SHEET INDEX	
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	EXISTING CONDITIONS, DEMOLITION AND SOILS PLAN
3	ENVIRONMENTAL CONCEPT PLAN
4	PRELIMINARY GRADING, SEDIMENT AND EROSION CONTROL PLAN
5	STORMWATER MANAGEMENT NOTES AND DETAILS

ENVIRONMENTAL CONCEPT PLAN

JORDAN OVERLOOK

LOTS 6 THRU 9

A RESUBDIVISION OF "JORDAN OVERLOOK" LOT3, PLAT Nos. 23115-23116

ZONED: R-20

TAX MAP NO.: 30 PARCEL NO.: 309 GRID NO.: 10

SIXTH ELECTION DISTRICT

HOWARD COUNTY, MARYLAND

SWM 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 THOUGH 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:

JORDAN OVERLOOK LOTS 6 - 9 IS ZONED R-20 AND LOCATED ON TAX MAP 30, PARCEL NO. 309 OF THE HOWARD COUNTY, MARYLAND TAX MAP DATABASE SYSTEM. THE PROPERTY CONSISTS OF 3.747 ACRES OF WHICH NO ACRES ARE ENCUMBERED WITH A PRESERVATION EASEMENT DEDICATED TO HOWARD COUNTY MARYLAND AGRICULTURAL LAND PRESERVATION PROGRAM AND IS LOCATED IN THE HOWARD COUNTY METROPOLITAN DISTRICT. THE NORTHERN PORTION OF THIS SITE BORDERS OPEN SPACE OF SECTION 1, AREA B OF THE VILLAGE OF OAKLAND MILLS. THIS AREA CONTAINS A POND, WETLANDS AND A CLASS I PERENNIAL STREAM CONTAINED WITHIN A 100 YR FLOODPLAIN. THIS NORTHERN ADJACENT AREA RECEIVES DRAINAGE FROM THE SUBJECT PROPERTY, AS WELL AS THE SURROUNDING COMMUNITIES AND IS IN THE LITTLE PATUXENT RIVER WATERSHED (12131105). TO THE SOUTH OF THE SUBJECT SITE IS THE PREVIOUSLY APPROVED SUBDIVISION F-11-041 (JORDAN OVERLOOK LOTS 1-4) AND RE-SUBDIVISION JORDAN OVERLOOK LOT 5. TO THE EAST, THE VILLAGE OF OAKLAND MILLS "THUNDER HILL" SUBDIVISION AND TO THE WEST THE DALTON SUBDIVISION. ALL OF THESE ADJOINING SUBDIVISIONS ARE SINGLE FAMILY HOME COMMUNITIES. THIS PROJECT OBTAINS ACCESS TO THE SOUTH FROM CANVASBACK DRIVE, WHICH IS THE ONLY POINT OF ACCESS TO A PUBLIC ROAD FOR THIS PROPERTY. THIS R-20 ZONED SUBDIVISION IS PROPOSING 4 SINGLE FAMILY LOTS, WHICH WILL UTILIZE A USE-IN-COMMON DRIVEWAY WITH LOTS 2, 4 AND 5 OF THE JORDAN OVERLOOK SUBDIVISION, AS WELL AS LOT 618 OF THE DALTON SUBDIVISION. THE SITE IS PARTIALLY WOODED AND CONTAINS SPECIMEN TREES, OF WHICH SOME ARE PROPOSED TO BE REMOVED. SOILS ON THE OVERALL SITE CONSIST OF MOSTLY 'B' SOILS WITH A SMALL AMOUNT OF 'C' SOILS ON THE EASTERN EDGE OF THE PROPERTY. THE REMOVAL OF SPECIMEN TREES IS SUBJECT TO AN APPROVED ALTERNATIVE COMPLIANCE APPLICATION. THIS DESIGN PROVIDES TREATMENT FOR A PE OF 1.2" TO MEET THE CRITERIA OF "WOODS IN GOOD CONDITION" BY EXCEEDING THE REQUIRED ESDV OF 2,017 CUFT THROUGH THE USE OF A PROPOSED BIO-RETENTION FACILITY AND DRYWELLS.

