FINAL ROAD CONSTRUCTION, GRADING AND SEDIMENT CONTROL PLANS

GTW'S WAVERLY WOODS

SECTION 14

BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

Zoned: PSC & PEC

Tax Map: 16, Parcels: 120, 221 & P/O 249 Grids: 3 & 4

SHEET INDEX

SHEET No.	SHEET
1	TITLE SHEET
2	BARNSLEY WAY PLAN AND PROFILE
3-4	STREET TREE, GRADING AND SEDIMENT CONTROL PLAN
5	LANDSCAPE PLAN
6-7	STORMWATER MANAGEMENT NOTES AND DETAILS
8-9	SEDIMENT CONTROL NOTES AND DETAILS
10	STORM DRAIN PROFILES
11	STORM DRAIN DRAINAGE AREA MAP
12-13	FOREST CONSERVATION PLANS
14-19	34'-7" x 11'-4" ARCH CULVERT STRUCTURAL DETAILS
20	OFF-SITE FOREST CONSERVATION PLAN
21	MASTER FOREST CONSERVATION CHART
22	BARNSLEY WAY - STRIPING PLAN
23	GUARDRAIL DETAILS
24	BORINGS PROFILES
25-27	WETLAND MITIGATION EROSION AND SEDIMENT CONTROL PLAN

APPROVED: DEPARTMENT OF PUBLIC WORKS	
CHIEF, BUREAU OF HIGHWAYS	DATE 8-27-09
APPROVED: DEPARTMENT OF PLANNING AND ZONING	
CHIEF, DIVISION OF LAND DEVELOPMENT	DATE 9/29/09
CHIEF, DEVELOPMENT ENGINEERING DIVISION	DATE 8/31/09

NO.	DESCRIPTION	DATE
2	ADD FCE #8 - 0.155 ACRES RETENTION	7-10-13
1	REPLACE SHEETS 25 & 26, ADD SHEET 27	3-9-10

REVISIONS

ROAD CLASSIFICATION CHART

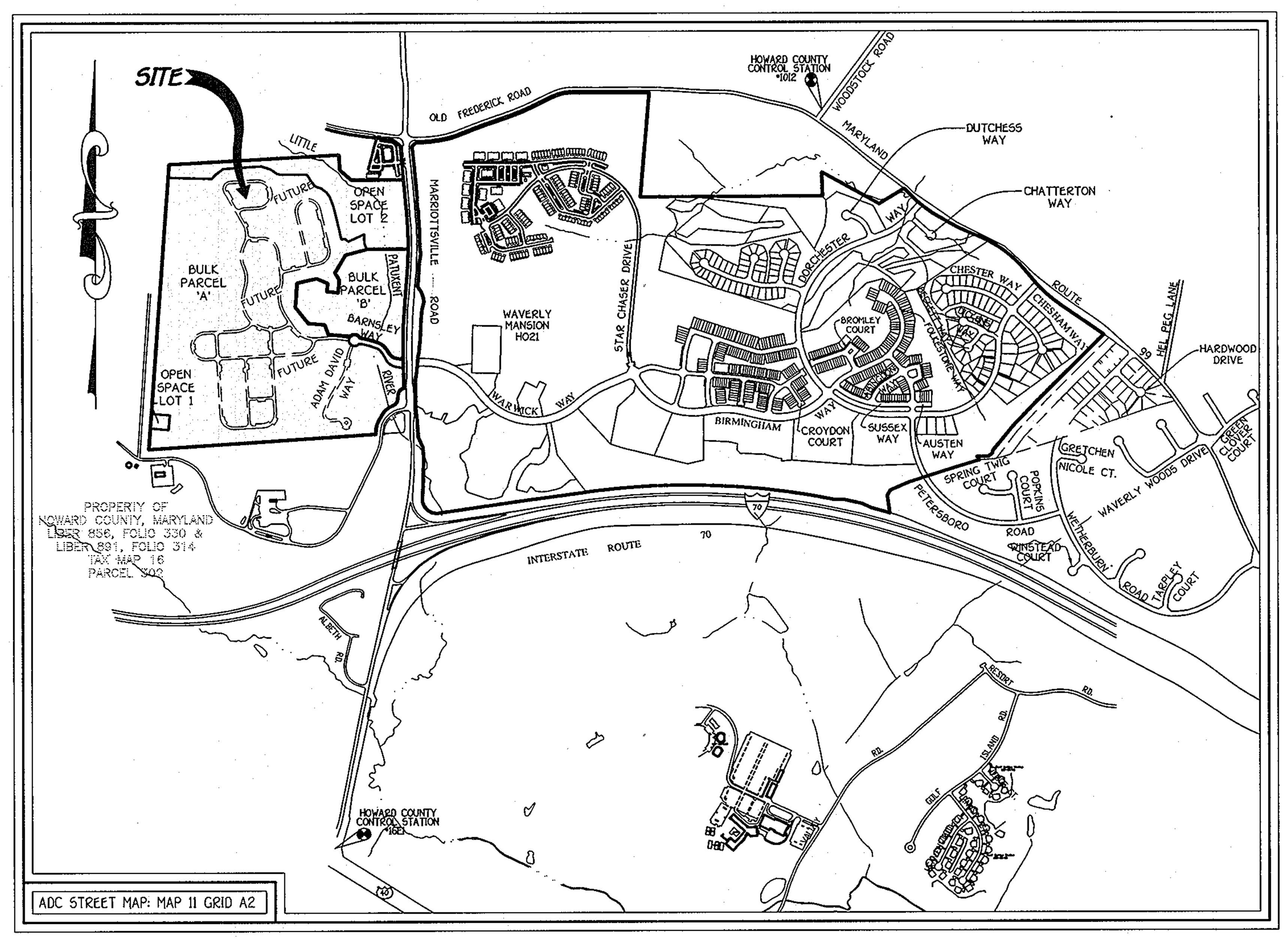
ROAD	CLASSIFICATION	R/W WIDTH
BARNSLEY WAY	MINOR COLLECTOR	60'

STREET SIGN CHART

STREET NAME	STATION	OFFSET	POSTED SIGN	SIGN CODE
BARNSLEY WAY	2+00	28'R	SPEED LIMIT 30 MPH	R2-1
BARNSLEY WAY	0+68	8'R	KEEP RIGHT	R4-7
BARNSLEY WAY	1+13	8'R	KEEP RIGHT	R4-7
BARNSLEY WAY	2+55	23'L	ADVANCE INTERSECTION LANE CONTROL	R3-8b
BARNSLEY WAY	4+00	23'L	SIGNAL AHEAD	W3-3(1)

STREET LIGHT CHART

STREET NAME	STATION	OFFSET	FIXTURE/POLE TYPE	COMMENTS
BARNSLEY WAY	0+79	34'R	150-WATT "PREMIER" H.P.S. VAPOR FIXTURE, POST TOP FIXTURE MOUNTED ON A 14-FOOT BLACK FIBERGLASS POLE.	----
	1+10	40'L		
	2+15	32'L		
	3+52	23'R		
	6+15	23'L		
	7+17	24'R		
ADAM DAVID WAY (FUTURE)	0+52	18'R		



VICINITY MAP
SCALE: 1"= 1200'

THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND

GENERAL NOTES

1. ALL ASPECTS OF THE PROJECT ARE IN CONFORMANCE WITH THE LATEST HOWARD COUNTY STANDARDS UNLESS WAIVERS ARE APPROVED.

2. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS, DIVISION OF CONSTRUCTION INSPECTION AT 410-313-1880 AT LEAST (5) WORKING DAYS. PRIOR TO THE START OF CONSTRUCTION.

3. THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION.

4. LOCATION: WESTSIDE OF MARRIOTTSVILLE ROAD AND OPPOSITE OF WARWICK WAY. TAX MAP No. : #16, PARCEL Nos. : 120, 221 & P/O 249.

5. SUBJECT PROPERTY ZONED PEC AND PSC PER 02/02/04 COMPREHENSIVE ZONING PLAN AND THE COMP-LITE ZONING AMENDMENTS DATED 07-28-06. BULK PARCEL 'B' IS ZONED PEC AND THE REST OF PROPERTIES IN THIS SUBDIVISION ARE ZONED PSC.

6. TOPOGRAPHY SHOWN HEREON IS FROM AERIAL MAPS FLOWN WITH 2 FOOT CONTOUR INTERVALS PREPARED BY HARFORD AERIAL SURVEYS DATED NOVEMBER 1998 AND SUPPLEMENTED WITH FIELD RUN TOPOGRAPHY BY FISHER, COLLINS & CARTER, INC.

7. PROPERTY IS LOCATED WITHIN METROPOLITAN DISTRICT.

8. PUBLIC WATER AND SEWER WILL BE PROVIDED TO THE PROPOSED BUILDING UNITS UNDER CONTRACT NO. 24-4380-D. PRIVATE SEWER MAINS WILL BE PROVIDED WITH THE SITE DEVELOPMENT PLAN.

9. STORMWATER MANAGEMENT WILL BE PROVIDED IN ACCORDANCE WITH HOWARD COUNTY AND MARYLAND 378 SPECIFICATIONS. FOR PHASE I, WATER QUALITY WILL BE PROVIDED BY A MICRO-POOL FACILITY. THE STORMWATER MANAGEMENT PONDS ARE PRIVATELY OWNED AND MAINTAINED BY THE H.O.A. NOTE: THE STORMWATER MANAGEMENT STUDY FOR GTW'S WAVERLY WOODS, SECTION 12, BULK PARCEL A, HAS BEEN COMPARED TO THE HYDROLOGY BASELINE STUDY PREPARED BY MILDENBERG ASSOCIATES, INC. OCTOBER, 1994, FOR CONSISTENCY WITH THE ORIGINAL. FOR CONTINUITY PURPOSES, THE SWM REPORT SUPPORTS SEVERAL PHASES OF DEVELOPMENT. FOR THIS PLAN, THE HOWARD COUNTY SOIL CONSERVATION DISTRICT HAS ONLY APPROVED POND No. 1. THE COMPUTATIONS AND DATA ASSOCIATED WITH POND Nos. 2 AND 3 HAVE BEEN REVIEWED AND APPROVED UNDER SDP-09-039

10. THIS HORIZONTAL AND VERTICAL DATUM SHOWN ARE BASED ON THE FOLLOWING NAD '83 HOWARD COUNTY CONTROL STATIONS:
HOWARD COUNTY MONUMENT 1012 N 601060.177 E 1345336.7580 ELEV. = 445.577
HOWARD COUNTY MONUMENT 16E1 N 593250.9322 E 1340192.7110 ELEV. = 509.924

11. AREA TABULATION:
SUBMISSION LIMITS

TOTAL NUMBER OF OPEN SPACE LOTS TO BE RECORDED	2
TOTAL NUMBER OF BULK PARCELS TO BE RECORDED	2
TOTAL AREA OF OPEN SPACE LOTS TO BE RECORDED	19.396 AC.
TOTAL AREA OF BULK PARCELS TO BE RECORDED	151.251 AC.
TOTAL AREA OF ROADWAY TO BE RECORDED	1.121 AC.
TOTAL AREA OF PSC TO BE RECORDED	149.450 AC.
TOTAL AREA OF PEC TO BE RECORDED	20.468 AC.
TOTAL AREA TO BE RECORDED	171.768 AC.

12. THE NOISE STUDY FOR THIS PROJECT WAS PREPARED BY MARS GROUP DATED MARCH, 2006 AND WAS APPROVED UNDER THE S-06-013 PLAN DATED JANUARY 17, 2008. A REVISED NOISE STUDY WAS PREPARED BY MARS GROUP DATED MAY, 2008 AND APPROVED UNDER P-08-010 ON 10/16/08. THE 65 DBA NOISE CONTOUR LINE DRAWN ON THIS PLAT IS ADVISORY AS REQUIRED BY THE HOWARD COUNTY DESIGN MANUAL, CHAPTER 5, REVISED FEBRUARY, 1992 AND CANNOT BE CONSIDERED TO EXACTLY LOCATE THE 65 DBA NOISE EXPOSURE. THE 65 DBA NOISE LINE WAS ESTABLISHED BY HOWARD COUNTY TO ALERT DEVELOPERS, BUILDERS AND FUTURE RESIDENTS THAT AREAS BEYOND THIS THRESHOLD MAY EXCEED GENERALLY ACCEPTED NOISE LEVELS ESTABLISHED BY THE U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT.

13. TOTAL FOREST CONSERVATION OBLIGATION FOR GTW'S WAVERLY WOODS, SECTION 14:
a. AFTER THE RECORDING OF PRIOR GTW'S WAVERLY WOODS RECORD PLATS INCLUDING F-08-159, PROPERTY OF GTW JOINT VENTURE, THE REMAINING FOREST OBLIGATION IS 17.46 ACRES RETENTION (95.7 ACRES - 78.24 ACRES) AND 15.11 ACRES REFORESTATION (108.8 ACRES - 93.69 ACRES) TO BE PROVIDED WITH GTW'S WAVERLY WOODS, SECTION 14.
b. ON-SITE RETENTION SURETY = 17.46 x 43560 X 0.20 = $152,112.00
c. ON-SITE REFORESTATION SURETY = 4.68 x 43560 X 0.50 = $101,930.00
d. OFF-SITE REFORESTATION SURETY = 10.43 x 43560 X 0.50 = $227,165.00
e. OFF-SITE REFORESTATION WILL BE PROVIDED ON THE PROPERTY OF WITCHING HOUR FARM, LLC, TAX MAP NO. 8, PARCEL NO. 249, GRID NO. 1, 4TH ELECTION DISTRICT, LIBER 10912, FOLIO 365.
F. TOTAL FOREST CONSERVATION SURETY OF $481,207.00 WILL BE PROVIDED WITH THE DEVELOPER'S AGREEMENT.

14. THE ORIGINAL OR BASE MODEL FLOODPLAIN STUDY FOR GTW'S WAVERLY WOODS WAS PREPARED BY MILDENBERG, BOENDER & ASSOC., DATED OCT. 1994 AND WAS APPROVED UNDER S-94-007 IN OCTOBER, 1994. A REVISED FLOODPLAIN STUDY WAS PREPARED BY FISHER, COLLINS & CARTER, INC. DATED NOVEMBER, 2006 AND APPROVED UNDER F-07-032. A REVISED FLOODPLAIN STUDY WAS PREPARED BY FISHER, COLLINS & CARTER, INC. DATED APRIL 17, 2008 THAT MODELS THE PROPOSED CULVERTS FOR THE BARNSLEY WAY STREAM CROSSING. THIS FLOODPLAIN STUDY WAS APPROVED FOR P-08-010 ON 10/16/08.

15. THE PREVIOUS WETLANDS REPORT PREPARED BY ENVIRONMENTAL SYSTEMS ANALYSIS, INC. AND APPROVED WITH S-94-07 ON NOVEMBER 30, 1993 HAS BEEN RE-CERTIFIED UNDER THIS PLAN BY ECO-SCIENCE PROFESSIONALS, INC. DATED APRIL, 2006 AND APPROVED WITH S-06-013 ON JANUARY 17, 2008.

16. A TRAFFIC STUDY WAS PREPARED BY THE TRAFFIC GROUP AND APPROVED ON JULY 14, 1994 AS PART OF S-94-07 AND AMENDED UNDER S-06-13 APPROVED ON NOVEMBER 17, 2008.

17. SOILS INFORMATION TAKEN FROM SOIL MAP NO. 17, SOIL SURVEY, HOWARD COUNTY, MARYLAND, JULY, 1968 ISSUE. THE SOILS INVESTIGATION REPORT WAS PREPARED BY I.T.E., INC. ON JUNE 28, 1994.

18. FOREST STAND DELINEATION PREPARED BY ENVIRONMENTAL SYSTEM ANALYSIS, INC. AND APPROVED ON NOVEMBER 30, 1995 UNDER S-94-07.

19. BOUNDARY OUTLINE IS BASED ON A FIELD MONUMENTED SURVEY PERFORMED BY FISHER, COLLINS & CARTER, INC. ON OR ABOUT AUGUST 1990.

20. BARNSLEY WAY IS A PUBLIC ROAD AND MAINTAINED BY HOWARD COUNTY, MARYLAND.

21. THE SKETCH PLAN NO. S-94-07 WAS APPROVED ON NOVEMBER 30, 1993. THE PLANNING BOARD APPROVED, ON NOVEMBER 1, 2007, PB CASE NO. 381, GTW'S WAVERLY WOODS, SECTION 14, BULK PARCEL 'A', COMPREHENSIVE SKETCH PLAN (S-06-13) AND DEVELOPMENT CRITERIA FOR THE DEVELOPMENT OF 350 AGE-RESTRICTED ADULT HOUSING UNITS (139 SINGLE FAMILY ATTACHED UNITS AND 211 SINGLE FAMILY DETACHED UNITS) ON 149.40 ACRES OF LAND ZONED PLANNED SENIOR COMMUNITY.

22. STREET LIGHT PLACEMENT AND THE TYPE OF FIXTURES AND POLES SHALL BE IN ACCORDANCE WITH THE HOWARD COUNTY DESIGN MANUAL, VOLUME III (2006), SECTION 5.5.A. A MINIMUM OF 20' SHALL BE MAINTAINED BETWEEN ANY STREET LIGHT AND ANY TREE.

