |
| I. | TOTAL AREA OF EXISTING FOREST = 3.57 AC.* (2.73 AC. OUTSIDE OF FLOODPLAIN)      |
| J. | TOTAL GREEN OPEN AREA = 3.54 AC.*   |
| K. | TOTAL IMPERVIOUS AREA = 0.59 AC.*   |
| L. | AREA OF ERODIBLE SOILS = 2.26 AC.   |
| M. | AREA OF ROAD DEDICATION = 0.19 AC.  |
| N. | DENSITY PERMITTED = 4.13 AC. - 1.00 AC. = 3.05 ACRES X 4 LOTS/ACRE = 12 LOTS    |
| O. | PROPOSED NUMBER OF LOTS = 8 LOTS  |
| P. | OPEN SPACE REQUIRED = 4.13 AC X 25% = 1.03 AC                                   |
| Q. | OPEN SPACE PROVIDED = 2.32 AC.* (100%)  |
|    | 0.09 AC.* (non-credited)  |



EXISTING CONDITIONS PLAN VIEW

SCALE: 1" = 100'

**FISHER, COLLINS & CARTER, INC.**  
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS  
CENTRONAL SQUARE OFFICE PARK - 10772 BALTIMORE NATIONAL PIKE  
ELICOTT CITY, MARYLAND 21042  
(410) 461 - 2995

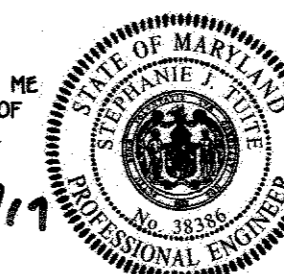
**OWNER**  
JAMES C. JOHNSON & VALENCIA SCOTT  
6077 MEADOWRIDGE RD  
ELK RIDGE, MD 21075

**DEVELOPER**  
BURKARD HOMES  
5030 DORSEY HALL DRIVE, SUITE 102  
ELICOTT CITY, MD 21075  
240-375-1012

## PROFESSIONAL CERTIFICATION

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. 36386, EXPIRATION DATE: 01/12/2018.

