

GENERAL NOTES

- STORM WATER MANAGEMENT TO BE PROVIDED FOR THIS DEVELOPMENT BY ENVIRONMENTAL SITE DESIGN UTILIZING A MICRO-BIORETENTION FACILITY (M-6), FILTERRA FILTRATION SYSTEMS, AND DRY WELLS (M-5). ALL DRYWELLS ARE TO BE PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNERS THEMSELVES. MICRO-BIORETENTION FACILITY AND FILTERRA FILTRATION SYSTEMS ARE TO BE PRIVATELY OWNED AND MAINTAINED BY THE HOMEOWNERS ASSOCIATION. REFERENCE 2010 MDE STORMWATER DESIGN MANUAL, (CHAPTER 5).
- THE SUBJECT PROPERTY IS ZONED "R-A-15" IN ACCORDANCE WITH THE OCTOBER 6, 2013 COMPREHENSIVE ZONING PLAN.
- THIS SITE IS LOCATED WITHIN THE 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. 24FA AND 25AA 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.
- WETLANDS SHOWN ON-SITE ARE BASED ON A FIELD INVESTIGATION PERFORMED BY JOHN CANOLES OF ECO-SCIENCE PROFESSIONALS, INC. DATED SEPTEMBER 29, 2015. THERE ARE SOME NECESSARY PROPOSED DISTURBANCES TO THE WETLANDS OR ASSOCIATED BUFFERS.
- A FOREST STAND DELINEATION AND ENVIRONMENTAL RESOURCES ASSESSMENT WAS PERFORMED BY JOHN CANOLES OF ECO-SCIENCE PROFESSIONALS, INC., DATED SEPTEMBER 29, 2015.
- APPROVAL OF THIS ECP DOES NOT CONSTITUTE AN APPROVAL OF ANY SUBSEQUENT AND ASSOCIATED SUBDIVISION PLAN/PLAN 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/PLAN 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 DEVELOPMENT PLAN APPROVAL BY THE DEPARTMENT OF PLANNING AND ZONING IS REQUIRED PRIOR TO BUILDING PERMITS BEING ISSUED FOR THE CONSTRUCTION OF RESIDENTIAL DWELLINGS ON THESE LOTS.
- PUBLIC WATER AND SEWER ARE AVAILABLE THROUGH CONTRACT NO. 118 - W&S. WATER AND SEWER SERVICE WILL BE GRANTED UNDER THE PROVISIONS OF SECTION 18.122B OF THE HOWARD COUNTY CODE.
- A TOTAL OF 8 UNITS ARE PROPOSED UNDER THIS PLAN.
- A PRE-SUBMISSION COMMUNITY MEETING WAS HELD ON JULY 2, 2015 AT 6:00 PM AT THE MILLER BRANCH LIBRARY.
- REFERENCE WAIVER PETITION WP-16-067, APPROVED MARCH 2014, 2015, TO WAIVE SECTION 16.166(a)(2)(D) "STREAMS AND WETLANDS" AND SECTION 16.116(b)(1) "STEEP SLOPES". THIS APPROVAL IS SUBJECT TO THE FOLLOWING CONDITIONS:
 - COMPLIANCE WITH THE ATTACHED COMMENTS FROM THE DEVELOPMENT ENGINEERING DIVISION.
 - THE PROPERTY WILL REQUIRE THE PLANNING AND ZONING DIRECTORS APPROVAL TO EXCEED THE 120' BUILDING LENGTH REQUIREMENT SET FORTH IN SECTION 112.03.1.6 OF THE HOWARD COUNTY ZONING REGULATIONS. WRITTEN APPROVAL FOR THE GREATER BUILDING LENGTH THAN SPECIFIED WILL BE REQUIRED FROM THE PLANNING AND ZONING DIRECTOR WITH THE SUBMISSION OF THE SKETCH PLAN OR THE PRELIMINARY EQUIVALENT SKETCH PLAN.
 - APPROVAL IS RESTRICTED TO MINIMIZE THE SITE DISTURBANCES SHOWN ON THE REVISED WAIVER EXHIBIT TO THE MAXIMUM EXTENT POSSIBLE FOR IMPACTS TO THE STREAM BUFFER AREA AND THE STEEP SLOPE AREA SHOWN ON THE PLANS.
- THIS PROJECT DOES NOT CONTRIBUTE TO ANY TIER II WATERS.

SITE DATA

LOCATION: TAX MAP 25, BLOCK 7
 PARCEL: 43
 2ND ELECTION DISTRICT
 PRESENT ZONING: R-A-15
 GROSS AREA OF PROJECT: 3.42 AC.
 AREA OF RIGHT-OF-WAY DEDICATION: 0.00 AC.
 LIMIT OF DISTURBANCE: 0.95 AC.
 PROPOSED USE OF SITE: RESIDENTIAL (SFA)
 NUMBER OF RESIDENTIAL LOTS PROPOSED: 8 LOTS
 AREA OF RESIDENTIAL LOTS PROPOSED: 0.26 AC.
 OPEN SPACE REQUIRED: 0.86 AC.
 OPEN SPACE PROVIDED: 2.46 AC.
 CREDITED OPEN SPACE PROVIDED: 2.22 AC.
 NON-CREDITED OPEN SPACE PROVIDED: 0.24 AC.
 AREA OF STREAM/BUFFER: 0.52 AC.
 AREA OF WETLANDS/BUFFER: 0.08 AC.
 AREA OF MODERATE SLOPES (15% - 24.99%): 0.29 AC.
 AREA OF STEEP SLOPES (25% OR GREATER): 1.16 AC.
 AREA OF FLOODPLAIN: 0.00 AC.
 NET PROJECT AREA: 2.26 AC.
 AREA OF EXISTING FOREST COVER: 1.60 AC.
 AREA OF ERODIBLE SOILS: 3.42 AC.
 AREA MANAGED BY ESDV (THIS PLAN): 0.95 AC.
 IMPEVIOUS AREA: 0.39 AC.
 GREEN AREA: 0.56 AC.
 DPZ REF'S: SDP-66-011, CONT. 118-W&S

