

PRIVATE 12 63 HDPEP PRIVATE 15 HDPEP PUBLIC 42 18 1678 HDPEP PUBLIC ROOF DRAIN PIPE SCHEDULE PIPE DIAMETER (IN) LENGTH (FT) TYPE OWNERSHIP PVC PRIVATE 97 10 63 PVC PRIVATE

STORM DRAIN PIPE SCHEDULE

TYPE

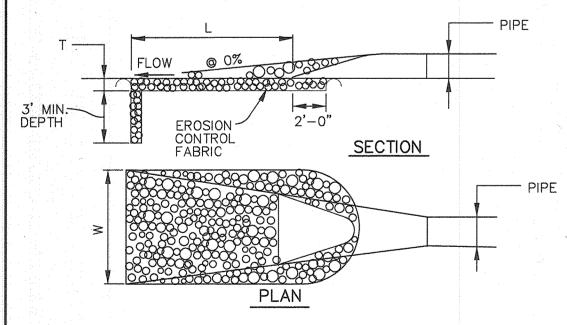
PVC

OWNERSHIP

PRIVATE

LENGTH (FT)

PIPE DIAMETER (IN)



STRUCTURE	D-50	LENGTH (L)	WIDTH (W)	THICKNESS (T)	SHA CLASS
E-1	9.5"	10'	12'	19"	I
E-2	6.0"	10'	10'	12"	0
E-3	9.5"	21'	23'	19"	Ι
E-4	9.5"	10'	12'	19"	I

OUTLET PROTECTION DETAIL NOT TO SCALE

APPROVED: DEPARTMENT OF PUBLIC WORKS	
Herme	10/17/2019
CHIEF, BUREAU OF HIGHWAYS MK	DATE
APPROVED: HOWARD COUNTY DEPARTMENT OF I	PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT	DATE
and Edmb	10.21.19
CHIEF, DEVELOPMENT ENGINEERING DIVISION	◆ DATE

CONSTRUCTION SPECIFICATIONS
1. THE SUBGRADE FOR THE FILTER, RIP—RAP, OR GABION SHALL BE PREPARED TO THE REQUIRED LINES AND GRADES. ANY FILL REQUIRED IN THE SUBGRADE SHALL BE COMPACTED TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.

2. THE ROCK OR GRAVEL SHALL CONFORM TO THE SPECIFIED GRADING LIMITS WHEN INSTALLED RESPECTIVELY IN THE RIP-RAP OR FILTER.

3. GEOTEXTILE CLASS C28 OR BETTER SHALL BE PROTECTED FROM PUNCHING, CUTTING, OR TEARING. ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE SHALL BE PREPARED BY PLACING ANOTHER PIECE OF GEOTEXTILE FABRIC OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE FABRIC. ALL OVERLAPS WHETHER FOR REPAIRS OR FOR JOINING TWO PIECES OF GEOTEXTILE FABRIC SHALL BE A MINIMUM OF ONE FOOT.

4. STONE FOR THE RIP—RAP OR GABION OUTLETS MAY BE PLACED BY EQUIPMENT. THEY SHALL BE CONSTRUCTED TO THE FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. THE STONE FOR HE RIP—RAP OR GABION OUTLETS SHALL BE DELIVERED AND PLACED IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN
THE LARGER STONES. RIP—RAP SHALL BE PLACED IN A
MANNER TO PREVENT DAMAGE TO THE FILTER BLANKET OR
GEOTEXTILE FABRIC. HAND PLACEMENT WILL BE REQUIRED TO
THE EXTENT NECESSARY TO PREVENT DAMAGE TO THE
PERMANENT WORKS PERMANENT WORKS.

5. THE STONE SHALL BE PLACED SO THAT IT BLENDS IN WITH THE EXISTING GROUND. IF THE STONE IS PLACED TOO HIGH THEN THE FLOW WILL BE FORCED OUT OF THE CHANNEL AND SCOUR ADJACENT TO THE STONE WILL OCCUR.

INLET STRUCTURE SCHEDULE BY NORTHING AND EASTING										
NUMBER	TYPE	LOCATION	INVERT IN	INVERT OUT	TOP ELEV.	STD. DETAIL	OWNER	REMARKS		
l <b>-</b> 1	D	N537925.5337, E1337553.4768	423.92(6")	423.10(12")	428.50	HO.CO. D-4.10	PRIVATE			
· I-2	A-5 5'	N537941.9369, E1337588.4613	428.50(18")	428.36(18") 427.70(6")	434.59	HO.CO. D-4.01	PUBLIC	SEE MODIFICATION DETAILS SHEET 9		

ances water a series of the se	INLET STRUCTURE TABLE BY CENTERLINE STATION												
Distantos (Caracia)	NUMBER	TYPE	LOCATION	INVERT IN	INVERT OUT	TOP ELEV.	STD. DETAIL	OWNER	REMARKS				
lancospososposospososposospososposospososp	I <b>-</b> 3	S	CL STA. 12+17.07, OFFSET 19.00 LEFT	436.00(18") 436.00(18")	435.90(18")	439.50	HO.CO. D-4.22	PUBLIC					
NOT THE OWNER AND A	1-4	S	CL STA. 7+47.93, OFFSET 20.59 LEFT	440.19(15")	439.94(18")	443.98	HO.CO. D-4.22	PUBLIC					
	1–5	S	CL STA. 7+47.56, OFFSET 20.92 RIGHT		440.40(15")	443.90	HO.CO. D-4.22	PUBLIC					
	1-6	S	CL STA. 12+15.70, OFFSET 20.48 RIGHT		436.44(18")	439.94	HO.CO. D-4.22	PUBLIC					
CHARGE CONTRACTOR	1-7	S	CL STA. 5+92.46, OFFSET 20.61 LEFT	435.98(18")	435.88(18")	439.69	HO.CO. D-4.22	PUBLIC					
	1-8	S	CL STA. 5+92.53, OFFSET 20.91 RIGHT		436.19(18")	439.69	HO.CO. D-4.22	PUBLIC					

OUTFALL STRUCTURE SCHEDULE												
NUMBER	TYPE	LOCATION	INVERT IN	INVERT OUT	TOP ELEV.	STD. DETAIL	OWNER	REMARKS				
E-1	18" END SECTION	N538207.8380, E1337364.8487	400.07(18")		401.71	HO.CO. D-5.51	PUBLIC					
E-2	PIPE	N537920.9050, E1337565.5056	427.00(6")		427.57	-	PRIVATE					
E-3	18" END SECTION	N538067.8478, E1338600.5291	405.43(18")		407.07	HO.CO. D-5.51	PUBLIC	~				
E-4	24" END SECTION	N538880.3839, E1338395.4875		453.75(24")	456.33	HO.CO. D-5.51	PUBLIC					

