FINAL ROAD CONSTRUCTION PLANS

REGAN PROPERTY

LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A' and
NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A'
PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

5th ELECTION DISTRICT

HOWARD COUNTY, MARYLAND

GENERAL NOTES

1.) ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS AND SPECIFICATIONS OF HOWARD COUNTY PLUS MSHA STANDARDS AND SPECIFICATIONS IF APPLICABLE.

2.) THE BOUNDARY SHOWN IS BASED ON A MONUMENTED FIELD-RUN SURVEY PERFORMED BY BENCHMARK ENGINEERING, INC., DATED JANUARY, 2012.

3.) THE COORDINATES SHOWN HEREON ARE BASED UPON THE HOWARD COUNTY GEODETIC CONTROL MONUMENTS 40FA & 40FB, WHICH ARE BASED ON THE MARYLAND STATE PLANE COORDINATE SYSTEM.

4.) EXISTING TOPOGRAPHY IS TAKEN FROM FIELD RUN BY BENCHMARK ENGINEERING, INC., ON OR ABOUT JANUARY 2012. CONTOUR INTERVAL IS 2 FEET.

5.) THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK BEING DONE.

6.) THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS/BUREAU OF ENGINEERING/CONSTRUCTION INSPECTION DIVISION AT (410) 313-1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF WORK.

7.) FOREST STAND DELINEATION PLAN WAS PREPARED BY ECO-SCIENCE PROFESSIONALS, INC., DATED MARCH 14, 2012, AND APPROVED UNDER SP-12-004.

8.) SPECIMEN TREES WERE FOUND ON-SITE AS PER FOREST STAND DELINEATION PLAN PREPARED BY ECO-SCIENCE PROFESSIONALS, INC., DATED MARCH 14, 2012, AND APPROVED UNDER SP-12-004. NO SPECIMEN TREES WILL BE REMOVED FOR THIS DEVELOPMENT.

9.) WETLANDS EXIST WITHIN THE LIMITS OF DISTURBANCE AS SHOWN ON THE WETLAND DELINEATION REPORT PREPARED BY ECO-SCIENCE PROFESSIONALS, INC., DATED MARCH 14, 2012, AND APPROVED UNDER SP-12-004.

10.) A NOISE STUDY IS NOT REQUIRED FOR THIS PROJECT.

11.) A.P.F.O. TRAFFIC STUDY WAS PREPARED BY THE MARS GROUP, INC., DATED MARCH, 2012, AND APPROVED UNDER SP-12-004.

12.) THE EXISTING PERCOLATION TEST LOCATIONS WILL PROVIDE ADEQUATE INFORMATION FOR SEVERAL OF THE MICRO-SCALE PRACTICES USED FOR STORMWATER MANAGEMENT. A GEOTECHNICAL REPORT FOR THIS PROJECT WAS PREPARED BY GEOTECHNICAL LABORATORIES, INC., DATED APRIL, 2012 FOR THE REMAINING MICRO-SCALE PRACTICES.

13.) THERE ARE EXISTING STRUCTURES LOCATED ON-SITE TO BE REMOVED. ONE EXISTING DWELLING ON SITE IS TO REMAIN.

14.) TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO CEMETERY LOCATIONS ON-SITE.

15.) THIS PLAN IS SUBJECT TO THE AMENDED 5th EDITION OF THE HOWARD COUNTY SUBDIVISION REGULATIONS

16.) STORMWATER MANAGEMENT SHALL BE PROVIDED FOR THIS PROJECT BASED ON GUIDELINES ESTABLISHED BY THE 2000 MARYLAND STORMWATER DESIGN MANUAL, VOLUMES I & II AS AMENDED BY THE STORMWATER MANAGEMENT ACT OF 2007. ENVIRONMENTAL SITE DESIGN METHODS SHALL BE UTILIZED AS FOLLOWS: THE ROADS ARE TREATED BY NON-ROOFTOP DISCONNECT, GRASS SWALES AND MICRO-BIORETENTION FACILITIES. DRIVEWAY AREAS MAY BE TREATED BY DISCONNECTION, OR ON-LOT MICRO-BIORETENTION. SOME SHARED DRIVEWAY SECTION WILL BE TREATED IN MICRO-BIORETENTION FACILITIES C & D. ALL ON-LOT STORMWATER MANAGEMENT FACILITIES AND CREDITS ARE SUBJECT TO THE REQUIREMENTS OF RECORDED DOC.*

17.) THE TOTAL FOREST CONSERVATION OBLIGATION AMOUNT OF 14.73 ACRES SHALL BE MET BY THE ON-SITE RETENTION OF 6.93 AC. WITHIN A FOREST CONSERVATION EASEMENT AND THE ON-SITE AFFORESTATION AND REFORESTATION OF 7.80 AC. WITHIN A FOREST CONSERVATION EASEMENT. THE DEVELOPER SHALL BOND IN ACCORDANCE WITH THE DEPARTMENT OF PUBLIC WORKS DEVELOPER'S AGREEMENT WITH SURETY IN THE AMOUNT OF $169,884.00 (339,768SF*0.50).

18.) STREET LIGHTS ARE NOT REQUIRED.

19.) ALL LANDSCAPING REQUIREMENTS SHALL BE FULFILLED IN ACCORDANCE WITH THE HOWARD COUNTY CODE, SECTION 16.124 AND THE LANDSCAPE MANUAL.

20.) FOR FLAG OR PIPESTEM LOTS, REFUSE COLLECTION, SNOW REMOVAL AND ROAD MAINTENANCE ARE PROVIDED TO THE JUNCTION OF THE FLAG OR PIPESTEM AND ROAD RIGHT-OF-WAY AND NOT TO THE PIPESTEM LOT DRIVEWAY.

21.) DRIVEWAYS SHALL BE PROVIDED PRIOR TO ISSUANCE OF A USE AND OCCUPANCY PERMIT FOR ANY NEW DWELLINGS FOR FIRE AND EMERGENCY VEHICLES PER THE FOLLOWING MINIMUM REQUIREMENTS:
A) WIDTH - 12' (16' SERVING MORE THAN ONE RESIDENCE).
B) SURFACE - 6" OF COMPACT CRUSHER RUN BASE WITH TAR AND CHIP COATING.
C) GEOMETRY - MAX. 15% GRADE; MAX. 10% GRADE CHANGE & MIN. 45' TURNING RADIUS.
D) STRUCTURES(CULVERTS/BRIDGES) - CAPABLE OF SUPPORTING 25 GROSS TONS (H25 LOAD)
E) DRAINAGE ELEMENTS - CAPABLE OF SAFELY PASSING 100 YEAR FLOODPLAIN WITH NO MORE THAN 1 FOOT DEPTH OVER DRIVEWAY.
F) STRUCTURE CLEARANCES - MINIMUM 12 FEET.
G) MAINTENANCE - SUFFICIENT TO INSURE ALL WEATHER USE.

22.) TRAFFIC CONTROL DEVICES, MARKINGS AND SIGNING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). ALL STREET AND REGULATORY SIGNS SHALL BE IN PLACE PRIOR TO THE PLACEMENT OF ANY ASPHALT.

23.) SUBJECT PROPERTY IS ZONED RR-DEO PER OCTOBER 23, 2013 COMPREHENSIVE ZONING PLAN.

24.) APPLICABLE HOWARD COUNTY DPZ FILE REFERENCES FOR THIS PROJECT INCLUDE: ECP-12-045, WP-13-025, SP-12-004, F-14-114

25.) FINANCIAL SURETY IN THE AMOUNT OF $33,000.00 FOR THE REQUIRED STREET TREES AND $11,400.00 FOR THE REQUIRED PERIMETER LANDSCAPING SHALL BE POSTED AS PART OF THE DPW DEVELOPER'S AGREEMENT.

26.) WRITTEN AUTHORIZATION BY BGE OF THE PROJECT LANDSCAPE PLAN WILL BE OBTAINED PRIOR TO SIGNATURE APPROVAL OF ROAD CONSTRUCTION PLANS.

27.) THE INTENDED USE OF THE PRESERVATIONS PARCELS: BUILDABLE PRESERVATION PARCEL "A" IS A PRIVATELY OWNED RESIDENCE, PRIVATELY OWNED WITH HOWARD COUNTY AND THE HOA AS EASEMENT HOLDERS. NON-BUILDABLE PRESERVATION PARCELS "B", "C" AND "D" ARE FOR THE PROTECTION OF ENVIRONMENTAL FEATURES AND TO BE PRIVATELY OWNED WITH HOWARD COUNTY AND THE HOA AS EASEMENT HOLDERS. NON-BUILDABLE PRESERVATION PARCEL "E" IS A PUBLIC OWNED SEWERAGE EASEMENT, TO BE OWNED BY HOWARD COUNTY, MARYLAND, WITH THE HOA AS AN EASEMENT HOLDER.

28.) THERE IS A FLOODPLAIN LOCATED ONSITE BASED ON A FLOODPLAIN ANALYSIS PREPARED BY BENCHMARK ENGINEERING, INC., DATED MARCH 2012, REVISED JULY, 2012.

29.) THE EXISTING 22' PAVING SECTION OF POINT RIDGE DRIVE, AS SHOWN ON F-95-06, WAS CARRIED THROUGH TO THE INTERSECTION WITH PLEASANT SPRINGS COURT. POINT RIDGE ROAD FROM STATION 0+00 TO STATION 2+73 EXCEEDS 200 ADT BUT NO EXPANSION TO THE WIDTH IS PROPOSED AS MOST OF THIS ROADWAY IS EXISTING.

30.) THIS PROPERTY IS NOT WITHIN THE METROPOLITAN DISTRICT. WATER AND SEWER SHALL BE PRIVATE FOR LOTS 1-10, LOTS 17-22 AND PRESERVATION PARCEL "A". WATER SHALL BE PRIVATE AND SEWER SHALL BE PUBLIC FOR LOTS 11-16.

31.) EXISTING UTILITIES SHOWN HEREON ARE BASED ON FIELD LOCATIONS AND RECORD DRAWINGS.

32.) A PRIVATE RANGE OF ADDRESS SIGN SHALL BE FABRICATED AND INSTALLED BY HOWARD COUNTY BUREAU OF HIGHWAYS AT THE DEVELOPERS/OWNERS EXPENSE FOR EACH OF THE USE-IN-COMMON DRIVEWAYS. CONTACT HOWARD COUNTY TRAFFIC DIVISION AT 401-313-2430 FOR DETAILS AND COST ESTIMATE.
A) THE R1-1 (STOP) SIGNS AND THE STREET NAME SIGN (SNS) ASSEMBLIES FOR THIS DEVELOPMENT MUST BE INSTALLED BEFORE THE BASE PAVING IN COMPLETE. B) THE TRAFFIC CONTROL DEVICE LOCATIONS SHOWN ON THESE PLANS ARE APPROXIMATE AND MUST BE FIELD APPROVED BY HOWARD COUNTY TRAFFIC DIVISION (410-313-2430) PRIOR TO THE INSTALLATION OF ANY OF THE TRAFFIC CONTROL DEVICES. C) ALL TRAFFIC CONTROL DEVICES ARE THEIR LOCATIONS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MARYLAND MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MDMUTCD). D) ALL SIGN POSTS USED FOR TRAFFIC CONTROL SIGNS INSTALLED IN THE COUNTY RIGHT-OF-WAY SHALL BE MOUNTED ON A 2 GALVANIZED STEEL, PERFORATED (QUICK PUNCH), SQUARE TUBE POST (14 GAUGE) INSERTED INTO A 2-1/2" GALVANIZED STEEL, PERFORATED, SQUARE TUBE SLEEVE (12 GAUGE) - 3' LONG. THE ANCHOR SHALL NOT EXTEND THAN TWO QUICK PUNCH HOLES ABOVE GROUND LEVEL. A GALVANIZED STEEL POLE CAP SHALL BE MOUNTED ON TOP OF EACH POST.

33.) AN INVESTIGATION OF DESIGN ALTERNATIVES HAS BEEN PROVIDED AT THE FINAL PLAN SUBMISSION FOR EXTENDING POINT RIDGE ROAD AND PLEASANT SPRINGS COURT IN ORDER TO ELIMINATE OR SHORTEN THE LOT PIPESTEMS. NO VIABLE ALTERNATIVES WERE FOUND.

34.) WAIVER PETITION WP-13-025, A REQUEST TO WAIVE SUBSECTIONS 16.115(C) AND 16.116(A) OF THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS. THE PLANNING DIRECTOR APPROVED THE WAIVER REQUEST ON FEBRUARY 8, 2013 SUBJECT TO THE FOLLOWING CONDITIONS:
1. THE PETITIONER SHALL OBTAIN AUTHORIZATION BY THE MARYLAND DEPARTMENT OF THE ENVIRONMENT AND U.S. ARMY CORPS OF ENGINEERS FOR ACTIVITIES PROPOSED IN STREAMS, WETLANDS, THE WETLAND BUFFER AND THE 100-YEAR FLOODPLAIN.
2. THE PETITIONER SHALL NOT STORE OR DISCARD BUILDING MATERIALS OR OTHER DEBRIS WITHIN THE 100-YEAR FLOODPLAIN WITHOUT PRIOR WRITTEN AUTHORIZATION BY THE HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING AND THE MARYLAND DEPARTMENT OF THE ENVIRONMENT.
3. THE PETITIONER SHALL ENSURE THAT ALL GRADING AND ROAD CONSTRUCTION ACTIVITIES WITHIN THE WETLANDS, STREAMS, BUFFERS AND 100-YER FLOODPLAIN THE MINIMUM NECESSARY TO ACCOMMODATE THE PROPOSED ROAD CROSSINGS AND SIDE SLOPE GRADING. THE PETITIONER SHALL ENSURE THAT BEST MANAGEMENT PRACTICES ARE USED WHEN CONSTRUCTING THE ROAD CROSSING AND THAT STABILIZATION IS INITIATED IMMEDIATELY UPON COMPLETING OF THE ROAD CONSTRUCTION ACTIVITIES.
4. THE PETITIONER SHALL COMPLY WITH THE DEVELOPMENT ENGINEERING DIVISION COMMENTS DATED AUGUST 13, 2012.

35.) LOTS 12 thru 17 OF THIS SUBDIVISION ARE CONNECTED TO THE SHARED SEWAGE DISPOSAL FACILITY GOVERNED BY SECTIONS 18.1200 ET SEQ. OF THE HOWARD COUNTY CODE. THE DEVELOPER IS OBLIGATED TO CONSTRUCT THE FACILITY UNDER THE PROVISIONS OF THE DEVELOPER AGREEMENT TO BE EXECUTED IN ASSOCIATION WITH THIS PLAN (F-13-112). A BUILDING PERMIT FOR LOTS 12 thru 17 MAY NOT BE ISSUED UNTIL THE CONSTRUCTION OF THE FACILITY IS COMPLETED. ACTIVITY ON THESE LOTS IS RESTRICTED AND IS SUBJECT TO THE DECLARATION OF COVENANTS, CONDITIONS, RIGHT-OF-ENTRY, AND RESTRICTIONS FOR SHARED SEWAGE DISPOSAL FACILITY INTENDED TO BE RECORDED AMONG THE LAND RECORDS OF HOWARD COUNTY, MARYLAND. LOTS 12 thru 17 SHALL BE ASSESSED SHARED SEWAGE DISPOSAL FACILITIES CHARGES AND ASSESSMENTS PURSUANT TO SECTIONS 20.800 ET SEQ. OF THE HOWARD COUNTY CODE. THE SHARED SEWAGE DISPOSAL FACILITY IS TO OWNED AND MAINTAINED BY HOWARD COUNTY.

36.) NO GRADING, REMOVAL OF VEGETATIVE COVER OR TREES, PAVING AND NEW STRUCTURES SHALL BE PERMITTED WITHIN THE LIMITS OF WETLANDS, STREAMS, THEIR REQUIRED BUFFERS OR 100YR FLOODPLAIN EXCEPT THAT ASSOCIATED WITH THE ROAD AND DRIVEWAY CROSSINGS PER WP-13-025.

37.) THIS DEVELOPMENT IS SUBJECT TO MDE PERMIT NO. 12-NT-0278/201261105

38.) A PRE-SUBMISSION COMMUNITY MEETING FOR THIS PROJECT WAS HELD ON FEBRUARY 29, 2012.

40.) THIS PROJECT IS EXEMPT FROM SB-236 GROWTH TIER LEGISLATION. PERCOLATION CERTIFICATION PLAN WAS APPROVED PRIOR TO JULY 1, 2012.

41.) THE USE-IN-COMMON DRIVEWAY MAINTENANCE AGREEMENT FOR LOTS 3-5, 7-10, 17-23 AND PRESERVATION PARCEL 'A' WERE RECORDED SIMULTANEOUSLY WITH THIS PLAT.

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

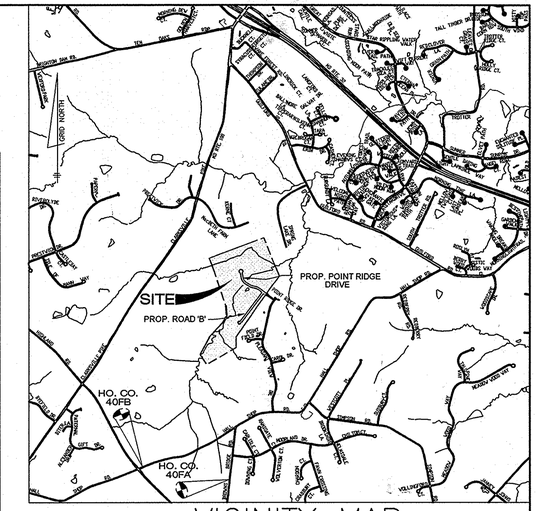
GRID NORTH

PLAN VIEW
SCALE: 1" = 200'

BENCH MARKS
HO. CO. #40FA (NAD '83) ELEV. 497.10 CONCRETE MONUMENT 0.25' BELOW SURFACE ON BROWN BRIDGE ROAD 0.3 MILE NORTH OF ROUTE 216 E 1,328,421.39' N 548,106.926'
HO. CO. #40FB (NAD '83) ELEV. 504.438' MONUMENT BEING 10.5' OFF EDGE OF PAVEMENT 2.0' BELOW SURFACE AT THE INTERSECTION OF HALL SHOP ROAD AND ROUTE 216 E 1,328,000.81' N 548,470.381'

STORMWATER MANAGEMENT PRACTICES		
LOT NUMBER	DISCONNECTION OF NON-ROOFTOP RUNOFF N-2 (NUMBER)	MICRO-BIORETENTION M-6 (NUMBER)
LOT 2	1	1
LOT 3		1
LOT 4	1	1
LOT 5	1	1
LOT 6	1	1
LOT 7	1	1
LOT 8	1	1
LOT 9		1
LOT 10	1	1
LOT 11		1
LOT 12		1
LOT 13		1
LOT 14		1
LOT 15		1
LOT 16		1
LOT 17		1
LOT 18	1	1
LOT 19		1
LOT 20	1	1
LOT 21	1	1
LOT 22	1	1
LOT 23	1	1

MICRO-BIORETENTION FACILITIES ON LOTS 3, 5, 6, 7, 8, 18 AND 20 MUST INCLUDE AN IMPERMEABLE LINER.



VICINITY MAP
SCALE: 1" = 2000'
ADC MAP PAGE: 4933, GRID: K10 & K1

LEGEND

SOILS CLASSIFICATION	ChB2
SOILS DELINEATION	
EXISTING CONTOURS	450
PROPOSED CONTOURS	999
LIMIT OF WETLANDS	
25' WETLANDS BUFFER	
CENTERLINE OF STREAM	
STREAM BUFFER	
EXISTING WOODS LINE	
PROPOSED WOODS LINE	
EXISTING STRUCTURE	
PROPOSED STRUCTURE	
SLOPES 15% TO 24.9%	
SLOPES 25% OR GREATER	
100 YEAR FLOODPLAIN	
PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)	
PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)	
TREE PROTECTION FENCE	
FCE PERMANENT SIGNAGE	
PROP. STREET TREE	POINT RIDGE DRIVE / ROAD 'B'
PRIVATE SEWAGE DISPOSAL AREA	
PRIVATE WELL AREA	
PROP. WELL LOCATION	
BOUNDARY COORDINATE	502

SITE DATA TABULATION

1) GENERAL SITE DATA
a. PRESENT ZONING: RR-DEO
b. LOCATION: TAX MAP 34 - GRID 24 - PARCEL 200
c. APPLICABLE DPZ FILE REFERENCES: ECP-12-045, SP-12-004, WP-13-025
d. DEED REFERENCE: L.11915 / F.00086
e. PROPOSED USE OF SITE: 22 SFD HOMES; 1 BUILDABLE PRESERVATION PARCEL; 4 NON-BUILDABLE PRESERVATION PARCEL
f. PROPOSED WATER AND SEWER SYSTEMS: PRIVATE; LOTS 1-10, 17-22 AND PRESERVATION PARCEL "A" PRIVATE WATER PUBLIC SEWER; LOTS 11-16

2) AREA TABULATION
a. TOTAL AREA OF SITE ..... 83.81 Ac.±
b. AREA OF 100 YEAR FLOODPLAIN (EXISTING) ..... 21.97 Ac.±
c. AREA OF STEEP SLOPES (25% OR GREATER) ..... 1.30 Ac.± (1.15 Ac.± OUTSIDE FLOODPLAIN)
d. NET AREA OF SITE ..... 60.69 Ac.±
e. AREA OF THIS PLAN SUBMISSION ..... 83.81 Ac.±
f. LIMIT OF DISTURBANCE ..... 8.02 Ac.±
g. AREA OF PROPOSED BUILDABLE LOTS ..... 26.11 Ac.±
h. AREA OF PRESERVATION PARCEL ..... 55.07 Ac.±
i. AREA OF PROPOSED PUBLIC ROAD ..... 2.63 Ac.±
j. AREA OF PROPOSED PUBLIC R/W DEDICATION ..... N/A

3) DENSITY TABULATION
a. NET AREA OF SITE ..... 60.69 Ac.±
b. TOTAL NUMBER OF LOTS ALLOWED PER ZONING
1 UNIT PER 4.25 GROSS ACRES 19
1 UNIT PER 2 NET ACRES (MAX) 30

4) UNIT/LOT TABULATION
a. TOTAL NUMBER OF BUILDABLE LOTS PROPOSED ON THIS SUBMISSION 22
b. TOTAL NUMBER OF PRESERVATION PARCELS PROPOSED ON THIS SUBMISSION ..... 4 (1 BUILDABLE)

MINIMUM LOT SIZE CHART			
LOT	GROSS AREA (sf)	PIPESTEM AREA (sf)	MINIMUM LOT SIZE (sf)
3	51,061	1,813	49,248
4	54,164	4,324	49,840
5	50,404	446	49,958
7	46,577	86	46,491
8	43,843	935	42,908
9	45,659	1,309	44,350
18	42,854	813	42,041
19	47,933	1,538	46,395
20	44,233	4,229	40,004
21	45,035	5,010	40,025
22	53,563	6,064	47,499
23	56,251	6,346	49,905

DENSITY EXCHANGE CHART	
RECEIVING PARCEL INFORMATION	TAX MAP 34, GRID 24, PARCEL 200
TOTAL AREA OF SUBDIVISION	83.81 AC
DENSITY UNITS ALLOWED BY RIGHT	83.81 / 4.25 = 19 D.U.
MAXIMUM DEO UNITS ALLOWED	60.69 / 2 = 30 D.U.
NUMBER OF UNITS PROPOSED	23 (22 LOTS AND 1 BUILDABLE PRESERVATION PARCEL)
DEO DENSITY UNITS TO BE RECEIVED FROM SENDING PARCEL	4
SENDING PARCEL INFORMATION	MURRAY PROPERTY F-14-114 TAX MAP 6, PARCEL 70

COORDINATE CHART		
No.	NORTH	EAST
500	554344.6910	1327853.7230
501	554917.7563	1329395.0152
502	553844.5182	1329833.2938
503	552134.6445	1328558.7074
504	551829.9320	1328567.4588
505	551330.6843	1327743.6131
506	551624.1937	1327569.3869
507	551872.5861	1327699.6861
508	552294.1837	1327959.6887
509	552580.4821	1328233.2743
510	552761.7848	1328312.8566
511	552772.2759	1328339.7637
512	553083.8823	1328305.3581

SHEET INDEX	
NO.	DESCRIPTION
1	COVER SHEET
2	LAYOUT PLAN
3	ROAD PROFILE AND DETAILS (POINT RIDGE DRIVE)
4	ROAD PROFILE AND DETAILS (PLEASANT SPRINGS COURT)
5	GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP
6	GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP
7	GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP
8	GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP
9	GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP
10	GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP
11	GRADING, SEDIMENT AND EROSION CONTROL DETAIL AND NOTES
12	STORM DRAIN DRAINAGE AREA MAP
13	STORM DRAIN DRAINAGE AREA MAP
14	STORM DRAIN PROFILES
15	STORMWATER MANAGEMENT PLAN
16	STORMWATER MANAGEMENT PLAN
17	STORMWATER MANAGEMENT PLAN
18	STORMWATER MANAGEMENT PLAN
19	LANDSCAPE PLAN
20	LANDSCAPE PLAN
21	FOREST CONSERVATION PLAN
22	FOREST CONSERVATION PLAN
23	FOREST CONSERVATION NOTES AND DETAILS
24	BOTTOMLESS ARCH CROSSING #1
25	BOTTOMLESS ARCH CROSSING #1
26	BOTTOMLESS ARCH CROSSING #1
27	BOTTOMLESS ARCH CROSSING #1
28	BOTTOMLESS ARCH CROSSING #2
29	BOTTOMLESS ARCH CROSSING #2
30	BOTTOMLESS ARCH CROSSING #2
31	BOTTOMLESS ARCH CROSSING #2
32	BRIDGE BORING LOGS
33	STREAM REALIGNMENT PLAN

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

NO.	DATE	REVISION

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. 28559, Expiration Date: 7-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

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
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: REGAN PROPERTY
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

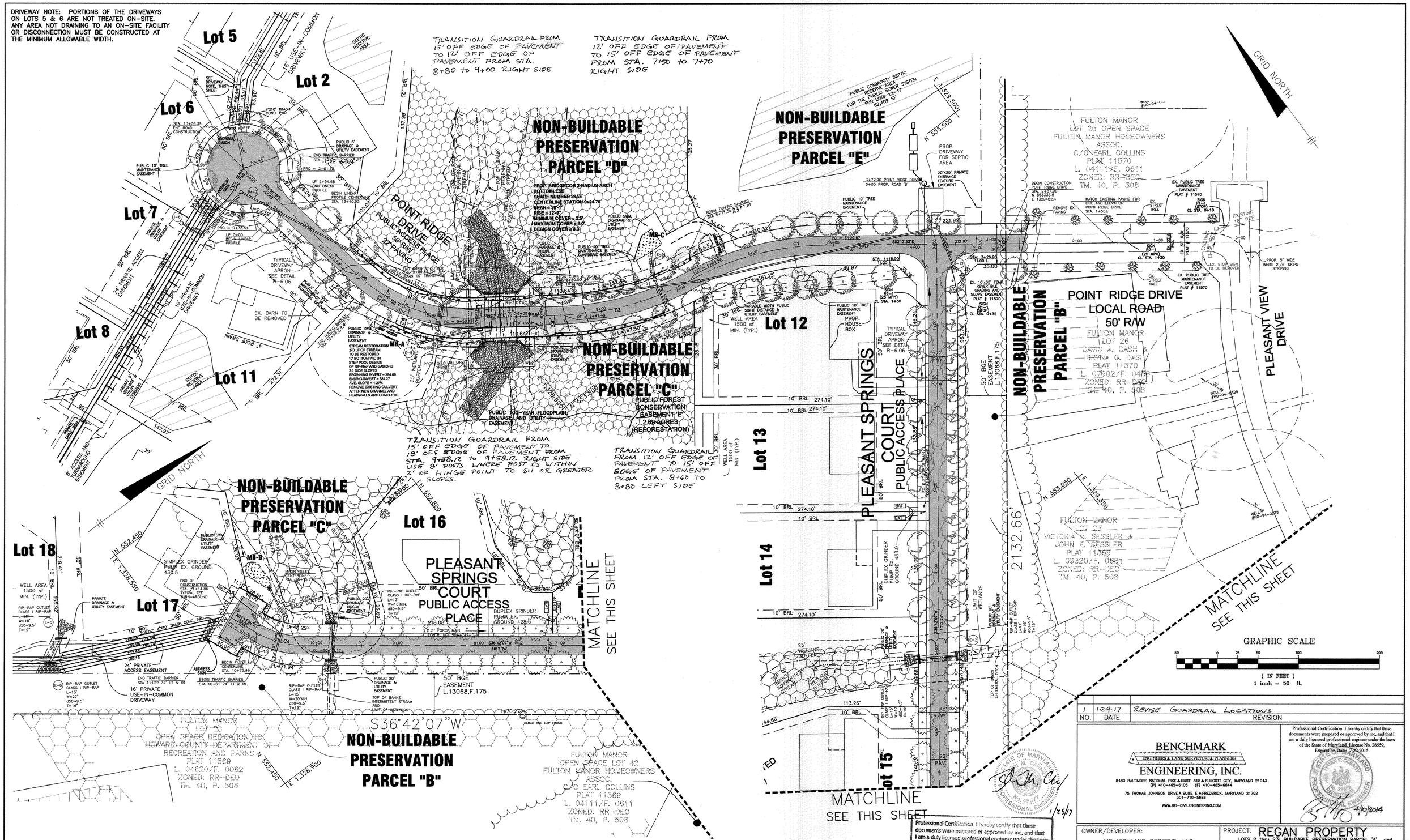
TITLE:
FINAL ROAD CONSTRUCTION PLAN
COVER SHEET

DATE: APRIL, 2014	PROJECT NO. 2171
DESIGN: JMC / DRAFT: JMC	SCALE: AS SHOWN / DRAWING 1 OF 33

F-13-112

P:\2171 Regan Property\dwg\7000r2.dwg, 4/9/2014 9:11:15 AM, eogle

DRIVEWAY NOTE: PORTIONS OF THE DRIVEWAYS ON LOTS 5 & 6 ARE NOT TREATED ON-SITE. ANY AREA NOT DRAINING TO AN ON-SITE FACILITY OR DISCONNECTION MUST BE CONSTRUCTED AT THE MINIMUM ALLOWABLE WIDTH.



PLAN VIEW
SCALE: 1" = 50'

NO.	DATE	REVISION
1	1-29-17	REVISE GUARDRAIL LOCATIONS

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
(P) 410-465-6105 (F) 410-465-6844
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BB-CIVILENGINEERING.COM

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. 28559, Expiration Date: 7-2-2015.
4/10/2014

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. 45577 Expiration Date: 06.08.18
1/25/17

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E', and A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

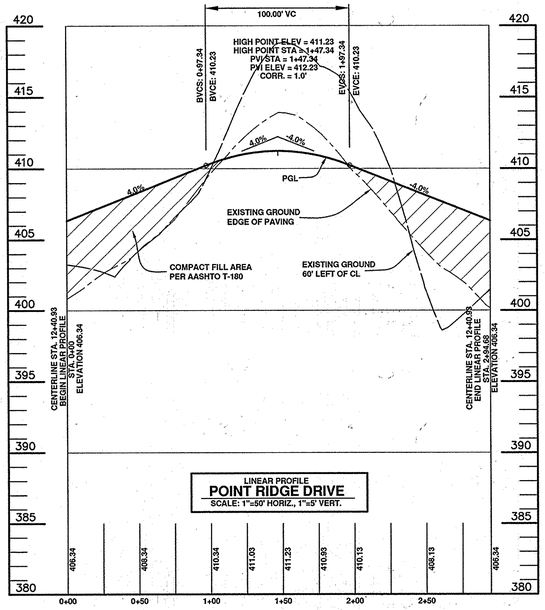
TITLE:
FINAL ROAD CONSTRUCTION PLAN
LAYOUT PLAN

DATE: APRIL, 2014 | PROJECT NO. 2171
DESIGN: JMC | DRAFT: JMC | SCALE: AS SHOWN | DRAWING 2 OF 33

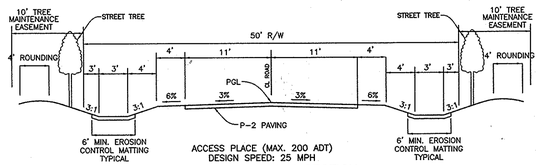
APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

CURVE TABLE						
CURVE	LENGTH	RADIUS	TANGENT	CHORD LENGTH	CHORD BEARING	DELTA
C1	173.55'	350.00'	88.60'	171.78'	N67°30'12"W	28°24'37"
C2	164.00'	350.00'	83.56'	162.56'	S68°16'49"E	26°51'24"
C3	156.78'	200.00'	82.67'	152.79'	S32°23'43"E	44°54'49"
C4	58.62'	110.00'	30.02'	57.92'	N51°58'00"E	30°31'52"

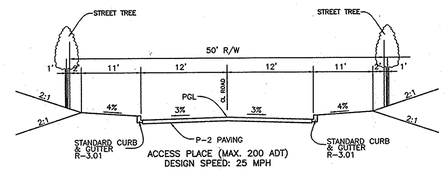
P:\2171 Regan Property\dwg\7000\2.dwg, 4/9/2014 9:09:53 AM, cogle



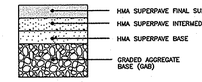
NOT TO SCALE



TYPICAL ROADWAY SECTION
POINT RIDGE DRIVE
STATIONS 2+68.40 TO 8+80.00, 9+89.89 TO 12+40.93
NOT TO SCALE

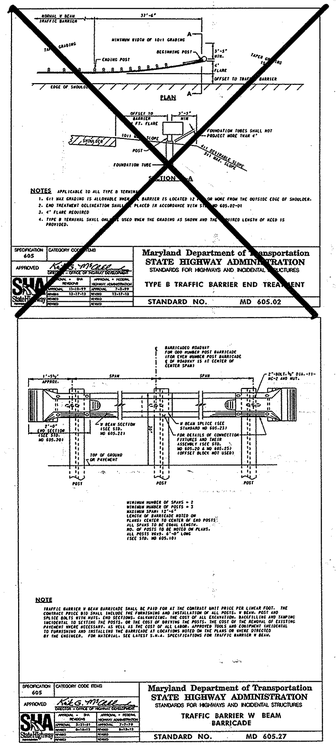


TYPICAL ROADWAY SECTION
PROPOSED POINT RIDGE DRIVE
STATIONS 8+80.00 TO 9+89.89
PROVIDE 10' TRANSITION FROM 22' PAVING TO 24' PAVING
NOT TO SCALE

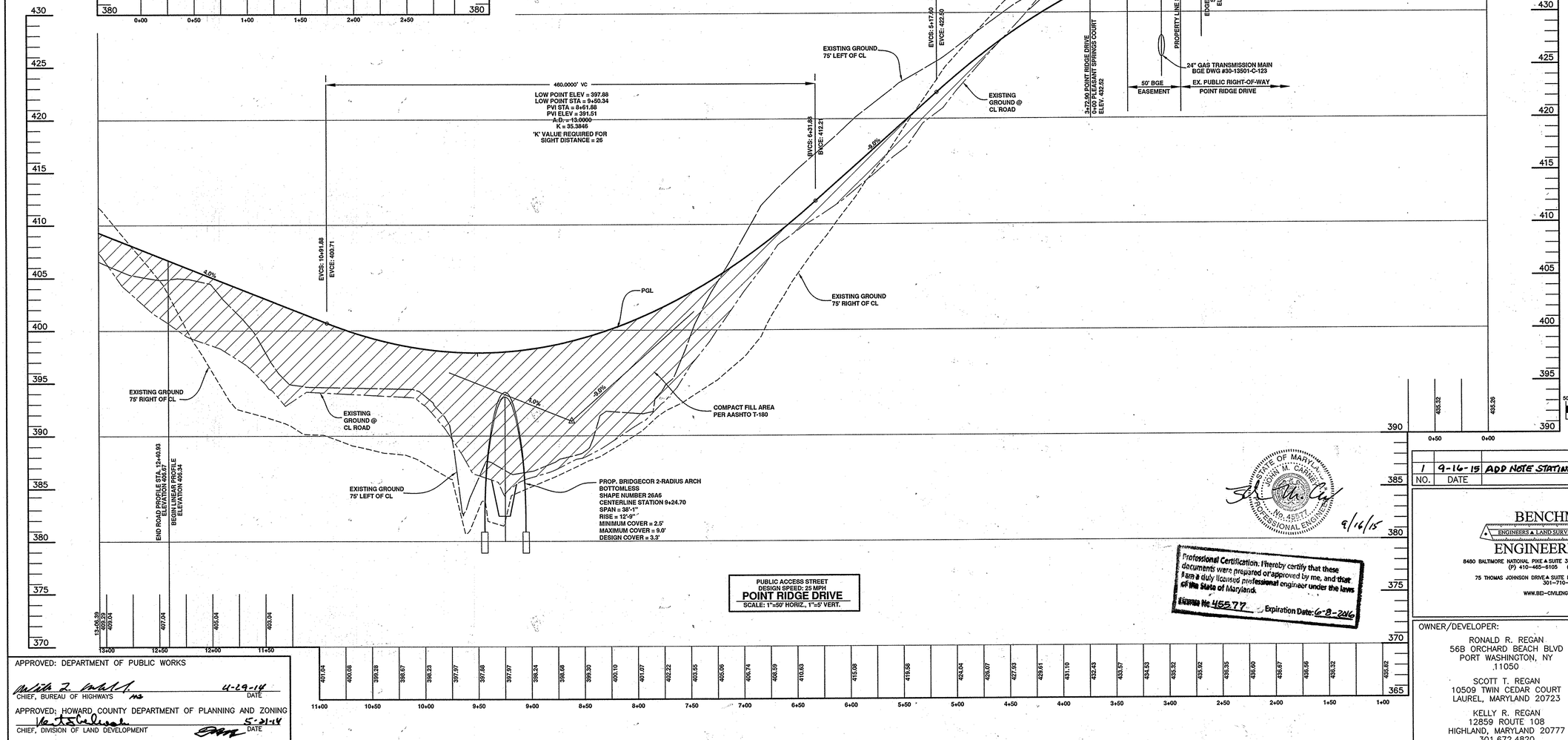


SECTION NUMBER	ROAD AND STREET CLASSIFICATION	CALIFORNIA BEARING RATIO (CBR)	3 TO <5	5 TO <7	≥7	3 TO <5	5 TO <7	≥7
		PAVEMENT MATERIAL (INCHES)	MIN HMA WITH GAB			MIN HMA WITH CONSTANT GAB		
P-2	PARKING DRIVE AISLES: RESIDENTIAL AND NON-RESIDENTIAL WITH NO MORE THAN 10 HEAVY TRUCKS PER DAY	HMA SUPERPAVE FINAL SURFACE 9.5 MM PG 64-22, LEVEL 1 (LOW ESAL)	1.5	1.5	1.5	1.5	1.5	1.5
	LOCAL ROADS: ACCESS PLACE, ACCESS STREET	HMA SUPERPAVE INTERMEDIATE SURFACE 9.5 MM PG 64-22, LEVEL 1 (LOW ESAL)	1.0	1.0	1.0	1.0	1.0	1.0
	CUL-DE-SAC: RESIDENTIAL	HMA SUPERPAVE BASE 19.0 MM PG 64-22, LEVEL 1 (LOW ESAL)	2.0	2.0	2.0	3.5	2.0	2.0
		GRADED AGGREGATE BASE (GAB)	8.0	4.0	3.0	4.0	4.0	4.0

P-2 PAVING DETAIL



USE OF END TREATMENT AS SHOWN ON STATE HIGHWAY ADMINISTRATION STANDARD DETAIL MD 605.20 HAS BEEN APPROVED BY BUREAU OF HIGHWAYS. EMAIL DATED 6/9/15.



GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

NO.	DATE	REVISION
1	9-16-15	ADD NOTE STATING STANDARD DETAIL MD 605.20 APPROVED AND REMOVE MD 605.02 DETAIL

STATE OF MARYLAND — JOHN M. CARNEY — No. 45577 — PROFESSIONAL ENGINEER
9/16/15

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. 45577, Expiration Date: 6-8-2016

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. 28559, Expiration Date: 7-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER
7/10/2014

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
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5585
WWW.BD-CIVILENGINEERING.COM

OWNER/DEVELOPER:
RONALD T. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050
SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723
KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS FLAT NO. 22601-22604

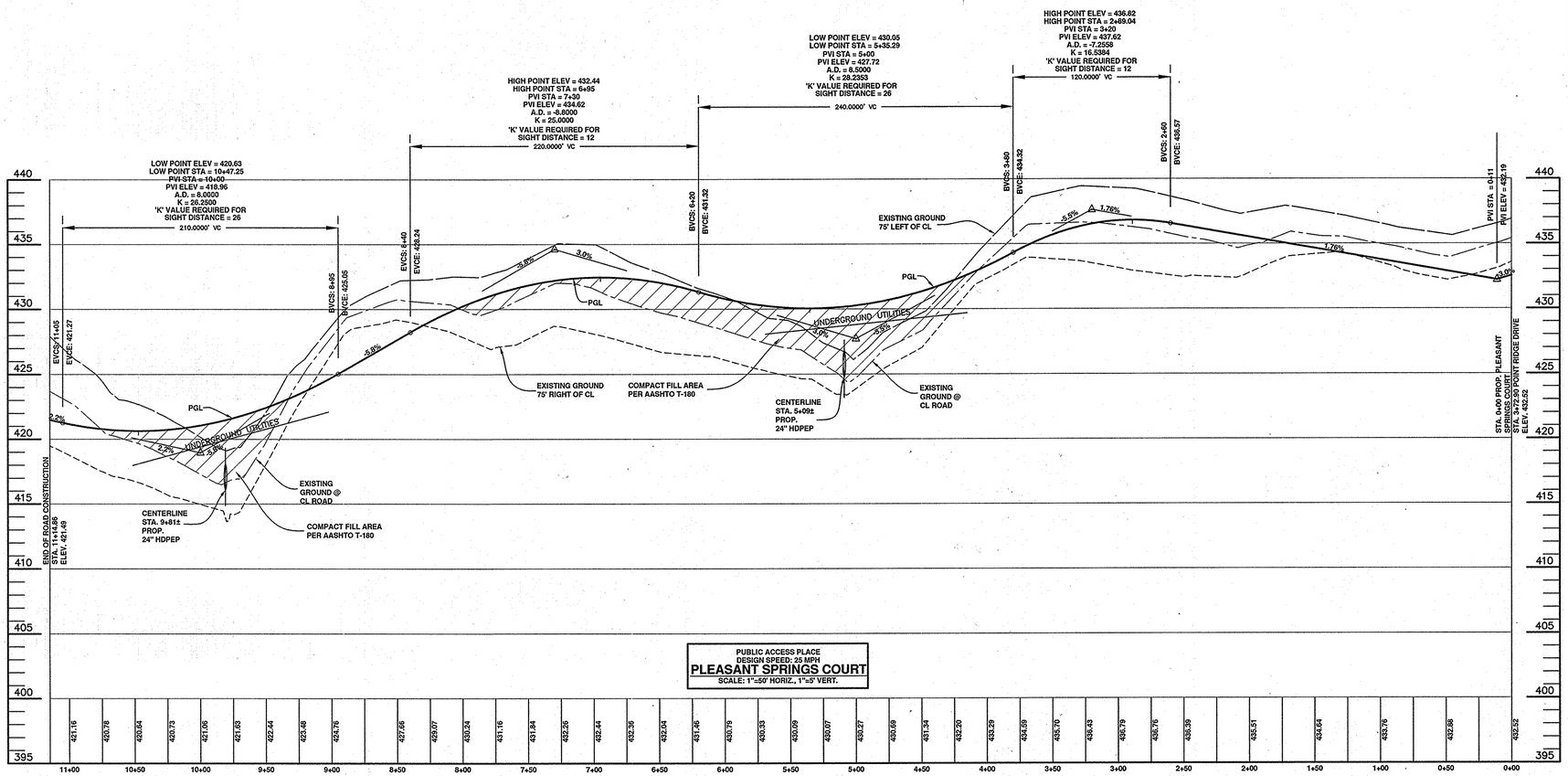
LOCATION: TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

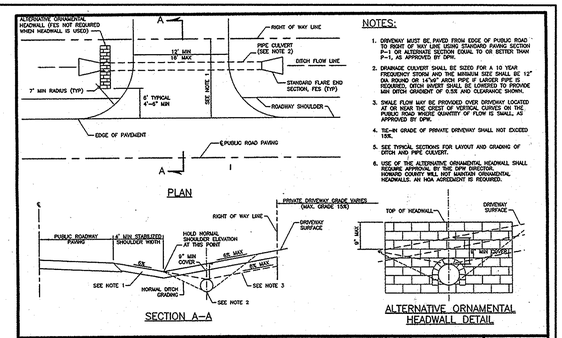
TITLE: POINT RIDGE DRIVE
FINAL ROAD CONSTRUCTION PLAN
ROAD PROFILE AND DETAILS

DESIGN: JMC | DRAFT: JMC | DATE: MARCH, 2014 | PROJECT NO. 2171 | SCALE: AS SHOWN | DRAWING 3 OF 33

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

F-13-112

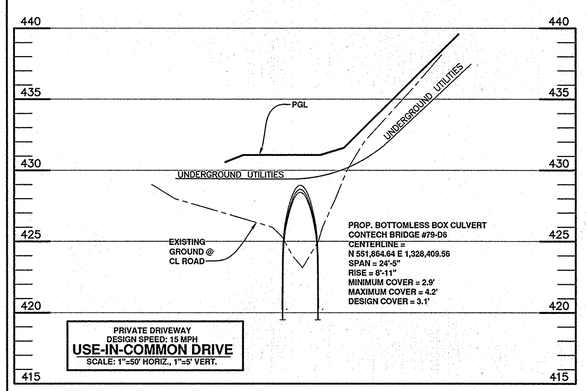


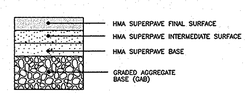


NOTES:

1. DRIVEWAY MUST BE PAVED FROM EDGE OF PUBLIC ROAD TO RIGHT OF WAY LINE USING STANDARD PAVING SECTION P-1, OR APPROVED EQUAL EQUAL TO OR BETTER THAN P-1, AS APPROVED BY DPW.
2. DRAINAGE CULVERT SHALL BE SIZED FOR A 10 YEAR FREQUENCY STORM AND THE MINIMUM SIZE SHALL BE 12" DIA. ROUND OR 14"x4" ARCH PIPE IF LARGER PIPE IS NOT REQUIRED. DESIGN DRAINAGE DITCH TO CONVEY 25 YEAR STORM WITH DITCH GRADIENT OF 0.5% AND CLEARANCE SHOWN.
3. SWALE FLOW MAY BE PROVIDED OVER DRIVEWAY LOCATED AT OR NEAR THE CREST OF VERTICAL CURVES ON THE ROADWAY WHEN THE SURFACE QUANTITY OF FLOW IS SMALL, AS APPROVED BY DPW.
4. TIE-IN GRADE OF PRIVATE DRIVEWAY SHALL NOT EXCEED 15%.
5. SEE TYPICAL SECTIONS FOR LAYOUT AND GRADING OF DITCH AND PIPE CULVERT.
6. USE OF THE ALTERNATIVE ORNAMENTAL HEADWALL SHALL REQUIRE APPROVAL BY THE DPW DIRECTOR. HOWARD COUNTY WILL NOT MAINTAIN ORNAMENTAL HEADWALLS. AN HOA AGREEMENT IS REQUIRED.