I. **NATURAL RESOURCE PROTECTION:**
THIS SITE HAS BEEN REDESIGNED WITH A REDUCED LOT YIELD THAT MAINTAINS THE BULK OF THE EXISTING FOREST. THE SITE DOES PROPOSE REMOVAL OF SPECIMEN TREES TO MEET THIS REDUCED DESIGN, WHICH WILL BE SUBJECT TO APPROVAL OF AN ALTERNATIVE COMPLIANCE APPLICATION.

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. THIS SITE ALSO WORKS TO MAINTAIN THE SWM DRAINAGE AREAS AND FACILITIES ESTABLISHED ON F-11-041.

III. **REDUCTION OF IMPERVIOUS AREAS THROUGH BETTER SITE DESIGN, ALTERNATIVE SURFACES AND NONSTRUCTURAL PRACTICES**
THIS PROJECT PROPOSES THE MINIMUM IMPERVIOUS AREAS NECESSARY TO PROVIDE ADEQUATE USE OF THE SUBJECT PROPERTY. TO ASSIST IN REDUCING THE OVERALL NEED FOR IMPERVIOUS SURFACES THIS PROJECT TAKES ADVANTAGE OF A USE-IN-COMMON DRIVEWAY TO MINIMIZE THE AMOUNT OF ROADWAY NEEDED TO ACCESS THE PROPOSED UNITS.

IV. **INTEGRATION OF EROSION AND SEDIMENT CONTROLS INTO STORMWATER STRATEGY:**
ALTHOUGH NO TRAPPING IS PROPOSED ON THIS PROJECT, THE SEDIMENT AND EROSION CONTROL PRACTICES HAVE BEEN PLACED TO WORK IN CONCERT WITH THE SWM DRAINAGE AREAS.

V. **IMPLEMENTATION OF ESD PLANNING TECHNIQUES AND PRACTICES TO THE MAXIMUM EXTENT PRACTICABLE (MEP)**
THE FULL REQUIRED ESD VOLUME IS BEING PROVIDED BY THE USE OF A BIO-RETENTION FACILITY AND DRYWELLS.

VI. **REQUEST FOR DESIGN MANUAL WAIVER:**
NO WAIVERS ARE EXPECTED TO BE REQUIRED ON THIS PROJECT.

STORMWATER MANAGEMENT PRACTICES			
LOT NO.	DRY WELLS M-5 (Y/N)	MICRO BIO-RETENTION M-6 (Y/N)	BIO-RETENTION M-6 (Y/N)
6	Y(3)	N	Y
7	Y(3)	N	Y
8	Y(3)	N	Y
9	Y(3)	N	Y
UIC DRIVE	N	Y	Y