23. PERMITS APPLICABLE FOR THIS SUBDIVISION ARE AS FOLLOWS: MDE TRACKING NUMBER 2009962/09-NT-3087

24. ALL HANDICAP RAMPS SHALL MEET CURRENT ADA REQUIREMENTS.

25. WP 95-23 WAS APPROVED ON 1/23/95 FOR DISTURBANCE TO WETLANDS, FLOODPLAIN, STREAMS, OR THEIR BUFFERS IN CERTAIN AREAS THROUGHOUT THE "WAVERLY WOODS" PROJECT. THE AREAS OF THIS SUBMISSION APPROVED UNDER THIS WAIVER FOR DISTURBANCE ARE AS FOLLOWS:
a) SHEET 3 - FLOODPLAIN FOR BARNSLEY WAY ROADWAY AND STORM DRAIN CULVERT.
b) SHEET 3 - WETLANDS AND BUFFER FOR BARNSLEY WAY ROADWAY AND STORM DRAIN CULVERT.

26. PROPERTY SUBJECT TO PRIOR DEPARTMENT OF PLANNING AND ZONING FILE Nos: S-94-07, S-06-013, ZB CASE NO. 1027 M, ZB CASE NO. 929-M, PB CASE NO. 381, F-01-091, F-01-093, F-01-148, F-01-147, F-08-159, P-08-010, WP-95-23 & WP-09-210.

27. TRAFFIC CONTROL DEVICES, MARKINGS AND SIGNING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

28. ALL SIGN POSTS USED FOR TRAFFIC CONTROL SIGNS INSTALLED IN THE COUNTY RIGHT OF WAY SHALL BE MOUNTED ON A 2" GALVANIZED STEEL, PERFORATED, SQUARE TUBE POST (14 GAUGE) INSERTED INTO 1 2-1/2" GALVANIZED STEEL, PERFORATED, SQUARE TUBE SLEEVE (12 GAUGE) - 3' LONG. A GALVANIZED STEEL CAP SHALL BE MOUNTED ON TOP OF EACH POST.

29. SOIL REQUIRING 95% COMPACTION IN FILL AREAS SHALL BE IN ACCORDANCE WITH AASHTO-T-180 STANDARDS.

30. THE ACCESS TO OPEN SPACE LOT 1 (TO BE DEDICATED TO HOWARD COUNTY, MARYLAND) WILL BE ALONG THE EXISTING DRIVEWAY ON THE PROPERTY OF HOWARD COUNTY, MARYLAND, LIBER 856, FOLIO 330 & LIBER 891, FOLIO 314, TAX MAP No. 16, ADJACENT TM PARCELS 220 & 302.

31. LANDSCAPE OBLIGATIONS FOR BULK PARCELS 'A', 'B' AND OPEN SPACE LOTS 1 AND 2 WILL BE PROVIDED AT THE SITE DEVELOPMENT PLAN STAGE.

GENERAL NOTES CONTINUED

32. THIS PROJECT IS SUBJECT TO WAIVER PETITION WP-09-210 TO WAIVE SUBDIVISION SECTIONS:
1. 16.120(c)(2)(i), REQUEST TO NOT BE REQUIRED TO PROVIDE ANY OF THE REQUIRED MINIMUM "SINGLE FAMILY DETACHED" LOT FRONTAGE OF 20 FEET ON AN APPROVED PUBLIC STREET, AND;
2. 16.120(c)(4), REQUEST TO NOT BE REQUIRED TO PROVIDE ANY OF THE REQUIRED MINIMUM "SINGLE FAMILY ATTACHED" LOT FRONTAGE OF 15 FEET ON AN APPROVED PUBLIC STREET AND, BE PERMITTED TO HAVE THE "SINGLE FAMILY ATTACHED" LOTS FRONT ON A PRIVATE ROAD EXCEEDING 200 FEET IN LENGTH.

THIS WAIVER HAS BEEN APPROVED SUBJECT TO COMPLIANCE WITH THE FOLLOWING CONDITIONS:
1. THE SUBMISSIONS OF THE PLATS TO CREATE THE INDIVIDUAL RESIDENTIAL LOTS FOR EACH PHASE OF THE PROJECT SHALL BE COORDINATED WITH THE SITE DEVELOPMENT PLANS SUBMITTED FOR EACH OF THE FIVE PHASES OF THE PROJECT.
2. ALL OF THE RESIDENTIAL LOTS SHALL FRONT ON AND OBTAIN ACCESS FROM THE PROPOSED PRIVATE ROADS WITHIN THE PROJECT AREA.
3. THE PROPOSED PRIVATE ROADS WITHIN THE PROJECT AREA SHALL BE LOCATED ON PROPERTY(IES) OWNED BY A HOMEOWNER'S ASSOCIATION (HOA) AND BE MAINTAINED BY THE SAME HOA.
4. THE PROPOSED PRIVATE ROADS WITHIN THE PROJECT AREA SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE DED AND DFRS.

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS
WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC, &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER
WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

ALDO [illegible] 7-29-09
DATE
"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. 20748, Expiration Date 2-22-11."

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND
OPEN SPACE LOTS 1 & 2

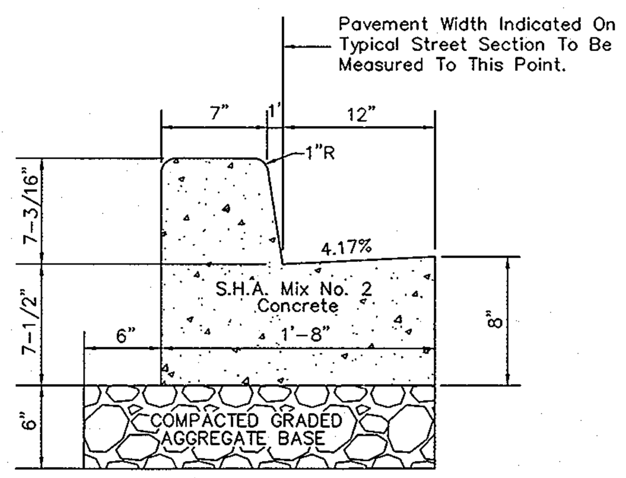
ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 1 OF 27

F-09-057

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 1 TITLE SHEET.dwg, 7/28/2009 1:49:32 PM, jamesl, 1:100

℄ CURVE DATA
BARNSLEY WAY
STA. 5+07.99 TO STA. 6+07.99
RADIUS = 550.00'R
ARC LENGTH = 100.00'
TANGENT = 50.14'
DELTA = 10°25'02"
CHORD = N77°16'47"W, 99.86'

℄ CURVE DATA
BARNSLEY WAY
STA. 3+20.34 TO STA. 4+30.71
RADIUS = 150.00'R
ARC LENGTH = 110.37'
TANGENT = 57.82'
DELTA = 42°09'24"
CHORD = N50°59'34"W, 107.89'



(DETAIL R-3.01)
STANDARD 7" COMB. CONC. CURB AND GUTTER
NO SCALE

REVISIONS		
NO.	DESCRIPTION	DATE

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 9/29/09

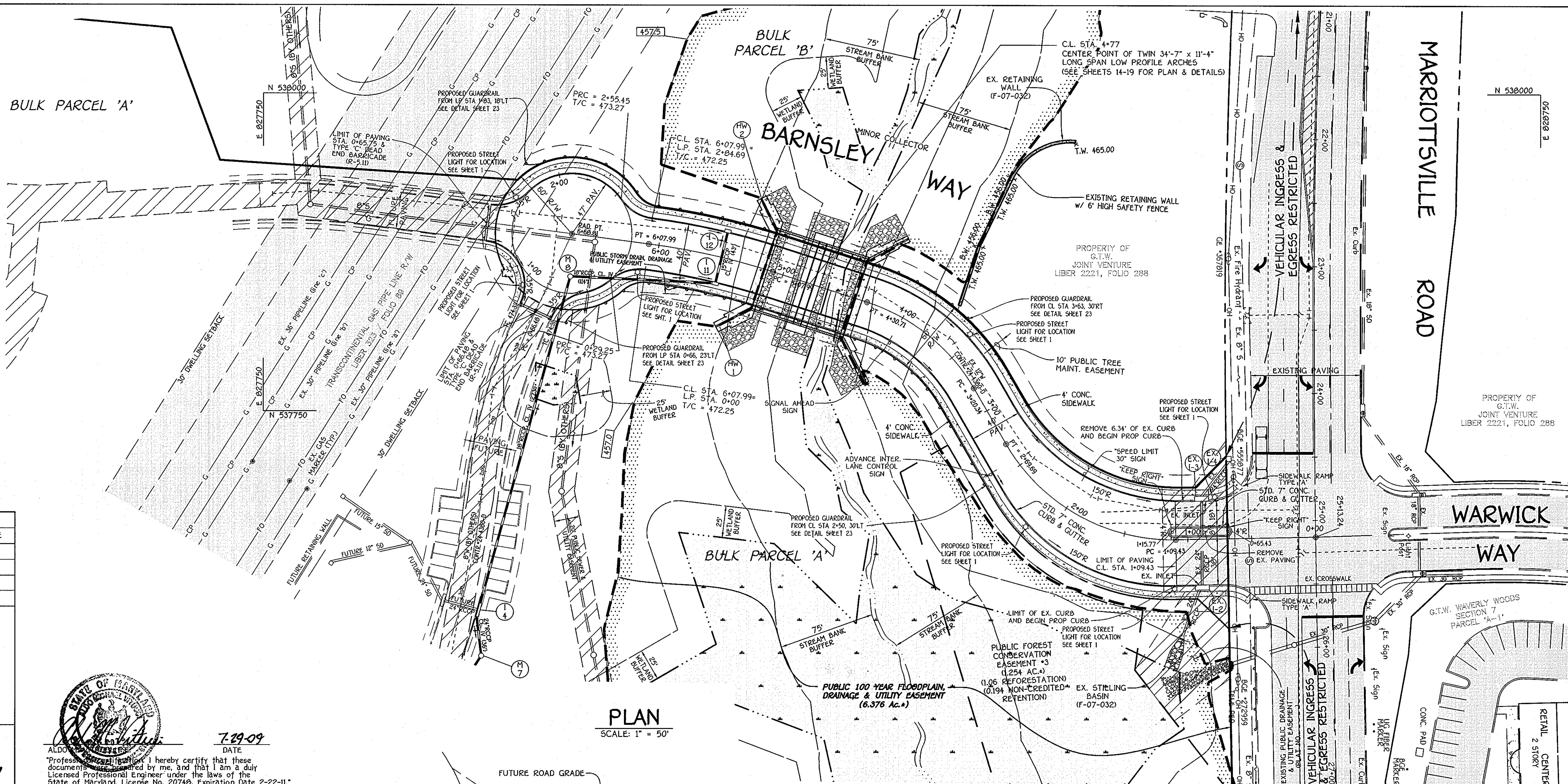
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 8/31/09

APPROVED: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 8-27-09

ALDO — DATE 7-29-09

"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."



℄ CURVE DATA
BARNSLEY WAY
STA. 1+09.43 TO STA. 2+69.69
RADIUS = 150.00'
ARC LENGTH = 160.26'
TANGENT = 88.73'
DELTA = 61°12'50"
CHORD = N60°31'16"W, 152.74'

CURB DATA - RIGHT SIDE
BARNSLEY WAY
STA. 1+03.09, 30' RT TO STA. 2+92.93, 20' RT
RADIUS = 150.00'
ARC LENGTH = 160.26'
TANGENT = 88.73'
DELTA = 61°12'50"
CHORD = N60°31'16"W, 152.74'

CURB DATA - LEFT SIDE
BARNSLEY WAY
STA. 1+11.88, 36' LT TO STA. 2+43.41, 22.64' LT
RADIUS = 150.00'
ARC LENGTH = 160.26'
TANGENT = 88.73'
DELTA = 61°12'50"
CHORD = N60°31'16"W, 152.74'

LEGEND	
SYMBOL	DESCRIPTION
	EXISTING STREAM
	EXISTING FLOODPLAIN
	EXISTING WETLANDS
	EXISTING SEWER LINE
	EXISTING STORM DRAIN LINE
G	EXISTING GAS LINE
	EXISTING WATER LINE
	EXISTING PAVING
	PROPOSED STORM DRAIN
	PROPOSED SIDEWALK
☼	PROPOSED LIGHT

GTW'S WAVERLY WOODS
SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOT 1

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND

BARNSLEY WAY
PLAN AND PROFILE

OWNERS
WAVERLY WOODS DEVELOPMENT CORPORATION, HOLE IN THE DOUGHNUT, LLC, & GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER
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C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

SCALE: AS SHOWN	DATE: JULY 28, 2009	DWG. NO. 2 OF 26
DES. AMV / RAI	DRN. JCL	CHK. AMV

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
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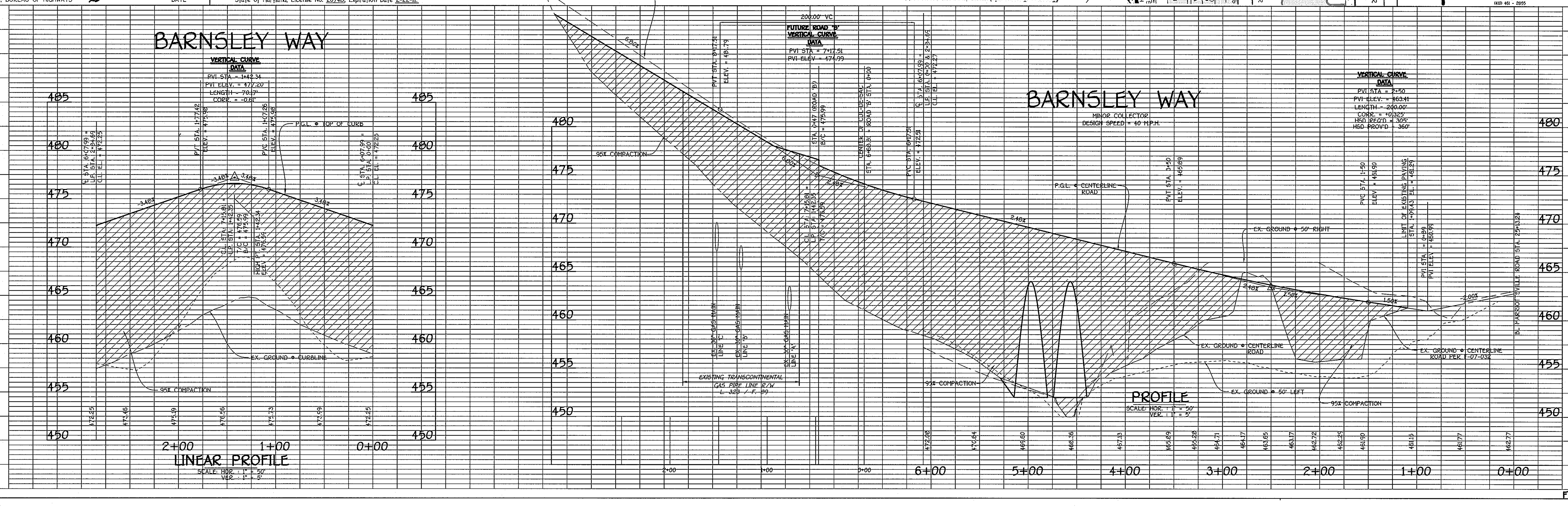


F-09-057

ENGINEER'S CERTIFICATE

I Hereby Certify That This Plan For Erosion And Sediment 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.

Signature — 7-29-09 Date

DEVELOPER'S CERTIFICATE

"I/We Certify That All Development And Construction Will Be Done According To This Plan Of Development And Plan For Erosion And Sediment Control And That All Responsible Personnel Involved In The Construction Project Will Have A Certificate Of Attendance At A Department Of Natural Resources 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 Or Their Authorized Agents. As Are Deemed Necessary."

Signature Of Developer — 8/5/09 Date

Approved: This Development Is Approved For Erosion And Sediment Control By The Howard Soil Conservation District.

District Howard Soil Conservation Dist. — 8/18/09 Date

Approved: Department Of Planning And Zoning

Chief, Division Of Land Development — 9/29/09 Date

Chief, Development Engineering Division — 8/31/09 Date

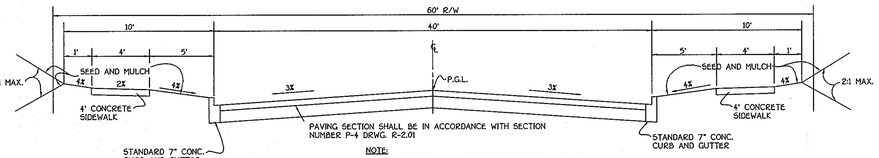
Approved: Howard County Department Of Public Works

Chief, Bureau Of Highways — 8-27-09 Date

STREET TREE SCHEDULE

SYMBOL	QTY.	BOTANICAL AND COMMON NAME	SIZE	COMMENTS
	660/40 = 16.5 16.5 x 2 = 33 33 TREES	PLATANUS OCCIDENTALIS 'BLOODGOOD' LONDON PLANETREE	2 1/2"-3" CAL.	40' APART ON PUBLIC R/W (BARNSLEY WAY)

NOTE: STREET TREE TYPES ARE ONLY A RECOMMENDATION AND MAY BE SUBSTITUTED WITH A COUNTY ACCEPTED EQUIVALENT FROM THE HOWARD COUNTY LANDSCAPE MANUAL. FINANCIAL SURETY FOR THE 33 REQUIRED STREET TREES HAS BEEN POSTED AS PART OF THE DEVELOPER'S AGREEMENT IN THE AMOUNT OF $9,900.00.



NOTE:
ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH HOWARD COUNTY DESIGN MANUAL VOLUME IV, STANDARD SPECIFICATION AND DETAILS FOR CONSTRUCTION.