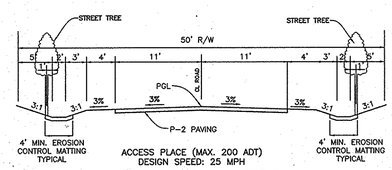
Howard County, Maryland Department of Public Works Approved: Chief, Bureau of Engineering	RESIDENTIAL DRIVEWAY ENTRANCE Open Section Roadway	Detail R-6.06



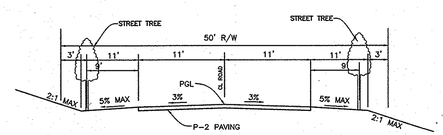


SECTION NUMBER	ROAD AND STREET CLASSIFICATION	CALIFORNIA BEARING RATIO (CBR)	3 TO <5	5 TO <7	≥7	3 TO <5	5 TO <7	≥7
		PAVEMENT MATERIAL (INCHES)	MIN HMA WITH GAB			HMA WITH CONSTANT GAB		
P-2	PARKING DRIVE AISLES: RESIDENTIAL AND NON-RESIDENTIAL WITH NO MORE THAN 10 HEAVY TRUCKS PER DAY LOCAL ROADS: ACCESS PLACE, ACCESS STREET CUL-DE-SAC: RESIDENTIAL	HMA SUPERPAVE FINAL SURFACE 9.5 MM PG 64-22, LEVEL 1 (LOW ESAL)	1.5	1.5	1.5	1.5	1.5	1.5
		HMA SUPERPAVE INTERMEDIATE SURFACE 9.5 MM PG 64-22, LEVEL 1 (LOW ESAL)	1.0	1.0	1.0	1.0	1.0	1.0
		HMA SUPERPAVE BASE 19.0 MM PG 64-22, LEVEL 1 (LOW ESAL)	2.0	2.0	2.0	3.5	2.0	2.0
		GRADED AGGREGATE BASE (GAB)	8.0	4.0	3.0	4.0	4.0	4.0

P-2 PAVING DETAIL



TYPICAL ROADWAY SECTION
PLEASANT SPRINGS COURT
STATIONS 8+25 TO 9+75
NOT TO SCALE



TYPICAL ROADWAY SECTION
PLEASANT SPRINGS COURT
STATIONS 0+00 TO 8+25 AND
STATIONS 9+75 TO 10+76
NOT TO SCALE

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

NO.	DATE	REVISION

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

BENCHMARK
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75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date: 7-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050

SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723

KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

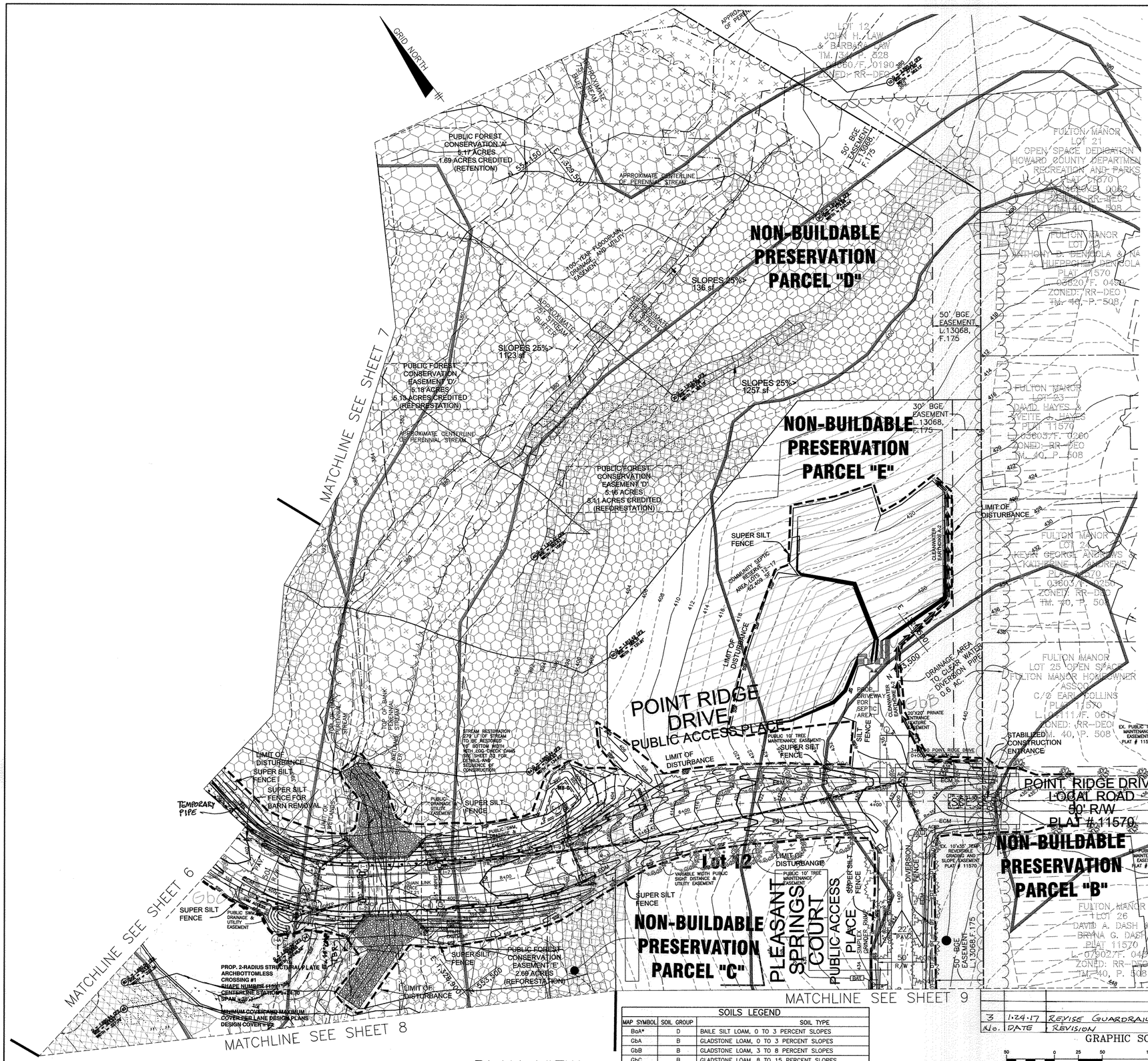
PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E', A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: PLEASANT SPRINGS COURT
FINAL ROAD CONSTRUCTION PLAN
ROAD PROFILE AND DETAILS

DESIGN: JMC	DRAFT: JMC	DATE: MARCH, 2014	PROJECT NO. 2171
		SCALE: AS SHOWN	DRAWING 4 OF 33

F-13-112



PLAN VIEW

SCALE: 1" = 50'

LEGEND

SOILS CLASSIFICATION	ChB2
SOILS DELINEATION	
EXISTING CONTOURS (AERIAL 12/02)	480 / 478
PROPOSED CONTOURS	999
LIMIT OF WETLANDS	
25' WETLANDS BUFFER	
CENTERLINE OF STREAM	
STREAM BUFFER	
EXISTING WOODS LINE	
PROPOSED WOODS LINE	
EXISTING STRUCTURE	
PROPOSED STRUCTURE	
SLOPES 15% TO 24.9%	
SLOPES 25% OR GREATER	
100 YEAR FLOODPLAIN	
PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)	
PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)	
TREE PROTECTION FENCE	//
FCE PERMANENT SIGNAGE	
PROP. STREET TREE	
NON-ROOFTOP DISCONNECTION AND RECEIVING AREA	
PRIVATE SEWAGE DISPOSAL AREA	
PRIVATE WELL AREA	
LIMIT OF DISTURBANCE	
SUPER SILT FENCE	
STABILIZED CONSTRUCTION ENTRANCE	SCE
STORMWATER MANAGEMENT BORING LOCATION	B-8 437.0
EROSION CONTROL MATTING	ECM
EARTH DIKE	
INLET PROTECTION	CIP / AGIP

STATE OF MARYLAND — STEVEN M. CARNEY — No. 45577 — PROFESSIONAL ENGINEER — 9/16/15

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. 45577 Expiration Date: 6/8/2016

NOTE: THIS PLAN IS NOT TO BE USED FOR RESIDENTIAL BUILDING PERMITS

ENGINEER'S CERTIFICATE

"I HEREBY CERTIFY THAT THIS PLAN FOR SEDIMENT AND EROSION CONTROL REPRESENTS A PRACTICAL AND WORKABLE PLAN BASED ON MY PERSONAL KNOWLEDGE OF THE SITE CONDITIONS AND THAT IT WAS PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF THE HOWARD SOIL CONSERVATION DISTRICT."

ENGINEER – BRIAN F. CLEARY — DATE 4/10/2014

DEVELOPER'S CERTIFICATE

"I/WE CERTIFY THAT ALL DEVELOPMENT AND CONSTRUCTION WILL BE DONE ACCORDING TO THIS PLAN OF DEVELOPMENT FOR SEDIMENT AND EROSION CONTROL, AND THAT ALL RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I ALSO AUTHORIZE PERIODIC ON-SITE INSPECTION BY THE HOWARD SOIL CONSERVATION DISTRICT."

DEVELOPER — DATE 4/3/14

THIS DEVELOPMENT PLAN IS APPROVED FOR SOIL EROSION AND SEDIMENT CONTROL BY THE HOWARD SOIL CONSERVATION DISTRICT.

HOWARD SCD — DATE 4/8/14

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

NO.	DATE	REVISION
2	9-16-15	REVISE GUARDRAIL ALONG POINT RIDGE DRIVE
1	2-9-15	REMOVE BARN LOD. BARN PREVIOUSLY REMOVED BY PRIOR OWNERS
3	1.24.17	REVISE GUARDRAIL LOCATION

SOILS LEGEND

MAP SYMBOL	SOIL GROUP	SOIL TYPE
BaA*	D	BAILE SILT LOAM, 0 TO 3 PERCENT SLOPES
GbA	B	GLADSTONE LOAM, 0 TO 3 PERCENT SLOPES
GbB	B	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B	GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
GmB*	C	GLENVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES
MaD	B	MANOR LOAM, 15 TO 25 PERCENT SLOPES

FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
* ERODIBLE SOILS

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

BENCHMARK
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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. 28559, Expiration Date: 6-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — PROFESSIONAL ENGINEER — 4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E', and A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. ____

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: FINAL ROAD CONSTRUCTION PLAN
GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP

DATE: MARCH, 2014 — PROJECT NO. 2171

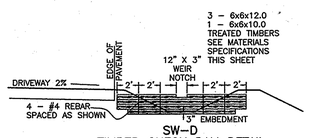
DESIGN: JCO — DRAFT: JCO — SCALE: AS SHOWN — DRAWING 5 OF 33

F-13-112

SOILS LEGEND		
MAP SYMBOL	SOIL GROUP	SOIL TYPE
BaA*	D	BAILE SILT LOAM, 0 TO 3 PERCENT SLOPES
GbA	B	GLADSTONE LOAM, 0 TO 3 PERCENT SLOPES
GbB	B	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B	GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
GmB*	C	GLENVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES
MaD	B	MANOR LOAM, 15 TO 25 PERCENT SLOPES

FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
* ERODIBLE SOILS

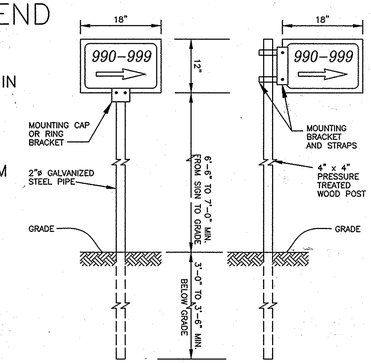
DRIVEWAY NOTE: PORTIONS OF THE DRIVEWAYS ON LOTS 5 & 6 ARE NOT TREATED ON-SITE. ANY AREA NOT DRAINING TO AN ON-SITE FACILITY OR DISCONNECTION MUST BE CONSTRUCTED AT THE MINIMUM ALLOWABLE WIDTH.



SW-D
TIMBER CHECK DAM DETAIL
NOT TO SCALE

SEE PREVIOUS SHEET FOR LEGEND

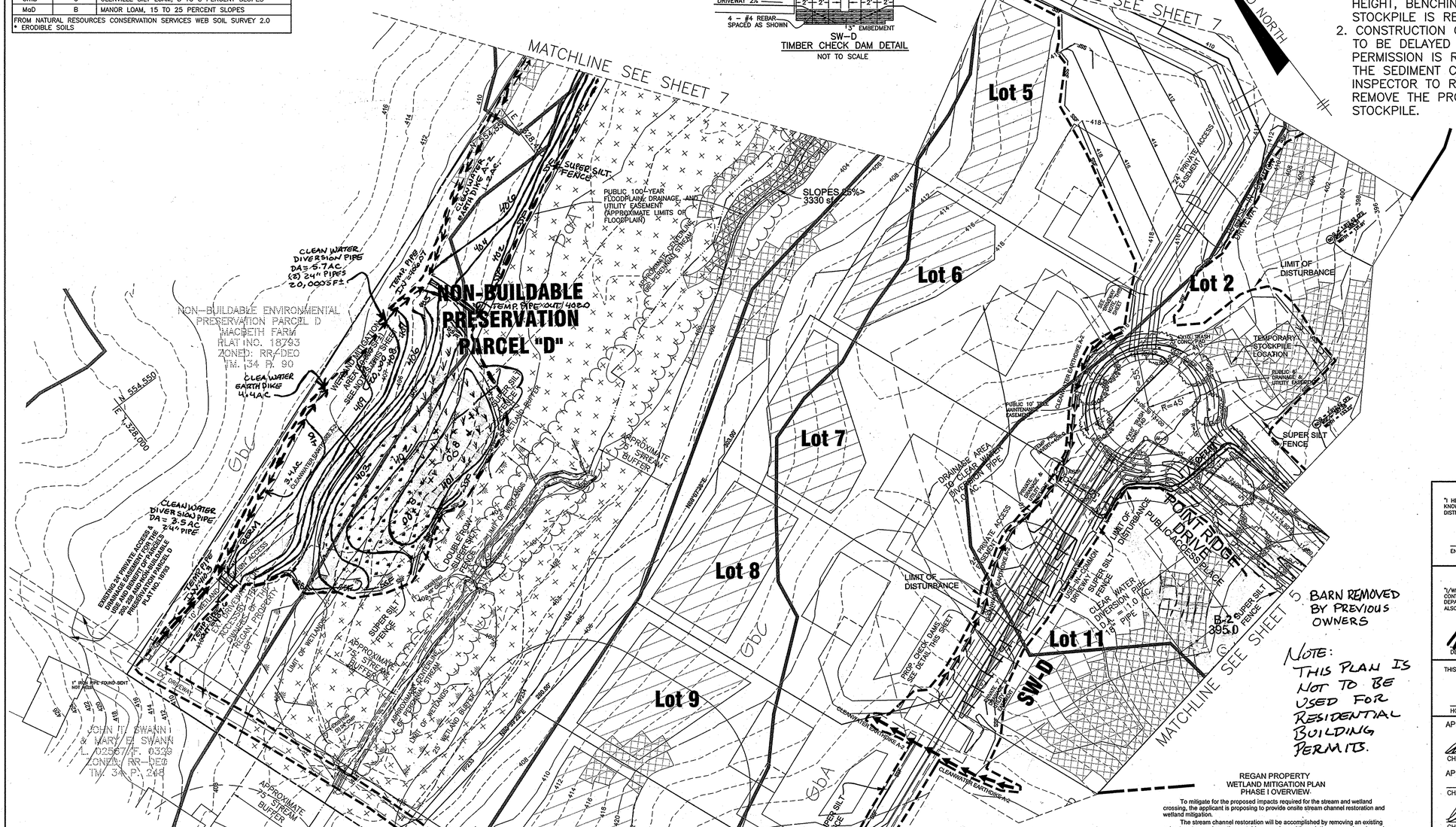
NOTE:
1. SHOULD THE PROPOSED STOCKPILE AREA EXCEED 15' IN HEIGHT, BENCHING OF THE STOCKPILE IS REQUIRED.
2. CONSTRUCTION ON LOT 2 IS TO BE DELAYED UNTIL PERMISSION IS RECEIVED FROM THE SEDIMENT CONTROL INSPECTOR TO RELOCATE OR REMOVE THE PROPOSED STOCKPILE.



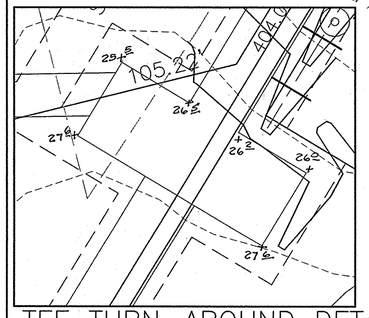
HO. CO. APPROVED SIGN DESIGN AND INSTALLATION DETAIL
NOT TO SCALE

THE FOLLOWING STANDARD SIGN DESIGN SPECIFICATIONS SHALL APPLY:

1. THE SIGN SIZE SHALL BE 12" x 18".
2. THE SIGN MATERIAL SHALL BE 0.080 GAUGE THICKNESS ANODIZED ALUMINUM.
3. THE SIGN SHALL HAVE A GREEN BACKGROUND WITH 3" HIGH WHITE REFLECTIVE NUMBERS AND ARROW WITH A WHITE REFLECTIVE BORDER.
4. WHERE A PRIVATE ROAD NAME IS IN USE OR PART OF A PRIVATE HOMEOWNER'S ARTICLES OF INCORPORATION AGREEMENT THE SIGN SIZE WILL BE ENLARGED TO ACCOMODATE THE NECESSARY LETTERING BUT REMAIN PROPORTIONAL TO THE ABOVE DESIGN LIMITS.
5. THE SIGN WILL BE INSTALLED WITHIN THE COMMON DRIVEWAY EASEMENT AREA AS NOTED ON THE FINAL PLAT.
6. ADDRESS NUMBER IDENTIFICATION SIGNS ARE TO BE PROVIDED UNDER THE TENANTS OF THE HOMEOWNER'S ASSOCIATION INCORPORATION OR A PROPERTY MANAGEMENT COMPANY FOR INSTALLATION AND MAINTENANCE IN ACCORDANCE WITH THE DEPARTMENT OF PLANNING AND ZONING ADDRESS NUMBERING SYSTEM AND PER SECTION 3.503(a) OF THE HOWARD COUNTY CODE – PUBLIC SIGNS. MAINTENANCE/REPAIR AND REPLACEMENT OF THE ADDRESS NUMBER DIRECTIONAL SIGNS WILL BE THE RESPONSIBILITY OF THE HOMEOWNER'S ASSOCIATION OR A PROPERTY MANAGEMENT COMPANY.
7. COMPLIANCE REGARDING THE INSTALLATION OF THE NEW ADDRESS NUMBER DIRECTIONAL SIGNS WILL BE ENFORCED BY THE DEPARTMENT OF INSPECTIONS, LICENSES AND PERMITS AT THE TIME OF FINAL APPROVAL FOR ISSUANCE OF THE USE AND OCCUPANCY PERMITS.



PLAN VIEW
SCALE: 1" = 50'



TEE TURN-AROUND DETAIL
SCALE: 1" = 20'

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

REGAN PROPERTY
WETLAND MITIGATION PLAN
PHASE I OVERVIEW.

To mitigate for the proposed impacts required for the stream and wetland crossing, the applicant is proposing to provide onsite stream channel restoration and wetland mitigation.

The stream channel restoration will be accomplished by removing an existing culvert system and creating a stable open channel through the proposed road crossing. The channel will be constructed through the proposed arch crossing. To minimize impact to the stream, the flow will be maintained through the existing culvert system while the new channel and crossing are being constructed. Once the new channel is in place, th flow will be redirected into the new channel and the old culvert will be removed and filled. Streambank plantings will be incorporated into the stream design to provide shading and habitat along the new channel.

Wetland mitigation will be accomplished by expanding existing wetland system on the site. The mitigation site location was selected because it is adjacent to existing wetlands, has low slope and is currently dominated by herbaceous upland species. To obtain the appropriate hydrologic input to the wetland, the grades within the mitigation area will be lowered to mimic the grade of the adjacent wetland. Monitoring of hydrologic conditions within the adjacent wetlands will be performed using the early growing season to determine the hydrologic nature of these wetlands. Typically the grades in the constructed wetlands will be slightly below the adjacent wetland grades to help insure proper hydrologic input. Should elevations be too low, resulting in standing water in the wetland area, a small drainage channel can be constructed to move the excess water from the site. The mitigation area will contain lower basins that will collect and hold standing water for extended periods to help provide additional input into the wetland system.

Topsoil should be salvaged and replaced whenever possible to a depth of 6 inches. Site should be graded to below 6 inches of final grade, then 6 inches topsoil, reclaimed or imported, shall be spread over the site. Soil and substrate amendments need to meet hydric soil characteristics and maintain the specified plant species. A minimum of 60 cubic yards of organic matter per acre is required. The addition of supplemental large woody debris will also recommended. Upon completion of grading, the soil must be disked or chisel plowed to a depth of at least 8 inches to avoid soil compaction. Side slopes extending out of the wetland will be graded to 3:1 where possible and no greater than 2:1.

Though the impacted wetlands are emergent, we would propose a mix of trees, shrubs and herbaceous species within the mitigation area to maximize funct ion and habitat value.

Species to be used may include:

Black willow	Duck potato
Red maple	Soft rush
Pin oak	Wool grass
Winterberry	New York ironweed
Buttonbush	Swamp beggar ticks
Smooth alder	Joe-pye weed

Installation ofiree and shrub stock will be based on the use of 2 3 foot tall, container grown plants installed at 9 foot spacing. Herbaceous plantings will be comprised of 2" plugs installed on 2 foot spacing. Standard MDE mitigation survival requirements and monitoring protocol will be followed.

Native wetland and upland seed mixes will utilized to further enhance the vegetative community development of the wetlands and to stabilize adjacent uplands.

ENGINEER'S CERTIFICATE

"I HEREBY CERTIFY THAT THIS PLAN FOR SEDIMENT AND EROSION CONTROL REPRESENTS A PRACTICAL AND WORKABLE PLAN BASED ON MY PERSONAL KNOWLEDGE OF THE SITE CONDITIONS AND THAT IT WAS PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF THE HOWARD SOIL CONSERVATION DISTRICT."

ENGINEER – BRIAN F. CLEARY — DATE 4/10/2014

DEVELOPER'S CERTIFICATE

"I/WE CERTIFY THAT ALL DEVELOPMENT AND CONSTRUCTION WILL BE DONE ACCORDING TO THIS PLAN OF DEVELOPMENT FOR SEDIMENT AND EROSION CONTROL, AND THAT ALL RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I ALSO AUTHORIZE PERIODIC ON-SITE INSPECTION BY THE HOWARD SOIL CONSERVATION DISTRICT."

DEVELOPER — DATE 4/3/14

THIS DEVELOPMENT PLAN IS APPROVED FOR SOIL EROSION AND SEDIMENT CONTROL BY THE HOWARD SOIL CONSERVATION DISTRICT.

HOWARD SCD — DATE 4/8/14

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

NO.	DATE	REVISION
1	2-9-15	EXPAND WETLAND MITIGATION & SPOIL AREA; REMOVE CUD FOR BARN

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
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date 12-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER

4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E', A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. ____

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
6th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: FINAL ROAD CONSTRUCTION PLAN
GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP

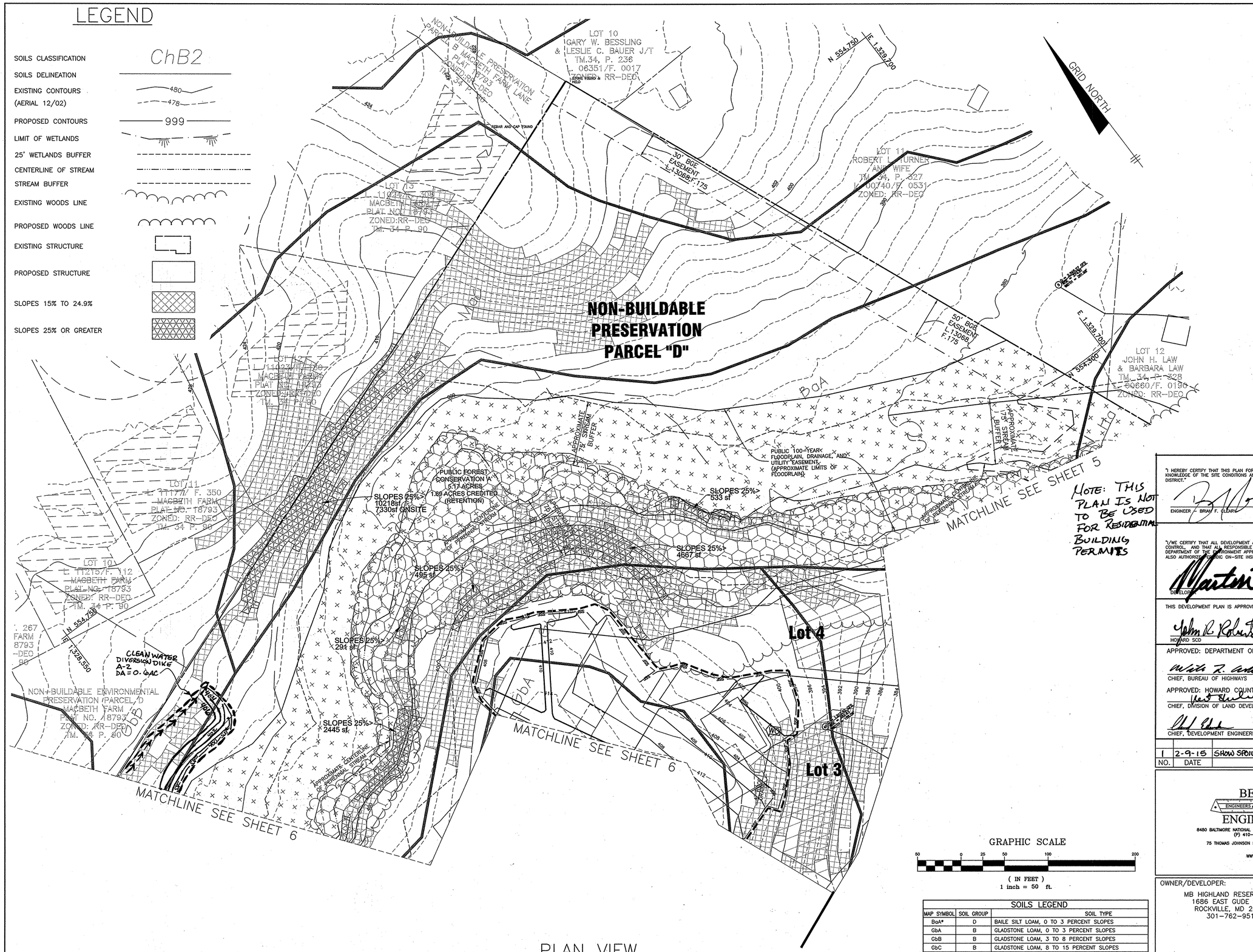
DATE: MARCH, 2014 | PROJECT NO. 2171

DESIGN: JCO | DRAFT: JCO | SCALE: AS SHOWN | DRAWING 6 OF 33

F-13-112

LEGEND

SOILS CLASSIFICATION	ChB2
SOILS DELINEATION	
EXISTING CONTOURS (AERIAL 12/02)	480 / 478
PROPOSED CONTOURS	999
LIMIT OF WETLANDS	
25' WETLANDS BUFFER	
CENTERLINE OF STREAM	
STREAM BUFFER	
EXISTING WOODS LINE	
PROPOSED WOODS LINE	
EXISTING STRUCTURE	
PROPOSED STRUCTURE	
SLOPES 15% TO 24.9%	
SLOPES 25% OR GREATER	



Note: THIS PLAN IS NOT TO BE USED FOR RESIDENTIAL BUILDING PERMITS

PLAN VIEW

SCALE: 1" = 50'

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

SOILS LEGEND		
MAP SYMBOL	SOIL GROUP	SOIL TYPE
BaA*	D	BAILE SILT LOAM, 0 TO 3 PERCENT SLOPES
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GbB	B	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B	GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
GmB*	C	GLENVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES
MoD	B	MANOR LOAM, 15 TO 25 PERCENT SLOPES

FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
* ERODIBLE SOILS

LEGEND

100 YEAR FLOODPLAIN	
PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)	
PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)	
TREE PROTECTION FENCE	
FCE PERMANENT SIGNAGE	
PROP. STREET TREE	
NON-ROOFTOP DISCONNECTION AND RECEIVING AREA	
PRIVATE SEWAGE DISPOSAL AREA	
PRIVATE WELL AREA	
LIMIT OF DISTURBANCE	
SUPER SILT FENCE	
STABILIZED CONSTRUCTION ENTRANCE	SCE
STORMWATER MANAGEMENT BORING LOCATION	B-8 437.0
EROSION CONTROL MATTING	ECM
EARTH DIKE	CIP
INLET PROTECTION	AGIP

ENGINEER'S CERTIFICATE

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ENGINEER – BRIAN F. CLEARY — DATE 4/10/2014

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HOWARD SCD — DATE 4/8/14

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

NO.	DATE	REVISION
1	2-9-15	SHOW SPOIL AREA, LOD + SEC FOR EARTH WORKS

BENCHMARK
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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. 28559, Expiration Date: 7-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO.

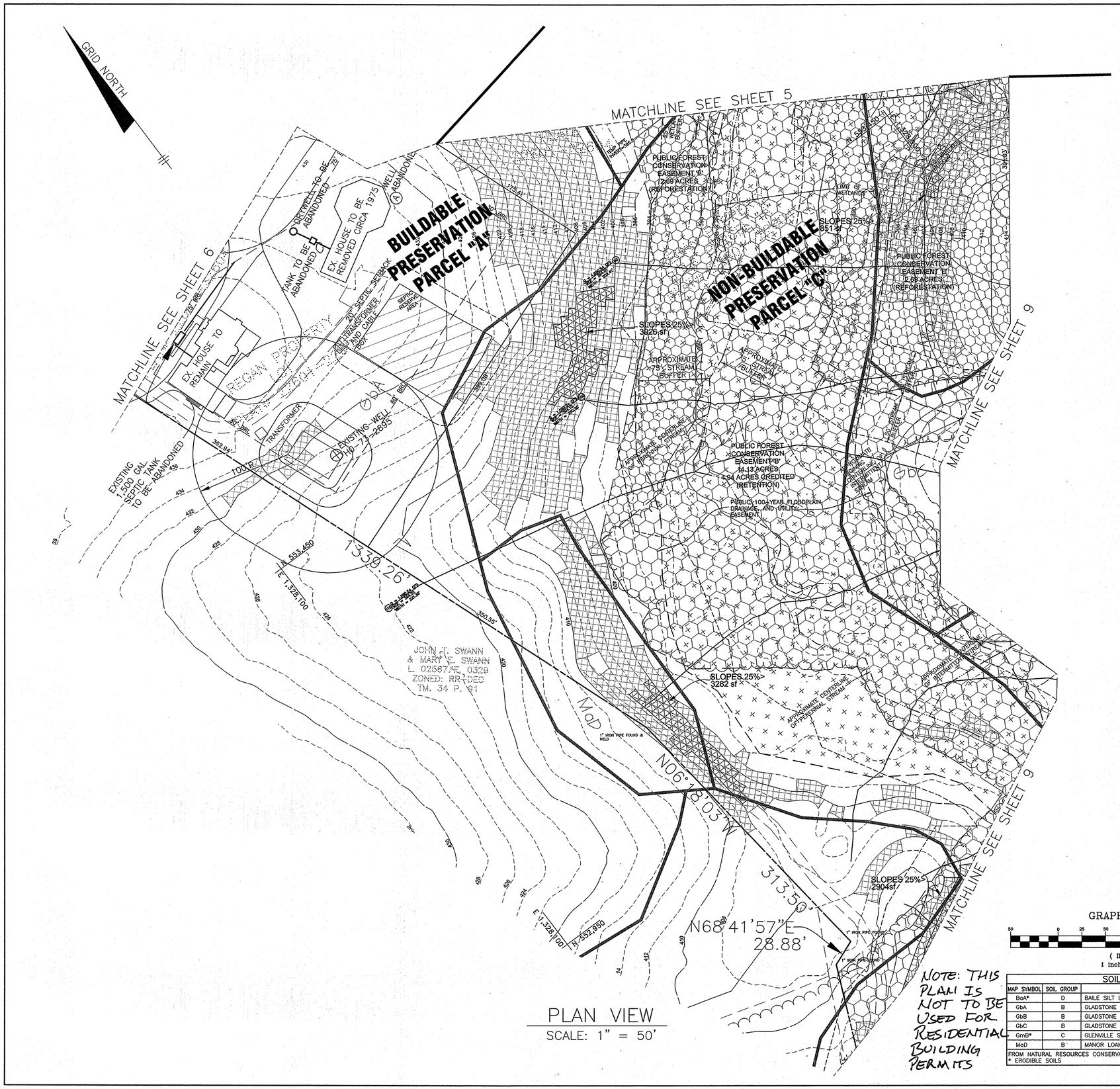
LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: FINAL ROAD CONSTRUCTION PLAN
GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP

DATE: MARCH, 2014 — PROJECT NO. 2171

DESIGN: JCO — DRAFT: JCO — SCALE: AS SHOWN — DRAWING 7 OF 33

F-13-112



PLAN VIEW

SCALE: 1" = 50'

LEGEND

SOILS CLASSIFICATION	ChB2
SOILS DELINEATION	
EXISTING CONTOURS (AERIAL 12/02)	480 / 478
PROPOSED CONTOURS	999
LIMIT OF WETLANDS	
25' WETLANDS BUFFER	
CENTERLINE OF STREAM	
STREAM BUFFER	
EXISTING WOODS LINE	
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PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)	
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TREE PROTECTION FENCE	//
FCE PERMANENT SIGNAGE	
PROP. STREET TREE	
NON-ROOFTOP DISCONNECTION AND RECEIVING AREA	
PRIVATE SEWAGE DISPOSAL AREA	
PRIVATE WELL AREA	
LIMIT OF DISTURBANCE	
SUPER SILT FENCE	
STABILIZED CONSTRUCTION ENTRANCE	SCE
STORMWATER MANAGEMENT BORING LOCATION	B-8 437.0
EROSION CONTROL MATTING	ECM
EARTH DIKE	CIP
INLET PROTECTION	AGIP

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

NOTE: THIS PLAN IS NOT TO BE USED FOR RESIDENTIAL BUILDING PERMITS

SOILS LEGEND		
MAP SYMBOL	SOIL GROUP	SOIL TYPE
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FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
* ERODIBLE SOILS

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ENGINEER – BRIAN F. CLEARY — DATE 4/10/2014

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HOWARD SCD — DATE 4/8/14

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

NO.	DATE	REVISION

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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. 28559, Expiration Date 12-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER

4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'.
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. ____

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
6th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

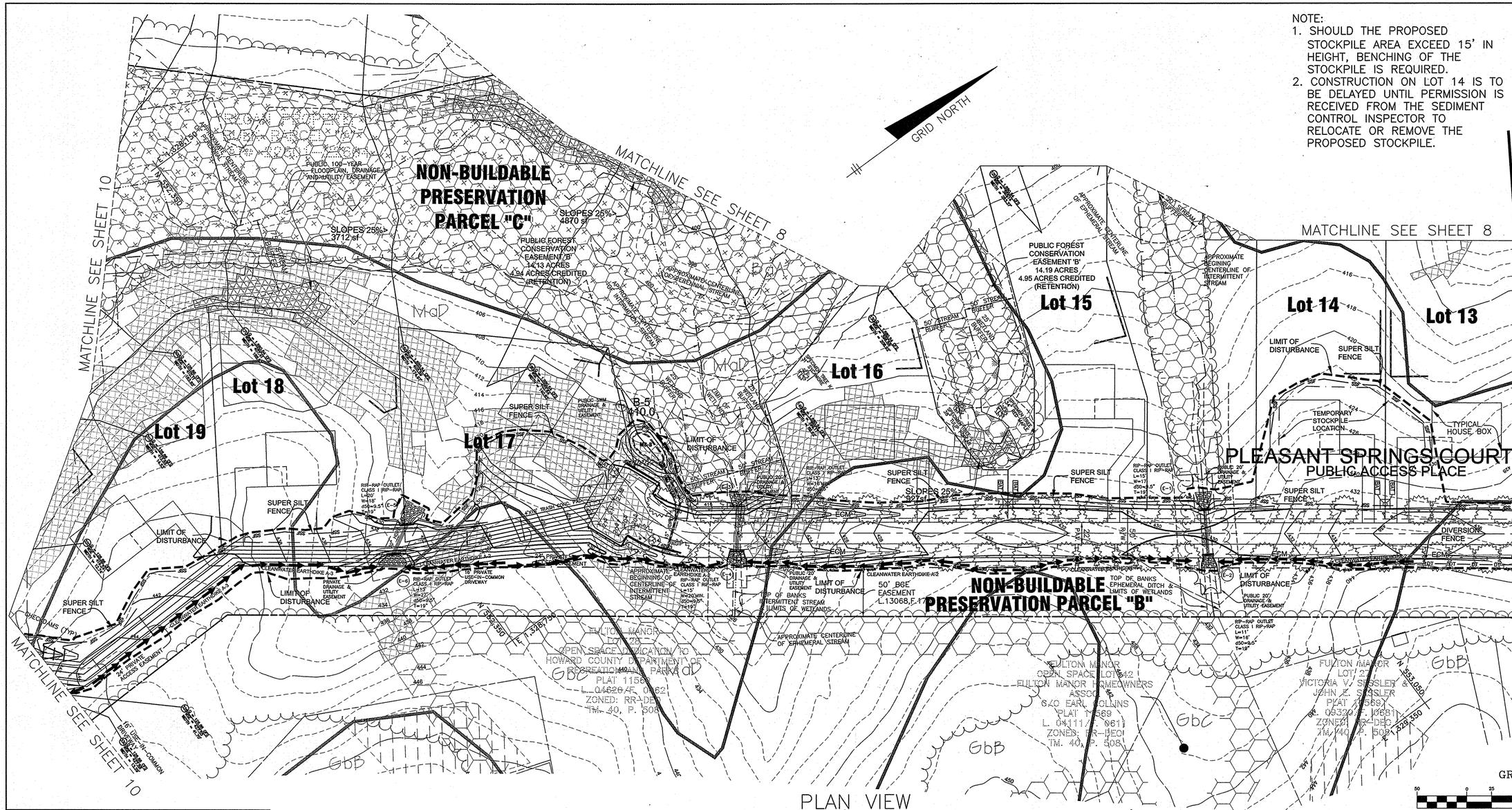
TITLE:
FINAL ROAD CONSTRUCTION PLAN
GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP

DATE: MARCH, 2014 — PROJECT NO. 2171

DESIGN: JCO — DRAFT: JCO — SCALE: AS SHOWN — DRAWING 8 OF 33

F-13-112

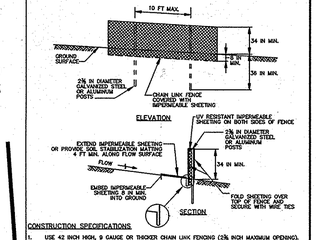
NOTE:
1. SHOULD THE PROPOSED STOCKPILE AREA EXCEED 15' IN HEIGHT, BENCHING OF THE STOCKPILE IS REQUIRED.
2. CONSTRUCTION ON LOT 14 IS TO BE DELAYED UNTIL PERMISSION IS RECEIVED FROM THE SEDIMENT CONTROL INSPECTOR TO RELOCATE OR REMOVE THE PROPOSED STOCKPILE.



DETAIL C-9 DIVERSION FENCE

SCALE: NONE

MAXIMUM DRAINAGE AREA = 2 ACRES



CONSTRUCTION SPECIFICATIONS

1. USE 42 INCH HIGH, 9 GAUGE OR THICKER CHAIN LINK FENCING (2½ INCH MAXIMUM OPENING).
2. USE 2½ INCH DIAMETER GALVANIZED STEEL POSTS OF 0.095 INCH WALL THICKNESS AND SIX FOOT LENGTH SPACED NO FURTHER THAN 10 FEET APART. THE POSTS DO NOT NEED TO BE SET IN CONCRETE.
3. FASTEN CHAIN LINK FENCE SECURELY TO THE FENCE POSTS WITH WIRE TIES.
4. SECURE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING TO CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT TOP, MID SECTION, AND BELOW GROUND SURFACE.
5. EXTEND SHEETING A MINIMUM OF 4 FEET ALONG FLOW SURFACE AND ENSED END A MINIMUM OF 8 INCHES INTO GROUND. SOIL STABILIZATION MATTING MAY BE USED IN LIEU OF IMPERMEABLE SHEETING ALONG FLOW SURFACE.
6. WHEN TWO SECTIONS OF SHEETING ADJOIN EACH OTHER, OVERLAP BY 6 INCHES AND FOLD WITH SEAM FACING DOWNGRADE.
7. KEEP FLOW SURFACE ALONG DIVERSION FENCE AND POINT OF DISCHARGE FREE OF EROSION, SEDIMENT, VEGETATIVE DEBRIS, SEDIMENT AND DEBRIS. MAINTAIN POSITIVE DRAINAGE. REPLACE IMPERMEABLE SHEETING IF TORN, IF UNDERMINING OCCURS, REINSTALL FENCE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

PLAN VIEW

SCALE: 1" = 50'

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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LEGEND

SOILS CLASSIFICATION — ChB2
SOILS DELINEATION
EXISTING CONTOURS (AERIAL 12/02) — 480, 478
PROPOSED CONTOURS — 999
LIMIT OF WETLANDS
25' WETLANDS BUFFER
CENTERLINE OF STREAM
STREAM BUFFER
EXISTING WOODS LINE
PROPOSED WOODS LINE
EXISTING STRUCTURE
PROPOSED STRUCTURE
SLOPES 15% TO 24.9%
SLOPES 25% OR GREATER
100 YEAR FLOODPLAIN
PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)
PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)
TREE PROTECTION FENCE
FCE PERMANENT SIGNAGE
PROP. STREET TREE
NON-ROOFTOP DISCONNECTION AND RECEIVING AREA
PRIVATE SEWAGE DISPOSAL AREA
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LIMIT OF DISTURBANCE
SUPER SILT FENCE
STABILIZED CONSTRUCTION ENTRANCE — SCE
STORMWATER MANAGEMENT BORING LOCATION — B-8 437.0
EROSION CONTROL MATTING — ECM
EARTH DIKE — CIP
INLET PROTECTION — AGIP

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ENGINEER — BRIAN F. CLEARY — DATE 4/10/2014

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APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

NO.	DATE	REVISION

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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. 28559, Expiration Date 6-23-2015.

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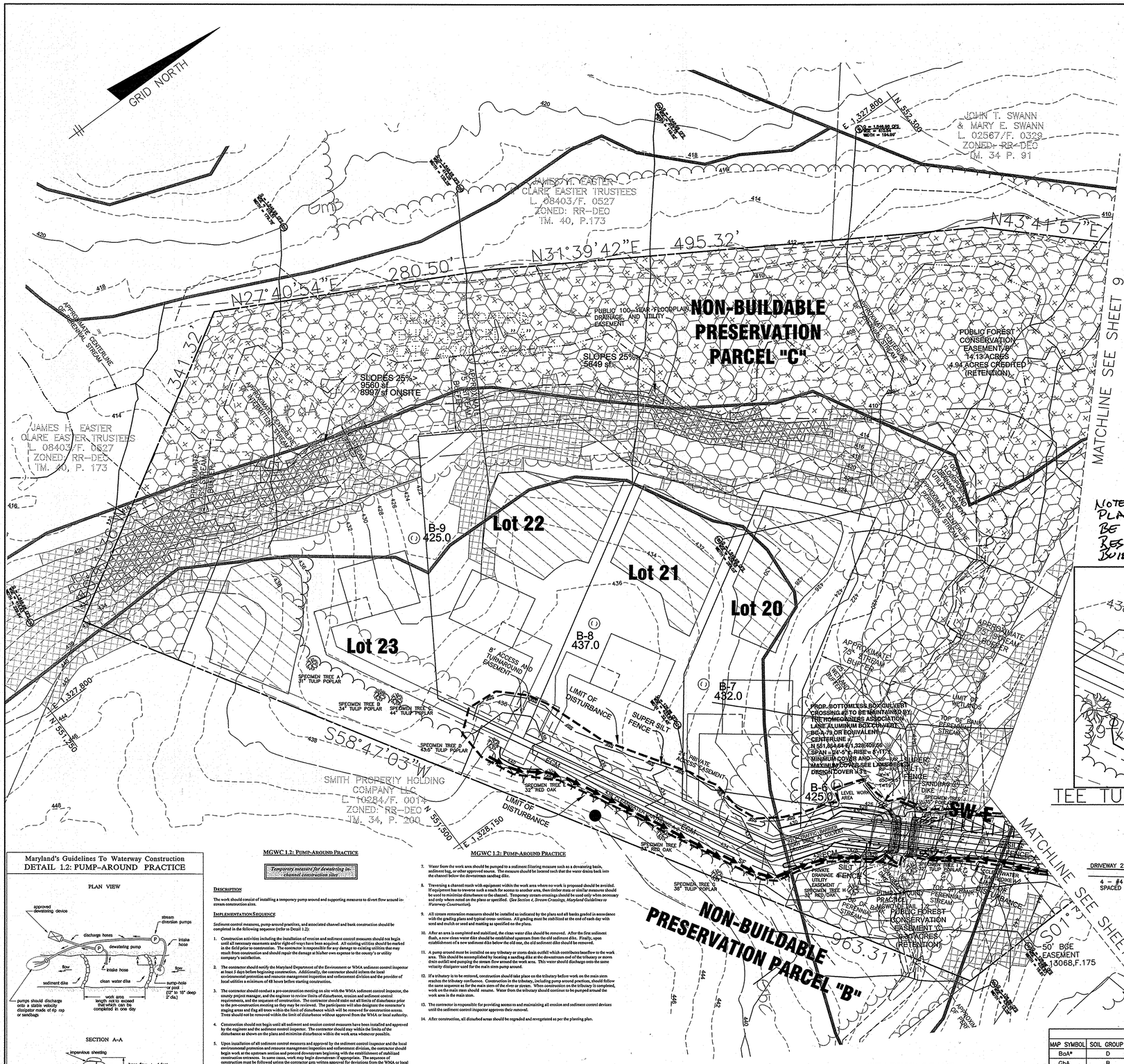
DESIGN: JCO — DRAFT: JCO — SCALE: AS SHOWN — DRAWING 9 OF 33

F-13-112



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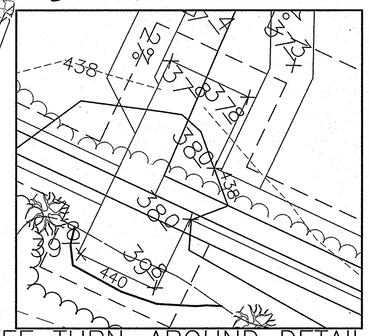
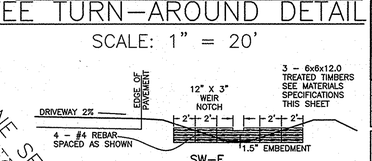
EROSION CONTROL MATTING	ECM
EARTH DIKE	
INLET PROTECTION	CIP / AGIP

NOTE: THIS PLAN IS NOT TO BE USED FOR RESIDENTIAL BUILDING PERMITS.



TEE TURN-AROUND DETAIL
SCALE: 1" = 20'



SW-E
TIMBER CHECK DAM DETAIL
NOT TO SCALE

MAP SYMBOL	SOIL GROUP	SOIL TYPE
BoA*	D	BAILE SILT LOAM, 0 TO 3 PERCENT SLOPES
GbA	B	GLADSTONE LOAM, 0 TO 3 PERCENT SLOPES
GbB	B	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B	GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
GmB*	C	GLENVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES
MaD	B	MANOR LOAM, 15 TO 25 PERCENT SLOPES

FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
* ERODIBLE SOILS

ENGINEER'S CERTIFICATE

"I HEREBY CERTIFY THAT THIS PLAN FOR SEDIMENT AND EROSION CONTROL REPRESENTS A PRACTICAL AND WORKABLE PLAN BASED ON MY PERSONAL KNOWLEDGE OF THE SITE CONDITIONS AND THAT IT WAS PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF THE HOWARD SOIL CONSERVATION DISTRICT."

ENGINEER – BRIAN F. CLEARY — DATE 4/10/2014

DEVELOPER'S CERTIFICATE

"I/WE CERTIFY THAT ALL DEVELOPMENT AND CONSTRUCTION WILL BE DONE ACCORDING TO THIS PLAN OF DEVELOPMENT FOR SEDIMENT AND EROSION CONTROL, AND THAT ALL RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I ALSO AUTHORIZE PERIODIC ON-SITE INSPECTION BY THE HOWARD SOIL CONSERVATION DISTRICT."

DEVELOPER — DATE 4/8/14

THIS DEVELOPMENT PLAN IS APPROVED FOR SOIL EROSION AND SEDIMENT CONTROL BY THE HOWARD SOIL CONSERVATION DISTRICT.

HOWARD SCD — DATE 4/9/14

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

NO.	DATE	REVISION

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
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(P) 410-465-6105 (F) 410-465-6644
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date 6-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'.
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. ____

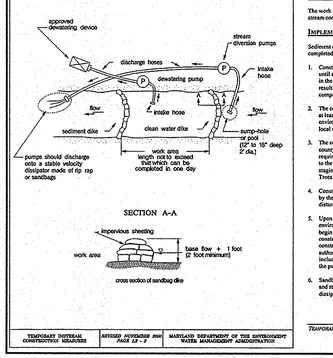
LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
FINAL ROAD CONSTRUCTION PLAN
GRADING, SEDIMENT AND EROSION CONTROL PLAN AND SOILS MAP

DESIGN: JCO | DRAFT: JCO | DATE: MARCH, 2014 | SCALE: AS SHOWN | PROJECT NO. 2171 | DRAWING 10 OF 33

F-13-112

Maryland's Guidelines To Waterway Construction
DETAIL 1.2: PUMP-AROUND PRACTICE



TEMPORARY INSTREAM CONSTRUCTION MEASURES | REVISED NOVEMBER 2000 PAGE 1.2 - 1 | MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MGWC 1.2: PUMP-AROUND PRACTICE

Temporary measure for dewatering in-channel construction sites

DESCRIPTION

The work should consist of installing a temporary pump around and supporting measures to divert flow around in-stream construction sites.

IMPLEMENTATION SEQUENCE

Sediment control measures, pump-around practices, and associated channel and bank construction should be completed in the following sequence (refer to Detail 1.2):

1. Construction activities including the installation of erosion and sediment control measures should not begin until all necessary easements and/or right-of-ways have been acquired. All existing utilities should be marked in the field prior to construction. *The contractor is responsible for any damage to existing utilities that may result from construction and should repair the damage at his/her own expense to the county's or utility company's satisfaction.*
2. The contractor should notify the Maryland Department of the Environment or WMA sediment control inspector at least 5 days before beginning construction. *Additionally,* the contractor should inform the local environmental protection and resource management inspection and enforcement division and the provider of local utilities a minimum of 48 hours before starting construction.
3. The contractor should conduct a pre-construction meeting on site with the WMA sediment control inspector, the county project manager, and the engineer to review limits of disturbance, erosion and sediment control requirements, and the sequence of construction. The contractor should make sure all limits of disturbance prior to the pre-construction meeting so they may be reviewed. The participants will also designate the contractor's staging areas and flag all trees within the limit of disturbance which will be removed for construction access. Trees should not be removed within the limit of disturbance without approval from the WMA or local authority.
4. Construction should not begin until all sediment and erosion control measures have been installed and approved by the engineer and the sediment control inspector. The contractor should stay within the limits of the disturbance as shown on the plans and minimize disturbance within the work area whenever possible.
5. Upon installation of all sediment control measures and approval by the sediment control inspector and the local environmental protection and resource management inspection and enforcement division, the contractor should begin work at the upstream section and proceed downstream beginning with the establishment of stabilized construction entrances. In some cases, work may begin downstream if appropriate. The sequence of construction must be followed unless the contractor gets written approval for deviations from the WMA or local authority. The contractor should only begin work in an area which can be completed by the end of the day including grading adjacent to the channel. At the end of each work day, the work area must be stabilized and the pump around removed from the channel. Work should not be conducted in the channel during rain events.
6. Sandbag dikes should be situated at the upstream and downstream ends of the work area as shown on the plans, and stream flow should be pumped around the work area. The pump should discharge onto a stable velocity dissipator made of riprap or sandbags.

TEMPORARY INSTREAM CONSTRUCTION MEASURES | MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES | PAGE 1.2 - 1

MGWC 1.2: PUMP-AROUND PRACTICE

7. Water from the work area should be pumped to a sediment filtering measure such as a dewatering basin, sediment bag, or other approved source. The measure should be located such that the water drains back into the channel below the downstream sandbag dike.
8. Traversing a channel reach with equipment within the work area where no work is proposed should be avoided. If equipment has to traverse such a reach for access to another area, then timber mats or similar measures should be used to minimize disturbance to the channel. Temporary stream crossings should be used only when necessary and only where noted on the plans or specified. (*See Section 6, Stream Crossings, Maryland Guidelines to Waterway Construction*).
9. All stream restoration measures should be installed as indicated by the plans and all banks graded in accordance with the grading plans and typical cross- sections. All grading must be stabilized at the end of each day with sod and mulch or seed and matting as specified on the plans.
10. After an area is completed and stabilized, the clean water dike should be removed. After the first sediment flush, a new clean water dike should be established upstream from the old sediment dike. Finally, upon establishment of a new sediment dike below the old one, the old sediment dike should be removed.
11. A pump around must be installed on any tributary or storm drain outfall which contributes baseflow to the work area. This should be accomplished by locating a sandbag dike at the downstream end of the tributary or storm drain outfall and pumping the stream flow around the work area. This water should discharge onto the same velocity dissipater used for the main stem pump around.
12. If a tributary is to be restored, construction should take place on the tributary before work on the main stem reaches the tributary confluence. Construction in the tributary, including pump around practices, should follow the same sequence as for the main stem of the river or stream. When construction on the tributary is completed, work on the main stem should resume. Water from the tributary should continue to be pumped around the work area in the main stem.
13. The contractor is responsible for providing access to and maintaining all erosion and sediment control devices until the sediment control inspector approves their removal.
14. After construction, all disturbed areas should be regraded and revegetated as per the planting plan.

TEMPORARY INSTREAM CONSTRUCTION MEASURES | MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000 | PAGE 1.2 - 2

B-4 STANDARDS AND SPECIFICATIONS
FOR VEGETATIVE STABILIZATION

Definition: Using vegetation as cover to protect exposed soil from erosion.
Purpose: To promote the establishment of vegetation on exposed soil.

Conditions Where Practice Applies

On all disturbed areas not stabilized by other methods. This specification is divided into sections on incremental stabilization; soil preparation, soil amendments and topsoiling; seeding and mulching; temporary stabilization; and permanent stabilization.