LEGEND	
SYMBOL	DESCRIPTION
	EXISTING CONTOUR 2' INTERVAL
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ex. F.H. 8"W	EXISTING WATER LINE
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	EXISTING GAS LINE
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	FOREST CONSERVATION EASEMENT (REFORESTATION)
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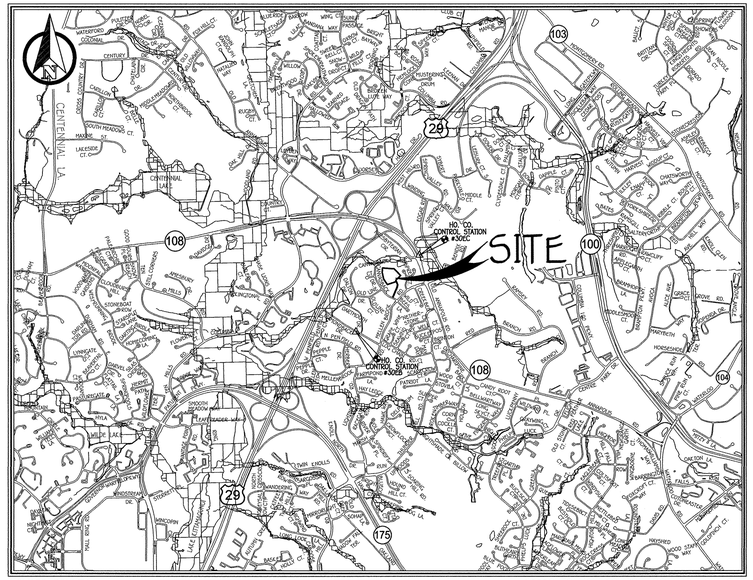
LOD	LIMIT OF DISTURBANCE
	EXISTING TREE LINE
	PROPOSED TREE LINE
DW	DRYWELL (M-5)-TYPICAL
GrB GrC	SOIL LINES AND TYPES
	EXISTING WETLANDS & WETLAND BUFFER
	BIO RETENTION FACILITY (F-6) OR (M-6) AS NOTED
	PROPOSED ROOF LEADER
	DENOTES EXISTING TREES TO BE REMOVED
CRZ	DENOTES EXISTING TREES TO REMAIN CRITICAL ROOT ZONE
	DENOTES 15%-24.9% SLOPES
	DENOTES AREA OF ERODIBLE SOILS



HOWARD COUNTY
GEODETIC SURVEY CONTROL NO. 30EC
N 571,962.914 E 1,360,059.950
ELEVATION: 399.235

HOWARD COUNTY
GEODETIC SURVEY CONTROL NO. 30EB
N 569,838.431 E 1,358,288.169
ELEVATION: 380.593

REFER TO HOWARD CO. ADC MAP #27, C-5

VICINITY MAP

SCALE: 1" = 2,000'

0' 2,000' 4,000' 8,000'

SCALE: 1" = 2,000'