ENVIRONMENTAL CONCEPT PLAN

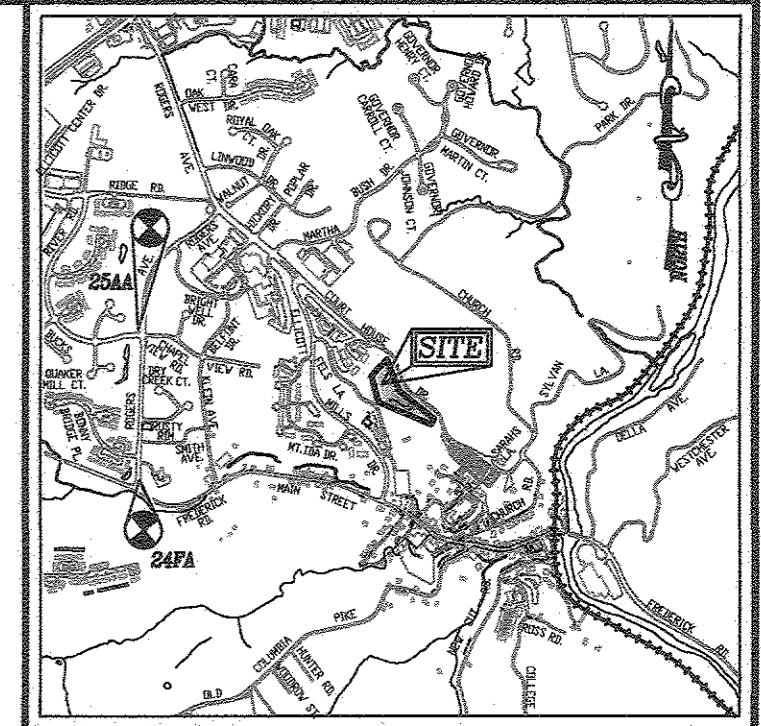
THE TOWNS AT COURT HILL

LOTS 1-8 AND OPEN SPACE LOT 9

PARCEL 43 (L. 7128 / F. 548)
 3614 COURT HOUSE DRIVE
 ELLICOTT CITY, MD 20143

BENCHMARKS

HOWARD COUNTY BENCHMARK 24FA (CONC. MON.)
 N 583751.41 E 1366091.86 ELEV. 282.88
 *LOCATED ON THE NORTH-EAST CORNER OF THE INTERSECTION AT FREDERICK ROAD AND ROGERS AVENUE.
 HOWARD COUNTY BENCHMARK 25AA (CONC. MON.)
 N 585307.19 E 1366070.97 ELEV. 307.71
 *LOCATED ON THE NORTH-WEST CORNER OF THE INTERSECTION AT PATAPSCO RIVER ROAD AND ROGERS AVENUE.



VICINITY MAP

SCALE: 1"=2000'
 ADC MAP COORDINATE: 21 88

LEGEND

- RIGHT-OF-WAY LINE
- BOUNDARY LINE
- ADJ. BOUNDARY LINES
- EXISTING EDGE OF PAVEMENT
- EXISTING CURB AND GUTTER
- PROPOSED CURB AND GUTTER
- EXISTING FENCE
- EXISTING SANITARY SEWER
- EXISTING OVERHEAD LINES
- EXISTING WATER
- EXISTING GUARDRAIL
- EXISTING FIRELINE
- EXISTING WETLANDS
- EXISTING WETLAND BUFFER
- EXISTING STREAM BUFFER
- EXISTING STREAM
- EXISTING UTILITY POLE
- EXISTING LIGHT POLE
- EXISTING SANITARY MANHOLE
- EXISTING CLEANOUT
- EXISTING FIRE HYDRANT
- PROPOSED TREELINE
- PROPOSED SIDEWALK
- PROPOSED MICRO-BIORETENTION FACILITY (M-6)
- PROPOSED DRY WELL (M-5)
- PROPOSED FOREST CONSERVATION EASEMENT
- EXISTING PUBLIC WATER, SEWER, AND UTILITY RIGHT OF WAY (PER CONT. 118-W&S)
- PROPOSED PUBLIC WATER, SEWER & UTILITY EASEMENT
- PROPOSED PRIVATE DRAINAGE EASEMENT

INTRODUCTION

The subject property is zoned R-A-15 and is located along the south side of Court House Drive, east of Ellicott Mills Drive in the Ellicott City area of Howard County, Maryland. The property is approximately 3.42 acres. This project was partially developed in conjunction with SDP-66-11, Court House Drive Apartments. The site was approved for five apartment buildings. Buildings 4 and 5 were constructed in addition to the corresponding drive and parking. The other three buildings (30 units) were not constructed although the site was mass graded in 1966-1968 and public water and sewer extended. There was no stormwater management proposed by the previous plan. The proposed layout attempts to utilize the previously graded areas/pads to create 8 townhouse units in one building. There is no proposed construction in regards to the previously developed areas.

