

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

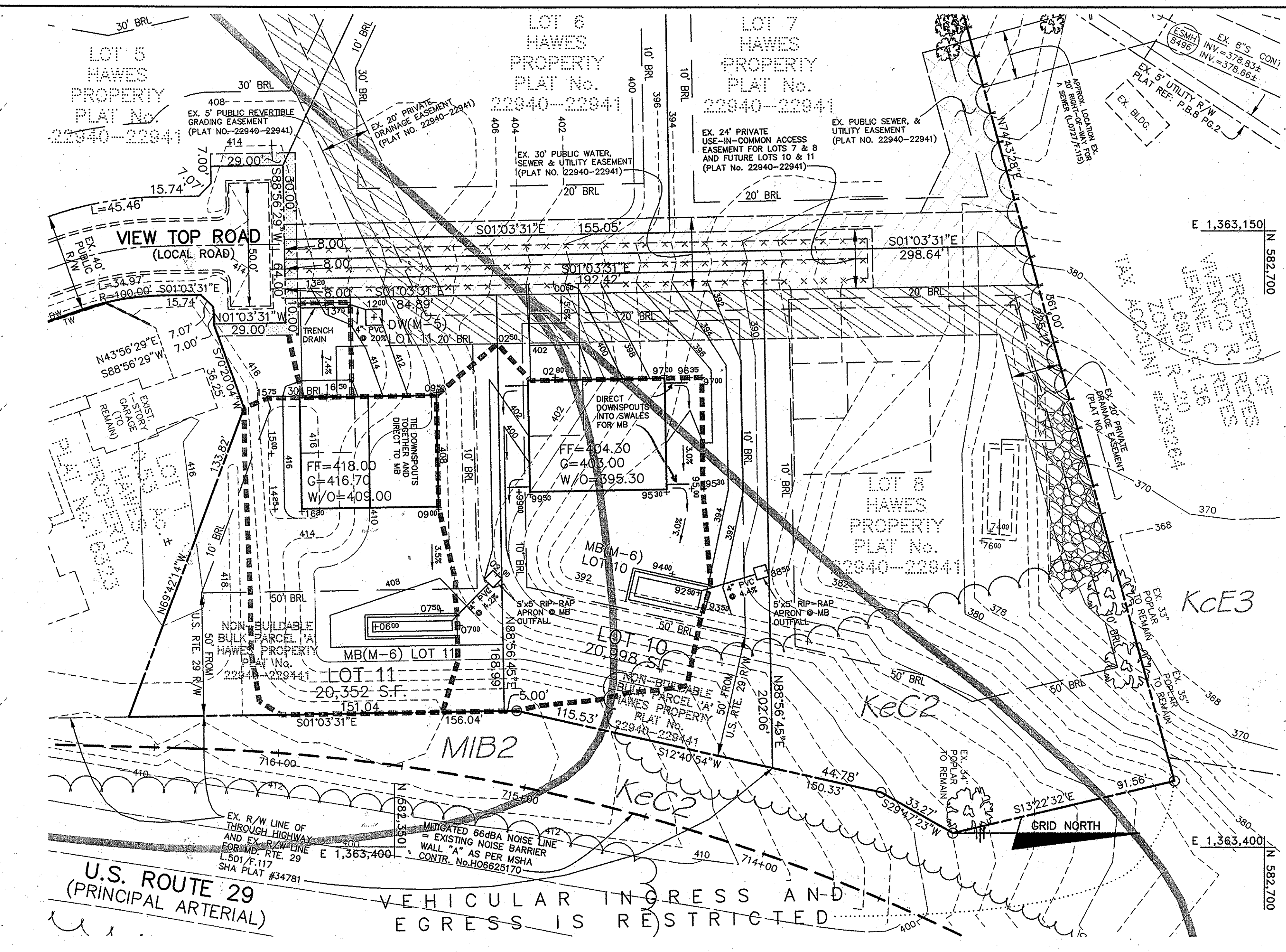
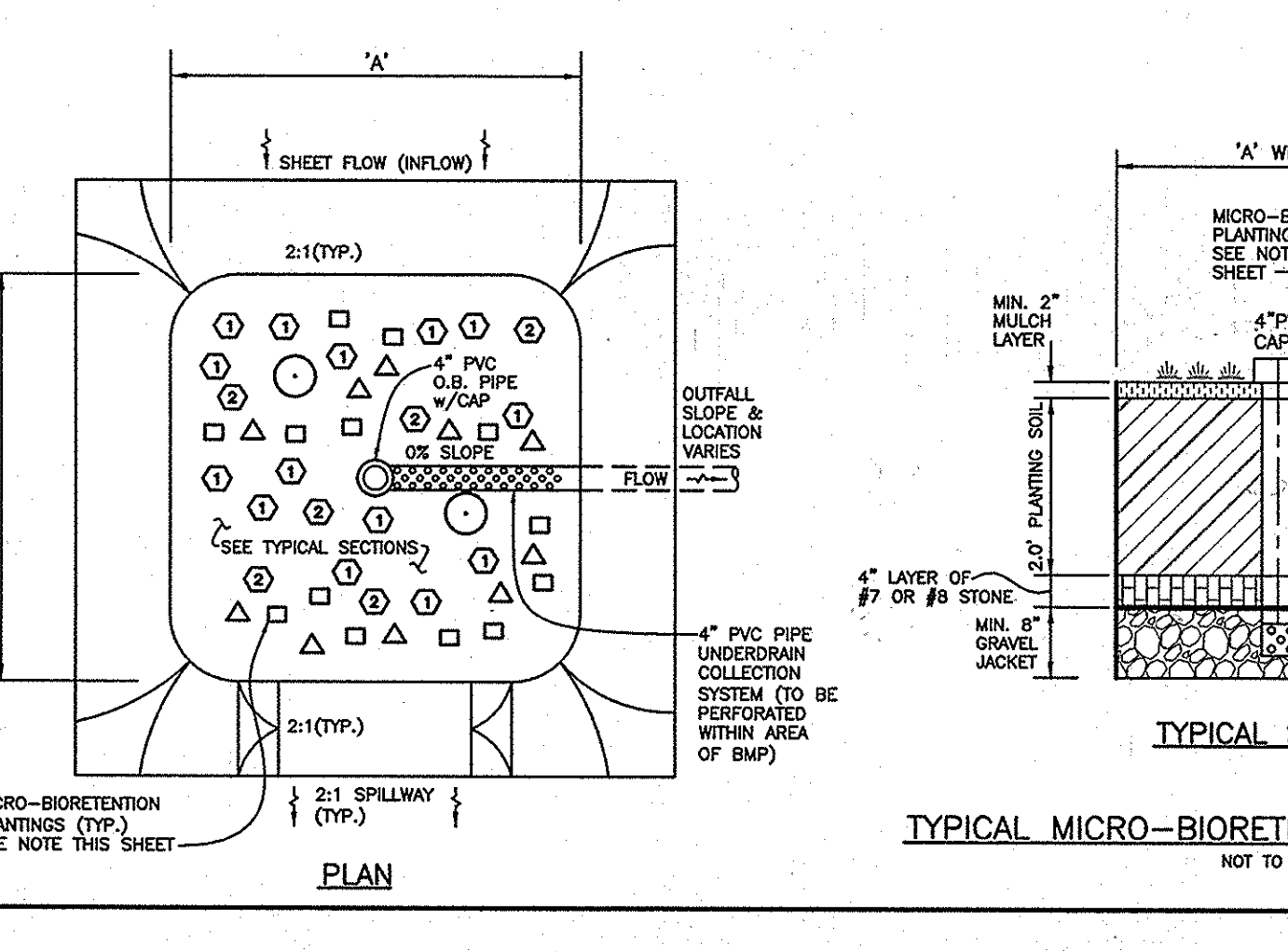
- The Owner shall inspect the monitoring wells and structures on a quarterly basis and after every heavy storm event.
- The Owner shall record the water levels and sediment build up in the monitoring wells over a period of several days to insure trench drainage.
- The Owner shall maintain a log book to determine the rate at which the facility drains.
- When the facility becomes clogged so that it does not drain down within a seventy-two (72) hour time period, corrective action shall be taken.
- The maintenance log book shall be available to Howard County for inspection to insure compliance with operation and maintenance standards.