GENERAL NOTES

1. THIS SUBDIVISION PLAN IS SUBJECT TO THE AMENDED FIFTH EDITION OF THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS AND THE 10-06-13 ZONING REGULATIONS PER COUNCIL BILL NO. 32-2013. DEVELOPMENT OR CONSTRUCTION ON THESE LOTS OR PARCELS MUST COMPLY WITH SETBACKS AND BUFFER REGULATIONS IN EFFECT AT THE TIME OF SUBMISSION OF A BUILDING OR GRADING PERMIT APPLICATION.
2. 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. 30EC & 30EB WERE USED FOR THIS PROJECT. HORIZONTAL AND VERTICAL CONTROL DATUM IS BASED ON HOWARD COUNTY GEODETIC CONTROL STATIONS:
   HOWARD COUNTY MONUMENT NO. 30EC — N 571,962.914, E 1,360,059.950, ELEV. = 399.235
   HOWARD COUNTY MONUMENT NO. 30EB — N 569,838.431, E 1,358,288.169, ELEV. = 380.593
3. THE SUBJECT PROPERTY IS ZONED R-20 PER THE 10/06/13 COMPREHENSIVE ZONING REGULATIONS.
4. BACKGROUND INFORMATION:
   A. SUBDIVISION NAME: JORDAN OVERLOOK
   B. TAX MAP NO. 30
   C. PARCEL NO. 309
   D. ZONING: R-20
   E. ELECTION DISTRICT: SIXTH
   F. GROSS AREA OF TRACT = 3.747 AC.
   G. NUMBER OF BUILDABLE LOTS: 4 (7 TOTAL IN OVERALL "JORDAN OVERLOOK" PROJECT)
   H. NUMBER OF OPEN SPACE LOTS: N/A
   I. AREA OF BUILDABLE LOTS: 3.747 AC.
   J. AREA OF OPEN SPACE LOTS: N/A
   K. AREA OF ROAD R/W TO BE DEDICATED: N/A
   L. PREVIOUS FILE NUMBERS: SP-09-010, BA-08-031, BA-10-008V, WP-12-005, F-11-041, F-19-034
   M. AREA OF FLOODPLAIN = 0.000 AC.
   N. AREA OF 25% OR GREATER SLOPES = 0.000 AC.
   O. NET AREA OF TRACT = 3.747 AC. +
5. THERE ARE NO CEMETERIES ON-SITE.
6. DRIVEWAY (S) SHALL BE PROVIDED PRIOR TO RESIDENTIAL OCCUPANCY 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 TAR AND CHIP COATING
   C. GEOMETRY - MAXIMUM 15% GRADE, MAXIMUM 10% GRADE CHAGE AND MINIMUM OF 45 FOOT TURNING RADIUS
   D. STRUCTURES (CULVERTS/BRIDGES) CAPABLE OF SUPPORTING 25 GROSS TONS (H25 LOADING)
   E. DRAINAGE ELEMENTS - CAPABLE OF SAFELY PASSING 100 YEAR FLOOD WITH NO MORE THAN 1 FOOT DEPTH OVER DRIVEWAY SURFACE
   F. STRUCTURES CLEARANCES - MINIMUM 12 FEET
   G. MAINTENANCE - SUFFICIENT TO ENSURE ALL WEATHER USE.
7. FOREST STAND DELINEATION WAS PREPARED BY ECO-SCIENCE PROFESSIONALS INC.
8. THE APPROVAL OF THIS "ECP" DOES NOT CONSTITUTE APPROVAL OF SUBSEQUENT OR ASSOCIATED SUBDIVISION PLANS OR PLAT AND/OR SITE DEVELOPMENT PLANS. REVIEW OF THIS PROJECT FOR COMPLIANCE WITH THE HOWARD COUNTY ZONING REGULATIONS SHALL OCCUR AT THE SUBDIVISION PLAN/PLAT AND/OR SITE DEVELOPMENT PLAN STAGES. THE APPLICANT AND CONSULTANT SHOULD EXPECT ADDITIONAL AND MORE DETAILED REVIEW COMMENTS AS THE PROJECT PROGRESSES THROUGH THE PLAN REVIEW PROCESS.
9. A FIELD REVIEW OF THE SITE HAS CONFIRMED THAT NO WETLANDS, STREAMS OR BUFFERS ARE PRESENT ON-SITE, AS CERTIFIED BY ECO-SCIENCE PROFESSIONALS, INC.
10. THE EXISTING SPRING HOUSE ON OPEN SPACE LOT 18 IS TO REMAIN.
11. NO CLEARING, GRADING OR CONSTRUCTION IS PERMITTED WITHIN THE STREAM, WETLANDS OR THEIR REQUIRED BUFFERS.
12. NO NOISE STUDY IS REQUIRED FOR THIS PROJECT PER HOWARD COUNTY DESIGN MANUAL, VOL. III, SECTION 5.2.9.
13. FOREST CONSERVATION OBLIGATIONS WILL BE PROVIDED AT THE FINAL PLAN STAGE OF THIS PROJECT.
14. SOIL BORING INFORMATION WILL BE PROVIDED AT THE FINAL PLAN STAGE OF THIS PROJECT.
15. PUBLIC WATER AND SEWER SHALL BE UTILIZED WITHIN THIS DEVELOPMENT. CONTRACT NO. 24-4403-D PUBLIC WATER AND SEWER ARE IN THE LITTLE PATUXENT DRAINAGE AREA.
16. SOILS INFORMATION TAKEN FROM NRCS WEB SOIL SURVEY.
17. BOUNDARY OUTLINE BASED ON FIELD RUN SURVEY PERFORMED BY FISHER, COLLINS & CARTER, INC. DATED JANUARY 29, 2007.
18. TOPOGRAPHIC CONTOURS BASED ON FIELD RUN SURVEY BY FISHER, COLLINS AND CARTER INC. DATED FEBRUARY 5, 2007.