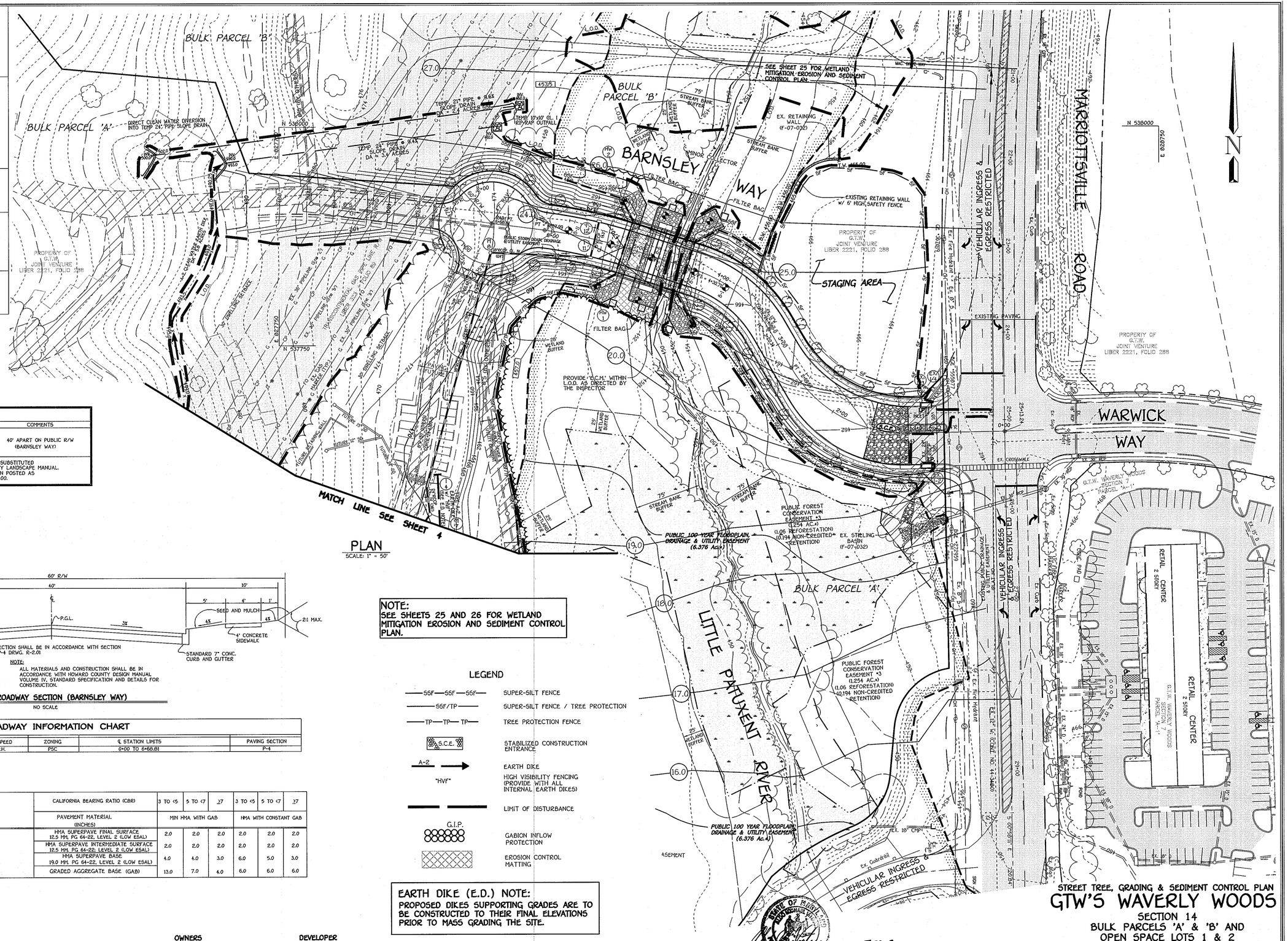
TYPICAL ROADWAY SECTION (BARNSLEY WAY)

NO SCALE

ROADWAY INFORMATION CHART

ROAD NAME	CLASSIFICATION	DESIGN SPEED	ZONING	℄ STATION LIMITS	PAVING SECTION
BARNSLEY WAY	MINOR COLLECTOR	40 M.P.H.	PSC	0+00 TO 6+68.81	P-4

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-4	MINOR COLLECTORS: NON-RESIDENTIAL MAJOR COLLECTORS:	HMA SUPERPAVE FINAL SURFACE 12.5 MM, PG 64-22, LEVEL 2 (LOW ESAL)	2.0	2.0	2.0	2.0	2.0	2.0
		HMA SUPERPAVE INTERMEDIATE SURFACE 12.5 MM, PG 64-22, LEVEL 2 (LOW ESAL)	2.0	2.0	2.0	2.0	2.0	2.0
		HMA SUPERPAVE BASE 19.0 MM, PG 64-22, LEVEL 2 (LOW ESAL)	4.0	4.0	3.0	6.0	5.0	3.0
		GRADED AGGREGATE BASE (GAB)	13.0	7.0	4.0	6.0	6.0	6.0



PLAN
SCALE: 1" = 50'

NOTE:
SEE SHEETS 25 AND 26 FOR WETLAND MITIGATION EROSION AND SEDIMENT CONTROL PLAN.

LEGEND

- SSF SSF SSF — SUPER-SILT FENCE
- SSF/TP — SUPER-SILT FENCE / TREE PROTECTION
- TP TP TP — TREE PROTECTION FENCE
- S.C.E. — STABILIZED CONSTRUCTION ENTRANCE
- A-2 "HVF" — EARTH DIKE / HIGH VISIBILITY FENCING (PROVIDE WITH ALL INTERNAL EARTH DIKES)
- LIMIT OF DISTURBANCE
- G.I.P. — GABION INFLOW PROTECTION
- EROSION CONTROL MATTING

EARTH DIKE (E.D.) NOTE:
PROPOSED DIKES SUPPORTING GRADES ARE TO BE CONSTRUCTED TO THEIR FINAL ELEVATIONS PRIOR TO MASS GRADING THE SITE.

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS
WAVERLY WOODS DEVELOPMENT CORPORATION, HOLE IN THE DOUGHNUT, LLC. & GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER
WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

ALDO M. — 7-29-09 DATE

"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

STREET TREE, GRADING & SEDIMENT CONTROL PLAN
GTW'S WAVERLY WOODS
SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 3 OF 26

F-09-057

K:\SDSKPROJ\10770 BARNSLEY WAY\dwg\TRAKS\10770 SHEET 2-4 ROAD PLAN AND PROFILE.dwg, 7/29/2009 9:52:27 AM, jamesl,

ENGINEER'S CERTIFICATE

I Hereby Certify That This Plan For Erosion And Sediment 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.

Signature — 7-29-09 Date

DEVELOPER'S CERTIFICATE

"I/We Certify That All Development And Construction Will Be Done According To This Plan Of Development And Plan For Erosion And Sediment Control And That All Responsible Personnel Involved In The Construction Project Will Have A Certificate Of Attendance At A Department Of Natural Resources 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 Or Their Authorized Agents, As Are Deemed Necessary."

Signature Of Developer — 8/5/09 Date

Approved: This Development Is Approved For Erosion And Sediment Control By The Howard Soil Conservation District.

District Howard Soil Conservation Dist. — 8/18/09 Date

Approved: Department Of Planning And Zoning

Chief, Division Of Land Development — 9/29/09 Date

Chief, Development Engineering Division — 8/31/09 Date

Approved: Howard County Department Of Public Works

Chief, Bureau Of Highways — 8-27-09 Date

TEMPORARY SEDIMENT BASIN No. 1 @ BMP #1

INITIAL D.A. = 11.02 Ac.±
FINAL D.A. = 16.62 Ac.±
STORAGE REQUIRED
WET = 1800 x 16.62 = 29,916 Cu.Ft.
DRY = 1800 x 16.62 = 29,916 Cu.Ft.
STORAGE PROVIDED
WET = 29,916 Cu.Ft. @ ELEV. 459.75
DRY = 29,916 Cu.Ft. @ ELEV. 462.10
BOTTOM ELEV. = 454.00
STORAGE DEPTH = 4.75'
TOP OF SETTLED EMBANKMENT = 466.00
CLEAN OUT ELEV. = 458.00
RISER CREST ELEV. = 462.70
1 YR. ORIFICE EL. = 459.75
Q1 exist. = 0.47 c.f.s.
Q1 prop. = 2.9 c.f.s. @ 462.71 (NON-EROSIVE)

EARTH DIKE (E.D.) NOTE:

PROPOSED DIKES SUPPORTING GRADES ARE TO BE CONSTRUCTED TO THEIR FINAL ELEVATIONS PRIOR TO MASS GRADING THE SITE.

LEGEND

- SSF—SSF—SSF — SUPER-SILT FENCE
- SSF/TP — SUPER-SILT FENCE / TREE PROTECTION
- TP—TP—TP — TREE PROTECTION FENCE
- S.C.E. — STABILIZED CONSTRUCTION ENTRANCE
- A-2 — EARTH DIKE
- "HVF" — HIGH VISIBILITY FENCING
- LIMIT OF DISTURBANCE
- G.I.P. — GABION INFLOW PROTECTION

MATCH LINE SEE SHEET 3

BULK PARCEL 'A'

PUBLIC FOREST CONSERVATION EASEMENT #4 (10.84 AC.±) (REFORESTATION)

PUBLIC FOREST CONSERVATION EASEMENT #3 (RETENTION) (0.406 AC.±)

PUBLIC FOREST CONSERVATION EASEMENT #3 (1.254 AC.±) (1.06 REFORESTATION) (0.194 NON-CREDITED RETENTION)

PUBLIC FOREST CONSERVATION EASEMENT #2 (2.63 AC.±) (0.40 REFORESTATION) (0.13 NON-CREDITED RETENTION)

LITTLE PATUXENT RIVER

PUBLIC 100 YEAR FLOODPLAIN, DRAINAGE & UTILITY EASEMENT (6.376 Ac.±)

STORM DRAIN MANHOLE TOP 467.96
36"HDPE INV. IN 462.91
36"HDPE INV. OUT 460.91

STORM DRAIN INLET TOP 475.00
24" HDPE INV. IN 462.91
36"HDPE INV. OUT 460.15

STORM DRAIN MANHOLE TOP 467.50
36" HDPE INV. IN 462.91
36"HDPE INV. OUT 460.91

TOP RISER: 462.61
TOP INLET: 462.92
BOTTOM STRUCTURE: 458.00
TOP TRASH RACK: 462.92
BOTTOM TRASH RACK: 462.40
THROAT OPENING: 462.46
30"RCP INV. OUT: 458.00

PROP. CL. I RIP-RAP OUTFALL PROTECTION

PROP. 27' CL. I RIP-RAP STILLING BASIN SEE DETAIL, SHEET 6

FILTER BAG

PUBLIC S.W.M. ACCESS, DRAINAGE & UTILITY EASEMENT

PROPOSED S.W.M. FACILITY (B.M.P. #1)
MICRO-POOL DESIGN
HAZARD CLASS 'A'
WQv AND CPv PROVIDED
WQv ELEV. = 459.81
CPv ELEV. = 461.44
10 YR. WSEL = 462.98
100 YR. WSEL = 463.58

EX. 18" CMP

Ex. Guardrail

VEHICULAR INGRESS & EGRESS RESTRICTED

EX. 8" S.S.M.H.

EX. 8" S.S. CONT.

CONT. No. 24-4380-D

8"S (BY OTHERS)

EX. 8" S.S. CONT.

EX. WV MONUMENT CONTR. 24-4380-D

EX. WV MONUMENT CONTR. 24-4380-D

TYPE 1-2 EARTH DIKE (SEE E.D. NOTE)

TEMPORARY STOCKPILE AREA

FUTURE PAVING

FUTURE 18" SD

FUTURE 8" SAN

FUTURE 12" WATER

FUTURE 8" WATER

EX. 36" PIPELINE (SEE NOTE 9)

EX. 30" PIPELINE (SEE NOTE 9)

EX. FIBER OPTIC MARKER (TYP.)

EX. GAS MARKER (TYP.)

EX. GAS & ELECTRIC CABLE

EX. TRANSMISSION TOWER

EXISTING 6' CHAIN LINK FENCE

30' BUILDING SETBACK

15' ENVIRONMENTAL SETBACK

EXISTING 16.5' RIGHT-OF-WAY FOR INGRESS & EGRESS L. 303, F. 140 (TO BE REMOVED BY RECORDATION OF THIS PLAT)

50' STRUCTURE AND USE SETBACK

BEGIN THE USE OF STONE CHECK DAMS @ 25' INTERVALS

LIMIT OF CLEANWATER EARTH DIKE, END OF STONE CHECK DAMS @ 25' INTERVALS PER B.B.3 DETAIL

PROVIDE 100' OF CL. I RIP-RAP CHANNEL LINING UNTIL FUTURE S.D. INLET IS IN PLACE. LINING TO BE 3' WIDE, 1' DEEP AND CONTOURED TO DIRECT FLOW.

PROPERTY OF HOWARD COUNTY, MARYLAND LIBER 656, FOLIO 339 & LIBER 891, FOLIO 214 TAX MAP 16 PARCEL 302

N 537500.00 E 827400.00

N 536750.00 E 827600.00

N 536760.00 E 828600.00

PLAN
SCALE: 1" = 50'

NOTE: FOR ACCESS TO OPEN SPACE LOT 1, SEE GENERAL NOTE 41 ON SHEET 1.

FINAL B.M.P. No. 1 GRADING PLAN
SCALE: 1" = 50'

AS-BUILT CERTIFICATION

I HEREBY CERTIFY THAT THE FACILITY SHOWN ON THIS PLAN WAS CONSTRUCTED AS SHOWN ON THE "AS-BUILT" PLANS AND MEETS THE APPROVED PLANS AND SPECIFICATIONS.

Paul W. Riedel — 12043 P.E. NO. — 12/10/14 DATE

AS-BUILT INFORMATION ADDED : DECEMBER 17, 2014

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
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ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

ALDO J. REGONESI — 7-29-09 DATE

"Professional Engineer I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20749, Expiration Date 2-22-11."

STREET TREE, GRADING & SEDIMENT CONTROL PLAN

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 4 OF 27

F-09-057
AS-BUILT 12/10/14

K:\SDSKPROJ\10770 BARNSLEY WAY\dwg\FINALS\10770 SHEET 2-4 ROAD PLAN AND PROFILE.dwg, 7/29/2009 9:54:00 AM, jamesl,

Approved: Department Of Planning And Zoning

Cindy Hamm — 9/29/09
Chief, Division Of Land Development — Date

[signature] — 8/31/09
Chief, Development Engineering Division — Date

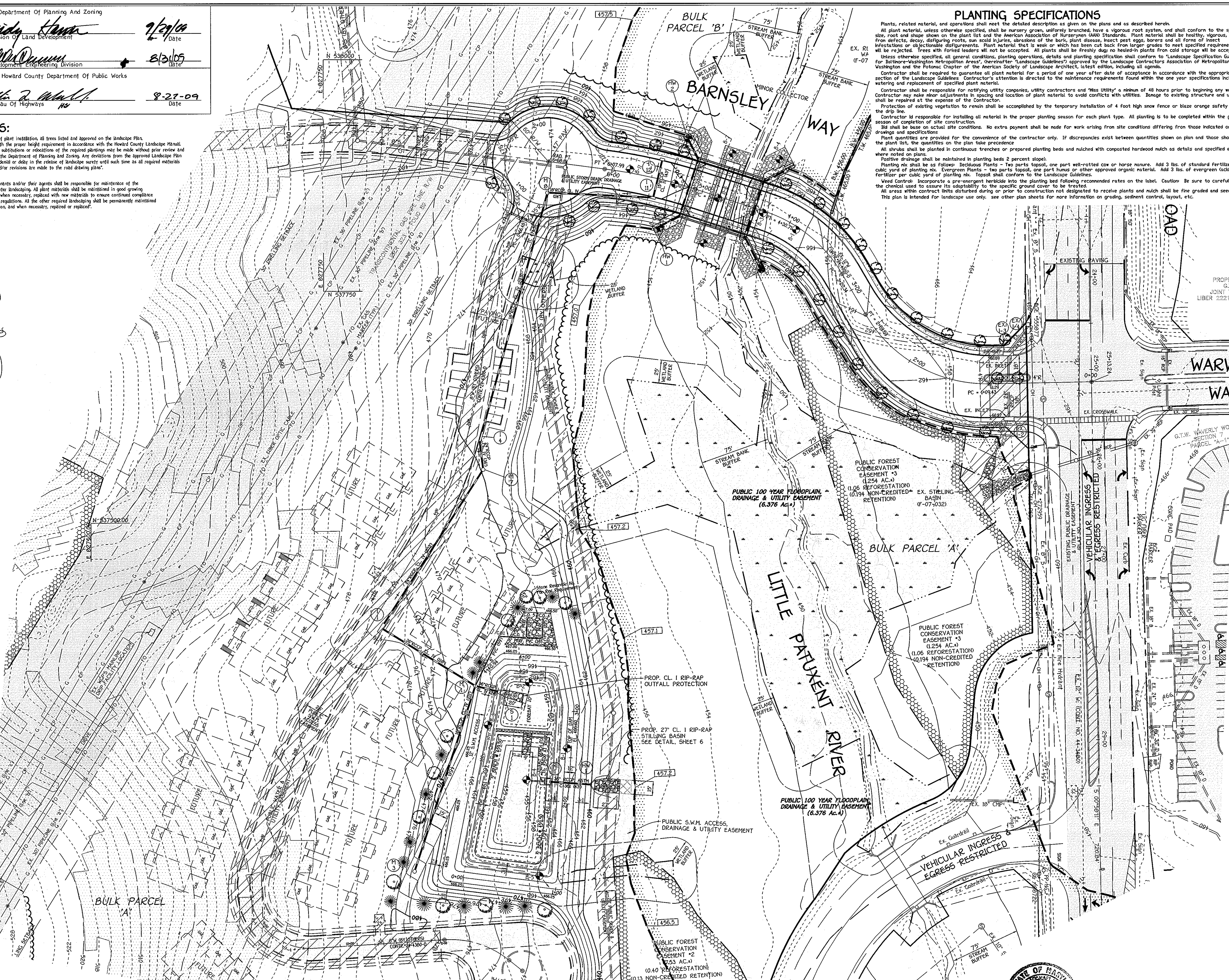
Approved: Howard County Department Of Public Works

[signature] — 8-27-09
Chief, Bureau Of Highways — Date

NOTES:

"At the time of plant installation, all trees listed and approved on the landscape Plan, shall comply with the proper height requirement in accordance with the Howard County Landscape Manual. In addition, no subtitutions or relocations of the required plantings may be made without prior review and approval from the Department of Planning and Zoning. Any deviations from the approved Landscape Plan may result in denial or delay in the release of landscape surety until such time as all required materials are planted and/or revisions are made to the road drawing plans".

