

Catherine and Isiah Leggett Math and Science Building

Montgomery College Takoma Park / Silver Spring Campus 7600 Takoma Avenue Takoma Park, MD 20912

Montgomery College Project #: FP16-077

USING AGENCY APPROVAL

DATE

DATE

TITLE

DGS APPROVAL

PROJECT MANAGER

CHIEF OF PM&D

DATE

SMITHGROUP

1700 NEW YORK AVENUE NW SUITE 100 WASHINGTON, DC 20006 202.842.2100

www.smithgroup.com AMT Engineering CIVIL ENGINEERS

800 King Farm Boulevard, 4th Floor Rockville, MD 20850 301-881-2545

Cagley & Associates STRUCTURAL ENGINEERS 6141 Executive Boulevard Rockville, MD 20852 301-881-9050

Mahan Rykiel LANDSCAPE ARCHITECTS 3300 Clipper Mill Road, Suite 200

410-235-6001

Spexsys AV, IT, SECURITY 7257 Parkway Drive, Suite 260 Hanover, MD 21076 410-712-0390

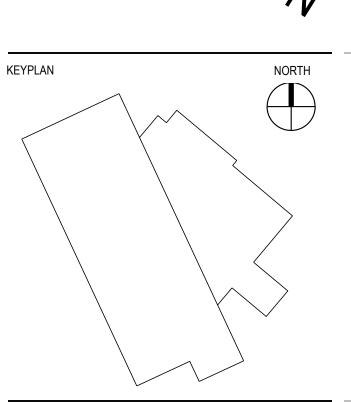
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DESIGN DEVELOPMENT
SCHEMATIC DESIGN SUBMISSION

SEALS AND SIGNATURES



STORMWATER MANAGEMENT PLAN

PROJECT NUMBER

C-26

SHEET NUMBER

PROPOSED BUILDING

CONDUCTED DURING CONSTRUCTION.

PROFESSIONAL CERTIFICATION

TYPE OF FACILITY: MICRO-BIORETENTION

FILTER BED AREA (LxW)/ SURFACE AREA (SF)

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. _____, EXPIRATION DATE

FILTER BED SURFACE ELEVATION

OUTLET PIPE SIZE / ELEVATION

PLANTING MEDIA THICKNESS

UNDERDRAIN GRAVEL THICKNESS

OVERFLOW INLET DIAMETER/TOP ELEVATION

DATE AS-BUILT ACCEPTED BY DPW

MULCH THICKNESS

SAND THICKNESS

UNDERDRAIN LENGTH

underdrain pipe size / elevation

 THE CONTRACTOR SHALL ENSURE THAT THE STORMWATER MANAGEMENT FACILITIES ARE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL PROVIDE THE ENGINEER OF RECORD WITH THE "RED LINED" AS-BUILT PLANS FOR REVIEW AND ACCEPTANCE PRIOR TO FINAL STABILIZATION.

SWM #5

DESIGN

33'x25' / 700 SF

2" HDPE / 310.75

6" PVC / 311.25

24" / 315.75

*AS-BUILT

SWM #4

*AS-BUILT

DESIGN

6'x20' / 500 SF

2" HDPE / 310.75

6" PVC / 311.25

24" / 315.75

AS-BUILT DATA FOR STORMWATER MANAGEMENT FACILITIES TO BE COMPLETED BY THE CERTIFYING DESIGN ENGINEER

*AS-BUILT

SWM #1

DESIGN

3'x7' / 150 SF

2" HDPE / 311.00

6" PVC / 311.50

24"/ 316.00

6"-12" PONDING TOP ELEV.="B" DEPTH (SEE TABLE) 30" PLANTING MEDIA — 6" SAND 6" NO. 57 STONE_ ABOVE PIPE BOTTOM OF FILTER 12" HDPE OUT INV. ELEV.="I" 6" SOLID PVC-12" MIN. NO. 57 STÓNE CLEAR TO CLEAR TO SUBGRADE 6" DIA. PERF. PERF.'S └PVC UNDERDRAIN

MICRO-BIO	ORETENTIO	ON DESIGN	N TABLE
ELEV.	BMP 1	BMP 4	BMP 5
А	315.50	315.25	315.25
В	315.75	315.50	315.50
С	316.00	316.25	316.25
D			
E	313.00	312.75	312.75
F	312.50	312.25	312.25
G	311.50	311.25	311.25
Н	311.25	311.00	311.00
J	15'	42'	53'
SURFACE AREA	150 SF	500 SF	700 SF
FILTER MEDIA DEPTH	2.5'	2.5'	2.5'
PONDING DEPTH	0.5'	1.0'	1.0'