SITE ANALYSIS DATA CHART

A. TOTAL AREA OF THIS SUBMISSION = 3.747 AC.+
   OVERALL JORDAN OVERLOOK PROJECT = 5.53 AC.+
B. LIMIT OF DISTURBED AREA = 103,962 SQ.FT. OR 2.39 AC.+
C. PRESENT ZONING DESIGNATION = R-20 (PER 10/06/13 COMPREHENSIVE ZONING PLAN).
D. PROPOSED USE: RESIDENTIAL SUBDIVISION (SINGLE FAMILY UNITS)
E. BUILDING COVERAGE OF SITE: 9,006 SQ.FT. OR 0.21 AC.+
F. PREVIOUS HOWARD COUNTY FILES: SP-09-010, BA-08-031, BA-10-008V, WP-12-005, F-11-041, F-19-034
G. TOTAL AREA OF FLOODPLAIN: 0.00 AC.+
H. TOTAL AREA OF SLOPES: 25% OR GREATER = 0.00 AC.+
   15%-24.99% = 0.14 AC.+
I. NET TRACT AREA = 3.747 AC.+
   (TOTAL SITE AREA - FLOODPLAIN - STEEP SLOPES AREA)
J. TOTAL AREA OF WETLANDS (INCLUDING BUFFER) = 0.00 AC.+
K. TOTAL AREA OF STREAMS: 0.00 AC.+
L. EXISTING FOREST EASEMENT F-11-041 = 1.27 AC+ (TO BE REMOVED)
M. PROPOSED FOREST EASEMENT = 1.25 AC.+
N. TOTAL GREEN OPEN AREA = 3.31 AC.+
   OVERALL JORDAN OVERLOOK PROJECT 4.69 AC.+
O. TOTAL IMPERVIOUS AREA = 37,062 SQ.FT.+ OR 0.85 AC.+
P. AREA OF ERODIBLE SOILS = 4.23 AC.+ (OVERALL JORDAN OVERLOOK SUBDIVISION)
   2.80 AC.+ (WITHIN THE LIMITS OF THIS SUBMISSION)

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/19/2020

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 7.07.20

STATE OF MARYLAND — FRANK JOHN MANALANSAN II — No. 21476 — PROFESSIONAL LAND SURVEYOR

PROFESSIONAL CERTIFICATION

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 21476, EXPIRATION DATE: 7/14/21.

FRANK MANALANSAN, II. — 5/11/20 Date

OWNER

5. JORDAN PROPERTY, LLC
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SUITE 200
ELLICOTT CITY, MD 21043
(410) 992-4600

DEVELOPER

LAND DESIGN & DEVELOPMENT
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TITLE SHEET

JORDAN OVERLOOK
9211 JORDAN RIVER ROAD
LOTS 6 THRU 9
A RESUBDIVISION OF "JORDAN OVERLOOK" LOT 3, PLAT Nos. 23115-23116
ZONED: R-20
TAX MAP NO.: 30 PARCEL NO.: 309 GRID NO.: 10
SIXTH ELECTION DISTRICT HOWARD COUNTY, MARYLAND SCALE: AS SHOWN
DATE: MAY, 2020
SHEET 1 OF 5

ECP-19-069

SOILS LEGEND

SOIL	NAME	CLASS	'K'VALUE
BaA	Baile silt loam, 0 to 3 percent slopes	D	0.49
GhB	Glenelg-Urban land complex, 0 to 8 percent slopes	B	0.43
GhC	Glenelg-Urban land complex, 8 to 15 percent slopes	B	0.43
GuB	Glenville-Urban land-Udorthents complex, 0 to 8 percent slopes	C	0.49
MaC	Manor loam, 8 to 15 percent slopes	B	0.32

NOTES:

* Hydric soils and/or contains hydric inclusions
** May contain hydric inclusions
† Generally only within 100-year floodplain areas