*Stephen J. J...* 9/28/17  
Signature of Professional Engineer DATE

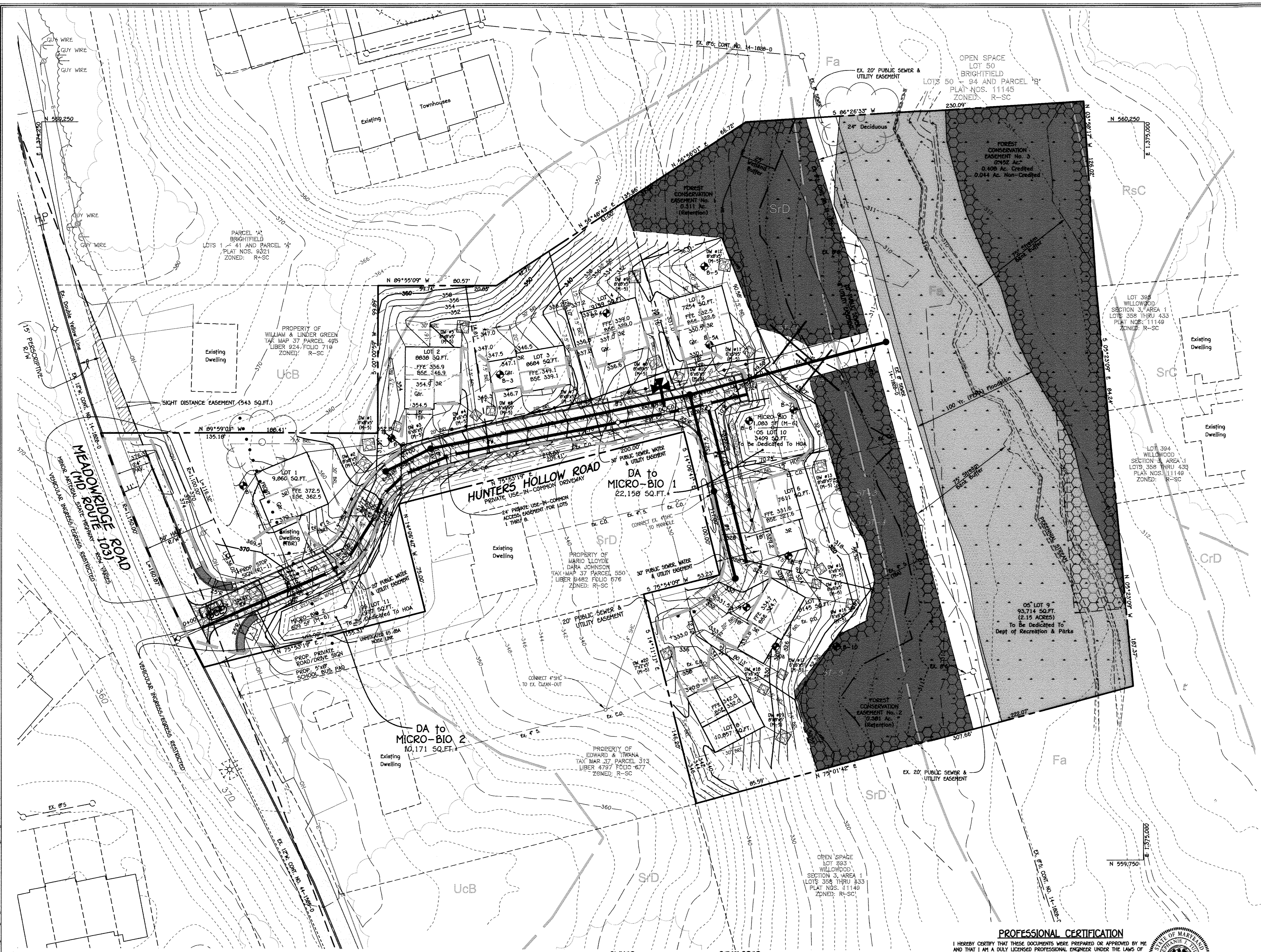


TITLE SHEET  
**MEADOWRIDGE VIEW**  
LOTS 1 THRU 8 AND  
OPEN SPACE LOTS 9 THRU 11

ZONED R-5C  
TAX MAP No. 37 GRID No. 09 PARCEL No. 78  
FIRST ELECTION DISTRICT HOWARD COUNTY, MARYLAND

SCALE: AS SHOWN DATE: SEPTEMBER, 2017  
SHEET 1 OF 4 ECP-17-046

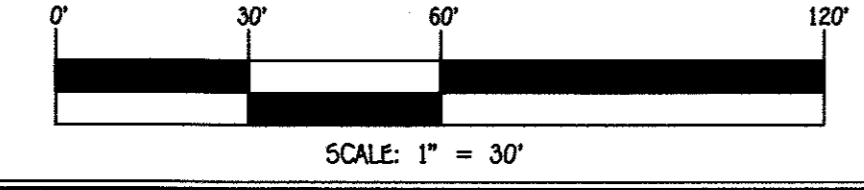
*Kent Shalovich* 10/31/17  
Chief, Division of Land Development Date  
*Paul Adams* 10-4-17  
Chief, Development Engineering Division Date



LEGEND	
SYMBOL	DESCRIPTION
	EXISTING 2' CONTOURS
	EXISTING 10' CONTOURS
	SOILS LINES AND TYPE
	EXISTING TREELINE
	PROPOSED TREELINE
	PROPOSED CONTOUR
	SPOT ELEVATION (M-5)
	SPOT ELEVATION
	FLOW ARROW
	EXISTING POWER POLE
	SPECIMEN TREE
	EXISTING TREES
	WETLANDS
	FEMA FLOODPLAIN
	25% OR GREATER SLOPES
	15% TO 24.9% SLOPES

**ENVIRONMENTAL CONCEPT PLAN**  
**MEADOWRIDGE VIEW**  
LOTS 1 THRU 8 AND  
OPEN SPACE LOTS 9 THRU 11  
ZONED R-SC  
TAX MAP No. 37 GRID No. 09 PARCEL No. 78  
FIRST ELECTION DISTRICT HOWARD COUNTY, MARYLAND  
SCALE: AS SHOWN DATE: SEPTEMBER, 2017  
SHEET 2 OF 4 **ECP-17-046**

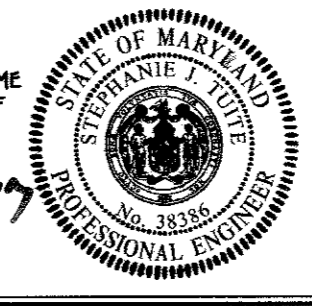
**FISHER, COLLINS & CARTER, INC.**  
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS  
CENTRAL SQUARE OFFICE PARK - 10277 BALDWIN NATIONAL PK.  
ELLSWORTH CITY, MARYLAND 21042  
(410) 441-2095