ELEV. A = TOP OF PLANTING MEDIA

ELEV. B = TOP OF MULCH LAYERELEV. C = PONDING DEPTH/ESD WATER SURFACE ELEVATION

ELEV. D = 10-YR WATER SURFACE ELEVATION ELEV. E = TOP OF SAND LAYER

ELEV. F = TOP OF STONE LAYER

ELEV. G = BOTTOM OF UNDERDRAIN

ELEV. H = BOTTOM OF FILTER

ELEV. I = OUTLET PIPE ELEVATION J = TOTAL LENGTH OF UNDERDRAIN

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SWM ENLARGEMENT

C-27

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SUITE 100

202.842.2100

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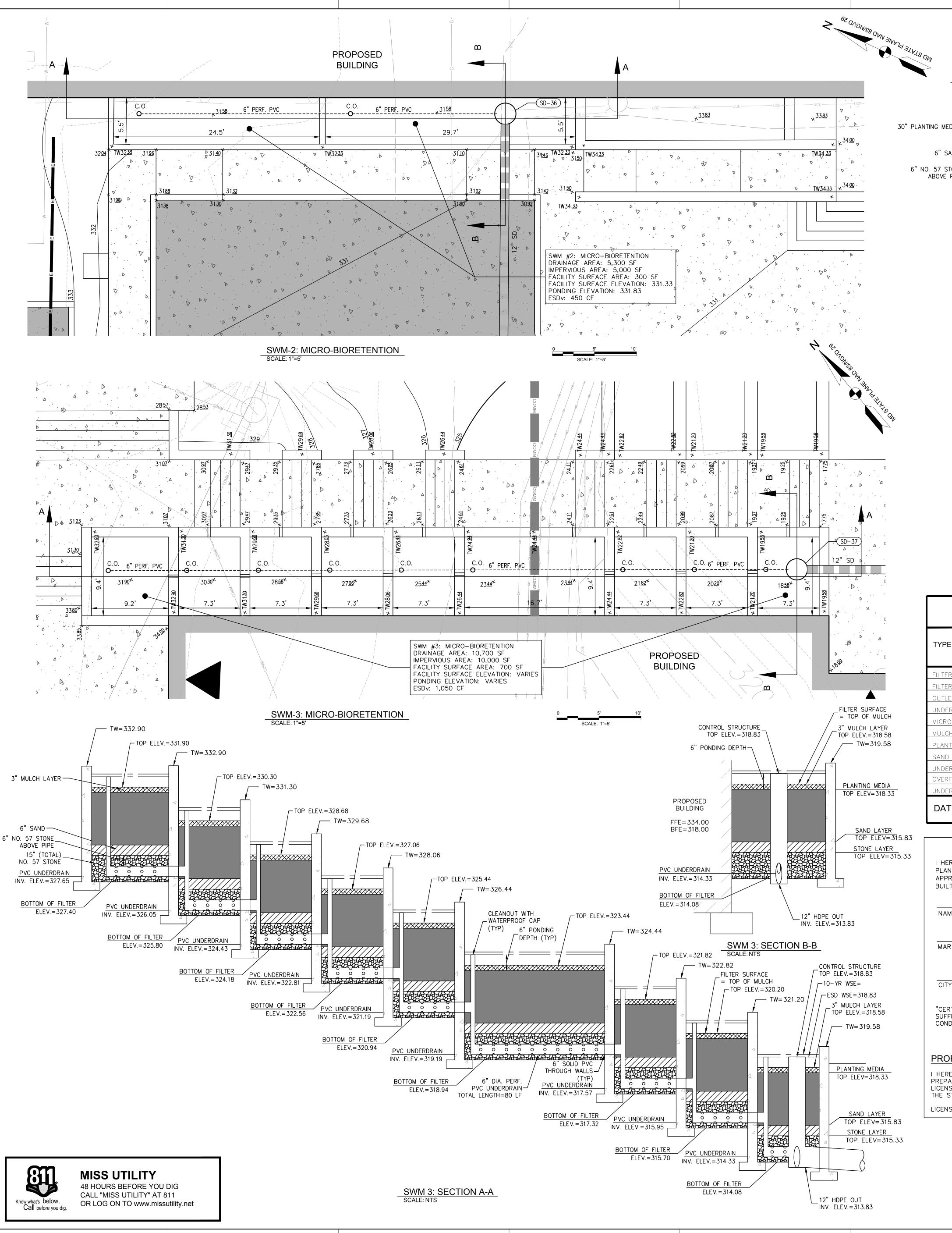
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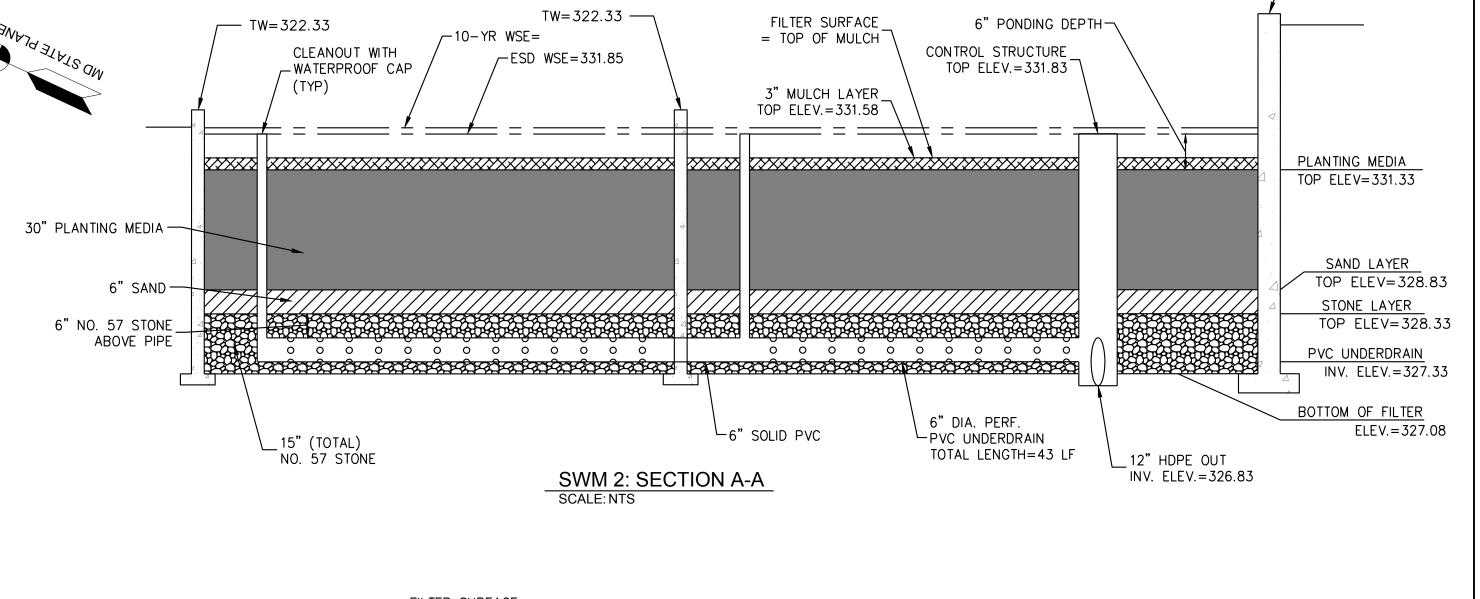
TOP ELEV="A" FILTER FABRIC - MIRAFI 140-N (OR APPROVED EQUIVALENT) ON THE SIDES ONLY