LEGEND

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×448.5	SPOT ELEVATION
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	DENOTES EXISTING TREES REMOVED UNDER F-11-041
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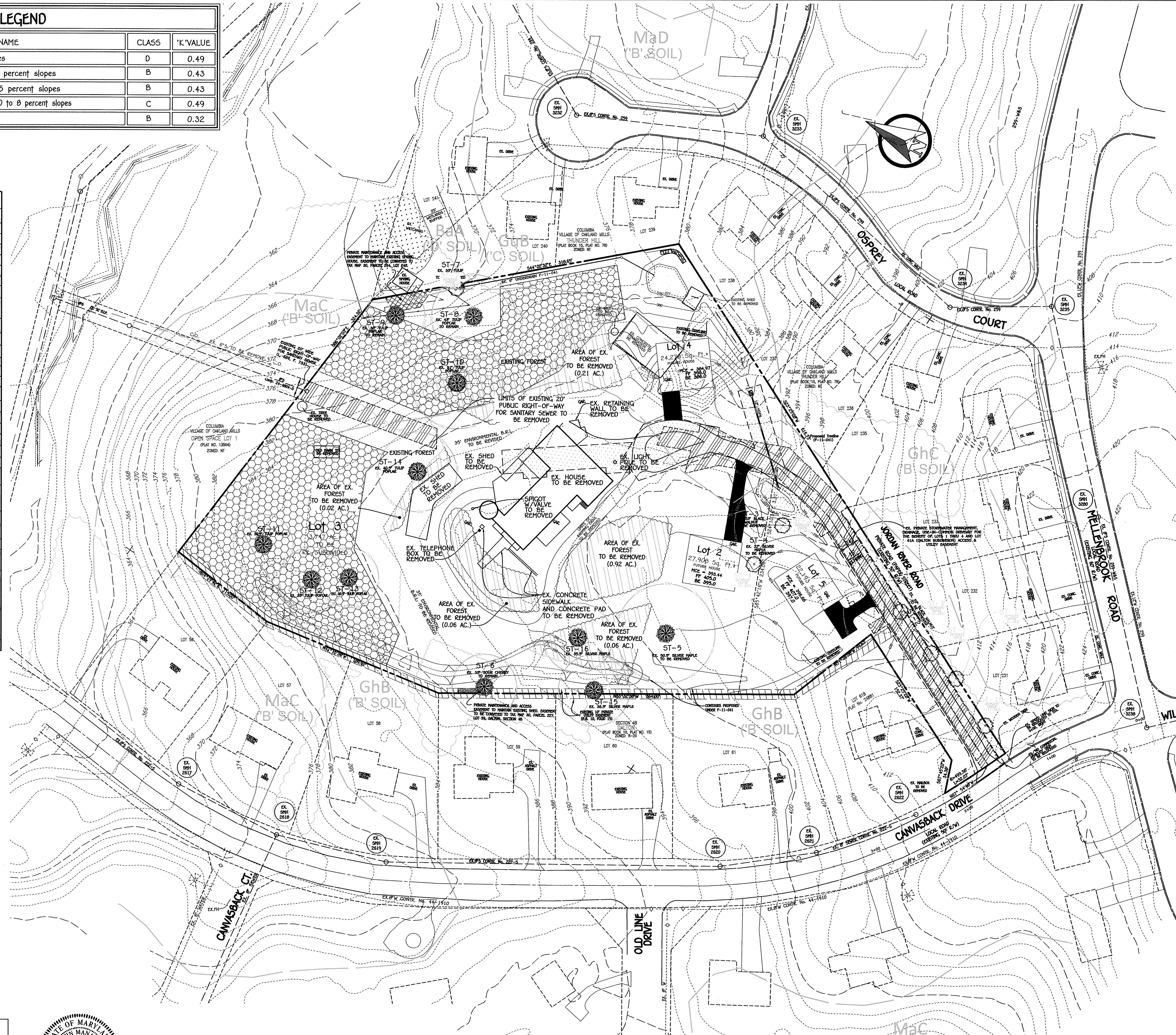