"The Owner, tenants and/or their agents shall be responsible for maintenace of the required perimeter landscaping. 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 the other required landscaping shall be permanently maintained in good condition, and when necessary, repaired or replaced".



PLANTING SPECIFICATIONS

Plants, related material, and operations shall meet the detailed description as given on the plans and as described herein.

All plant material, unless otherwise specified, shall be nursery grown, uniformly branched, have a vigorous root system, and shall conform to the species, size, root and shape shown on the plant list and the American Association of Nurserymen (AAN) Standards. Plant material shall be healthy, vigorous, free from defects, decay, disfiguring roots, sun scald injuries, abrasions of the bark, plant disease, insect pest eggs, borers and all forms of insect infestations or objectionable disfigurements. Plant material that is weak or which has been cut back from larger grades to meet specified requirements will be rejected. Trees with forked leaders will not be accepted. All plants shall be freshly dug; no healed-in plants from cold storage will be accepted.

Unless otherwise specified, all general conditions, planting operations, details and planting specification shall conform to 'Landscape Specification Guidelines for Baltimore-Washington Metropolitan Areas', (hereinafter 'Landscape Guidelines') approved by the Landscape Contractors Association of Metropolitan Washington and the Potomac Chapter of the American Society of Landscape Architect, latest edition, including all agenda.

Contractor shall be required to guarantee all plant material for a period of one year after date of acceptance in accordance with the appropriate section of the Landscape Guidelines Contractor's attention is directed to the maintenance requirements found within the one year specifications including watering and replacement of specified plant material.

Contractor shall be responsible for notifying utility companies, utility contractors and 'Miss Utility' a minimum of 48 hours prior to beginning any work. Contractor may make minor adjustments in spacing and location of plant material to avoid conflicts with utilities. Damage to existing structure and utilities shall be repaired at the expense of the Contractor.

Protection of existing vegetation to remain shall be accomplished by the temporary installation of 4 foot high snow fence or blaze orange safety fence at the drip line.

Contractor id responsible for installing all material in the proper planting season for each plant type. All planting is to be completed within the growing season of completion of site construction.

Bid shall be base on actual site conditions. No extra payment shall be made for work arising from site conditions differing from those indicated on drawings and specifications

Plant quantities are provided for the convenience of the contractor only. If discrepancies exist between quantities shown on plan and those shown on the plant list, the quantities on the plan take precedence

All shrubs shall be planted in continuous trenches or prepared planting beds and mulched with composted hardwood mulch as details and specified except where noted on plans.

Positive drainage shall be maintained in planting beds 2 percent slope).

Planting mix shall be as follows: Deciduous Plants – Two parts topsoil, one part well-rotted cow or horse manure. Add 3 lbs. of standard fertilizer per cubic yard of planting mix. Evergreen Plants – two parts topsoil, one part humus or other approved organic material. Add 3 lbs. of evergreen (acidic) fertilizer per cubic yard of planting mix. Topsoil shall conform to the Landscape Guidelines.

Weed Control: Incorporate a pre-emergent herbicide into the planting bed following recommended rates on the label. Caution: Be sure to carefully check the chemical used to assure its adaptability to the specific ground cover to be treated.

All areas within contract limits disturbed during or prior to construction not designated to receive plants and mulch shall be fine graded and seeded.

This plan is intended for landscape use only. see other plan sheets for more information on grading, sediment control, layout, etc.

SCHEDULE D STORMWATER MANAGEMENT AREA LANDSCAPING	
LINEAR FEET OF TYPE 'B' PERIMETER	D-1 : 805'
NUMBER OF TREES REQUIRED & PROVIDED: SHADE TREES EVERGREEN TREES	805' - 259' = 546' 11 14
CREDIT FOR EXISTING VEGETATION (NO, YES AND %)	259'
CREDIT FOR OTHER LANDSCAPING (NO, YES AND %)	NO

PLANT LIST

SYMBOL	QTY.	BOTANICAL AND COMMON NAME	SIZE
(shade tree symbol)	11	QUERCUS ACUTISSIMA SAWTOOTH OAK	2 1/2-3" CAL.
(evergreen symbol)	14	PINUS STROBUS EASTERN WHITE PINE	6' - 8' HT.

"THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 16.124 OF THE HOWARD COUNTY CODE AND THE LANDSCAPE MANUAL". FINANCIAL SURETY FOR THE REQUIRED 11 SHADE & 14 EVERGREEN TREES HAS BEEN POSTED AS PART OF THE DEVELOPER'S AGREEMENT IN THE AMOUNT OF $ 5,400.00

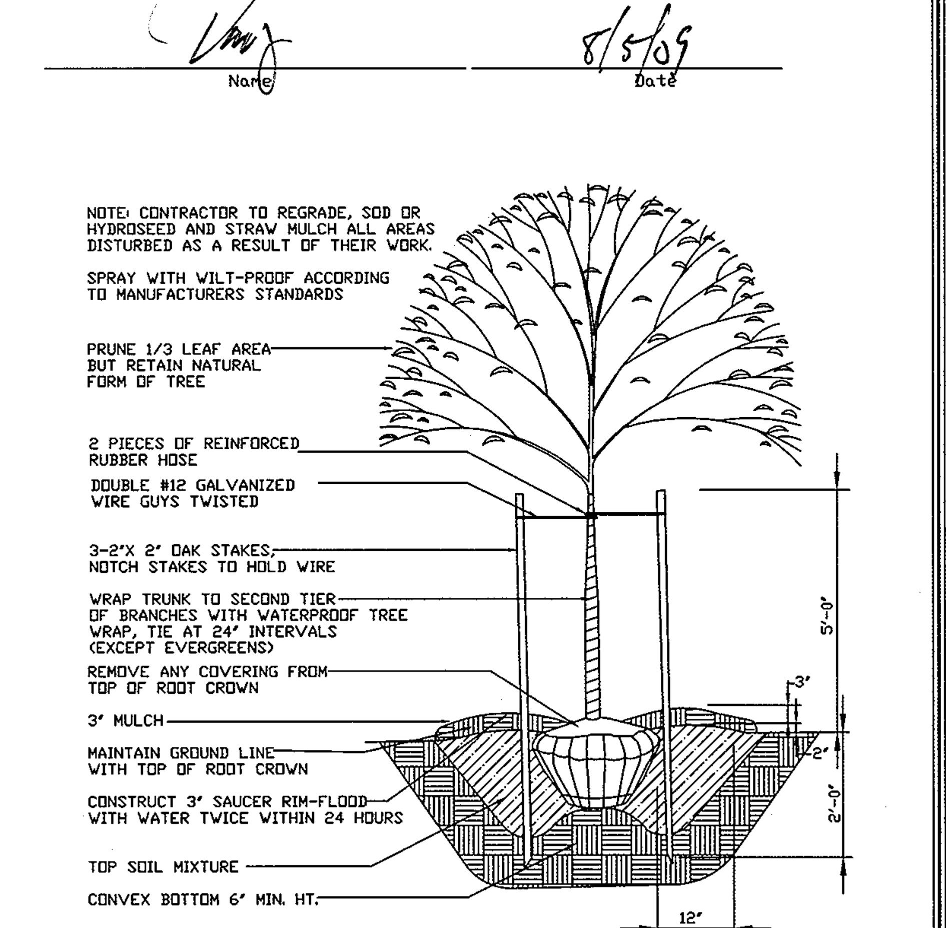
INTERNAL POND PLANT LIST

ZONE 5 FLOODPLAIN TERRACE	ELEV. 459.50 TO ELEV. 462.00 PLANT AREA w/ SWITCH GRASS QUANTITY - N/A SPACING - N/A
ZONE 3 SHORELINE FRINGE	ELEV. 459.50 (5' BENCH) PLANT BENCH AREA w/ THE FOLLWING: INKBERRY, WITCHHAZEL & WINTERBERRY QUANTITY - 9 EACH SPACING - 12' MAX.
ZONE 2 SHALLOW WATER BENCH	ELEV. 458.00 TO ELEV. 459.50 PLANT AREA w/ BULRUSH, RIVER QUANTITY - N/A SPACING - N/A
ZONE 1 DEEPWATER POOL	ELEV. 455.00 TO ELEV. 458.00 PLANT AREA w/ WIDGEON-GRASS QUANTITY - N/A SPACING - N/A

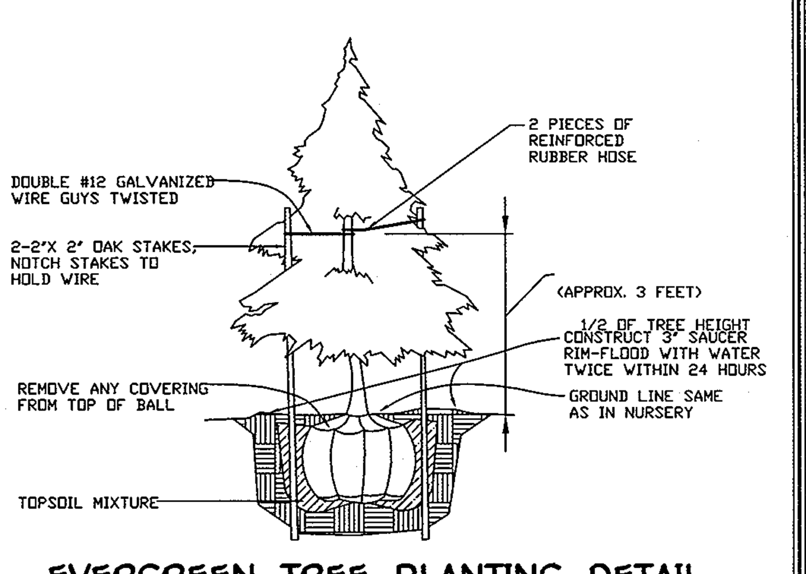
LANDSCAPE DEVELOPER'S CERTIFICATE

I/We certify that the landscaping shown on this plan will be done according to the plan, Section 16.124 of the Howard County Code and the Howard County Landscape Manual. I/We further certify that upon completion 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.

[signature] — 8/5/09
Name — Date



SHADE TREE PLANTING DETAIL



EVERGREEN TREE PLANTING DETAIL

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION, HOLE IN THE DOUGHNUT, LLC, & GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
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CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

PLAN
SCALE: 1" = 50'

ALDO M. VITUCCI, P.E. — 7-29-09
DATE

"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. 20748, Expiration Date 2-22-11."

LANDSCAPE PLAN

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 5 LANDSCAPE PLAN.dwg, 7/29/2009 10:04:02 AM, jamesl, 1:1

STORMWATER MANAGEMENT POND CONSTRUCTION SPECIFICATIONS

These specifications are appropriate to all ponds within the scope of the Standard for practice MD-378. All references to ASTM and AASHTO specifications apply to the most recent version.

Site Preparation

Areas designated for borrow areas, embankment, and structural works shall be cleared, grubbed and stripped of topsoil. All trees, vegetation, roots and other objectionable material shall be removed. Channel banks and sharp breaks shall be sloped to no steeper than 1:1. All trees shall be cleared and grubbed within 15 feet of the toe of the embankment.

Areas to be covered by the reservoir will be cleared of all trees, brush, logs, fences, rubbish and other objectionable material unless otherwise designated on the plans. Trees, brush, and stumps shall be cut approximately level with the ground surface. For dry stormwater management ponds, a minimum of a 25-foot radius around the inlet structure shall be cleared.

All cleared and grubbed material shall be disposed of outside and below the limits of the dam and reservoir as directed by the owner or his representative. When specified, a sufficient quantity of topsoil will be stockpiled in a suitable location for use on the embankment and other designated areas.

EARTH FILL

Material - The fill material shall be taken from approved designated borrow areas. It shall be free of roots, stumps, wood, rubbish, stones greater than 6", frozen or other objectionable materials. Fill material for the center of the embankment, and cut off trench shall conform to Unified Soil Classification GC, SC, CH, or CL and must have at least 30% passing the *200 sieve. Consideration may be given to the use of other materials in the embankment if designed by a geotechnical engineer. Such special designs must have construction supervised by a geotechnical engineer. Materials used in the outer shell of the embankment must have the capability to support vegetation of the quality required to prevent erosion of the embankment.

Placement - Areas on which fill is to be placed shall be scarified prior to placement of fill. Fill materials shall be placed in maximum 8-inch thick (before compaction) layers which are to be continuous over the entire length of the fill. The most permeable borrow material shall be placed in the downstream portions of the embankment. The principal spillway must be installed concurrently with fill placement and not excavated into the embankment.

Compaction - The movement of the hauling and spreading equipment over the fill shall be controlled so that the entire surface of each lift shall be traversed by not less than one tread track of heavy equipment or compaction shall be achieved by a minimum of four complete passes of a sheepsfoot, rubber tired or vibratory roller. Fill material shall contain sufficient moisture such that the required degree of compaction will be obtained with the equipment used. The fill material shall contain sufficient moisture so that if formed into a ball it will not crumble, yet not be so wet that water can be squeezed out.

When required by the reviewing agency the minimum required density shall not be less than 95% of maximum dry density with a moisture content within ±2% of the optimum. Each layer of fill shall be compacted as necessary to obtain that density, and is to be certified by the Engineer at the time of construction. All compaction is to be determined by AASHTO Method T-99 (Standard Proctor).

Cut Off Trench - The cutoff trench shall be excavated into impervious material along or parallel to the centerline of the embankment as shown on the plans. The bottom width of the trench shall be governed by the equipment used for excavation, with the minimum width being four feet. The depth shall be at least four feet below existing grade or as shown on the plans. The side slopes of the trench shall be 1 to 1 or flatter. The backfill shall be compacted with construction equipment, rollers, or hand tampers to assure maximum density and minimum permeability.

Embankment Core - The core shall be parallel to the centerline of the embankment as shown on the plans. The top width of the core shall be a minimum of four feet. The height shall extend up to at least the 10 year water elevation or as shown on the plans. The side slopes shall be 1 to 1 or flatter. The core shall be compacted with construction equipment, rollers, or hand tampers to assure maximum density and minimum permeability. In addition, the core shall be placed concurrently with the outer shell of the embankment.

Structure Backfill

Backfill adjacent to pipes or structures shall be of the type and quality conforming to that specified for the adjoining fill material. The fill shall be placed in horizontal layers not to exceed four inches in thickness and compacted by hand tampers or other manually directed compaction equipment. The material needs to fill completely all spaces under and adjacent to the pipe. At no time during the backfilling operation shall driven equipment be allowed to operate closer than four feet, measured horizontally, to any part of a structure. Under no circumstances shall equipment be driven over any part of a concrete structure or pipe, unless there is a compacted fill of 24" or greater over the structure or pipe.

Structure backfill may be flowable fill meeting the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 313 as modified. The mixture shall have a 100-200 psi; 28 day unconfined compressive strength. The flowable fill shall have a minimum pH of 4.0 and a minimum resistivity of 2,000 ohm-cm. Material shall be placed such that a minimum of 6" (measured perpendicular to the outside of the pipe) of flowable fill shall be under (bedding), over and, on the sides of the pipe. It only needs to extend up to the spring line for rigid conduits. Average slump of the fill shall be 7" to assure flowability of the material. Adequate measures shall be taken (sand bags, etc.) to prevent floating the pipe. When using flowable fill, all metal pipe shall be bituminous coated. Any adjoining soil fill shall be placed in horizontal layers not to exceed four inches in thickness and compacted by hand tampers or other manually directed compaction equipment. The material shall completely fill all voids adjacent to the flowable fill zone. At no time during the backfilling operation shall driven equipment be allowed to operate closer than four feet, measured horizontally, to any part of a structure. Under no circumstances shall equipment be driven over any part of a structure or pipe unless there is a compacted fill of 24" or greater over the structure or pipe. Backfill material outside the structural backfill (flowable fill) zone shall be of the type and quality conforming to the specified for the core of the embankment or other embankment materials.

Pipe Conduits

All pipes shall be circular in cross section.

Corrugated Metal Pipe - All of the following criteria shall apply for corrugated metal pipe:

1. Materials - (Polymer Coated steel pipe) - Steel pipes with polymeric coatings shall have a minimum coating thickness of 0.01 inch (10 mil) on both sides of the pipe. This pipe and its appurtenances shall conform to the requirements of AASHTO Specifications M-245 & M-246 with watertight coupling bands or flanges.