Effects on Water Quality and Quantity

Stabilization practices are used to promote the establishment of vegetation on exposed soil. When soil is stabilized with vegetation, the soil is less likely to erode and more likely to allow infiltration of rainfall, thereby reducing sediment loads and runoff to downstream areas.
Planting vegetation in disturbed areas will have an effect on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, percolation, and groundwater recharge. Over time, vegetation will increase organic matter content and improve the water holding capacity of the soil and subsequent plant growth.
Vegetation will help reduce the movement of sediment, nutrients, and other chemicals carried by runoff to receiving waters. Plants will also help protect groundwater supplies by assimilating those substances present within the root zone.
Sediment control practices must remain in place during grading, seedbed preparation, seeding, mulching, and vegetative establishment.

Adequate Vegetative Establishment

Inspect seeded areas for vegetative establishment and make necessary repairs, replacements, and reseedings within the planting season.
1. Adequate vegetative stabilization requires 95 percent groundcover.
2. If an area has less than 40 percent groundcover, restabilize following the original recommendations for lime, fertilizer, seedbed preparation, and seeding.
3. If an area has between 40 and 94 percent groundcover, over-seed and fertilize using half of the rates originally specified.
4. Maintenance fertilizer rates for permanent seeding are shown in Table B.6.

B-4-1 STANDARDS AND SPECIFICATIONS
FOR INCREMENTAL STABILIZATION

Definition: Establishment of vegetative cover on cut and fill slopes.
Purpose: To provide timely vegetative cover on cut and fill slopes as work progresses.

Conditions Where Practice Applies

Any cut or fill slope greater than 15 feet in height. This practice also applies to stockpiles.

Criteria

A. Incremental Stabilization - Cut Slopes
1. Excavate and stabilize cut slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all cut slopes as the work progresses.
2. Construction sequence example (Refer to Figure B.1):
   a. Construct and stabilize all temporary swales or dikes that will be used to convey runoff around the excavation.
   b. Perform Phase 1 excavation, prepare seedbed, and stabilize.
   c. Perform Phase 2 excavation, prepare seedbed, and stabilize. Overseed Phase 1 areas as necessary.
   d. Perform final phase excavation, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.

Note: Once excavation has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.

B. Incremental Stabilization - Fill Slopes
1. Construct and stabilize fill slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all slopes as the work progresses.
2. Stabilize slopes immediately when the vertical height of a lift reaches 15 feet, or when the grading operation ceases as prescribed in the plans.
3. At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.
4. Construction sequence example (Refer to Figure B.2):
   a. Construct and stabilize all temporary swales or dikes that will be used to divert runoff around the fill. Construct silt fence on low side of fill unless other methods shown on the plans address this area.
   b. At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.
   c. Place Phase 1 fill, prepare seedbed, and stabilize.
   d. Place Phase 2 fill, prepare seedbed, and stabilize.
   e. Place final phase fill, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.

Note: Once the placement of fill has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.
Figure B.

B-4-4 STANDARDS AND SPECIFICATIONS
FOR TEMPORARY STABLIZATION

Definition: To stabilize disturbed soils with vegetation for up to 6 months.
Purpose: To use fast growing vegetation that provides cover on disturbed soils.

Conditions Where Practice Applies

Exposed soils where ground cover is needed for a period of 6 months or less. For longer duration of time, permanent stabilization practices are required.

Criteria

1. Select one or more of the species or seed mixtures listed in Table B.1 for the appropriate Plant Hardiness Zone (from Figure B.3), and enter them in the Temporary Seeding Summary below along with application rates, seeding dates and seeding depths. If this Summary is not put on the plan and completed, then Table B.1 plus fertilizer and lime rates must be put on the plan.
2. For sites having soil tests performed, use and show the recommended rates by the testing agency. Soil tests are not required for Temporary Seeding.
3. When stabilization is required outside of a seeding season, apply seed and mulch or straw mulch alone as prescribed in Section B-4-3.A.1.b and maintain until the next seeding season.

B-4-8 STANDARDS AND SPECIFICATIONS
FOR STOCKPILE AREA

Definition: A mound or pile of soil protected by appropriately designed erosion and sediment control measures.
Purpose: To provide a designated location for the temporary storage of soil that controls the potential for erosion, sedimentation, and changes to drainage patterns.

Conditions Where Practice Applies

Stockpile areas are utilized when it is necessary to salvage and store soil for later use.

Criteria

1. The stockpile location and all related sediment control practices must be clearly indicated on the erosion and sediment control plan.
2. The footprint of the stockpile must be sized to accommodate the anticipated volume of material and based on a side slope ratio no steeper than 2:1. Benching must be provided in accordance with Section B-3 Land Grading.
3. Runoff from the stockpile area must drain to a suitable sediment control practice.
4. Access the stockpile area from the upgrade side.
5. Clear water runoff into the stockpile area must be minimized by use of a diversion device such as an earth dike, temporary swale or diversion fence. Provisions must be made for discharging concentrated flow in a non-erosive manner.
6. Where runoff concentrates along the toe of the stockpile fill, an appropriate erosion/sediment control practice must be used to intercept the discharge.
7. Stockpiles must be stabilized in accordance with the 3/7 day stabilization requirement as well as Standard B-4-1 Incremental Stabilization and Standard B-4-4 Temporary Stabilization.
8. If the stockpile is located on an impervious surface, a liner should be provided below the stockpile to facilitate cleanup. Stockpiles containing contaminated material must be covered with impermeable sheeting.

Maintenance

The stockpile area must continuously meet the requirements for Adequate Vegetative Establishment in accordance with Section B-4 Vegetative Stabilization. Side slopes must be maintained at no steeper than a 2:1 ratio. The stockpile area must be kept free of erosion. If the vertical height of a stockpile exceeds 20 feet for 2:1 slopes, 30 feet for 3:1 slopes, or 40 feet for 4:1 slopes, benching must be provided in accordance with Section B-3 Land Grading.

H-5 STANDARDS AND SPECIFICATIONS
FORDUST CONTROL

Definition: Controlling the suspension of dust particles from construction activities.
Purpose: To prevent blowing and movement of dust from exposed soil surfaces to reduce on and off-site damage including health and traffic hazards.

Conditions Where Practice Applies

Areas subject to dust blowing and movement where on and off-site damage is likely without treatment.

Specifications

1. Mulches: See Section B-4-2 Soil Preparation, Topsoiling, and Soil Amendments, Section B-4-3 Seeding and Mulching, and Section B-4-4 Temporary Stabilization. Mulch must be anchored to prevent blowing.
2. Vegetative Cover: See Section B-4-4 Temporary Stabilization.
3. Tillage: Till to roughen surface and bring clods to the surface. Begin plowing on windward side of site. Chisel-type plows spaced about 12 inches apart, spring-toothed harrows, and similar plows are examples of equipment that may produce the desired effect.
4. Irrigation: Sprinkle site with water until the surface is moist. Repeat as needed. The site must not be irrigated to the point that runoff occurs.
5. Barriers: Solid board fences, silt fences, snow fences, burlap fences, straw bales, and similar material can be used to control air currents and soil blowing.
6. Chemical Treatment: Use of chemical treatment requires approval by the appropriate plan review authority.

ENGINEER'S CERTIFICATE

"I HEREBY CERTIFY THAT THIS PLAN FOR SEDIMENT AND EROSION CONTROL REPRESENTS A PRACTICAL AND WORKABLE PLAN BASED ON MY PERSONAL KNOWLEDGE OF THE SITE CONDITIONS AND THAT IT WAS PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF THE HOWARD SOIL CONSERVATION DISTRICT."

ENGINEER — BRIAN F. CLEARY 4/10/2014 DATE

DEVELOPER'S CERTIFICATE

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DEVELOPER 4/8/14 DATE

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HOWARD SCD 4/8/14 DATE

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS 4-29-14 DATE

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT 5-21-14 DATE

CHIEF, DEVELOPMENT ENGINEERING DIVISION 5-9-14 DATE

B-4-2 STANDARDS AND SPECIFICATIONS
FOR SOIL PREPARATION, TOPSOILING, AND SOIL AMENDMENTS

Definition: The process of preparing the soils to sustain adequate vegetative stabilization.
Purpose: To provide a suitable soil medium for vegetative growth.
Conditions Where Practice Applies: Where vegetative stabilization is to be established.

Criteria

A. Soil Preparation
1. Temporary Stabilization
   a. Seedbed preparation consists of loosening soil to a depth of 3 to 5 inches by means of suitable agricultural or construction equipment, such as disc harrows or chisel plows or rippers mounted on construction equipment. After the soil is loosened, it must not be rolled or dragged smooth but left in the roughened condition. Slopes 3:1 or flatter are to be tracked with ridges running parallel to the contour of the slope.
   b. Apply fertilizer and lime as prescribed on the plans.
   c. Incorporate lime and fertilizer into the top 3 to 5 inches of soil by disking or other suitable means.
2. Permanent Stabilization
   a. A soil test is required for any earth disturbance of 5 acres or more. The minimum soil conditions required for permanent vegetative establishment are:
      i. Soil pH between 6.0 and 7.0.
      ii. Soluble salts less than 500 parts per million (ppm).
      iii. Soil contains less than 40 percent clay but enough fine grained material (greater than 30 percent silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception: if lovegrass will be planted, then a sandy soil (less than 30 percent silt plus clay) would be acceptable.
      iv. Soil contains 1.5 percent minimum organic matter by weight.
      v. Soil contains sufficient pore space to permit adequate root penetration.
   b. Application of amendments or topsoil is required if on-site soils do not meet the above conditions.
   c. Graded areas must be maintained in a true and even grade as specified on the approved plan, then scarified or otherwise loosened to a depth of 3 to 5 inches.
   d. Apply soil amendments as specified on the approved plan or as indicated by the results of a soil test.
   e. Mix soil amendments into the top 3 to 5 inches of soil by disking or other suitable means. Rake lawn areas to smooth the surface, remove large objects like stones and branches, and ready the area for seed application. Loosen surface soil by dragging with a heavy chain or other equipment to roughen the surface where site conditions will not permit normal seedbed preparation. Track slopes 3:1 or flatter with tracked equipment leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. Leave the top 1 to 3 inches of soil loose and friable. Seedbed loosening may be unnecessary on newly disturbed areas.

B. Topsoiling
1. Topsoil is placed over prepared subsoil prior to establishment of permanent vegetation. The purpose is to provide a suitable soil medium for vegetative growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable soil gradation.
2. Topsoil salvaged from an existing site may be used provided it meets the standards as set forth in these specifications. Typically, the depth of topsoil to be salvaged for a given soil type can be found in the representative soil profile section in the Soil Survey published by USDA-NRCS.
3. Topsoiling is limited to areas having 2:1 or flatter slopes where:
   a. The texture of the exposed subsoil/parent material is not adequate to produce vegetative growth.
   b. The soil material is so shallow that the rooting zone is not deep enough to support plants or furnish continuing supplies of moisture and plant nutrients.
   c. The original soil to be vegetated contains material toxic to plant growth.
   d. The soil is so acidic that treatment with limestone is not feasible.
4. Areas having slopes steeper than 2:1 require special consideration and design.
5. Topsoil Specifications: Soil to be used as topsoil must meet the following criteria:
   a. Topsoil must be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by the appropriate approval authority. Topsoil must not be a mixture of contrasting textured subsoils and must contain less than 5 percent by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than 1½ inches in diameter.
   b. Topsoil must be free of noxious plants or plant parts such as Bermuda grass, quack grass, Johnson grass, nut sedge, poison ivy, thistle, or others as specified.
   c. Topsoil substitutes or amendments, as recommended by a qualified agronomist or soil scientist and approved by the appropriate approval authority, may be used in lieu of natural topsoil.
6. Topsoil Application
   a. Erosion and sediment control practices must be maintained when applying topsoil.
   b. Uniformly distribute topsoil in a 5 to 8 inch layer and lightly compact to a minimum thickness of 4 inches. Spreading is to be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations must be corrected in order to prevent the formation of depressions or water pockets.
   c. Topsoil must not be placed if the topsoil or subsoil is in a frozen or muddy condition, when the subsoil is excessively wet or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

C. Soil Amendments (Fertilizer and Lime Specifications)
1. Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas of 5 acres or more. Soil analysis may be performed by a recognized private or commercial laboratory. Soil samples taken for engineering purposes may also be used for chemical analyses.
2. Fertilizers must be uniform in composition, free flowing and suitable for accurate application by appropriate equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers must all be delivered to the site fully labeled according to the applicable laws and must bear the name, trade name or trademark and warranty of the producer.
3. Lime materials must be ground limestone (hydrated or burnt lime may be substituted except when hydroseeding) which contains at least 50 percent total oxides (calcium oxide plus magnesium oxide). Limestone must be ground to such fineness that at least 50 percent will pass through a #100 mesh sieve and 98 to 100 percent will pass through a #20 mesh sieve.
4. Lime and fertilizer are to be evenly distributed and incorporated into the top 3 to 5 inches of soil by disking or other suitable means.
5. Where the subsoil is either highly acidic or composed of heavy clays, spread ground limestone at the rate of 4 to 8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of topsoil.

B-4-5 STANDARDS AND SPECIFICATIONS FOR PERMANENT STABILIZATION(CONTINUED)

d. Till areas to receive seed by disking or other approved methods to a depth of 2 to 4 inches, level and rake the areas to prepare a proper seedbed. Remove stones and debris over 1 ½ inches in diameter. The resulting seedbed must be in such condition that future mowing of grasses will pose no difficulty.
e. If soil moisture is deficient, supply new seedings with adequate water for plant growth (½ to 1 inch every 3 to 4 days depending on soil texture) until they are firmly established. This is not especially true when seedings are made late in the planting season, in abnormally dry or hot seasons, or on adverse sites.

A. Sod: to provide quick cover on disturbed areas (2:1 grade or flatter).
1. General Specifications
   a. Class of turfgrass must be Maryland State Certified. Sod labels must be made available to the job foreman and inspector.
   b. Sod must be machine cut at a uniform soil thickness of ¾ inch, plus or minus ¼ inch, at the time of cutting. Measurement for thickness must exclude top growth and thatch. Broken pads and torn or uneven ends will not be acceptable.
   c. Standard size sections of sod must be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10 percent of the section.
   d. Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.
   e. Sod must be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period must be approved by an agronomist or soil scientist prior to its installation.
2. Sod Installation
   a. During periods of excessively high temperature or in areas having dry subsoil, lightly irrigate the subsoil immediately prior to laying the sod.
   b. Lay the first row of sod in a straight line with subsequent rows placed parallel to it and tightly wedged against each other. Stagger lateral joints to promote more uniform growth and strength. Ensure that sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would cause air drying of the roots.
   c. Wherever possible, lay sod with the long edges parallel to the contour and with staggering joints. Roll and tamp, peg or otherwise secure the sod to prevent slippage on slopes. Ensure solid contact exists between sod roots and the underlying soil surface.
   d. Water the sod immediately following rolling and tamping until the underside of the new sod pad and soil surface below the sod are thoroughly wet. Complete the operations of laying, tamping and irrigating for any piece of sod within eight hours.
3. Sod Maintenance
   a. In the absence of adequate rainfall, water daily during the first week or as often and sufficiently as necessary to maintain moist soil to a depth of 4 inches. Water sod during the heat of the day to prevent wilting.
   b. After the first week, sod watering is required as necessary to maintain adequate moisture content.
   c. Do not mow until the sod is firmly rooted. No more than 1/3 of the grass leaf must be removed by the initial cutting or subsequent cuttings. Maintain a grass height of at least 3 inches unless otherwise specified.

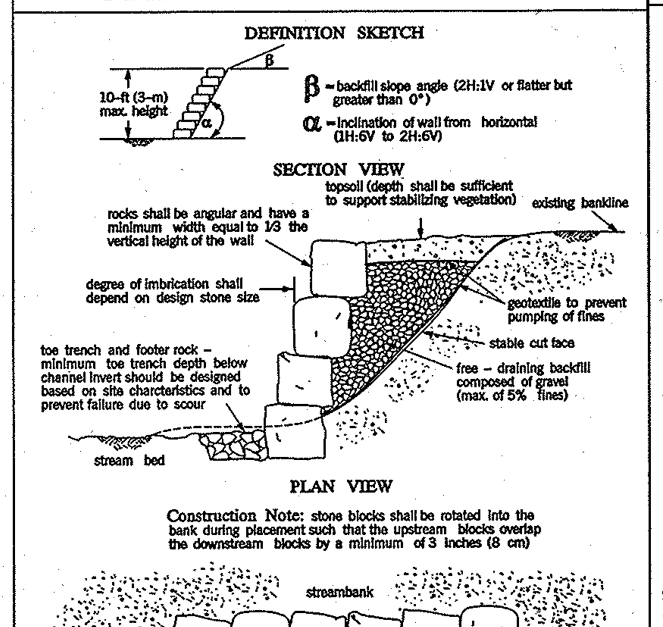
B-4-5 STANDARDS AND SPECIFICATIONS
FOR PERMANENT STABILIZATION

Definition: To stabilize disturbed soils with permanent vegetation.
Purpose: To use long-lived perennial grasses and legumes to establish permanent ground cover on disturbed soils.
Conditions Where Practice Applies: Exposed soils where ground cover is needed for 6 months or more.

Criteria

A. Seed Mixtures
1. General Use
   a Select one or more of the species or mixtures listed in Table B.3 for the appropriate Plant Hardiness Zone (from Figure B.3) and based on the site condition or purpose found on Table B.2. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The Summary is to be placed on the plan.
   b Additional planting specifications for exceptional sites such as shorelines, stream banks, or dunes or for special purposes such as wildlife or aesthetic treatment may be found in USDA-NRCS Technical Field Office Guild, Section 342 - Critical Area Planting.
   c For sites having disturbed areas over 5 acres, use and show the rates recommended by the soil testing agency.
   d For areas receiving low maintenance, apply urea form fertilizer (46-0-0) at 3 ½ pounds per 1000 square feet (150 pounds per acre) at the time of seeding in addition to the soil amendments shown in the Permanent Seeding Summary.
2. Turfgrass Mixtures
   a. Areas where turfgrass may be desired include lawns, parks, playgrounds, and commercial sites which will receive a medium to high level of maintenance.
   b. Select one or more of the species or mixtures listed below based on the site conditions or purpose. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The summary is to be placed on the plan.
   i. Kentucky Bluegrass: Full sun Mixture: For use in areas that receive intensive management. Irrigation required in the areas of central Maryland and Eastern Shore. Recommended Certified Kentucky Bluegrass Cultivars Seeding Rate: 1.5 to 2.0 pounds per 1000 square feet. Choose a minimum of three Kentucky Bluegrass Cultivars with each ranging from 10 to 35 percent of the total mixture by weight.
   ii. Kentucky Bluegrass/Perennial Rye: Full Sun Mixture: For use in full sun areas where rapid establishment is necessary and when turf will receive medium to intensive management. Certified Perennial Ryegrass Cultivars/Certified Kentucky Bluegrass Seeding Rate: 2 pounds mixture per 1000 square feet. Choose a minimum of three Kentucky Bluegrass Cultivars with each ranging from 10 to 35 percent of the total mixture by weight.
   iii. Tall Fescue/Kentucky Bluegrass: Full Sun Mixture: For use in drought prone areas and/or for areas receiving low to medium management in full sun to medium shade. Recommended mixture includes; Certified Tall Fescue Cultivars 95 to 100 percent, Certified Kentucky Bluegrass Cultivars 0 to 5 percent. Seeding Rate: 5 to 8 pounds per 1000 square feet. One or more cultivars may be blended.
   iv. Kentucky Bluegrass/Fine Fescue: Shade Mixture: For use in areas with shade in Bluegrass lawns. For establishment in high quality, intensively managed turf area. Mixture includes Certified Kentucky Bluegrass Cultivars 30 to 40 percent and Certified Fine Fescue and 60 to 70 percent. Seeding Rate: 1 ½ to 3 pounds per 1000 square feet.
   Notes:Select turfgrass varieties from those listed in the most current University of Maryland Publication, Agronomy Memo #77, "Turfgrass Cultivar Recommendations for Maryland" Choose certified material. Certified material is the best guarantee of cultivar purity. The certification program of the Maryland Department of Agriculture, Turf and Seed Section, provides a reliable means of consumer protection and assures a pure genetic line.
   c. Ideal Times of Seeding for Turf Grass Mixtures
   Western MD: March 15 to June 1, August 1 to October 1 (Hardiness Zones: 5b, 6a)
   Central MD: March 1 to May 15, August 15 to October 15 (Hardiness Zone: 6b)
   Southern MD, Eastern Shore: March 1 to May 15, August 15 to October 15 (Hardiness Zones: 7a, 7b)

Maryland's Guidelines To Waterway Construction
DETAIL 2.2: IMBRICATED RIPRAP



SLOPE PROTECTION AND STABILIZATION TECHNIQUES | REVISED NOVEMBER 2000 PAGE 2.2 - 3 | MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MGWC 2.2: IMBRICATED RIPRAP

Approximate Cost ($1999):
$90 per linear ft

INSTALLATION GUIDELINES

All erosion and sediment control devices, including dewatering basins, should be implemented as the first order of business according to a plan approved by the WMA or local authority. The recommended construction procedure for imbricated riprap is as follows (refer to Detail 2.2):

1. The stream should be diverted according to a WMA recommended procedure (see *Section 1, Temporary Instream Construction Measures, Maryland's Guidelines to Waterway Construction*), and the construction area should be dewatered.
2. All excavation should be made in reasonably close conformity with the existing stream slope and bed. The slope of the cut face should be in the range of 1H:6V to 2H:6V. Loose material at the toe of the embankment should be excavated until a stable foundation is reached, usually within 2 to 3 feet (0.6 to 0.9 meters) of the surface. The subgrade should be smooth, firm, and free from protruding objects or voids that would effect the proper positioning of the first layer of stones.
3. A graded granular filter or filter fabric should be placed on the face of the cut slope to prevent the migration of fine materials through the revetment. If filter fabric is used, it should be carefully and loosely placed on the prepared slope and secured. Adjacent strips should overlap a minimum of 8 inches (0.20 meters). If the filter fabric is torn or damaged, it should be repaired or replaced.
4. The rock layers should be neatly stacked with staggered joints so that each stone rests firmly on two stones in the tier below. Additionally, smaller stones should be used to fill voids so that each rock rests solidly on the previous rock layer with minimal opportunity for movement. Upon completion of the first layer of stone, the toe trench should be filled with Class III riprap sized according to MGWC 2.1: Riprap or additional imbricated stone. Two footer stones should be used where high potential for channel incision exists. The height of the imbricated revetment is dictated by the size of the stone used, and the height should not exceed 3 times the length of the longest axis and should not be greater than 10 feet (3 meters).
5. Placement of the granular backfill should occur concurrently with the stone placement. The backfill slope angle should be 2H:1V or flatter but should be greater than 0 degrees to facilitate drainage. Once all of the backfill is in place, it should be covered with a filter layer and a layer of topsoil sufficient to support a native vegetative cover.
6. The disturbed sections of the channel, including the slopes and stream bed, should be stabilized with methods approved by the WMA.

Note: The use of rock vanes (MGWC 3.3: Rock Vanes) should be considered to dissipate excessive toe velocities.

SLOPE PROTECTION AND STABILIZATION TECHNIQUES — *MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000*

PAGE 2.2 - 2

B-4-3 STANDARDS AND SPECIFICATIONS
FOR SEEDING AND MULCHING

Definition: The application of seed and mulch to establish vegetative cover.
Purpose: To protect disturbed soils from erosion during and at the end of construction.
Conditions Where Practice Applies: To the surface of all perimeter controls, slopes, and any disturbed area not under active grading.

Criteria

A. Seeding
1. Specifications
   a. All seed must meet the requirements of the Maryland State Seed Law. All seed must be subject to re-testing by a recognized seed laboratory. All seed used must have been tested within the 6 months immediately preceding the date of sowing such material on any project. Refer to Table B.4 regarding the quality of seed. Seed tags must be available upon request to the inspector to verify type of seed and seeding rate.
   b. Mulch alone may be applied between the fall and spring seeding dates only if the ground is frozen. The appropriate seeding mixture must be applied when the ground thaws.
   c. Inoculants: The inoculant for treating legume seed in the seed mixtures must be a pure culture of nitrogen fixing bacteria prepared specifically for the species. Inoculants must not be used later than the date indicated on the container. Add fresh inoculants as directed on the package. Use four times the recommended rate when hydroseeding. Note: It is very important to keep inoculant as cool as possible until used. Temperatures above 75 to 80 degrees Fahrenheit can weaken bacteria and make the inoculant less effective.
   d. Sod or seed must not be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed (14 days min.) to permit dissipation of phyto-toxic materials.
2. Application
   a. Dry Seeding: This includes use of conventional drop or broadcast spreaders.
      i. Incorporate seed into the subsoil at the rates prescribed on Temporary Seeding Table B.1, Permanent Seeding Table B.3, or site-specific seeding summaries.
      ii. Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction. Roll the seeded area with a weighted roller to provide good seed to soil contact.
   b. Drill or Cultipacker Seeding: Mechanized seeders that apply and cover seed with soil.
      i. Cultipacking seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of soil covering. Seedbed must be firm after planting.
      ii. Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction.
   c. Hydroseeding: Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer).
      i. If fertilizer is being applied at the time of seeding, the application rates should not exceed the following: nitrogen, 100 pounds per acre total of soluble nitrogen; P2O5 (phosphorous), 200 pounds per acre; K2O (potassium), 200 pounds per acre.
      ii. Lime: Use only ground agricultural limestone (up to 3 tons per acre may be applied by hydroseeding). Normally, not more than 2 tons are applied by hydroseeding at any one time. Do not use burnt or hydrated lime when hydroseeding.
      iii. Mix seed and fertilizer on site and seed immediately and without interruption.
      iv. When hydroseeding do not incorporate seed into the soil.

B. Mulching
1. Mulch Materials (in order of preference)
   a. Straw consisting of thoroughly threshed wheat, rye, oat, or barley and reasonably bright in color. Straw is to be free of noxious weed seeds as specified in the Maryland Seed Law and not musty, moldy, caked, decayed, or excessively dusty. Note: Use only sterile straw mulch in areas where one species of grass is desired.
   b. Wood Cellulose Fiber Mulch (WCFM) consisting of specially prepared wood cellulose processed into a uniform fibrous physical state.
      i. WCFM is to be dyed green or contain a green dye in the package that will provide an appropriate color to facilitate visual inspection of the uniformly spread slurry.
      ii. WCFM, including dye, must contain no germination or growth inhibiting factors.
      iii. WCFM materials are to be manufactured and processed in such a manner that the wood cellulose fiber mulch will remain in uniform suspension in water under agitation and will blend with seed, fertilizer and other additives to form a homogeneous slurry. The mulch material must form a blotter-like ground cover, on application, having moisture absorption and percolation properties and must cover and hold grass seed in contact with the soil without inhibiting the growth of the grass seedlings.
      iv. WCFM material must not contain elements or compounds at concentration levels that will be phyto-toxic.
      v. WCFM must conform to the following physical requirements: fiber length of approximately 10 millimeters, diameter approximately 1 millimeter, pH range of 4.0 to 8.5, ash content of 1.6 percent maximum and water holding capacity of 90 percent minimum.
2. Application
   a. Apply mulch to all seeded areas immediately after seeding.
   b. When straw mulch is used, spread it over all seeded areas at the rate of 2 tons per acre to a uniform loose depth of 1 to 2 inches. Apply mulch to achieve a uniform distribution and depth so that the soil surface is not exposed. When using a mulch anchoring tool, increase the application rate to 2.5 tons per acre.
   c. Wood cellulose fiber used as mulch must be applied at a net dry weight of 1500 pounds per acre. Mix the wood cellulose fiber with water to attain a mixture with a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.
3. Anchoring
   a. Perform mulch anchoring immediately following application of mulch to minimize loss by wind or water. This may be done by one of the following methods (listed by preference), depending upon the size of the area and erosion hazard:
      i. A mulch anchoring tool is a tractor drawn implement designed to punch and anchor mulch into the soil surface a minimum of 2 inches. This practice is most effective on large areas, but is limited to flatter slopes where equipment can operate safely. If used on sloping land, this practice should follow the contour.
      ii. Wood cellulose fiber may be used for anchoring straw. Apply the fiber binder at a net dry weight of 750 pounds per acre. Mix the wood cellulose fiber with water at a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.
      iii. Synthetic binders such as Acrylic DLR (Agro-Tack), DCA-70, Petroset, Terra Tax II, Terra Tack AR or other approved equal may be used. Follow application rates as specified by the manufacturer. Application of liquid binders needs to be heavier at the edges where wind catches mulch, such as in valleys and on crests of banks. Use of asphalt binders is strictly prohibited.
      iv. Lightweight plastic netting may be stapled over the mulch according to manufacturer recommendations. Netting is usually available in rolls 4 to 15 feet wide and 300 to 3,000 feet long.

SEDIMENT CONTROL NOTES

1. A minimum of 48 hours notice must be given to the Howard County Department of Inspections, Licenses and Permits, Sediment Control Division prior to the start of any construction (313-1855).
2. All vegetative and structural practices are to be installed according to the provisions of this plan and are to be in conformance with the most current MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL and revisions thereto.
3. Following initial soil disturbance or re-disturbance, permanent or temporary stabilization shall be completed within: a) 3 calendar days for all perimeter sediment control structures, dikes, perimeter slopes and all slopes greater than 3:1, b) 7 days as to all other disturbed or graded areas on the project site.
4. All disturbed areas must be stabilized within the time period specified above in accordance with the 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL for permanent seeding (Sec. B-4-5), temporary seeding (Sec. B-4-4) and mulching (Sec.B-4-3). Temporary stabilization with mulch alone can only be done when recommended seeding dates do not allow for proper germination and establishment of grasses.
5. All sediment control structures are to remain in place and are to be maintained in operative condition until permission for their removal has been obtained from the Howard County Sediment Control Inspector.

Total Area of Site	83.81	Acres
Area Disturbed	12.8	Acres
Area to be roofed or paved	1.8	Acres
Area to be vegetatively stabilized	11.0	Acres
Total Cut	16300	Cu. Yds.
Total Fill	15950	Cu. Yds.
Offsite waste/borrow are location		

7. Any sediment control practice that is disturbed by grading activity for placement of utilities must be repaired on the same day of disturbance.
8. Additional sediment control must be provided, if deemed necessary by the Howard County Sediment Control Inspector.
9. On all sites with disturbed areas in excess of 2 acres, approval of the inspection agency shall be requested upon completion of installation of perimeter erosion and sediment controls, but before proceeding with any other earth disturbance or grading. Other building or grading inspection approvals may not be authorized until this initial approval by the inspection agency is made.
10. Trenches for the construction of utilities is limited to three pipe lengths or that which shall be back-filled and stabilized by the end of each workday, whichever is shorter.
11. Any changes or revisions to the sequence of construction must be reviewed and approved by the plan approval authority prior to proceeding with construction.
12. A project is to be sequenced so that grading activities begin on one grading unit (maximum acreage of 20 ac. per grading unit) at a time. Work may proceed to a subsequent grading unit when at least 50 percent of the disturbed area in the preceding grading unit has be stabilized and approved by the enforcement authority. Unless otherwise specified and approved by the approval authority, no more than 30 acres cumulatively may be disturbed at a given time. Rev. 4/2013

Sequence of Construction

Day 1: Obtain grading permit. A letter of Authorization from MDE must be obtained prior to disturbances to the stream, floodplain or wetlands for the road and/or utility crossings. Stream closure shall be between March 1st and May 31st. No grading or clearing is allowed unless allowed by the Sediment Control Inspector.

Day 2: Install stabilized construction entrance at Point Ridge Road.

Day 3-18: Install clean water diversion dike to direct clean water flow around the disturbed area at culvert crossings E-1 to E-2. Construct culvert complete with riprap outfalls and headwalls and stabilize immediately. Install perimeter controls in the vicinity of E1 & E-2.

Day 19-34: Install clean water diversion dike to direct clean water flow around the disturbed area at culvert crossings E-3 to E-4. Construct culvert complete with riprap outfalls and headwalls and stabilize immediately. Install remaining perimeter controls.

Day 35-45: Upon approval of the Howard County Sediment Control Inspector, install perimeter controls for the remainder of the site including the cleanwater diversion at proposed inlet I-6 and outlet at stream. Install super silt fencing on downhill side of existing barn, unless barn has been removed prior to construction.

Day 46-53: With inspector's approval remove existing barn and stabilize disturbed areas per temporary stabilization notes. If barn is already razed verify stabilization.

Day 54-74: With perimeter controls in place install the bottomless arch crossings at Crossings 1 and 2. The construction of Crossing #1 includes the construction of a realignment of the existing stream from the existing pipe to the low part of the floodplain. Stream reconstruction is to be completed prior to culvert installation but is to remain dry until the culvert and controlled backfill is complete. Upon approval of the Howard County Sediment Control Inspector, bring the road bed of Point Ridge Road and proposed Pleasant Springs Court to subgrade and stabilize slopes in accordance with temporary seedbed notes. This construction can take place prior to the completion of the stream crossings for the work that is outside of the environmental areas. Note that once the box culverts are installed access is prohibited from anywhere except Point Ridge Drive. Install pump around practice as needed.

Day 75-89: Install pressure sewer main and storm drain systems including outfall locations. This construction can take place prior to the completion of the stream crossings for the work that is outside of the environmental areas.

Day 90-108: Complete grading of the disturbed area and stabilize disturbed areas in accordance with the permanent seedbed notes. Install the wetland mitigation area. This construction can take place prior to the completion of the stream crossings for the work that is outside of the environmental areas.

Day 109-128: Install the community septic reserve area including tanks and trenches. This construction can take place prior to the completion of the stream crossings for the work that is outside of the environmental areas.

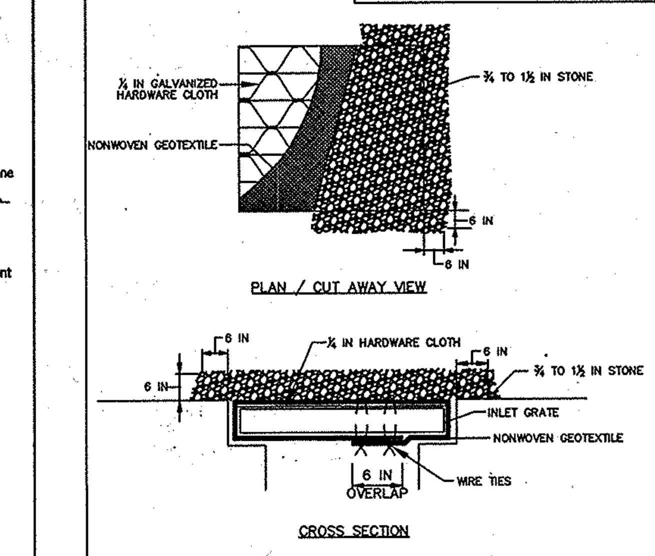
Day 129-148: Pave roads and stabilize disturbed areas permanent stabilization notes. This construction can take place prior to the completion of the stream crossings for the work that is outside of the environmental areas. Install all remaining rip-rap outfall protections.

Day 149-164: With disturbed areas stabilized and with inspector's approval install micro-bioretention facilities MB-A thru MB-C and stabilize.

Day 165 to 170: Upon approval of the Howard County Sediment Control Inspector, remove remaining sediment control devices and stabilize disturbed areas in accordance with the permanent seedbed notes.

DETAIL E-9-2 AT-GRADE INLET PROTECTION — STANDARD SYMBOL AGIP

MAXIMUM DRAINAGE AREA = 1 ACRE

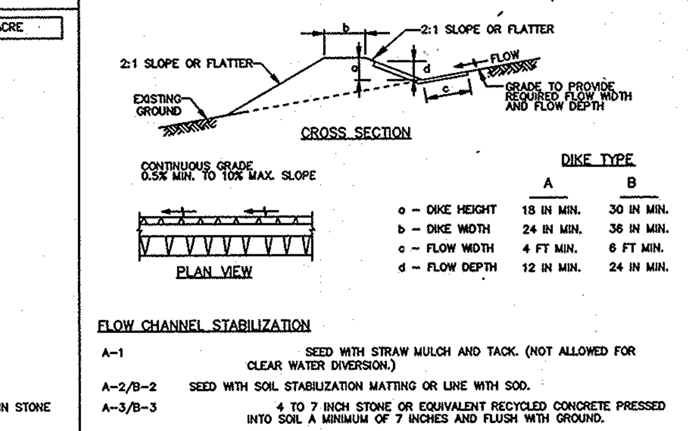


CONSTRUCTION SPECIFICATIONS

1. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
2. LIFT GRATE AND WRAP WITH NONWOVEN GEOTEXTILE TO COMPLETELY COVER ALL OPENINGS. SECURE WITH WIRE TIES AND SET GRATE BACK IN PLACE.
3. PLACE CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE 6 INCHES THICK ON THE GRATE.
4. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-1 EARTH DIKE — STANDARD SYMBOL A-1



FLOW CHANNEL STABILIZATION

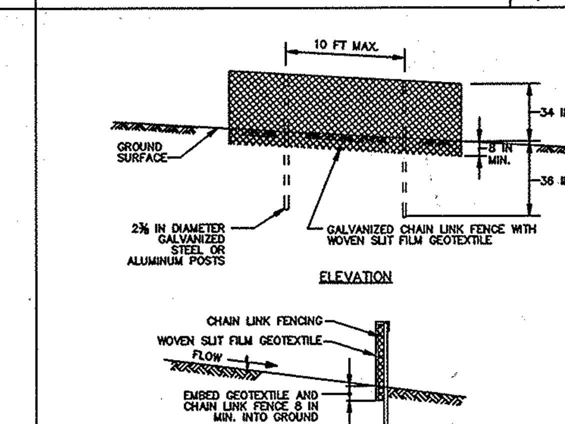
A-1 SEED WITH STRAW MULCH AND TACK. (NOT ALLOWED FOR CLEAR WATER DIVERSION.)
A-2/B-2 SEED WITH SOIL STABILIZATION MATTING OR LINE WITH SOD.
A-3/B-3 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE PRESSED INTO SOIL A MINIMUM OF 7 INCHES AND FLUSH WITH GROUND.

CONSTRUCTION SPECIFICATIONS

1. REMOVE AND DISPOSE OF ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SO AS NOT TO INTERFERE WITH PROPER FUNCTION OF EARTHDIKE.
2. EXCAVATE OR SHAPE EARTH DIKE TO LINE, GRADE, AND CROSS SECTION AS SPECIFIED. BANK PROJECTIONS OR OTHER IRREGULARITIES ARE NOT ALLOWED.
3. COMPACT FILL.
4. CONSTRUCT FLOW CHANNEL ON AN UNINTERRUPTED, CONTINUOUS GRADE, ADJUSTING THE LOCATION DUE TO FIELD CONDITIONS AS NECESSARY TO MAINTAIN POSITIVE DRAINAGE.
5. PROVIDE OUTLET PROTECTION AS REQUIRED ON APPROVED PLAN.
6. STABILIZE EARTH DIKE WITHIN THREE DAYS OF INSTALLATION. STABILIZE FLOW CHANNEL FOR CLEAR WATER DIVERSION WITHIN 24 HOURS OF INSTALLATION.
7. MAINTAIN LINE, GRADE, AND CROSS SECTION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. MAINTAIN POSITIVE DRAINAGE. KEEP EARTH DIKE AND POINT OF DISCHARGE FREE OF EROSION, AND CONTINUOUSLY MEET REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.
8. UPON REMOVAL OF EARTH DIKE, GRADE AREA FLUSH WITH EXISTING GROUND. WITHIN 24 HOURS OF REMOVAL STABILIZE DISTURBED AREA WITH TOPSOIL, SEED, AND MULCH, OR AS SPECIFIED ON APPROVED PLAN.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-3 SUPER SILT FENCE — STANDARD SYMBOL SSF

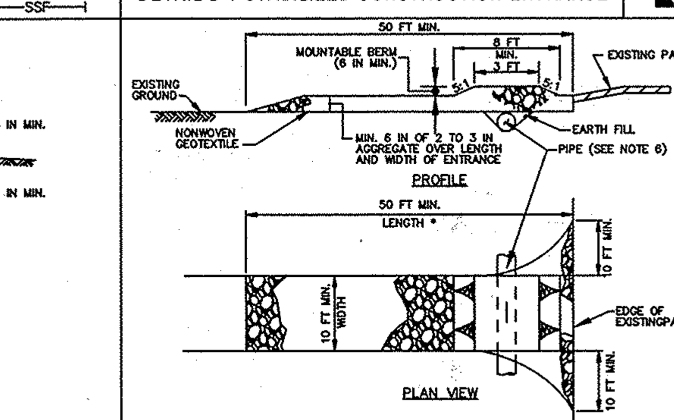


CONSTRUCTION SPECIFICATIONS

1. INSTALL 2⅜ INCH DIAMETER GALVANIZED STEEL POSTS OF 0.095 INCH WALL THICKNESS AND SIX FOOT LENGTH SPACED NO FURTHER THAN 10 FEET APART. DRIVE THE POSTS A MINIMUM OF 36 INCHES INTO THE GROUND.
2. FASTEN 9 GAUGE OR HEAVIER GALVANIZED CHAIN LINK FENCE (2⅜ INCH MAXIMUM OPENING) 42 INCHES IN HEIGHT SECURELY TO THE FENCE POSTS WITH WIRE TIES OR HUG RINGS.
3. FASTEN WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS, SECURELY TO THE UPSLOPE SIDE OF CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID SECTION. EMBED GEOTEXTILE AND CHAIN LINK FENCE A MINIMUM OF 8 INCHES INTO THE GROUND.
4. WHERE ENDS OF THE GEOTEXTILE COME TOGETHER, THE ENDS SHALL BE OVERLAPPED BY 6 INCHES, FOLDED, AND STAPLED TO PREVENT SEDIMENT BY PASS.
5. EXTEND BOTH ENDS OF THE SUPER SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SUPER SILT FENCE.
6. PROVIDE MANUFACTURER CERTIFICATION TO THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
7. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL CHAIN LINK FENCING AND GEOTEXTILE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-1 STABILIZED CONSTRUCTION ENTRANCE — STANDARD SYMBOL SCE

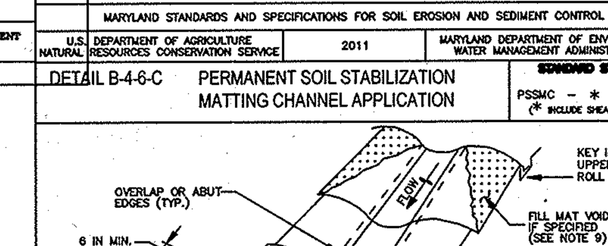


CONSTRUCTION SPECIFICATIONS

1. PLACE STABILIZED CONSTRUCTION ENTRANCE IN ACCORDANCE WITH THE APPROVED PLAN. VEHICLES MUST TRAVEL OVER THE ENTIRE LENGTH OF THE SCE. USE MINIMUM LENGTH OF 50 FEET (*30 FEET FOR SINGLE RESIDENCE LOT). USE MINIMUM WIDTH OF 10 FEET. FLARE SCE 10 FEET MINIMUM AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
2. PIPE ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD THE SCE UNDER THE ENTRANCE, MAINTAINING POSITIVE DRAINAGE. PROTECT PIPE INSTALLED THROUGH THE SCE WITH A MOUNTABLE BERM WITH 5:1 SLOPES AND A MINIMUM OF 12 INCHES OF STONE OVER THE PIPE. PROVIDE PIPE AS SPECIFIED ON APPROVED PLAN. WHEN THE SCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY, A PIPE IS NOT NECESSARY. A MOUNTABLE BERM IS REQUIRED WHEN SCE IS NOT LOCATED AT A HIGH SPOT.
3. PREPARE SUBGRADE AND PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS.
4. PLACE CRUSHED AGGREGATE (2 TO 3 INCHES IN SIZE) OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) AT LEAST 6 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE SCE.
5. MAINTAIN ENTRANCE IN A CONDITION THAT MINIMIZES TRACKING OF SEDIMENT. ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN CLEAN SURFACE, MOUNTABLE BERM, AND SPECIFIED DIMENSIONS. IMMEDIATELY REMOVE STONE AND/OR SEDIMENT SPILLED, DROPPED, OR TRACKED ONTO ADJACENT ROADWAY BY VACUUMING, SCRAPING, AND/OR SWEEPING. WASHING ROADWAY TO REMOVE MUD TRACKED ONTO PAVEMENT IS NOT ACCEPTABLE UNLESS WASH WATER IS DIRECTED TO AN APPROVED SEDIMENT CONTROL PRACTICE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-4-6-C PERMANENT SOIL STABILIZATION MATTING CHANNEL APPLICATION — STANDARD SYMBOL PSSMC – * lb/ft² (* INCLUDE SHEAR STRESS)

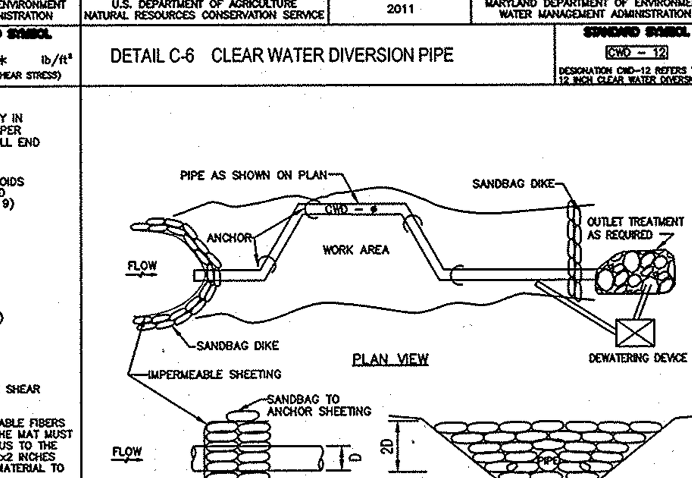


CONSTRUCTION SPECIFICATIONS

1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE PERMANENT SOIL STABILIZATION MATTING MADE OF OPEN WEAVE SYNTHETIC, NON-DEGRADABLE FIBERS OR ELEMENTS OF UNIFORM THICKNESS AND DISTRIBUTION THROUGHOUT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES OR WOOD STAKES. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1 ½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPE AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS, UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
5. UNROLL MATTING IN DIRECTION OF WATER FLOW, CENTERING THE FIRST ROLL ON THE CHANNEL CENTER LINE. WORK FROM CENTER OF CHANNEL OUTWARD WHEN PLACING ROLLS. LAY MATTING SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT EDGES OF MATTING ROLLS PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE NEXT DOWNSTREAM MAT.
7. KEY IN THE TOP OF SLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. IF SPECIFIED BY THE DESIGNER OR MANUFACTURER AND DEPENDING ON THE TYPE OF MAT BEING INSTALLED, ONCE THE MATTING IS KEYED AND STAPLED IN PLACE, FILL THE MAT VOIDS WITH TOP SOIL OR GRANULAR MATERIAL AND LIGHTLY COMPACT OR ROLL TO MAXIMIZE SOIL/MAT CONTACT WITHOUT CRUSHING MAT.
10. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL C-6 CLEAR WATER DIVERSION PIPE — STANDARD SYMBOL CWD – 12 (DESIGNATION CWD-12 REFERS TO 12 INCH CLEAR WATER DIVERSION.)