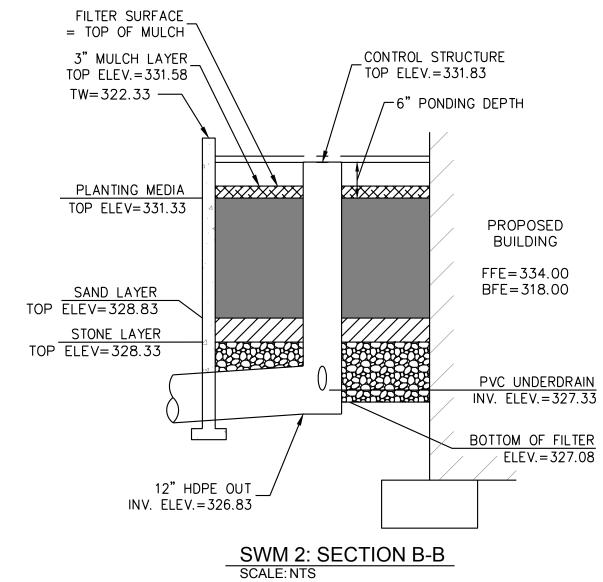
TOP ELEV="E STONE LAYER TOP ELEV="F" PVC UNDERDRAIN INV. ELEV.="G"

TOTAL LENGTH="J" LF

1 MICRO-BIORETENTION - TYPICAL SECTION







AS-BUILT DATA FOR STORM	WATER MANAGEME CERTIFYING DESIG		O BE COMPLETED E	BY THE
TYPE OF FACILITY: MICRO-BIORETENTION	SWM	#2	SWM	#3
THE OF TAGILITY. WHORE BIORETENTION	DESIGN	*AS-BUILT	DESIGN	*AS-BUILT
filter bed area (lxw)/ surface area (sf)	54'x5.5' / 300 SF		77'x9.4' / 700 SF	
FILTER BED SURFACE ELEVATION	331.58		VARIES	
OUTLET PIPE SIZE / ELEVATION	12" HDPE / 326.83		12" HDPE / 313.83	
underdrain pipe size / elevation	6" PVC / 327.33		6" PVC / 313.83	
MICRO-BIORETENTION VOLUME	450 CF		1,050 CF	
MULCH THICKNESS	3"		3"	
PLANTING MEDIA THICKNESS	30"		30"	
SAND THICKNESS	6"		6"	
UNDERDRAIN GRAVEL THICKNESS	15"		15"	
OVERFLOW INLET DIAMETER/TOP ELEVATION	24"/ 331.83		24" / 318.83	
UNDERDRAIN LENGTH	43'±		80'±	
DATE AS-BUILT ACCEPTED BY DPW:				

AS BUILT CERTIFICATION HEREBY CERTIFY THAT THE STORMWATER MANAGEMENT FACILITY SHOWN ON THE PLANS HAS (HAVE) BEEN CONSTRUCTED IN ACCORDANCE WITH THE PLANS APPROVED BY THE CITY OF ROCKVILLE, EXCEPT AS NOTED IN RED ON THE "AS BUILT" DRAWINGS. SIGNATURE MARYLAND REGISTRATION NUMBER DATE CITY OF ROCKVILLE REVIEW NO. FACILITY IDENTIFICATION (NUMBER AND/OR TYPE) "CERTIFY" MEANS TO STATE OR DECLARE A PROFESSIONAL OPINION BASED ON SUFFICIENT AND APPROPRIATE ONSITE INSPECTIONS AND MATERIAL TESTS CONDUCTED DURING CONSTRUCTION. 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. ______, EXPIRATION DATE

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TW = 324.33

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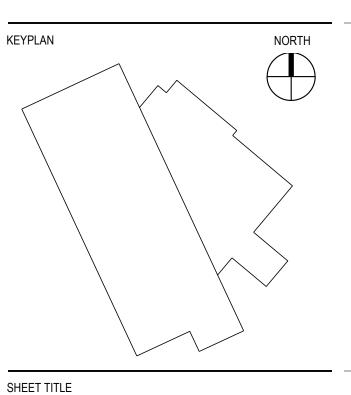
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SCHEMATIC DESIGN SUBMISSION 23 JAN 2019