Materials - (Aluminum Coated Steel Pipe) - This pipe and its appurtenances shall conform to the requirements of AASHTO Specification M-274 with watertight coupling bands or flanges. Aluminum Coated Stel Pipe, when used with flowable fill or when soil and/or water conditions warrant the need for increased durability, shall be fully bituminous coated per requirements of AASHTO Specification M-190 Type A. Any aluminum coating damaged or otherwise removed shall be replaced with cold applied bituminous coating compound. Aluminum surfaces that are to be in contact with concrete shall be painted with one coat of zinc chromate primer or two coats of asphalt.

Materials - (Aluminum Pipe) - This pipe and its appurtenances shall conform to the requirements of AASHTO Specification M-196 or M-211 with watertight coupling banks or flanges. Aluminum Pipe, when used with flowable fill or when soil and/or water conditions warrant for increased durability, shall be fully bituminous coated per requirements of AASHTO Specification M-190 Type A. Aluminum surfaces that are to be in contact with concrete shall be painted with one coat of zinc chromate primer or two coats of asphalt. Hot dip galvanized bolts may be used for connections. The pH of the surrounding soils shall be between 4 and 9.

2. Coupling bands, anti-seep collars, end sections, etc., must be composed of the same material and coatings as the pipe. Metals must be insulated from dissimilar materials with use of rubber or plastic insulating materials at least 24 mils in thickness.

3. Connections- All connections with pipes must be completely watertight. The drain pipe or barrel connection to the riser shall be welded all around when the pipe and riser are metal. Anti-seep collars shall be connected to the pipe in such a manner as to be completely watertight. Dimple bands are not considered to be watertight.

All connections shall use a rubber or neoprene gasket when joining pipe sections. The end of each pipe shall be re-rolled an adequate number of corrugations to accommodate the bandwidth. The following type connections are acceptable for pipes less than 24-inches in diameter: flanges on both ends of the pipe with a circular 3/8 inch closed cell neoprene gasket, prepunched to the flange bolt circle, sandwiched between adjacent flanges; a 12-inch wide standard lap type band with 12-inch wide by 3/8-inch thick closed cell circular neoprene gasket; and a 12-inch wide hugger type band with o-ring gaskets having a minimum diameter of 1/2-inch greater than the corrugation depth. Pipes 24-inches in diameter and larger shall be connected by a 24-inch long annular corrugated band using a minimum of 4 (four) rods and lugs, 2 on each connecting pipe end. A 24-inch wide by 3/8-inch thick closed cell circular neoprene gasket will be installed with 12-inches on the end of each pipe. Flanged joints with 3/8-inch closed cell gaskets the full width of the flange is also acceptable.

Helically corrugated pipe shall have either continuously welded seams or have lock seams with internal caulking or a neoprene bead.

4. Bedding - The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil is encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.

5. Backfilling shall conform to "Structure Backfill".

6. Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings.

Reinforced Concrete Pipe - All of the following criteria shall apply for reinforced concrete pipe:

1. Materials - Reinforced concrete pipe shall have bell and spigot joints with rubber gaskets and shall equal or exceed ASTM C-361.

2. Bedding - Reinforced concrete pipe conduits shall be laid in a concrete bedding/cradle for their entire length. This bedding/cradle shall consist of high slump concrete placed under the pipe and up the sides of the pipe at least 50% of its outside diameter with a minimum thickness of 6 inches. Where a concrete cradle is not needed for structural reasons, flowable fill may be used as described in the "Stucture Backfill" section of this standard. Gravel bedding is not permitted.

3. Laying pipe - Bell and spigot pipe shall be placed with the bell end upstream. Joints shall be made in accordance with recommendations of the manufacturer of the material. After the joints are sealed for the entire line, the bedding shall be placed so that all spaces under the pipe are filled. Care shall be exercised to prevent any deviation from the original line and grade of the pipe. The first joint must be located within 4 feet from the riser.

4. Backfilling shall conform to "Structure Backfill".

5. Other details (Anti-seep collars, valves, etc.) shall be as shown on the drawings.

Plastic Pipe

The following criteria shall apply for plastic pipe:

1. Materials - PVC pipe shall be PVC-1120 or PVC-1220 conforming to ASTM D-1785 or ASTM D-2241. Corrugated High Density Polyethylene (HDPE) pipe, couplings and fittings shall conform to the following: 4" - 10" inch pipe shall meet the requirement of AASHTO M252 Type S, and 12" through 24" inch shall meet the requirement of AASHTO M294 Type S.

2. Joints and connections to anti-seep collars shall be completely watertight.

3. Bedding - The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil is encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.

4. Backfilling shall conform to "Structure Backfill".

5. Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings.

Drainage Diaphragms - When a drainage diaphragm is used, a registered professional engineer will supervise the design and construction inspection.

Concrete

Concrete shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 414, Mix No. 3.

Rock Riprap

Rock riprap shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 311.

Geotextile shall be placed under all riprap and shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 921.09, Class C.

Care of Water during Construction

All work on permanent structures shall be carried out in areas free from water. The Contractor shall construct and maintain all temporary dikes, levees, cofferdams, drainage channels, and stream diversions necessary to protect the areas to be occupied by the permanent works. The contractor shall also furnish, install, operate, and maintain all necessary pumping and other equipment required for removal of water from various parts of the work and for maintaining the excavations, foundation, and other parts of the work free from water as required or directed by the engineer for constructing each part of the work. After having served their purpose, all temporary protective works shall be removed or leveled and graded to the extent required to prevent obstruction in any degree whatsoever of the flow of water to the spillway or outlet works and so as not to interfere in any way with the operation or maintenance of the structure. Stream diversions shall be maintained until the full flow can be passed through the permanent works. The removal of water from the required excavation and the foundation shall be accomplished in a manner and to the extent that will maintain stability of the excavated slopes and bottom required excavations and will allow satisfactory performance of all construction operations. During the placing and compacting of material in required excavations, the water level at the locations being refilled shall be maintained below the bottom of the excavation at such locations which may require draining the water sumps from which the water shall be pumped.

Stabilization

All borrow areas shall be graded to provide proper drainage and left in a sightly condition. All exposed surfaces of the embankment, spillway, spoil and borrow areas, and berms shall be stabilized by seeding, liming, fertilizing and mulching in accordance with the Natural Resources Conservation Service Standards and Specifications for Critical Area Planting (MD-342) or as shown on the accompanying drawings.

Erosion and Sediment Control

Construction operations will be carried out in such a manner that erosion will be controlled and water and air pollution minimized. State and local laws concerning pollution abatement will be followed. Construction plans shall detail erosion and sediment control measures.

OPERATION AND MAINTENANCE

An operation and maintenance plan in accordance with Local or State Regulations will be prepared for all ponds. As a minimum, the dam inspection checklist located in Appendix A shall be included as part of the operation and maintenance plan and performed at least annually. Written records of maintenance and major repairs needs to be retained in a file. The issuance of a Maintenance and Repair Permit for any repairs or maintenance that involves the modification of the dam or spillway from its original design and specifications is required. A permit is also required for any repairs or reconstruction that involve a substantial portion of the structure. All indicated repairs are to be made as soon as practical.

OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND JOINTLY MAINTAINED STORMWATER MANAGEMENT FACILITIES

ROUTINE MAINTENANCE

1. Facility shall be inspected annually and after major storms. Inspections shall be preformed during wet weather to determine if the pond is functioning properly.
2. Top and side slopes of the embankment shall be mowed a minimum of two (2) times a year, once in June and once in September. Other side slopes and maintenance access should be mowed as needed.
3. Debris and litter shall be removed during regular mowing operations and as needed.
4. Visible signs of erosion in the pond as well as the rip-rap or gabion outlet area shall be repairer as soon as it is noticed.

NON-ROUTINE MAINTENANCE

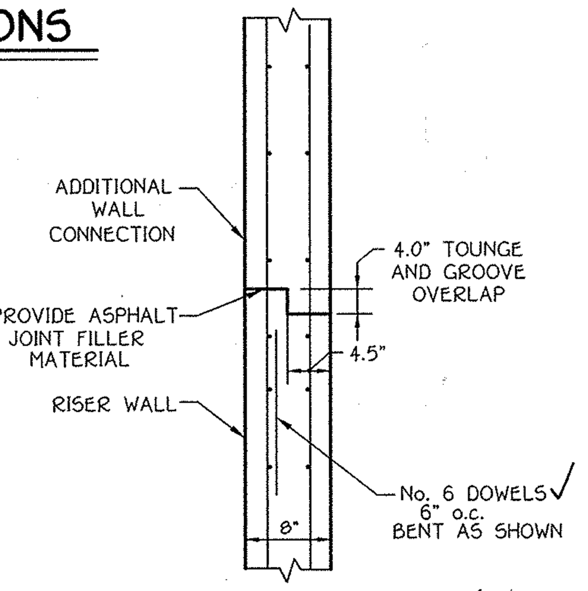
1. Structural components of the pond such as the dam, the riser, and the pipes shall be repaired upon the detection of any damage. The components shall be inspected during routine maintenance operations.
2. Sediment shall be removed from the pond, and forebay, no later than when the capacity of the pond or forebay, is half full of sediment, or, when deemed necessary for aesthetic reasons, upon approval from the Department of Public Works.

EMBANKMENT AND CUT-OFF TRENCH CONSTRUCTION

The areas of the proposed SWM facilities should be stripped of topsoil and any other unsuitable materials from the embankment or structure areas in accordance with Soil Conservation Guidelines. After stripping operations have been completed, the exposed subgrade materials should be proofrolled with a loaded dump truck or similar equipment in the presence of a geotechnical engineer or his representative. For areas that are not accessible to a dump truck, the exposed. materials should be observed and tested by a geotechnical engineer or his representative utilizing a Dynamic Cone Penetrometer. Any excessively soft or loose materials identified. by .proofrolling or penetrometer testing should be excavated to suitable firm.soil, and then grades re-established by backfilling with suitable soil.

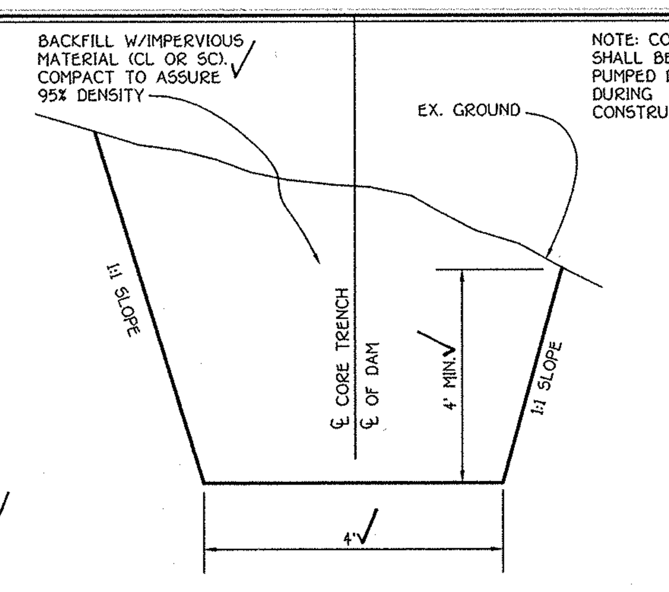
A representative of the Geotechnical Engineer should; be present to monitor placement and compaction of fill for the embankment and cut-off trench. In accordance with NRCS-MD Code No: 378 Pond Standards/Specifications, soils considered suitable for the center of embankment and cut-off trench shall conform to Unified Soil Classification GC, SG, CH, or CL and must have at least 30% passing the *200 sieve.

It is our professional opinion that in addition to the soil materials described above a fine-grained soil including Silt (ML) with a plasticity index of 10 or more can be utilized for the center of the embankment and core tench. All fill materials must be placed and 'compacted in' accordance with NRCS-MD Code No. 378 specifications.



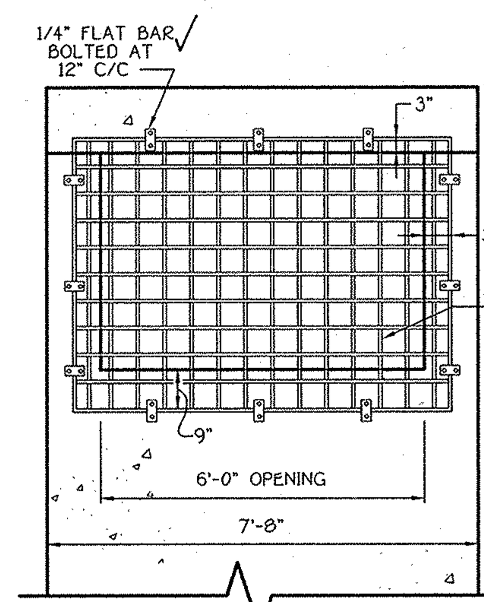
KEYED JOINT DETAIL WALL SECTION TO WALL SECTION

(NO SCALE)

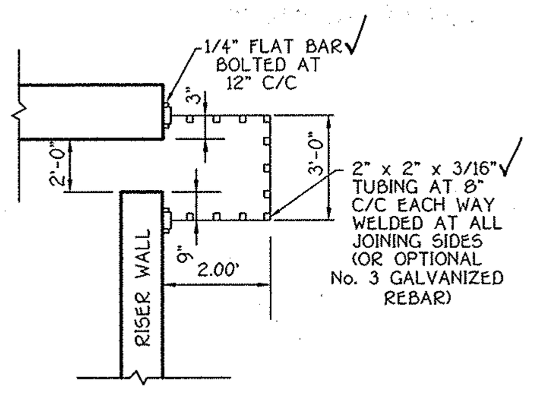


CORE TRENCH DETAIL

(NO SCALE)

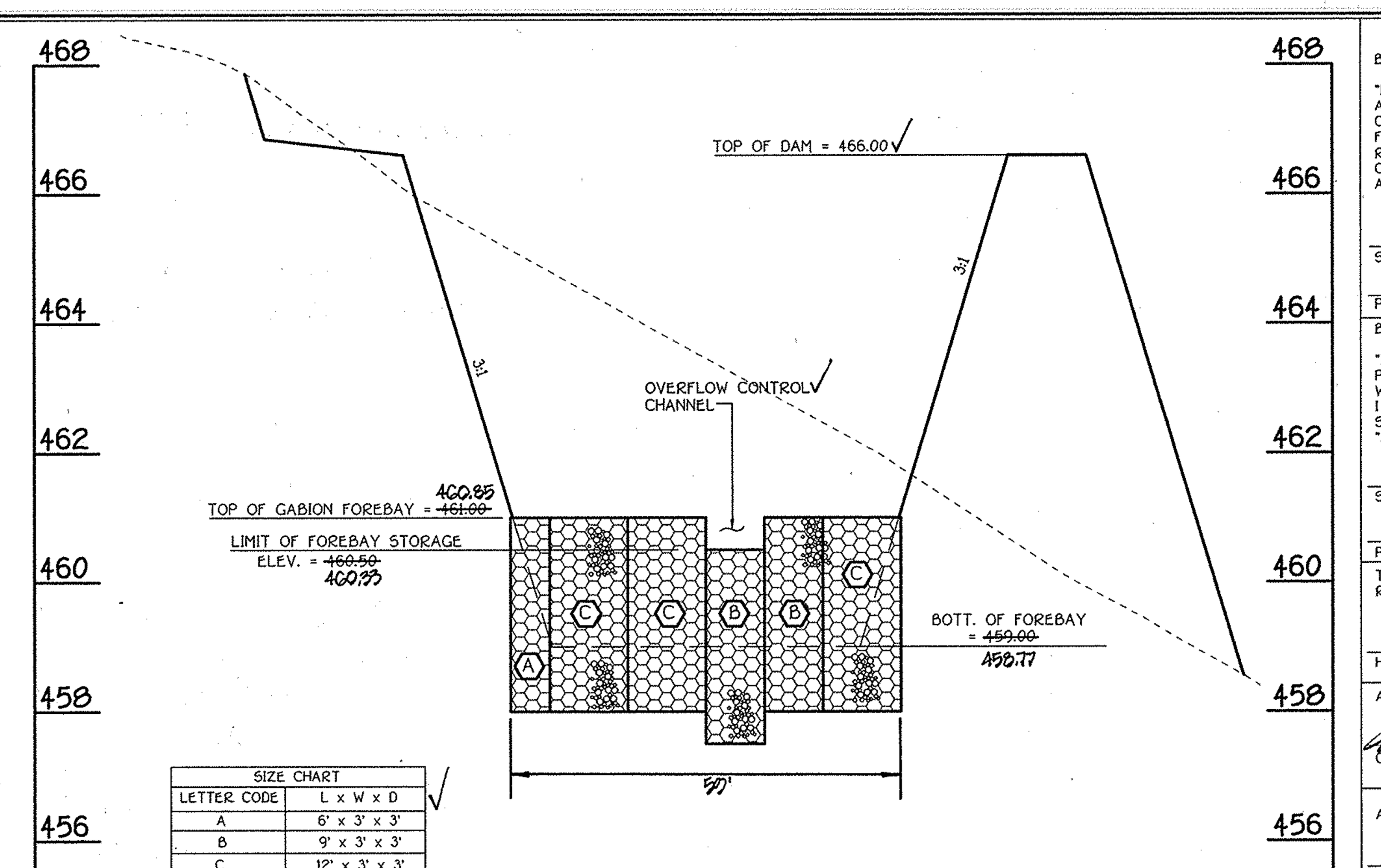


NOTES:
1. FIELD MEASURE THE STRUCTURE DIMENSIONS TO INSURE EXACT FIT OF TRASH RACK.
2. GALVANIZE ENTIRE TRASH RACK AFTER FABRICATION.
3. PAINT BATTLESHIP GRAY.