TABLE B.3.2 MATERIALS AND SPECIFICATIONS FOR SWM FACILITIES (DRYWELLS)

MATERIAL	SPECIFICATION	SIZE	NOTES:
PLANTINGS (IF REQUIRED)	SEE APPENDIX A: TABLE A.2	N/A	PLANTINGS ARE SITE SPECIFIC
PLANTING SOIL (2.0' TO 4.0' DEEP)	SAND: 30-50% SILT: 30-40% CLAY: 10-20%	N/A	USDA SOIL TYPES: LOAMY SAND, SANDY LOAM OR LOAM
MULCH	SHREDED HARDWOOD	N/A	2" TO 3" DEPTH, AGED 6 MONTHS, MINIMUM
GEOTEXTILE (CLASS "C")	APPROXIMATE OPENING SIZE: (ASTM D-4751) TENSILE STRENGTH: (ASTM D-4832) PUNCTURE RESISTANCE: (ASTM D-4833)	N/A	1" TO 6" PERFS. MINIMUM OF 3" OF GRAVEL OVER PIPES, NOT NECESSARY UNDERNEATH PIPES
UNDERDRAIN PIPING	ASHTO M-43	0.375" TO 0.750"	3/4" PERFS. @ 6" O.C. 4 HOLES PER ROW; MINIMUM OF 3" OF GRAVEL OVER PIPES, NOT NECESSARY UNDERNEATH PIPES
POURED-IN-PLACE CONC. (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 CONC. REQUIRED: 28 DAY STRENGTH TEST AND SLUMP TEST; ALL CONC. DESIGN (CAST IN-PLACE OF 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 ALLOWABLE HORIZONTAL LOADING (BASED ON SOIL PRESSURES); AND ANALYSIS OF POTENTIAL CRACKING
CHECK DAM (TREATED WOOD)	AWPA STANDARD C6	6"x8" OR 6"x6"	DO NOT COAT WITH CEMENTitious; EMBED AT LEAST 3" INTO SIDE SLOPES

TABLE B.4.1 MATERIALS AND SPECIFICATIONS FOR (M-6) MICRO-BIORETENTION

MATERIAL	SPECIFICATION	SIZE	NOTES:
PLANTINGS (IF REQUIRED)	SEE APPENDIX A: TABLE A.2	N/A	PLANTINGS ARE SITE SPECIFIC
PLANTING SOIL (2.0' TO 4.0' DEEP)	LOAMY SAND (50-60%) & COMPOST (30-40%) OR LOAMY SAND (30%) COARSE SAND (30%) & COMPOST (30-40%)	N/A	USDA SOIL TYPES: LOAMY SAND, SANDY LOAM; CLAY CONTENT <5%
ORGANIC CONTENT	MIN. 10% BY DRY WEIGHT	N/A	
PEA GRAVEL DIAPHRAGM	SHREDED HARDWOOD	N/A	AGED 6 MONTHS, MINIMUM
GEOTEXTILE	ASTM D-4751	N/A	PE TYPE 1 - NONWOVEN
GRAVEL (UNDERDRAINS & BERMS)	ASHTO M-43	#57 OR #66	#8 STONE
UNDERDRAIN PIPING	F788, TYPE P268 OR ASHTO M-278	4" TO 6" PERFS. SCH 40 PVC OR SDR35	3/4" PERFS. @ 6" O.C. 4 HOLES PER ROW; MINIMUM OF 3" OF GRAVEL OVER PIPES, NOT NECESSARY UNDERNEATH PIPES; PERFORATED PIPE SHALL BE WRAPPED WITH 1/4" GALVANIZED HARDWARE CLOTH
POURED-IN-PLACE CONC. (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 CONC. REQUIRED: 28 DAY STRENGTH TEST AND SLUMP TEST; ALL CONC. DESIGN (CAST IN-PLACE OF 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 ALLOWABLE HORIZONTAL LOADING (BASED ON SOIL PRESSURES); AND ANALYSIS OF POTENTIAL CRACKING
SAND (1.0' DEEP)	ASHTO M-6 OR ASTM C-35	0.02" TO 0.04"	SAND SUBSTITUTIONS SUCH AS DOLOMITE AND GRANITONITE (ASHTO #10) ARE NOT ACCEPTABLE; NO CHEMICAL CEMENTATION OR POLYMERIC SAND SUBSTITUTIONS ARE ACCEPTABLE; NO "ROCK DUST" CAN BE USED FOR SAND