METHODOLOGY

The current project proposes to utilize the areas previously approved for apartment buildings by a previous site development plan for eight townhouse units on a private road. The intent is to utilize the previous building pads and grading scheme to minimize the volume and extent of new grading. Some areas of the site have been naturally reforested.

For purposes of computing the pre and post development runoff, the limit of disturbance was used as the drainage condition and the proposed condition is computed as the actual impervious cover and grass. The TR-55 runoff rates are as follows:

	Q ₁₀ cfs	Q ₁₀₀ cfs
EXISTING CONDITION	1.30	4.27
DEVELOPED CONDITION (unmanaged)	4.83	10.33

Based on the TR-55 analyses the volume of storage was computed for the 10 and 100 year storm events. A TR-20 routing will be performed in conjunction with the site development plan final engineering. The 100-year storage is estimated to be 6,103 cf and will be provided in 311 lf of 60-inch diameter AL CMP.

We have computed the proposed impervious percentages including roads, buildings, driveways and sidewalks to be 36% of the limit of disturbance (0.96 acres). Based on the computed P_e of 1.8", the overall ESD_v requirement is 2320 cf. Due to the amount of detention storage being provided for the project we are providing Environmental Site Design volume to the maximum extent possible. The individual practices are designed to provide a minimum P_e of 1.0" and a maximum of 2.6".

The ESD_v is provided by the use of a micro-bioretention facility (M-6), structural practices (Filterra units) and dry wells (M-5). The Filterra units are used to avoid disturbance to steep slope to create another micro-bioretention facility. Previous paving is not feasible due to public water and sewer and house utility connections. In order to minimize the dry well areas for the rooftops we are proposing to use the Stormtech chambers. An individual segment and gravel can accommodate one half of the townhouse rooftop. Each Stormtech chamber provides slightly more storage than P_e of 2.6" and therefore the excess is not credited toward the ESD_v provided.

PRACTICE	TYPE	ESD _v PROVIDED
MBR-1	micro bioretention M-6	581 cf
Filterra (2)	structural practice	1213 cf
DW (8)	drywells M-5	728 cf

The total ESD_v that can be provided on-site is 2322 of which equates to a site P_e of 1.80".

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

CONCLUSION

The Environmental Concept Plan computations illustrate that ESD can be adequately accomplished to the maximum extent possible (MEP) for the proposed project. Currently, there are no disturbances proposed to environmental features with the exception of the SW M outfall which will need to be located in the stream buffer so that it can discharge directly to the stream invert and minimize potential for erosion. This disturbance is considered to be essential or a necessary disturbance. The natural drainage patterns have been preserved with the site drainage discharging to the existing stream. The outfall for the proposed development is a more appropriate location than the existing situation. A geotechnical analysis will be performed in conjunction with the site development plan, if required.

The facilities proposed for this project will be privately owned and maintained. There are no existing drainage easements located on site. There are no floodplains located within the subject property (no drainage areas exceeding 30 acres). The development of the subject property will not create any adverse impacts to adjacent properties. This project is proposing the utilization of several ESD practices in addition to detention.

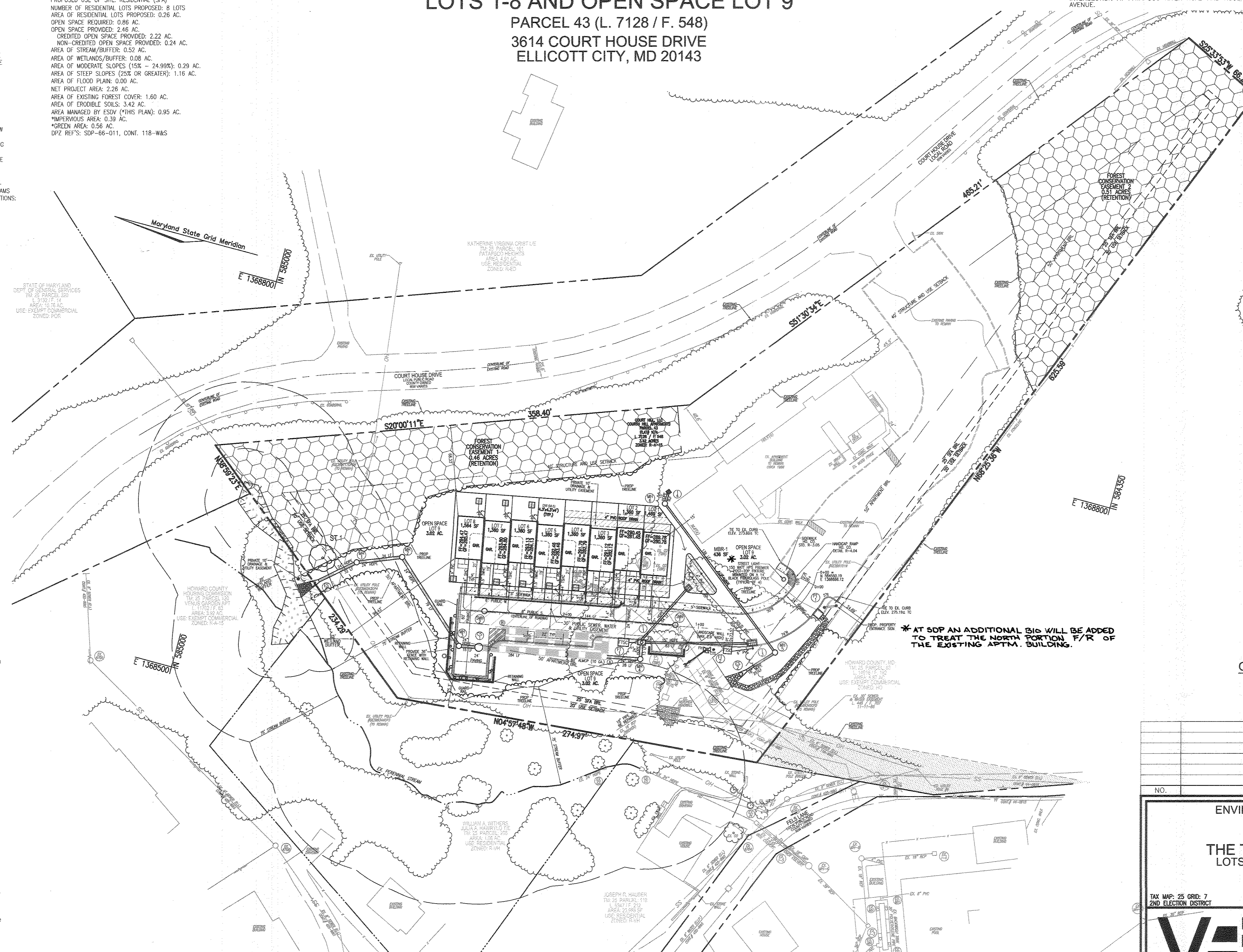
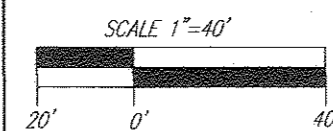
This project is designed to minimize additional earthwork and utilize existing infrastructure. The existing public water and sewer system serves the subject project. The site ultimately discharges to the Patapsco River and this area is designated as a Stream Use I.