SEALS AND SIGNATURES



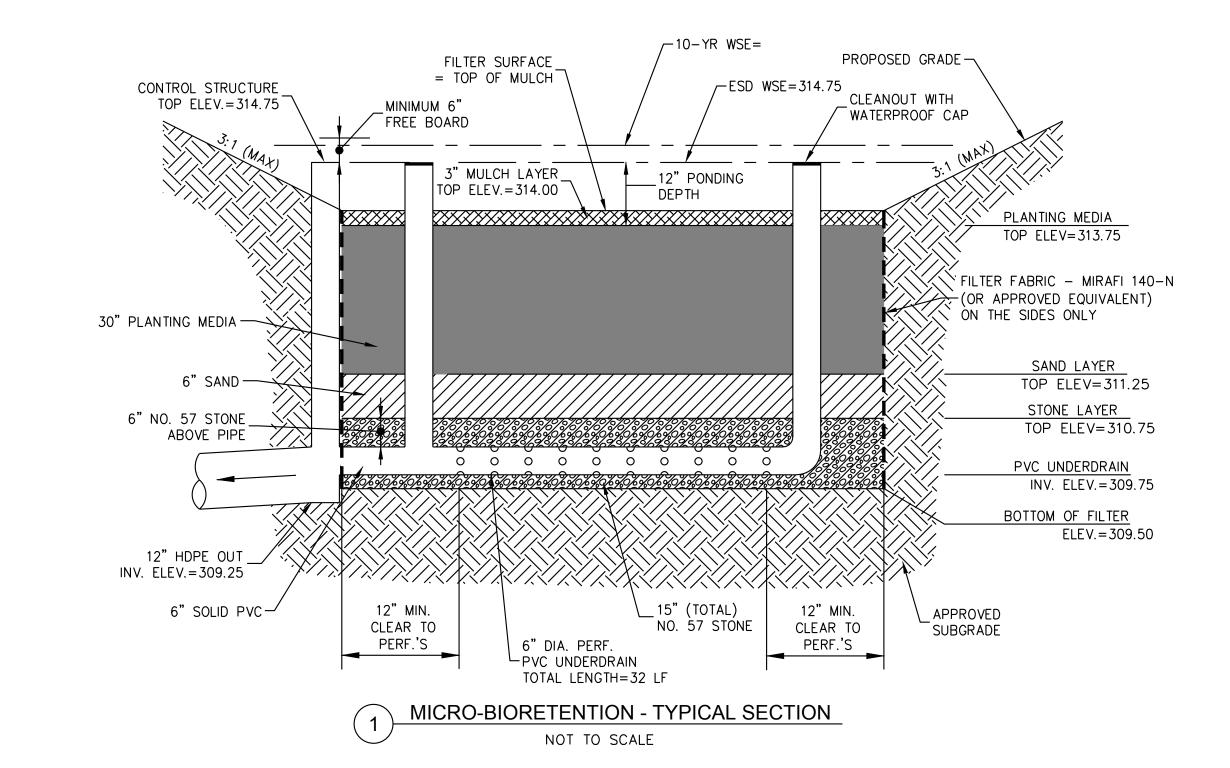


SWM ENLARGEMENT

PROJECT NUMBER

C-28

SHEET NUMBER



AS-BUILT DATA FOR STORMWATER MANAGEMENT FACILITIES TO BE COMPLETED BY THE CERTIFYING DESIGN ENGINEER SWM #6 TYPE OF FACILITY: MICRO-BIORETENTION DESIGN *AS-BUILT FILTER BED AREA (LxW)/ SURFACE AREA (SF) 5'x17' / 450 SF FILTER BED SURFACE ELEVATION OUTLET PIPE SIZE / FLEVATION 12" HDPF / 309.25 UNDERDRAIN PIPE SIZE / ELEVATION " PVC / 309.50 MICRO-BIORETENTION VOLUME MULCH THICKNESS PLANTING MEDIA THICKNESS SAND THICKNESS UNDERDRAIN GRAVEL THICKNESS OVERFLOW INLET DIAMETER/TOP ELEVATION 24"/ 314.75 UNDERDRAIN LENGTH DATE AS-BUILT ACCEPTED BY DPW:



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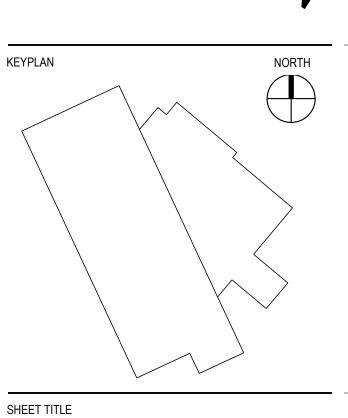
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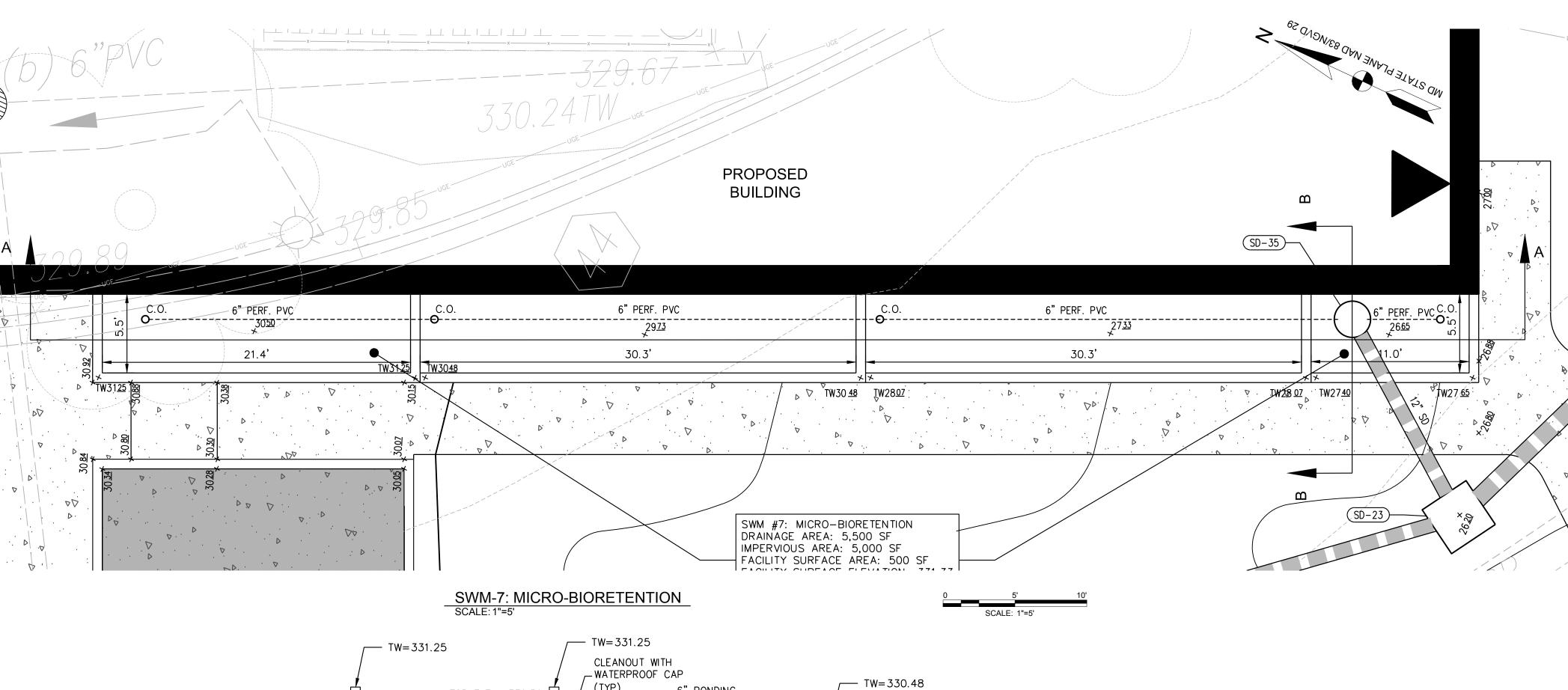