TRASH RACK 'A' DETAIL

(NO SCALE)



SIZE CHART	
LETTER CODE	L x W x D
A	6' x 3' x 3'
B	9' x 3' x 3'
C	12' x 3' x 3'

GABION FOREBAY PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 2'

By The Developer:

"I/We Certify That All Development And/Or Construction Will Be Done According To These Plans, And That Any 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 Shall Engage A Registered Professional Engineer To Supervise Pond Construction And Provide The Howard Soil Conservation District With An "As-Built" Plan Of The Pond Within 30 Days Of Completion. I Also Authorize Periodic On-Site Inspections By The Howard Soil Conservation District."

Signature Of Developer — Date 8/5/09

Printed Name Of Developer

By The Engineer:

"I Certify That This Plan For Pond Construction, Erosion And Sediment Control Represents A Practical And Workable Plan Based On My Personal Knowledge Of The Site Conditions. This Plan Was Prepared In Accordance With The Requirements Of The Howard Soil Conservation District. I Have Notified The Developer That He/She Must Engage A Registered Professional Engineer To Supervise Pond Construction And Provide The Howard Soil Conservation District With An "As-Built" Plan Of The Pond Within 30 Days Of Completion."

Signature Of Engineer — Date 7-29-09

Printed Name Of Engineer

These Plans For Small Pond Construction, Soil Erosion And Sediment Control Meet The Requirements Of The Howard Soil Conservation District.

Howard Soil Conservation District — Date 8/18/09

Approved: Department Of Public Works

Chief Bureau Of Highways — Date 8-27-09

Approved: Department Of Planning And Zoning

Chief, Division Of Land Development — Date 9/29/09

Chief, Development Engineering Division — Date 8/31/09

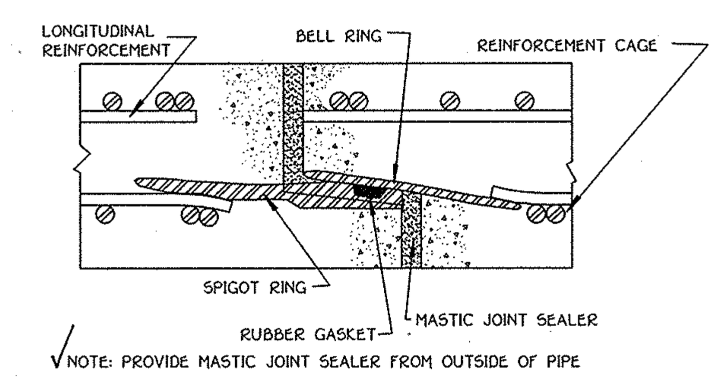
AS-BUILT CERTIFICATION

I Hereby Certify That The Facility Shown On This Plan Was Constructed As Shown On The " As-Built" Plans And Meets The Approved Plans And Specifications.

Signature — P.E. No. 12043 — Date: 12/19/14

Certify Means To State Or Declare A Professional Opinion Based Upon Onsite Inspections And Material Tests Which Are Conducted During Construction. The Onsite Inspections And Material Tests Are Those Inspections And Tests Deemed Sufficient And Appropriate Commonly Accepted Engineering Standards. Certify Does Not mean Or Imply A Guarantee By The Engineer Nor Does An Engineer's Certification Relieve Any Other Party From Meeting Requirements Imposed By Contract, Employment, Or Other Means, Including Meeting Commonly Accepted Industry Practices.

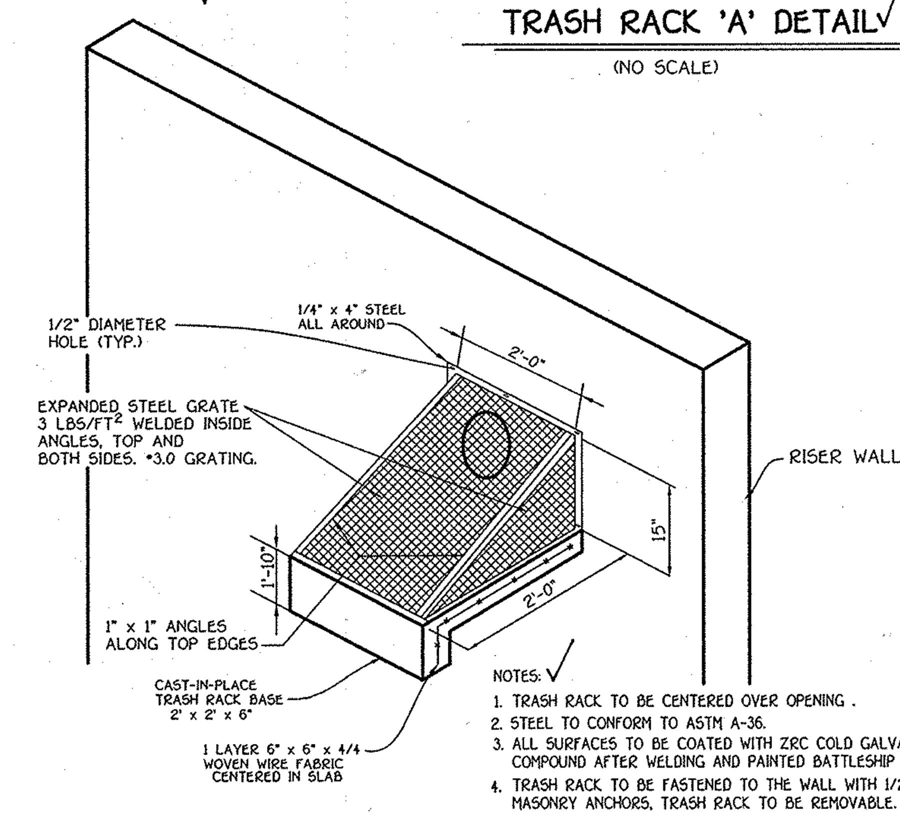
AS-BUILT INFORMATION ADDED : NOVEMBER 26, 2014



NOTE: PROVIDE MASTIC JOINT SEALER FROM OUTSIDE OF PIPE JOINTS PRIOR TO INSTALLING BARREL UNDERGROUND
ASTM DESIGNATION C361
DIAMETERS 12 THRU 168 INCH
PRESSURES TO 125 FEET OF HEAD

CONCRETE PIPE JOINT DETAIL

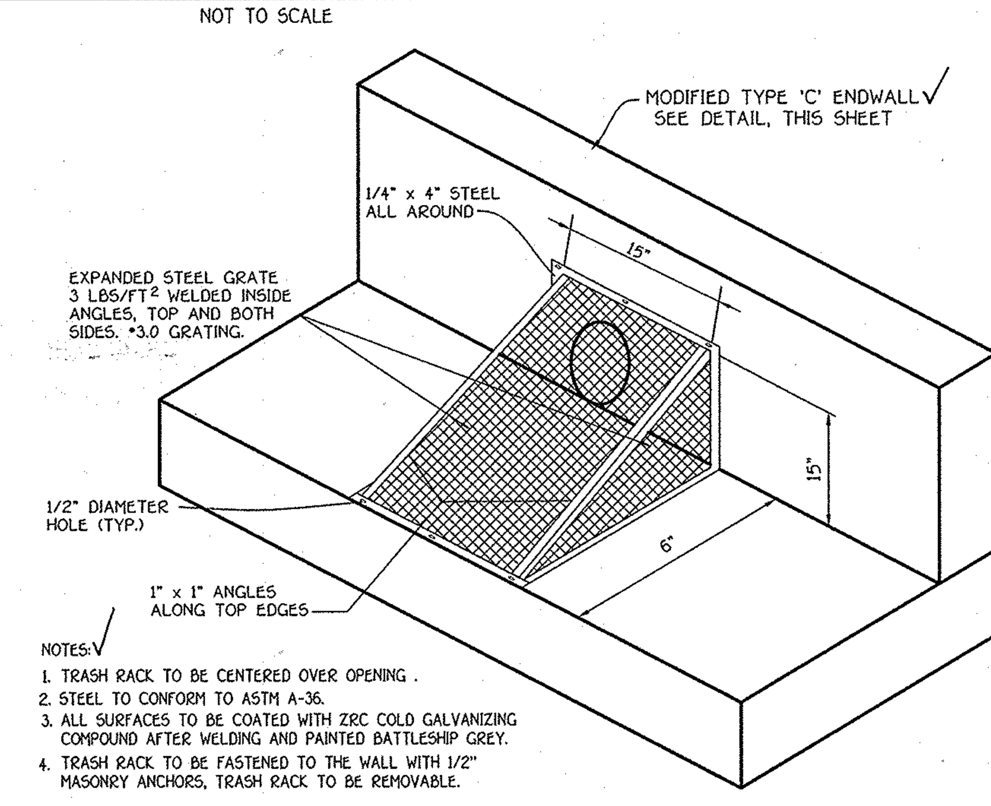
(NO SCALE)



NOTES:
1. TRASH RACK TO BE CENTERED OVER OPENING .
2. STEEL TO CONFORM TO ASTM A-36.
3. ALL SURFACES TO BE COATED WITH ZRC COLD GALVANIZING COMPOUND AFTER WELDING AND PAINTED BATTLESHIP GREY.
4. TRASH RACK TO BE FASTENED TO THE WALL WITH 1/2" MASONRY ANCHORS, TRASH RACK TO BE REMOVABLE.

EXPANDED METAL TRASH RACK FOR LOW FLOW ORIFICE

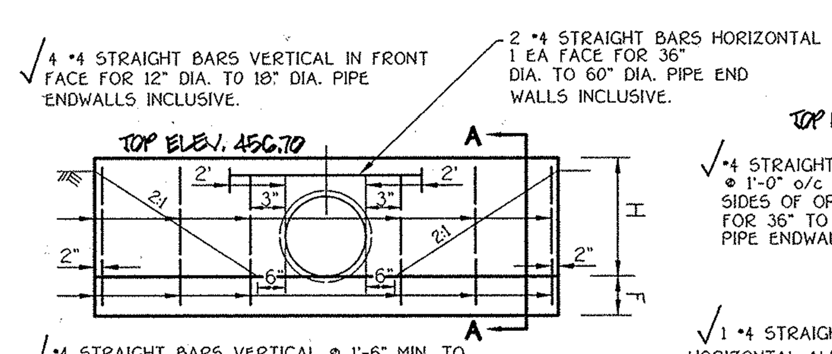
NOT TO SCALE



NOTES:
1. TRASH RACK TO BE CENTERED OVER OPENING .
2. STEEL TO CONFORM TO ASTM A-36.
3. ALL SURFACES TO BE COATED WITH ZRC COLD GALVANIZING COMPOUND AFTER WELDING AND PAINTED BATTLESHIP GREY.
4. TRASH RACK TO BE FASTENED TO THE WALL WITH 1/2" MASONRY ANCHORS, TRASH RACK TO BE REMOVABLE.

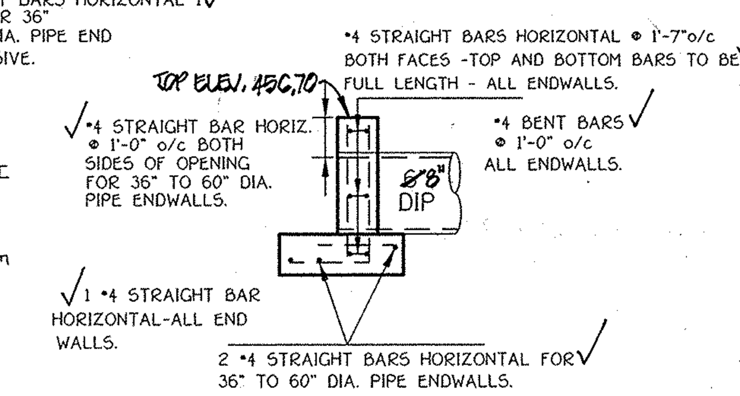
EXPANDED METAL TRASH RACK FOR DRAIN PIPE

NOT TO SCALE

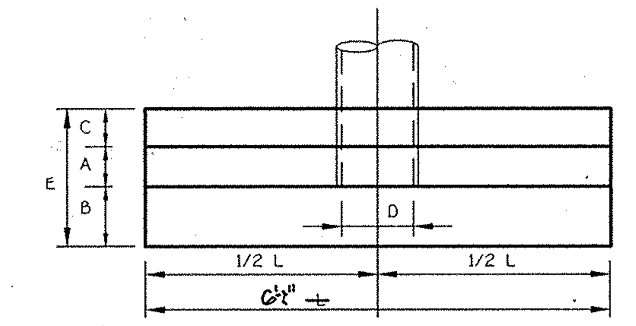


ELEVATION

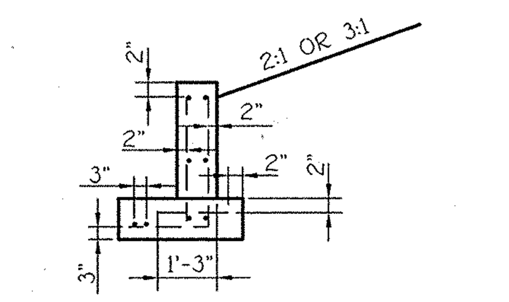
'S' DISTANCES FROM INSIDE SURFACE OF PIPE TO VERTICAL BARS IN FRONT AND REAR FACE.
4" FOR 12" DIA. TO 18" DIA. PIPES INCL.
6" FOR 24" DIA.TO 36" DIA. PIPES INCL.
8" FOR 42" DIA.TO 60" DIA. PIPES INCL.



SECTION A-A



PLAN



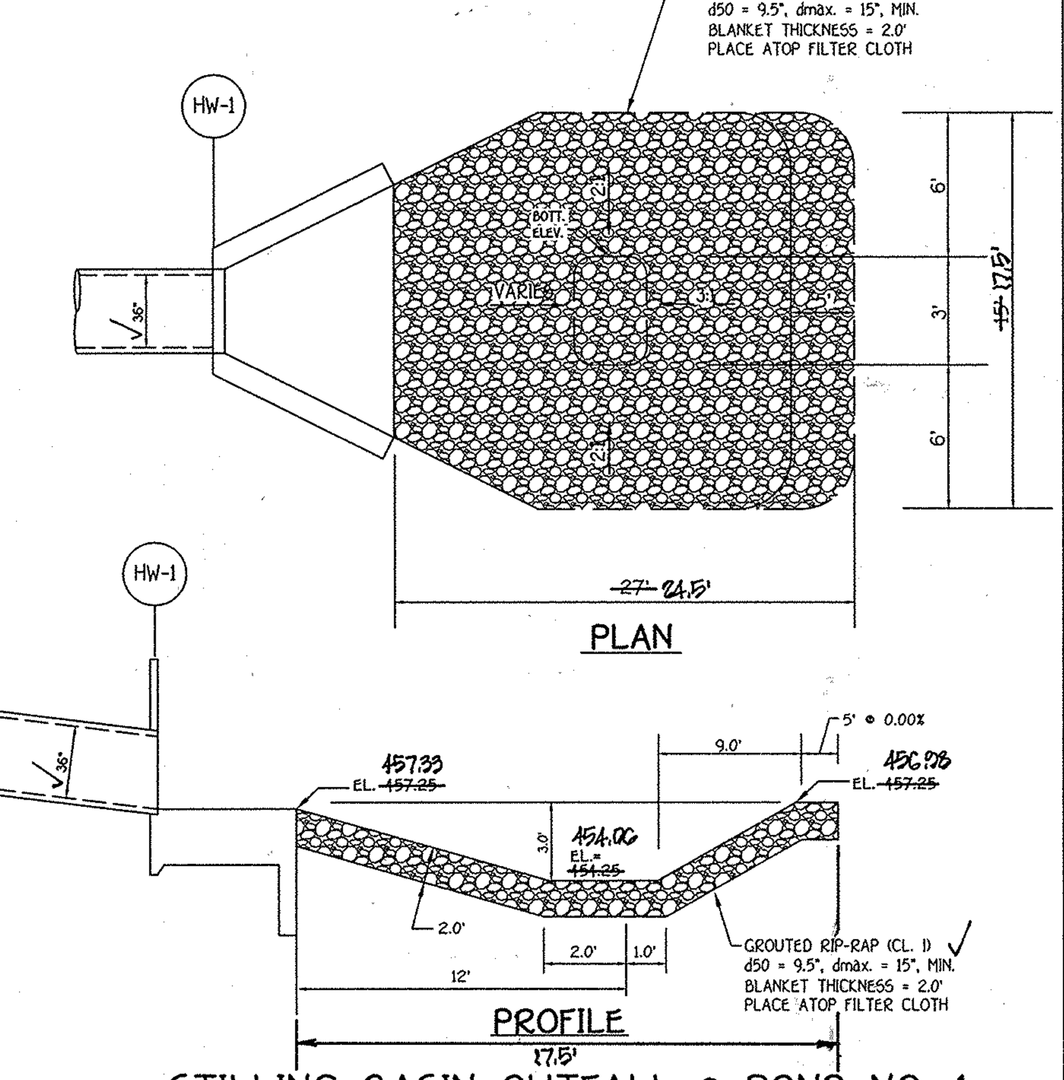
DISPOSITION OF BARS - DETAIL

REINFORCING: DEFORMED STEEL BARS (1/2" DIA.)
CHAMFER: ALL EXPOSED EDGES 1"x 1" OR AS DIRECTED.
CONC. SHALL BE S.H.A. A. MIX No. 2.