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*Stephen J. Jure* 9/28/17  
Signature Professional Engineer DATE



*Nest Shulman* 10/2/17  
 Chief, Division of Land Development Date  
*Bob Clark* 10-4-17  
 Chief, Development Engineering Division Date



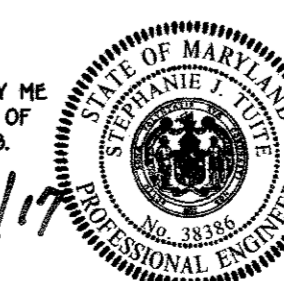
LEGEND	
SYMBOL	DESCRIPTION
	EXISTING 2' CONTOURS
	EXISTING 10' CONTOURS
	SOILS LINES AND TYPE
	EXISTING TREELINE
	PROPOSED TREELINE
	PROPOSED CONTOUR
	PROPOSED DRYWELL (M-5)
	SPOT ELEVATION
	FLOW ARROW
	EXISTING POWER POLE
	SPECIMEN TREE
	EXISTING TREES
	SLOPES 15% TO 25%
	SLOPES 25% OR GREATER
	LIMITS OF DISTURBANCE
	5' SILT FENCE
	SUPER SILT FENCE
	STABILIZES CONSTRUCTION ENTRANCE
	DRAINAGE AREA DIVIDE

SOILS LEGEND			
SOIL	NAME	CLASS	K FACTOR
Fa	Fallsington sandy loam, 0 to 2 percent slopes	D	0.20
RaC	Russett fine sandy loam, 5 to 10 percent slopes	C	0.24
SrD	Sassafras and Croom soils, 10 to 15 percent slopes	B	0.37
UcB	Urban land-Chillum-Beltville complex, 0 to 5 percent slopes	D	0.37

**SCHEMATIC GRADING, SEDIMENT & EROSION CONTROL PLAN**  
**MEADOWRIDGE VIEW**  
 LOTS 1 THRU 8 AND  
 OPEN SPACE LOTS 9 THRU 11  
 ZONED R-SC

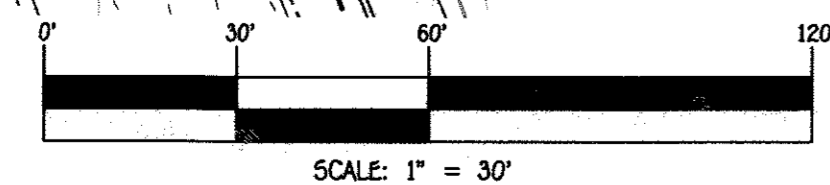
TAX MAP No. 37 GRID No. 09 PARCEL No. 78  
 FIRST ELECTION DISTRICT HOWARD COUNTY, MARYLAND  
 SCALE: AS SHOWN DATE: SEPTEMBER, 2017  
 SHEET 3 OF 4

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*Signature of Professional Engineer* 9/28/17  
 DATE



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 ELLICOTT CITY, MARYLAND 21042  
 (410) 461-2995



**DA to CULVERT**  
 1.64 ACRES±  
 $Q_{10} = 4.0$  CFS  
 $c = 0.37$   
 $V = 6.60$  iph

**HUNTERS HOLLOW ROAD**  
 PRIVATE USE-IN-COMMON  
 ACCESS EASEMENT FOR LOTS  
 1 THRU 8

PROPERTY OF  
 WILLIAM & LINDER GREEN  
 TAX MAP 37 PARCEL 495  
 LIBER 824 FOLIO 710  
 ZONED: R-SC

PROPERTY OF  
 MARIO LLOYDE  
 DARA JOHNSON  
 TAX MAP 37 PARCEL 550  
 LIBER 1842 FOLIO 676  
 ZONED: R-SC

PROPERTY OF  
 EDWARD & TIWANA  
 TAX MAP 37 PARCEL 383  
 LIBER 4787 FOLIO 672  
 ZONED: R-SC

OPEN SPACE  
 LOT 50  
 BRIGHTFIELD  
 LOTS 50, 84 AND PARCEL 19  
 PLAT NOS. 11145  
 ZONED: R-SC

LOT 398  
 WILLOWOOD  
 SECTION 3, AREA 1  
 LOTS 358 THRU 433  
 PLAT NOS. 11149  
 ZONED: R-SC

LOT 394  
 WILLOWOOD  
 SECTION 3, AREA 1  
 LOTS 358 THRU 433  
 PLAT NOS. 11149  
 ZONED: R-SC

05' LOT 9  
 93,714 SQ. FT.  
 (2.15 ACRES)  
 To be Dedicated To  
 Dept of Recreation & Parks

OPEN SPACE  
 LOT 983  
 WILLOWOOD  
 SECTION 3, AREA 1  
 LOTS 358 THRU 433  
 PLAT NOS. 11149  
 ZONED: R-SC

# Infiltration and Filter System Construction Specifications

Infiltration and filter systems either take advantage of existing permeable soils or create a permeable medium such as sand for WC, and Ke v. In some instances where permeability is great, these facilities may be used for 0p as well. The most common systems include infiltration trenches, infiltration basins, sand filters, and organic filters.