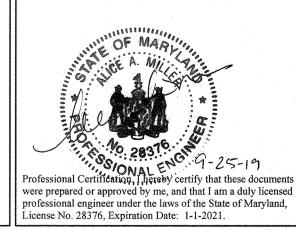
	MANHOLE STRUCTURE SCHEDULE BY CENTERLINE STATION									
NUMBER	TYPE		LOCATION		INVERT IN	INVERT OUT	TOP ELEV.	STD. DETAIL	OWNER	REMARKS
M-3	48" MH	CL STA.	6+67.17, OFFSET	27.65 LEFT	435.48(18")	435.38(18")	442.02		PUBLIC	

	MANHOLE STRUCTURE SCHEDULE BY NORTHING AND EASTING												
NUMBER	TYPE	LOCATION	INVERT IN	INVERT OUT	TOP ELEV.	STD. DETAIL	OWNER	REMARKS					
M-1	48" MH	N538207.4428, E1337384.8504	400.37(18")	400.27(18")	405.37	HO.CO. G-5.12	PUBLIC						
M-2	48" MH	N537962.9435, E1337502.3005	418.98(12") 418.48(18")	418.38(18")	423.48	HO.CO. G-5.12	PUBLIC						
M-4	48" MH	N538216.8340, E1338155.0183	435.07(18")	434.97(18")	444.04	HO.CO. G-5.12	PUBLIC						
M-5	48" MH	N537936.8275, E1338287.2689	429.53(18")	429.43(18")	440.05	HO.CO. G-5.12	PUBLIC						
M-6	48" MH	N538073.0587, E1338581.6960	405.94(18")	405.84(18")	410.34	HO.CO. G-5.12	PUBLIC						

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			<del>a di salah da </del>	The state of the s	
	NO.	DATE	REVISION		
4.5	<b></b>				

# **BENCHMARK** ● ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS ENGINEERING, INC.

8480 BALTIMORE NATIONAL PIKE \$\text{SUITE 315} \text{\$\text{ELLICOTT CITY, MARYLAND 21043}} (P) 410-465-6105 (F) 410-465-6644 WWW.BEI-CIVILENGINEERING.COM



OWNER/DEVELOPER:

OCR DEVELOPMENT, LLC 2102 E MADISON ST BALTIMORE, MD 21205 518-386-9168

**FULTON HILL** LOTS 1-8, BUILDABLE PRESERVATION PARCEL A AND NON-BUILDABLE BULK PARCEL B A RE-SUBDIVISION OF LOT 2 OF THE ST. FRANCIS OF ASSISI SUBDIVISION

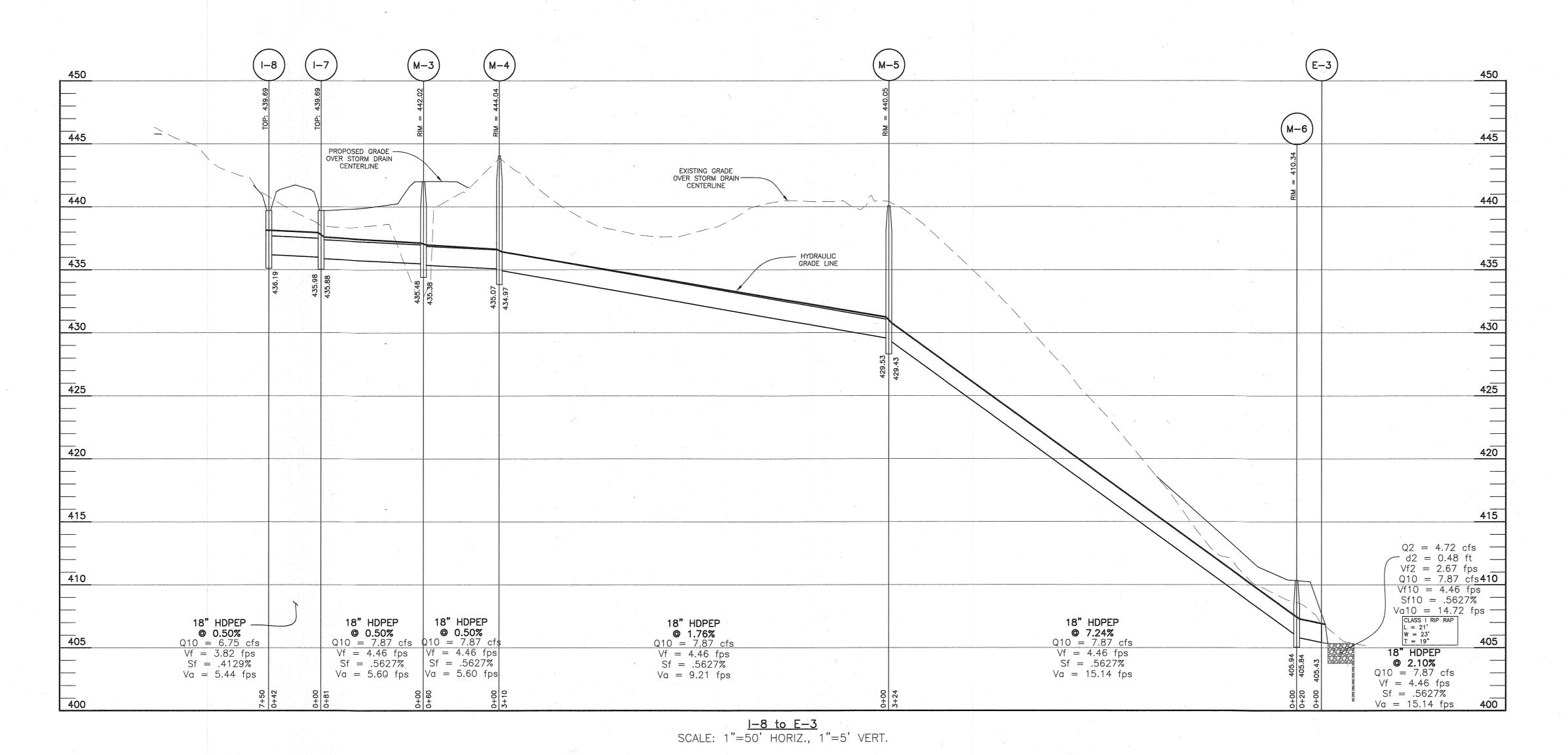
LOCATION: TAX MAP: 46 - GRID: 03 - PARCEL: 337 ZONED: RR-DEO ELECTION DISTRICT NO. 5 - HOWARD COUNTY, MARYLAND