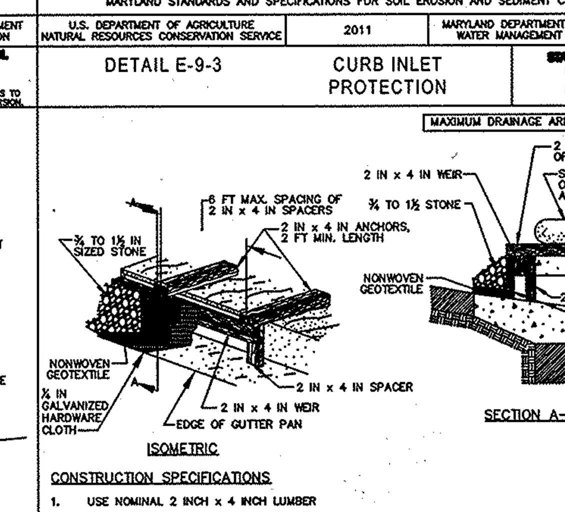
CONSTRUCTION SPECIFICATIONS

1. FLEXIBLE PIPE IS PREFERRED. HOWEVER, CORRUGATED METAL PIPE OR EQUIVALENT PVC PIPE CAN BE USED. MAKE ALL JOINTS WATERTIGHT.
2. FOR SANDBAGS USE MATERIALS THAT ARE RESISTANT TO ULTRA-VIOLENT RADIATION, TEARING, AND PUNCTURE AND WOVEN TIGHTLY ENOUGH TO PREVENT LEAKAGE OF FILL MATERIAL.
3. USE 10 MIL OR THICKER, UV RESISTANT, IMPERMEABLE SHEETING OR OTHER APPROVED MATERIAL THAT IS IMPERMEABLE AND RESISTANT TO PUNTURING AND TEARING.
4. PLACE IMPERMEABLE SHEETING SUCH THAT UPGRADE PORTION OVERLAPS DOWNGRADE PORTION BY A MINIMUM OF 18 INCHES.
5. SET HEIGHT OF SANDBAG DIKE AT TWICE THE PIPE DIAMETER. MAINTAIN HEIGHT ALONG LENGTH OF SANDBAG DIKE. PLACE DOUBLE ROW OF SANDBAGS.
6. AT A MINIMUM, SECURELY ANCHOR DIVERSION PIPE AT EACH DOWNGRADE JOINT.
7. SET OUTLET END OF DIVERSION PIPE LOWER THAN INLET END.
8. PROVIDE OUTLET PROTECTION AS REQUIRED ON APPROVED PLAN.
9. DEWATER WORK AREA USING AN APPROVED EROSION AND SEDIMENT CONTROL PRACTICE AS SPECIFIED ON APPROVED PLAN.
10. KEEP POINT OF DISCHARGE FREE OF EROSION. MAINTAIN WATER TIGHT CONNECTIONS AND POSITIVE DRAINAGE. REPLACE SANDBAGS AND IMPERMEABLE SHEETING IF TORN.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-9-3 CURB INLET PROTECTION — STANDARD SYMBOL CIP

MAXIMUM DRAINAGE AREA = ¼ ACRE



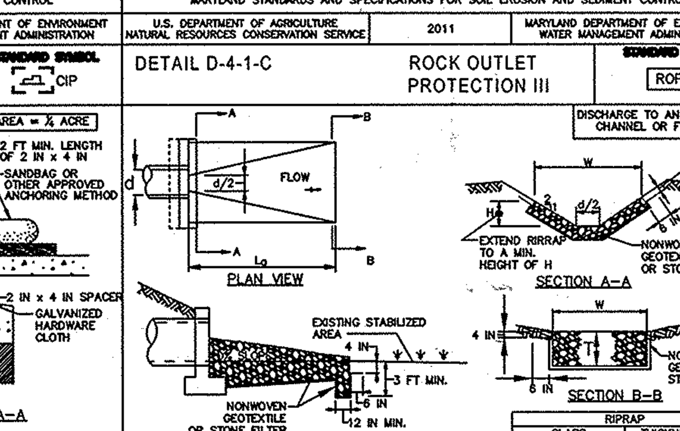
CONSTRUCTION SPECIFICATIONS

1. USE NOMINAL 2 INCH x 4 INCH LUMBER
2. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
3. NAIL THE 2x4 WEIR TO 9 INCH LONG VERTICAL SPACERS (MAXIMUM 6 FEET APART).
4. ATTACH A CONTINUOUS PIECE OF ¼ INCH GALVANIZED HARDWARE CLOTH, WITH A MINIMUM WIDTH OF 30 INCHES AND A MINIMUM LENGTH OF 4 FEET LONGER THAN THE THROAT OPENING, TO THE 2x4 WEIR, EXTENDING IT 2 FEET BEYOND THROAT ON EACH SIDE.
5. PLACE A CONTINUOUS PIECE OF NONWOVEN GEOTEXTILE OF THE SAME DIMENSIONS AS THE HARDWARE CLOTH OVER THE HARDWARE CLOTH AND SECURELY ATTACH TO THE 2x4 WEIR.
6. PLACE THE ASSEMBLY AGAINST THE INLET THROAT AND NAIL TO 2x4 ANCHORS (MINIMUM 2 FEET LENGTH). EXTEND THE ANCHORS ACROSS THE INLET TOP AND HOLD IN PLACE BY SANDBAGS OR OTHER APPROVED ANCHORING METHOD.
7. INSTALL END SPACERS A MINIMUM OF 1 FOOT BEYOND THE ENDS OF THE THROAT OPENING.
8. FORM THE HARDWARE CLOTH AND THE GEOTEXTILE TO THE CONCRETE GUTTER AND FACE OF CURB TO SPAN THE INLET OPENING. COVER THE HARDWARE CLOTH AND GEOTEXTILE WITH CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE.
9. AT NON-SUMP LOCATIONS, INSTALL A TEMPORARY SANDBAG OR ASPHALT BERM TO PREVENT INLET BYPASS.
10. STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL D-4-1-C ROCK OUTLET PROTECTION III — STANDARD SYMBOL ROPIII

DISCHARGE TO AN UNCONFINED CHANNEL OR FLAT AREA



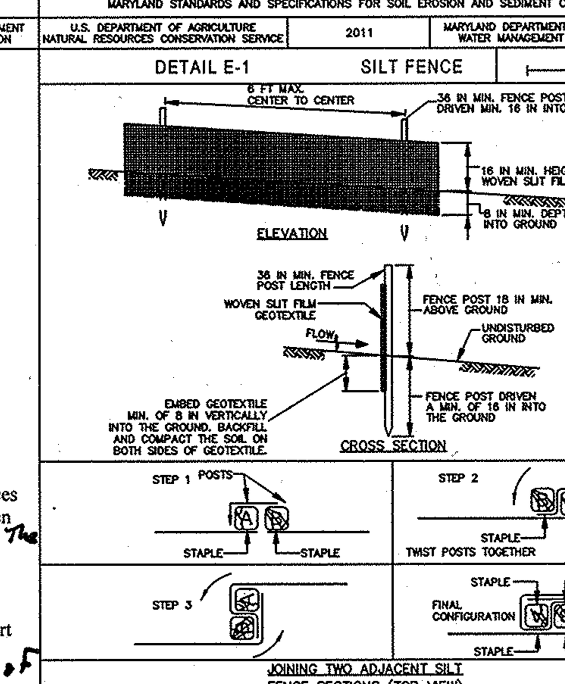
RIPRAP CLASS	THICKNESS (T)
I	19 IN
II	32 IN
III	46 IN

CONSTRUCTION SPECIFICATIONS

1. RIPRAP AND STONE MUST CONFORM TO THE SPECIFIED CLASS.
2. USE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, AND PROTECT FROM PUNCTURING, CUTTING, OR TEARING. REPAIR ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE BY PLACING ANOTHER PIECE OF GEOTEXTILE OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE. PROVIDE A MINIMUM OF ONE FOOT OVERLAP FOR ALL REPAIRS AND FOR JOINING TWO PIECES OF GEOTEXTILE TOGETHER.
3. PREPARE THE SUBGRADE FOR GEOTEXTILE OR STONE FILTER (⅜ TO 1½ INCH MINIMUM STONE FOR 6 INCH MINIMUM DEPTH) AND RIPRAP TO THE REQUIRED LINES AND GRADES. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
4. EXTEND GEOTEXTILE AT LEAST 6 INCHES BEYOND EDGES OF RIPRAP AND EMBED AT LEAST 4 INCHES AT SIDES OF RIPRAP.
5. CONSTRUCT RIPRAP OUTLET TO FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. PLACE STONE FOR RIPRAP OUTLET IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE RIPRAP IN A MANNER TO PREVENT DAMAGE TO THE FILTER BLANKET OR GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.
6. WHERE NO ENDWALL IS USED, CONSTRUCT THE UPSTREAM END OF THE APRON SO THAT THE WIDTH IS TWO TIMES THE DIAMETER OF THE OUTLET PIPE, AND EXTEND THE STONE UNDER THE OUTLET BY A MINIMUM OF 18 INCHES.
7. CONSTRUCT APRON WITH 0% SLOPE ALONG ITS LENGTH AND WITHOUT OBSTRUCTIONS. PLACE STONE SO THAT IT BLENDS IN WITH EXISTING GROUND.
8. MAINTAIN LINE, GRADE, AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND RIPRAP DISLODGED RIPRAP. MAKE NECESSARY REPAIRS IMMEDIATELY.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-1 SILT FENCE — STANDARD SYMBOL SF



1 OF 2

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-1 SILT FENCE — STANDARD SYMBOL SF

CONSTRUCTION SPECIFICATIONS

1. USE WOOD POSTS 1¾ X 1¾ ± ⅟₁₆ INCH (MINIMUM) SQUARE CUT OF SOUND QUALITY HARDWOOD. AS AN ALTERNATIVE TO WOODEN POST USE STANDARD "T" OR "U" SECTION STEEL POSTS WEIGHING NOT LESS THAN 1 POUND PER LINEAR FOOT.
2. USE 36 INCH MINIMUM POSTS DRIVEN 16 INCH MINIMUM INTO GROUND NO MORE THAN 6 FEET APART.
3. USE WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS AND FASTEN GEOTEXTILE SECURELY TO UPSLOPE SIDE OF FENCE POSTS WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION.
4. PROVIDE MANUFACTURER CERTIFICATION TO THE AUTHORIZED REPRESENTATIVE OF THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT THE GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
5. EMBED GEOTEXTILE A MINIMUM OF 8 INCHES VERTICALLY INTO THE GROUND. BACKFILL AND COMPACT THE SOIL ON BOTH SIDES OF FABRIC.
6. WHERE TWO SECTIONS OF GEOTEXTILE ADJOIN: OVERLAP, TWIST, AND STAPLE TO POST IN ACCORDANCE WITH THIS DETAIL.
7. EXTEND BOTH ENDS OF THE SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SILT FENCE.
8. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL FENCE.

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MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL — U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE — 2011 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

NO.	DATE	REVISION
1	2-9-15	ADJUST LOD + STABILIZATION AREAS

BENCHMARK ENGINEERING, INC.
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
(P) 410-465-6105 (F) 410-465-6644
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date: ____2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER
4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: REGAN PROPERTY
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A' and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. ______

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

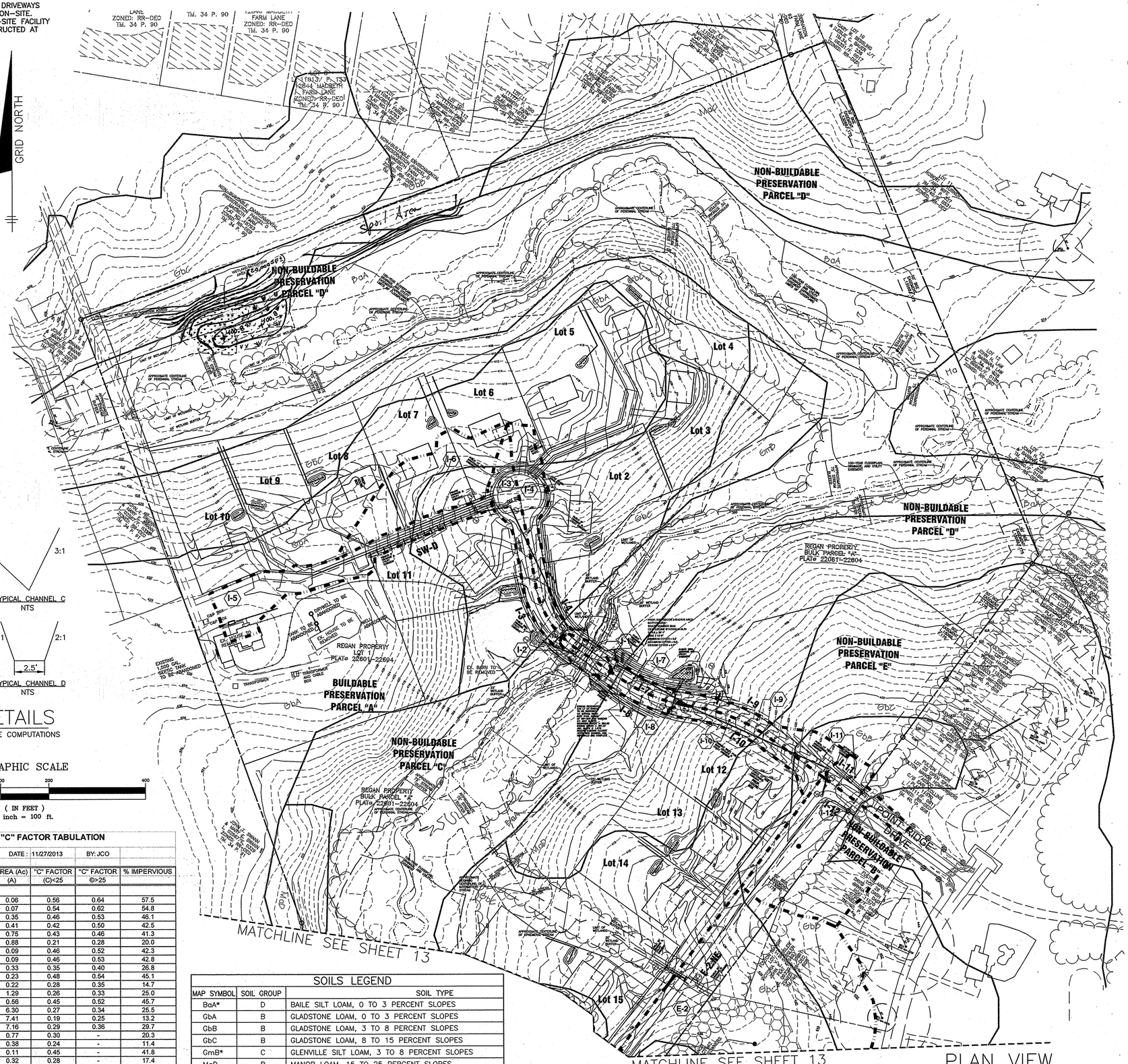
TITLE: FINAL ROAD CONSTRUCTION PLAN
GRADING, SEDIMENT AND EROSION CONTROL DETAILS AND NOTES

DATE: MARCH, 2014 — PROJECT NO. 2171

DESIGN: JMC — DRAFT: JCO — SCALE: AS SHOWN — DRAWING 11 OF 33

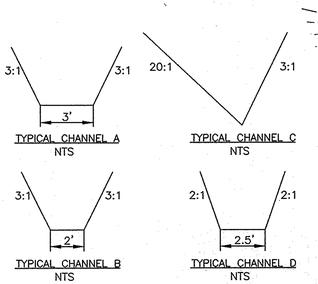
F-13-112

DRIVEWAY NOTE: PORTIONS OF THE DRIVEWAYS ON LOTS 5 & 6 ARE NOT TREATED ON-SITE. ANY AREA NOT DRAINING TO AN ON-SITE FACILITY OR DISCONNECTION MUST BE CONSTRUCTED AT THE MINIMUM ALLOWABLE WIDTH.



PLAN VIEW

SCALE: 1" = 100'



SWALE DETAILS

SEE SHEET 13 FOR SWALE COMPUTATIONS

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

AREA AND "C" FACTOR TABULATION

PROJECT: Regan Property DATE: 11/27/2013 BY: JCO

INLET #	ZONING (Z)	SUBAREA (B)	AREA (Ac) (A)	"C" FACTOR (C)<25	"C" FACTOR (C)>25	% IMPERVIOUS
I-1	RR-DEO		0.06	0.56	0.64	57.5
I-2	RR-DEO		0.07	0.54	0.62	54.8
I-3	RR-DEO		0.35	0.46	0.53	46.1
I-4	RR-DEO		0.41	0.42	0.50	42.5
I-5	RR-DEO		0.75	0.43	0.46	41.3
I-6	RR-DEO		0.88	0.21	0.28	20.0
I-7	RR-DEO		0.09	0.46	0.52	42.3
I-8	RR-DEO		0.09	0.46	0.53	42.8
I-9	RR-DEO		0.33	0.35	0.40	26.8
I-10	RR-DEO		0.23	0.48	0.54	45.1
I-11	RR-DEO		0.22	0.28	0.35	14.7
I-12	RR-DEO		1.29	0.26	0.33	25.0
I-14	RR-DEO		0.56	0.45	0.52	45.7
E-2	RR-DEO		6.30	0.27	0.34	25.5
E-4	RR-DEO		7.41	0.19	0.25	13.2
E-6	RR-DEO		7.16	0.29	0.36	29.7
SW-D	RR-DEO		0.77	0.30	-	20.3
E-2 NE	RR-DEO		0.38	0.24	-	11.4
E-3 NE	RR-DEO		0.11	0.45	-	41.8
E-4 NE	RR-DEO		0.32	0.28	-	17.4
E-4 W	RR-DEO		1.16	0.17	-	5.9
SW-E	RR-DEO		0.08	0.54	-	54.1

SOILS LEGEND

MAP SYMBOL	SOIL GROUP	SOIL TYPE
BaA*	D	BAILE SILT LOAM, 0 TO 3 PERCENT SLOPES
GbA	B	GLADSTONE LOAM, 0 TO 3 PERCENT SLOPES
GbB	B	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B	GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
GmB*	C	GLENVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES
MaD	B	MANOR LOAM, 15 TO 25 PERCENT SLOPES

FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
* ERODIBLE SOILS

I-3 Swale: CHANNEL A
10- year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 1.0600 cfs
Slope ..... 0.0400 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 3.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft /ft (V/H)
Results:
Depth ..... 0.3301 ft
Velocity ..... 0.8048 fps
Full Flowrate ..... 16.0680 cfs
Flow area 1.3171 ft2
Flow perimeter ..... 5.0878 ft
Hydraulic radius ..... 0.2589 ft
Top width ..... 4.9806 ft
Area 9.2972 ft2
Perimeter ..... 11.4124 ft
Percent full ..... 2 4.8176 %

I-4 Swale: CHANNEL A
10year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 1.1300 cfs
Slope ..... 0.0400 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 3.0000 ft
Left slope ..... 0.3333 ft/ft (V/ H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.3419 ft
Velocity ..... 0.8208 fps
Full Flowrate ..... 16.0680 cfs
Flow area 1.3767 ft2
Flow perimeter ..... 5.1629 ft
Hydraulic radius ..... 0.2666 ft
Top width ..... 5.0519 ft
Area 9.2972 ft2
Perimeter ..... 11.4124 ft
Percent full ..... 25.7104 %

I-7 Swale: CHANNEL A
10year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.2800 cfs
Slope ..... 0.0400 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 3.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.1550 ft
Velocity ..... 0.5213 fps
Full Flowrate ..... 16.0680 cfs
Flow area 0.5371 ft2
Flow perimeter ..... 3.9805 ft
Hydraulic radius ..... 0.1349 ft
Top width ..... 3.9302 ft
Area 9.2972 ft2
Perimeter ..... 11.4124 ft
Percent full ..... 11.6554 %

I-8 Swale: CHANNEL A
10year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.2900 cfs
Slope ..... 0.0400 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 3.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.1582 ft
Velocity ..... 0.5276 fps
Full Flowrate ..... 16.0680 cfs
Flow area 0.5497 ft2
Flow perimeter ..... 4.0008 ft
Hydraulic radius ..... 0.1374 ft
Top width ..... 3.9493 ft
Area 9.2972 ft2
Perimeter ..... 11.4124 ft
Percent full ..... 11.8947 %

I-9 Swale: CHANNEL A
10-year StormData:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.7500 cfs
Slope ..... 0.0900 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 3.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.2163 ft
Velocity ..... 0.9500 fps
Full Flowrate ..... 24.1020 cfs
Flow area 0.7895 ft2
Flow perimeter ..... 4.3684 ft
Hydraulic radius..... 0.1807 ft
Top width ..... 4.2982 ft
Area 9.2972 ft2
Perimeter ..... 11.4124 ft
Percent full ..... 16.2667 %

I-10 Swale: CHANNEL A
10year Storm Data: CHANNEL A
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.7300 cfs
Slope ..... 0.0980 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 3.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.2130 ft
Velocity ..... 0.9416 fps
Full Flowrate ..... 24.1020 cfs
Flow area 0.7753 ft2
Flow perimeter ..... 4.3475 ft
Hydraulic radius ..... 0.1783 ft
Top width ..... 4.2784 ft
Area 9.2972 ft2
Perimeter .....11.4124 ft
Percent full ..... 16.0179 %

I-11 Swale: CHANNEL A
10year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.4100 cfs
Slope ..... 0.0300 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 3.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.2097 ft
Velocity ..... 0.5387 fps
Full Flowrate ..... 13.9153 cfs
Flow area 0.7611 ft2
Flow perimeter ..... 4.3264 ft
Hydraulic radius ..... 0.1759 ft
Top width ..... 4.2584 ft
Area 9.2972 ft2
Perimeter ..... 11.4124 ft
Percent full ..... 15.7677 %

I-12 Swale: CHANNEL A
10year Storm Data:
Shape .....Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 2.2500 cfs
Slope ..... 0.0300 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 3.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.5361 ft
Velocity ..... 0.9106 fps
Full Flowrate ..... 13.9153 cfs
Flow area 2.4709 ft2
Flow perimeter ..... 6.3912 ft
Hydraulic radius ..... 0.3866 ft
Top width ..... 6.2172 ft
Area 9.2972 ft2
Perimeter ..... 11.4124 ft
Percent full ..... 40.3115 %

SWD:CHANNEL D
10year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 1.5400 cfs
Slope ..... 0.0800 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 2.5000 ft
Left slope ..... 0.5000 ft/ft (V/H)
Right slope ..... 0.5000 ft/ft (V/H)
Results:
Depth..... 0.3802 ft
Velocity ..... 1.2421 fps
Full Flowrate ..... 16.7420 cfs
Flow area 1.2398 ft2
Flow perimeter ..... 4.2005 ft
Hydraulic radius ..... 0.2952 ft
Top width ..... 4.0210 ft
Area 6.8628 ft2
Perimeter ..... 8.4479 ft
Percent full ..... 28.59 %

E2 NE: CHANNEL C
10yeaSstorm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.5900 cfs
Slope ..... 0.0500 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 0.0000 ft
Left slope ..... 0.0500 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.2903 ft
Velocity ..... 0.6086 fps
Full Flowrate ..... 34.1470 cfs
Flow area 0.9695 ft2
Flow perimeter ..... 6.7324 ft
Hydraulic dius ..... 0.1440 ft
Top width ..... 6.6780 ft
Area 20.3426 ft2
Perimeter ..... 30.8394 ft
Percent full ..... 21.8304 %

E3 NE: CHANNEL B
10year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.3300 cfs
Slope ..... 0.0500 ft/ft
Mannig's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 2.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.1972 ft
Velocity ..... 0.6457 fps
Full Flowrate ..... 14.7647 cfs
Flow area 0.5111 ft2
Flow perimeter ..... 4.7 ft
Hydraulic radius ..... 0.1574 ft
Top width ..... 3.1833 ft
Area 7.9672 ft2
Perimeter ..... 10.4124 ft
Percent full ..... 14.8266 %

E4 NE: CHANNEL B
10year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.6000 cfs
Slope ..... 0.0500 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 2.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Computed Results:
Depth ..... 0.2741 ft
Velocity ..... 0.7756 fps
Full Flowrate ..... 14.7647 cfs
Flow area 0.7736 ft2
Flow perimeter .....3.7336 ft
Hydraulic radius ..... 0.2072 ft
Top width ..... 3.6447 ft
Area 7.9672 ft2
Perimeter ..... 10.4124 ft
Percent full .....20.6079 %

E4 W: CHANNEL B
10year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 1.3400 cfs
Slope ..... 0.0830 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 2.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)
Results:
Depth ..... 0.3678 ft
Velocity ..... 1.1740 fps
Full Flowrate ..... 19.0230 cfs
Flow area 1.1414 ft2
Flow pimeter ..... 4.3262 ft
Hydraulic radius ..... 0.2638 ft
Top width ..... 4.2069 ft
Area 7.9672 ft2
Perimeter ..... 10.4124 ft
Percent full ..... 27.6523 %

SW-E: CHANNEL B
10-year Storm Data:
Shape ..... Trapezoidal
Solving for ..... Depth of Flow
Flowrate ..... 0.3000 cfs
Slope ..... 0.3000 ft/ft
Manning's n 0.1500
Height ..... 1.3300 ft
Bottom width ..... 2.0000 ft
Left slope ..... 0.3333 ft/ft (V/H)
Right slope ..... 0.3333 ft/ft (V/H)

Computed Results:
Depth ..... 0.1537 ft
Velocity ..... 0.7928 fps
Full Flowrate ..... 20.8804 cfs
Flow area 0.3784 ft2
Flow perimeter ..... 2.9725 ft
Hydraulic radius ..... 0.1273 ft
Top width ..... 2.9226 ft
Area 7.9672 ft2
Perimeter ..... 10.4124 ft
Percent full ..... 11.5598 %

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

NO.	DATE	REVISION
1	2-9-15	SHOW FINAL WETLAND MITIGATION AREA (20,000SF PERMOE) & SPOIL AREA

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
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date: 6-30-2013.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER

4/10/2014

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050

SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723

KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: REGAN PROPERTY
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
FINAL ROAD CONSTRUCTION PLAN
STORM DRAIN DRAINAGE AREA MAP

DATE: DECEMBER 2013 PROJECT NO. 2171

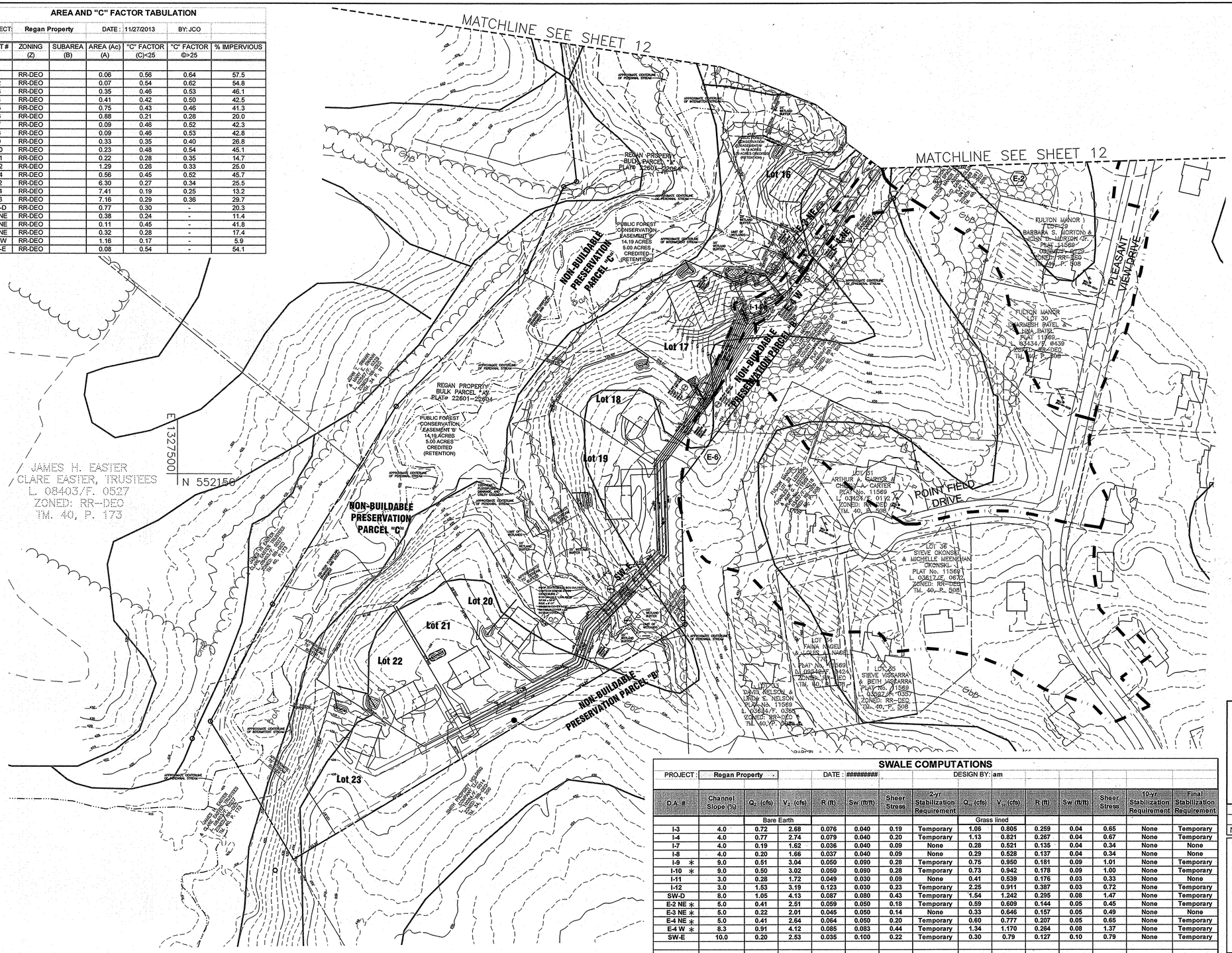
DESIGN: JCO DRAFT: JCO SCALE: AS SHOWN DRAWING 12 OF 33

F-13-112

AREA AND "C" FACTOR TABULATION

PROJECT: Regan Property DATE: 11/27/2013 BY: JCO

INLET #	ZONING (Z)	SUBAREA (B)	AREA (Ac) (A)	"C" FACTOR (C)<25	"C" FACTOR (C)>25	% IMPERVIOUS
I-1	RR-DEO		0.06	0.56	0.64	57.5
I-2	RR-DEO		0.07	0.54	0.62	54.8
I-3	RR-DEO		0.35	0.46	0.53	46.1
I-4	RR-DEO		0.41	0.42	0.50	42.5
I-5	RR-DEO		0.75	0.43	0.46	41.3
I-6	RR-DEO		0.88	0.21	0.28	20.0
I-7	RR-DEO		0.09	0.46	0.52	42.3
I-8	RR-DEO		0.09	0.46	0.53	42.8
I-9	RR-DEO		0.33	0.35	0.40	28.8
I-10	RR-DEO		0.23	0.48	0.54	45.1
I-11	RR-DEO		0.22	0.28	0.35	14.7
I-12	RR-DEO		1.29	0.26	0.33	25.0
I-14	RR-DEO		0.56	0.45	0.52	45.7
E-2	RR-DEO		6.30	0.27	0.34	25.5
E-4	RR-DEO		7.41	0.19	0.25	13.2
E-6	RR-DEO		7.16	0.29	0.36	29.7
SW-D	RR-DEO		0.77	0.30	-	20.3
E-2 NE	RR-DEO		0.38	0.24	-	11.4
E-3 NE	RR-DEO		0.11	0.45	-	41.8
E-4 NE	RR-DEO		0.32	0.28	-	17.4
E-4 W	RR-DEO		1.16	0.17	-	5.9
SW-E	RR-DEO		0.08	0.54	-	54.1



LEGEND

SOILS CLASSIFICATION	ChB2
SOILS DELINEATION	
EXISTING CONTOURS (AERIAL 12/02)	480 / 478
PROPOSED CONTOURS	999
LIMIT OF WETLANDS	
25' WETLANDS BUFFER	
CENTERLINE OF STREAM	
STREAM BUFFER	
EXISTING WOODS LINE	
PROPOSED WOODS LINE	
EXISTING STRUCTURE	
PROPOSED STRUCTURE	
SLOPES 15% TO 24.9%	
SLOPES 25% OR GREATER	
100 YEAR FLOODPLAIN	
PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)	
PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)	
TREE PROTECTION FENCE	
PRIVATE SEWAGE DISPOSAL AREA	
STORM DRAIN DRAINAGE DIVIDE	
DRAINAGE AREA DESIGNATION	I-11

SWALE COMPUTATIONS

PROJECT: Regan Property DATE: ########## DESIGN BY: am

D.A. #	Channel Slope (%)	Q_2 (cfs)	V_2 (cfs)	R (ft)	Sw (ft/ft)	Sheer Stress	2-yr Stabilization Requirement	Q_{10} (cfs)	V_{10} (cfs)	R (ft)	Sw (ft/ft)	Sheer Stress	10-yr Stabilization Requirement	Final Stabilization Requirement
		Bare Earth						Grass lined						
I-3	4.0	0.72	2.68	0.076	0.040	0.19	Temporary	1.05	0.805	0.259	0.04	0.65	None	Temporary
I-4	4.0	0.77	2.74	0.079	0.040	0.20	Temporary	1.13	0.821	0.267	0.04	0.67	None	Temporary
I-7	4.0	0.19	1.62	0.036	0.040	0.09	None	0.28	0.521	0.135	0.04	0.34	None	None
I-8	4.0	0.20	1.66	0.037	0.040	0.09	None	0.29	0.528	0.137	0.04	0.34	None	None
I-9 *	9.0	0.51	3.04	0.050	0.090	0.28	Temporary	0.75	0.950	0.181	0.09	1.01	None	Temporary
I-10 *	9.0	0.50	3.02	0.050	0.090	0.28	Temporary	0.73	0.942	0.178	0.09	1.00	None	Temporary
I-11	3.0	0.28	1.72	0.049	0.030	0.09	None	0.41	0.539	0.176	0.03	0.33	None	None
I-12	3.0	1.53	3.19	0.123	0.030	0.23	Temporary	2.25	0.911	0.387	0.03	0.72	None	Temporary
SW-D	8.0	1.05	4.13	0.087	0.080	0.43	Temporary	1.54	1.242	0.295	0.08	1.47	None	Temporary
E-2 NE *	5.0	0.41	2.51	0.059	0.050	0.18	Temporary	0.59	0.609	0.144	0.05	0.45	None	Temporary
E-3 NE *	5.0	0.22	2.01	0.045	0.050	0.14	None	0.33	0.546	0.157	0.05	0.49	None	None
E-4 NE *	5.0	0.41	2.64	0.064	0.050	0.20	Temporary	0.60	0.777	0.207	0.05	0.65	None	Temporary
E-4 W *	8.3	0.91	4.12	0.085	0.083	0.44	Temporary	1.34	1.170	0.264	0.08	1.37	None	Temporary
SW-E	10.0	0.20	2.53	0.035	0.100	0.22	Temporary	0.30	0.79	0.127	0.10	0.79	None	Temporary

Sheer Stress Equation:

$\tau = \gamma \cdot R \cdot S_w$ where:

τ = shear stress (lb/ft^2)
γ = weight density of water (62.4 lb/ft^3)
R = average water depth (hydraulic radius) (ft)
S_w = water surface slope (ft/ft)

Note: The swale computation were prepared for sediment control matting determination. A 'bare earth' Manning's coefficient for the 2-year storm was used. Since the Q-10 flows resulted in velocities under 1.0 fps in all stormwater treatment swales except SW-D the flows were not recomputed for the Pe.

* SWALES NOT USED FOR SWM

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

PLAN VIEW
SCALE: 1" = 100'

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

NO.	DATE	REVISION

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
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75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BD-CIVILENGINEERING.COM

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. 28559 Expiration Date: 7-22-2015

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

OWNER/DEVELOPER:

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PROJECT: REGAN PROPERTY
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

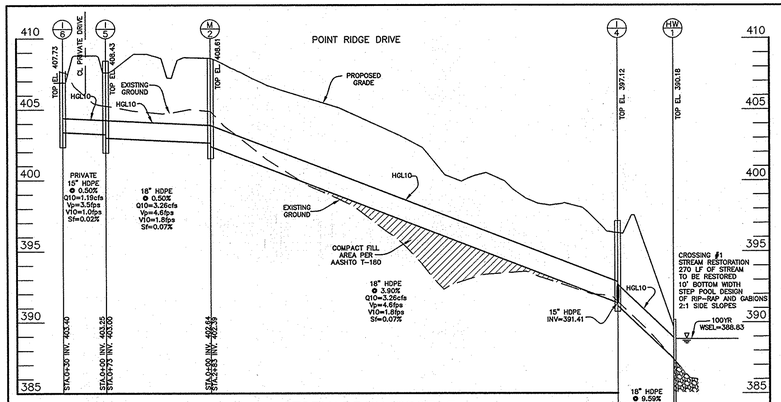
LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
FINAL ROAD CONSTRUCTION PLAN
STORM DRAIN DRAINAGE AREA MAP

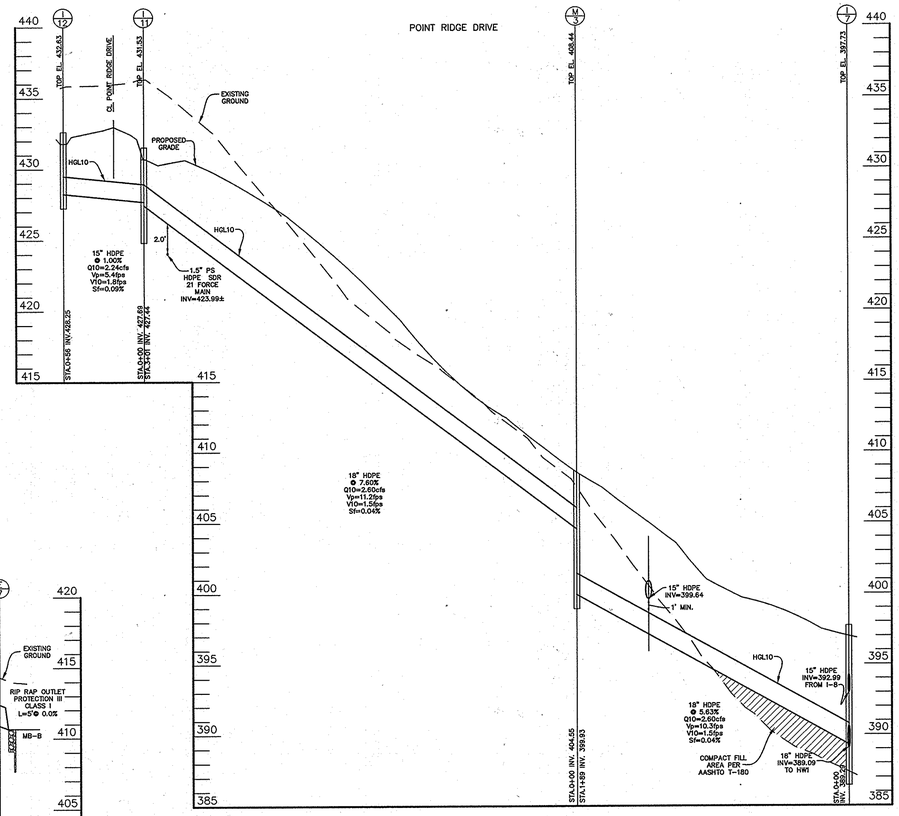
DATE: JANUARY 2014 PROJECT NO. 2171

DESIGN: JCO DRAFT: JCO SCALE: AS SHOWN DRAWING 13 OF 33

F-13-112



STORM DRAIN PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



STORM DRAIN PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'

STRUCTURE SCHEDULE

NO.	TYPE	LOCATION	INV. IN	INV. OUT	TOP ELEV.	THROAT ELEV.	OWNERSHIP	HO. CO. STD.
END SECTIONS								
E-1	24" TYPE'C'HEADWALL	552989.6 1329058.9	–	422.40	425.90	–		D-5.21
E-2	24" TYPE'C'HEADWALL	552964.5 1329098.8	–	425.50	429.00	–		D-5.21
E-3	30" TYPE'C'HEADWALL	552616.3 1328771.3	–	412.20	416.20	–		D-5.21
E-4	30" TYPE'C'HEADWALL	552585.1 1328813.1	–	416.00	421.00	–		D-5.21
E-5	30" TYPE'C'HEADWALL	552335.1 1328591.9	–	425.10	429.10	–		D-5.21
E-6	30" TYPE'C'HEADWALL	552306.6 1328607.9	–	426.90	430.90	–		D-5.21
E-7	18"CONC. END SECTION	552576.9 1328703.5	–	410.80	412.30	–		D-5.51, D-5.52
E-8	18"CONC. END SECTION	553668.8 1328807.8	–	394.02	395.52	–		D-5.51, D-5.52
E-9	18"CONC. END SECTION	553581.0 1329118.1	–	398.55	400.05	–		D-5.51, D-5.52
INLETS								
I-1	TYPE A-5	POINT RIDGE DRIVE 9+59.3 12'R	–	394.87	398.12	–		D-4.01
I-2	TYPE A-5	POINT RIDGE DRIVE 9+59.3 12'L	394.75	394.50	398.12	–		D-4.01
I-3	TYPE D	POINT RIDGE DRIVE 9+97.5 20'L	–	392.79	397.12	396.29		D-4.10
I-4	TYPE D	POINT RIDGE DRIVE 9+98.1 21'R	18" 391.41 18" 391.36	391.16	397.12	396.29		D-4.10
I-5	TYPE D	553938.1 13218668.5	403.25	403.00	408.43	407.60		D-4.10
I-6	TYPE D	553965.6 1328657.5	–	403.40	407.73	406.90		D-4.10
I-7	TYPE D	POINT RIDGE DRIVE 8+69.7 21'R	18" 392.99 18" 389.29	389.09	397.73	396.90		D-4.10
I-8	TYPE D	POINT RIDGE DRIVE 8+69.7 21'L	–	393.40	397.73	396.90		D-4.10
I-9	TYPE D	POINT RIDGE DRIVE 7+23.6 20.6'L	399.33	394.95	404.07	403.24		D-4.10
I-10	TYPE D	POINT RIDGE DRIVE 7+23.6 20.6'R	–	399.74	404.07	403.24		D-4.10
I-11	TYPE D	POINT RIDGE DRIVE 3+71.0 20.5'R	327.69	327.44	431.53	430.70		D-4.10
I-12	TYPE D	PLEASANT SPRINGS CT. 0+32.6 22'L	–	428.25	432.63	431.80		D-4.10
I-13	TYPE D	PLEASANT SPRINGS CT. 10+47.0 21'L	–	415.30	419.68	418.85		D-4.10
MANHOLES								
M-2	4'-0" MANHOLE	12+88.4 23.1' L	402.64	402.29	408.55	–		G-4.12
M-3	4'-0" MANHOLE	6+74.6 5.8' L	404.55	399.93	408.44	–		G-4.12
M-4	4'-0" MANHOLE	10+47.0 30.1' R	413.51	412.01	417.00	–		G-4.12

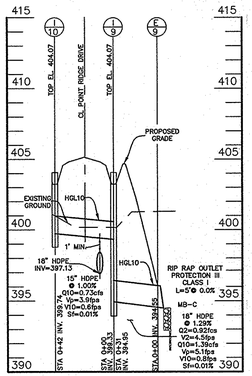
1) STRUCTURE LOCATION FOR MANHOLES IS AT THE CENTER OF THE MANHOLE.
2) STRUCTURE LOCATION FOR INLETS IS AT THE CENTER OF THE INLET TOP OF CURB.
3) STRUCTURE ELEVATION AND LOCATION FOR END SECTIONS IS AT THE MIDPOINT OF THE END OF PIPE BEGINNING OF END SECTION.
4) PRECAST STRUCTURES MEETING HS-20 LOADING MAY BE USED.
5) STRUCTURE LOCATION FOR CURB OR COMBINATION INLETS IS AT THE CENTER FACE OF CURB.
6) STRUCTURE LOCATION FOR TYPE D INLETS IS AT THE CENTER TOP OF SLAB.
7) OUTLET PROTECTION TO BE PER MDE RIP-RAP OUTLET PROTECTION III, D-4-1C (SEE DETAIL SHEET 11)

DRIVEWAY CULVERT SCHEDULE

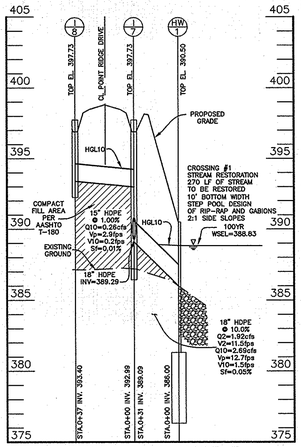
LOT	SIZE	TYPE	PIPE	INVERT IN	INVERT OUT
1	12"	HDPE	22LF@4%	408.4	407.7
10	12"	HDPE	22LF@3%	403.7	402..8
UIC 2-4	12"	HDPE	26LF@3%	409.5	408.9
UIC 6-9	12"	HDPE	26LF@4%	408.4	407.4

STORMDRAIN PIPE SCHEDULE

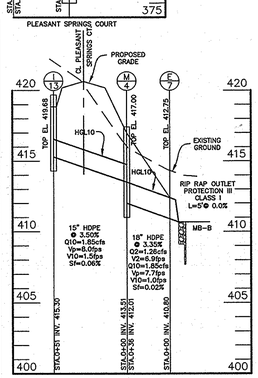
PIPE SIZE	LENGTH	TYPE	TYPE
15"	281'	HDPE	PUBLIC
18"	1056'	HDPE	PUBLIC
24"	44'	HDPE	PUBLIC
30"	32'	HDPE	PRIVATE
30"	45'	HDPE	PUBLIC



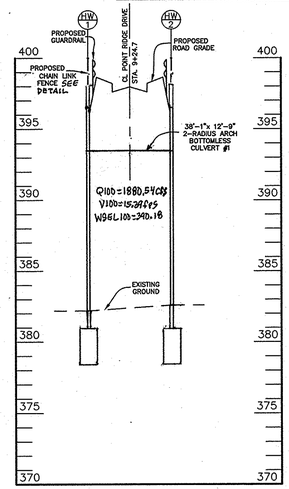
STORM DRAIN PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



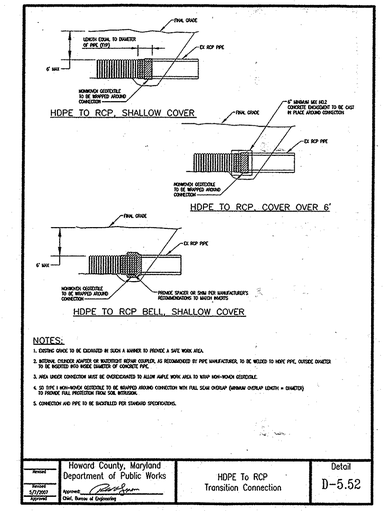
STORM DRAIN PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



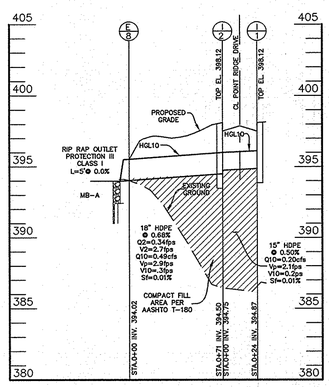
STORM DRAIN PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



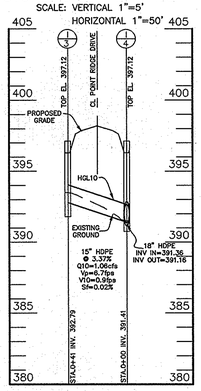
BOTTOMLESS CULVERT POINT RIDGE DRIVE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



Revised	Howard County, Maryland Department of Public Works	HDPE To RCP Transition Connection	Detail
Approved 5/7/2002	Approved: Chief, Bureau of Engineering		D-5.52



STORM DRAIN PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



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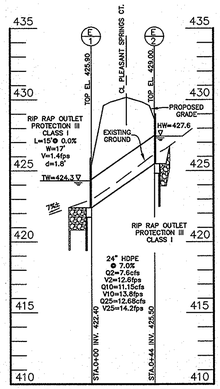
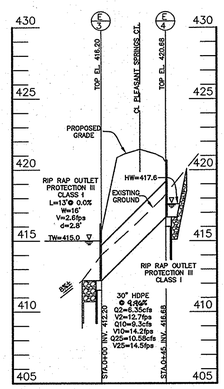
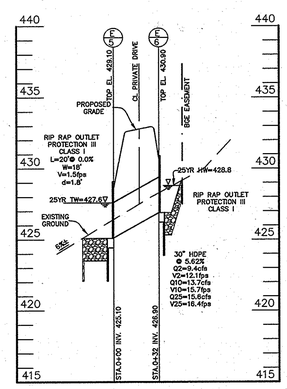


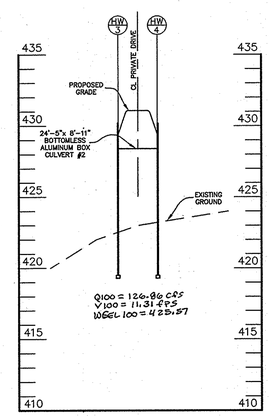
PUBLIC CULVERT PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



PUBLIC CULVERT PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



PRIVATE CULVERT PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'



PRIVATE CULVERT PROFILE
SCALE: VERTICAL 1"=5'
HORIZONTAL 1"=50'

NO.	DATE	REVISION

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
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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. 28559, Expiration Date: 06-30-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050

SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723

KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
FINAL ROAD CONSTRUCTION PLAN
STORM DRAIN PROFILES

DESIGN: JCO	DRAFT: JCO	DATE: MARCH, 2014	PROJECT NO. 2171
		SCALE: AS SHOWN	DRAWING 14 OF 33

F-13-112

PROJECT:	Regan Property			DATE:	11/22/13	
	PRACTICES AND SIZING					
		Pe:	1.0	inches		

Lot No.	Drainage Area	Impervious	I (%)	Rv	ESDv (cf)	Notes
2	11590	3700	32%	0.337	325.8	
3	7580	4520	60%	0.587	370.6	*Lined
4	8846	5535	63%	0.613	452.0	
5	9423	4310	46%	0.462	362.5	*Lined
6	3455	3360	97%	0.925	266.4	*Lined
7	4525	3850	85%	0.816	307.6	*Lined
8	12052	5258	44%	0.443	444.6	*Lined
9	11444	5174	45%	0.457	435.7	
10	8192	4962	61%	0.595	406.3	
11	19283	5215	27%	0.293	471.5	
12	8812	5342	61%	0.596	437.4	
13	8263	5350	65%	0.633	435.7	
14	8371	5392	64%	0.630	439.3	
15	8520	5725	67%	0.655	464.9	
16	8307	5057	61%	0.598	413.9	
17	14780	5360	36%	0.376	463.6	
18	6189	3850	62%	0.610	314.5	*Lined
19	9425	5212	55%	0.548	430.2	
20	6667	4200	63%	0.617	342.8	*Lined
21	7347	4205	57%	0.565	346.0	
22	14537	4806	33%	0.348	421.0	
23	5796	3850	66%	0.648	312.9	
MB-A	6195	3040	49%	0.492	253.8	
MB-B	18672	7486	40%	0.411	639.3	
MB-C	32822	9187	28%	0.302	825.8	
SW-D	33666	6849	20%	0.233	654.0	

*Micro-Bioretention facilities within the 100' well radius must be provided with an impermeable liner.

MICRO-BIORETENTION GEOMETRY												PLANTING SCHEDULE		
FACILITY	LENGTH*	WIDTH*	DEPTH	A	B	C	D	E	F	G	H	⟨1⟩	⟨2⟩	[3]
HOMEOWNER OWNED AND MAINTAINED														
MB-1	30.0	10.0	0.75	394.00	393.25	393.00	391.00	390.67	390.17	389.67	389.90	18	14	14
MB-2	32.0	10.5	1.00	406.00	405.00	404.75	402.75	402.42	401.92	401.42	392.00	22	17	17
MB-3	29.0	8.0	1.00	410.00	409.00	408.75	406.75	406.42	405.92	405.42	406.00	20	15	15
MB-4	25.0	8.5	1.00	416.00	415.00	414.75	412.75	412.42	411.92	411.42	413.00	18	14	14
MB-5	17.0	9.0	1.00	417.50	416.50	416.25	414.25	413.92	413.42	412.92	415.00	13	9	9
MB-6	17.0	9.0	1.00	417.00	416.00	415.75	413.75	413.42	412.92	412.42	413.50	14	11	11
MB-7	26.0	9.5	1.00	420.00	419.00	418.75	416.75	416.42	415.92	415.42	407.50	21	16	16
MB-8	22.0	11.0	1.00	423.00	422.00	421.75	419.75	419.42	418.92	418.42	407.00	20	15	15
MB-9	22.5	11.0	1.00	424.00	423.00	422.75	420.75	420.42	419.92	419.42	407.00	19	14	14
MB-10	31.0	13.0	0.75	399.75	399.00	398.75	396.75	396.42	395.92	395.42	395.80	26	19	19
MB-11	27.0	9.0	1.00	422.00	421.00	420.75	418.75	418.42	417.92	417.42	417.00	20	15	15
MB-12	26.0	9.0	1.00	421.00	420.00	419.75	417.75	417.42	416.92	416.42	416.00	20	15	15
MB-13	27.0	9.0	1.00	422.00	421.00	420.75	418.75	418.42	417.92	417.42	417.00	20	15	15
MB-14	28.0	9.0	1.00	414.00	413.00	412.75	410.75	410.42	409.92	409.42	409.00	21	16	16
MB-15	22.5	10.5	1.00	410.00	409.00	408.75	406.75	406.42	405.92	405.42	404.50	19	14	14
MB-16	29.0	17.0	1.00	406.00	405.00	404.75	402.75	402.42	401.92	401.42	404.50	20	15	15
MB-17	20.0	9.0	1.00	426.00	425.00	424.75	422.75	422.42	421.92	421.42	420.50	16	12	12
MB-18	24.0	10.0	1.00	430.00	429.00	428.75	426.75	426.42	425.92	425.42	424.00	20	15	15
MB-19	20.5	12.0	1.00	430.00	429.00	428.75	426.75	426.42	425.92	425.42	424.50	17	13	13
MB-20	27.0	7.0	1.00	435.50	434.50	434.25	432.25	431.92	431.42	430.92	429.00	19	14	14
MB-21	19.0	46.0	1.00	428.00	427.00	426.75	424.75	424.42	423.92	423.42	421.00	23	17	17
MB-22	20.0	7.5	1.00	426.00	425.00	424.75	422.75	422.42	421.92	421.42	422.00	15	11	11

* FACILITY SIZES ARE IRREGULAR. SEE PLAN VIEW FOR SPECIFIC SHAPE AND DIMENSIONS

BORING LOG — GEOLAB, INC.

Report No.: Date:

Client: Benchmark Engineering, Inc.			
Project: Regan Property, Clarksville, Maryland			Project No. 112-041
Boring No.: B-8 (1 of 1)	Total Depth 11	Elev. 437.0 +/-	Location: See Boring Location Plan
Type of Boring: Solid-stem auger	Started: 3/30/2012	Completed: 3/30/2012	Driller: O. Straus/ B. McGrain

Elevation	Depth	DESCRIPTION OF MATERIALS (classification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
437	0.0	Sod with root (organic) matter and organic soil				Boring dry during drilling and at completion. Bedrock was not encountered in this boring.
436.25	0.75	Brown to reddish-brown clayey SILT with some fine to medium sand and little rock fragments, moist (ML)				
435	2.0	Brown to orangish-brown fine to medium sandy SILT with some to little rock fragments, moist (ML)				
432	5.0	Light brown to brown micaceous silty fine to medium SAND with little rock fragments, moist (SM)				
426	11.0	End of Boring				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

BORING LOG — GEOLAB, INC.