OPENINGS		DIMENSIONS							VOLUME	STEEL
D IN.	AREA SQ.FT.	A	B	C	E	F	H	L	CONC. C.Y.	LBS.
6"	0.79	9"	6"	6"	1'-9"	9"	1'-6"	~~5'-5"~~ 6'-1"	0.61	38

MODIFIED TYPE 'C' ENDWALL

NO SCALE



STILLING BASIN OUTFALL @ POND NO. 1

NO SCALE

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC, &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

ALDO M. VITUCCI, P.E. — DATE 7-29-09

"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

STORMWATER MANAGEMENT NOTES AND DETAILS

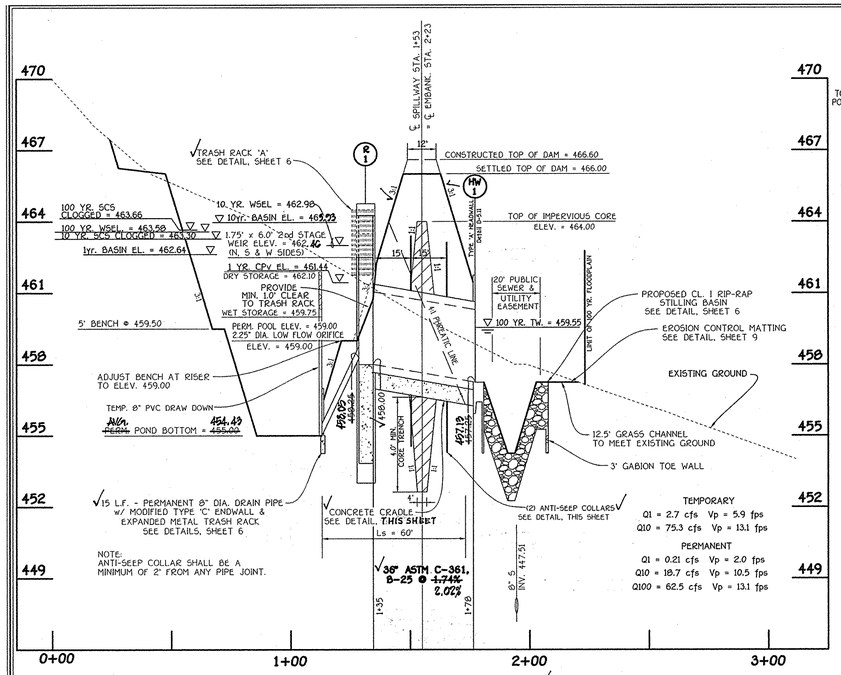
GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND
OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 6 OF 27

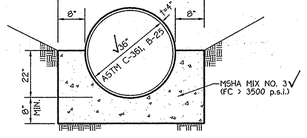
F-09-057
AS-BUILT: 11/26/14

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 6-7 SWM DETAILS.dwg, 7/28/2009 2:33:07 PM, jamesl, 1:1



PRINCIPLE SPILLWAY PROFILE

SCALE: HOR. : 1" = 30'
VER. : 1" = 3'



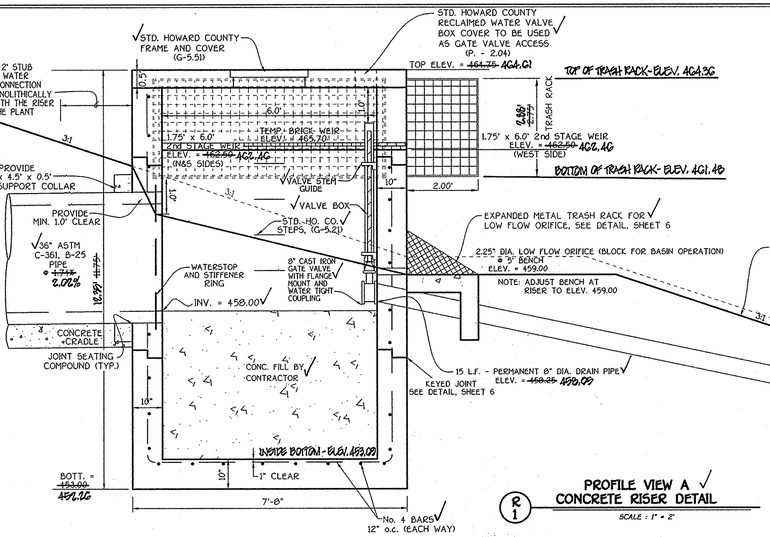
NOTE:
CONC. CRADLE TO BE POURED DIRECTLY AGAINST EARTH BANKS. IF BOTTOM OF TRENCH IS WIDER THAN THE CRADLE, SLOPING SIDES (FRAMED) SHALL BE USED.

SCS TR-46 A2 CONCRETE CRADLE

NO SCALE

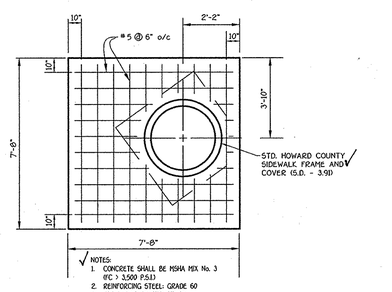
S.W.M. FACILITY B.M.P. NO. 1 PROFILE ALONG ℄ EMBANKMENT

SCALE: HORIZ. 1" = 30'
VERT. 1" = 3'



PROFILE VIEW A CONCRETE RISER DETAIL

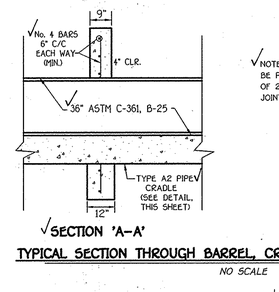
SCALE : 1" = 2'



NOTES:
1. CONCRETE SHALL BE MSHA MIX No. 3 (f'c > 3,500 P.S.I.)
2. REINFORCING STEEL: GRADE 60
3. FOR WALLS OF STRUCTURE SHALL UTILIZE L.M. SCOFIELD CO. T-9055 FORM LINERS (RANDOM SPLIT-FACE ROCK) OPTIONAL.
4. PROVIDE ROUGH BROOM FINISH.
5. ANCHOR BOLTS SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 6.07.03.59 OF THE MSHA STANDARDS AND SPECS.
6. ALL REINFORCING SPLICES SHALL BE LAP SPLICES OF 30 BAR DIA. UNLESS OTHERWISE SHOWN.

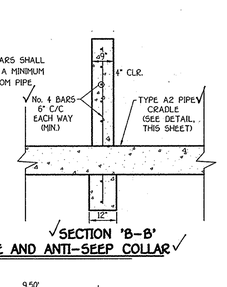
TOP SLAB DETAIL

NO SCALE



SECTION 'A-A'

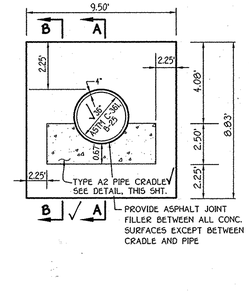
NOTE: COLLARS SHALL BE PLACED A MINIMUM OF 2'-0" FROM PIPE JOINTS.

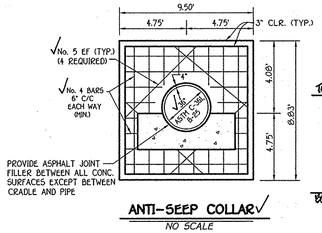


SECTION 'B-B'

TYPICAL SECTION THROUGH BARREL, CRADLE AND ANTI-SEEP COLLAR

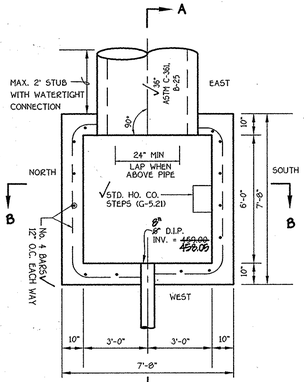
NO SCALE





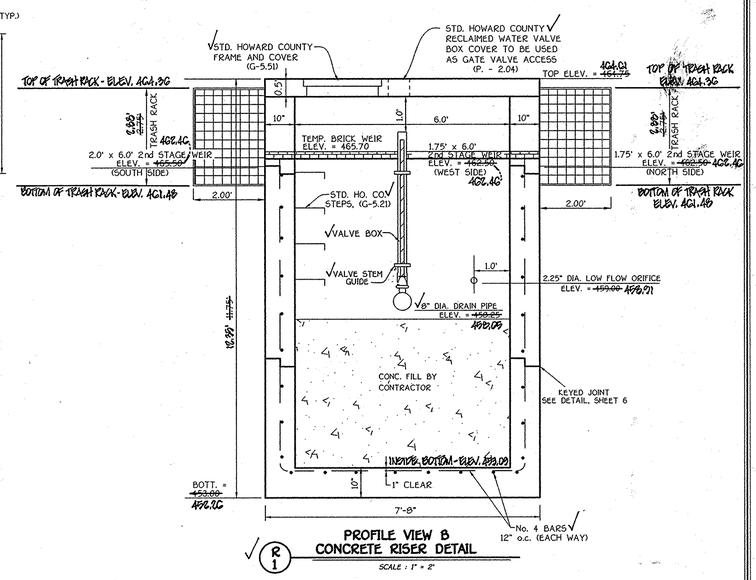
ANTI-SEEP COLLAR

NO SCALE



RISER PLAN VIEW

NO SCALE



PROFILE VIEW B CONCRETE RISER DETAIL

SCALE : 1" = 2'

By The Developer:

"I/We Certify That All Development And/Or Construction Will Be Done According To These Plans, And That Any 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 Shall Engage A Registered Professional Engineer To Supervise Pond Construction And Provide The Howard Soil Conservation District With An "As-built" Plan Of The Pond Within 30 Days Of Completion. I Also Authorize Periodic On-Site Inspections By The Howard Soil Conservation District."

Signature Of Developer — Date: 8/5/09

Printed Name Of Developer

By The Engineer:

"I Certify That This Plan For Pond Construction, Erosion And Sediment Control Represents A Practical And Workable Plan Based On My Personal Knowledge Of The Site Conditions. This Plan Was Prepared In Accordance With The Requirements Of The Howard Soil Conservation District. I Have Informed The Developer That He/She Must Engage A Registered Professional Engineer To Supervise Pond Construction And Provide The Howard Soil Conservation District With An "As-Built" Plan Of The Pond Within 30 Days Of Completion."

Signature — Date: 7-29-09

Printed Name

These Plans For Small Pond Construction Soil Erosion And Sediment Control Meet The Requirements Of The Howard Soil Conservation District.

Howard Soil Conservation District — Date: 8/18/09

Approved: Department Of Public Works

Chief, Bureau Of Highways — Date: 8-27-09

Approved: Department Of Planning And Zoning

Chief, Division Of Land Development — Date: 9/29/09

Chief, Development Engineering Division — Date: 8/31/09

AS-BUILT CERTIFICATION

I Hereby Certify That The Facility Shown On This Plan Was Constructed As Shown On The " As-Built" Plans And Meets The Approved Plans And Specifications.

Signature — Paul W. Kaiser — P.E. No. 12,043 — Date: 12/19/14

Certify Means To State Or Declare A Professional Opinion Based Upon Onsite Inspections And Material Tests Which Are Conducted During Construction. The Onsite Inspections And Material Tests Are Those Inspections And Tests Deemed Sufficient And Appropriate Commonly Accepted Engineering Standards. Certify Does Not mean Or Imply A Guarantee By The Engineer Nor Does An Engineer's Certification Relieve Any Other Party From Meeting Requirements Imposed By Contract, Employment, Or Other Means, Including Meeting Commonly Accepted Industry Practices.

AS-BUILT INFORMATION ADDED : NOVEMBER 26, 2014

STORMWATER MANAGEMENT NOTES AND DETAILS

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC

TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4

THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND

DATE: JULY 28, 2009

SHEET 7 OF 27

F-09-057

AS-BUILT: 11/26/14

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS

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GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

STATE OF MARYLAND — ALDO M. VITUCCI — No. 20748 — REGISTERED PROFESSIONAL ENGINEER

ALDO M. VITUCCI, P.E. — DATE 7-29-09

"Professional certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 6-7 SWM DETAILS.dwg, 7/28/2009 2:55:57 PM, jamesl, 111

ENGINEER'S CERTIFICATE

I Hereby Certify That This Plan For Erosion And Sediment 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.

Signature _______ 7-29-09 Date

DEVELOPER'S CERTIFICATE

"I/We Certify That All Development And Construction Will Be Done According To This Plan Of Development And Plan For Erosion And Sediment Control And That All Responsible Personnel Involved In The Construction Project Will Have A Certificate Of Attendance At A Department Of Natural Resources 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 Or Their Authorized Agents, As Are Deemed Necessary."

Signature Of Developer _______ 8/5/09 Date

Approved: This Development Is Approved For Erosion And Sediment Control By The Howard Soil Conservation District.

District Howard Soil Conservation Dist. _______ 8/18/09 Date

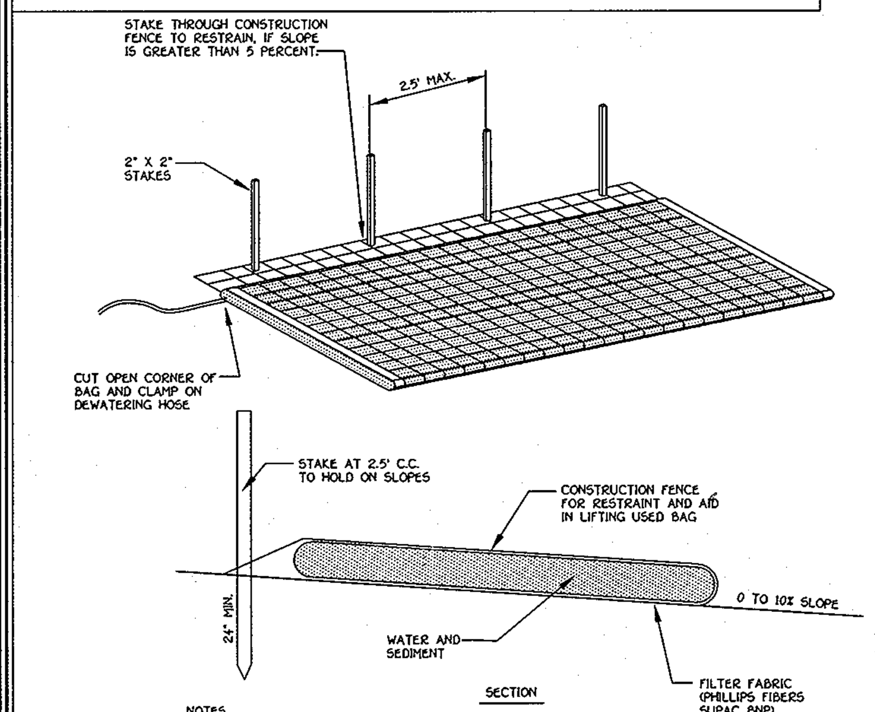
Approved: Department Of Planning And Zoning

Chief, Division Of Land Development _______ 9/29/09 Date

Chief, Development Engineering Division _______ 8/31/09 Date

Approved: Howard County Department Of Public Works

Chief, Bureau Of Highways _______ 8-27-09 Date



NOTES

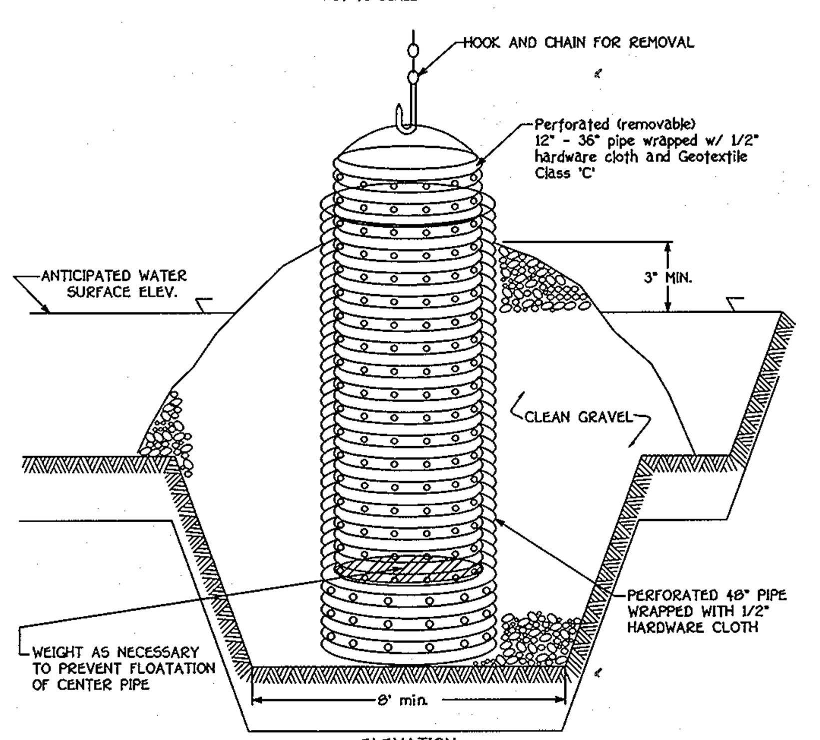
1. FILTER BAG SHALL BE PLACED ON A SLOPING OR LEVEL, WELL GRADED VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM DEVICE AND ANY WORK AREAS.
2. WITDH AND LENTH SHALL BE AS SHOWN IN THE TABLE.
3. THE FILTER BAG MUST BE STAKED IN PLACE AND SECURED TO THE PUMP DISHARGE LINE.
4. FILTER BAG SHALL NOT BE USED FOR DISCHARGE FLOWS GREATER THAN 300 GPM. DEVICE SHALL BE REMOVED AND DISPOSED OF AFTER BAG IS FILLED WITH SEDIMENT.
5. SEDIMENT FROM BAG SHALL BE SPREAD IN AN UPLAND AREA.