The extended detention facility and the various ESD_v practices provide natural resource protection and enhancement. The site discharge utilizes the natural flow pattern from the site. The project will utilize dry wells (M-5), a micro-bioretention facility (M-6) and Filterra structural practices in addition to pipe storage for peak management control.

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

[Signature] 6-23-17
 CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

[Signature] 6-22-17
 CHIEF, DIVISION OF LAND DEVELOPMENT DATE



LAYOUT PLAN
 SCALE: 1"=40'

SPECIMEN TREE CHART

NO.	SIZE (IN. DBH/FEET HEIGHT)	CRZ	COMMON NAME	CONDITION	COMMENTS
ST 1	34" 51'		SYCAMORE	GOOD CONDITION, WITHIN THE STREAM BUFFER	TO BE REMOVED

SHEET INDEX

DESCRIPTION	SHEET NO.
LAYOUT PLAN	1 OF 3
SOILS MAP, GRADING, EROSION AND SEDIMENT CONTROL PLAN	2 OF 3
PROPOSED ESD _v DRAINAGE AREA MAP AND SWM DETAILS	3 OF 3

OWNER/DEVELOPER
 COURT HILL, LLC.
 5881 STEARMAN COURT
 ELK RIDGE, MD 21075
 C/O ART WARSHAW
 443-255-1976

NO.	REVISION	DATE

ENVIRONMENTAL CONCEPT PLAN
LAYOUT PLAN
THE TOWNS AT COURT HILL
LOTS 1-8 AND OPEN SPACE LOT 9
 PARCEL 43 (L. 7128 / F. 548)
 3614 COURT HOUSE DRIVE
 ELLICOTT CITY, MD 21043

TAX MAP: 25 GRID: 7
 2ND ELECTION DISTRICT

ROBERT H. VOGEL ENGINEERING, INC.
 ENGINEERS • SURVEYORS • PLANNERS
 8407 MAIN STREET
 ELLICOTT CITY, MD 21043
 TEL: 410.461.7666
 FAX: 410.461.8966

PROFESSIONAL CERTIFICATE

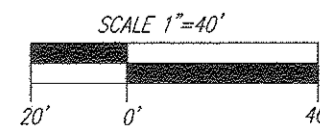
DESIGN BY: _____
 DRAWN BY: JMR
 CHECKED BY: RHW
 DATE: JUNE 2017
 SCALE: AS SHOWN
 W.O. NO.: 04-104

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

1 SHEET OF 3

SOILS LEGEND				
SYMBOL	NAME / DESCRIPTION	GROUP	K-FACTOR	ERODIBLE
MgD	MANOR-BANNERTOWN SANDY LOAMS, 15 TO 25 PERCENT SLOPES, ROCKY	B	.15	YES
MgF	MANOR-BANNERTOWN SANDY LOAMS, 25 TO 65 PERCENT SLOPES, ROCKY	B	.20	YES

SOILS INFORMATION FROM USDA WEB SOIL SURVEY WEBSITE
 HOWARD COUNTY SOILS MAP NUMBER 14 - ELLICOTT CITY SE
 NOTE:
 OR THOSE SOILS WITH A SOIL ERODIBILITY FACTOR K GREATER THAN 0.35 AND WITH HIGHLY ERODIBLE SOILS ARE THOSE SOILS WITH A SLOPE GREATER THAN 15 PERCENT A SLOPE GREATER THAN 5 PERCENT



GRADING PLAN
 SCALE: 1"=40'