When properly planted, vegetation will thrive and enhance the functioning of these systems. For example, pre-treatment buffers will trap sediments that often are bound with phosphorous and metals. Vegetation planted in the facility will aid in nutrient uptake and water storage. Additionally, plant roots will provide arteries for stormwater to permeate soil for groundwater recharge. Finally, successful plantings provide aesthetic value and wildlife habitat making these facilities more desirable to the public.

## Design Constraints:

- > Planting buffer strips of at least 20 feet will cause sediments to settle out before reaching the facility, thereby reducing the possibility of clogging.
- > Determine areas that will be saturated with water and water table depth so that appropriate plants may be selected (hydrology will be similar to bioretention facilities, see figure A.5 and Table A.4 for planting material guidance).
- > Plants known to send down deep taproots should be avoided in systems where filter fabric is used as part of facility design.
- > Test soil conditions to determine if soil amendments are necessary.
- > Plants shall be located so that access is possible for structure maintenance.
- > Stabilize heavy flow areas with erosion control mats or sod.
- > Temporarily divert flows from needed areas until vegetation is established.
- > See Table A.5 for additional design considerations.

## Bio-retention

### Soil Bed Characteristics

The characteristics of the soil for the bioretention facility are perhaps as important as the facility location, size, and treatment volume. The soil must be permeable enough to allow runoff to filter through the media, while having characteristics suitable to promote and sustain a robust vegetative cover crop. In addition, much of the nutrient pollutant uptake (nitrogen and phosphorus) is accomplished through absorption and microbial activity within the soil profile. Therefore, soils must balance their chemical and physical properties to support biotic communities above and below ground.

The planting soil should be a sandy loam, loamy sand, loam (USDA), or a loam/sand mix (should contain a minimum 35 to 60% sand, by volume). The clay content for these soils should be less than 25% by volume (Environmental Quality Resources (EQE), 1996; Engineering Technology Inc. and Biohabitats, Inc. (ETAB), 1993). Soils should fall within the SM, ML, SC classifications or the Unified Soil Classification System (USCS). A permeability of at least 1.0 feet per day (0.9"/hr) is required (a conservative value of 0.5 feet per day is used for design). The soil should be free of stones, stumps, roots, or other woody material over 1" in diameter. Brush or seeds from noxious weeds (e.g., Johnson Grass, Mugwort, Nutsedge, and Canada Thistle or other noxious weeds as specified under COMAR 15.08.01.05) should not be present in the soils. Placement of the planting soil should be in 12 to 18 lifts that are loosely compacted (tamped lightly with a bucket or trowel by cover trucks). The specific characteristics are presented in Table A.3.

Table A.3 Planting Soil Characteristics

Parameter	Value
pH range	5.2 to 7.00
Organic matter	1.5 to 4.0% (by weight)
Magnesium	35 lbs. per acre, minimum
Phosphorus (phosphate - P2O5)	75 lbs. per acre, minimum
Potassium (potash - K2O)	85 lbs. per acre, minimum
Soluble salts	500 ppm
Clay	0 to 5%
Silt	30 to 55%
Sand	35 to 60%

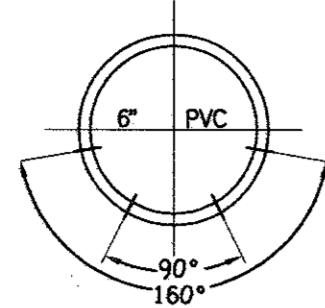
### Mulch Layer

The mulch layer plays an important role in the performance of the bioretention system. The mulch layer helps maintain soil moisture and avoids surface sealing, which reduces permeability. Mulch helps prevent erosion, and provides a microenvironment suitable for soil biota at the mulch/soil interface. It also serves as a pretreatment layer, trapping the finer sediments, which remain suspended after the primary pretreatment.