Report No.: Date:

Client: Benchmark Engineering, Inc.			
Project: Regan Property, Clarksville, Maryland			Project No. 112-041
Boring No.: B-9 (1 of 1)	Total Depth 11	Elev. 425.0 +/-	Location: See Boring Location Plan
Type of Boring: Solid-stem auger	Started: 3/30/2012	Completed: 3/30/2012	Driller: O. Straus/ B. McGrain

Elevation	Depth	DESCRIPTION OF MATERIALS (classification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
425	0.0	Sod with root (organic) matter and organic soil				Boring dry during drilling and at completion. Bedrock was not encountered in this boring.
424.25	0.75	Dark brown SILT with little fine sand, damp (ML)				
419	6.0	Dark brown micaceous fine to medium sandy SILT, damp, (ML)				
414	11.0	End of Boring				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

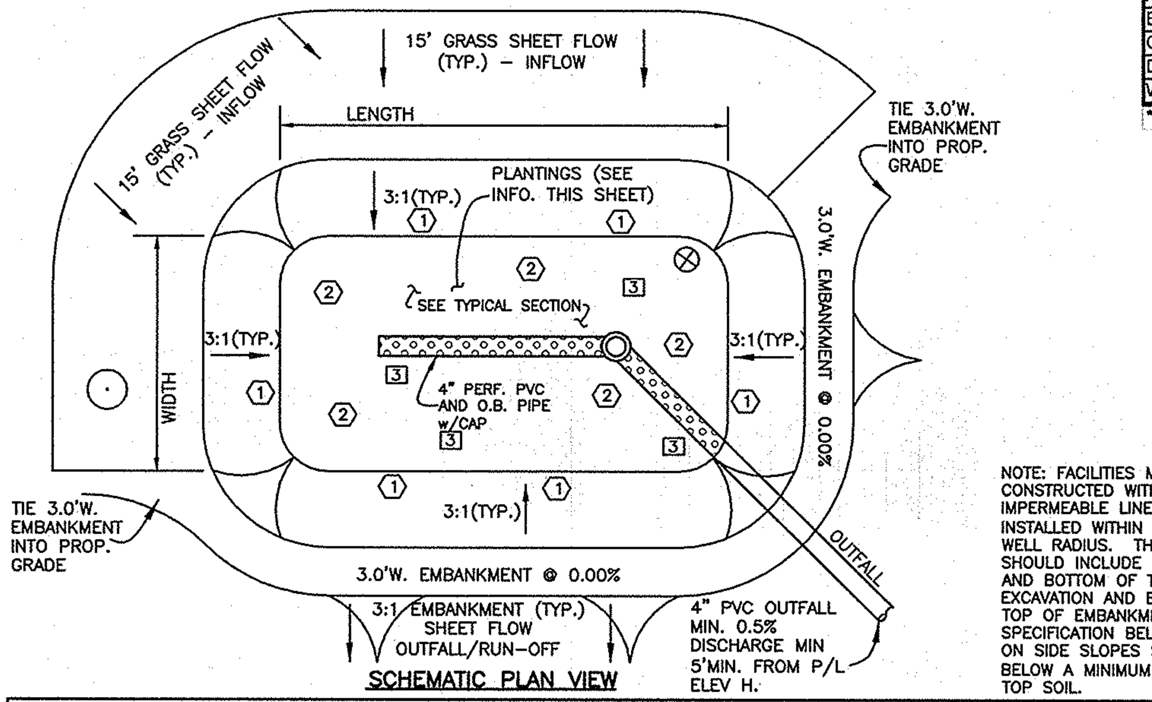
LEGEND

- LIMIT OF WETLANDS
- 25' WETLANDS BUFFER
- CENTERLINE OF STREAM
- STREAM BUFFER
- EXISTING WOODS LINE
- PROPOSED WOODS LINE
- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- 100 YEAR FLOODPLAIN
- PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)
- PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)
- PRIVATE SEWAGE DISPOSAL AREA
- PRIVATE WELL AREA

REGAN PROPERTY		Project Number	2171
Determine ESD Implementation Goals			
Soil Conditions for "Woods in Good Condition"			
HSG	RCN	Area (ft2)	Percent
A	38	0	0%
B	55	1,347,856	97%
C	70	21,866	2%
D	77	16,548	1%
Target RCN	55	1386270	

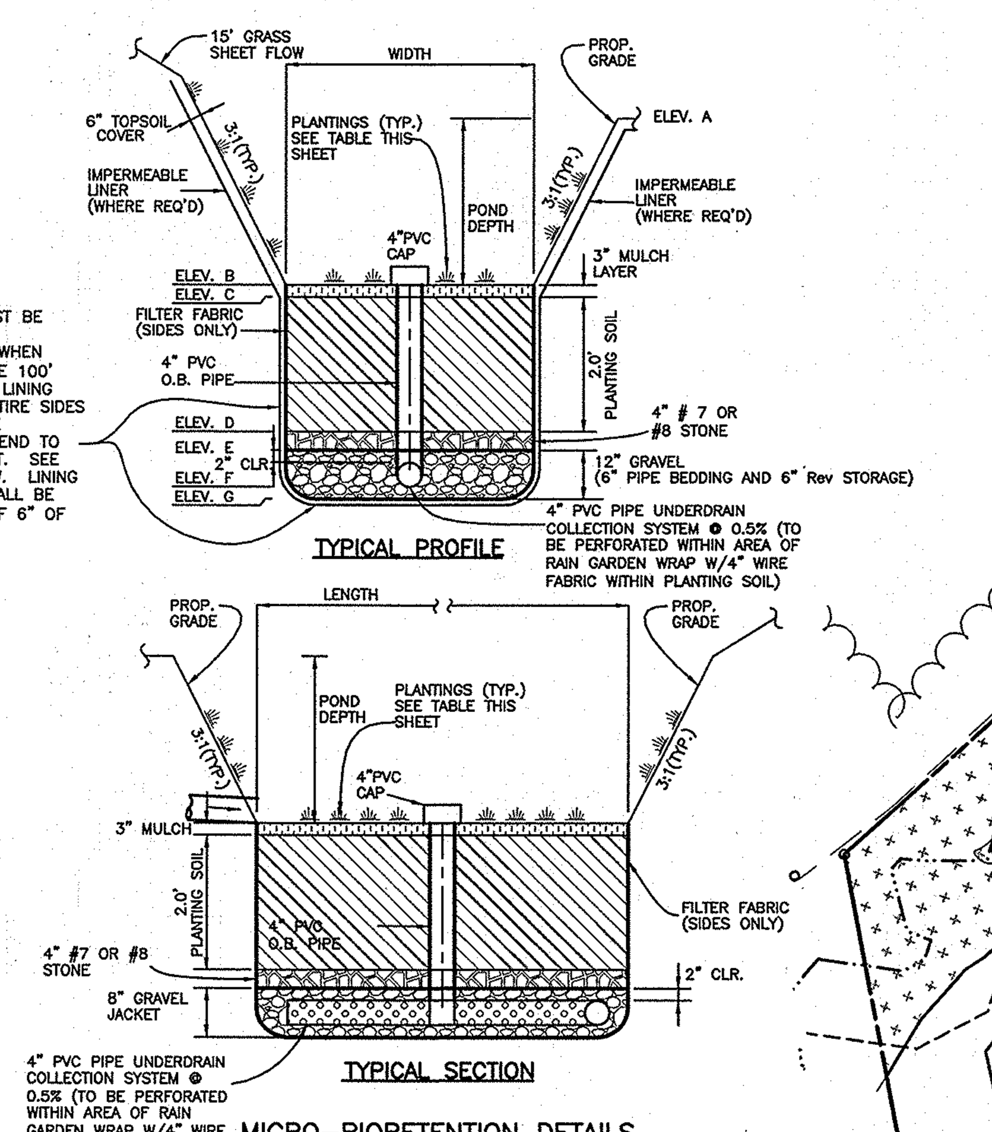
Determine Target Pe Using Table 5.3				
Soil Conditions Developed Condition				
HSG	Area (ft2)	Impervious	Percent	Target Pe
A				
B	1347856	209364		
C	21866			
D	16548	3564		
Weighted Pe	1386270	212928	15%	1.0

* See graphical determination in SWM report.



SCHEMATIC PLAN VIEW

NOTE: FACILITIES MUST BE CONSTRUCTED WITH IMPERMEABLE LINER WHEN INSTALLED WITHIN THE 100' WELL RADIUS. THIS LINING SHOULD INCLUDE ENTIRE SIDES AND BOTTOM OF THE EXCAVATION AND EXTEND TO TOP OF EMBANKMENT. SEE SPECIFICATION BELOW. LINING ON SIDE SLOPES SHALL BE BELOW A MINIMUM OF 6" OF TOP SOIL.



MICRO–BIORETENTION DETAILS

NOT TO SCALE

MATERIALS & SPECIFICATIONS 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 CHIPS
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; MINIMUM OF 3" OF GRAVEL OVER PIPES, NOT NECESSARY UNDERNEATH PIPES. PIPE SHALL BE WRAPPED WITH 1/4–INCH GALVANIZED HARDWARE CLOTH
IMPERVIOUS LINER	ASTM–D–4833 (THICKNESS) ASTM–D–412 (TENSILE STRENGTH 1,100 LB., ELONGATION 200%) ASTM–D–624 (TEAR RESISTANCE – 150 LB./IN) ASTM–D–471 (WATER ADSORPTION: +8 TO –2% MASS)	30 MIL. THICK	LINER TO BE ULTRAVIOLET RESISTANT. A GEOTEXTILE FABRIC SHOULD BE USED TO PROTECT THE LINER FROM PUNCTURE.
GEOTEXTILE (BELOW IMPERV. LINER)	ASTM–D–4833 (PUNCTURE STRENGTH 125LB) ASTM–D–4632 (TENSILE STRENGTH 300 LB.)		

APPROVED: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS

[signature] 4-29-14

CHIEF, BUREAU OF HIGHWAYS — DATE:

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

[signature] 5-21-14

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE:

[signature] 5-9-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE:

MICROBIORETENTION PLANTING SCHEDULE

(SEE SPREADSHEET ABOVE FOR SPECIFIC NUMBER OF PLANTINGS)

- ⟨1⟩ IRIS VERSICOLOR (IRIS)
- ⟨2⟩ LOBELIA CARDINALIS CARDINAL FLOWER
- [3] RUDBECKIA SUBTOMENTOSA – SWEET CONEFLOWER
- ⊗ CALLUNA VULGARIS (HEATHER) (1 PER FACILITY)
- ⊙ ACER GINNALA (ARMUR MAPLE) (1 PER FACILITY)

PUBLIC MICRO-BIORETENTION PLANTINGS			
	⟨1⟩	⟨2⟩	[3]
MB-A	14	10	10
MB-B	35	26	26
MB-C	29	22	22

MICROBIORETENTION PLANTING DATA

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

OPERATION AND MAINTENANCE SCHEDULE FOR MICRO–BIORETENTION (M–6)

A. 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.

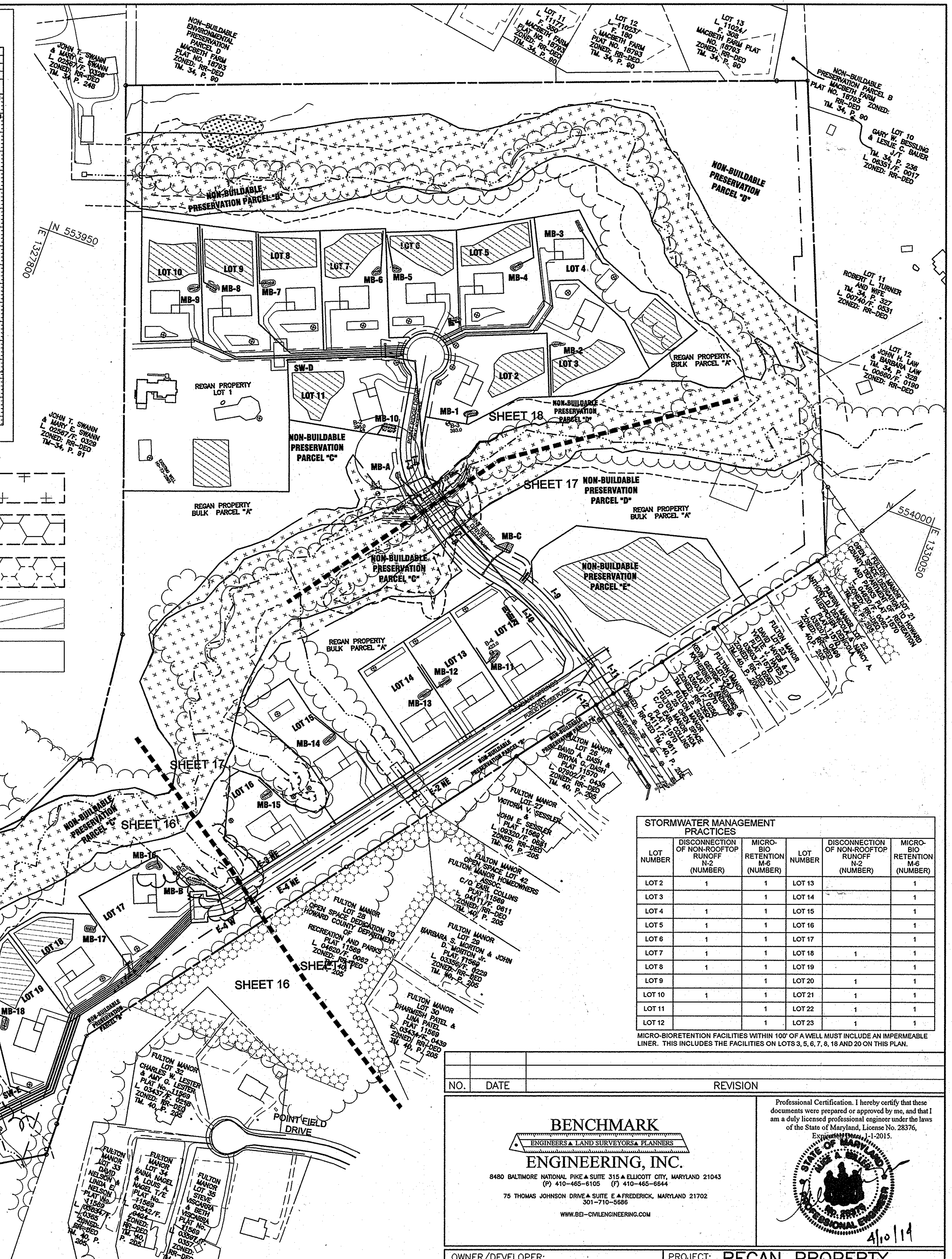
B. THE OWNER SHALL PERFORM A PLANT INSPECTION IN THE SPRING AND IN THE FALL OF EACH YEAR. DURING THE INSPECTION, THE OWNER SHALL REMOVE DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, REPLACE DEAD PLANT MATERIAL WITH ACCEPTABLE REPLACEMENT PLANT MATERIAL, TREAT DISEASED TREES AND SHRUBS, AND REPLACE ALL DEFICIENT STAKES AND WIRES.

C. THE OWNER SHALL INSPECT THE MULCH EACH SPRING. THE MULCH SHALL BE REPLACED EVERY TWO TO THREE YEARS. THE PREVIOUS MULCH LAYER SHALL BE REMOVED BEFORE THE NEW LAYER IS APPLIED.

D. 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 COMPACTION OR DEVELOPMENT OF IMPERVIOUS AREA. IN COMMERCIAL AREAS, FOOT TRAFFIC SHOULD BE DISCOURAGED AS WELL.



PLAN VIEW

SCALE: 1" = 150'

GRAPHIC SCALE

150 0 75 150 300 600

(IN FEET)
1 inch = 150 ft.

STORMWATER MANAGEMENT PRACTICES					
LOT NUMBER	DISCONNECTION OF NON-ROOFTOP RUNOFF N-2 (NUMBER)	MICRO-BIO RETENTION M-6 (NUMBER)	LOT NUMBER	DISCONNECTION OF NON-ROOFTOP RUNOFF N-2 (NUMBER)	MICRO-BIO RETENTION M-6 (NUMBER)
LOT 2	1	1	LOT 13		1
LOT 3		1	LOT 14		1
LOT 4	1	1	LOT 15		1
LOT 5	1	1	LOT 16		1
LOT 6	1	1	LOT 17		1
LOT 7	1	1	LOT 18	1	1
LOT 8	1	1	LOT 19		1
LOT 9		1	LOT 20	1	1
LOT 10	1	1	LOT 21	1	1
LOT 11		1	LOT 22	1	1
LOT 12		1	LOT 23	1	1

MICRO-BIORETENTION FACILITIES WITHIN 100' OF A WELL MUST INCLUDE AN IMPERMEABLE LINER. THIS INCLUDES THE FACILITIES ON LOTS 3, 5, 6, 7, 8, 18 AND 20 ON THIS PLAN.

NO.	DATE	REVISION

BENCHMARK ENGINEERING, INC.
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
(P) 410-465-6105 (F) 410-465-6644
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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: 1-1-2015.

STATE OF MARYLAND — PROFESSIONAL ENGINEER — NO. 28376
4/10/14

OWNER/DEVELOPER:

RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050

SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723

KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: REGAN PROPERTY
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A' and NON–BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON–BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601–22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP–12–004, ECP–12–045, WP–13–025

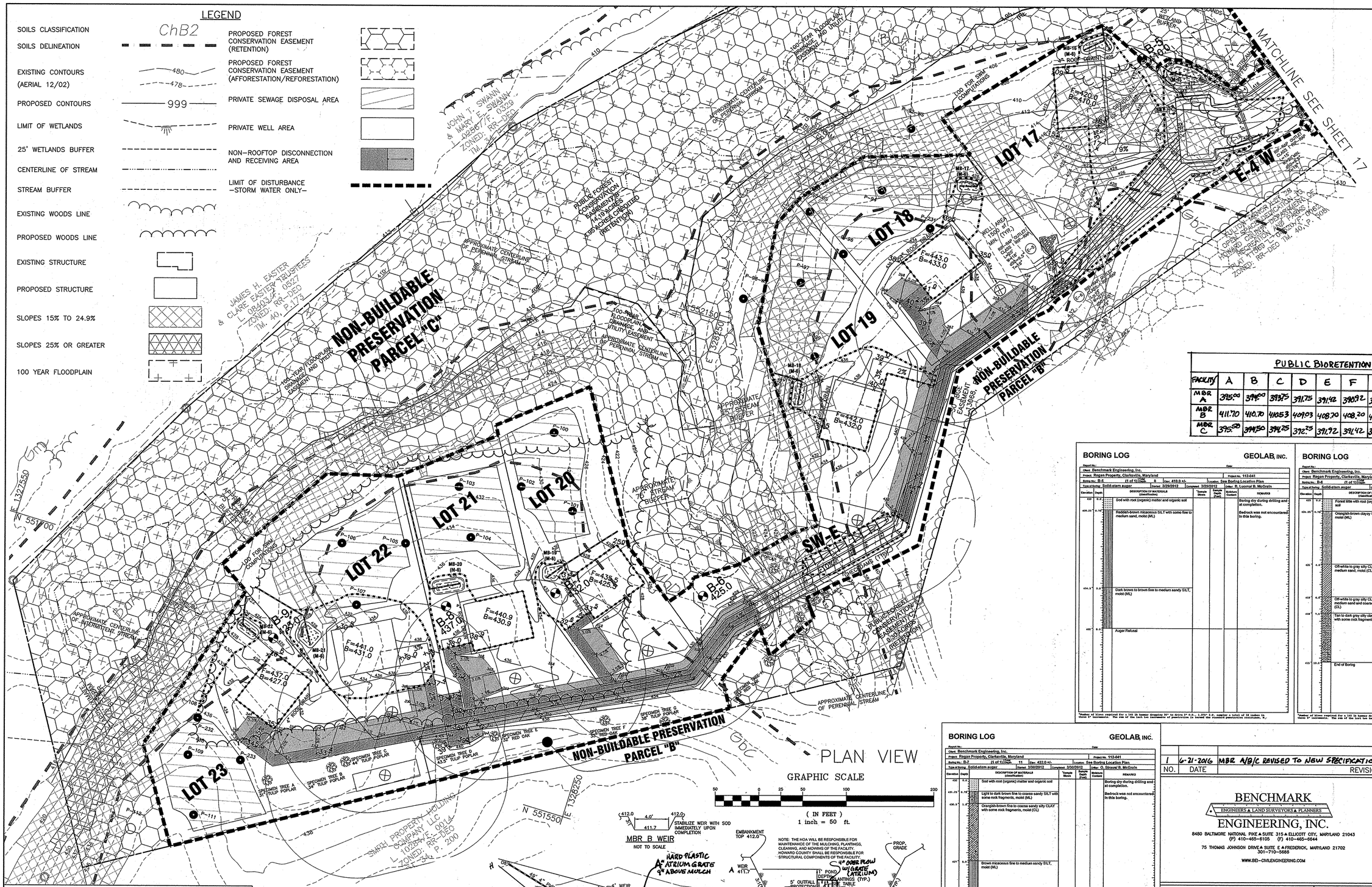
TITLE:
STORMWATER MANAGEMENT PLANS NOTES AND DETAILS

DATE: JANUARY 2014	PROJECT NO. 2171
DESIGN: AAM	DRAFT: AAM
SCALE: AS SHOWN	DRAWING 15 OF 33

F–13–112

LEGEND

- SOILS CLASSIFICATION — ChB2
- SOILS DELINEATION
- EXISTING CONTOURS (AERIAL 12/02) — 480, 478
- PROPOSED CONTOURS — 999
- LIMIT OF WETLANDS
- 25' WETLANDS BUFFER
- CENTERLINE OF STREAM
- STREAM BUFFER
- EXISTING WOODS LINE
- PROPOSED WOODS LINE
- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- SLOPES 15% TO 24.9%
- SLOPES 25% OR GREATER
- 100 YEAR FLOODPLAIN
- PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)
- PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)
- PRIVATE SEWAGE DISPOSAL AREA
- PRIVATE WELL AREA
- NON-ROOFTOP DISCONNECTION AND RECEIVING AREA
- LIMIT OF DISTURBANCE -STORM WATER ONLY-



PLAN VIEW

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

PUBLIC BIORETENTION DIMENSIONS

FACILITY	A	B	C	D	E	F	G	H	LENGTH	WIDTH	PAGE (A)	LINER
MBR A	395.00	394.00	393.75	391.75	391.42	390.92	388.92	390.70	SEE DETAIL (SHT 18)	131	NO
MBR B	411.70	410.70	410.53	409.03	408.70	408.20	406.87	408.00	SEE DETAIL (THIS SHT)	480	NO
MBR C	395.50	394.50	394.25	392.25	391.92	391.42	390.50	391.20	SEE DETAIL (SHT 17)	657	NO

BORING LOG — GEOLAB, INC.

Report No.: Date:
Client: Benchmark Engineering, Inc.
Project: Regan Property, Clarksville, Maryland — Project No. 112-041
Boring No.: B-5 (1 of 1) Hole Diam. 8 in — Elev. 410.0 +/- — Location: See Boring Location Plan
Type of Boring: Solid-stem auger — Started: 3/20/2012 — Completed: 3/20/2012 — Inspector: R. Loomis/ R. McGrain

Elevation	Depth	DESCRIPTION OF MATERIALS (Identification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
410	0.0	Sod with root (organic) matter and organic soil				Boring dry during drilling and at completion.
409.25	0.75	Reddish-brown micaceous SILT with some fine to medium sand, moist (ML)				Bedrock was not encountered in this boring.
404.5	5.5	Dark brown to brown fine to medium sandy SILT, moist (ML)				
403	7.0	Auger Refusal				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

BORING LOG — GEOLAB, INC.

Report No.: Date:
Client: Benchmark Engineering, Inc.
Project: Regan Property, Clarksville, Maryland — Project No. 112-041
Boring No.: B-6 (1 of 1) Hole Diam. 10 in — Elev. 425.0 +/- — Location: See Boring Location Plan
Type of Boring: Solid-stem auger — Started: 3/20/2012 — Completed: 3/20/2012 — Inspector: O. Strassel/ R. McGrain

Elevation	Depth	DESCRIPTION OF MATERIALS (Identification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
425	0.0	Forest litter with root (organic) matter and organic soil				Boring dry during drilling and at completion.
424.25	0.75	Orangish-brown clayey SILT with some fine sand, moist (ML)				Red rock was not encountered in this boring.
421	4.0	Off-white to grey silty CLAY with some fine to medium sand, moist (CL)				
419	6.0	Off-white to grey silty CLAY with some fine to medium sand and coarse rock fragments, moist (CL)				
418	7.0	Tan to dark grey silty clayey fine to coarse SAND with some rock fragments, moist (SM)				
415	10.0	End of Boring				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

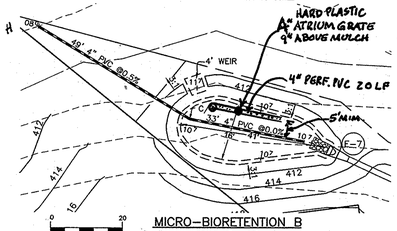
BORING LOG — GEOLAB, INC.

Report No.: Date:
Client: Benchmark Engineering, Inc.
Project: Regan Property, Clarksville, Maryland — Project No. 112-041
Boring No.: B-7 (1 of 1) Hole Diam. 11 in — Elev. 432.0 +/- — Location: See Boring Location Plan
Type of Boring: Solid-stem auger — Started: 3/20/2012 — Completed: 3/20/2012 — Inspector: O. Strassel/ R. McGrain

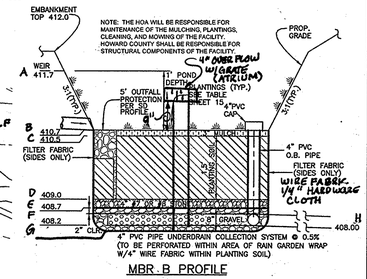
Elevation	Depth	DESCRIPTION OF MATERIALS (Identification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
432	0.0	Sod with root (organic) matter and organic soil				Boring dry during drilling and at completion.
431.75	0.25	Light to dark brown fine to coarse sandy SILT with some rock fragments, moist (ML)				Bedrock was not encountered in this boring.
426.5	5.5	Orangish-brown fine to coarse sandy silty CLAY with some rock fragments, moist (CL)				
423	9.0	Brown micaceous fine to medium sandy SILT, moist (ML)				
421	11.0	End of Boring				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

MBR B WEIR
NOT TO SCALE



MICRO-BIORETENTION B
SCALE: 1" = 20'



NOTE: THE HOA WILL BE RESPONSIBLE FOR MAINTENANCE OF THE MULCHING, PLANTINGS, CLEANING, AND MOWING OF THE FACILITY. HOWARD COUNTY SHALL BE RESPONSIBLE FOR STRUCTURAL COMPONENTS OF THE FACILITY.

MBR B PROFILE
NOT TO SCALE

APPROVED: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE: 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE: 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE: 5.9.14

SOILS LEGEND

MAP SYMBOL	SOIL GROUP	SOIL TYPE
BaA*	D	BAILE SILT LOAM, 0 TO 3 PERCENT SLOPES
GbA	B	GLADSTONE LOAM, 0 TO 3 PERCENT SLOPES
GbB	B	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B	GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
GmB*	C	GLENVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES
MaD	B	MANOR LOAM, 15 TO 25 PERCENT SLOPES

FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
* ERODIBLE SOILS

NO.	DATE	REVISION
1	6-21-2016	MBR N/B/C REVISED TO NEW SPECIFICATIONS

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
(P) 410-465-6105 (F) 410-465-6544
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5668
WWW.BEI-CMILENGINEERING.COM

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: 1-1-2015.

STATE OF MARYLAND — MARK A. BRUNO — No. 28376 — PROFESSIONAL ENGINEER
4-10-14

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY 11050
SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723
KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: REGAN PROPERTY
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E', A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: STORMWATER MANAGEMENT PLANS

DATE: JANUARY 2014 — PROJECT NO. 2171
DESIGN: AAM — DRAFT: AAM — SCALE: AS SHOWN — DRAWING 16 OF 33

F-13-112

LEGEND

SOILS CLASSIFICATION	ChB2
SOILS DELINEATION	
EXISTING CONTOURS (AERIAL 12/02)	480 / 478
PROPOSED CONTOURS	999
LIMIT OF WETLANDS	
25' WETLANDS BUFFER	
CENTERLINE OF STREAM	
STREAM BUFFER	
EXISTING WOODS LINE	
PROPOSED WOODS LINE	
EXISTING STRUCTURE	
PROPOSED STRUCTURE	
SLOPES 15% TO 24.9%	
SLOPES 25% OR GREATER	
100 YEAR FLOODPLAIN	
PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)	
PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)	
PRIVATE SEWAGE DISPOSAL AREA	
PRIVATE WELL AREA	
NON-ROOFTOP DISCONNECTION AND RECEIVING AREA	
LIMIT OF DISTURBANCE -STORM WATER ONLY-	

BORING LOG — GEOLAB, INC.

Report No.: Date:
Client: Benchmark Engineering, Inc.
Project: Regan Property, Clarksville, Maryland — Project No. 112-041
Boring No.: B-4 (1 of 1) Depth: 11 Elev: 423.0 +/- Location: See Boring Location Plan
Type of Boring: Solid-stem auger Started: 3/29/2012 Completed: 3/29/2012 Driller: O. Strauss/ B. McGrain

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
423'	0.0	Sod with root (organic) matter and organic soil				Boring dry during drilling and at completion.
422.25'	0.75'	Reddish-brown micaceous SILT with some fine to medium sand, moist (ML)				Bedrock was not encountered in this boring.
417.5'	5.5'	Dark brown to brown fine to medium sandy SILT, moist (ML)				
412'	11.0'	End of Boring				

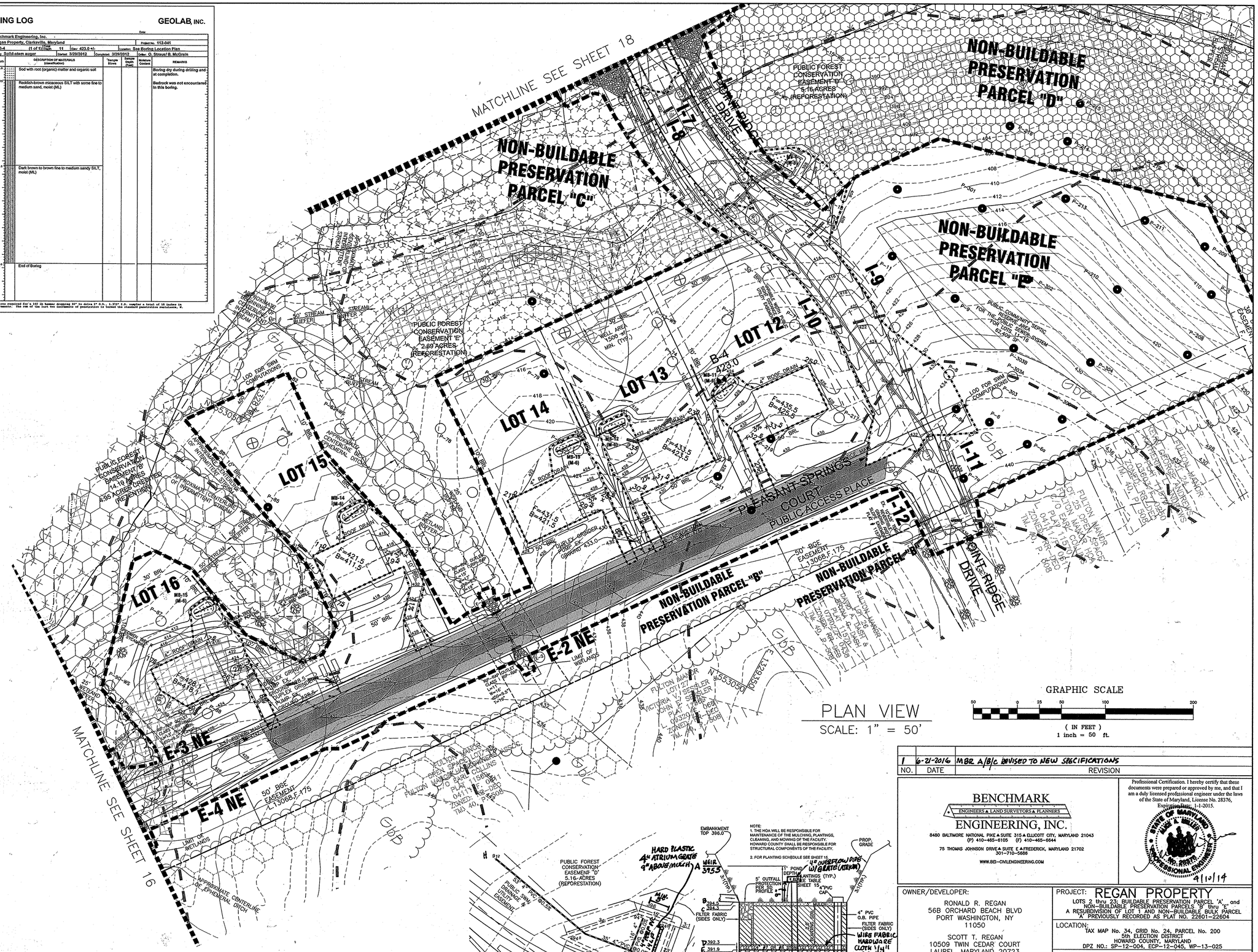
*Number of blows required for a 140 lb hammer dropping 30" to drive 3" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

BORING LOG — GEOLAB, INC.

Report No.: Date:
Client: Benchmark Engineering, Inc.
Project: Regan Property, Clarksville, Maryland — Project No. 112-041
Boring No.: B-3 (1 of 1) Depth: 6 Elev: 393.0 +/- Location: See Boring Location Plan
Type of Boring: Solid-stem auger Started: 3/29/2012 Completed: 3/29/2012 Driller: B. Luzonis/ B. McGrain

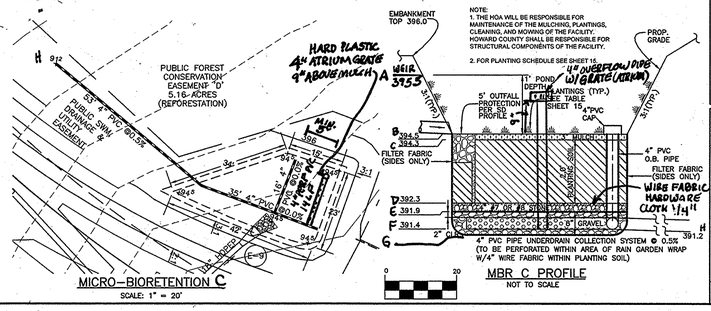
Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
393'	0.0	Sod with root (organic) matter and organic soil				Boring dry during drilling and at completion.
392.25'	0.75'	Brown micaceous fine to medium sandy SILT with little rock fragments, moist (ML)				Bedrock was not encountered in this boring.
388.5'	4.5'	Light orange, gray and tan Elastic SILT with little fine sand, moist (MH)				Large diameter rock fragments encountered
387'	6.0'	Auger Refusal				

*Number of blows required for a 140 lb hammer dropping 30" to drive 3" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.



PLAN VIEW
SCALE: 1" = 50'

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.



NOTE:
1. THE HOA WILL BE RESPONSIBLE FOR MAINTENANCE OF THE MULCHING, PLANTINGS, CLEANING, AND MOWING OF THE FACILITY. HOWARD COUNTY SHALL BE RESPONSIBLE FOR STRUCTURAL COMPONENTS OF THE FACILITY.
2. FOR PLANTING SCHEDULE SEE SHEET 12.

NO.	DATE	REVISION
1	6-21-2014	MBR A/B/C REVISED TO NEW SPECIFICATIONS

APPROVED: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE: 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE: 5-2-14
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE: 5.9.14

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
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5688
WWW.BD-CMLENGINEERING.COM

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: 1-1-2015.
STATE OF MARYLAND — ALAN A. MILLER — No. 28376 — PROFESSIONAL ENGINEER
4/10/14

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050
SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723
KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

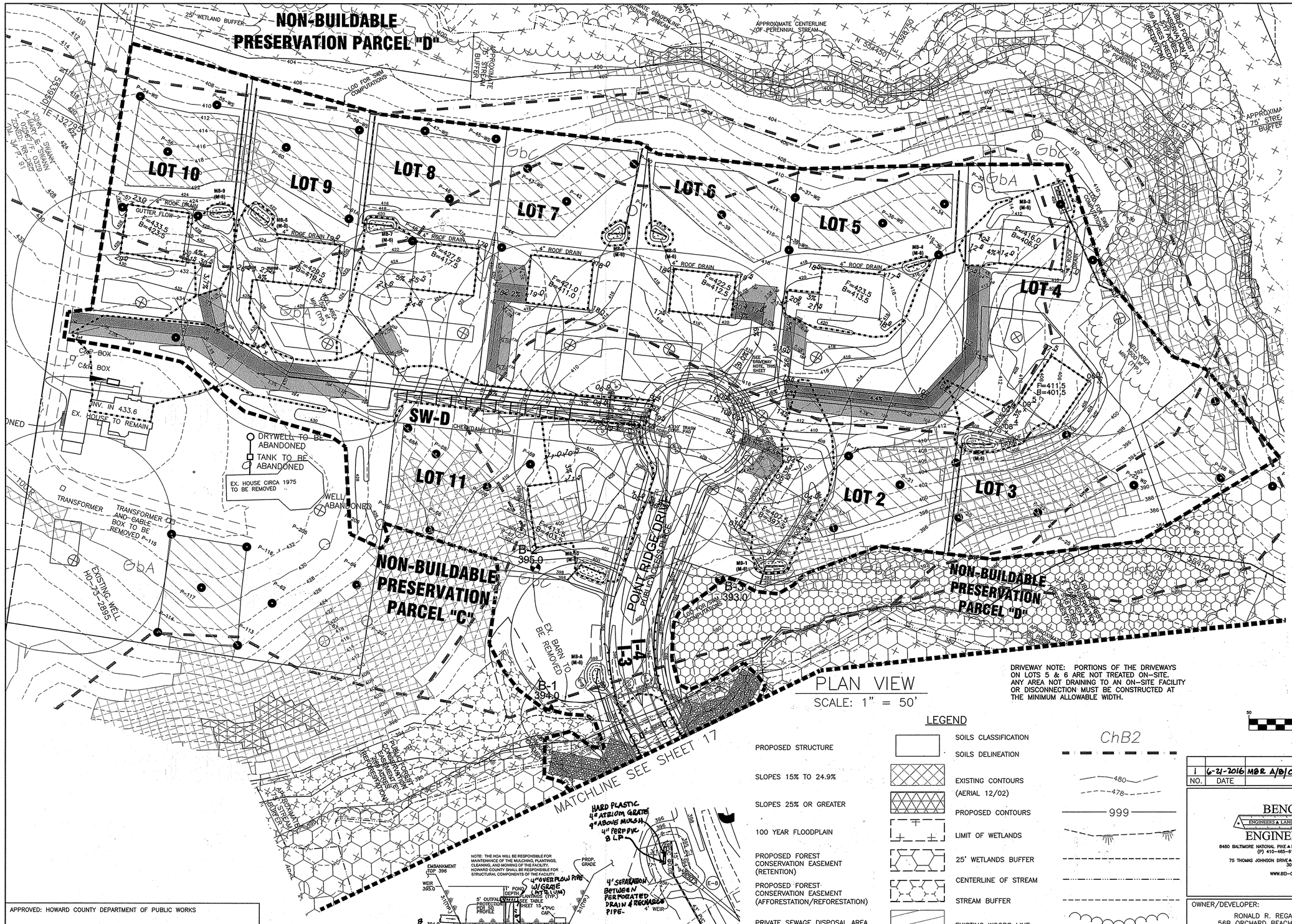
PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
STORMWATER MANAGEMENT PLANS

DESIGN: AAM	DRAFT: AAM	DATE: DECEMBER 2013	PROJECT NO. 2171
		SCALE: AS SHOWN	DRAWING 17 OF 33

F-13-112



NON-BUILDABLE PRESERVATION PARCEL "D"

PLAN VIEW

SCALE: 1" = 50'

DRIVEWAY NOTE: PORTIONS OF THE DRIVEWAYS ON LOTS 5 & 6 ARE NOT TREATED ON-SITE. ANY AREA NOT DRAINING TO AN ON-SITE FACILITY OR DISCONNECTION MUST BE CONSTRUCTED AT THE MINIMUM ALLOWABLE WIDTH.

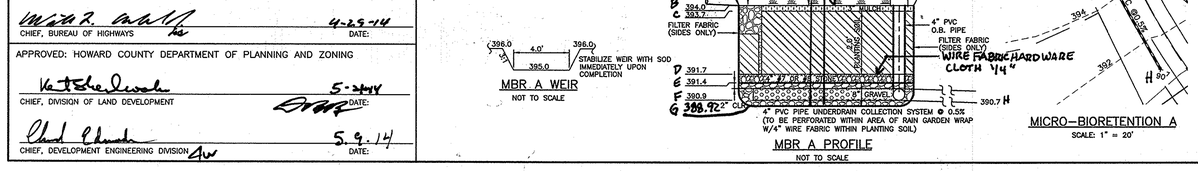
LEGEND

PROPOSED STRUCTURE	SOILS CLASSIFICATION
	SOILS DELINEATION (ChB2)
SLOPES 15% TO 24.9%	EXISTING CONTOURS (AERIAL 12/02)
SLOPES 25% OR GREATER	PROPOSED CONTOURS
100 YEAR FLOODPLAIN	LIMIT OF WETLANDS
PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)	25' WETLANDS BUFFER
PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)	CENTERLINE OF STREAM
	STREAM BUFFER
PRIVATE SEWAGE DISPOSAL AREA	EXISTING WOODS LINE
PRIVATE WELL AREA	PROPOSED WOODS LINE
NON-ROOFTOP DISCONNECTION AND RECEIVING AREA	EXISTING STRUCTURE
LIMIT OF DISTURBANCE -STORM WATER ONLY-	PROPOSED STRUCTURE

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.



BORING LOG — GEOLAB, INC.

Report No.: Date:
Client: Benchmark Engineering, Inc.
Project: Regan Property, Clarksville, Maryland — Project No. 112-041
Boring No.: B-1 (1 of 1) Hole: 8.5 Elev: 394.0 +/- Location: See Boring Location Plan
Type of boring: Solid-stem auger Started: 3/29/2012 Completed: 3/29/2012 Driller: B. Luoma/ B. McGrain

Elevation	Depth	Description of Materials (classification)	Sample Blows	Sample Depth (Feet)	Moisture Content	Remarks
394	0.0	Sod with root (organic) matter and organic soil				Groundwater encountered at a depth of 8.0 feet at completion. After 24 hours, the water was encountered at a depth of 7.5 feet. Bedrock was not encountered in this boring.
393.25	0.75	Off-white gravelly fine to coarse SAND with little silt, damp (SM)				
392.5	1.5	Brown micaceous fine to medium sandy SILT with little gravel, moist (ML)				
391	3.0	Dark brown and gray silty CLAY with little fine sand and little to trace gravel, moist to saturated (CL)				
385.5	8.5	End of Boring				

*Number of blows required for a 140 lb hamer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches is shown 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

BORING LOG — GEOLAB, INC.

Report No.: Date:
Client: Benchmark Engineering, Inc.
Project: Regan Property, Clarksville, Maryland — Project No. 112-041
Boring No.: B-2 (1 of 1) Hole: 8 Elev: 395.0 +/- Location: See Boring Location Plan
Type of boring: Solid-stem auger Started: 3/29/2012 Completed: 3/29/2012 Driller: B. Luoma/ B. McGrain

Elevation	Depth	Description of Materials (classification)	Sample Blows	Sample Depth (Feet)	Moisture Content	Remarks
395	0.0	Sod with root (organic) matter and organic soil				Groundwater encountered at a depth of 6.0 feet during drilling. At completion, cave-in depth at 3.5 feet. Bedrock was not encountered in this boring.
394.25	0.75	Brown micaceous fine to medium sandy SILT with trace to little rock fragments, moist to saturated (ML)				
387	8.0	End of Boring				

*Number of blows required for a 140 lb hamer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches is shown 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

NO.	DATE	REVISION
1	6-21-2016	MBR A/B/C REVISED TO NEW SPECIFICATIONS

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
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75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5688
WWW.BD-CMLENGINEERING.COM

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: 1-1-2015.

STATE OF MARYLAND — MICHAEL A. BAYNE — No. 28376 — PROFESSIONAL ENGINEER
4/10/2014

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050
SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723
KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'.
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
STORMWATER MANAGEMENT PLANS

DESIGN: AAM	DRAFT: AAM	DATE: DECEMBER 2013	PROJECT NO. 2171
		SCALE: AS SHOWN	DRAWING 18 OF 33

F-13-112

Specimen Trees

Key	Species, Size (dbh)	Comments *
A	Tulip poplar, 31"	
B	Tulip poplar, 34"	Fair condition, poor trunk
C	Tulip poplar, 44"	Good condition, twin stems
D	Tulip poplar, 43.5"	Twin stems
E	Red oak, 32"	Fair, limb dieback
F	Red oak, 33"	
G	Tulip poplar, 38"	Poor condition, trunk rot
H	Red oak, 32"	
I	Tulip poplar, 32"	
J	Tulip poplar, 35"	
K	Sycamore, 31"	
L	Tulip poplar, 38"	
M	Red maple, 34"	

* Good unless otherwise noted

ALL SPECIMEN TREES ARE TO REMAIN.

LANDSCAPE NOTES:

1. THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 16.124 OF THE HOWARD COUNTY CODE AND THE HOWARD COUNTY LANDSCAPE MANUAL.

2. STREET TREE LOCATIONS:
   A. WHEN THE DISTANCE BETWEEN THE CURB AND SIDEWALK IS 6 FEET OR GREATER, THE TREES SHALL BE LOCATED WITHIN THE RIGHT-OF-WAY AND SHALL BE CENTERED BETWEEN THE CURB AND SIDEWALK.
   B. WHEN THE DISTANCE BETWEEN THE CURB AND SIDEWALK IS LESS THAN 6 FEET, TREES MAY BE PLANTED 3 FEET FROM THE SIDEWALK IN THE DIRECTION AWAY FROM THE ROAD. A 10-FOOT WIDE TREE MAINTENANCE EASEMENT SHALL BE REQUIRED IF THE RIGHT-OF-WAY IS LIMITED.
   C. TREES SHALL BE PLANTED 6 FEET BEHIND CURB WHEN THERE ARE NO SIDEWALKS.
   D. TREES TO BE PLANTED MINIMUM 30 FEET FROM SIGNS AND INTERSECTIONS WHEN PLANTED BETWEEN SIDEWALK AND CURB. TREES MAY NOT BE PLANTED WITHIN 5 FEET OF A STORM DRAIN INLET, OPEN SPACE ACCESS STRIP, OR 10 FEET OF A DRIVEWAY.

3. AT THE TIME OF INSTALLMENT, ALL SHRUBS AND OTHER PLANTINGS HEREWITH LISTED AND APPROVED FOR THIS SITE, SHALL BE OF THE PROPER HEIGHT REQUIREMENTS IN ACCORDANCE WITH THE HOWARD COUNTY LANDSCAPE MANUAL. IN ADDITION, NO SUBSTITUTIONS OR RELOCATION OF REQUIRED PLANTINGS MAY BE MADE WITHOUT PRIOR REVIEW AND APPROVAL FROM THE DEPARTMENT OF PLANNING AND ZONING. ANY DEVIATION FROM THIS APPROVED LANDSCAPE PLAN MAY RESULT IN DENIAL OR DELAY IN RELEASE OF LANDSCAPE SURETY UNTIL SUCH TIME AS ALL REQUIRED MATERIALS ARE PLANTED AND/OR REVISIONS ARE MADE TO APPLICABLE PLANS AND CERTIFICATIONS.

4. THE OWNER, TENANTS AND/OR THEIR AGENTS SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE REQUIRED LANDSCAPING INCLUDING BOTH PLANT MATERIALS AND BERMS, FENCES AND WALLS. ALL PLANT MATERIALS SHALL BE MAINTAINED IN GOOD GROWING CONDITION, AND WHEN NECESSARY, REPLACED WITH NEW MATERIALS TO ENSURE CONTINUED COMPLIANCE WITH APPLICABLE REGULATIONS. ALL OTHER REQUIRED LANDSCAPING SHALL BE PERMANENTLY MAINTAINED IN GOOD CONDITION, AND WHEN NECESSARY, REPAIRED OR REPLACED.

5. FINANCIAL SURETY IN THE AMOUNT OF $33,000.00 FOR THE REQUIRED STREET TREES AND $11,400.00 FOR THE REQUIRED PERIMETER LANDSCAPING SHALL BE POSTED AS PART OF THE DPW DEVELOPER'S AGREEMENT.