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

Chad Elch 6-23-17
 CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE
Kurt Schaefer 6-22-17
 CHIEF, DIVISION OF LAND DEVELOPMENT DATE

LEGEND	
RIGHT-OF-WAY LINE	---
BOUNDARY LINE	---
ADJ. BOUNDARY LINES	---
EXISTING EDGE OF PAVEMENT	---
EXISTING CURB AND GUTTER	---
PROPOSED CURB AND GUTTER	---
EXISTING FENCE	X
EXISTING STORMDRAIN	SD
EXISTING SANITARY SEWER	SS
EXISTING OVERHEAD LINES	OH
EXISTING WATER	W
EXISTING GUARDRAIL	---
EXISTING TREETRUNK	---
EXISTING WETLANDS	---
EXISTING WETLAND BUFFER	---
EXISTING STREAM BUFFER	---
EXISTING STREAM	---
EXISTING UTILITY POLE	---
EXISTING LIGHT POLE	---
EXISTING SANITARY MANHOLE	---
EXISTING CLEANOUT	---
EXISTING FIRE HYDRANT	---
PROPOSED TREETRUNK	---
PROPOSED SIDEWALK	---
PROPOSED MICRO-BIORETENTION FACILITY (M-B)	---
PROPOSED DRY WELL (M-5)	DW
PROPOSED FOREST CONSERVATION EASEMENT	---
EXISTING PUBLIC WATER, SEWER, AND UTILITY RIGHT OF WAY (PER CONT. # 118-W&S)	---
PROPOSED PUBLIC WATER, SEWER & UTILITY EASEMENT	---
PROPOSED PRIVATE DRAINAGE EASEMENT	---
EXISTING 10' CONTOUR	---
EXISTING 2' CONTOUR	---
SOILS	---
PROPOSED 10' CONTOUR	---
PROPOSED 2' CONTOUR	---
PROPOSED SPOT ELEVATION	---
EXISTING STEEP SLOPES	---
EXISTING MODERATE SLOPES	---
PROPOSED SUPER SILT FENCE	---
PROPOSED DIVERSION FENCE	---
PROPOSED INLET PROTECTION	---
PROPOSED LIMIT OF DISTURBANCE	---
PROPOSED EROSION CONTROL MATING	---
PROPOSED STABILIZED CONSTRUCTION ENTRANCE	---
PROPOSED TREE PROTECTION FENCE	---

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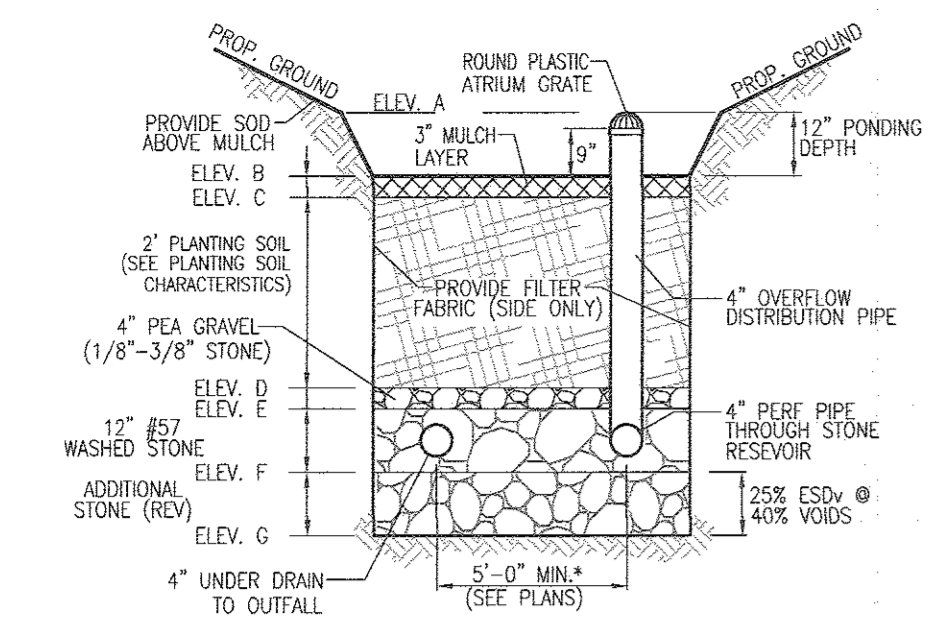
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ENVIRONMENTAL CONCEPT PLAN
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	DESIGN BY: RHV	PROFESSIONAL CERTIFICATE I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 16193 EXPIRATION DATE: 06-27-2018
	DRAWN BY: JMR	
	CHECKED BY: RHV	
	DATE: JUNE 2017	
SCALE: AS SHOWN	W.O. NO.: 04-104	2 SHEET OF 3



MICRO-BIORETENTION
NOT TO SCALE

FACILITY	MICRO-BIORETENTION FACILITY ELEVATIONS (M-6)						OUTFALL INV.	FACILITY SIZE		
	A	B	C	D	E	F				
MBR-1	275.00	274.00	273.75	271.75	271.42	270.42	269.72	270.75	270.12	438 SF

MICROBIOTENTION NOTES:
 1. ONLY THE SIDES OF MICROBIOTENTION ARE TO BE WRAPPED IN FILTER FABRIC. FILTER FABRIC BETWEEN LAYER OR AT THE BOTTOM OF THE MICROBIOTENTION 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 BIOS. (SEE PLANS)
 4. PERIF. PIPE THROUGH STONE RESERVOIR