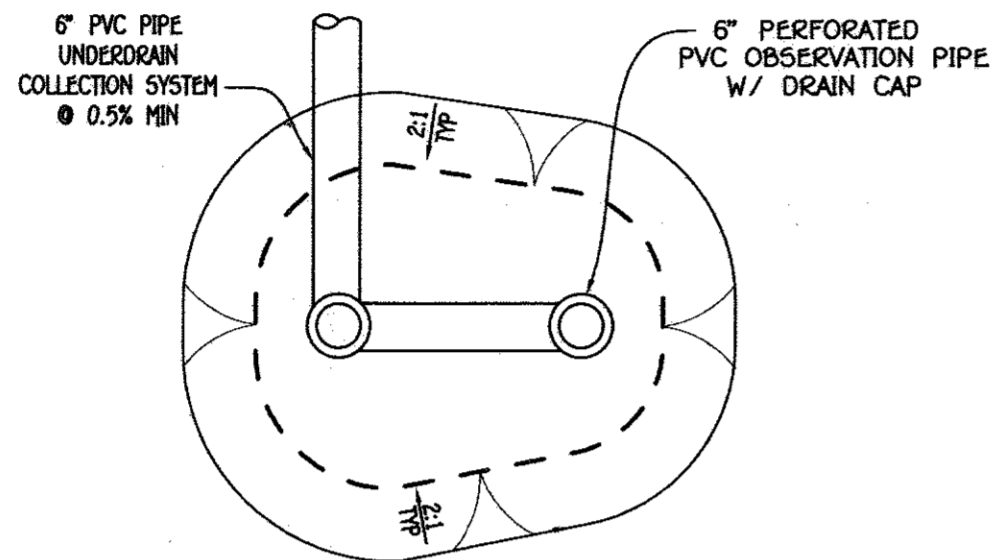
The mulch layer should be standard landscape style, single or double shredded hardwood mulch or chips. The mulch layer should be well aged (stockpiled or stored for at least 12 months), uniform in color, and free of other materials, such as weed seeds, soil, roots, etc. The mulch should be applied to a maximum depth of three inches. Grass clippings should not be used as a mulch material.

### Planting Guidance

Plant material selection should be based on the goal of simulating a terrestrial forested community of native species. Bioretention simulates an upland-species ecosystem. The community should be dominated by trees, but have a distinct community of understory trees, shrubs and herbaceous materials. By creating a diverse, dense plant cover, a bioretention facility will be able to treat stormwater runoff and withstand urban stresses from insects, disease, drought, temperature, wind, and exposure. The proper selection and installation of plant materials is key to a successful system. There are essentially three zones within a bioretention facility (Figure A.5). The lowest elevation supports plant species adapted to standing and fluctuating water levels. The middle elevation supports plants that like drier soil conditions, but can still tolerate occasional inundation by water. The outer edge is the highest elevation and generally supports plants adapted to drier conditions. A sample of appropriate plant materials for bioretention facilities are included in Table A.4. The layout of plant material should be flexible, but should follow the general principals described in Table A.5. The objective is to have a system, which resembles a random, and natural plant layout, while maintaining optimal conditions for plant establishment and growth. For a more extensive bioretention plan, consult ETAB, 1993 or Claytor and Schueler, 1997.