SCHEDULE A
PERIMETER LANDSCAPE EDGE

CATEGORY	ADJACENT TO PERIM. PROPERTY (1)	ADJACENT TO PERIM. PROPERTY (2)	ADJACENT TO PERIM. PROPERTY (3)	ADJACENT TO PERIM. PROPERTY (4)	ADJACENT TO PERIM. PROPERTY (5)	ADJACENT TO ROAD (LOT 12) (6)	TOTALS
LANDSCAPE TYPE	A 1:60 shade	A 1:60 shade	A 1:60 shade	A 1:60 shade	A 1:60 shade	B 1:50 shade 1:40 evergreen	
LINEAR FEET OF ROADWAY FRONTAGE/PERIMETER	696 LF	1432 LF	2406 LF	1550 LF	3302 LF	257 LF	
CREDIT FOR EXISTING VEGETATION (YES, NO, LINEAR FEET) (DESCRIBE BELOW IF NEEDED)	YES* 696 LF	YES* 1432 LF	YES* 2406 LF	YES* 928 LF	YES 1464 LF* 725 LF**	NO	
CREDIT FOR WALL, FENCE OR BERM (YES, NO, LINEAR FEET) (DESCRIBE BELOW IF NEEDED)	NO	NO	NO	NO	NO	NO	
NUMBER OF PLANTS REQUIRED	-	-	-	622 LF	1113 LF	257 LF	
SHADE TREES	0	0	0	11	19	5	35
EVERGREEN TREES	0	0	0	0	0	6	6
OTHER TREES (2:1 SUBSTITUTE)	0	0	0	0	0	0	0
SHRUBS	0	0	0	0	0	0	0
NUMBER OF PLANTS PROVIDED							
SHADE TREES	0	0	0	11	19	5	35
EVERGREEN TREES	0	0	0	0	0	6	6
OTHER TREES (2:1 SUBSTITUTE)	0	0	0	0	0	0	0
SHRUBS (10:1 SUBSTITUTE)	0	0	0	0	0	0	0

* CREDIT TAKEN IS FOR ON-SITE FOREST CONSERVATION EASEMENT (RETENTION)

** CREDIT TAKEN IS FOR EXISTING TREES NOT IN FCE

PERIMETER LANDSCAPE PLANTING LIST

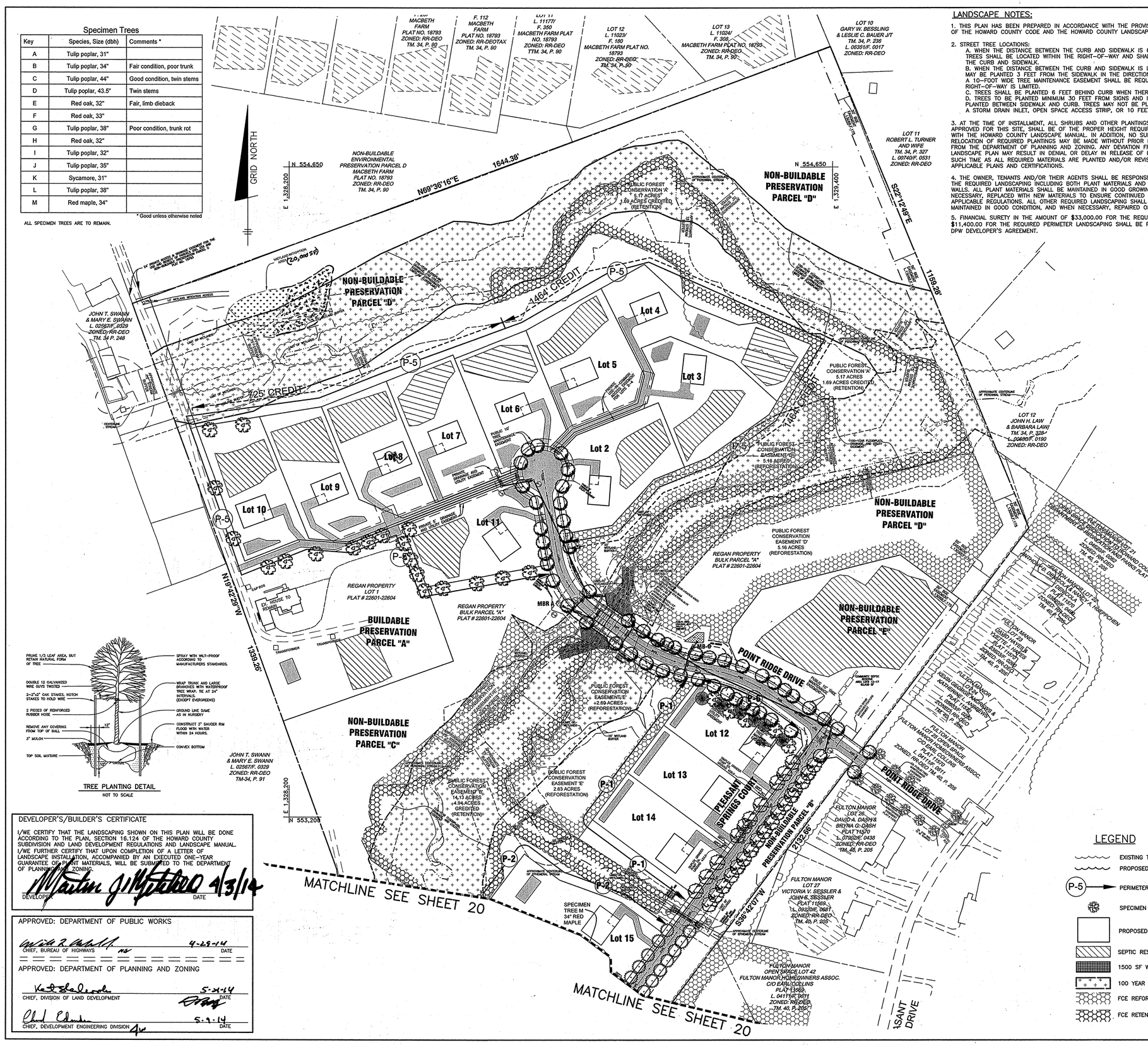
SYMBOL	QUANTITY	NAME	REMARKS	DESCRIPTION
	35	FAGUS GRANDIFOLIA (American Beech)	2.5" – 3" cal.	SHADE TREES ALONG PERIMETER EDGES TO BE PROVIDED BY THE DEVELOPER
	6	ILEX OPACA (American Holly)	5' – 6' ht.	EVERGREEN TREES ALONG PERIMETER EDGES TO BE PROVIDED BY THE DEVELOPER

STREET TREE SCHEDULE

	POINT RIDGE DRIVE	PLEASANT SPRINGS CT.	TOTAL
LINEAR FEET OF RIGHT-OF-WAY	2109	2287	
LINEAR FEET OF CREDIT	0	0	
LINEAR FEET OF REQUIRED PLANTING	2109	2287	
TREE SIZE	LARGE 1:40 LF	LARGE 1:40 LF	
TREES REQUIRED	53	57	110

STREET TREE PLANTING LIST

SYMBOL	QUANTITY	NAME	REMARKS	DESCRIPTION
	53	TILIA CORDATA 'GREENSPIRE' (Greenspire Littleleaf Linden)	2.5" –3" cal.	TO BE PLANTED ALONG POINT RIDGE DRIVE (PROVIDED BY THE DEVELOPER)
	30	ACER RUBRUM 'RED SUNSET' (Red Sunset Red Maple)	2.5" –3" cal.	TO BE PLANTED ALONG PLEASANT SPRINGS COURT (PROVIDED BY THE DEVELOPER)
	27	QUERCUS COCCINEA SCARLET OAK (Scarlet Oak)	2.5" –3" cal.	TO BE PLANTED ALONG PLEASANT SPRINGS COURT (PROVIDED BY THE DEVELOPER)



TREE PLANTING DETAIL

NOT TO SCALE

JOHN T. SWANN & MARY E. SWANN L. 02567/F. 0329 ZONED: RR-DEO TM-34, P. 91

DEVELOPER'S/BUILDER'S CERTIFICATE

I/WE CERTIFY THAT THE LANDSCAPING SHOWN ON THIS PLAN WILL BE DONE ACCORDING TO THE PLAN, SECTION 16.124 OF THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS AND LANDSCAPE MANUAL. I/WE FURTHER CERTIFY THAT UPON COMPLETION OF A LETTER OF LANDSCAPE INSTALLATION, ACCOMPANIED BY AN EXECUTED ONE-YEAR GUARANTEE OF PLANT MATERIALS, WILL BE SUBMITTED TO THE DEPARTMENT OF PLANNING AND ZONING.

DEVELOPER — DATE 4/3/14

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-2-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

LEGEND

- EXISTING TREELINE
- PROPOSED TREELINE
- P-5 PERIMETER DESIGNATION
- SPECIMEN TREE
- PROPOSED STRUCTURE
- SEPTIC RESERVE AREA
- 1500 SF WELLBOX
- 100 YEAR FLOODPLAIN
- FCE REFORESTATION
- FCE RETENTION

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100ft.

NO.	DATE	REVISION
1	2-9-15	SHOW FINAL WETLAND MITIGATION AREA (20,000 SF PER MDE)

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
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date: 12-32-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

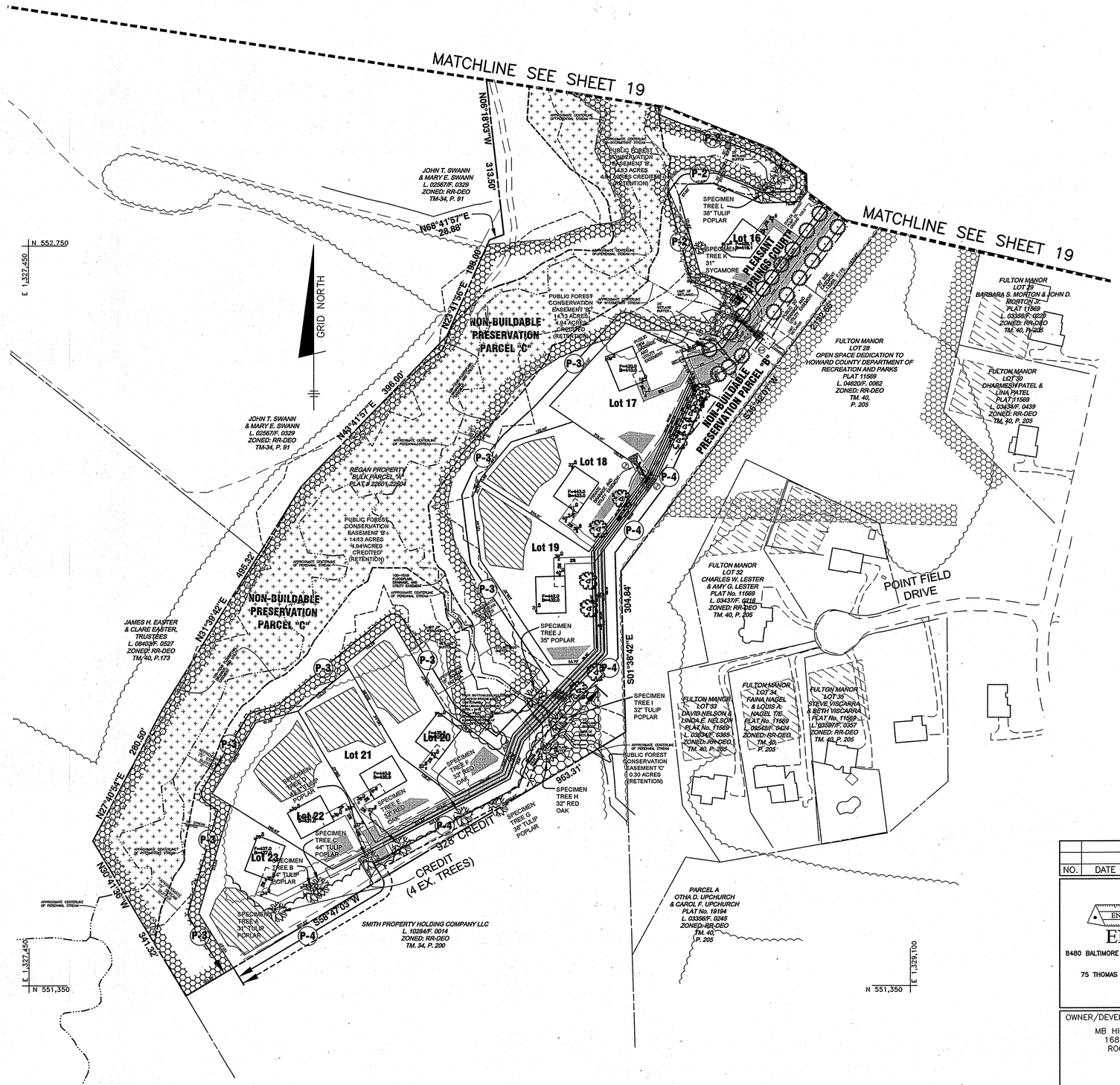
PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

PERIMETER LANDSCAPE AND STREET TREE PLAN

DESIGN: JMC	DRAFT: JMC	DATE: APRIL, 2014	PROJECT NO. 2171
		SCALE: AS SHOWN	DRAWING 19 OF 33

F-13-112



LEGEND

- EXISTING TREELINE
- PROPOSED TREELINE
- P-5 PERIMETER DESIGNATION
- SPECIMEN TREE
- PROPOSED STRUCTURE
- SEPTIC RESERVE AREA
- 1500 SF WELLBOX
- 100 YEAR FLOODPLAIN
- FCE REFORESTATION
- FCE RETENTION

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100ft.

NO.	DATE	REVISION

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I/WE CERTIFY THAT THE LANDSCAPING SHOWN ON THIS PLAN WILL BE DONE ACCORDING TO THE PLAN, SECTION 16.124 OF THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT REGULATIONS AND LANDSCAPE MANUAL. I/WE FURTHER CERTIFY THAT UPON COMPLETION OF A LETTER OF LANDSCAPE INSTALLATION, ACCOMPANIED BY AN EXECUTED ONE-YEAR GUARANTEE OF PLANT MATERIALS, WILL BE SUBMITTED TO THE DEPARTMENT OF PLANNING AND ZONING.

Marston J. McFetridge 4/3/14
DEVELOPER DATE

APPROVED: DEPARTMENT OF PUBLIC WORKS

4-29-14
CHIEF, BUREAU OF HIGHWAYS DATE

APPROVED: DEPARTMENT OF PLANNING AND ZONING

5-21-14
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

5-8-14
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
(P) 410-465-6105 (F) 410-465-6444
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5685
WWW.BEI-CIVILENGINEERING.COM

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. 28559 Expiration Date: 7-22-2015.

STATE OF MARYLAND BRIAN F. CLEARY No. 28559 REGISTERED PROFESSIONAL ENGINEER
4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A' and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

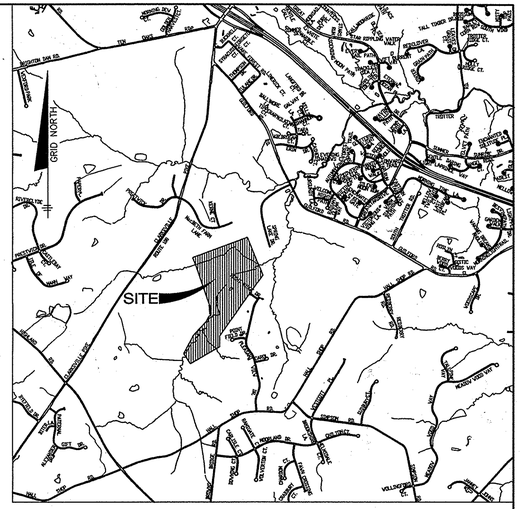
LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
PERIMETER LANDSCAPE AND STREET TREE PLAN

DESIGN: JMC	DRAFT: JMC	DATE: APRIL, 2014	PROJECT NO. 2171
		SCALE: AS SHOWN	DRAWING 20 OF 33

F-13-112

PLAN VIEW
SCALE: 1" = 100'



VICINITY MAP
SCALE: 1' = 2000'
ADC MAP PAGE: 31 GRID: D4

Specimen Trees

Key	Species, Size (dbh)	Comments *
A	Tulip poplar, 31"	
B	Tulip poplar, 34"	Fair condition, poor trunk
C	Tulip poplar, 44"	Good condition, twin stems
D	Tulip poplar, 43.5"	Twin stems
E	Red oak, 32"	Fair, limb dieback
F	Red oak, 33"	
G	Tulip poplar, 38"	Poor condition, trunk rot
H	Red oak, 32"	
I	Tulip poplar, 32"	
J	Tulip poplar, 35"	
K	Sycamore, 31"	
L	Tulip poplar, 38"	
M	Red maple, 34"	

* Good unless otherwise noted

ALL SPECIMEN TREES ARE TO REMAIN.

LEGEND

- EXISTING CONTOURS (AERIAL 12/02)
- PROPOSED CONTOURS
- SOIL BOUNDARY
- LIMIT OF WETLANDS
- 25' WETLANDS BUFFER
- CENTERLINE OF STREAM
- STREAM BUFFER
- EXISTING WOODS LINE
- PROPOSED WOODS LINE
- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- SLOPES 15% TO 24.9%
- SLOPES 25% OR GREATER
- EX. 100 YEAR FLOODPLAIN
- PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)
- PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)
- TREE PROTECTION FENCE
- FCE PERMANENT SIGNAGE
- PROP. STREET TREE
- PRIVATE SEWAGE DISPOSAL AREA

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 inch = 100ft.

SOILS LEGEND

MAP SYMBOL	SOIL GROUP	SOIL TYPE
BoA*	D	BAILE SILT LOAM, 0 TO 3 PERCENT SLOPES
GbA	B	GLADSTONE LOAM, 0 TO 3 PERCENT SLOPES
GbB	B	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B	GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
GmB*	C	GLENVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES
MoD	B	MANOR LOAM, 15 TO 25 PERCENT SLOPES

FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
* ERODIBLE SOILS

THE WATERSHED FOR THIS DRAINAGE AREA IS THE MIDDLE PATUXENT RIVER, DNR LISTING NUMBER 2111306.

NO.	DATE	REVISION
1	2-9-18	SHOW FINAL MITIGATION FOR WETLANDS & SPOIL AREA FOR EARTH WORKS & REMOVE BARN

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-25-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

Eco-Science Professionals, Inc.
CONSULTING ECOLOGISTS
P.O. Box 5006 Glen Arm, MD 21057 (410) 592-6752

MD DNR Qualified Professional
USACOE Wetland Delineator
Certification # WDCP93MD0610044B2
John P. Canoles

BENCHMARK
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301-710-5088
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date: 7-22-2015.
STATE OF MARYLAND BRIAN P. CLEARY No. 28559 REGISTERED PROFESSIONAL ENGINEER
4/10/2014

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050
SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723
KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. ____

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: FINAL ROAD CONSTRUCTION PLAN
FOREST CONSERVATION PLAN

DATE: DECEMBER, 2013 | PROJECT NO. 2171
DESIGN: JMC | DRAFT: JMC
SCALE: AS SHOWN | DRAWING 21 OF 33

F-13-112

SOILS LEGEND		
MAP SYMBOL	SOIL GROUP	SOIL TYPE
BoA*	D	BAILE SILT LOAM, 0 TO 3 PERCENT SLOPES
GbA	B	GLADSTONE LOAM, 0 TO 3 PERCENT SLOPES
GbB	B	GLADSTONE LOAM, 3 TO 8 PERCENT SLOPES
GbC	B	GLADSTONE LOAM, 8 TO 15 PERCENT SLOPES
GmB*	C	GLENVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES
MoD	B	MANOR LOAM, 15 TO 25 PERCENT SLOPES

FROM NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY 2.0
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K	Sycamore, 31"	
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LEGEND

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- PROPOSED CONTOURS — 999 —
- SOIL BOUNDARY — GbB —
- LIMIT OF WETLANDS
- 25' WETLANDS BUFFER
- CENTERLINE OF STREAM
- STREAM BUFFER
- EXISTING WOODS LINE
- PROPOSED WOODS LINE
- EXISTING STRUCTURE
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- SLOPES 15% TO 24.9%
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- EX. 100 YEAR FLOODPLAIN
- PROPOSED FOREST CONSERVATION EASEMENT (RETENTION)
- PROPOSED FOREST CONSERVATION EASEMENT (AFFORESTATION/REFORESTATION)
- TREE PROTECTION FENCE — // —
- FCE PERMANENT SIGNAGE
- PROP. STREET TREE
- PRIVATE SEWAGE DISPOSAL AREA
- PRIVATE WELL AREA

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 inch = 100ft.

THE WATERSHED FOR THIS DRAINAGE AREA IS THE MIDDLE PATUXENT RIVER, DNR LISTING NUMBER 2111306.

NO.	DATE	REVISION

PLAN VIEW
SCALE: 1" = 100'

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

Eco-Science Professionals, Inc.
CONSULTING ECOLOGISTS
P.O. Box 5006 Glen Arm, MD 21057 (410) 592-6752

MD DNR Qualified Professional
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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. 28559 Expiration Date: 7-22-2015.

STATE OF MARYLAND — BRIAN F. CLERY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER
4/10/2014

OWNER/DEVELOPER:
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56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050
SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723
KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E', A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. ____

LOCATION: TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: FINAL ROAD CONSTRUCTION PLAN
FOREST CONSERVATION PLAN

DATE: JANUARY 2014 — PROJECT NO. 2171
DESIGN: JMC — DRAFT: JMC — SCALE: AS SHOWN — DRAWING 22 OF 33

F-13-112

FOREST CONSERVATION WORKSHEET

REGAN PROPERTY

Computations by: JCO BEI JOB No. 2171 Date: 6/4/2013

NET TRACT AREA:

A.	Total tract area	83.81	ac.
B.	Land Dedication acres (parks, county facility, etc.)	0.00	ac.
C.	Area within underground transmissions lines but not Floodplain	3.46	ac.
D.	Area to remain in Commercial Agricultural Production/use	0.00	ac.**
E.	Other deductions: (floodplain)	21.82	ac.
F.	Net Tract Area	58.53	ac.**

LAND USE CATEGORY:

Select category (RLD, RMD, Sub., CIO, Inst.) RMD

G.	Afforestation Threshhold	20% x "F" =	11.70	ac.
H.	Conservation threshhold	25% x "F" =	14.60	ac.

EXISTING FOREST COVER:

I.	Existing forest cover	9.92	ac.
J.	Area of forest above afforestation threshold	0.00	ac.
K.	Area of forest above conservation threshold	0.00	ac.

BREAK EVEN POINT:

L.	Forest retention above threshold with no mitigation	0.00	ac.
M.	Clearing permitted without mitigation	0.00	ac.
	Break Even Point	13.70	ac.

PROPOSED FOREST CLEARING:

N.	Total area of forest to be cleared	2.99	ac.
O.	Total area of forest to be retained	6.93	ac.

PLANTING REQUIREMENTS:

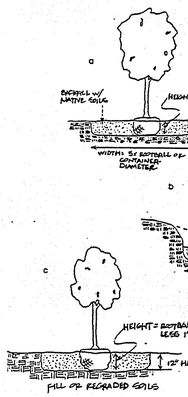
P.	Reforestation for clearing above conservation threshold	0.00	ac.
Q.	Reforestation for clearing below conservation threshold	6.00	ac.
R.	Credit for retention above conservation threshold	0.00	ac.
S.	Total reforestation required	6.00	ac.
T.	Total afforestation required	1.80	ac.
U.	Credit for landscaping - may not exceed 20% of "S."	0.00	ac.
V.	Total reforestation and afforestation required	7.80	ac.

The Forest Conservation Obligations for this project will be met by:
6.93 ac. of ex. forest retained within an on-site Forest Conservation Easement,
7.80 of total reforestation and afforestation

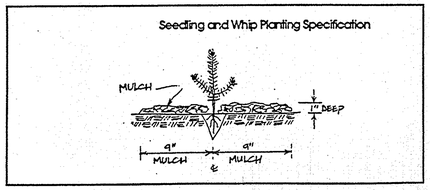
** THE DEVELOPER MAY BREAK THE PRESERVATION PARCEL INTO MULTIPLE PARCELS WITH DIFFERENT USES AND/OR OWNERS. THIS MAY HAVE AN AFFECT ON THE NTA.

NOTE: IN ACCORDANCE WITH THE FOREST CONSERVATION MANUAL, APPENDIX L, RURAL CLUSTER OPTION "B" HAS BEEN USED TO CALCULATE THE FOREST CONSERVATION OBLIGATIONS.

Planting Specifications:
Container Grown and Balled and Burlapped Stock



Seeding and Whip Planting Specification



Mulching newly planted seedings is suggested as it helps the soil retain moisture and it protects the seedling from compaction and stem injury.

APPROVED: DEPARTMENT OF PUBLIC WORKS

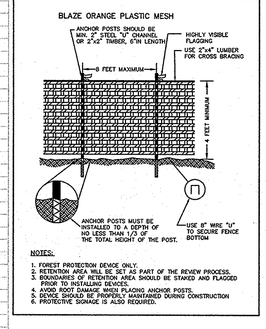
CHIEF, BUREAU OF HIGHWAYS — DATE 4-25-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

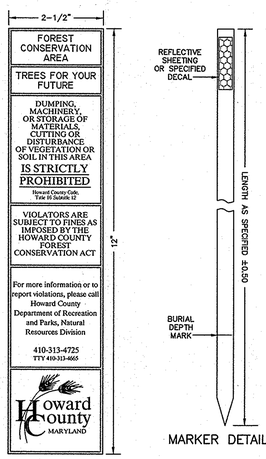
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

TREE PROTECTION FENCE



NOTES:
1. FOREST PROTECTION DEVICE ONLY.
2. RETENTION AREA WILL BE SET AS PART OF THE REVIEW PROCESS.
3. BOUNDARIES OF RETENTION AREA SHOULD BE STAKED AND FLAGGED PRIOR TO INSTALLING DEVICES.
4. AVOID ROOT DAMAGE WHEN PLACING ANCHOR POSTS.
5. PROTECTIVE DEVICES MUST BE MAINTAINED DURING CONSTRUCTION
6. PROTECTIVE SIGNAGE IS ALSO REQUIRED.

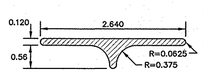


DECAL SPECIFICATIONS

Materials:
Number 3690 Scotchcal non-reflective substrate.

Color:
Dark green text and border on beige background.

MARKER DETAIL



MARKER – SECTION VIEW

FCE CARSONITE MARKER
NOT TO SCALE

FCE D - Afforestation Area - 5.18 acres
Planting units Required: 3626
Planting units Provided: 3626

Qty	Species	Size	Spacing	Total FCA Units
300	Acer rubrum - Red maple	2-3' whip	11' o.c.	
200	Acer saccharinum - Silver maple	2-3' whip	11' o.c.	
150	Juglans nigra - Black walnut *	2-3' whip	11' o.c.	
250	Liriodendron tulipifera - Tulip poplar *	2-3' whip	11' o.c.	
150	Nyssa sylvatica - Black gum	2-3' whip	11' o.c.	
250	Platanus occidentalis - Sycamore	2-3' whip	11' o.c.	
200	Prunus serotina - Black Cherry *	2-3' whip	11' o.c.	
150	Quercus palustris - Pin oak	2-3' whip	11' o.c.	
163	Viburnum prunifolium - Blackhaw *	2-3' whip	11' o.c.	
1613	Total whip plantings x 2 units /tree = FCA unit credit			3626
	Total Unit Credit			3626

FCE E - Afforestation Area - 2.63 acres
Planting units Required: 1841
Planting units Provided: 1842

Qty	Species	Size	Spacing	Total FCA Units
190	Acer rubrum - Red maple	2-3' whip	11' o.c.	
75	Acer saccharinum - Silver maple	2-3' whip	11' o.c.	
75	Juglans nigra - Black walnut *	2-3' whip	11' o.c.	
125	Liriodendron tulipifera - Tulip poplar *	2-3' whip	11' o.c.	
75	Nyssa sylvatica - Black gum	2-3' whip	11' o.c.	
125	Platanus occidentalis - Sycamore	2-3' whip	11' o.c.	
100	Prunus serotina - Black Cherry *	2-3' whip	11' o.c.	
75	Quercus palustris - Pin oak	2-3' whip	11' o.c.	
81	Viburnum prunifolium - Blackhaw *	2-3' whip	11' o.c.	
921	Total whip plantings x 2 units /tree = FCA unit credit			1842
	Total Unit Credit			1842

Planting Notes:

Planting density based spacing requirements: whips with shelter @ 11' on center.

* - these species should not be planted in wetlands

Planting may be made in a curvilinear fashion along contour. The planting should avoid a grid appearance but should be spaced to facilitate maintenance

Multiflora rose/heavy brush removal/control may be required prior to installation of planting.

All whips are required to be installed with tree shelters per Howard County FCA requirements.

Planting units defined by the spacing requirements established in the FCA Manual. One plant unit is defined as 1 seedling or whip without shelter. The Manual states that 700 seedlings/whips without shelters are required per acre, or 350 whips w/shelters, or 200 1" caliper trees, or 100 2" caliper trees. By conversion it has been determined that a seeding or whip without shelter = 1 unit, whip with shelter = 2 units, 1"caliper tree = 3.5 units and 2" caliper tree =7 units. The use of plant units simplifies the plant density calculations when mixing stock size.

FOREST CONSERVATION NOTES:

1. ANY FOREST CONSERVATION EASEMENT (FCE) AREA SHOWN HEREON IS SUBJECT TO PROTECTIVE COVENANTS WHICH MAY BE FOUND IN THE LAND RECORDS OF HOWARD COUNTY WHICH RESTRICT THE DISTURBANCE AND USE OF THESE AREAS.

2. THE FOREST CONSERVATION EASEMENTS HAVE BEEN ESTABLISHED TO FULFILL THE REQUIREMENTS OF SECTION 16.1200 OF THE HOWARD COUNTY CODE, FOREST CONSERVATION ACT. NO CLEARING, GRADING, OR CONSTRUCTION IS PERMITTED WITHIN THE FOREST CONSERVATION EASEMENTS; HOWEVER, FOREST MANAGEMENT PRACTICES AS DEFINED IN THE DEED OF FOREST CONSERVATION EASEMENT ARE ALLOWED

3. LIMITS OF DISTURBANCE SHALL BE RESTRICTED TO AREAS OUTSIDE THE LIMIT OF TEMPORARY FENCING OR THE FCE BOUNDARY, WHICHEVER IS GREATER.

4. THERE SHALL BE NO CLEARING, GRADING, CONSTRUCTION OR DISTURBANCE OF VEGETATION IN THE FOREST CONSERVATION EASEMENT, EXCEPT AS PERMITTED BY HOWARD COUNTY DPZ.

5. NO STOCKPILES, PARKING AREAS, EQUIPMENT CLEANING AREAS, ETC. SHALL OCCUR WITHIN AREAS DESIGNATED AS FOREST CONSERVATION EASEMENTS.

6. TEMPORARY FENCING SHALL BE USED TO PROTECT FOREST RESOURCES DURING CONSTRUCTION. THE FENCING SHALL BE PLACED ALONG ALL FCE BOUNDARIES WHICH OCCUR WITHIN 15 FEET OF THE PROPOSED LIMITS OF DISTURBANCE.

7. PERMANENT SIGNAGE SHALL BE PLACED 50–100' APART ALONG THE BOUNDARIES OF ALL AREAS INCLUDED IN FOREST CONSERVATION EASEMENTS.

8. THE TOTAL FOREST CONSERVATION OBLIGATION AMOUNT OF 14.73 ACRES SHALL BE MET BY THE ON–SITE RETENTION OF 6.93 AC. WITHIN A FOREST CONSERVATION EASEMENT AND THE ON–SITE AFFORESTATION AND REFORESTATION OF 7.80 AC. WITHIN A FOREST CONSERVATION EASEMENT. THE DEVELOPER SHALL BOND IN ACCORDANCE WITH THE DEPARTMENT OF PUBLIC WORKS DEVELOPER'S AGREEMENT WITH SURETY IN THE AMOUNT OF $169,884.00 (339,768.00 SF x 0.50).

FOREST CONSERVATION EASEMENT CHART

EASEMENT	TOTAL AREA	TYPE	CREDITED AREA
A	5.17 AC.	RETENTION	1.69 AC.
B	14.13 AC.	RETENTION	4.94 AC.
C	0.30 AC.	RETENTION	0.30 AC.
D	5.17 AC.	AFFORESTATION/REFORESTATION	5.11 AC.
E	2.69 AC.	AFFORESTATION/REFORESTATION	2.69 AC.

REFORESTATION PLAN

The reforestation area will be placed into a Forest Conservation Easement.

A. Planting Plan and Methods

Plant species selection was based on our knowledge regarding plant communities in Maryland's Piedmont Plateau and information provided in the soil survey on typical vegetation for the soil type on the planting site. Species selection was also based on our knowledge of plant availability in the nursery industry.

Reforestation will be accomplished through a mixed planting of whips and branched transplants. Container grown stock is recommended but bareroot stock may be used to help control afforestation costs. If bareroot stock is used the root systems of all plants will be dipped in an anti-desiccant gel prior to planting to improve moisture retention in the root systems.

Prior to planting the proposed Forest Conservation Easements all multiflora rose in the planting area shall be removed. Removal of the rose may be performed with mowing and herbicide treatments. Physical removal of all top growth following by a periodic herbicide treatment of stump sprouts is recommended. Native tree and shrub species occurring within the rose thickets should be retained wherever possible. Herbicides treatments shall occur on 2 month intervals during the first growing season and once each in the spring and fall for subsequent years. Herbicide used shall be made specifically to address woody plant material and shall be applied as per manufacturers specifications. Care should be taken not to spray planted trees or naturally occurring native tree/shrub seedlings. It is recommended that initiation of rose removal begin at least six months prior to planting.

B. Planting and Soil Specifications

Plant material will be installed in accordance with the Planting Detail and Planting Specifications shown on the Forest Conservation Plan.

Amendments to existing soil will be in accordance with the Planting Specifications shown on the Forest Conservation Plan. Soil disturbance will be limited to individual planting locations.

C. Maintenance of Plantings

For information regarding maintenance of the reforestation plantings, see Section VIII B.

D. Guarantee Requirements

A 90 percent survival rate of the reforestation plantings will be required after one growing season. All plant material below the 90 percent survival threshold will be replaced at the beginning of the second growing season. At the end of the second growing season, a 75 percent survival rate will be required. All plant material below the 75 percent survival threshold will be replaced by the beginning of the next growing season.

E. Security for Reforestation

Section 16-1209 of the Howard County Forest Conservation Act requires that a developer shall post a security (bond, letter of credit, etc.) with the County to insure that all work is done in accordance with the FCP.

CONSTRUCTION PERIOD PROTECTION PROGRAM

A. Forest Protection Techniques

1. Soil Protection Area (Critical Root Zone)

The soil protection area, or critical root zone, of a tree is that portion of the soil column where most of a its roots may be found. The majority of roots responsible for water and nutrient uptake are located just below the soil surface. Temporary fencing shall be placed around the critical root zone of the forest in areas where the forest limits occur within 25 feet of the limit of disturbance.

2. Fencing and Signage

Existing forest limits occurring within 25 feet of the limits of disturbance shall be protected using temporary protective fencing. Permanent signage shall be placed around the afforestation area prior to plant installation, as shown on the plan.

B. Pre-Construction Meeting

Upon staking of limits of disturbance a pre-construction meeting will be held between the developer, contractor and appropriate County inspector. The purpose of the meeting will be to
verify that all sediment control is in order, and to notify the contractor of possible penalties for non-compliance with the FCP.

C. Storage Facilities/Equipment Cleaning

All equipment storage, parking, sanitary facilities, material stockpiling, etc. associated with construction of the project will be restricted to those areas outside of the proposed Forest Conservation Easement. Cleaning of equipment will be limited to area within the LOD of the proposed homesites. Wastewater resulting from quipment cleaning will be controlled to prevent runoff into environmentally sensitive areas.

FOREST PROTECTION PROCEDURES – Preconstruction Phase

1) The edge of the woods to be protected will be marked (staked or flagged) in the field per the limits of forest conservation easement shown in the approved site development plan prior to the start of construction activity. All areas within protective easement are to be considered "off limits" to any construction activities. The optional protective fencing shall be installed at the outside edge of forested areas and should be combined with sediment control devices when possible. The limit of the critical root zone and therefore the location of the protective devices is to be determined as follows:

Edge of Forested Area – 1 foot of protective radius/inch of DBH or an eight foot protective radius, whichever is greater.

Critical Root Zone for the forest on this site is an average of 12 feet from the trunk of the tree. Critical root zones for Specimen Trees:

A=31' B=34' C=44' D=44' E=32'
F=33' G=38' H=32' I=32' J=35'
K=31' L=38' M=34'

2) Construction activities expressly prohibited within the preservation areas are:

Placing or stockpiling backfill or top soil in protected areas
Felling trees into protected areas
Driving construction equipment into or through protected areas
Burning in or in close proximity to protected areas
Stacking or storing supplies of any kind
Concrete wash-off areas.
Conducting trenching operations
Grading beyond the limits of disturbance
Parking vehicles or construction equipment
Removal of root mat or topsoil
Siting and construction of: Utility lines
Access roads
Impervious surfaces
Stormwater management devices
Staging areas

3) Protective fencing (see Figure "Protective Fencing") shall be the responsibility of the general contractor. The general contractor shall affix signs to the fencing at 25' minimum intervals indicating that these areas are "Forest Retention Area" (see Figure "Signage"). The general contractor shall take great care to assure the restricted areas are not violated and that root systems are protected from smothering, flooding, excessive wetting from dewatering operations, off-site runoff, spillage, and drainage or solutions containing materials hazardous to tree roots.

4) The general contractor shall be responsible for any tree damaged or destroyed within the preservation areas whether caused by the contractor, his agents, employees, subcontractors, or licensees.

5) Foot traffic shall be kept to a minimum in the protective areas.

6) All trees which are not to be preserved within fifty feet of any tree preservation areas are to be removed in a manner that will not damage those trees that are designated for preservation. It is highly recommended that tree stumps within this fifty foot area be ground out with a stump grinding machine to minimize damage.

7) The general contractor shall designate a "wash out" area onsite for concrete trucks which will not drain toward a protected area.

8) A pre-construction meeting shall be held with local authorities before any disturbance has taken place on site.

D. Sequence of Construction

The following timetable represents the proposed timetable for development. The items outlined in the Forest Conservation Plan will be enacted within two (2) years of subdivision approval.

Below find a proposed sequence of construction.

1. Install all signage and sediment control devices.

2. Hold pre-construction meeting between developer, contractor and County inspector.

3. Build access roads, install well and septic systems, and construct houses. Stabilize all disturbed areas accordingly.

4. Begin multiflora rose removal. Install permanent protective signage for
Easements and initiate plantings in accordance with Forest Conservation Plan. Plantings will be completed within two (2) years of subdivision approval.

5. Remove sediment control.

6. Hold post-construction meeting with County inspectors to assure compliance with FCP. Submit Certification of Installation.

7. Monitor and maintain plantings for 2 years.

E. Construction Monitoring

Eco-Science Professionals, or another qualified professional designated by the developer, will monitor construction of the project to ensure that all activities are in compliance with the Forest Conservation Plan.

F. Post-Construction Meeting

Upon completion of construction, Eco-Science Professionals, or another qualified professional designated by the developer, will notify the County that construction has been completed and arrange for a post-construction meeting to review the project site. The meeting will allow the County inspector to verify that afforestation plantings have been installed.

FOREST PROTECTION PROCEDURES – Construction Phase

Forest and tree conditions should be monitored during construction and corrective measures taken when appropriate.

The following shall be monitored:

a) Soil compaction
b) Root injury – prune and monitor; consider crown reduction
c) Limb injury – prune and monitor
d) Flooded conditions – drain and monitor; correct problem
e) Drought conditions – water and monitor; correct problem
f) Other stress signs – determine reason, correct, and monitor

FOREST PROTECTION PROCEDURES – Post Construction Phase

The following measures shall be taken:

1) Corrective measures if damages were incurred due to negligence:

a) Stress reduction

b) Removal of dead or dying trees. This may be done only if trees pose an immediate safety hazard.

2) Removal of temporary structures:

a) No burial of discarded materials will occur onsite within the conservation area.

b) No open burning within 100 feet of a wooded area.

c) All temporary forest protection structures will be removed after construction.

d) Remove temporary roads by removing stone or broadcasting mulch; pre-construction elevation should be maintained.

e) Aerate compacted soil.

f) Replant disturbed sites with trees, shrubs and/or herbaceous plants.

g) Retain signs for retention areas or specimen trees.

h) A County official shall inspect the entire site.

3) Future protection measures:

a) Howard County and the developer shall arrange for the dedication of an appropriate forest conservation easement at a later date.

POST-CONSTRUCTION MANAGEMENT PLAN

Howard County requires a two year post-construction management plan be prepared as part of the forest conservation plan. The plan goes into effect upon acceptance of the construction certification of completion by the County. Eco-Science Professionals, or another qualified professional designated by the developer, will be responsible for implementation of the post-construction management plan.

The following items will be incorporated into the plan:

A. Fencing and Signage

Permanent signage indicating the limits of the retention/reforestation area shall be maintained.

B. General Site Inspections/Maintenance of Plantings

Site inspections will be performed a minimum of three times during the growing season. The purpose of the inspections will be to assess the health of the afforestation plantings. Appropriate measures will be taken to rectify any problems which may arise.

In addition, maintenance of the afforestation plantings will involve the following steps:

1. Watering - All plant material shall be watered twice a month during the 1st growing season, more or less frequently depending on weather conditions. During the second growing season, once a month during May-September, if needed.

2. Removal of invasive exotics and noxious weeds. Old field successional species will be retained.

3. Identification of serious plant pests and diseases, treatment with appropriate agent.

4. Pruning of dead branches.

5. After 12 and 24 months, replacement of plants, if required, in accordance with the Guarantee Requirements shown on the FCP.

C. Education

The developer will provide appropriate materials to property owners informing them of the location and purpose of the afforestation area. Materials may include site plans and information explaining the intent of the forest conservation law.

D. Final Inspection

At the end of the two year post-construction management period, Eco-Science Professionals, or another qualified professional, will submit to the administrator of the Howard County Forest Conservation Program certification that all retention/afforestation requirements have been met. Upon acceptance of this certification, the County will release the developer from all future obligations and release the developer's bond.

THE WATERSHED FOR THIS DRAINAGE AREA IS THE MIDDLE PATUXENT RIVER, DNR LISTING NUMBER 2111306.

FOREST PROTECTION PROCEDURES – Preconstruction Phase

Stress Reduction and Protection of Specimen Trees
Isolated from Forest Retention Areas and
General Forest Retention Areas
(as they may apply)

Isolated specimen trees that are to be preserved will be examined to determine if stress reduction techniques are needed. Protective measures and their evaluation criteria are provided on this plan only if they are employed herein.

Root Pruning

Evaluation Criteria

Will the critical root zone be affected by construction activities such as grade changes, digging for foundations and roads or utility installation?

Design Considerations

a) Prune prior to construction as shown on the plan (see Figure "Root Pruning Detail.")
b) Prune root with a clean cut using proper pruning equipment such as a vibratory knife.
c) Exact location of pruning trench should be identified, and immediately backfilled to cover exposed roots after pruning with soil removed other topsoil, peat moss, or other suitable material or with other high organic soil.
d) For trees over 15" in diameter, root pruning may be done up to one year in advance of construction.
e) Tree(s) will be monitored for signs of stress.

Crown Reduction or Pruning

Evaluation Criteria

Has the root system been significantly reduced (>30%) or are there dead, damaged, or diseased limbs?

Design Considerations

a) Reduce only at specified times of the year:
Flowering trees – only after flowering and before bud set
Non–Flowering trees – in late winter, early spring or mid summer
b) No more than 1/3 of the crown should be removed at one time using acceptable pruning methods (see Figure "Crown Reduction Detail")
c) Monitor for signs of stress

Watering

Evaluation Criteria

Will construction activities alter the hydrology of the site? Has or will root pruning occur?

Design Considerations

a) Water only as necessary
b) Monitor for signs of stress (see Figure "Tree Planting and Maintenance Calendar")

Fertilizing

Evaluation Criteria

Is or will be tree(s) be under stressful conditions? Has or will root pruning occur?

Design Considerations

a) Use low nitrogen and slow release fertilizers.
b) Apply in late fall or early spring (see Figure "Tree Planting and Maintenance and Calendar")
c) For small trees (<3" in diameter), use punch hole method or pressurized injection method (see Figure "Application of Fertilizers by Injection.")
d) For larger trees (>3" diameter), use punch hole method or pressurized injection method (see Figure "Application of Fertilizers by Injection.")
e) Do not apply fertilizer any closer than 3' from tree trunk for pressurized injection method.
f) Monitor for signs of stress.

NO.	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
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date 12.22.2015.

STATE OF MARYLAND · BRIAN F. CLEARY · No. 28559 · REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

Eco-Science Professionals, Inc.
CONSULTING ECOLOGISTS
P.O. Box 5006 Glen Arm, MD 21057 (410) 592-6752

MD DNR Qualified Professional
USACOE Wetland Delineator
Certification # WPCP93MD0610044B2
John P. Canoles

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050

SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723

KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON–BUILDABLE PRESERVATION PARCELS 'B' thru 'E', A RESUBDIVISION OF LOT 1 AND NON–BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601–22604

LOCATION: TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP–12–004, ECP–12–045, WP–13–025

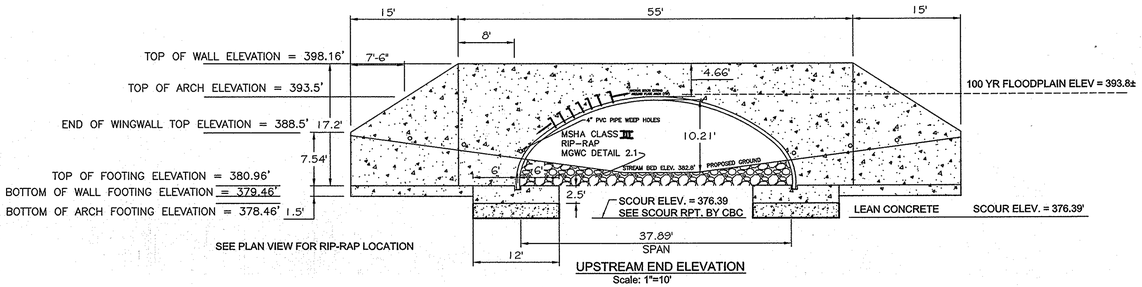
TITLE: FINAL ROAD CONSTRUCTION PLAN
FOREST CONSERVATION NOTES AND DETAILS

DATE: DECEMBER 2013 | PROJECT NO. 2171

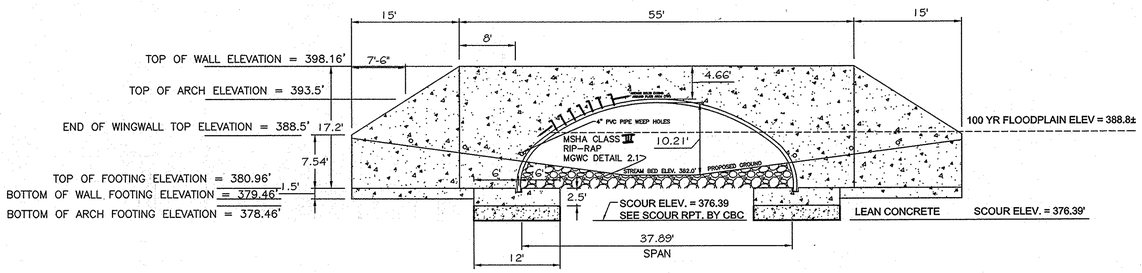
DESIGN: JMC | DRAFT: JMC | SCALE: AS SHOWN | DRAWING 23 OF 33

F-13-112

BRIDGE PLATE ARCH CULVERT DESIGN
38' SPAN 12'-6.54" RISE 7 GAGE (0.187")
63'-3.0625" LONG



UPSTREAM END ELEVATION
Scale: 1"=10'



DOWNSTREAM END ELEVATION
Scale: 1"=10'

DESIGN DATA

DESIGN LOADING:
ARMTEC BRIDGE PLATE STRUCTURE: HS25
HEADWALLS: EARTH PRESSURE ONLY
WINGWALLS: EARTH PRESSURE ONLY
DESIGN FILL HEIGHT: 3'-6" MIN - 5'-0" MAX FROM CROWN OF PLATE TO BOTTOM OF FLEXIBLE PAVEMENT;
NET ALLOWABLE SOIL BEARING PRESSURE: 4,000 PSF *
GROSS ALLOWABLE SOIL BEARING PRESSURE: 4,000 PSF *

* FOUNDATION EXCAVATION AND SUBGRADE PREPARATION SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL RECOMMENDATIONS FOR THIS PROJECT PREPARED BY GEOLAB GEOTECHNICAL LABORATORIES, INC., DATED 05/24/13 AND 11/29/13 AND SUBSEQUENT RECOMMENDATIONS TO ACHIEVE 4,000 PSF ALLOWABLE BEARING CAPACITY.

GEOTECH RECOMMENDATIONS TO ACHIEVE 4,000 PSF ALLOWABLE BEARING CAPACITY:
IF THE FOOTERS FOR THIS STRUCTURE NEED TO HAVE SUBGRADE LOWERED TO ACHIEVE 4000PSF BEARING THEN EXCAVATE DOWN TO 4000PSF BEARING AND IMMEDIATELY BACKFILL WITH LEAN CONCRETE TO BOTTOM OF FOOTING ELEVATION.

PROVIDE A FENCE ALONG THE END OF THE WALL. END OF THE FENCING MUST BE TAPERED TO AVOID ACCESS TO THE LEDGE.

GENERAL NOTES:

Scope: The plate arch culvert & retaining wall engineer's (Ryan & Associates) scope consists of preparing the culvert & culvert retaining walls designs to enable the contractor to obtain necessary permits and properly construct the arch and walls. The design considers the internal and local stability and is in accordance with acceptable engineering practice and these specifications. A scour analysis has been performed and the riprap designed by Benchmark Engineering on thier sheet 33 provides adequate protection. Professional Engineering oversight and certification for the arch construction is also a requirement of these plans. Services outside this scope such as investigation of failed or non-conforming construction or any other services may be provided on a time & materials basis or for a negotiated fee. The scope of Ryan & Associates (RA) for this project does not include arch stakeout or any other civil engineering/surveying. Reinforcing shop drawings are required to be reviewed and approved by the design engineer.

INSTALLATION MUST CONFORM TO THE ATTACHED "Ryan & Associates Structural Specifications and Guidelines".

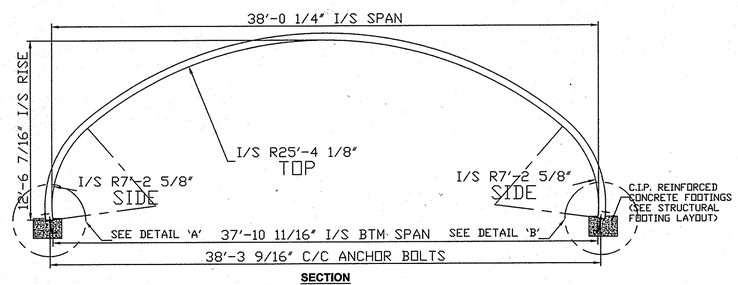
CONSTRUCTION REVIEW & CERTIFICATION: CONSTRUCTION INSPECTION, TESTING AND CERTIFICATION BY A MD LICENSED PROFESSIONAL STRUCTURAL & GEOTECHNICAL ENGINEER IS A REQUIREMENT OF THESE PLANS. ACCEPTANCE OF THE USE OF THESE PLANS INDICATES AGREEMENT FOR PROFESSIONAL ENGINEERING CONSTRUCTION REVIEW AND CERTIFICATION

THESE DRAWINGS ARE THE PROPERTY OF RYAN & ASSOCIATES. UNAUTHORIZED REPRODUCTION FOR ANY PURPOSE IS AN INFRINGEMENT UPON COPYRIGHT LAWS. VIOLATORS WILL BE SUBJECT TO PROSECUTION BY THE FULLEST EXTENT OF THE LAW.

WRITTEN DIMENSIONS ON THE DRAWINGS SHALL HAVE PRECEDENCE OVER SCALE DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB AND THIS OFFICE MUST BE NOTIFIED OF ANY VARIATION FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DRAWINGS.

DRAWING INDEX

Sheet 24 - Upstream & Downstream Elevations, Plate Geometry
Sheet 25 - Structural Elevation, Combined Footing Layout
Sheet 26 - Arch, Head & Wingwall Details
Sheet 27 - Manufacturer "Armtec" Specifications
Sheet 28 - Structural Specifications



SECTION
ARMTEC 36H BRIDGE-PLATE LOW PROFILE ARCH
0 5'-0"
SCALE

PLATE ARCH GEOMETRY
Scale: 1"=5'

MARYLAND 1-800-257-7777 STOP-CALL BEFORE YOU DIG!

CALL "MISS UTILITY"
TELEPHONE 1-800-257-7777 FOR UTILITY LOCATIONS AT LEAST 48 HOURS BEFORE CONSTRUCTION.

NO.	DATE	REVISION

BENCHMARK
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301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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, William K. Ryan, P.E. License No. 21586, Expiration Date: 5-9-2015.