OPERATION AND MAINTENANCE SCHEDULE FOR (M-6) MICROBIOTENTION AREAS
 1. ANNUAL MAINTENANCE OF PLANT MATERIAL, MULCH LAYER AND SOIL LAYER IS REQUIRED. MAINTENANCE OF MULCH AND SOIL IS LIMITED TO CORRECTING AREAS OF EROSION OR WASH OUT. ANY MULCH REPLACEMENT SHALL BE DONE IN THE SPRING. PLANT MATERIAL SHALL BE CHECKED FOR DISEASE AND INSECT INFESTATION AND MAINTENANCE WILL ADDRESS DEAD MATERIAL AND PRUNING. ACCEPTABLE REPLACEMENT PLANT MATERIAL IS LIMITED TO THE FOLLOWING: 2000 MAINTENANCE STORMWATER DESIGN MANUAL VOLUME II, TABLE A-4.1 AND 2.
 2. SCHEDULE OF PLANT INSPECTION WILL BE TWICE A YEAR IN SPRING AND FALL. THIS INSPECTION WILL INCLUDE REMOVAL OF DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, TREATMENT OF ALL DISEASED TREES AND SHRUBS AND REPLACEMENT OF ALL DEFICIENT STAKES AND 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.

APPENDIX B.4.C SPECIFICATIONS FOR MICRO-BIORETENTION, RAIN GARDENS, 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 TAPPED WITHIN THE MICRO-BIORETENTION PRACTICE THAT MAY BE HARMFUL TO PLANT GROWTH, OR PROVE A HINDRANCE TO THE PLANTING OR MAINTENANCE OPERATIONS. THE PLANTING SOIL SHALL BE FREE OF BERMOUDA GRASS, QUACKGRASS, JOHNSON GRASS, OR OTHER NOXIOUS WEEDS AS SPECIFIED UNDER COMAR 15.08.01.05.
 THE PLANTING SOIL SHALL BE TESTED AND SHALL MEET THE FOLLOWING CRITERIA:
 * SOIL COMPONENT - LOAMY SAND OR SANDY LOAM (USDA SOIL TEXTURAL CLASSIFICATION).
 * 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 (30% 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.
 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 CONTRACTOR SHOULD USE WIDE TRACK OR MASH 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 CHISEL PLOW, RIPPER, OR SUBSOILER. THESE TILLING OPERATIONS ARE TO REFRACATURE THE SOIL PROFILE THROUGH THE 12 INCH COMPACTION ZONE. SUBSTITUTE METHODS MUST BE APPROVED BY THE ENGINEER. ROTILLERS TYPICALLY DO NOT TILL DEEP ENOUGH TO REDUCE THE EFFECTS OF COMPACTION FROM HEAVY EQUIPMENT.
 ROTILL 2 TO 3 INCHES OF SAND INTO THE BASE OF THE BIORETENTION FACILITY BEFORE BACKFILLING THE OPTIONAL SAND LAYER. PUMP ANY POONED WATER BEFORE PREPARING (ROTILLING) BASE.
 WHEN BACKFILLING THE TOPSOIL OVER THE SAND LAYER, FIRST PLACE 3 TO 4 INCHES OF TOPSOIL OVER THE SAND, THEN ROTILL THE SAND/TOPSOIL TO CREATE A GRADATION ZONE. BACKFILL THE REMAINDER OF THE TOPSOIL TO FINAL GRADE.
 WHEN BACKFILLING THE BIORETENTION FACILITY, PLACE SOIL IN LIFTS 12" TO 18". DO NOT USE HEAVY EQUIPMENT WITHIN THE BIORETENTION BASIN. HEAVY EQUIPMENT CAN BE USED AROUND THE PERIMETER OF THE BASIN TO SUPPLY SOILS AND SAND. GRADE BIORETENTION MATERIALS WITH LIGHT EQUIPMENT SUCH AS A COMPACT LOADER OR A DOZER/LOADER WITH MESH TRACKS.