Specimen Tree Chart

Key (X#)	Species	Size (in.dbh)	CRZ (feet radius)	Comments	REMOVE/REMAIN
1	Black walnut	44.5	66.75	poor condition, CRZ impacted by existing driveway	removed under F-11-041
2	Black walnut	39	58.5	Fair condition, CRZ impacted by existing driveway	removed under F-11-041
3	Black walnut	33	49.5	good condition	removed under F-11-041
4	Silver maple	37	55.5	poor condition, trunk rot	removed under F-11-041
5	Silver maple	50.5	75.75	fair condition, limb dieback noted	TO REMAIN
6	Sour cherry	33	49.5	poor condition, leaning and root anchorage exposed	TO REMAIN
7	Tulip poplar	33	49.5	good condition	removed under F-11-041
8	Tulip poplar	43	64.5	good condition	TO REMAIN
9	Tulip poplar	30	45	good condition	TO REMAIN
10	Tulip poplar	31	46.5	fair condition, storm damage in canopy	TO REMAIN
11	Tulip poplar	30.5	45.75	good condition	TO REMAIN
12	Tulip poplar	33	49.5	good condition	TO REMAIN
13	Tulip poplar	30.5	45.75	fair condition, storm damage in canopy	TO REMAIN
14	Tulip poplar	40.5	60.75	fair, twin stems above bh, some storm damage in canopy	TO REMAIN
15	Silver maple	36.5	54.75	good condition	TO REMAIN
16	Silver maple	35.5	53.25	fair condition, multistemmed above bh, weak structure, limited crown. Existing driveway impacts drz	TO REMAIN
17	Black locust	36.5	54.75	fair condition, limited crown, some dieback, offsite	removed under F-11-041
18	Black walnut	44	66	good condition, offsite. Existing driveway, road and house impact crz	removed under F-11-041

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APPROVED: DEPARTMENT OF PLANNING AND ZONING

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CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 7-27-20

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PLAN
SCALE: 1" = 50'

0' 50' 100' 200'
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EXISTING CONDITIONS, DEMOLITION AND SOILS PLAN

JORDAN OVERLOOK

9211 JORDAN RIVER ROAD

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SIXTH ELECTION DISTRICT HOWARD COUNTY, MARYLAND SCALE: AS SHOWN

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ECP-19-069

I:\2006\06043\dwg\ECP - 4 Lot 2019\Plan Set\06043 ecp sheet 2 demo.dwg, C-02_DEMO PLAN, 1:1

LEGEND

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PLAN
SCALE: 1" = 50'

SCALE: 1" = 30'

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0' 30' 60' 120'
SCALE: 1" = 30'

PLAN
SCALE: 1" = 50'

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/19/2020

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 7.27.20

STATE OF MARYLAND FRANK JOHN MANALANSAN II PROFESSIONAL LAND SURVEYOR No. 21476

PROFESSIONAL CERTIFICATION
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 21476, EXPIRATION DATE: 7/14/21.

FRANK MANALANSAN, II. — Date 5/11/20

OWNER
S. JORDAN PROPERTY, LLC
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(410) 992-4600

DEVELOPER
LAND DESIGN & DEVELOPMENT
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PRELIMINARY GRADING, SEDIMENT AND EROSION CONTROL PLAN
JORDAN OVERLOOK
9211 JORDAN RIVER ROAD
LOTS 6 THRU 9
A RESUBDIVISION OF "JORDAN OVERLOOK" LOT 3, PLAT Nos. 23115-23116
ZONED: R-20
TAX MAP NO.: 30 PARCEL NO.: 309 GRID NO.: 10
SIXTH ELECTION DISTRICT HOWARD COUNTY, MARYLAND SCALE: AS SHOWN
DATE: MAY, 2020
SHEET 4 OF 5

ECP-19-069

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 WQ, and Re v. In some instances where permeability is great, these facilities may be used for Qp 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 seeded 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 (EQR), 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 (0.5"/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 backhoe bucket or traversed by dozer tracks). 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 -1(K2O)	85 lbs. per acre, minimum
Soluble salts	500 ppm
Clay	10 to 25 %
Silt	30 to 55 %
Sand	35 to 60%

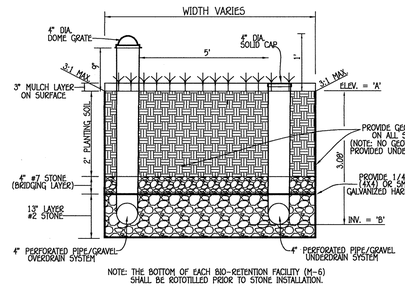
Mulch Layer

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 dryer 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.