MICRO-BIORETENTION (M-6) PLANTING TABLE

LOT	(M-6)	(M-6)	Quantity	(M-6)	Quantity
LOT 10	VINCA MINOR (Common Periwinkle)	27	VINCA MINOR (Common Periwinkle)	19	
LOT 11	AJUSTA REPTANS (Creeper/Bugleweed)	24	AJUSTA REPTANS (Creeper/Bugleweed)	17	
	IRIS VERSICOLOR (Iris)	13	IRIS VERSICOLOR (Iris)	9	
	HERMERCALLIS SP (Daylily)	8	HERMERCALLIS SP (Daylily)	6	
	ACER RUBRUM (Red Sunset Red Maple)	1	ACER RUBRUM (Red Sunset Red Maple)	1	

MICRO-BIORETENTION (M-6) DESIGN TABLE

Lot No.	Practice	MDE	Type	No. used	Total DA	Total DA Imp. Area	% Impervious	Q _e	Target Pe	Total DA to Practice	Total Imp. Area to Practice	Imp. Treated by Practice	At (Treatment)	ESDv					
LOT 10	MB	(M-6)	Micro-Bioretenion	1	13,600	2,475	18%	0.34	1.60	13,600	2,475	2,475	272	280	ok	1.0	272.0	320.0	PASS
LOT 11	MB	(M-6)	Micro-Bioretenion	1	10,150	2,475	24%	0.32	1.20	10,150	2,475	2,475	203	204	ok	1.0	203.0	246.0	PASS
LOT 11	DW	(M-5)	DRYWELL	1	900	770	85%	0.98	2.20	900	770	770	0	0	0	5.0	116.8	117.7	PASS
Totals					24,650	5,720													

OPERATION & MAINTENANCE SCHEDULE FOR (M-6) MICRO-BIORETENTION

- The Owner shall maintain the plant material, mulch layer and soil layer annually. Maintenance of mulch and soil is limited to correcting grade erosion or avoiding replacement of underlying materials. The stone for the rip-rap or level spreaders shall be compacted to a density of approximately that of the surrounding undisturbed material. Embankments shall be prepared by stripping topsoil and any other unsuitable materials from the areas, and be compacted to a minimum of 98% of maximum dry density (referenced to ASTM 159 STANDARD PRACTICE).
- The rock or gravel shall conform to the specified grading limits when installed respectively in the rip-rap or filter.
- Geotextile class C or better shall be protected from puncturing, cutting, or tearing. Any damage other than an occasional small hole shall be repaired 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.
- Stones for the rip-rap or level spreaders 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 the rip-rap or level spreaders shall be delivered and placed in a manner that will ensure that it is reasonably homogeneous with the smaller stones and 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.
- The stone layer 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.

SOILS LEGEND

MAP SYMBOL	SOIL TYPE	MAPPING UNIT
KcE3	D KELLY CLAY LOAM - 15 TO 35 PERCENT SLOPES - SEVERELY ERODED	
KcC2	D KELLY SILT LOAM - 8 TO 15 PERCENT SLOPES - MODERATELY ERODED	
MIB2	B MANOR LOAM - 3 TO 8 PERCENT SLOPES - MODERATELY ERODED	