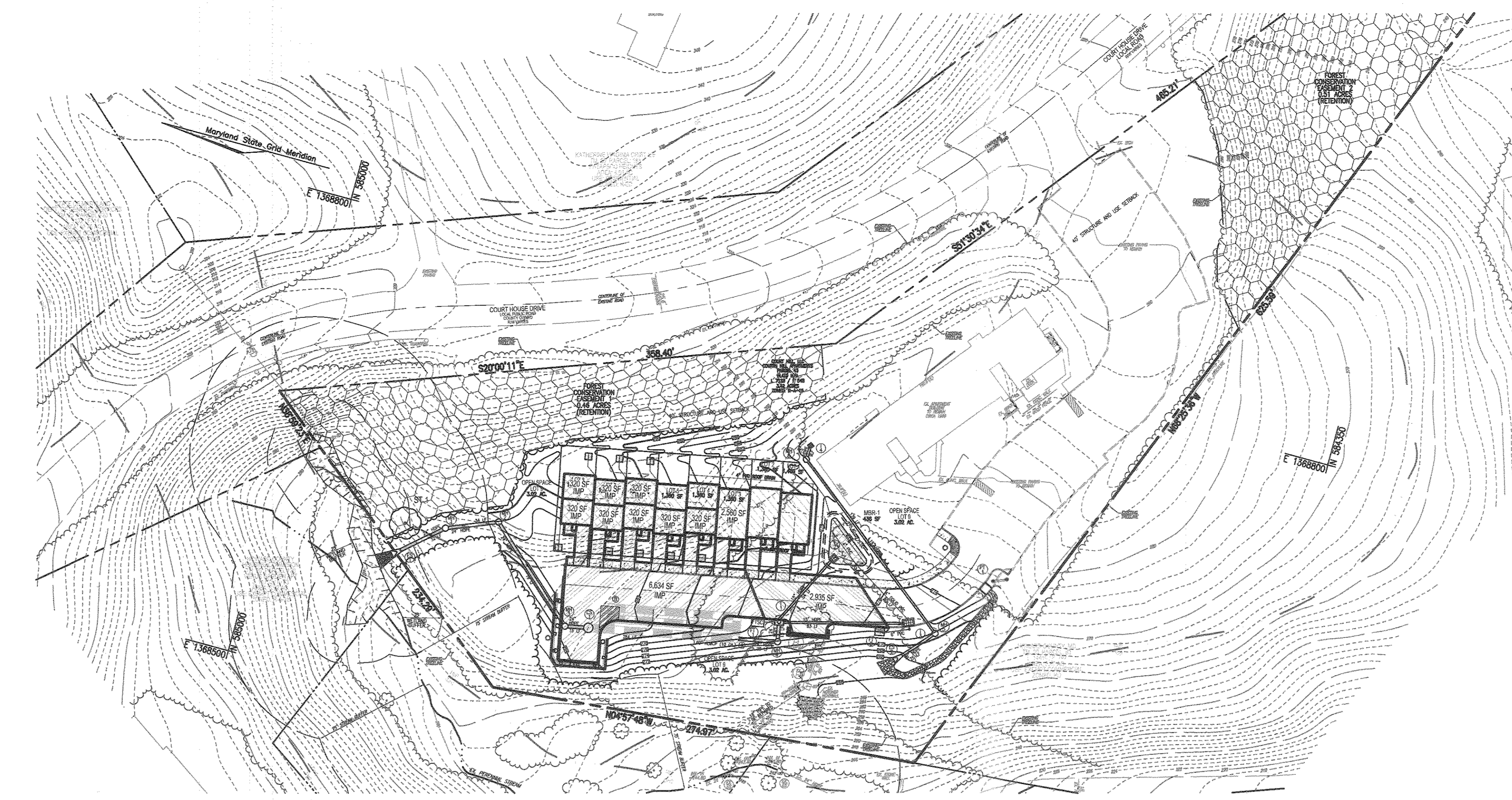
4. PLANT MATERIAL
 RECOMMENDED PLANT MATERIAL FOR MICRO-BIORETENTION PRACTICES CAN BE FOUND IN APPENDIX A, SECTION A.2.3.

5. PLANT INSTALLATION
 COMPOST IS A BETTER ORGANIC MATERIAL SOURCE, IS LESS LIKELY TO FLOAT, AND SHOULD BE PLACED IN THE INVERT AND OTHER LOW AREAS. MULCH SHOULD BE PLACED SURROUNDING TO A UNIFORM THICKNESS OF 2" TO 3". SHREDDED OR CHIPPED HARDWOOD MULCH IS THE ONLY ACCEPTED MULCH. PINE MULCH AND WOOD CHIPS WILL FLOAT AND MOVE TO THE PERIMETER OF THE BIORETENTION AREA DURING A STORM EVENT AND ARE NOT ACCEPTABLE. SHREDDED MULCH MUST BE WASH AGED (6 TO 12 MONTHS) FOR ACCEPTANCE.
 ROOTSTOCK OF THE PLANT MATERIAL SHALL BE KEPT MOST 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 GRADUALLY USING 2" TO 3" STAKES ONLY AS NECESSARY AND FOR THE FIRST GROWING SEASON ONLY.
 STAKES ARE TO BE EQUALLY SPACED ON THE OUTSIDE OF THE TREE BALL.
 GRASSES AND LEGUME SEED SHOULD BE DRILLED INTO THE SOIL TO A DEPTH OF AT LEAST ONE INCH. GRASS AND LEGUME PLUGS SHALL BE PLANTED FOLLOWING THE NON-GRASS GROUND COVER PLANTING SPECIFICATIONS.

THE TOPSOIL SPECIFICATIONS PROVIDE ENOUGH ORGANIC MATERIAL TO ADEQUATELY SUPPLY NUTRIENTS FROM ANNUAL CYCLING. THE PRIMARY FUNCTION OF THE BIORETENTION STRUCTURE IS TO IMPROVE WATER QUALITY. ADDING FERTILIZERS, PESTICIDES, OR AT A MINIMUM, IMPROVES THIS GOAL. ONLY ADD FERTILIZER IF WOOD CHIPS OR MULCH ARE USED TO AMEND THE SOIL. ROTILL 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. THE PERFORATED MATERIAL IS SLOTTED, 1/4" HOLES (E.G., PVC OR HDPE).
 * PERFORATIONS - IF PERFORATED PIPE IS USED, PERFORATIONS SHOULD BE 3/8" DIAMETER LOCATED 6" ON CENTER WITH A MINIMUM OF FOUR HOLES PER ROW. PIPE SHALL BE WRAPPED WITH A 1/4" (NO. 4 OR 44) GALVANIZED HARDWARE CLOTH.
 * GRAVEL - THE GRAVEL LAYER AND 5" STONE (PREFERRED) SHALL BE AT LEAST 1" 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 #10 TO THE UNDERDRAIN. THIS LAYER MAY BE CONSIDERED PART OF THE FILTER BED WHEN BED THICKNESS EXCEEDS 24".
 THE MAIN COLLECTOR PIPE FOR UNDERDRAIN SYSTEMS SHALL BE CONSTRUCTED AT A MINIMUM SLOPE OF 0.5%. OBSERVATION WELLS AND/OR CLEAN-OUT PIPES MUST BE PROVIDED (ONE MINIMUM PER EVERY 1000 SQUARE FEET OF SURFACE AREA).