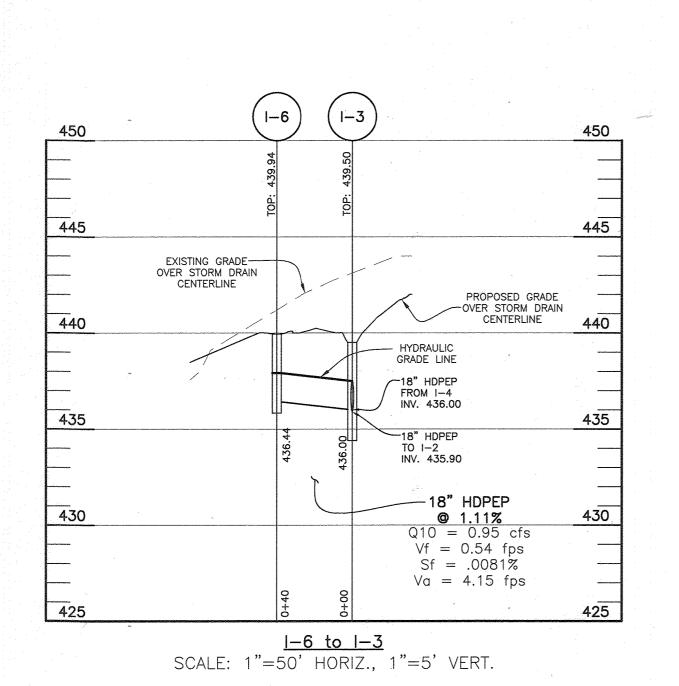
STORM DRAIN PROFILES DATE: SEPTEMBER, 2019

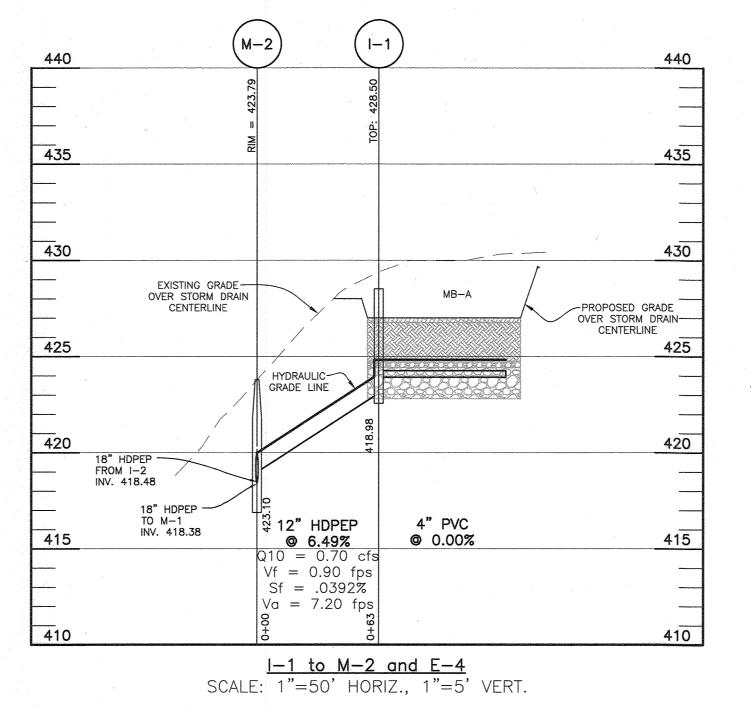
DESIGN: AAM DRAFT: AAM CHECK: CAM SHEET <u>8</u> OF <u>1</u> SCALE: AS SHOWN

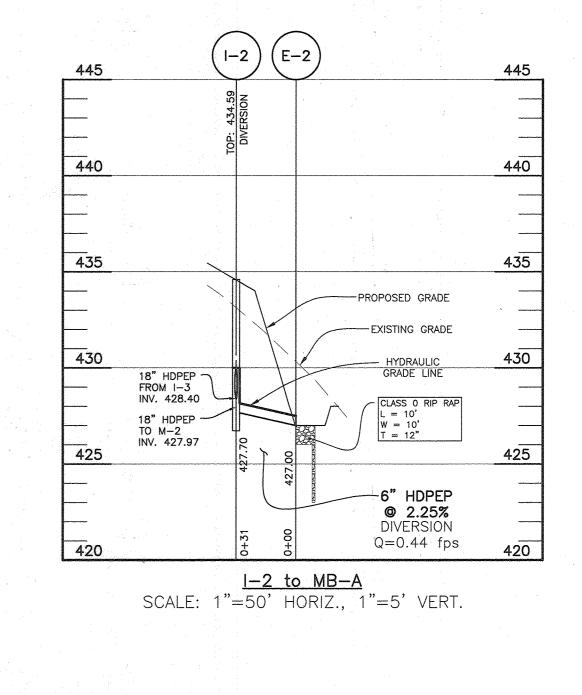
F-18-047

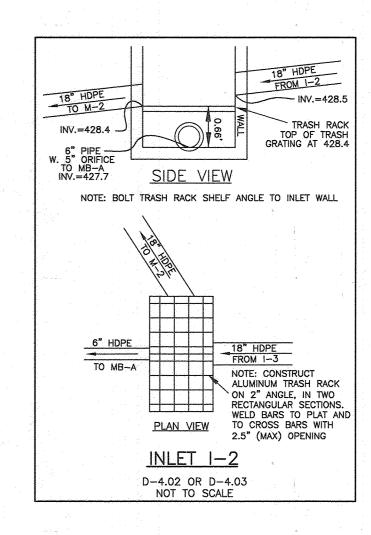
PROJECT NO. 2761







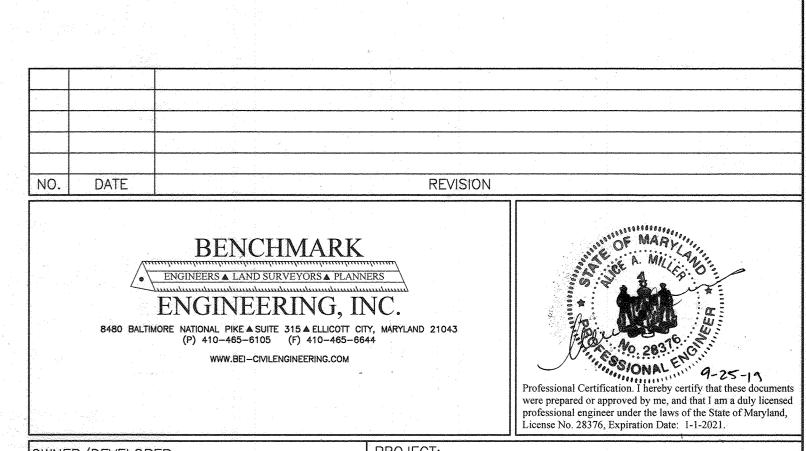




DIVERSION STRUCTURE DETAILS

NOT TO SCALE

DESIGN: AAM | DRAFT: AAM | CHECK: CAM | SCALE: AS SHOWN



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. 28376, Expiration Date: 1-1-2021.