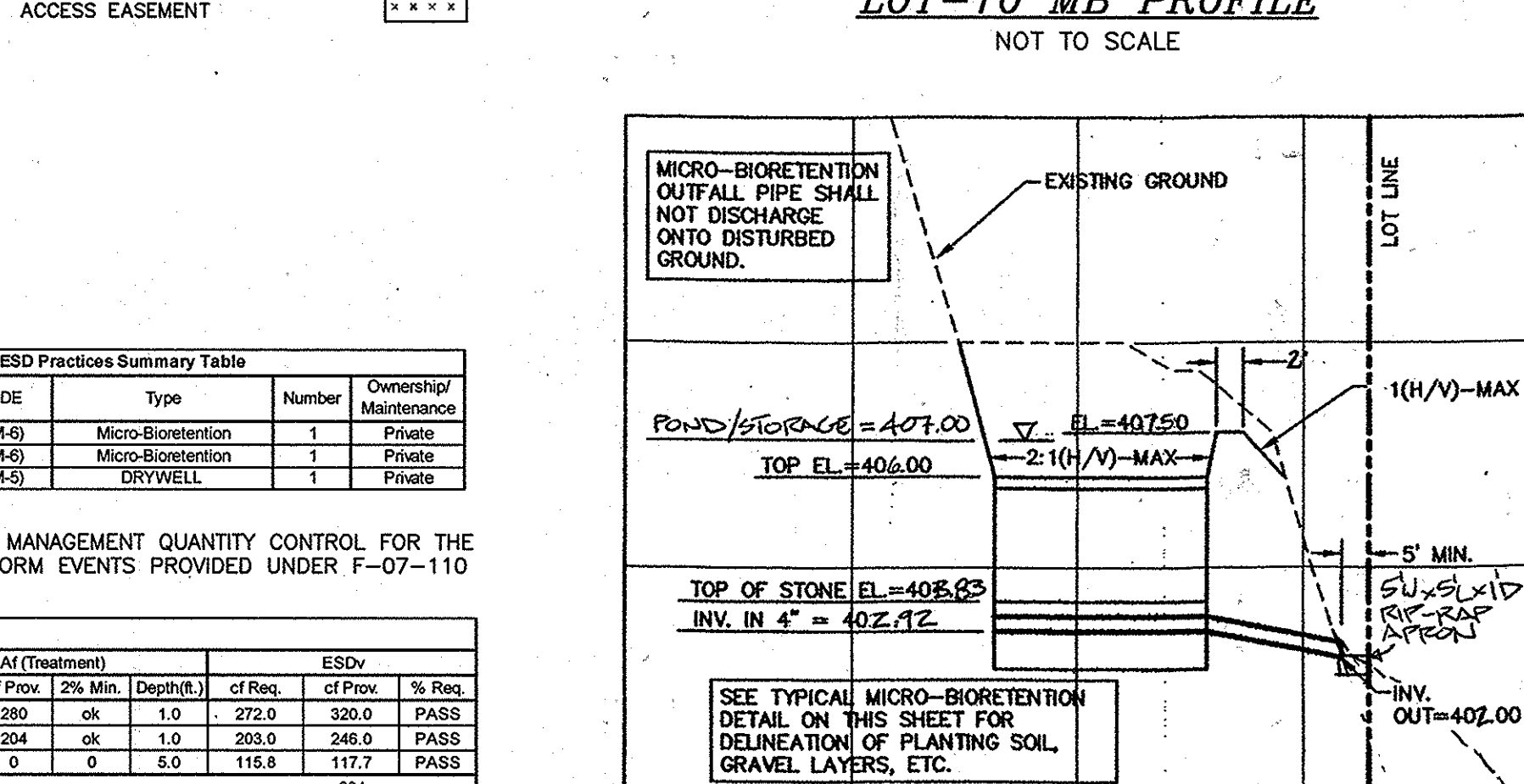
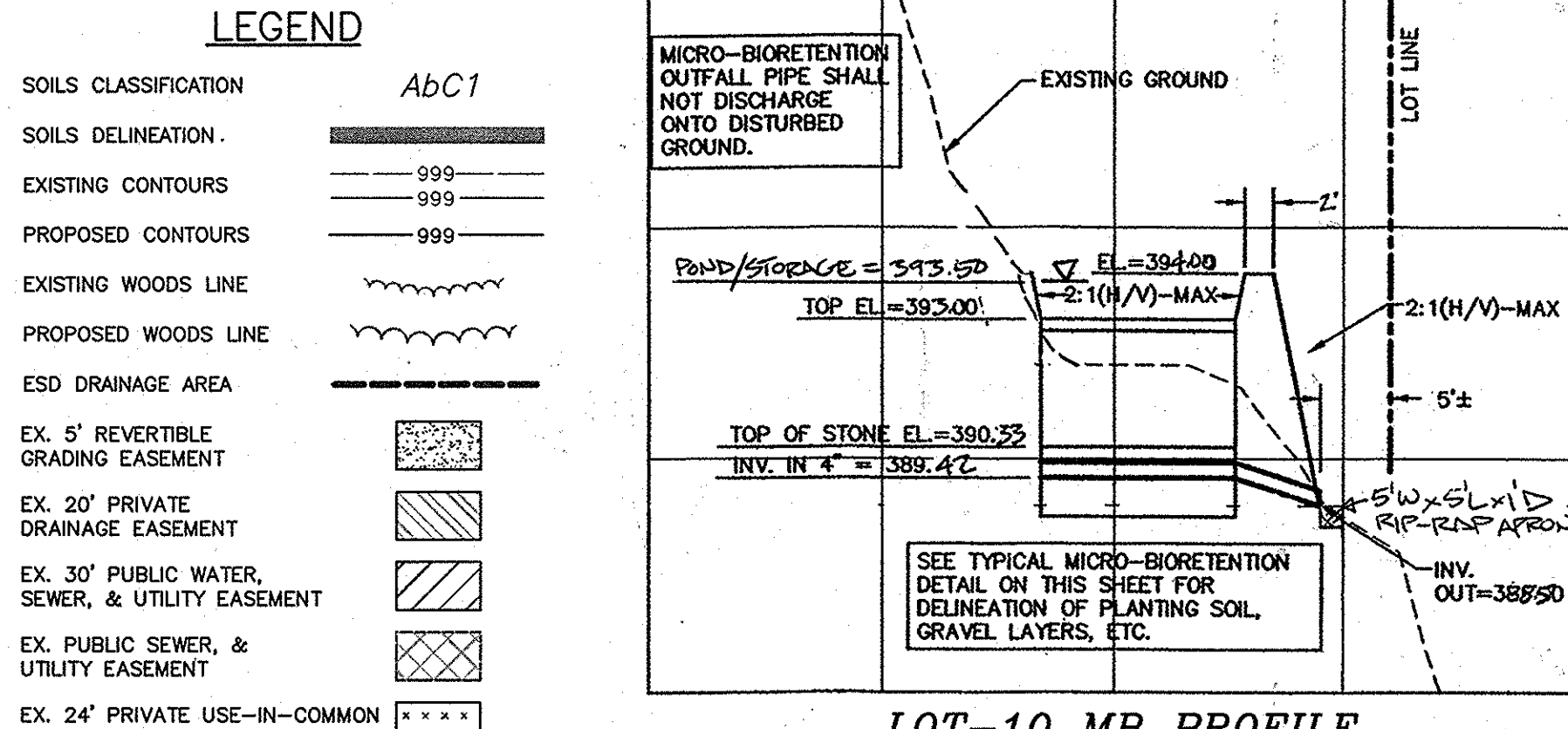
NO. CO. USDA SOILS MAP No. 16
* - INDICATES HYDRIC SOILS INCLUSIONS