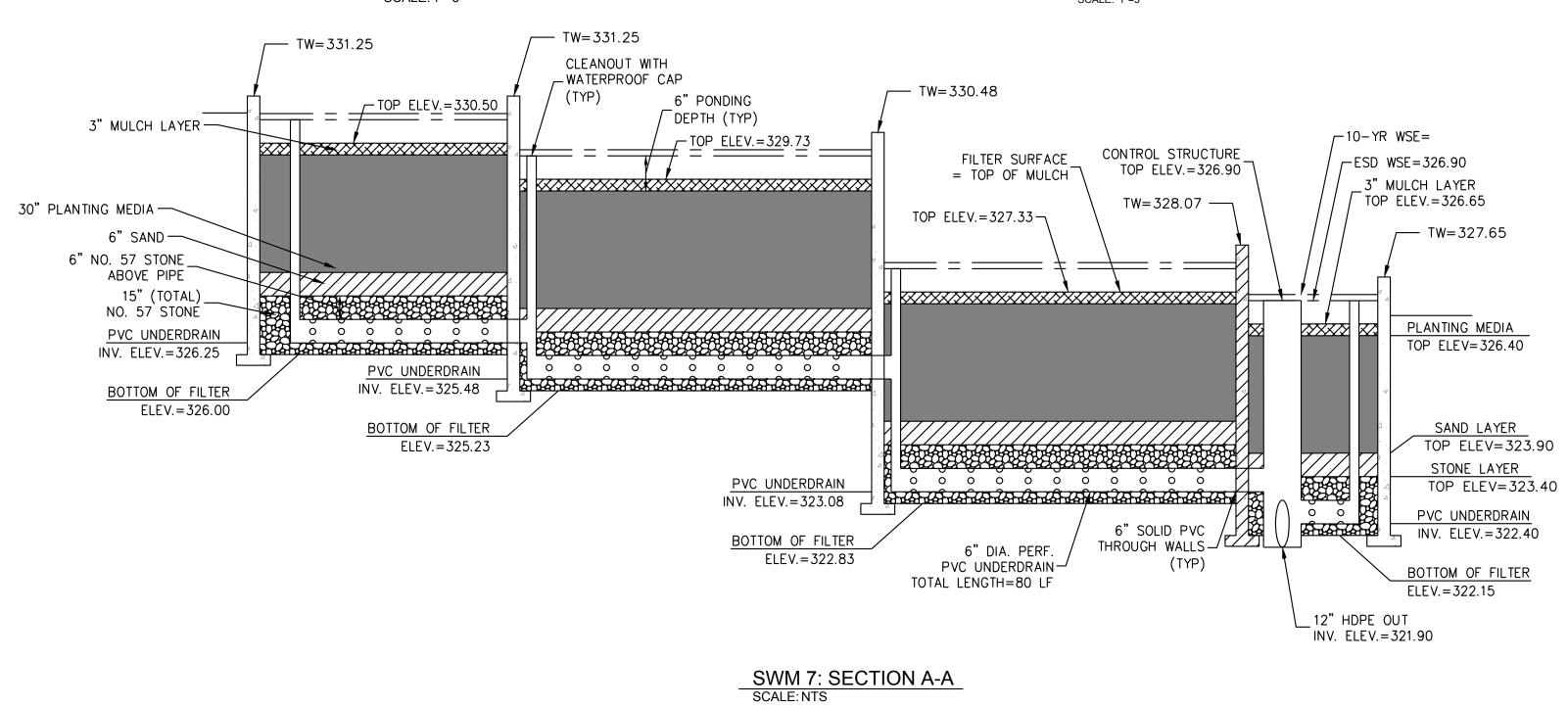
SWM ENLARGEMENT

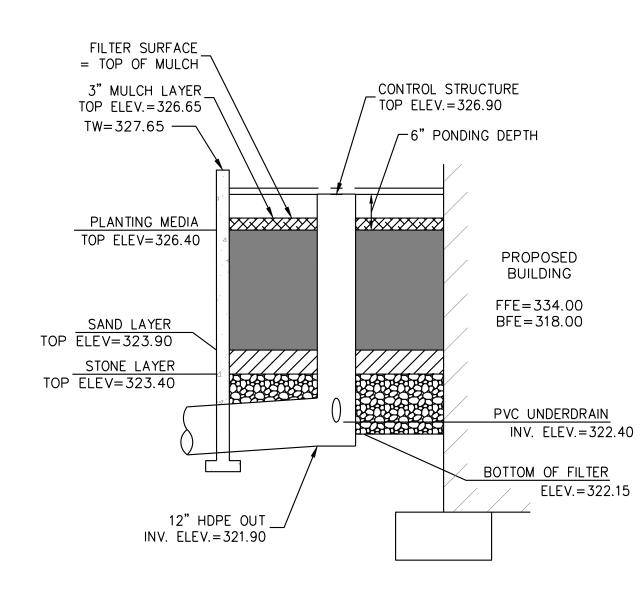
C-29

PROJECT NUMBER

SHEET NUMBER







SWM 7: SECTION B-B
SCALE: NTS

AS-BUILT DATA FOR STORMWATER TO BE COMPLETED BY THE CERTII	

TYPE OF FACILITY: MICRO-BIORETENTION	SWM #7		
THE OF TROILITE WHORE BIORETERTION	DESIGN	*AS-BUILT	
FILTER BED AREA (LxW)/ SURFACE AREA (SF)	93'x5.5' / 500 SF		
FILTER BED SURFACE ELEVATION	326.65		
OUTLET PIPE SIZE / ELEVATION	12" HDPE / 321.90		
UNDERDRAIN PIPE SIZE / ELEVATION	6" PVC / 322.40		
MICRO-BIORETENTION VOLUME	750 CF		
MULCH THICKNESS	3"		
PLANTING MEDIA THICKNESS	30"		
SAND THICKNESS	6"		
UNDERDRAIN GRAVEL THICKNESS	15"		
OVERFLOW INLET DIAMETER/TOP ELEVATION	24"/ 326.90		
UNDERDRAIN LENGTH	80'±		

ACILITY IDENTIFICATION UMBER AND/OR TYPE) PROFESSIONAL OPINION BASED ON
UMBER AND/OR TYPE)
PROFESSIONAL OPINION BASED ON
TIONS AND MATERIAL TESTS
/
ERE AM A DULY LAWS OF

AS BUILT CERTIFICATION

I HEREBY CERTIFY THAT THE STORMWATER MANAGEMENT FACILITY SHOWN ON THE

AS-BUILT CERTIFICATION REQUIREMENTS:

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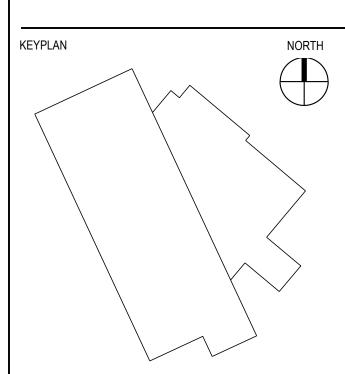
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SEALS AND SIGNATURES





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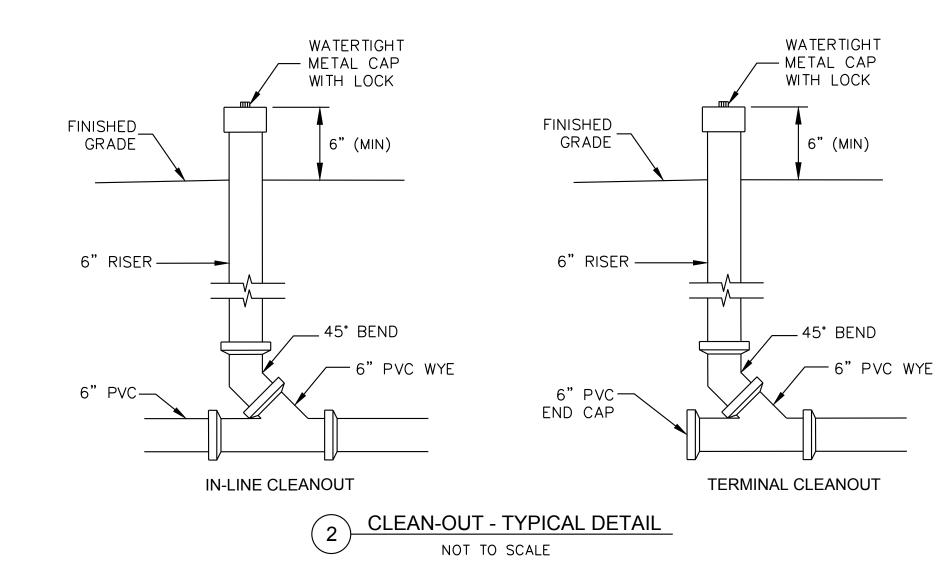
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MC DPS MICRO-BIORETENTION SPECIFICATIONS