OWNER/DEVELOPER:

OCR DEVELOPMENT, LLC 2102 E MADISON ST BALTIMORE, MD 21205 518—386—9168

PROJECT: FULTON HILL LOTS 1-8, BUILDABLE PRESERVATION PARCEL A AND NON-BUILDABLE BULK PARCEL B A RE—SUBDIVISION OF LOT 2 OF THE ST. FRANCIS OF ASSISI SUBDIVISION

LOCATION: TAX MAP: 46 — GRID: 03 — PARCEL: 337 ZONED: RR—DEO ELECTION DISTRICT NO. 5 — HOWARD COUNTY, MARYLAND

TITLE:

STORM DRAIN PROFILES

DATE: SEPTEMBER 2019 PROJECT NO. 2761

SHEET 9 OF 17

F-18-047

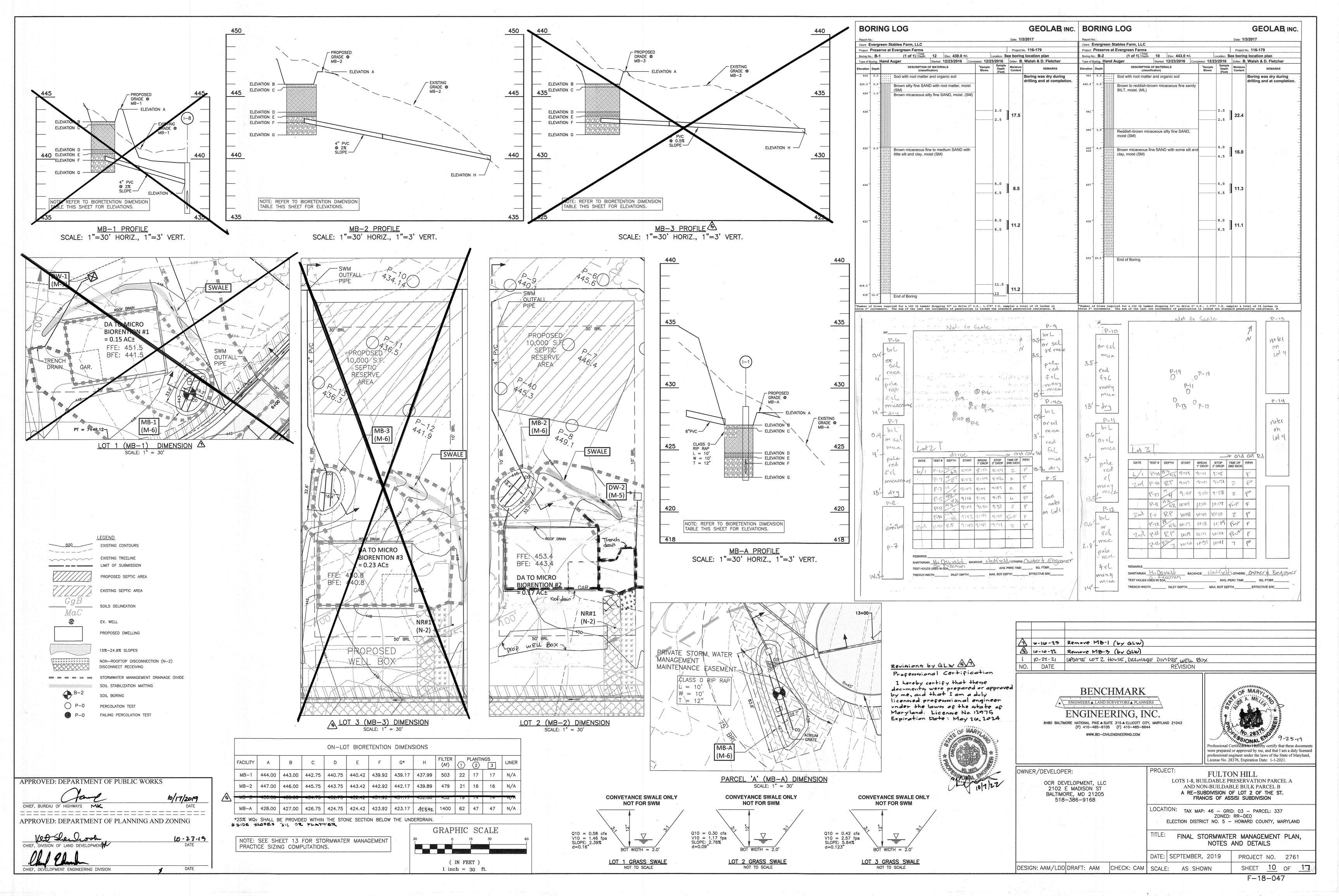
APPROVED: DEPARTMENT OF PUBLIC WORKS

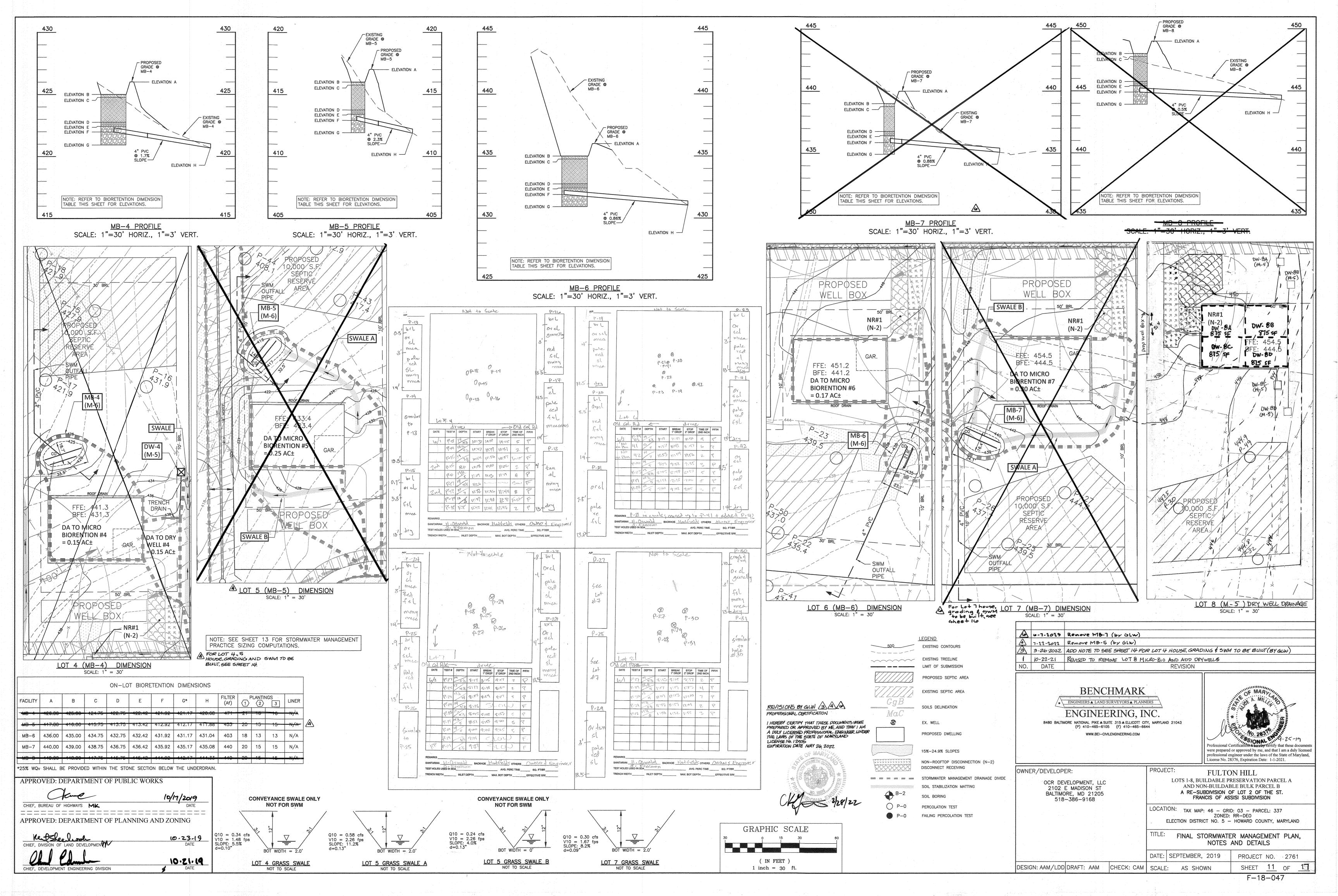
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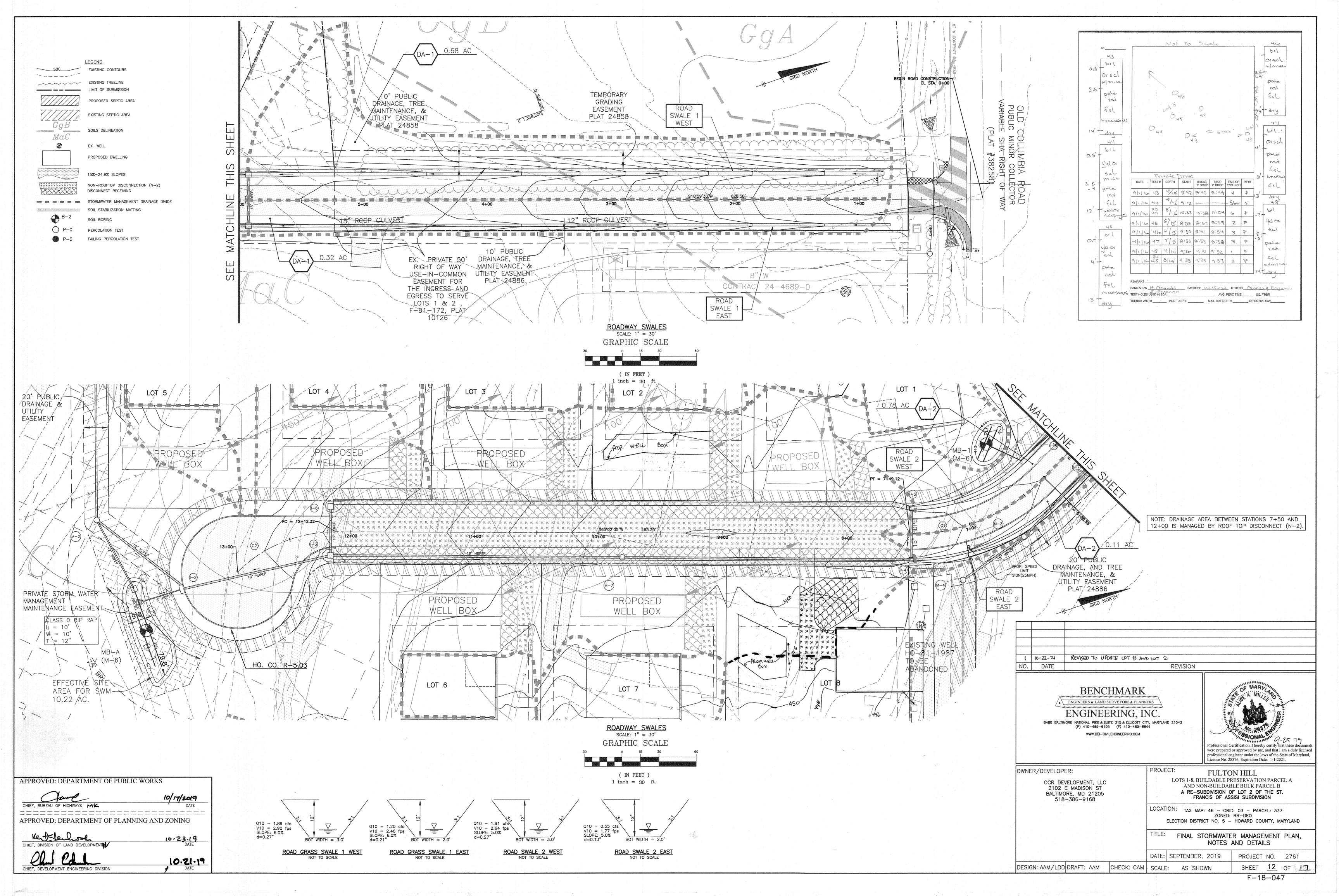
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING
VELT 10-21-19
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

CHIEF, DEVELOPMENT ENGINEERING DIVISION

DATE







### OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED DRY WELLS (M-5)

1. THE MONITORING WELLS AND STRUCTURES SHALL BE INSPECTED ON A QUARTERLY BASIS AND AFTER EVERY LARGE STORM EVENT. . WATER LEVELS AND SEDIMENT BUILD UP IN THE MONITORING WELLS SHALL BE RECORDED OVER A PERIOD OF SEVERAL DAYS TO INSURE TRENCH DRAINAGE.