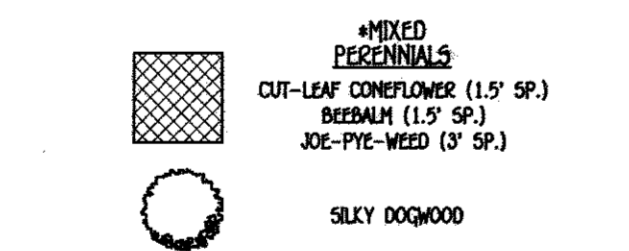


SCH 40 PVC PERFORATED UNDERDRAIN PIPE DETAIL FOR HORIZONTAL DRAIN PIPE  
NO SCALE

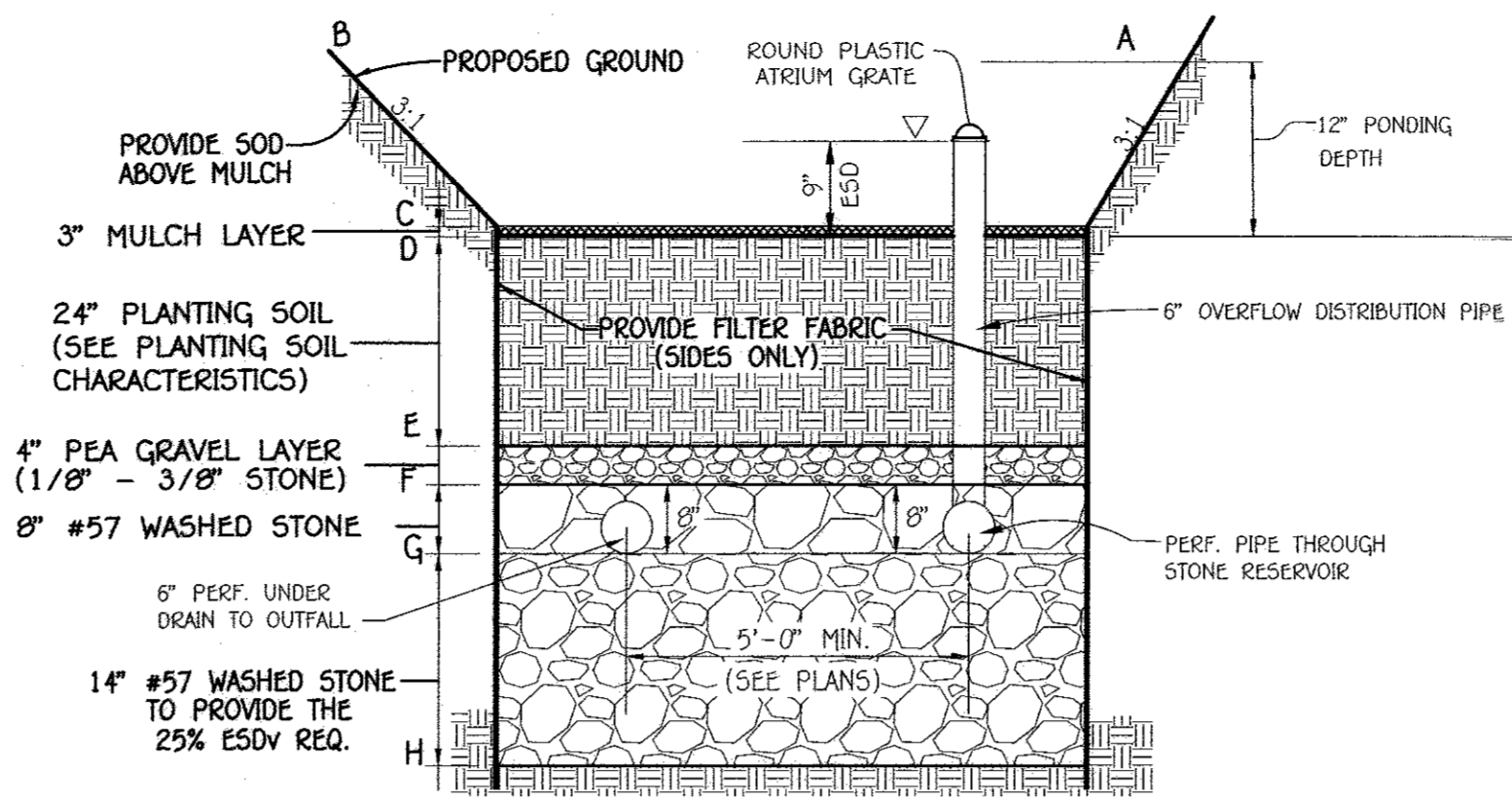


MICRO-BIO-RETENTION PLANTING DETAIL  
NOT TO SCALE

MICRO-BIO 1 QUANTITY	MICRO-BIO 2 QUANTITY	NAME	MAXIMUM SPACING (FT.)
130	65	MIXED PERENNIALS	1.5 TO 3.0 FT.
2	2	SILKY DOGWOOD	PLANT AWAY FROM INFLOW LOCATION