GENERAL NOTES

- SUBJECT PROPERTY ZONED R-20 PER THE 2-2-04 COMPREHENSIVE ZONING PLAN AND THE COMP LIFE ZONING AMENDMENTS EFFECTIVE 7-28-06.
- THIS PROJECT IS SUBJECT TO THE CURRENT AMENDED FIFTH EDITION OF THE SUBDIVISION AND LAND DEVELOPMENT REGULATIONS AND THE ZONING REGULATIONS.
- THIS PLAN CONFORMS TO THE AMENDED FIFTH EDITION OF THE SUBDIVISION REGULATIONS AND THE AMENDED HOWARD COUNTY ZONING REGULATIONS. IT ALSO FALLS UNDER THE CRITERIA ESTABLISHED IN THE INFL DEVELOPMENT REGULATIONS OF COUNTY BILL 45-2003 EFFECTIVE OCTOBER 2, 2003.
- TOPOGRAPHY SHOWN HEREON IS BASED ON A FIELD-RUN TOPOGRAPHIC SURVEY PERFORMED BY BENCHMARK ENGINEERING DATED MARCH, 2003 AND SUPPLEMENTED IN NOVEMBER, 2006. CONTOURS ARE AT 2' INTERVALS. ADDITIONAL TOPOGRAPHY SUPPLEMENTED BY HOWARD COUNTY GIS.
- 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. #2478 AND #2413 WERE USED FOR THIS PROJECT.
- THERE ARE NO EXISTING WETLANDS, WETLANDS BUFFERS, STREAMS, STREAM BUFFERS OR 100-YEAR FLOODPLAIN ON-SITE AS PER A CERTIFICATION LETTER PREPARED BY ECO-SCIENCE PROFESSIONALS, INC. DATED APRIL, 2003 AND APPROVED UNDER F-03-017.
- TO THE BEST OF OUR KNOWLEDGE THERE ARE NO CEMETERIES LOCATED ON THIS SITE.
- THIS SITE IS LOCATED WITHIN THE METROPOLITAN DISTRICT.
- A LANDSCAPING PLAN FOR THIS PROJECT IS APPROVED UNDER F-07-110; THEREFORE, A SEPARATE SUPPLEMENTAL PLAN IS NOT REQUIRED.

ESD NARRATIVE

- NO NATURAL RESOURCES SUCH AS WETLANDS, STREAMS, OR VALUABLE FOREST LAND EXIST ON-SITE. THE PROPOSED MICRO-BIORETENTION FACILITIES WILL PROVIDE STORMWATER QUALITY TREATMENT FOR THE RE-SUBDIVISION, WHICH WILL BE AN IMPROVEMENT OVER THE EXISTING CONDITION/UNDEVELOPED PARCEL. THE PREVIOUS EXISTING STEEP SLOPES (>25%) WERE MASS GRADED UNDER F-07-110.
- THE IMPROVEMENTS AND DEVELOPED AREA WILL MAINTAIN THE EXISTING DRAINAGE PATTERNS AS CLOSELY AS POSSIBLE. NO IMPACT IS PROPOSED THAT WOULD ALTER ANY NATURAL FLOW PATTERNS.
- NON-STRUCTURAL PRACTICES WERE EXAMINED TO THE FULL EXTENT POSSIBLE. DUE TO THE LIMITED SIZE OF THE PROPOSED LOTS, THESE PRACTICES WERE NOT FEASIBLE.
- THE REQUIRED SEDIMENT AND EROSION CONTROL MEASURES WILL BE IN ACCORDANCE WITH THE LATEST MOE STANDARDS & SPECIFICATIONS UTILIZING PERIMETER SUPER SILT FENCE; NO SEDIMENT TRAPS OR BASINS ARE REQUIRED.
- TABLE B.2 SUMMARY OF SITE DEVELOPMENT STRATEGIES WAS UTILIZED TO THE EXTENT ALLOWABLE BY THE CURRENT HOWARD COUNTY ZONING & LAND DEVELOPMENT REGULATIONS BY UTILIZING SHARED DRIVEWAYS, MINIMIZING IMPERVIOUS AREAS, AND LIMITING EARTH DISTURBANCE.
- Forest Conservation Obligations are fulfilled under F-07-110.



BENCHMARK ENGINEERING, INC.
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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. 22940, Expiration Date: 6-30-2017

OWNER: HONG TAO MA, CHAO JIANG, 4513 REBECCA COURT, ELLICOTT CITY, MARYLAND 21043, PHONE: (410) 493-4950

PROJECT: HAWES PROPERTY LOTS 10 AND 11 A RE-SUBDIVISION OF BULK PARCEL 'A' (PLAT NOS. 22940-22941)

LOCATION: TAX MAP 24 - GRID 17 PARCEL 253 - ZONE: R-20 2nd ELECTION DISTRICT HOWARD COUNTY, MARYLAND

TITLE: SUPPLEMENTAL SWM PLAN

DATE: SEPTEMBER, 2015 **PROJECT NO.:** 2614

SCALE: AS SHOWN **DRAWING NO.:** 1 OF 1

Des: MCR/CAM Draft: MCR Check: CAM