3. A LOG BOOK SHALL BE MAINTAINED TO DETERMINE THE RATE AT WHICH THE FACILITY DRAINS.

4. WHEN THE FACILITY BECOMES CLOGGED SO THAT IT DOES NOT DRAIN DOWN WITHIN THE 72 HOUR TIME PERIOD, CORRECTIVE ACTION SHALL BE TAKEN. 5. THE MAINTENANCE LOG BOOK SHALL BE AVAILABLE TO HOWARD COUNTY FOR INSPECTION TO INSURE COMPLIANCE WITH OPERATION AND MAINTENANCE CRITERIA.

6. 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.

## OPERATION AND MAINTENANCE SCHEDULE FOR MICRO-BIORETENTION (M-6)

1. 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. 2. THE OWNER SHALL PERFORM A PLANT IN THE SPRING AND IN THE FALL OF EACH YEAR. DURING THE INSPECTION, THE OWNER SHALL REMOVE DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, REPLACE DEAD PLANT MATERIAL WITH ACCEPTABLE REPLACEMENT PLANT MATERIAL, TREAT DISEASED TREES AND SHRUBS, AND REPLACE ALL DEFICIENT STAKES AND WIRES. THE OWNER SHALL INSPECT THE MULCH EACH SPRING. THE MULCH SHALL BE REPLACED EVERY TWO TO THEE YEARS. THE PREVIOUS MULCH LAYER SHALL BE REMOVED BEFORE THE NEW LAYER IS

4. THE OWNER SHALL CORRECT SOIL EROSION ON AN AS NEEDED BASIS, WITH A MINIMUM OF ONCE PER MONTH AND AFTER EACH HEAVY STORM.

#### OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED DISCONNECTION OF ROOFTOP RUNOFF (N-1). DISCONNECTION OF NON-ROOFTOP RUNOFF (N-2)

A. MAINTENANCE OF AREAS RECEIVING DISCONNECTED RUNOFF IS GENERALLY NO DIFFERENT THAN THAT

REQUIRED FOR OTHER LAWN OR LANDSCAPED AREAS. THE OWNER SHALL ENSURE THE AREAS RECEIVING RUNOFF ARE PROTECTED FROM FUTURE COMPACTION OR DEVELOPMENT OF IMPERVIOUS AREA. IN COMMERCIAL AREAS, FOOT TRAFFIC SHOULD BE DISCOURAGED AS WELL.

MATERIALS	& SPECIFICATIONS F	FOR MICRO	-BIORETENTION
MATERIAL	SPECIFICATION	SIZE	NOTES:
PLANTINGS	SEE APPENDIX A; TABLE A.4	N/A	PLANTINGS ARE SITE SPECIFIC
PLANTING SOIL (2.0' TO 4.0' DEEP)	LOAMY SAND 60-65% COMPOST 35-40% OR SANDY LOAM 30% COARSE SAND 30% & COMPOST 40%	N/A	USDA SOIL TYPES: LOAMY SAND OR SANDY LOAM; CLAY CONTENT <5%
ORGANIC CONTENT	MIN 10% BY DRY WEIGHT ASTM D 2974		
MULCH	SHREDDED HARDWOOD	N/A	AGED 6 MONTHS, MINIMUM, NO PINE OR WOOD CHIE
GEOTEXTILE (CLASS "C")		N/A	PE TYPE 1 NONWOVEN
GEOTEXTILE (1/4" WIRE MESH)		1/4" WIRE MESH	1/4" WIRE MESH
UNDERDRAIN GRAVEL	AASHTO M-43	NO. 57 OR NO. 6 0.375" TO 0.750"	
UNDERDRAIN PIPING	F758, TYPE PS28 OR AASHTO M-278	4" TO 6" RIGID SCH.40 PVC, SDR35 OR HDPE	3/8" PERF. @ 6" O/C, 4 HOLES PER ROW; MINIMU OF 2" OF GRAVEL OVER PIPES, NOT NECESSARY UNDERNEATH PIPES.
IMPERVIOUS LINER	ASTM-D-4833 (THICKNESS) ASTM-D-412 (TENSILE STRENGTH 1,100 LB., ELONGATION 200%) ASTM-D-624 (TEAR RESISTANCE - 150	30 MIL. THICK	LINER TO BE ULTRAVIOLET RESISTANT. A GEOTEXTILE FABRIC SHOULD BE USED TO PROTECT THE LINER FROM PUNCTURE.



REVISIONS BY GLW 3 4 5 6 7 PROFESSIONAL CERTIFICATION HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROPESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSENO. 12075 EXPIRATION DATE: MAY 26,2022

N 3-28-22	
APPROVED: DEPARTMENT OF PUBLIC	WORKS
Jame	10/17/2019
CHIEF, BUREAU OF HIGHWAYS MK	DATE
APPROVED: DEPARTMENT OF PLANNI	NG AND ZONING
CHIEF, DISSION OF LAND DEVELOPMENT	10 · 23 · 19 DATE
Chil Chil	10.71.19
CHIEF, DEVELORMENT ENGINEERING DIVISION	<b>1</b> DATE

ASTM-D-471 (WATER ADSORPTION: +8

ASTM-D-4833 (PUNCTURE STRENGTH 125LB)

BELOW IMPERV. LINER) ASTM-D-4632 (TENSILE STRENGTH 300 LB.)

## CONSTRUCTION SPECIFICATIONS

## 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 dumped 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 Bermuda grass, Quackgrass, Johnson grass, or other noxious weeds as specified under COMAR

#### 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 and(60%-65%) and compost (35% 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

There shall be at least one soil test per project. Each test shall consist of both the standard soil test for pH, and additional tests of organic matter, and soluble salts. A textural analysis is required from the site stockpiled topsoil. If topsoil is imported, then a texture analysis shall be performed for each location where the topsoil was

#### 3. Compaction:

excavated.

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 a loader, the contractor should use wide track or marsh track equipment, or light equipment with turf type 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 alleviated at the base of the bioretention facility by using a primary tilling operation such as a chisel plow, ripper, or subsoiler. These tilling operations are to refracture the soil profile through the 12 inch compaction zone. Substitute methods must be approved by the engineer. Rototillers typically do not till deep enough to reduce the effects of compaction from heavy equipment.

Rototill 2 to 3 inches of sand into the base of the bioretention facility before backfilling the optional sand layer. Pump any ponded water before preparing (rototilling) base.

When backfilling the topsoil over the sand layer, first place 3 to 4 inches of topsoil over the sand, then rototill the sand/topsoil to create a gradation zone. Backfill the remainder of the topsoil to final grade.

When backfilling the bioretention facility, place soil in lifts 12" to 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 marsh tracks.

### 4. Plant Material:

Recommended plant material for micro-bioretention practices can be found in Appendix A, Section A.2.3.

### 5. Plant Installation:

Compost is a better organic material source, is less likely to float, and should be placed in the invert and other low areas. Mulch should be placed in 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 well aged (6 to 12 months) for acceptance.

Rootstock of the plant material shall be kept moist during transport and on-site storage. The plant root ball should be planted so 1/8th of the ball is above final grade surface. The diameter of the planting pit shall be at least six inches larger than the diameter of the planting ball. Set and maintain the plant straight during the entire planting process. Thoroughly water ground bed cover after installation.

Trees shall be braced using 2" by 2" stakes only as necessary and for the first growing season only. Stakes are to be equally spaced on the outside of the tree ball.

Grasses and legume seed should be drilled into the soil to a depth of at least one inch. Grass and legume plugs shall be planted following the non-grass ground cover planting specifications.

The topsoil specifications provide enough organic material to adequately supply nutrients from natural cycling. The primary function of the bioretention structure is to improve water quality. Adding fertilizers defeats, or at a minimum, impedes this goal. Only add fertilizer if wood chips or mulch are used to amend the soil. Rototill urea fertilizer at a rate of 2 pounds per 1000 square feet.