NOTE: THE BOTTOM OF EACH BIO-RETENTION FACILITY (M-6) SHALL BE ROTOTILLED PRIOR TO STONE INSTALLATION.

TYPICAL SECTION BIO-RETENTION FACILITY (M-6)

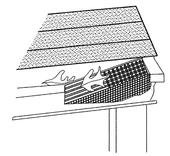
NO NOT SCALE

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

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

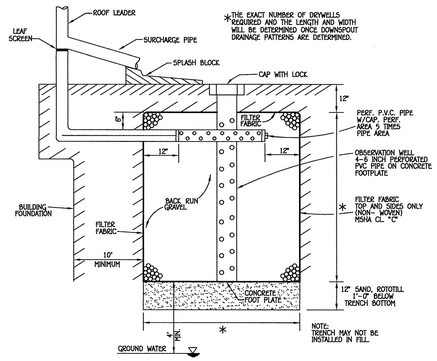
Table B.4. Materials Specifications for Micro-Bioretention, Rain Gardens & Landscape Infiltration

Material	Specification	Size	Notes
Plantings	see Appendix A; Table A.4	n/a	plantings are site-specific
Planting soil (2' to 4' deep)	loamy sand 60-65% compost 35-40% or sandy loam 30% coarse sand 30% compost 40%		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
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. 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 = 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 EH-10 or H-20); allowable horizontal loading (based on soil pressures); and analysis of potential cracking
Sand	AASHTO-M-6 or ASTM-C-33	0.02" to 0.04"	Sand substitutions such as Diabase and Graystone (AASHTO) #10 are not acceptable. No calcium carbonated or dolomitic sand substitutions are acceptable. No "rock dust" can be used for sand.



GUTTER DRAIN FILTER DETAIL

NOT TO SCALE



OPERATION AND MAINTENANCE SCHEDULE FOR DRYWELLS (M-5)

A. THE OWNER SHALL INSPECT THE MONITORING WELLS AND STRUCTURES ON A QUARTERLY BASIS AND AFTER EVERY HEAVY STORM EVENT.
B. THE OWNER SHALL RECORD THE WATER LEVELS AND SEDIMENT BUILD UP IN THE MONITORING WELLS OVER A PERIOD OF SEVERAL DAYS TO INSURE TRENCH DRAINAGE.
C. THE OWNER SHALL MAINTAIN A LOG BOOK TO DETERMINE THE RATE AT WHICH THE FACILITY DRAINS.
D. 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.
E. THE MAINTENANCE LOG BOOK SHALL BE AVAILABLE TO HOWARD COUNTY FOR INSPECTION TO INSURE COMPLIANCE WITH OPERATION AND MAINTENANCE CRITERIA.
F. 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 6-9	A	845 SQ.FT.	108 CU.FT.	114 CU.FT.	100%	11'x6.5'x4'		
LOT 6-9	B	702 SQ.FT.	89 CU.FT.	96 CU.FT.	100%	10'x6'x4'		
LOT 6-9	C	702 SQ.FT.	89 CU.FT.	96 CU.FT.	100%	10'x6'x4'		

0' 30' 60' 120'

SCALE: 1" = 30'

FISHER, COLLINS & CARTER, INC.
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(410) 461 - 2855

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/9/2020

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 7/27/20

STATE OF MARYLAND — FRANK JOHN MANALANSAN II — No. 21476 — PROFESSIONAL LAND SURVEYOR

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STORMWATER MANAGEMENT NOTES AND DETAILS

JORDAN OVERLOOK

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