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

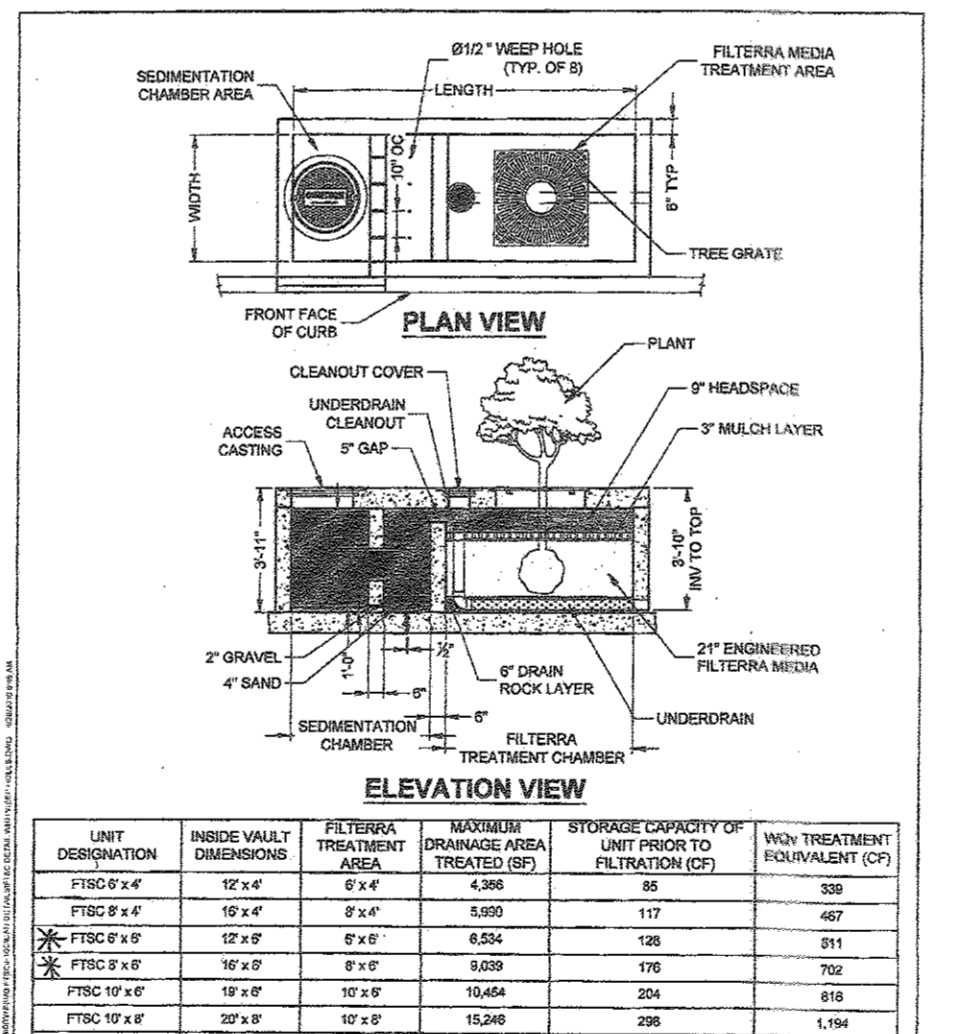


PROPOSED ESDv DRAINAGE AREA MAP

SCALE: 1"=50'

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)	n/a	aged 6 months, minimum; no pine or wood chips
Mulch	shredded hardwood	n/a	
Pea gravel displacer	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	n/a	PE Type 1 nonwoven
Gravel (underdrains and infiltration berms)	AASHTO M-43	NO. 57 OR NO. 6 AGGREGATE (0.8" to 3/8")	
Underdrain piping	F 758, Type PS 28 or AASHTO M-278	4" to 6" rigid schedule 40 PVC or SDR35	Slotted or perforated pipe; 3/8" perf. @ 6" on center, 4 holes per row; minimum of 3" of gravel over pipe; not necessary underdrain pipes. Perforated pipe shall be wrapped with 1/4-inch galvanized hardware cloth.
Poured in place concrete (if required)	MSHA Mix No. 3, f'c = 3500 psi @ 28 days, normal weight, air-entrained; conforming to meet ASTM-615-00	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 318.8R92 vertical loading (H 10 or H1-20); allowable horizontal loading (based on soil properties) and analysis of potential cracking. 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.
Sand	AASHTO M-6 or ASTM-C-33	0.02" to 0.04"	



ENVIRONMENTAL SITE DESIGN

1.00 0.96 0.94 0.92 0.90 0.88 0.86 0.84 0.82 0.80 0.78 0.76 0.74 0.72 0.70 0.68 0.66 0.64 0.62 0.60 0.58 0.56 0.54 0.52 0.50 0.48 0.46 0.44 0.42 0.40 0.38 0.36 0.34 0.32 0.30 0.28 0.26 0.24 0.22 0.20 0.18 0.16 0.14 0.12 0.10 0.08 0.06 0.04 0.02 0.00

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