## 6. Underdrains:

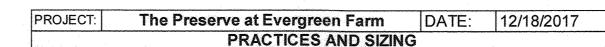
# Underdrains should meet the following criteria:

- Pipe- Should be 4" to 6" diameter, slotted or perforated rigid plastic pipe (ASTMF 758, Type PS 28, or
- AASHTO-M-278) in a gravel layer. The preferred material is slotted, 4" rigid pipe (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 4x4) galvanized hardware cloth. Gravel - The gravel layer (No. 57 stone preferred) shall be at least 3" thick above and below the
- underdrain
- The main collector pipe shall be at a minimum 0.5% slope. A rigid, non-perforated observation well must be provided (one per every 1,0000 square feet) to provide a
- clean-out port and monitor performance of the filter.
- A 4" layer of pea gravel (1/4" to 3/4" stone) shall be located between the filter media and underdrain to prevent migration of fines into 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



	BIORETENT	ION FACILI	TIES (M-6)									. Šartvila 1972
•	FACILITY	CILITY Drainage Impervious		I (%)	Rv	ESDv (cf)	75% ESDv (cf)	Volume Stored		Volume treated (V/0.75)		Pe Treated
$\triangle$	<del>WD 1</del>	0020	0750	<b>57</b> %	0.500	951.0	200.0	440		591		1.91
	MB-2	7267	3750	52%	0.514	354.1	265.6	446	cf	595	cf	1.91
B	MP 3	0913	1570	47%	0.400	430.1	327.0	495		500		1.51
	*MB-4	6704	3750	56%	0.553	351.4	263.6	425	-¢	567		1.83
A	MB-5	10061	5715	52%	0.519	539.1	404.3	416	ef	555		1.17
	MB-6	7422	4570	62%	0.604	424.7	318.6	403	cf	537	cf	1.44
4	-MB 7	12866	4570	36%	0.370	450.5	337.9	440	cf	587		1.48
:	MB-8	7442	4570	61%	0.603	424.8	318.6	437	cf	583	cf	1.56
	MB-A	63229	8302	13%	0.168	1127.5						
	•	MB-A (	CONTINUED	)	**************************************	120.3	1217.7	1401	cf	1868	cf	2.11

FACILITY	Drainage Im	Impervious	1 (%)	Rv	ESDv (cf)	Depth	Porosity	Width	Length	Volume	Pe
PACILITI		Impervious								Stored	Treated
DW-1	826	826	100%	0.950	74.3	5.0	0.40	6	6	72	1.10
DW-2	826	826	100%	0.950	74.3	5.0	0.40	6	6	72	1.10
DW-4	826	826	100%	0.950	74.3	5.0	0.40	6	6	72	1.10
		edicional decision distribution de des	<del></del>	***************************************	language de la companya de la compa				TOTAL:	216	cf

ROADWAY TREATMENT					
	Area Treated		Converted to ESDv	Remaining	
,	(sf)	Pe	(cf)	ESDv	
Grass Swales (M-8):	15600	1.200	1560	N/A	
Non-rooftop Disconnection (N-2):	10562	1.000	880	120	(added to MBR-A)
DRIVEWAY TREATMENT					
	Area Treated	Pe	Converted to ESDv		
Non-rooftop Disconnection (N-2):	5200	1.000	433		en e

ON-LOT BIORETENTION DIMENSIONS

MB-A 428.00 427.00 426.75 429.75 429.42 423.92 423.80 423.92 1400 62 47 47 N/A

SWALE COMPUTATIONS

Q<sub>10</sub> (cfs)

Grass lined

V<sub>10</sub> (cfs)

0.58 1.46 Permanent\*

2.57

2.90

1.20 2.46 Permanent\*

2.01 2.78 Permanent\*

1.17 Permanent\*

1.48 Permanent\*

2.26 Permanent\*

2.26 Permanent\*

1.67 Permanent\*

1.77 Permanent\*

Stabilization

Requirement

Permanent\*

Permanent\*

PROJECT: EVERGREEN STABLES DESIGN BY: LDD

Channel Slope (%)

2.39

2.76

5.64

11.20

4.00

8.20

6.00

6.00

5.00

5.00

445.75 | 443.75 | 443.42 | 442.92 | 442.17

MB 5 | 417.00 | 416.00 | 415.75 | 413.75 | 413.42 | 412.92 | 412.17 | 411.88

\*25% WQv SHALL BE PROVIDED WITHIN THE STONE SECTION BELOW THE UNDERDRAIN

D.A. #

SW-1

SW-2

SW-3

SW-4

SW-5A

SW-5B

SW-7

**ROAD SWALE EAST 1** 

**ROAD SWALE WEST 1** 

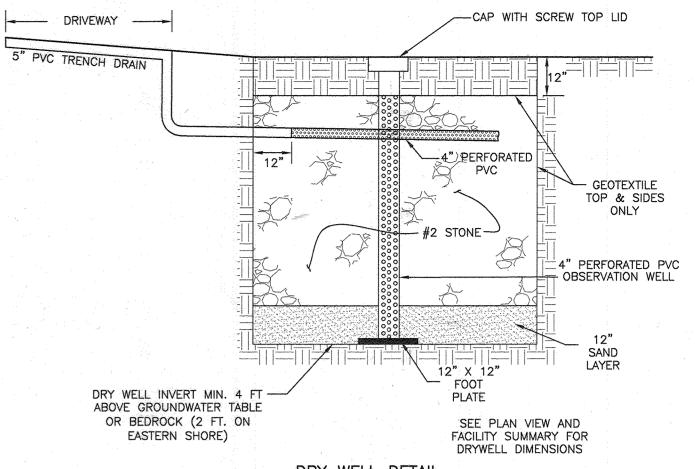
**ROAD SWALE EAST 2** 

ROAD SWALE WEST 2

MB-6 | 436.00 | 435.00 | 434.75 | 432.75 | 432.42 | 431.92 | 431.17 | 43**0.04** | 403

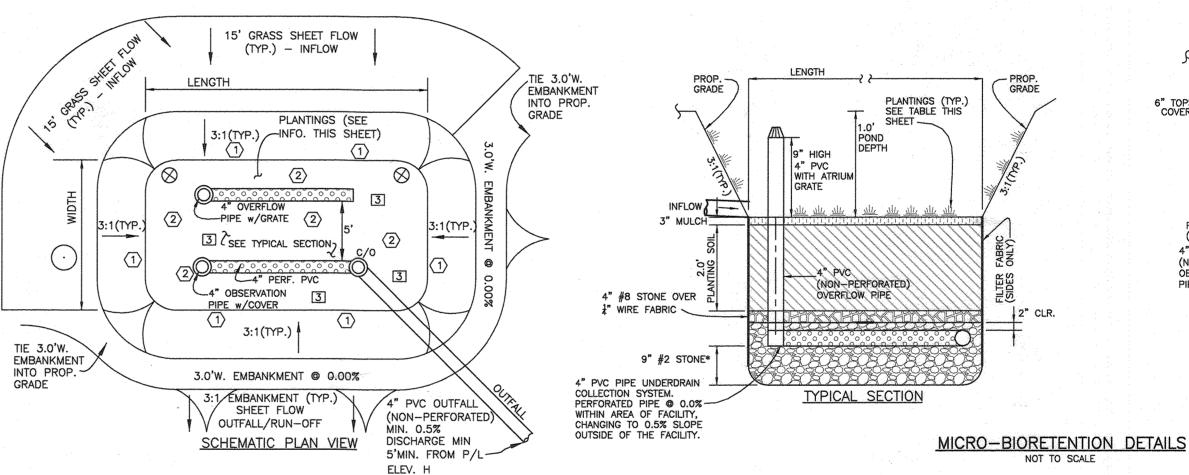
MB-8 | 449.00 | 448.00 | 443.75 | 445.75 | 445.42 | 444.92 | 444.17 | 444.33 | 440 | 20 |