- 1. THE UNDERDRAIN CONSISTS OF 6-INCH DIAMETER SCHEDULE 40 OR STRONGER PERFORATED PVC PIPE AT 0.00% SLOPE. THE UNDERDRAIN PIPE WILL BE PLACED WITHIN THE GRAVEL LAYER. A MINIMUM OF 3-INCHES OF GRAVEL MUST BE PLACED UNDER THE PIPE, WITH A MINIMUM OF 6-INCHES OF GRAVEL OVER THE PIPE. PERFORATIONS MUST BE 3/8 INCH IN DIAMETER AND MUST BE LOCATED 4 INCHES ON CENTER, EVERY 90 DEGREES AROUND THE PIPE, PERFORATED PIPE MUST BEGIN AT LEAST 12-INCHES INSIDE THE FILTER MEDIA. FILTER FABRIC MUST NOT BE WRAPPED AROUND THE UNDERDRAIN PIPE. AN ACCEPTABLE ALTERNATIVE TO PERFORATED PIPE IS 6-INCH DIAMETER SCHEDULE 40 SLOTTED PVC PIPE WITH 0.125-INCH SLOTS. SLOTS SHALL BE 0.125-INCHES WIDE AND A MINIMUM OF 1.9-INCHES IN LENGTH, WITH A MINIMUM OF 4 SLOTS PER ROW AND 4 ROWS PER LINEAR FOOT OF PIPE.
- 2. ACCESS FOR CLEANING ALL UNDERDRAIN PIPING IS NEEDED. WATERTIGHT CLEAN-OUTS FOR EACH PIPE SHALL BE LEVEL WITH THE TOP OF THE MULCH. ALL CLEAN-OUTS SHOULD BE 6" IN DIAMETER AND HAVE A REMOVABLE WATERPROOF CAP. CLEANOUTS MUST BE CAPPED IMMEDIATELY AFTER FILTER MEDIA IS IN
- 3. THE GRAVEL LAYER SURROUNDING THE UNDERDRAIN PIPE(S) MUST MEET MSHA SIZE #7 (TABLE 901A), AND MUST PROVIDE A MINIMUM OF 6-INCHES COVER OVER THE PIPE(S), AND MINIMUM 3-INCHES UNDER THE PIPE. NO GEOTEXTILE OR FILTER FABRIC IS ALLOWED TO BE PLACED HORIZONTALLY ANYWHERE WITHIN THE FILTER MEDÍA .
- 4. A MINIMUM 6-INCH FINE AGGREGATE SAND LAYER SHALL BE PROVIDED BELOW THE PLANTING MEDIA. ASTM C33 OR AASHTO M6 FINE AGGREGATE CONCRETE SAND IS REQUIRED PER MONTGOMERY COUNTY SAND SPECIFICATIONS.
- 5. THE PLANTING MEDIA SHALL BE 24"-48" THICK AND SHALL CONSIST OF 1/3 PERLITE OR SOLITE, 1/3 COMPOST AND 1/3 TOPSOIL. THE PERLITE SHALL BE COARSE GRADE HORTICULTURAL PERLITE. THE COMPOST SHALL BE HIGH GRADE COMPOST FREE OF STONES AND PARTIALLY COMPOSTED WOODY MATERIAL. THE SOIL SHALL MEET THE FOLLOWING MINIMUM CRITERIA: CONTAIN NO MORE THAN 10% CLAY, 30-55% SILTS AND 35-60% SAND. THE SOIL SHALL BE FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN 2-INCHES. THE FIRST LAYER OF THE PLANTING MEDIA SHALL BE LIGHTLY TILLED TO MIX IT INTO THE SAND LAYER, SO AS NOT TO CREATE A DEFINITIVE BOUNDARY. THE PLANTING MATERIAL SHALL BE FLOODED AFTER PLACEMENT. ANY SETTLEMENT THAT OCCURS SHALL BE FILLED BACK TO THE DESIGN ELEVATION.
- 6. THE MULCH LAYER IS AN IMPORTANT PART OF THE MICRO-BIORETENTION DEVICE. MUCH OF THE POLLUTANT REMOVAL CAPACITY OF THE MICRO-BIORETENTION SYSTEM IS WITHIN THE MULCH LAYER. THE SURFACE MULCH LAYER WILL CONSIST OF STANDARD DOUBLE SHREDDED AGED HARDWOOD MULCH. THE MULCH SHOULD BE APPLIED UNIFORMLY TO A DEPTH OF 3 INCHES. YEARLY REPLENISHING MAY BE NECESSARY. PINE BARK IS NOT ACCEPTABLE.
- 7. PLANTS, THROUGH THEIR POLLUTANT UPTAKE AND EVAPO-TRANSPIRATION OF STORMWATER RUNOFF, PLAY A KEY ROLE IN THE OVERALL EFFECTIVENESS OF THE MICRO-BIORETENTION DEVICE. BOTH THE NUMBER AND TYPE OF TREE AND SHRUB PLANTINGS FOR THE SYSTEM MAY VARY, ESPECIALLY WHERE AESTHETICS OR OTHER CONSIDERATIONS ARE CRITICAL TO SITE DEVELOPMENT. WHILE NATIVE PLANTS ARE ENCOURAGED, THEY ARE NOT ALWAYS APPROPRIATE IN ALL SITUATIONS WHILE NO HARD PLANTING RULE EXISTS, THE PLANTS SHOULD BE A MIX OF TREES, SHRUBS AND HERBACEOUS MATERIALS. HOWEVER, THERE SHOULD BE 2 TO 3 SHRUBS PLANTED PER TREE AND HERBACEOUS PLANTINGS SHALL MAKE UP 40% OF THE TOTAL NUMBER OF PLANTS. TREES SHALL BE A MINIMUM OF 1 ½ IN. CALIPER, SHRUBS SHALL BE MINIMUM 2 GAL. SIZE AND HERBACEOUS PLANTS SHALL BE A MINIMUM 1 GAL SIZE. MATURE PLANT CANOPY SHOULD COVER 85% OF THE MICRO-BIORETENTION DEVICE. ALTERNATIVE PLANTING SCHEMES, INCLUDING USE OF GRASSES, MAY BE CONSIDERED IN SOME SITUATIONS, SO LONG AS THE PLANTING PLAN IS DESIGNED BY A REGISTERED LANDSCAPE ARCHITECT REGISTERED IN THE STATE OF MARYLAND, HOWEVER LAWN GRASSES ARE NOT APPROPRIATE FOR THESE FACILITIES. ALL PLANTINGS SHALL BE IN ACCORDANCE WITH THE MONTGOMERY COUNTY LANDSCAPE GUIDELINES. ALL LANDSCAPE PLANS MUST BE SEALED BY A REGISTERED LANDSCAPE ARCHITECT. SINCE THE PLANTS ARE AN INTEGRAL PART OF THE MICRO-BIORETENTION SYSTEM, NO CHANGES TO THE APPROVED LANDSCAPE PLAN WILL BE ALLOWED UNLESS AN ALTERNATE PLANT LIST, PREPARED BY A REGISTERED LANDSCAPE ARCHITECT, HAS BEEN APPROVED BY DPS PRIOR TO INSTALLATION. SINCE PLANT AVAILABILITY CAN CHANGE, DPS SUGGESTS INCLUDING AN ALTERNATE PLANT LIST ON THE LANDSCAPING PLANS.
- 8. PROVIDE APPROVED FILTER CLOTH (MIRAFI 140N OR APPROVED EQUIVALENT) ON THE SIDES OF THE TRENCH ONLY. DO NOT PLACE ANY GEOTEXTILE OR FILTER FABRIC ON THE BOTTOM OF THE TRENCH, OR HORIZONTALLY ANYWHERE WITHIN THE FACILITY.