NOTE: PLANT MATERIAL MUST COVER AT LEAST 50% OF THE SURFACE AREA OF THE MICRO-BIORETENTION

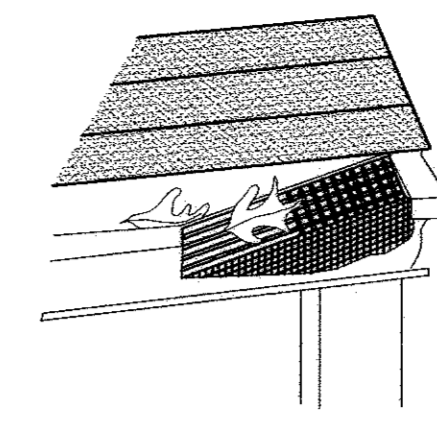


MICRO-BIO-RETENTION SECTION WITH 6" OVERFLOW DISTRIBUTION PIPE  
NO SCALE

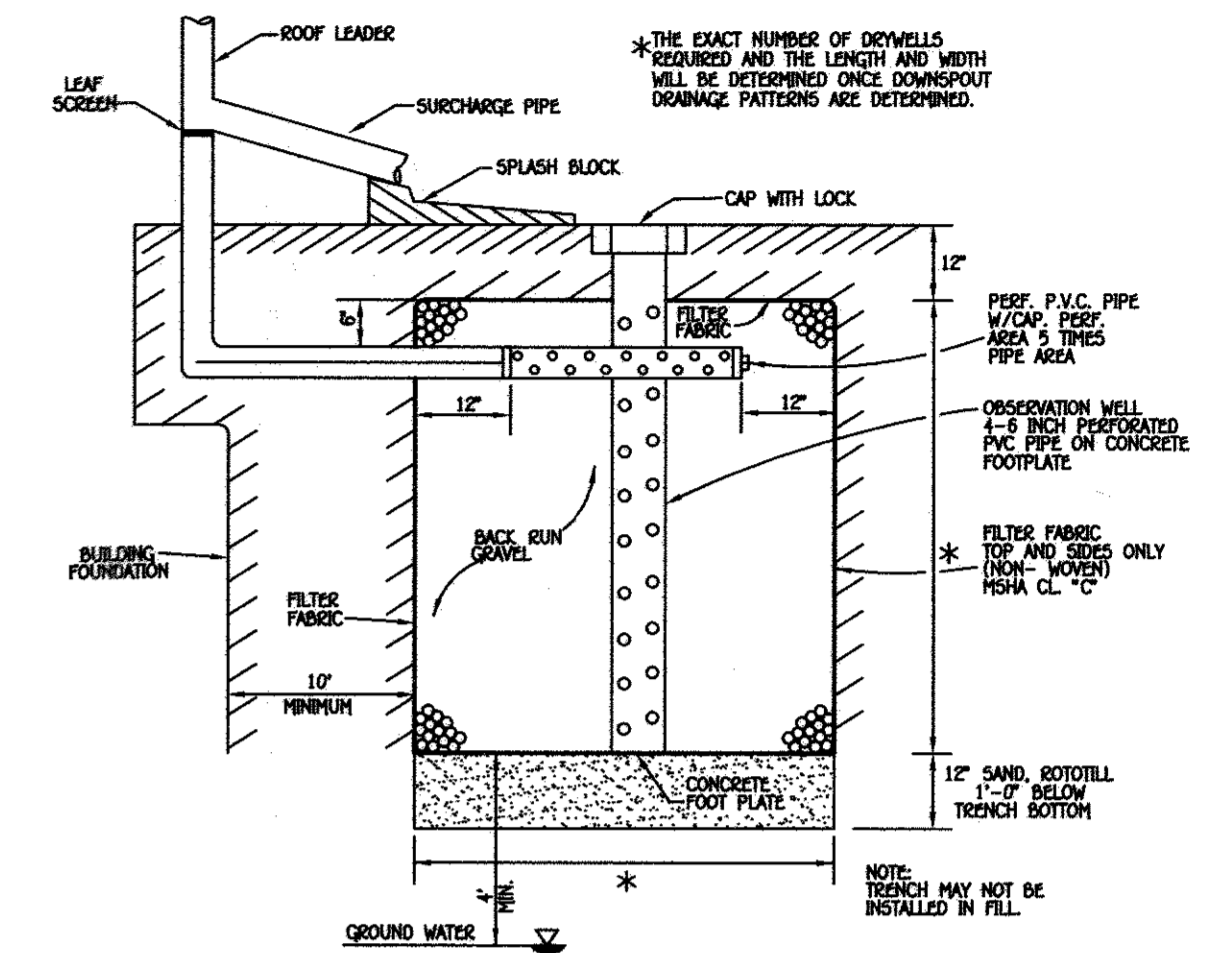
## OPERATION AND MAINTENANCE SCHEDULE FOR BIO-RETENTION AREAS (M-6)

- 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 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.