**FACILITY** 



DRY WELL DETAIL NOT TO SCALE

-			DRY WEL	L DIMEN	ISIONS		
	DRY WELL DESIGNATION	LENGTH	WIDTH	DEPTH	GRADE	TOP OF STONE	BOTTOM OF SAND
	DW-1	6.00	6.00	5.00	447	446.00	441.00
-	DW-2	6.00	6.00	5.00	449	446	441
	DW-4	6.00	6.00	5.00	435	434.00	429.00



439.89

 $\langle 1 \rangle \langle 2 \rangle \langle 3 \rangle$ 

15' GRASS SHEET FLOW	WIDTH	PROP. GRADE
6" TOPSOIL SI	LANTINGS (TYP.) POND EE TABLE THIS HEET \ /\mathrm{//m}	ELEV. A
	9" HIGH 4" PVC OVERFLOW W/ATRIUM	(a) (a)
ELEV. B ELEV. C FILTER FABRIC	GRATE WALL ALL	3" MULCH LAYER
(SIDES ONLY)  4" PVC (NON-PERFORATED) OBSERVATION PIPE W/CAP		2.0, 2.0, 3.0, 4" #8 STONE 4" #8 SOIR
ELEV. D  ELEV. E  2" CLR.		OVER ‡" WIRE FABRIC
9" #2 STONE*		4" PVC PIPE UNDERDRAIN COLLECTION SYSTEM. PERFORATED PIPE @ 0.0% WITHIN AREA OF FACILITY, CHANGING TO 0.5% SLOPE OUTSIDE OF THE FACILITY.
	TYPICAL PROFILE	0.3% SLOPE OUTSIDE OF THE PAULITY.

MICROBIORETENTION PLANTING DATA

1. PLANTINGS WITHIN THE PONDING AREA OF THE MICRO-BIORETENTION FACILITY ARE TO BE OF A MEDIUM TO HIGH WATER TOLERANCE 2. PLANTINGS ALONG THE PERIMETER (BERM) AREA OF THE MICRO-BIORETENTION FACILITY ARE TO BE OF A LOW TO MEDIUM WATER TOLERANCE 3. AVOID PLANTINGS WITH EXCESSIVE ROOT MASS IN POND AREA OF THE MICRO-BIORETENTION FACILITY NEAR O.B. PIPE AND

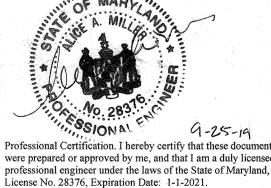
MICROBIORETENTION PLANTING SCHEDULE (SPECIFIC NUMBER OF PLANTINGS SHALL BE DETERMINED WITH FINAL DESIGN AT PLOT PLAN PHASE)

- (1) IRIS VERSICOLOR (IRIS)
- 2 LOBELIA CARDINALIS CARDINAL FLOWER
- 3 RUDBECKIA SUBTOMENTOSA SWEET CONEFLOWER
- CALLUNA VULGARIS (HEATHER) (2 PER FACILITY) SALIX NIGRA (BLACK WILLOW) (1 PER FACILITY)

1 6-16-2029 Remove MB-1 (by GLW) 6 6-1-2023 Remove MB-7 (by GLW) (6) 10-10-2012 Remove MB-3 (by GLW) 1-22-2022 Remove MB-5 (by GLW) /3 3-26-2022 REMOVE MB-4 BY GLW DATE REVISION

> **BENCHMARK**  ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS ENGINEERING, INC. 8480 BALTIMORE NATIONAL PIKE & SUITE 315 & ELLICOTT CITY, MARYLAND 21043

(P) 410-465-6105 (F) 410-465-6644 WWW.BEI-CIVILENGINEERING.COM



		•
DEVELOPER:		PROJECT:
OCR DEVELOR 2102 E MAI BALTIMORE, I 518-386	DISON ST MD 21205	LC

FULTON HILL LOTS 1-8, BUILDABLE PRESERVATION PARCEL A AND NON-BUILDABLE BULK PARCEL B A RE-SUBDIVISION OF LOT 2 OF THE ST. FRANCIS OF ASSISI SUBDIVISION

ZONED: RR-DEO ELECTION DISTRICT NO. 5 - HOWARD COUNTY, MARYLAND TITLE:

STORMWATER MANAGEMENT PLAN, NOTES AND DETAILS DATE: SEPTEMBER, 2019 PROJECT NO. 2761

SCALE: AS SHOWN

F-18-047

Pe: 1.1 inches

	FACILITY	Drainage Area	Impervious	I (%)	Rv	ESDv (cf)	75% ESDv (cf)	Volume Stored	Volume treated (V/0.75)	Pe Treated
Λ	<b>WD</b>	0020	0750	57%	0.500	951.0	200.0	44016	501 01	1.91
_	MB-2	7267	3750	52%	0.514	354.1	265.6	446 cf	595 cf	1.91
\	MR 2	0012	4570	47%	0.400	430.1	927.0	405 cf	500 cf	4,51
_	MB-4	6704	3750	56%	0.553	351.4	263.6	425 cf	567 cf	1.83
7	MB-5	10061	5715	52%	0.519	539.1	404.3	416 cf	555 ef	1.17
	MB-6	7422	4570	62%	0.604	424.7	318.6	403 cf	537 cf	1.44
λ	-MB-7	12866	4570	36%	0.370	450.5	337.9	440 cf	587 cf	1.48
-	MB-8	7442	4570	61%	0.603	424.8	318.6	437 cf	583 cf	1.56
	MB-A	63229	8302	13%	0.168	1127.5				
		MB-A (	CONTINUED	)		120.3	1217.7	1401 cf	1868 cf	2.11
						An	TOTAL:	3445 cf	6461 cf	
		EACH ITIES					l <del>ine en idea en en idea en e</del>	direction years direction and a second contract of the contrac		•

FACILITY	Drainage	Impervious	I (%)	Rv	ESDv	Double	Porosity	Width	Length	Volume	Pe
ACILITY	Area				(cf) Depth	Depth				Stored	Treated
DW-1	826	826	100%	0.950	74.3	5.0	0.40	6	6	72	1.1
DW-2	826	826	100%	0.950	74.3	5.0	0.40	6	6	72	1,1
DW-4	826	826	100%	0.950	74.3	5.0	0.40	6	6	72	1.10
									TOTAL:	216	cf

ROADWAY TREATMENT					
	Area Treated (sf)	Pe	Converted to ESDv (cf)	Remaining ESDv	#
Grass Swales (M-8):	15600	1.200	1560	N/A	
Non-rooftop Disconnection (N-2):	10562	1.000	880	120	(added to MBR-A)
DRIVEWAY TREATMENT					
	Area Treated	Pe	Converted to ESDv		

OWNER/D

LOCATION: TAX MAP: 46 - GRID: 03 - PARCEL: 337

SHEET 13 OF 17

DESIGN: AAM/LDD DRAFT: AAM CHECK: CAM