MONTGOMERY COUNTY SAND SPECIFICATIONS

WASHED ASTM C33 FINE AGGREGATE CONCRETE SAND IS UTILIZED FOR STORMWATER MANAGEMENT APPLICATIONS IN MONTGOMERY COUNTY. IN ADDITION TO THE ASTM C33 SPECIFICATION, SAND MUST MEET ALL OF THE FOLLOWING CONDITIONS:

- 1. SAND MUST MEET GRADATION REQUIREMENTS FOR ASTM C-33 FINE AGGREGATE CONCRETE SAND. AASHTO M-6 GRADATION IS ALSO ACCEPTABLE.
- 2. SAND MUST BE SILICA BASED. NO LIMESTONE BASED PRODUCTS MAY BE USED. IF THE MATERIAL IS WHITE OR GRAY IN COLOR, IT IS PROBABLY NOT ACCEPTABLE.
- 3. SAND MUST BE CLEAN. NATURAL, UNWASHED SAND DEPOSITS MAY NOT BE USED. LIKEWISE, SAND THAT HAS BECOME CONTAMINATED BY IMPROPER STORAGE OR INSTALLATION PRACTICES WILL BE REJECTED.
- 4. MANUFACTURED SAND OR STONE DUST IS NOT ACCEPTABLE UNDER ANY CIRCUMSTANCE.

AS-BUILT CERTIFICATION REQUIREMENTS:

- THE CONTRACTOR SHALL PREPARE AND MAINTAIN A SET OF "RED LINED" AS-BUILT PLANS FOR THE CONSTRUCTION OF THE SWM FACILITY(S).
- THE CONTRACTOR SHALL ALSO COORDINATE AND ARRANGE FOR ALL REQUIRED INSPECTIONS THROUGHOUT THE CONSTRUCTION OF THE SWM FACILITY(S).
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> Montgomery College Takoma Park / Silver Spring Campus 7600 Takoma Avenue Takoma Park, MD 20912

Montgomery College Project #: FP16-077

USING AGENCY APPROVAL

DATE TITLE **DGS APPROVAL** DATE PROJECT MANAGER DATE CHIEF OF PM&D

SMITHGROUP

1700 NEW YORK AVENUE NW SUITE 100 WASHINGTON, DC 20006 202.842.2100 www.smithgroup.com

AMT Engineering CIVIL ENGINEERS 800 King Farm Boulevard, 4th Floor Rockville, MD 20850 301-881-2545

Cagley & Associates STRUCTURAL ENGINEERS 6141 Executive Boulevard Rockville, MD 20852 301-881-9050

Mahan Rykiel LANDSCAPE ARCHITECTS 3300 Clipper Mill Road, Suite 200 Baltimore, MD 21211 410-235-6001

Spexsys AV, IT, SECURITY 7257 Parkway Drive, Suite 260 Hanover, MD 21076

410-712-0390 DWG FILE: DRAWN BY: CHECKED BY:

ISSUED FOR REV DATE

27 SEP 2019

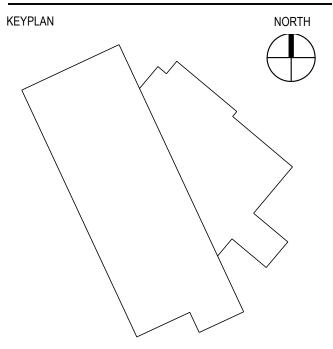
23 JAN 2019

SEALS AND SIGNATURES

SCHEMATIC DESIGN SUBMISSION

DESIGN DEVELOPMENT





SWM SPECIFICATIONS. NOTES AND DETAILS

PROJECT NUMBER

C-31 SHEET NUMBER