MICRO-BIORETENTION FILTER	A	B	C	D	E	F	G	H	I
#1	320.50	320.50	319.50	319.25	317.25	316.92	316.25	315.08	316.00
#2	363.00	363.00	362.00	361.75	359.75	359.42	358.75	357.58	355.15



GUTTER DRAIN FILTER DETAIL  
NOT TO SCALE



## STORMWATER MANAGEMENT NOTES

- STORMWATER MANAGEMENT IS PROVIDED IN ACCORDANCE WITH CHAPTER 5, 'ENVIRONMENTAL SITE DESIGN' OF THE 2007 MARYLAND STORMWATER MANAGEMENT DESIGN MANUAL, EFFECTIVE MAY 4, 2010.
- MAXIMUM CONTRIBUTING ROOF TOP AREA TO EACH DOWNSPOUT SHALL BE 1,000 SQ. FT. OR LESS.
- DRYWELLS SHALL BE PROVIDED AT LOCATIONS WHERE THE LENGTH OF DISCONNECTION IS LESS THAN 75' AT 5%. THE SIZE AND CONSTRUCTION OF THE DRYWELL SHALL BE IN ACCORDANCE WITH THE DETAIL SHOWN ON THIS SHEET.
- FINAL GRADING IS SHOWN ON THE SITE DEVELOPMENT PLAN.

## OPERATION AND MAINTENANCE SCHEDULE FOR DRYWELLS (M-5)

- THE OWNER SHALL INSPECT THE MONITORING WELLS AND STRUCTURES ON A QUARTERLY BASIS AND AFTER EVERY HEAVY STORM EVENT.
- THE OWNER SHALL RECORD THE WATER LEVELS AND SEDIMENT BUILD UP IN THE MONITORING WELLS OVER A PERIOD OF SEVERAL DAYS TO INSURE PROPER DRAINAGE.
- THE OWNER SHALL MAINTAIN A LOG BOOK TO DETERMINE THE DATE AT WHICH THE FACILITY DRAINS.
- WHEN THE FACILITY BECOMES CLOGGED SO THAT IT DOES NOT DRAIN DOWN WITHIN A SEVENTY TWO (72) HOUR TIME PERIOD, CORRECTIVE ACTION SHALL BE TAKEN.
- THE MAINTENANCE LOG BOOK SHALL BE AVAILABLE TO HOWARD COUNTY FOR INSPECTION TO INSURE COMPLIANCE WITH OPERATION AND MAINTENANCE CRITERIA.
- 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.

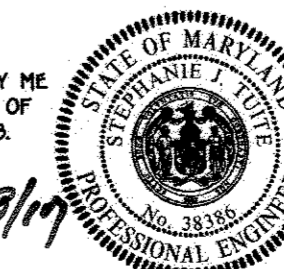
DRY WELL CHART								
LOT No.	DRYWELL No.	AREA OF ROOF PER DRYWELL	VOLUME REQUIRED	VOLUME PROVIDED	AREA OF TREATMENT	L	W	D
LOT 1	1	707 SQ. FT.	99 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 1	2	820 SQ. FT.	114 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 2	3	457 SQ. FT.	64 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 2	4	344 SQ. FT.	48 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 2	5	726 SQ. FT.	101 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 3	6	410 SQ. FT.	57 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 3	7	892 SQ. FT.	99 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 4	8	735 SQ. FT.	103 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 4	9	659 SQ. FT.	92 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 5	10	457 SQ. FT.	64 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 5	11	344 SQ. FT.	48 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 5	12	726 SQ. FT.	101 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 6	13	410 SQ. FT.	57 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 6	14	891 SQ. FT.	124 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 7	15	446 SQ. FT.	63 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 7	16	446 SQ. FT.	63 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 7	17	410 SQ. FT.	57 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 8	18	344 SQ. FT.	48 C.F.	72 C.F.	100%*	6'	6'	5'
LOT 8	19	825 SQ. FT.	115 C.F.	128 C.F.	100%*	6'	6'	5'
LOT 8	20	458 SQ. FT.	64 C.F.	98 C.F.	100%*	7'	7'	5'

\* AREA OF TREATMENT EXCEEDS THAT REQUIRED.

## PROFESSIONAL CERTIFICATION

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. 36386, EXPIRATION DATE: 01/12/2018.

Signature of Professional Engineer DATE 9/29/17



## STORMWATER MANAGEMENT DETAILS MEADOWRIDGE VIEW LOTS 1 THRU 8 AND OPEN SPACE LOTS 9 THRU 11

ZONED R-5C  
TAX MAP No. 37 GRID No. 09 PARCEL No. 78  
FIRST ELECTION DISTRICT HOWARD COUNTY, MARYLAND  
SCALE: AS SHOWN DATE: SEPTEMBER, 2017  
SHEET 4 OF 4