STATE OF MARYLAND WILLIAM KARL RYAN No. 21586 PROFESSIONAL ENGINEER
4/8/2014

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

DRAWN BY: WKR
DESIGN BY: WKR
CHECKED BY: WKR
DATE: 03/27/2014
DO NOT SCALE THIS DRAWING: DIMENSIONS AND NOTES HAVE PRECEDENCE OVER DRAWING

CLIENT: LANE/LSB&C
OWNER: MB Highland Reserve, LLC
JOB No: 1101-14-03

Ryan & Associates
A Division of WKR Consulting Inc.
SPECIALIZING IN STRUCTURAL & GEOTECHNICAL ENGINEERING
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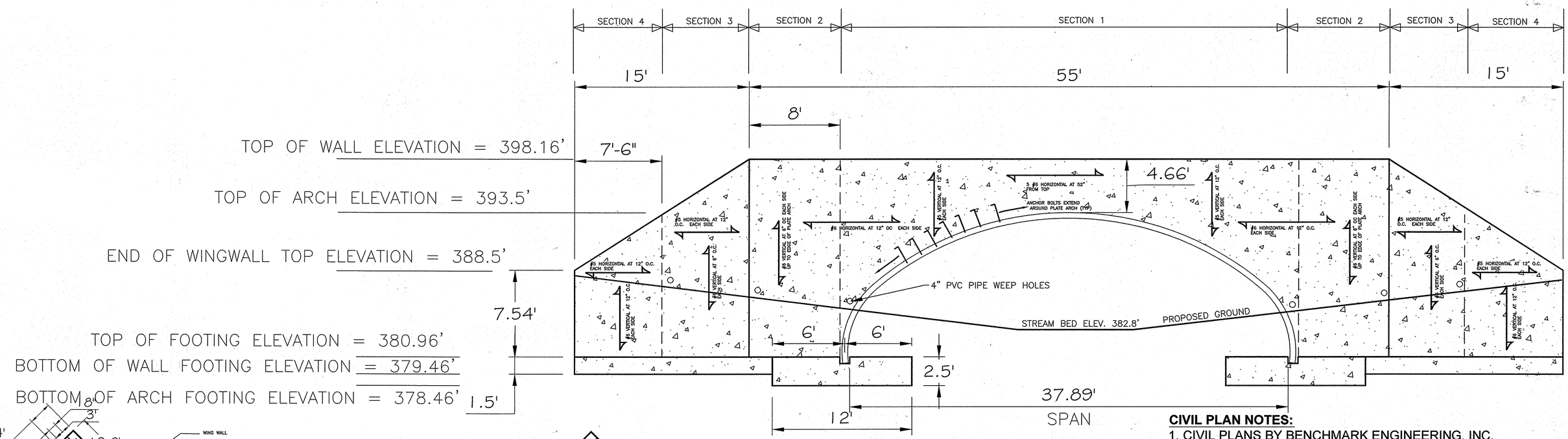
LANE — LONGSPAN Bridge & Culvert
LANE ENTERPRISES, INC. - LSB&C DIVISION
8271 MERCER ST., PULASKI, PA 16143
LANE: 724-652-7747
LSB&C: 888-949-5722

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050
SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723
KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: REGAN PROPERTY
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604
LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-006, ECP-12-045, WP-13-025
TITLE: PLATE ARCH CULVERT CROSSING #1
UPSTREAM/DOWNSTREAM ELEVATIONS, PLATE GEOMETRY

DESIGN: WKR	DRAFT: WKR	DATE: APRIL 4, 2014	PROJECT NO. 2171
		SCALE: AS SHOWN	DRAWING 24 OF 33

F-13-112



HEADWALL/WINGWALL ELEVATION - TYPICAL BOTH SIDES

SCALE: 1/4"=1'

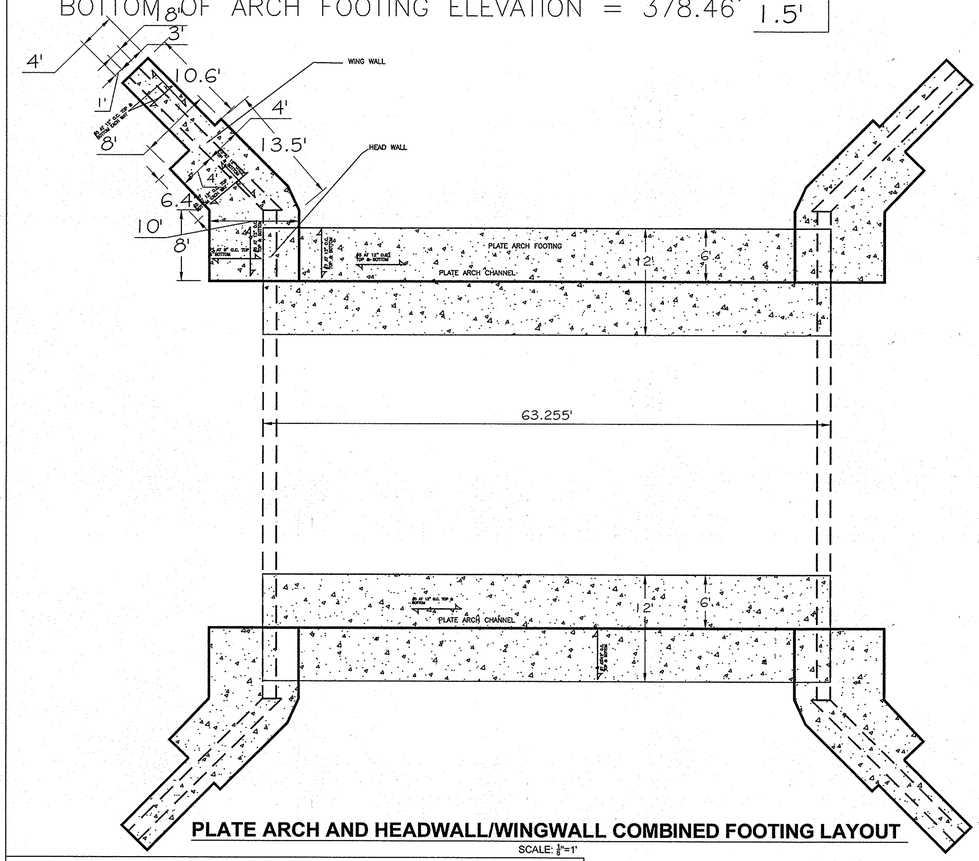
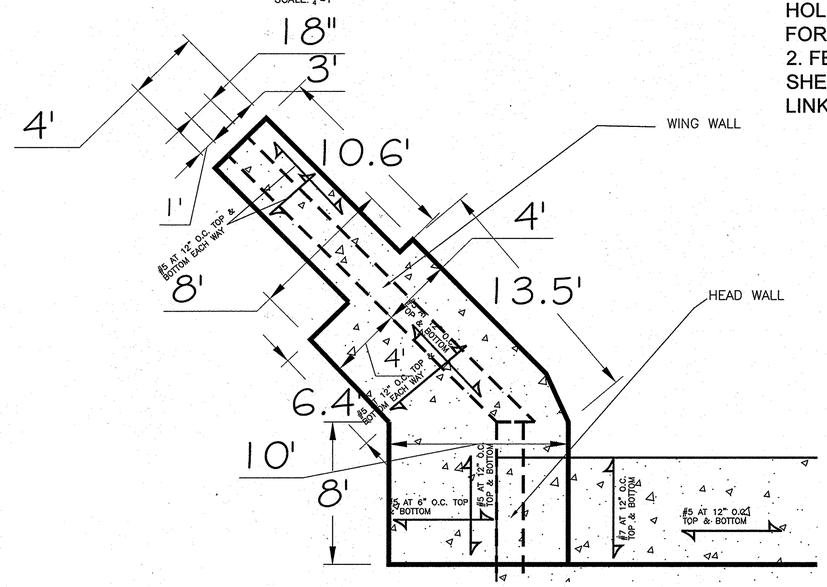


PLATE ARCH AND HEADWALL/WINGWALL COMBINED FOOTING LAYOUT

SCALE: 1/8"=1'



HEADWALL/WINGWALL COMBINED FOOTING LAYOUT CLOSE-UP

SCALE: 1/4"=1'

CIVIL PLAN NOTES:

1. CIVIL PLANS BY BENCHMARK ENGINEERING, INC. AND THEY ARE TO BE FOLLOWED AND HOLD PRECEDENCE OVER THESE PLANS FOR LOCATION INFORMATION;
2. FENCH ALONG HEADWALLS & WINGWALLS AS SHOWN ON SHEET 26 AND IN ACCORDANCE WITH HOWARD COUNTY CHAIN LINK FENCE STANDARD DETAIL G-7.21.

PLATE ARCH STRUCTURAL NOTES:

1. SUBGRADE BEARING CAPACITY 4000PSF TO BE VERIFIED BY OVERSITE ENGINEER OF RECORD;
2. FOOTING CONCRETE 4000 PSI;
3. ALL BACKFILL AROUND ARCH TO BE A-1-a MIN 19' PAST ARCH AND COMPACTED TO 95% STD. PROCTOR MAX. DRY DENSITY;
4. SCOUR ANALYSIS HAS BEEN COMPLETED BY CBC ENGINEERS. SCOUR IS NEXT TO SIDES OF CULVERT. FOOTING EXTENDING 6' INSIDE CULVERT MEETS SCOUR PROTECTION REQUIREMENTS.;
5. 2000 PSI LEAN CONCRETE OR VIBRATED #57 STONE TO BE USED BELOW FOOTING SUBGRADE TO ACHIEVE BEARING CAPACITY IF NEEDED.

NO.	DATE	REVISION

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
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301-710-3685
WWW.BD-CIVILENGINEERING.COM

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, William K. Ryan, P.E. License No. 21586, Expiration Date: 5-9-2015.

STATE OF MARYLAND — WILLIAM KARL RYAN — No. 21586 — PROFESSIONAL ENGINEER

4/8/2014

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

DRAWN BY: WKR
DESIGN BY: WKR
CHECKED BY: WKR
DATE: 03/27/2014

DO NOT SCALE THIS DRAWING: DIMENSIONS AND NOTES HAVE PRECEDENCE OVER DRAWING

CLIENT: LANE/LSB&C
OWNER: MB Highland Reserve, LLC
JOB No: 1101-14-03

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A Division of WKR Consulting Inc.
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KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

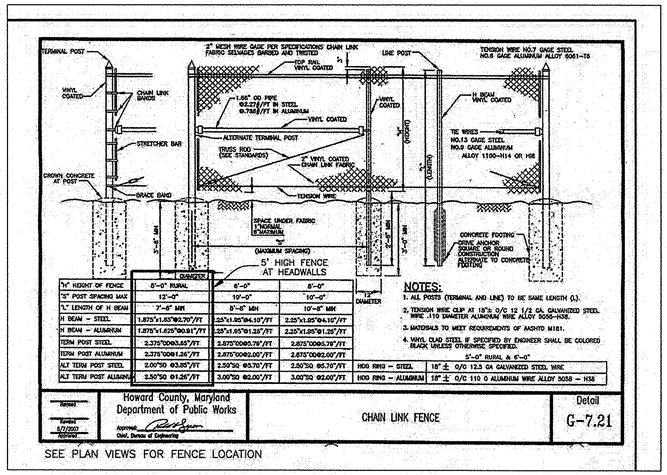
PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

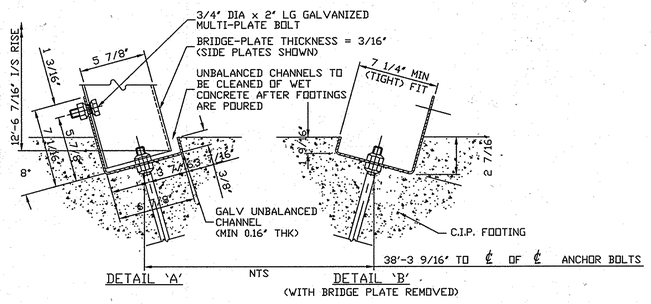
TITLE: PLATE ARCH CULVERT CROSSING #1
HEADWALL/WINGWALL FOOTING LAYOUT AND ELEVATIONS

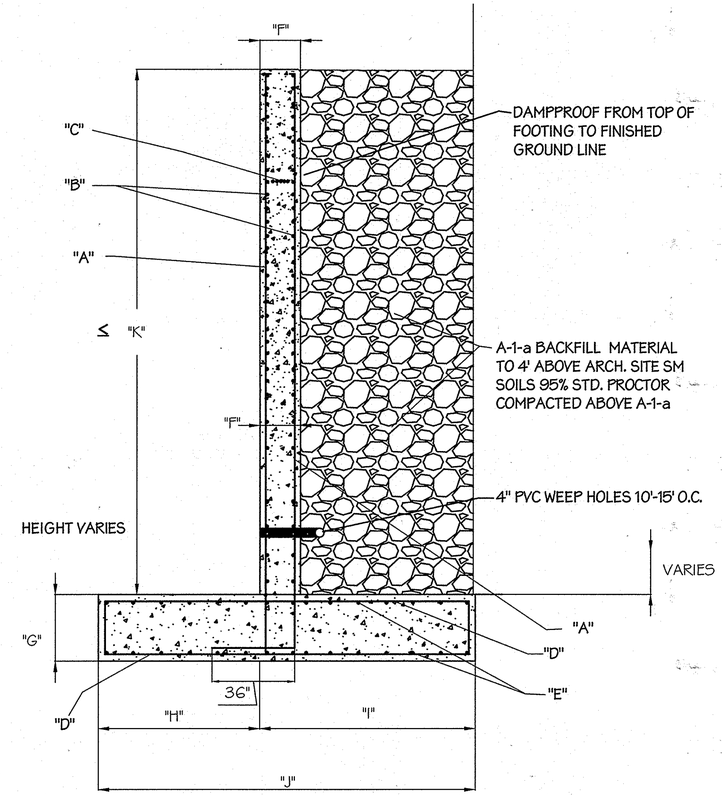
DATE: APRIL 4, 2014
PROJECT NO. 2171
DESIGN: WKR
DRAFT: WKR
SCALE: AS SHOWN
DRAWING 25 OF 33

F-13-112



	STEEL (GALVANIZED)		ALUMINUM	
"H" HEIGHT OF FENCE	5'-0" RURAL	6'-0"	5'-0"	
"S" POST SPACING MAX	12'-0"	10'-0"	10'-0"	
"L" LENGTH OF H BEAM	7'-6" MIN	8'-6" MIN	10'-6" MIN	
H BEAM - STEEL	1.875"x1.65"@2.70"/FT	2.25"x1.85"@4.10"/FT	2.25"x1.85"@4.10"/FT	
H BEAM - ALUMINUM	1.875"x1.625"@0.91"/FT	2.25"x1.85"@1.25"/FT	2.25"x1.85"@1.25"/FT	
TERM POST STEEL	2.375"OD@3.65"/FT	2.875"OD@5.79"/FT	2.875"OD@5.79"/FT	
TERM POST ALUMINUM	2.375"OD@1.26"/FT	2.875"OD@2.00"/FT	2.875"OD@2.00"/FT	
ALT TERM POST STEEL	2.00"SQ @3.65"/FT	2.50"SQ @5.70"/FT	2.50"SQ @5.70"/FT	5'-0" RURAL & 6'-0"
ALT TERM POST ALUMINUM	2.50"SQ @1.26"/FT	3.00"SQ @2.00"/FT	3.00"SQ @2.00"/FT	HOG RING - STEEL 18"± O/C 12.5 GA GALVANIZED STEEL WIRE
				HOG RING - ALUMINUM 18"± O/C 110 O ALUMINUM WIRE ALLOY 5056 - H38





TYPICAL WALL SECTION - SEE CHART FOR DIMENSIONS

SCALE: NS

HOWARD COUNTY CHAINLINK FENCE DETAIL FOR FENCE CONSTRUCTION ALONG WINWALLS AND HEADWALLS

SCALE: NS

SECTION	MAX. HEIGHT H	VERTICAL REINFORCING A	HORIZONTAL REINFORCING B	SECTION 1 BEAM ADDITIONAL STEEL C	FOOTING STEEL D	FOOTING STEEL E	WALL WIDTH F	FOOTING THICKNESS G	FOOTING TOE H	FOOTING HEEL I	FOOTING TOTAL LENGTH J	WALL MAX HEIGHT K
1	-	#5 @ 12" O.C.	#6 @ 12" O.C.	5 - #6 @ 52"	-	-	18"	-	-	-	-	4'
2	17'-6"	#6 @ 6" O.C.	#6 @ 12" O.C.	-	#5 @ 6" O.C.	#5 @ 12" O.C.	18"	18"	6'	4'	10'	17'-6"
3	17'-6"	#6 @ 6" O.C.	#5 @ 12" O.C.	-	#5 @ 6" O.C.	#5 @ 12" O.C.	18"	18"	4'	4'	8'	17-6"'
4	7'-6"	#6 @ 12" O.C.	#5 @ 12" O.C.	-	#5 @ 12" O.C.	#5 @ 12" O.C.	18"	12"	1'	3'	4'	7'-6"
PLATE ARCH	-	-	-	-	#7 @ 12" O.C.	#5 @ 12" O.C.	-	2.5'	6'	6'	12'	-

HEADWALL & WINGWALL & PLATE ARCH DIMENSIONS & REINFORCING DETAILS CHART

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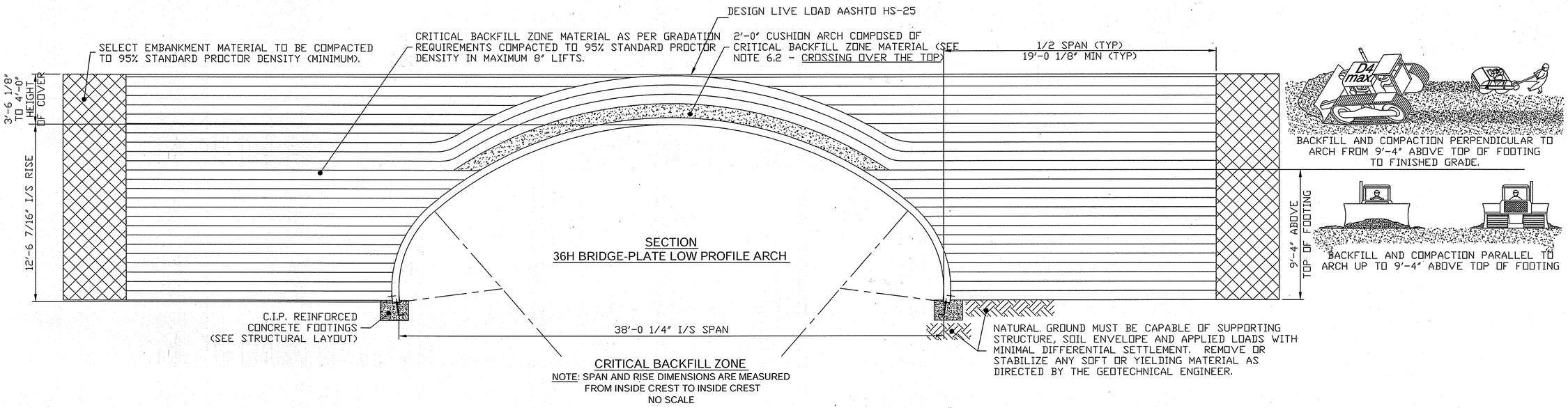
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604
LOCATION: TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025
TITLE: PLATE ARCH CULVERT CROSSING #1
ARMTEC PLATE DETAILS, WALL & FOOTINGS GEOMETRY & DETAILS

DESIGN: WKR DRAFT: WKR
DATE: APRIL 4, 2014 PROJECT NO. 2171
SCALE: AS SHOWN DRAWING 26 OF 33

F-13-112



NOTES:
1. ALL DIMENSIONS IN FT-IN (IMPERIAL UNITS) UNLESS NOTED
2. BRIDGE-PLATE IS MANUFACTURED IN METRIC UNITS [mm]

INSTALLATION INSTRUCTIONS

THESE INSTALLATION INSTRUCTIONS ARE INTENDED TO BE USED IN CONJUNCTION WITH THE ENGINEER'S SPECIFICATIONS AND ARE NOT TO SUPERSEDE THEM.

1.0 ASSEMBLY OF STRUCTURE

1.1 THE BRIDGE PLATE SHALL BE ASSEMBLED IN ACCORDANCE WITH PLATE ASSEMBLY DRAWING AND INSTALLATION INSTRUCTIONS PROVIDED.

1.2 BOLTING MUST BE DONE WITH THE CURVED SURFACE OF THE NUT AGAINST THE PLATE.

1.3 BEFORE BACKFILLING, ALL BOLTS SHALL BE TIGHTENED TO A TORQUE OF 150 FT-LBS MINIMUM, 250 FT-lbs MAXIMUM.

2.0 DIMENSIONAL CHECK OF STRUCTURE

2.1 DURING PLATE ASSEMBLY, THE DIMENSIONS OF THE STRUCTURE MUST BE CHECKED AND RECORDED. ANY VARIATIONS SHALL BE WITHIN RECOMMENDED ARMTEC TOLERANCES.

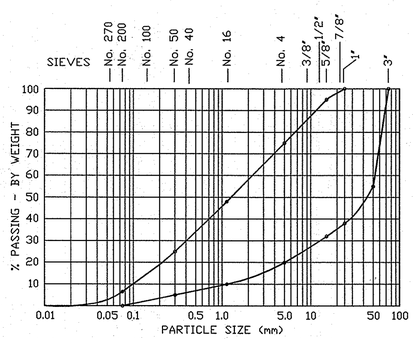
2.2 A REGULAR CHECK IS TO BE MADE OF THE LINE AND DIM- ENSION OF THE STRUCTURE WHILE BACKFILLING PROCEEDS. THIS CHECK SHALL BE USED AS AN EVALUATION OF THE INFLUENCE OF THE COMPACTIVE EFFORTS ON THE SHAPE OF THE STRUCTURE. THE PLUMB BOB METHOD OF MONITORING IS RECOMMENDED FOR THIS CHECKING PROCEDURE. COMPACTIVE EFFORTS MAY INCREASE THE RISE OF THE STRUCTURE.

3.0 BACKFILLING

MATERIAL - BACKFILL GRADATION SPECIFICATIONS

3.1 MATERIAL IN THE CRITICAL BACKFILL ZONE SHALL BE GRANULAR WITH ANGULAR GRAINS. SIEVE ANALYSIS FOR THIS MATERIAL MUST FALL WITHIN THE GRADATION ENVELOPE SHOWN BELOW. MATERIAL MUST BE WELL GRADED. MAXIMUM PARTICLE SIZE IS NOT TO EXCEED 3" WITHIN 1' OF THE STRUCTURE.

3.2 ph OF 5 TO 10 RESISTIVITY NOT LESS THAN 3000 OHM-CMS. CHLORIDES NOT GREATER THAN 100 ppm. SULPHATES NOT GREATER THAN 200 ppm.



SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE

ASTM OR UNIFIED CLASSIFICATION

3.3 MATERIAL OUTSIDE THE CRITICAL BACKFILL ZONE SHALL BE SELECT EMBANKMENT MATERIAL COMPACTED TO 95% STANDARD PROCTOR DENSITY (MINIMUM).

4.0 SPREADING

4.1 HEAVY EQUIPMENT SHALL OPERATE ONLY AS CLOSE TO THE STRUCTURE AS IS ALLOWED BY THE ENGINEER (AS ADVISED BY THE ARMTEC REPRESENTATIVE).

4.2 MATERIAL IS NOT TO BE DUMPED ON TOP OF THE STRUC- TURE BUT SHALL BE DUMPED ON EITHER SIDE AND THEN SPREAD IN LAYERS SUITABLE FOR THE TYPE OF COMPACTION EQUIPMENT BEING USED. TRUCK END-DUMPING OR DOZER PLACEMENT AGAINST THE SIDE OF THE STRUCTURE IS ABSOLUTELY NOT PERMITTED.

4.3 FILL SHALL BE PLACED IN LAYERS WHICH SHALL NOT EXCEED 8" IN DEPTH BEFORE COMPACTION FOR EVEN THE HEAVIEST VIBRATORY ROLLER. HEAVY EQUIPMENT SHALL VEER AWAY FROM THE ENDS OF THE STRUCTURE, SO AS TO REDUCE HORIZONTAL PRESSURES AGAINST THE END OF THE STRUCTURE.

4.4 TRUCKS CAN UNLOAD IN ROUGH LAYERS STARTING NO CLOSER THAN 5' FROM THE SIDEWALLS WHILE MOVING OUT.

4.5 FILL DEPTH SHALL BE MAINTAINED APPROXIMATELY EQUAL ON EACH SIDE OF THE STRUCTURE AT ALL TIMES. THE MAXIMUM DIFFERENCE IN ELEVATION SHALL BE 1'-4".

5.0 COMPACTION

5.1 AREAS CLOSE TO THE STRUCTURE SHALL BE COMPACTED USING VIBRATING OR TAMPING EQUIPMENT RUNNING PARALLEL WITH THE LENGTH OF THE STRUCTURE AT ALL TIMES.

5.2 GRANULAR FILL MATERIAL SHALL BE AT OPTIMUM MOISTURE CONTENT DURING COMPACTION.

5.3 EACH FILL LAYER SHALL BE COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY.

6.0 CROSSING OVER THE TOP

6.1 WHEN THE BACKFILL REACHES AN ELEVATION OF 9'-4"
ABOVE THE TOP OF THE FOOTING, SPREADING AND COMPACTION OVER THE CROWN MUST BE MADE IN A DIRECTION PERPENDICULAR TO THE LENGTH OF THE STRUCTURE (i.e. PARALLEL TO THE CORRUGATIONS) UNTIL THE BACKFILL REACHES THE FINISHED GRADE.

6.2 THE INITIAL COVERING OF THE TOP IS THE MOST CRITICAL LOADING SITUATION AND MUST BE PERFORMED IN THE PRESENCE OF THE ENGINEER OR AN AUTHORIZED REP- RESENTATIVE. 1' OF BACKFILL MUST EXIST AT ALL TIMES BETWEEN THE EQUIPMENT AND THE STRUCTURE. THIS 1' COVER (CUSHION ARCH) MUST BE BUILT UP EVENLY FROM BOTH SIDES. THE EQUIPMENT USED SHALL NOT BE HEAVIER THAN A D-4 CATERPILLAR DOZER (16 000 lbs) FOR SPREADING MATERIAL AND NOT HEAVIER THAN A BUFFALO-BOMAG BW-75S FOR COMPACTION.

6.3 FOR COVER GREATER THAN 1'-8", THE ENGINEER, AT HIS/HER DISCRETION, MAY PERMIT HEAVIER EQUIPMENT. ACTUAL SIZES OF EQUIPMENT AND OPERATION DISTANCE FROM THE STRUCTURE SHALL BE DETERMINED BY THE ENGINEER USING INFORMATION PROVIDED BY THE MONITORING OF THE SHAPE.

6.4 DESIGN VEHICLES/HIGHWAY TRAFFIC MAY ONLY CROSS OVER THE STRUCTURE AFTER FILL IS PLACED AND COMPACTED TO FINISHED HEIGHT OF COVER AS SHOWN ABOVE.

6.5 IF THE BACKFILL IS NOT TO BE PLACED IMMEDIATELY TO THE FINISHED ROAD ELEVATION, A WEARING AND TRAVELLING SURFACE IS TO BE BUILT OVER THE CRITICAL BACKFILL ZONE IN ORDER TO KEEP THE LATTER OPERATIVE AND ADEQUATE TO PERFORM ITS FUNCTION AS A SAFE STRUCTURE AT ALL TIMES.

NO.	DATE	REVISION

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5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: PLATE ARCH CULVERT CROSSING #1
ARMTEC PLATE SPECIFICATIONS

DATE: APRIL 4, 2014 — PROJECT NO. 2171
DESIGN: WKR — DRAFT: WKR — SCALE: AS SHOWN — DRAWING 27 OF 33

F-13-112

STRUCTURAL NOTES & SPECIFICATIONS

1: DEFINITIONS

1.01 Owner: Regan Family

1.02 Contractor: TBD

1.03 Design Structural Engineer: Ryan & Associates, Frederick Office, MD 21740

1.04 Site Civil Engineer: Benchmark Engineering, Inc.

1.05 Site Geotechnical Investigation Engineer: Geolab, Inc.

If any of the above responsibilities change it is the owner's responsibility to notify LSBC/LANE prior to the start of the work. It is the owner's responsibility to make sure all parties listed above are aware of their roles, requirements, responsibilities and final submittals.

1.06 Reference Standards

A. ASTM 3034- Specification for Polyvinyl Chloride (PVC) Plastic Pipe
B. ASTM C 140- Sampling and Testing Concrete Masonry Units and related units
C. ASTM D 422- Gradation of Soils
D. ASTM D 698- (AASHTO T99) Standard Test Methods for Laboratory Compaction Characteristics of Soil using Standard Effort
E. ASTM D 1248- Polyethelene Plastics Extrusion Materials for wire and Cable
F. ASTM D 1557- (AASHTO T 180) Standard Test Method for Laboratory Compaction Characteristics of Soil using Modified Effort
G. ASTM D 1586- Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils
H. ASTM D 2166- Unconfined Compressive Strength of Cohesive Soil
I. ASTM D 2487- Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
J. ASTM D 3080- Direct Shear Test of Soils Under Consolidated Drained Conditions
K. ASTM D 4318- Liquid Limit, Plastic Limit and Plasticity Incex of Soils
L. ASTM D 2850- Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression
M. ASTM A 615- Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
N. ACI 318-02- Concrete Building Design and Construction
O. ACI 315-99 "Manual of Standard Practice for Detailing Reinforcing Concrete Structures"
P. AASHTO LRFD Bridge Design Specifications, 6th Edition, 2012
Q. AASHTO Standard Specifications For Highway Bridges, 17th Edition, 2002
R. AISI Handbook of Steel Drainage & Highway Construction Products, 1994 Edition

2: GENERAL

2.01 Contractor shall notify LSB&C/LANE and the oversite review engineer - RA (Engineer of Record - EOR) responsible for construction certification of any discrepancies, omissions, or conflicts between the various elements of the working drawings and/or specifications before proceeding with any work involved. In all cases, unless otherwise directed by the engineer in writing, the most stringent requirements shall govern and be performed.

2.02 Contractor shall verify all conditions, dimensions and elevations, etc., at the site and shall coordinate work performed by all trades. Do not scale drawings.

2.03 Shop drawings shall be reviewed and approved by the structural engineer (RA) prior to fabrication.

2.04 Sizes, locations, loads, and anchorage of equipment shall be verified in the field with equipment manufacturers (suppliers) prior to fabrication or installation of supporting structures.

2.05 Temporary bracing designed by a professional bracing/structural engineer shall be provided wherever necessary to take care of all loads to which the structure may be subjected, including wind. Such bracing shall be left in place as long as may be required for safety or until all the structure elements are complete, as determined by the bracing engineer.

2.06 During and after construction the contractor and/or owner shall keep loads on the structure within the limits of the design load until turned over to the county or final owner, then the load restrictions shall be enforced by that entity. Maximum loading is HS 25 as determined by AASHTO.

2.07 Contractor shall be responsible for safety and protection within and adjacent to the job site.

2.08 Civil engineer is responsible for erosion and sediment control design.

2.09 Road pavement design and its appurtenance structure are civil engineer's responsibility. Refer to the civil drawings for all pavement and roadway drainage system information and questions thereby to the civil engineer.

3: CONCRETE

3.01 All foundation concrete (footings, walls etc.) shall be normal weight concrete with a compressive strength equal to at least 4,000 psi within 28 days after casting. The water/cement ratio shall be no greater than 0.50 and slump shall be 2-4 inches.

3.02 All concrete work shall be placed, cured, stripped and protected as directed by these specifications and ACI standards and practices.

3.03 Contractor is responsible for all shoring and formwork.

3.04 Concrete design and detailing shall conform to the requirements of ACI 318-08. Contractor shall submit mix designs to the oversite review engineer accompanied by appropriate graphs and background data for approval. Mix design shall indicate 7 and 28-day strengths, cement content, air content, water-cement ratio, amount of fine and coarse aggregates and admixtures.

a. Minimum ultimate compressive strength of concrete at 28 days shall be as follows, unless noted otherwise:

Footings, Stiffeners and Walls concrete:	4000 PSI
Unreinforced concrete:	2000 PSI

3.05 All exterior concrete and concrete exposed to weather shall be air-entrained. (All concrete used on this project)

3.06 Use of additives shall not be permitted unless specifically approved by the oversite review engineer.

3.07 The concrete subcontractor shall not reproduce any portion of the structural contract drawings for utilization as shop drawings.

3.08 Concrete shall be consolidated by means of mechanical vibration. Vibrators shall be inserted and removed vertically at regular intervals not to exceed 18" to ensure uniform consolidation. In no case shall vibrators be used to transport the concrete inside the forms.

3.09 Formwork shall follow ACI 347 "Recommended practice for concrete form work". Forms shall conform to the working drawing to shape, line and dimensions members and shall be substantially free from surface defects and sufficiently tight to prevent leakage. They shall be properly braced and tied to maintain position and shape.

3.10 Fresh concrete will be protected from rain, flowing water and mechanical injury, sun, drying winds and freezing for a period of 7 days. The temperature of the concrete must be kept above 50 degrees F for at least 7 days.

3.11 Cure concrete in accordance with ACI Commitee 308 "Guide to curing concrete". The minimum cure time for footings, stiffeners and retaining walls is seven (7) days (depends on concrete mix design). Use approved curing compund to keep concrete moist to achieve specified strength of 4,000psi. Keep forms in place for seven (7) dayS. Verify strength with seven (7) day break test to confirm concrete will achieve required strength.

3.12 Ground water and surface water within the subgrade excavation area must be maintained below the bottoms of the footer elevation and the bottoms of the excavation during preparation of the subgrade.

3.13 No expansion or contraction joints are required unless otherwise noted in these plans.

3.14 Lean concrete for scour protection can be poured in sections both vertically and horizontally as necessary.

4: GEOTECHNICAL NOTES

4.01 Geotechnical site information provided by GeoLab, Inc..

4.02 All structural fill soils will have a minimum dry density of 135PCF unless indicated otherwise on this drawing set. Fill shall be compacted to at least 95% of the maximum dry density as determined by the standard proctor ASTM D698 (AASHTO T-99) with the exception of the top foot, which will be 100% of the maximum dry density.

4.03 All structural fill material will be placed in layers, which, before compaction, will not exceed eight inches. Each layer shall be spread to ensure conformity of materials in each layer.

4.04 Virgin/undisturbed soils are defined as soils with a minimum SPT "N" value of 12.

5: FOOTINGS

5.01 All footings are based on an allowable soil bearing pressure of 4,000 PSF for retaining wall and 4000 PSF for Arch. Any soil condition encountered during excavation that is contrary to those used for design of footings as outlined in these drawings shall be brought to the attention of the EOR construction oversight engineer for direction before proceeding.

5.02 Bottom of footings shall be a minimum of 30" below finished grade, unless a lower elevation is noted. Footing elevations noted are estimated based on available geotechnical and grading information. All footings adjacent to existing footings shall be lowered to match existing footing elevation.

5.03 All foundation subgrades shall be inspected and approved under the supervision of the RA EOR or their representative prior to pouring concrete. Footings may be lowered to achieve the minimum footing subgrade bearing capacity of 5,000/7,500 PSF. Undercut footing sub-grade as neccesary to achieve 5,000/7,500 psf bearing capacity and fill with unreinforced concrete or stone subgrade in accordance with section 7.05 of these specifications.

6: REINFORCING STEEL

6.01 Reinforcing bars shall be deformed billet steel conforming to ASTM A615, grade 60. All welded wire fabric shall conform to ASTM A185. Bars shall be branded by the manufacture with bar size and grade of steel and certified mill reports shall be submitted to oversite review engineer for approval and record. Reinforcing steel shall be detailed in accordance with the ACI 315-99 "Manual of Standard Practice for Detailing Reinforced Concrete Structures", latest edition. Provide corner bars at junctions of concrete walls and wall footings and lap 48 x bar diameters.

6.02 With wall reinforcing as shown in typical details, size and spacing of corner bars to be same as horizontal wall reinforcing, unless shown otherwise. Where continuous bars are called for, they shall run continuously around corners and lapped as necessary min. 48 x bar diameters. Provide standard hooks at discontinuous ends. Tension and compression lap splices shall not be less than the splice lengths as given in ACI 318. Generally lap top bars at mid span and bottom bars at supports. Provide placing accessories in accordance with ACI recommendations.

6.03 Provide the following minimum concrete cover for reinforcement:

a. Concrete cast against and permanently exposed to earth …3"
b. Concrete exposed to earth or weather:
   No. 6 through No. 18 bars …2"
   No. 5 bar, W31 or D31 wire, and smaller …2"
c. Concrete slabs, walls and joists not exposed to the earth or weather:
   No. 14 and No. 18 bars …1 ½"
   No. 11 bar and smaller …¾"
d. Beams, columns:
   Primary reinforcement, ties, stirrups and spirals … 2"

7: EARTHWORK SPECIFICATIONS

7.01 The contractor shall furnish all labor, material and equipment for the earthwork. The contractor shall perform all work and services except those set out and furnished by Long Span Bridge & Culvert, LLC. (LSBC)/LANE.

7.02 This work shall consist of all clearing and grading, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the project lines, grades, slopes and specifications.

7.03 This work is to be accomplished under the observation of the oversite review engineer or their representative. Placement of the backfill material will not be permitted unless the RA EOR or their representative is on site.

7.04 Prior to bidding the work, the contractor shall examine, investigate and inspect the construction site as to the nature and location of the work and local conditions at the construction site including, without limitation, the character of the surface or subsurface conditions and obstacles to be encountered on and around the construction site; and shall make such additional investigation as they may deem necessary for the planning and proper execution of the work.

7.05 The EOR or their representative in the field shall verify the subgrade soil condition, gravel, and the rock quality. All stone subgrade shall be compacted with a vibratory plate compactor in no more than 8" lifts and verified by the EOR or their representative.

7.06 If conditions other than those indicated by the confirmatory subsurface boring program are encountered by the contractor, Long Span Bridge & Culvert, LLC (LSBC/LANE) and RA should be notified immediately. The material, which the contractor believes to be a changed condition, should not be disturbed so that RA, LSBC/LANE and/or their designated representative can investigate the condition.

7.07 The work for clearing and grubbing includes furnishing all labor, materials, transportation, supervision, tools and construction machinery, which may be necessary to accomplish the clearing and grubbing for this project area.

7.08 All trees, bushes, etc., shall be removed from the limits of the proposed areas to receive fill or other engineered structures. The areas may be extended outside the actual lines of construction only to the distance required to provide the contractor with sufficient space to perform the work.

7.09 All stumps, vegetation, brush, debris or deleterious materials shall be removed from the limits of the fill or other engineered structures.

7.10 The work for stripping includes furnishing all labor, materials, transportation, supervision,tools and construction machinery, which may be necessary to be provided by the contractor.

7.11 When the construction/operation sequence requires, the area of fill or other engineered structures shall be properly stripped. This stripping shall include topsoil and other deleterious materials. Topsoil shall be removed to its full depth and stockpiled for use in the final cover. Any rubbish, organic and objectionable soils and other deleterious material shall be properly disposed of at a site approved by owner or LSBC/LANE.

7.12 The lines and grades shall be established by using control benchmarks provided by licensed surveyors.

7.13 Soft or spongy cohesive or silty materials encountered at the base of the excavation shall be removed at the direction of the EOR or their representative. The excavation for the footing wall foundations shall be observed and subgrade-bearing capacity certified by the EOR upon completion of this task. At the direction of the EOR or their representative, soft material will be removed to a depth directed by the EOR or their representative, and replaced with granular backfill compacted at least 100% of the maximum dry unit weight density at a moisture content within 2% of optimum as determined by AASHTO T-99 method / ASTM D698.

7.14 No select granular backfill may be placed, without being observed by LSBC/LANE's/RA's shape control technician.

7.15 Ground water and surface water within the subgrade excavation area must be maintained at least 3 feet below the footer elevation during preparation of the subgrade, If additional excavation is required to remove unsuitable materials, the water must be maintained 3 feet below the deepest excavation elevation.

7.16 The subgrade shall be compacted with a soil vibratory compactor or equivalent with a dynamic force of 50,000 pounds (min.). The top 1 foot of the subgrade soil shall be compacted to at least 100% of the maximum dry unit weight at a moisture content within 2% of optimum as determined by AASHTO T-99 method (standard proctor). All compaction and subgrade bearing capacity to be verified by the site geotechnical engineer or representative.

7.17 All select granular backfill material around the culvert and above the footing shall consist of AASHTO M 145 A-1-a. Recycled concrete material shall not be allowed. The select backfill material shall have fines (pass no. 200 sieve material) maximum 15% by weight. See typical select backfill chart this sheet.

7.18 The select granular backfill material and site soil backfill for the adjoining embankment material shall be tested in the laboratory for grain size distribution (AASHTO T-27 for granular material; AASHTO T-88 for soil material) and moisture-density relationship (AASHTO T-99). The testing described above is for purposes of verification of site soil backfill parameters and is in addition to the general project specifications for the embankment backfill, but does not supersede project specifications that may be more stringent.

7.19 All backfill operations shall place the material evenly on both sides of the plate arch and each lift shall extend for the entire length of the plate arch prior to placement of the next sequential lift. Fill placement shall begin in the middle of the plate arch length and extend equally on both sides in the upstream and downstream directions.

7.20 The select granular backfill shall be placed in horizontal layers not to exceed 8" loose depth. The lift thickness may be reduced by the EOR or their representative to obtain the required compaction, fill all the voids, achieve the proper seating of the backfill material and achieve the stability of the backfill material and the plate arch. The granular backfill shall be compacted to 95% of the maximum dry unit weight as determined by the standard proctor test (AASHTO T-99). Greater emphasis shall be given to a uniform degree of compaction throughout each lift than to achieving a degree of compaction greater than the minimum specified criteria. The site Geotechnical Engineer shall do testing of select granular backfill.

7.21 All granular material shall be compacted using mechanical devices, vibrating plates or other equipment approved by the EOR. Compaction equipment weighing more than 24,000 pounds shall not be used within 2.5' of the corrugated metal structure. The compaction equipment shall be capable of compacting the material under the haunch of the plate arch (I.E.; below the spring line of the plate arch).

7.22 The soil backfill (compacted normal backfill) within 32'-0" or to natural undisturbed embankment backfill on each side shall be placed in layers not to exceed 8" loose depth. The lift thickness may be reduced by the Site Geotechnical Engineer to obtain the required compaction. The soil backfill shall be compacted to a minimum of 95% of the maximum dry unit weight as determined by the standard proctor test (AASHTO T-99) and to a moisture content within 2% of the optimum moisture content as determined by the same test. Field nuclear density test shall be performed at a minimum frequency of four tests per every other lift and every 25' on the soil backfill on each side of the structure. The testing described above is in addition to the general project specifications for the embankment backfill, but does not supersede project specifications that may be more stringent than those requirements. The Site Geotechnical Engineer is responsible for testing and recording measurements of the soil backfill.

7.23 If at any time longitudinal cracks develop in the backfill surrounding the pipe to a distance of 30' from the spring line of the plate arch, these features must be brought to the immediate attention of the field QA/QC personnel and the EOR.

7.24 While compacting granular backfill material with a vibrator compactor and adjacent to the plate arch, the opposite side of the plate arch should be observed to note if vibrations are loosening the granular material on that side. This may be more prevalent at higher elevations of the backfill with respect to the plate arch. If this condition occurs, the field QA/QC technician and EOR should be notified prior to placement of a sequential lift on either side.

7.25 The structure should not be crossed with equipment heavier than a D4 dozer. No other equipment or highway (HS25) loading shall be allowed to cross the structure until the asphalt pavement is placed unless there is a minimum of 12" of soil cover or span/8 inches of soil cover whichever is greater, covering the plate arch. Top filling should begin at the middle of the structure (lengthwise) with the backfill being pushed up and over the structure with a D4 or preferably smaller type dozer. The fill should be pushed over the structure in a manner 45 to 90 degrees to the axis of the structure. Density test for structural fill are not required as long as the A-1-a material is vibrated with a vibratory smooth drum roller and moisture is +/-2% of optimum of a standard proctor maximum dry density. Density tests for regular soil backfill shall be performed at a minimum frequency of four tests per every lift on the soil backfill on each side of the structure. The testing described above is in addition to the general project specifications for the embankment backfill, but does not supersede project specifications that may be more stringent than those requirements. The contractor shall submit to the owner samples of all proposed soil backfill material for laboratory testing to verify moisture and density relationships (AASHTO T-99/ASTM D698) and grain size relationships (AASHTO T-27/ASTM C136).

7.26 All construction to be certified at the end of the job by a Professional Structural/Geotechnical Engineer (oversite review engineer - the EOR) qualified in the design and construction of plate arch culverts (minimum 10 years experience) that all work performed by contractor meets these design requirements and specifications. Certification to be submitted to LSBC/LANE, RA and the local jurisdiction for record file.

8: REQUIRED SUBMITTALS

8.01 The contractor must submit the following items to the oversite review engineer for approval in writing at least 2 weeks prior to use:
a. Manufacturer certification for yield strength of reinforcing steel.
b. Manufacturer certification for concrete design.
c. Shop drawings of all concrete work.
d. Plate arch shop drawings.

9: DEWATERING REQUIREMENTS

9.01 Dewater footing excavations using sump pumps or well points as required. Footing excavation must be dewatered and maintained that way for a minimum of seven days or concrete strength of 3,000psi has been reached, whichever is greater

10: CONSTRUCTION OVERSIGHT CERTIFICATIONS

9.01 The plate arch construction requires engineering oversight and inspection. The oversite reviewer/EOR, Civil, Structural and Geotechnical Engineers must provide LSBC/LANE certification reports of all footings and retaining wall/headwalls reinforcing placement and the following items:
a. Subgrade bearing capacity and backfill (select granular and compacted normal backfill) compaction testing, field reports, testing results, testing locations, and registered professional engineer's certification.
b. Field reports of concrete placement review, laboratory test results of concrete cylinder breaks at 7 and 28 days and certified by a Registered Professional Structural Engineer.
c. Final report of construction certification that the construction was performed in accordance with the design and the material testing and inspection verifying the same, stamped by a Registered Professional Structural/Geotechnical Engineer.

11: ENVIRONMENTAL PERMITTING

10.01 Environmental permitting must be addressed and applied for with the State (MDE) and Army Corp of Engineers, as required.

12: SAFETY

11.01 All contractors (and owners), their representatives and their crew must be qualified/certified to perform all works within their scope. They must adhere to OSHA's health and safety laws. The General Contractor is solely responsible for all site safety.

13: RA'S RESPONSIBILITY

12.01 RA's scope of work for this project are design of plate arch (minimum steel thickness stress analysis), footings, headwalls and wingwalls. Engineering Construction Review of Arch & Walls installation, footings, steel & concrete forming, and structural backfill placement is required. RA may contracted for this work also. Acceptance of the plan drawings by our client & the owner means they agree to our scope and responsibilities.

14: LONG SPAN BRIDGE & CULVERT, LLC/LANE SCOPE OF WORK

13.01 Long Span Bridge & Culvert, LLC (LSBC)/LANE will deliver, furnish and assemble the Long Span low profile arch on footings designed by Ryan & Associates and prepared by Site Contractor. The base channel will be furnished by LSBC and installed in the concrete foundations by the Site Contractor in accordance with the plans. Structural plate for this job to be 7ga (.187" thick) steel.

13.02 LSBC/LANE will conduct a pre-construction meeting prior to foundation preparation and arch assembly. Attendance at the pre-construction meeting is mandatory for the owner or the owner's representative (e.g. Site Civil Engineer, Site Contractor and Concrete Contractor) and the oversite review Structural/Geotechnical Engineer. It is the owner's responsibility to have each party in attendance. If a party is not in attendance it is the owner's responsibility to inform that entity of its responsibilities and duties prior to the start of work.

13.03 LSBC/LANE/RA will provide a shape control technician to monitor structure's shape and observe the proper placement and compaction of the select fill material, unless provided otherwise and approved in writing by LSBC/LANE/RA.

13.04 LSBC/LANE will require the Site Contractor to unload the structure plates and base channel. LSBC/LANE will require the Site Contractor to provide access to the structure for a rubber-tired crane. Parallel access roads shall be within 30' of the centerline of the structure on each side.

BACKFILL CHART

AASHTO M 145- TABLE 2 (MODIFIED*)

GROUP CLASSIFICATION	A-1		A-2 (MODIFIED)	
SIEVE ANALYSIS, PERCENT PASSING	A-1-a	A-1-b	A-2-4	A-2-5
NO. 10 (2.00 mm)	50 max	----	----	----
NO. 40 (.425 mm)	30 max	50 max	----	----
NO. 100 (.150 mm)	----	----	50 max	50 max
NO. 200 (.075 mm)	15 max	25 max	20 max	20 max
Characteristics of fraction passing No. 40 (0.425 mm)				
Liquid Limit	----	----	40 max	41 max
Plasticity Index	6 max	6 max	10 max	10 max
Usual Material Types	Stone Fragments Gravel and Sand		Silty or Clayey Gravel and Sand	

*Modified to be more select than M-145

NO.	DATE	REVISION

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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; William K. Ryan, P.E. License No. 21586, Expiration Date: 5-9-2015.

STATE OF MARYLAND · WILLIAM KARL RYAN · No. 21586 · PROFESSIONAL ENGINEER

4/8/2014

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

DRAWN BY: WKR
DESIGN BY: WKR
CHECKED BY: WKR
DATE: 03/27/2014

DO NOT SCALE THIS DRAWING; DIMENSIONS AND NOTES HAVE PRECEDENCE OVER DRAWING

CLIENT: LANE/LSB&C
OWNER: MB Highland Reserve, LLC
JOB No: 1101-14-03

Ryan & Associates
A Division of WKR Consulting Inc.
SPECIALIZING IN STRUCTURAL & GEOTECHNICAL ENGINEERING
e-mail: info@ryanandassociates.net
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10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723
KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

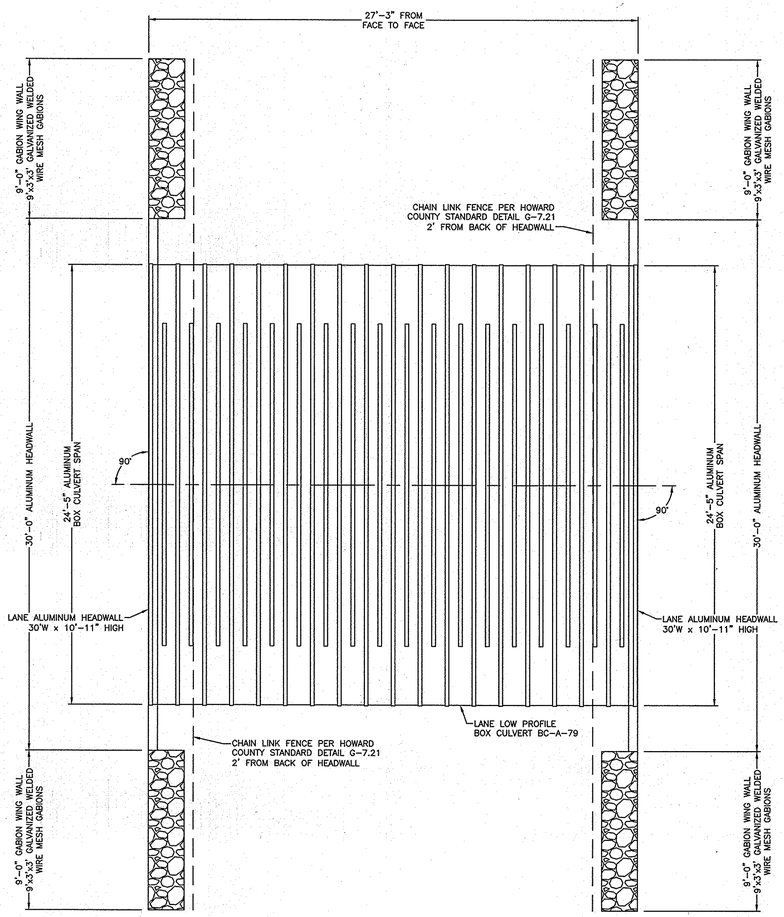
PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION: TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: PLATE ARCH CULVERT CROSSING #1
STRUCTURAL NOTES & SPECIFICATIONS

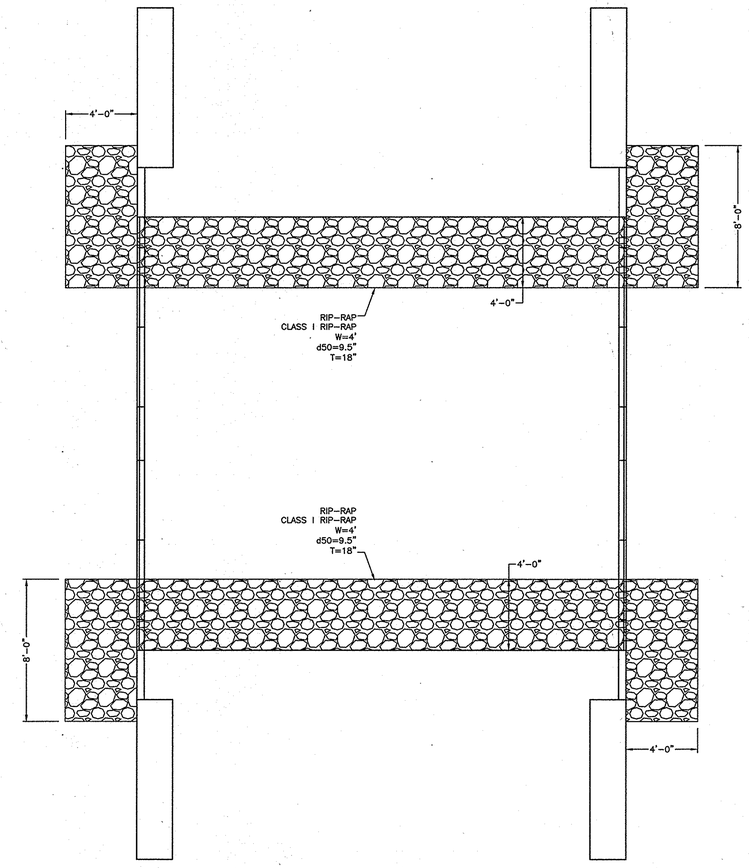
DESIGN: WKR DRAFT: WKR
DATE: APRIL 4, 2014 PROJECT NO. 2171
SCALE: AS SHOWN DRAWING 28 OF 33

F-13-112



BOX CULVERT PLAN VIEW

SCALE: ¼"=1'



RIP-RAP PROTECTION FOR CROSSING #2

SCALE: ¼"=1'

Culvert Data

Lane Low Profile Aluminum Box Culvert (BC-A-79) w/ Footer Plates*
Span: 24'-5"
Rise: 8'-11"
Thickness: 0.125" (Crown & Haunch)
External Ribs: Type VI (Crown & Haunch)

Culvert Design Data

Culvert Loading: AASHTO H525
Culvert Cover Heights: 2' Min. (Top of Crown to bottom of Flexible Pavement)
3' Max. (Top of Crown to Finish Grade)
Culvert Footer Plates: Minimum Soil Bearing Pressure Req. 4000 psf. (Confirmed by Others)
Headwall Design Pressure: Earth Pressure Only

*At time of excavation for footer plates, subgrade bearing to be inspected and verified by Geotechnical Engineer that subgrade meets or exceeds assumed design allowable bearing capacity for footer plates.

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-9-14

CONCEPT DRAWINGS ONLY, PROFESSIONALLY ENGINEERED SHOP DRAWINGS REQUIRED FOR APPROVAL.

NO.	DATE	REVISION

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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, William K. Ryan, P.E. License No. 21586, Expiration Date: 5-9-2015.

STATE OF MARYLAND — WILLIAM KARL RYAN — No. 21586 — PROFESSIONAL ENGINEER

4/8/2014

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301.672.4820

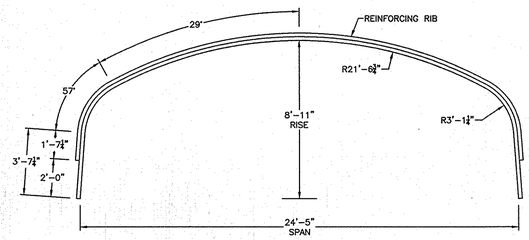
PROJECT: REGAN PROPERTY
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E', and A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
PLATE BOX CULVERT CROSSING #2
CULVERT PLAN VIEWS

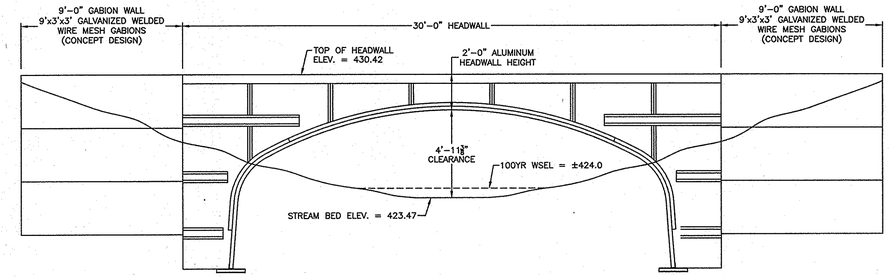
DATE: MARCH, 2014 — PROJECT NO. 2171
DESIGN: JCO — DRAFT: JDS — SCALE: NO SCALE — DRAWING 29 OF 33

F-13-112



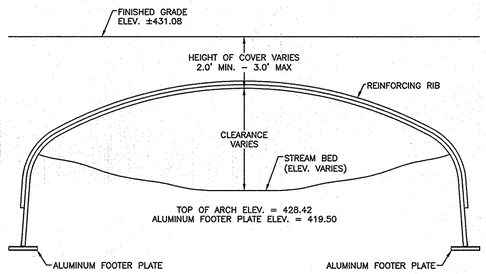
ALUMINUM BOX CULVERT SECTION VIEW

SCALE: ¼"=1'



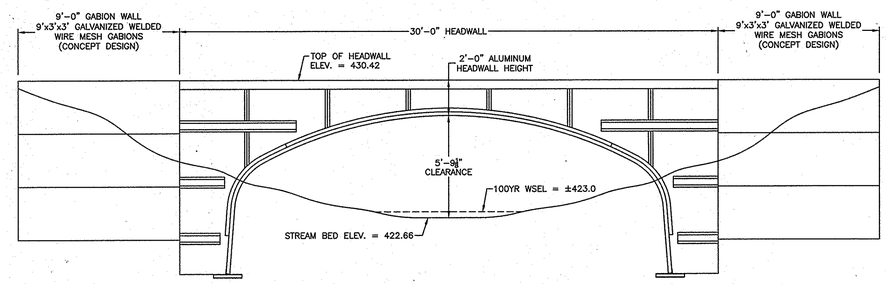
UPSTREAM END ELEVATION

SCALE: ¼"=1'



TYPICAL BRIDGE SECTION VIEW

SCALE: ¼"=1'



DOWNSTREAM END ELEVATION

SCALE: ¼"=1'

CONCEPT DRAWINGS ONLY, PROFESSIONALLY ENGINEERED SHOP DRAWINGS REQUIRED FOR APPROVAL.

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STATE OF MARYLAND — WILLIAM KARL RYAN — No. 21586 — PROFESSIONAL ENGINEER

4/8/2014

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LOCATION:
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5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE:
PLATE BOX CULVERT CROSSING #2
CULVERT SECTION & END VIEWS

DESIGN: JCO	DRAFT: JDS	DATE: MARCH, 2014	PROJECT NO. 2171
		SCALE: NO SCALE	DRAWING 30 OF 33

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

F-13-112

A. GENERAL

1. This specification covers the manufacture and installation of aluminum structural plate box culverts, consisting of aluminum structural plate, stiffening ribs, and appurtenances. Material and geometric requirements shall conform to AASHTO M219 and ASTM B864. Geometric requirements shall also conform to Figure 12.9.4.1–1 and Table 12.9.4.1–1 of the AASHTO LRFD Bridge Design Specifications. Box culvert dimensions, plate thicknesses, rib type and spacing, end treatment, and foundation (full invert or footings) shall be as indicated on project plans. Bolts and nuts shall conform to the requirements of ASTM A307 or ASTM A449 and shall be galvanized in accordance with ASTM A153.
2. Cover heights shown are based on AASHTO LRFD Bridge Design Specifications (5th Edition) as modified by applicable requirements contained in PennDOT Design Manual Part 4. Lane takes full responsibility for engineering theory, calculation correctness, and ensuring that all design assumptions are validated in the contract document either by needed details or construction specifications.
3. Footing reactions depend on the actual cover height and shall be calculated in accordance with Section 12.9 of the AASHTO LRFD Bridge Design Specifications and/or PennDOT Design Manual Part 4.
4. Standard design is for square end structures. Culvert ends requiring bevels or skews may require additional features to be incorporated into the shop drawings by the manufacturer.
5. Contractor is to certify that all information shown on the drawings has been thoroughly checked.

B. PROJECT DESIGN

1. Secure Project Engineers review and approval for use of box culvert (size & shape).
2. Rib and plate combinations for the various shell configurations not shown in the cover height tables require computational support consistent with the development of said table, signed and sealed by a licensed professional engineer.
3. As applicable, provide a suitable footing design for the application, complete with engineering calculations signed and sealed by a professional engineer. The design shall incorporate soil bearing capacities per geotechnical report documents, or otherwise determined by investigation.
4. Place footings below scour and frost depths. Place bottom of footing at a minimum depth equal to the prevailing frost depth or scour depth. If non–yielding material is found above the scour depth, the height of non–yielding material shall govern.
5. Assembly drawings and footing design shall be incorporated into construction plans.
6. The following order of precedence governs any real or apparent conflict between design parameters, stresses or specifications:

   a. Design requirements listed in "Special drawings and special design requirements" of the special provisions
   b. AASHTO LRFD Bridge Design Specifications

7. Do not change the bottom of the footing elevation unless appropriately authorized by both the Design Engineer and Geotech Engineer.
8. The type and extent of end treatment on the box culvert should be chosen and designed so as to prevent the loss of backfill due to high flow conditions.
9. Headwall construction shall be for vertical orientation only. Any design, other than vertical orientation, must be reviewed by the manufacturer and/or design engineer.

C. Structure Assembly

1. The box culvert shall be assembled in accordance with the shop drawings provided by Lane Enterprises.
2. Plate laps must be properly mated in a tangent fashion using proper alignment techniques and adequate bolt torque to seat the corrugation. The recommended installation bolt torque for aluminum box culverts is 90–115 ft–lbs for invert plates and 100–150 ft–lbs for all other components.

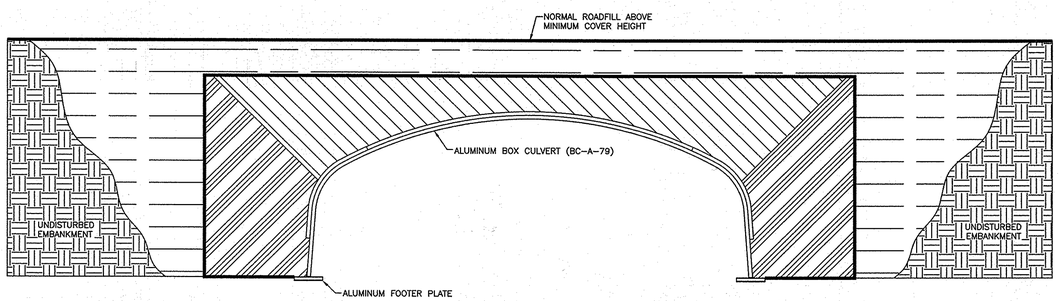
D. Construction

1. The work consists of furnishing, erecting and backfilling an aluminum structural plate box culvert on concrete footings, corrugated footer plates, or a corrugated invert plate. The work includes excavation of on–site soils, proper trench construction, and structure placement to the lines, grades and locations shown on approved project drawings.
2. The box culvert shall be installed in accordance with the plans and specifications, the manufacturer's recommendations and Section 26 of the AASHTO LRFD Bridge Construction Specifications. The contractor shall take special note that aluminum structural plate box culverts are flexible by nature and therefore derive structural stability from the strength and relative stiffness of the surrounding backfill material. It is the resulting soil–culvert interaction system that defines the ability of the flexible box culvert to withstand the defined service loads.
3. The structure shall be backfilled using a clean, well graded granular material that meets the requirements of AASHTO M145 for soil classifications A–1, A–3, A–2–4, or A–2–5. Backfill must be placed symmetrically on each side of the structure in 6 to 8–in lifts. Each lift shall be compacted to a minimum of 90% modified density per AASHTO T180.
4. If less than 3–ft of space is available on either side of the box culvert, concrete grout or a flowable fill may be required to ensure compaction against undisturbed soil.
5. The equivalent of a Caterpillar D4 bulldozer or smaller to operate near and above the structure during backfilling to finish grade.
6. Minimum cover may need to be increased for construction vehicle loads larger than a Caterpillar D4 bulldozer, but shall not exceed the maximum allowable cover for the box culvert design.
7. When using a full invert or footer plates, the foundation shall have a minimum of 4,000 psf bearing capacity and include 6–in stable, well–graded granular bedding (lower bearing capacities can be accommodated through special design or the use of concrete footings).

E. Structural Backfill

1. Structural backfill to be well graded granular, A–1, A–3, A–2–4, or A–2–5, per AASHTO M145, placed in six– to eight–inch lifts symmetrically on each side compacted to minimum 90% modified density per AASHTO T180.
2. For A–2 materials, moisture content must be between –3% to +2% of optimum as defined by AASHTO T180.
3. Structural backfill shall be free of organic material, frozen lumps, and rock fragments larger than three inches.
4. If less than 3–ft of space is available on either side of the box culvert, concrete grout may be required.
5. Equipment used to compact backfill within 3–ft from edge of footing shall be approved by the engineer prior to use.
6. Continuous culvert shape monitoring shall be conducted to correct any undue distortions.
7. As a minimum, structural backfill shall extend above the crown to the minimum cover specified for the box culvert.
8. Minimum cover may need to be increased for construction vehicle loads larger than the D4 dozer, but shall not exceed the maximum allowable cover for the box culvert design.

Sieve Analysis, Percent Passing				
Group Classification	**A-1**	**A-3**	**A-2-4**	**A-2-5**
No. 10 (2.00 mm)	——	——	——	——
No. 40 (0.425 mm)	50 max	51 max	——	——
No. 100 (0.150 mm)	——	——	50 max	50 max
No. 200 (0.075 mm)	25 max	10 max	20 max	20 max
Characteristics of fraction passing No. 40 (0.425 mm)				
Liquid Limit	——	——	40 max	41 max
Plasticity Index	6 max	Non-plastic	10 max	10 max
Typical Constituent Materials	Stone Fragment, Gravel and Sand	Sand	Silty or Clayey Gravel and Sand	



CRITICAL BACKFILL ZONE (GREATEST PRESSURE ON SOIL).

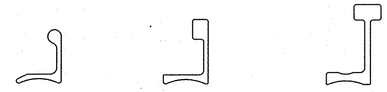
INITIAL LIFTS OVER CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH SMALL TRACTOR DRAWN EQUIPMENT.

SELECT GRANULAR STRUCTURAL BACKFILL LIMITS.

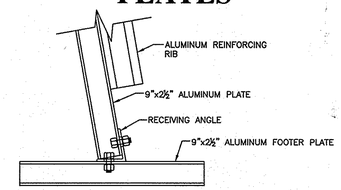
BACKFILL DETAIL

SCALE: ¼"=1'

TRANSVERSE RIB STIFFENERS



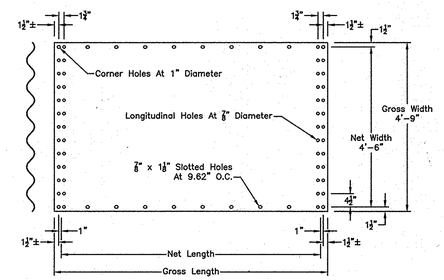
ALUMINUM FOOTER PLATES

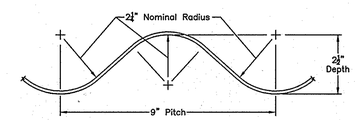


Footer plates requiring a thickness greater than 0.250" will be composed of two plates equaling the composite thickness required.

STANDARD PLATE DETAIL

(PLATE & APPURTENANCES IN ACCORDANCE WITH AASHTO M219)





Standard Sizes and Weights										
Length	Net Length	Gross Length	Weight Per Plate							
*N	in.	in.	0.100	0.125	0.125	0.150	0.175	0.200	0.225	0.250
8N	76.96	81.71	52.7	65.9	65.9	79.1	92.2	104.7	117.8	130.9
9N	86.58	91.33	58.9	73.6	73.6	88.4	103.1	117.8	132.6	147.3
10N	96.20	100.95	65.1	81.4	81.4	97.7	114.0	130.2	146.5	162.8
11N	105.82	110.57	71.3	89.2	89.2	107.0	124.8	142.6	160.5	178.3
12N	115.44	120.19	77.5	96.9	96.9	116.3	135.7	155.1	174.4	193.8
13N	125.06	129.81	83.7	104.7	104.7	125.6	146.5	167.5	188.4	209.3
14N	134.68	139.43	89.9	112.4	112.4	134.9	157.4	179.9	202.4	224.8
15N	144.30	149.05	96.1	120.2	120.2	144.2	168.3	192.3	216.3	240.4
16N	153.92	158.67	102.4	127.9	127.9	153.5	179.1	204.7	230.3	257.8
17N	163.54	168.29	180.6	135.7	135.7	162.8	190.0	217.1	244.2	271.4
18N	173.16	177.91	114.8	143.5	143.5	172.1	200.8	229.5	258.2	286.9

Notes:
(1) Weights based on nominal thickness.
(2) Bolt holes have not been deducted.
(3) *N = 9.62"

CONCEPT DRAWINGS ONLY, PROFESSIONALLY ENGINEERED SHOP DRAWINGS REQUIRED FOR APPROVAL.

NO.	DATE	REVISION

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
(P) 410–465–6105 (F) 410–465–6944
75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301–710–5688
WWW.BEI–CIVILENGINEERING.COM

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, William K. Ryan, P.E. License No. 21586, Expiration Date: 5-9-2015.

STATE OF MARYLAND — WILLIAM KARL RYAN — No. 21586 — PROFESSIONAL ENGINEER

4/8/2014

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

LANE

LONGSPAN Bridge & Culvert, LLC

LANE ENTERPRISES, INC. - LSB&C DIVISION
8271 MERCER ST., PULASKI, PA 16143
LANE: 724-652-7747
LSB&C: 888-949-5722

OWNER/DEVELOPER:
RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050

SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723

KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A', and NON–BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON–BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601–22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP–12–004, ECP–12–045, WP–13–025

TITLE:
PLATE BOX CULVERT CROSSING #2
PLATE SPECIFICATIONS

DATE: MARCH, 2014 — PROJECT NO. 2171

DESIGN: JCO — DRAFT: JDS — SCALE: NO SCALE — DRAWING 31 OF 33

F–13–112

BORING LOG — GEOLAB, INC.

Report No.: | Date: 5/20/2013

Client: Benchmark Engineering, Inc.

Project: Regan Property, Clarksville, Maryland | Project No. 112-041

Boring No.: SB-1 (1 of 1) | Total Depth 15 | Elev. 385.5 | Location: See Boring Location Plan

Type of Boring: Hollow-stem Auger | Started: 5/11/13 | Completed: 5/11/13 | Driller: Free State Drilling, Inc.

Elevation	Depth	DESCRIPTION OF MATERIALS (classification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
385.5	0.0	Sod with root (organic) matter and organic soil.				Groundwater was encountered during drilling at a depth of 6.0 feet. At the end of the day, the water level was at a depth of 2.0 feet.
384.6	0.9	Light brown silty fine to medium SAND, wet, very loose (SM)	0,0,3	1.0 / 2.5	34.5	
382.5	3.0	Gray micaceoius fine to course SAND with some gravel and little silt, moist, medium dense (SM)	6,7,6	3.5 / 5	13.1	
380	5.5	Light to dark brown micaceous silty fine to medium SAND, moist, loose to dense to medium dense (SM)	5,4,5	6.0 / 7.5	26.4	
			8,13,18	8.5 / 10	19.5	
			11,12,17	13.5 / 15	16.6	
370.5	15.0	End of Boring				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

BORING LOG — GEOLAB, INC.

Report No.: | Date: 5/20/2013

Client: Benchmark Engineering, Inc.

Project: Regan Property, Clarksville, Maryland | Project No. 112-041

Boring No.: SB-2 (1 of 1) | Total Depth 19.5 | Elev. 385.6 | Location: See Boring Location Plan

Type of Boring: Hollow-stem Auger | Started: 5/11/13 | Completed: 5/11/13 | Driller: Free State Drilling, Inc.

Elevation	Depth	DESCRIPTION OF MATERIALS (classification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
385.6	0.0	Sod with root (organic) matter and organic soil				Groundwater was encountered during drilling at a depth of 11.0 feet. At end of day, the water level was at 2.9 feet. Boring terminated at a depth of 19.5 feet due to auger refusal.
384.8	0.8	Dark brown clayey SILT with little fine sand, wet, soft (ML)	1,2,2	1.0 / 2.5	30.2	
382.6	3.0	Gray micaceoius fine to course SAND with some gravel and little silt, moist, medium dense (SM)	7,9,12	3.5 / 5	12.9	
380.1	5.5	Brown to grayish brown micaceous silty fine to medium SAND, wet, loose (SM)	3,3,4	6.0 / 7.5	30.2	
			5,5,5	8.5 / 10	29.1	
372.6	13.0	Tan fine to coarse sandy GRAVEL (rock fragmente) with trace silt, moist, medium dense (GP-GM)	9,9,15	13.5 / 15	10.1	
370.6	15.0	Brown and tan micaceous silty fine to medium SAND with little gravel, moist, very dense (SM)	24,50+	18.5 / 19.5	9.9	
366.1	19.5	End of Boring				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

BORING LOG — GEOLAB, INC.

Report No.: | Date: 5/20/2013

Client: Benchmark Engineering, Inc.

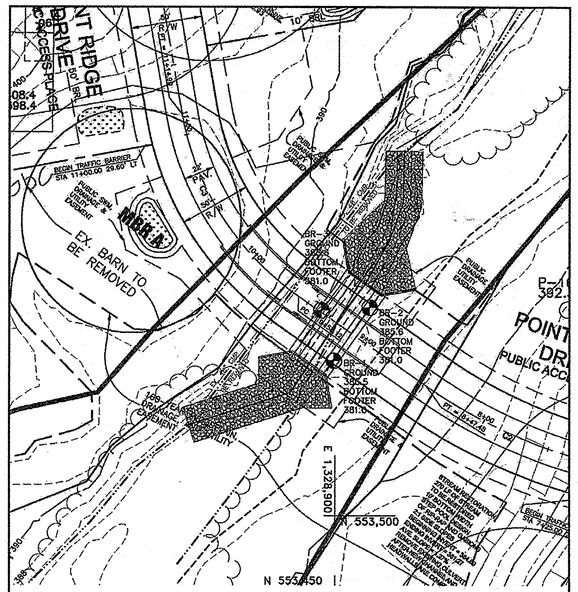
Project: Regan Property, Clarksville, Maryland | Project No. 112-041

Boring No.: SB-3 (1 of 1) | Total Depth 14.5 | Elev. 385.6 | Location: See Boring Location Plan

Type of Boring: Hollow-stem Auger | Started: 5/11/13 | Completed: 5/11/13 | Driller: Free State Drilling, Inc.

Elevation	Depth	DESCRIPTION OF MATERIALS (classification)	*Sample Blows	Sample Depth (Feet)	Moisture Content	REMARKS
385.6	0.0	Sod with root (organic) matter and organic soil.				Groundwater was encountered during drilling at a depth of 6.0 feet. At completion, the water level was recorded at a depth of 5.0 feet. At the end of the day, the water level was at a depth of 3.0 feet.
384.5	1.1	Dark brown SILT with some fine sand, wet, loose (ML)	1,1,2	1.0 / 2.5	39.1	
382.6	3.0	Gray micaceoius fine to course SAND with some gravel and little silt, moist, medium dense (SM)	7,8,12	3.5 / 5	7.9	
380.1	5.5	Dark gray micaceous silty fine to medium SAND, moist, medium dense to very dense (SM)	11,12,18	6.0 / 7.5	20.7	
			4,9,12	8.5 / 10	17.4	
			21,50+	13.5 / 14.5	13.1	
371.1	14.5	End of Boring				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.



BENCHMARK ENGINEERING, INC.

REGAN PROPERTY
BORING LOCATION PLAN

THIRD ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
SCALE: 1" = 50' DATE: 5-7-13

NO.	DATE	REVISION

BENCHMARK
ENGINEERS ▲ LAND SURVEYORS ▲ PLANNERS
ENGINEERING, INC.
8480 BALTIMORE NATIONAL PIKE ▲ SUITE 315 ▲ ELLICOTT CITY, MARYLAND 21043
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75 THOMAS JOHNSON DRIVE ▲ SUITE E ▲ FREDERICK, MARYLAND 21702
301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date: 7-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER

4/10/2014

OWNER/DEVELOPER:

RONALD R. REGAN
56B ORCHARD BEACH BLVD
PORT WASHINGTON, NY
11050

SCOTT T. REGAN
10509 TWIN CEDAR COURT
LAUREL, MARYLAND 20723

KELLY R. REGAN
12859 ROUTE 108
HIGHLAND, MARYLAND 20777
301.672.4820

PROJECT: **REGAN PROPERTY**
LOTS 2 thru 23; BUILDABLE PRESERVATION PARCEL 'A', and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E'
A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION:
TAX MAP No. 34, GRID No. 24, PARCEL No. 200
5th ELECTION DISTRICT
HOWARD COUNTY, MARYLAND
DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: FINAL ROAD CONSTRUCTION PLAN
BORING LOG PLAN

DATE: MARCH, 2014 | PROJECT NO. 2171

DESIGN: JCO | DRAFT: JCO | SCALE: NO SCALE | DRAWING 32 OF 33

APPROVED: DEPARTMENT OF PUBLIC WORKS

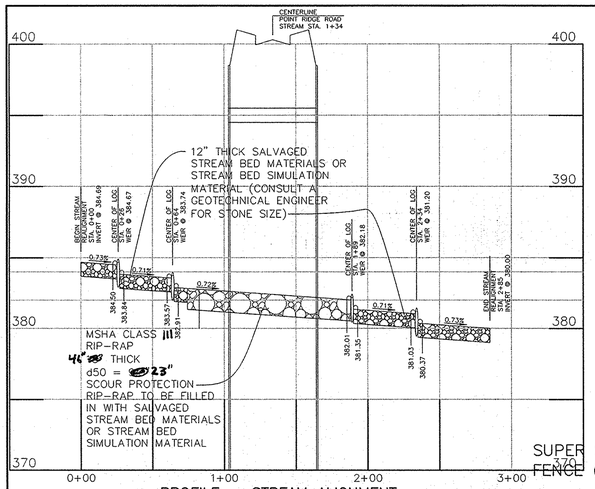
CHIEF, BUREAU OF HIGHWAYS — DATE 4-29-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

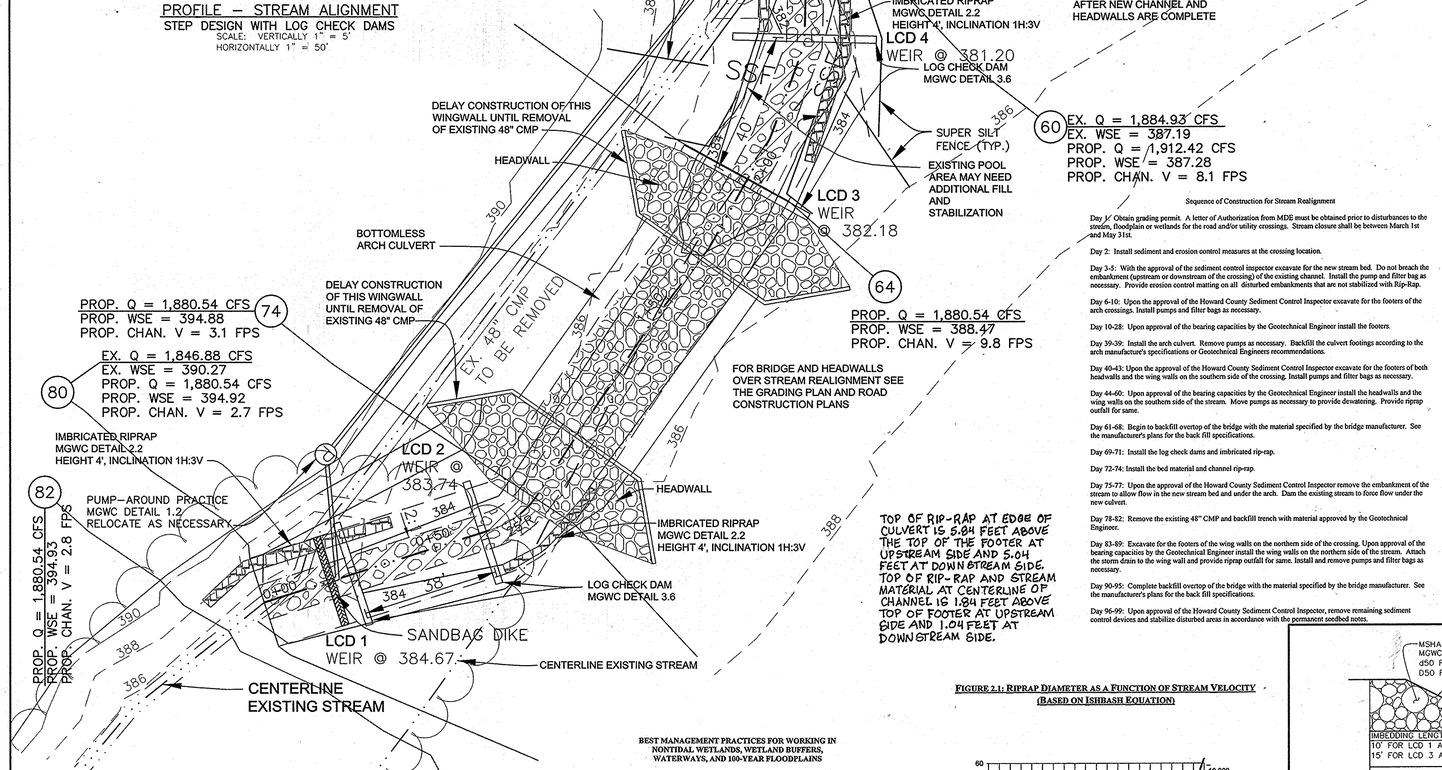
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5.9.14

F-13-112



PROFILE – STREAM ALIGNMENT
STEP DESIGN WITH LOG CHECK DAMS
SCALE: VERTICALLY 1" = 5'
HORIZONTALLY 1" = 50'



TOP OF RIP-RAP AT EDGE OF CULVERT IS 5.04 FEET ABOVE THE TOP OF THE FOOTER AT UPSTREAM SIDE AND 5.04 FEET AT DOWNSTREAM SIDE. TOP OF RIP-RAP AND STREAM MATERIAL AT CENTERLINE OF CHANNEL IS 1.84 FEET ABOVE TOP OF FOOTER AT UPSTREAM SIDE AND 1.04 FEET AT DOWNSTREAM SIDE.

Sequence of Construction for Stream Realignment

Day 1: Obtain grading permit. A letter of Authorization from MDE must be obtained prior to disturbances to the stream, floodplain or wetlands for the road and/or utility crossings. Stream closure shall be between March 1st and May 31st.

Day 2: Install sediment and erosion control measures at the crossing location.

Day 3-5: With the approval of the sediment control inspector excavate for the new stream bed. Do not breach the embankment (upstream or downstream of the crossing) of the existing channel. Install the pump and filter bag as necessary. Provide erosion control matting on all disturbed embankments that are not stabilized with Rip-Rap.

Day 6-10: Upon the approval of the Howard County Sediment Control Inspector excavate for the footers of the arch crossings. Install pumps and filter bags as necessary.

Day 10-28: Upon approval of the bearing capacities by the Geotechnical Engineer install the footers.

Day 39-39: Install the arch culvert. Remove pumps as necessary. Backfill the culvert footings according to the arch manufacturer's specifications or Geotechnical Engineers recommendations.

Day 40-43: Upon the approval of the Howard County Sediment Control Inspector excavate for the footers of both headwalls and the wing walls on the southern side of the crossing. Install pumps and filter bags as necessary.

Day 44-60: Upon approval of the bearing capacities by the Geotechnical Engineer install the headwalls and the wing walls on the southern side of the stream. Move pumps as necessary to provide dewatering. Provide riprap outfall for same.

Day 61-68: Begin to backfill overtop of the bridge with the material specified by the bridge manufacturer. See the manufacturer's plans for the back fill specifications.

Day 69-71: Install the log check dams and imbricated rip-rap.

Day 72-74: Install the bed material and channel rip-rap.

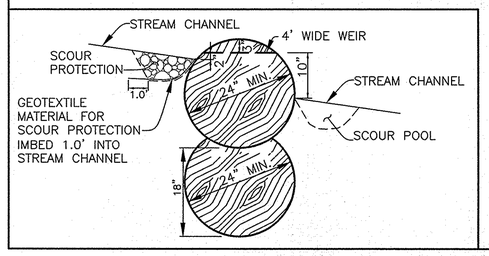
Day 75-77: Upon the approval of the Howard County Sediment Control Inspector remove the embankment of the stream to allow flow in the new stream bed and under the arch. Dam the existing stream to force flow under the new culvert.

Day 78-82: Remove the existing 48" CMP and backfill trench with material approved by the Geotechnical Engineer.

Day 83-89: Excavate for the footers of the wing walls on the northern side of the crossing. Upon approval of the bearing capacities by the Geotechnical Engineer install the wing walls on the northern side of the stream. Attach the storm drain to the wing wall and provide riprap outfall for same. Install and remove pumps and filter bags as necessary.

Day 90-95: Complete backfill overtop of the bridge with the material specified by the bridge manufacturer. See the manufacturer's plans for the back fill specifications.

Day 96-99: Upon approval of the Howard County Sediment Control Inspector, remove remaining sediment control devices and stabilize disturbed areas in accordance with the permanent seedbed notes.



PLAN VIEW
SCALE: 1" = 20'

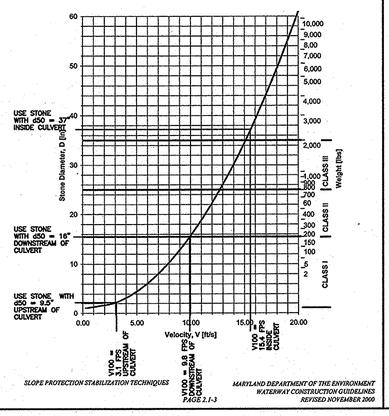
BEST MANAGEMENT PRACTICES FOR WORKING IN NONTIDAL WETLANDS, WETLAND BUFFERS, WATERWAYS, AND 100-YEAR FLOODPLAINS

1) No excess fill, construction material, or debris shall be stockpiled or stored in nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
2) Place materials in a location and manner which does not adversely impact surface or subsurface water flow into or out of nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
3) Do not use the excavated material as backfill if it contains waste metal products, unsightly debris, toxic material, or any other deleterious substance. If additional backfill is required, use clean material free of waste metal products, unsightly debris, toxic material, or any other deleterious substance.
4) Place heavy equipment on mats or suitably operate the equipment to prevent damage to nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
5) Repair and maintain any serviceable structure or fill so there is no permanent loss of nontidal wetlands, nontidal wetland buffers, or waterways, or permanent modification of the 100-year floodplain in excess of that lost under the originally authorized structure or fill.
6) Rectify any nontidal wetlands, wetland buffers, waterways, or 100-year floodplain temporarily impacted by any construction.
7) All stabilization in the nontidal wetland and nontidal wetland buffer shall consist of the following species: Annual Ryegrass (*Lolium multiflorum*), Millet (*Setaria italica*), Barley (*Hordeum* sp.), Oats (*Uniola* sp.), and/or Rye (*Secale cereale*). These species will allow for the stabilization of the site while also allowing for the voluntary revegetation of natural wetland species. Other non-persistent vegetation may be acceptable, but must be approved by the Nontidal Wetlands and Waterways Division. Kentucky 31 fescue shall not be utilized in wetland or buffer areas. The area should be seeded and mulched to reduce erosion after construction activities have been completed.
8) After installation has been completed, make post-construction grades and elevations the same as the original grades and elevations in temporarily impacted areas.
9) To protect aquatic species, in-stream work is prohibited as determined by the classification of the stream:

   ~~Use I waters: In-stream work shall not be conducted during the period March 1 through June 15, inclusive, during any year.~~
   ~~Use III waters: In-stream work shall not be conducted during the period October 1 through April 30, inclusive, during any year.~~
   Use IV waters: In-stream work shall not be conducted during the period March 1 through May 31, inclusive, during any year.

10) Stormwater runoff from impervious surfaces shall be controlled to prevent the washing of debris into the waterway.
11) Culverts shall be constructed and any riprap placed so as not to obstruct the movement of aquatic species, unless the purpose of the activity is to impound water.

FIGURE 2.1: RIPRAP DIAMETER AS A FUNCTION OF STREAM VELOCITY (BASED ON ISHIBASH EQUATION)



SLOPE PROTECTION STABILIZATION TECHNIQUES — MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000 — PAGE 2.1-3

MGWC 3.6: LOG & ROCK CHECK DAMS

Rigid engineering technique for creation of aquatic habitat and channel grade control

DESCRIPTION

Low profile drop structures, such as check dams, are primarily used to create aquatic habitat in the form of scour pools and for grade control on actively incising streams and rivers.

EFFECTIVE USES & LIMITATIONS

Log and rock check dams are best suited to Rosgen stream types B3-B4, C3-C4, E3, and F3-F4. When constructed and spaced properly, check dams can simulate the natural pattern of pools and riffles occurring in undisturbed streams while forming gravel deposits which fish use as spawning grounds.

Check dams have also been used to prevent the movement of fine sediments into the mainstream channel, to aerate water, and to raise water levels past culvert invert elevations, thereby allowing fish passage.

Check dams should be avoided in the following areas:

- channels with bedrock beds or unstable bed substrates;
- channels without well developed, stable banks;
- streams with high bedload transport;
- streams with naturally well developed pools-riffle sequences; and
- reaches where the water temperature regime is negatively impacted when the current is slowed.

MATERIAL SPECIFICATIONS

Check dams, when used as stream restoration and grade control measures, are typically made of rocks, logs, or a combination of the two.

Riprap: Riprap for added stability, bank armoring, and toe protection should be capable of withstanding bankfull flow velocities and designed according to MGWC 2.1: Riprap.

Logs: Native, not resistant wood such as Sycamore with a minimum diameter of 12 inches (0.30 meters) should be used when available. If more than one layer of logs is to be used, they should be hewn smooth so that they lie flat against each other. Before installation, the log(s) should be grooved or notched to concentrate low flows. On wider shallow streams with gravelly beds, large flat rocks or boulders sized according to MGWC 2.1: Riprap to resist bankfull flows and sealed with gravel and sand may be used in place of logs.

Approximate Cost ($1999):
$395 per log dam

INSTALLATION GUIDELINES

All erosion and sediment control devices, including dewatering basins, should be implemented as the first order of business according to a plan approved by the WMA. The recommended construction procedure for log and rock check dams should proceed as follows (refer to Detail 3.6):

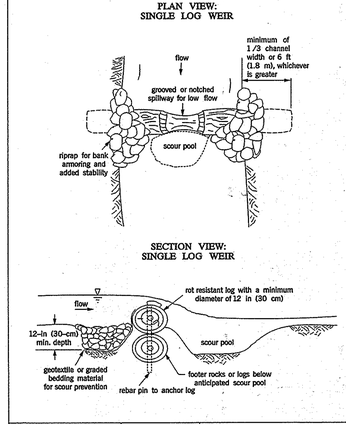
CHANNEL STABILIZATION AND REHABILITATION TECHNIQUES — MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000 — PAGE 3.6 - 1

MGWC 3.6: LOG & ROCK CHECK DAMS

1. The stream should be diverted according to a WMA recommended measure, and the construction area should be dewatered.
2. Check dams should be located in nonriffle areas where the bank is stable and of adequate height. The structure should be embedded as far as possible into the streambed and should be anchored a minimum of 1/3 of the stream width or 6 feet (1.8 meters) into the stream bank, whichever is greater. Generally, a crest height of 1 foot (0.3 meters) above the bed is sufficient for scour pool formation. (For further design guidance, refer to MGWC 3.9: Step Pools).
3. Once in place, the structure should be further secured against movement with rebar pins. Next, to prevent scour, geotextile fabric for scour prevention should be attached to the upstream portion of the log, buried at least 1 foot (0.30 meters) into the streambed, and backfilled with adequately sized rock. Once the excavated portion of the bank has been backfilled, it should be armored with aptly sized riprap, sod mats, or willow transplants to prevent erosion and scour from compromising the integrity of the structure.
4. Adjacent weirs should be spaced sufficiently far apart to allow for proper riffle or pool development according to step-pool and riffle-pool sequences as provided in MGWC 3.9: Step Pools. (Refer to the *1994 MD Standards and Specifications for Soil Erosion and Sediment Control* for spacing guidelines of check dams in ditches and swales.) Additionally, it has been recommended that the overall drop controlled by a set of two consecutive check dams should be less than 2 feet (0.6 meters) for stability purposes.
5. All disturbed sections of the channel, including the banks and streambed, should be stabilized with methods approved by the WMA.
6. All check dams should be monitored to determine if:
   - their orientation and geometry (e.g., the height of the drop) hinder fish migration,
   - their performance is adversely affected by deposited sediment, and
   - their placement causes bank instabilities and undesirable lateral stream movement, especially in the vicinity of the plunge pools.

CHANNEL STABILIZATION AND REHABILITATION TECHNIQUES — MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000 — PAGE 3.6 - 2

Maryland's Guidelines To Waterway Construction
DETAIL 3.6: LOG & ROCK CHECK DAMS



CHANNEL STABILIZATION AND REHABILITATION TECHNIQUES — REVISED NOVEMBER 2000 PAGE 3.6 - 3 — MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MGWC 2.1: RIPRAP

Rigid engineering technique for bank stabilization

DESCRIPTION

Riprap is used to protect and stabilize embankment soils from the erosive forces of flowing water and piping forces resulting from groundwater seepage. A well-engineered riprap system should consist of the following:

- a filter layer of gravel or cloth designed to prevent soil movement into or through the riprap layer while allowing water to drain from the embankment, and
- a stone layer of appropriate gradation and thickness to resist the shearing forces of channelized water.

EFFECTIVE USES & LIMITATIONS

When properly designed and installed, riprap is an effective method where soil conditions, water turbulence and velocity, expected vegetative cover, and groundwater conditions are such that the soil may erode under the design flow conditions. Some common areas of riprap applicability are:

- diversion channel banks and/or bottoms,
- roadside ditches,
- drop structure outlets, and
- laterally expanding banks threatening infrastructure or personal property.

Additionally, properly graded riprap forms a flexible, self-healing cover which can be easily repaired in localized areas by the timely replacement of stone. Uniform-grade riprap can also be used with a geotextile filter cloth.

Filter cloth should only be utilized when the bank material is noncohesive such as sand or gravel.

MATERIAL SPECIFICATIONS

- *Filters:* Material and design specifications for granular filters are found in Table 3.1a.

Table 3.1a: Granular Filter Material Grading Specifications

% less than	U.S. Standard sieve size
100	2 ½ in (64 mm)
85-100	1 in (25 mm)
60-100	½ in (13 mm)
35-70	No. 10
20-50	No. 40
3-20	No. 200

The thickness of the filter should not be less than 6 inches (15 cm). Generally, filters that are one-half the thickness of the riprap layer are satisfactory.

Synthetic filter cloth may be used cautiously based on the *1994 MD Standards and Specifications for Soil Erosion and Sediment Control*.

- *Riprap:* The maximum diameter or weight of stone for riprap should be based upon the design flow velocity using Figure 3.1. This chart is based on a maximum slope of 2ft:1V. The stone gradations for Classes I - III are found in Table 3.1b.

SLOPE PROTECTION AND STABILIZATION TECHNIQUES — MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000 — PAGE 2.1 -1

MGWC 2.1: RIPRAP

Table 3.1b: Stone Gradations for Riprap Stone Classes

Class	Size	% Total Weight < Given Size
I	150 lb (70 kg)	100
	2 lb (1 kg)	10 max
II	700 lb (320 kg)	100
	20 lb (10 kg)	10 max
III	2000 lb (910 kg)	100
	40 lb (20 kg)	10 max

Uniform-grade riprap should incorporate angular rock to promote interlocking.

Approximate Cost ($1999):
$78 per linear ft

INSTALLATION GUIDELINES

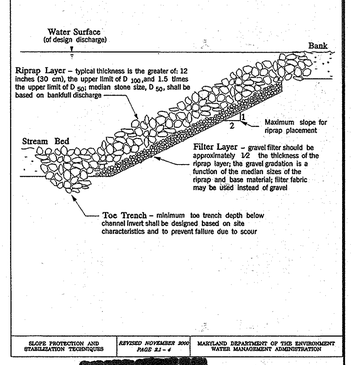
All erosion and sediment control devices, including dewatering basins, should be implemented as the first order of business according to a plan approved by the WMA or local authority. Once a slope stabilization project is initiated, preparation and placement of the riprap should immediately follow the initial disturbance to minimize the chances for further slope degradation. The recommended construction procedure for riprap is as follows beginning with initial slope preparations (refer to Detail 2.1):

1. The contractor should install all sediment and erosion control devices as the first order of business.
2. Excavation should be made in reasonably close conformity with the existing stream slope and bed.
3. All fill in the subgrade should be compacted to a density approximating that of the surrounding undisturbed material.
4. Provisions must be made to anchor the riprap at the stream bed so as to provide protection against undermining. If this cannot be accomplished by creating a toe trench, an alternative method of protection must receive prior written approval from the WMA or local authority.
5. The filter layer or blanket should be placed immediately after slope preparation.
   - The stone for granular filters should be spread in a uniform layer to the specified depth. Where more than one layer is employed, they should be spread such that there is minimal mixing.
   - When cloth filters are used, special care should be taken not to damage the fabric during riprap placement.
6. Riprap placement should begin with the toe. The larger stones, as specified by the design gradation, should be placed in the toe and along the perimeter of the slope and channel protection. The riprap should be placed with suitable equipment in such a manner as to produce a reasonably graded mass of stones with zero drop height. The placing of stones that cause extensive segregation is not allowed. Where appropriate, a few flow channel shall be constructed through the riprap.
7. Any excavation voids existing along the edges of the completed slope and channel protection should be backfilled and compacted.
8. All disturbed areas should be permanently stabilized in accordance with an approved sediment and erosion control plan.

Note: The use of rock vanes (MGWC 3.3: Rock Vanes) should be considered to redirect high-velocity flows at the toe.

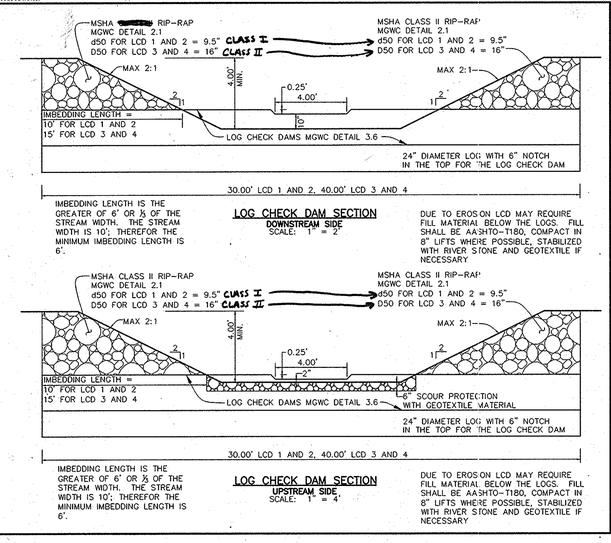
SLOPE PROTECTION AND STABILIZATION TECHNIQUES — MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000 — PAGE 2.1 -2

Maryland's Guidelines To Waterway Construction
DETAIL 2.1: RIPRAP



SLOPE PROTECTION AND STABILIZATION TECHNIQUES — REVISED NOVEMBER 2000 PAGE 2.1 - 4 — MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

[redacted]



IMBEDDING LENGTH IS THE GREATER OF 6' OR ⅓ OF THE STREAM WIDTH. THE STREAM WIDTH IS 10'; THEREFOR THE MINIMUM IMBEDDING LENGTH IS 6'.

LOG CHECK DAM SECTION
DOWNSTREAM SIDE
SCALE: 1" = 2'

DUE TO EROSION LCD MAY REQUIRE FILL MATERIAL BELOW THE LOGS. FILL SHALL BE AASHTO-T180, COMPACT IN 8" LIFTS WHERE POSSIBLE, STABILIZED WITH RIVER STONE AND GEOTEXTILE IF NECESSARY

IMBEDDING LENGTH IS THE GREATER OF 6' OR ⅓ OF THE STREAM WIDTH. THE STREAM WIDTH IS 10'; THEREFOR THE MINIMUM IMBEDDING LENGTH IS 6'.

LOG CHECK DAM SECTION
UPSTREAM SIDE
SCALE: 1" = 4'

DUE TO EROSION LCD MAY REQUIRE FILL MATERIAL BELOW THE LOGS. FILL SHALL BE AASHTO-T180, COMPACT IN 8" LIFTS WHERE POSSIBLE, STABILIZED WITH RIVER STONE AND GEOTEXTILE IF NECESSARY

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 5-9-14

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 5-21-14

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 5-19-14

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301-710-5686
WWW.BEI-CIVILENGINEERING.COM

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. 28559, Expiration Date: 7-22-2015.

STATE OF MARYLAND — BRIAN F. CLEARY — No. 28559 — REGISTERED PROFESSIONAL ENGINEER — 4/10/2014

OWNER/DEVELOPER:
MB HIGHLAND RESERVE, LLC
1686 EAST GUDE DRIVE
ROCKVILLE, MD 20850
301-762-9511

PROJECT: REGAN PROPERTY
LOTS 2 thru 23, BUILDABLE PRESERVATION PARCEL 'A' and NON-BUILDABLE PRESERVATION PARCELS 'B' thru 'E' and A RESUBDIVISION OF LOT 1 AND NON-BUILDABLE BULK PARCEL 'A' PREVIOUSLY RECORDED AS PLAT NO. 22601-22604

LOCATION: TAX MAP No. 34, GRID No. 24, PARCEL No. 200, 5th ELECTION DISTRICT, HOWARD COUNTY, MARYLAND, DPZ NO.: SP-12-004, ECP-12-045, WP-13-025

TITLE: FINAL ROAD CONSTRUCTION PLAN, STREAM REALIGNMENT PLAN

DESIGN: JC	DRAFT: JC	DATE: MARCH, 2014	PROJECT NO. 2171
		SCALE: AS SHOWN	DRAWING 33 OF 33

F-13-112