AVAILABLE FROM:

INDIAN VALLEY INDUSTRIES, INC. P.O. BOX 810 JOHNSON CITY, NEW YORK 13790 (800) 659-5111 OR A.C.F. ENVIRONMENTAL 1801-A WILLIS ROAD RICHMOND, VIRGINIA 23237 TOLL FREE 1-800-448-3636 OR PRICE AND COMPANY, INC. 425 36TH STREET WYOMING, MI. 49548 (616) 530-8230

FILTER BAG DETAIL

NOT TO SCALE



ELEVATION

Construction Specifications

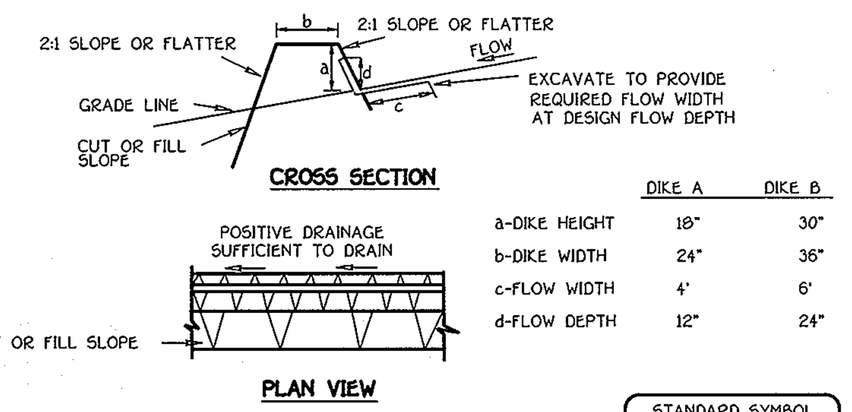
1. The outer pipe should be 48" dia. or shall, in any case, be at least 4" greater in diameter than the center pipe. The outer pipe shall be wrapped with 1/2" hardware cloth to prevent backfill material from entering the perforations.
2. After installing the outer pipe, backfill around outer pipe with 2" aggregate or clean gravel.
3. The inside stand pipe (center pipe) should be constructed by perforating a corrugated or PVC pipe between 12" and 36" in diameter. The perforations shall be 1/2" X 6" slits or 1" diameter holes 6" on center. The center pipe shall be wrapped with 1/2" hardware cloth first, then wrapped again with Geotextile Class C.
4. The center pipe should extend 12" to 18" above the anticipated water surface elevation or riser crest elevation when dewatering a basin.

REMOVABLE PUMPING STATION

NOT TO SCALE

EARTH DIKE

NOT TO SCALE



	DIKE A	DIKE B
a-DIKE HEIGHT	18"	30"
b-DIKE WIDTH	24"	36"
c-FLOW WIDTH	4'	6'
d-FLOW DEPTH	12"	24"

STANDARD SYMBOL A-2 B-3

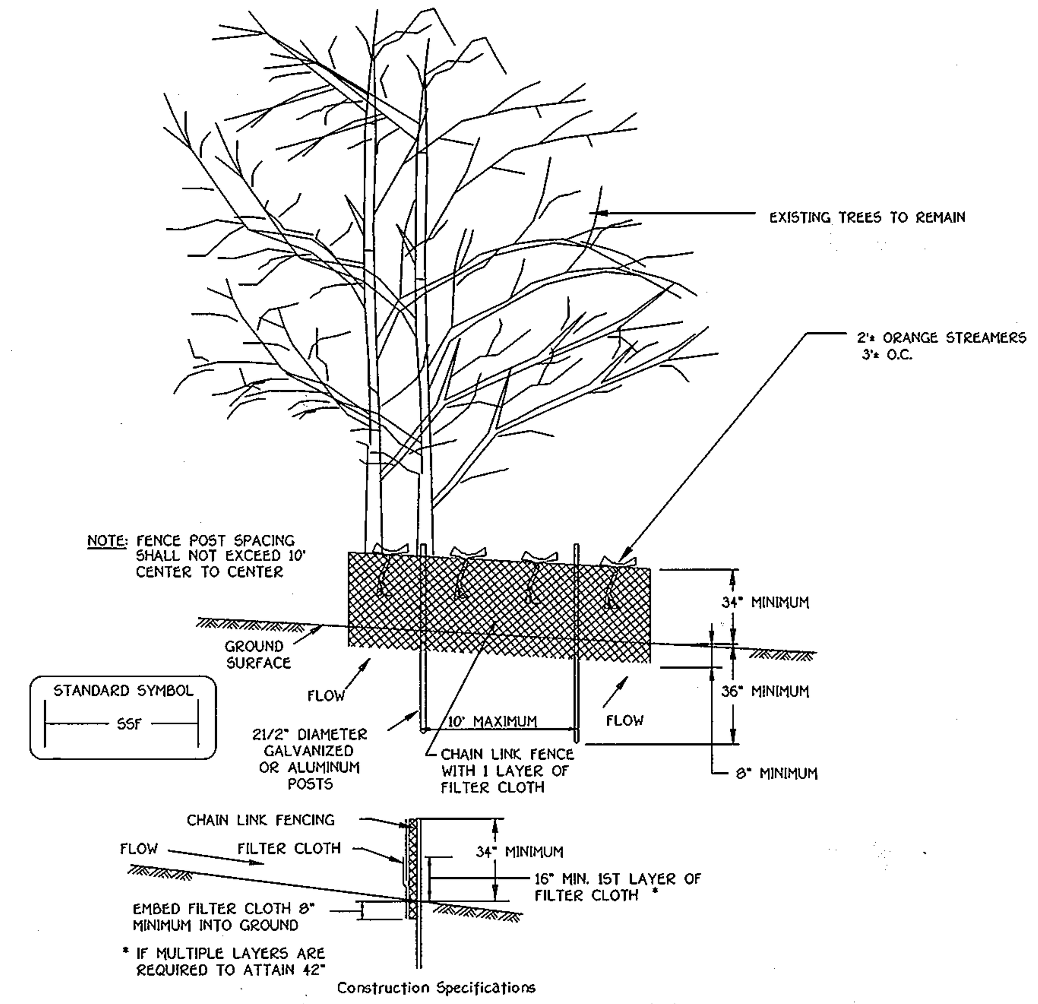
FLOW CHANNEL STABILIZATION

GRADE 0.5% MIN. 10% MAX.

1. Seed and cover with straw mulch.
2. Seed and cover with Erosion Control Matting or line with sod.
3. 4" - 7" stone or recycled concrete equivalent pressed into the soil 7" minimum

Construction Specifications

1. All temporary earth dikes shall have uninterrupted positive grade to an outlet. Spot elevations may be necessary for grades less than 1%.
2. Runoff diverted from a disturbed area shall be conveyed to a sediment trapping device.
3. Runoff diverted from an undisturbed area shall outlet directly into an undisturbed, stabilized area at a non-erosive velocity.
4. All trees, brush, stumps, obstructions, and other objectionable material shall be removed and disposed of so as not to interfere with the proper functioning of the dike.
5. The dike shall be excavated or shaped to line, grade and cross section as required to meet the criteria specified herein and be free of bank projections or other irregularities which will impede normal flow.
6. Fill shall be compacted by earth moving equipment.
7. All earth removed and not needed for construction shall be placed so that it will not interfere with the functioning of the dike.
8. Inspection and maintenance must be provided periodically and after each rain event.



Construction Specifications

1. Fencing shall be 42" in height and constructed in accordance with the latest Maryland State Highway Details for Chain Link Fencing. The specification for a 6' fence shall be used, substituting 42" fabric and 6' length posts.
2. Chain link fence shall be fastened securely to the fence posts with wire ties. The lower tension wire, brace and truss rods, drive anchors and post caps are not required except on the ends of the fence.
3. Filter cloth shall be fastened securely to the chain link fence with ties spaced every 24" at the top and mid section.
4. Filter cloth shall be embedded a minimum of 8" into the ground.
5. When two sections of filter cloth adjoin each other, they shall be overlapped by 6" and folded.
6. Maintenance shall be performed as needed and silt buildups removed when "bulges" develop in the silt fence, or when silt reaches 50% of fence height
7. Filter cloth shall be fastened securely to each fence post with wire ties or staples at top and mid section and shall meet the following requirements for Geotextile Class F:

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal/ft /minute^2(max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322

Design Criteria

Slope	Slope Steepness	Slope Length (maximum)	Silt Fence Length (maximum)
0 - 10%	0 - 10:1	Unlimited	Unlimited
10 - 20%	10:1 - 5:1	200 feet	1,500 feet
20 - 33%	5:1 - 3:1	100 feet	1,000 feet
33 - 50%	3:1 - 2:1	100 feet	500 feet
50% +	2:1 +	50 feet	250 feet

SUPER SILT FENCE, TREE PROTECTION FENCE

NOT TO SCALE

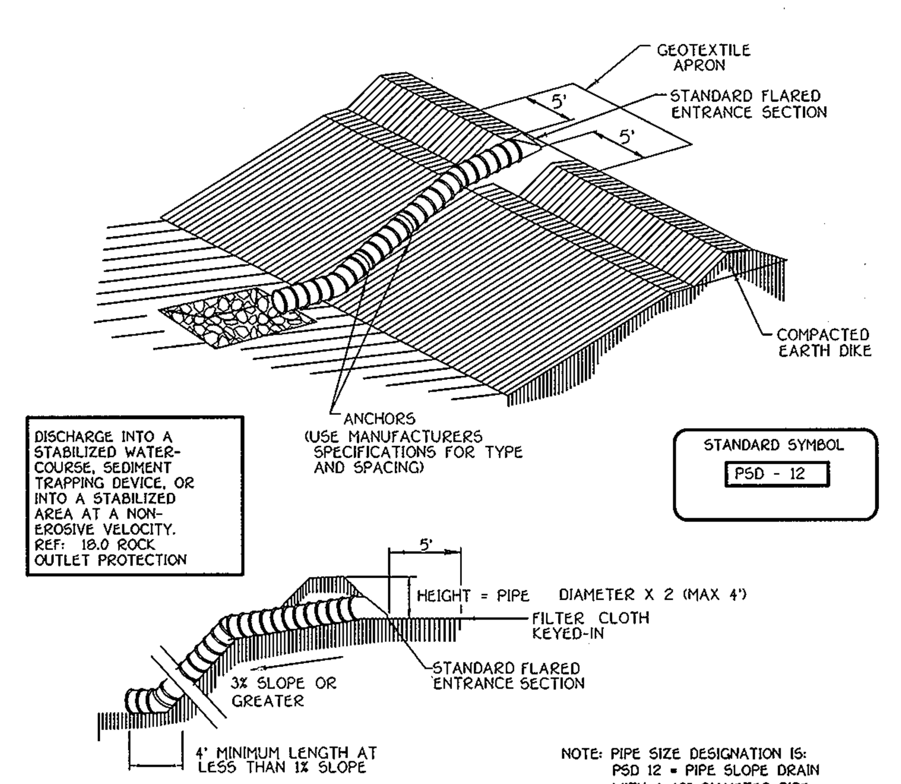


Table 6 Design Criteria for Pipe Slope Drain

Size	Pipe/Tubing Diameter (D) in	Maximum Drainage Area (Acres)
PSD-12	12	0.5
PSD-18	18	1.5
PSD-21	21	2.5
PSD-24	24	3.5
PSD-24 (2)	24	5.0

PIPE SLOPE DRAIN

NOT TO SCALE

Construction Specifications - Pipe Slope Drain

1. The Pipe Slope Drain (PSD) shall have a slope of 3 percent or steeper.

2. The top of the earth dike over the inlet pipe shall be at least 2 times the pipe diameter measured at the invert of the pipe.

3. Flexible tubing is preferred. However, corrugated metal pipe or equivalent PVC pipe can be used. All connections shall be watertight.

4. A flared end section shall be attached to the inlet end of pipe with a watertight connection. Filter cloth shall be placed under the inlet of the pipe slope drain and shall extend out 5' from the inlet. The filter cloth shall be "keyed in" on all sides.

5. The Pipe Slope Drain shall be securely anchored to the slope by staking at the grommets provided. Spacing for anchors shall be as provided by manufacturer's specification. In no case shall less than two (2) anchors be provided, equally spaced along the length of pipe. These details should be provided by pipe suppliers.

6. The soil around and under the pipe and end section shall be hand tamped in 4 inch lifts to the top of the earth dike.

7. All pipe connections shall be watertight.

8. Whenever possible where a PSD drains an unstabilized area, it shall outlet into a sediment trap or basin. If this is not possible then the slope drain will discharge into a stable conveyence that leads to a sediment trap or basin. When discharging into a trap or basin the PSD shall discharge at the same elevation as the wet pool elevation. The discharge from the PSD must be as far away from the sediment control outlet as possible.

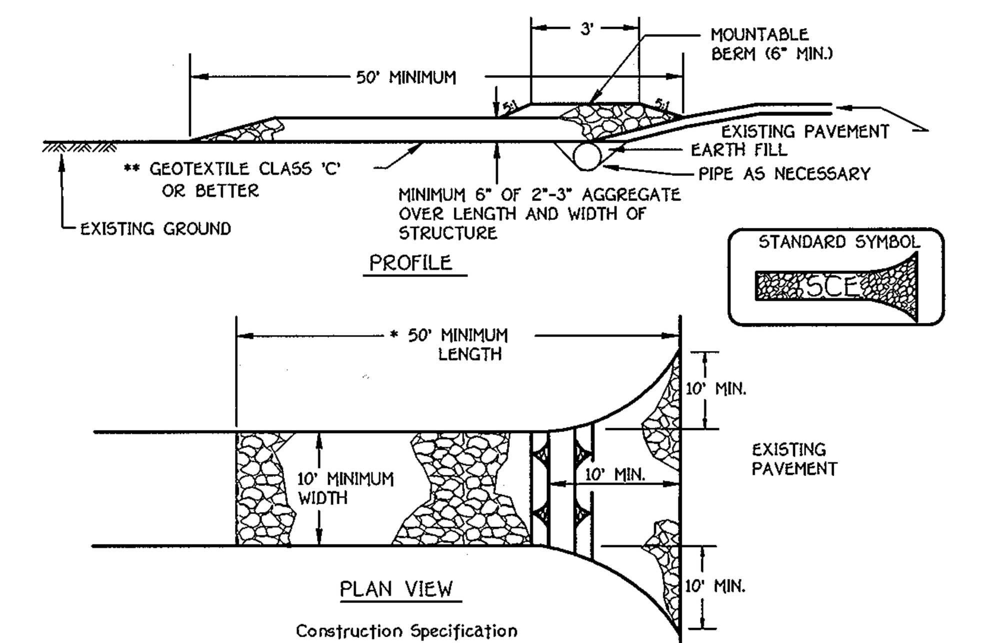
9. When the drainage area is stabilized, the PSD shall discharge onto a stabilized area at a non-erosive velocity.

10. Inspection and any required maintenance shall be performed periodically and after each rain event.

11. The inlet must be kept open at all times.

STABILIZED CONSTRUCTION ENTRANCE

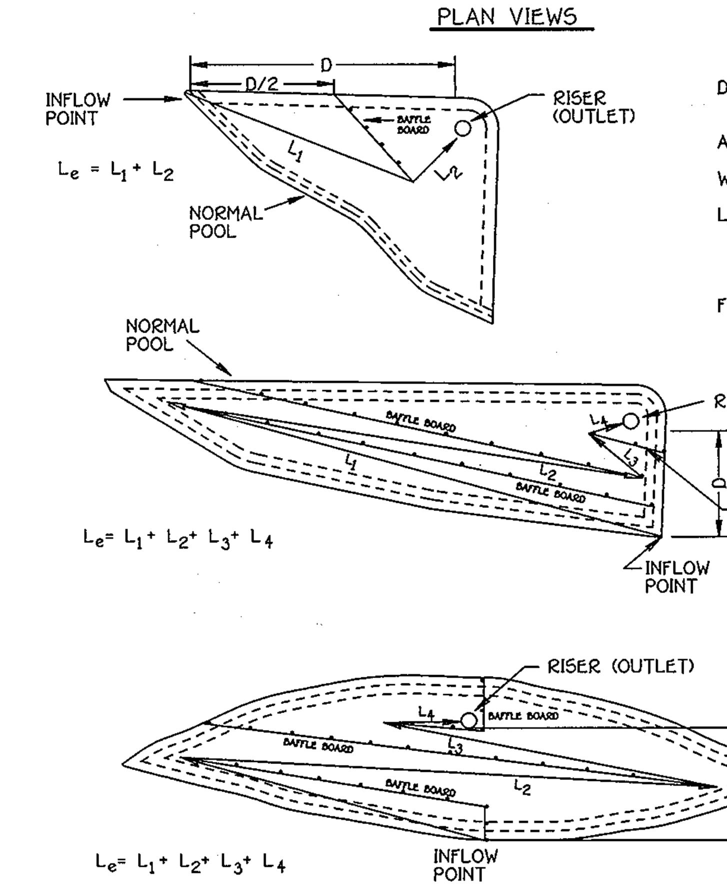
NOT TO SCALE



Construction Specification

1. Length - minimum of 50' (*30' for single residence lot).
2. Width - 10' minimum, should be flared at the existing road to provide a turning radius.
3. Geotextile fabric (filter cloth) shall be placed over the existing ground prior to placing stone. **The plan approval authority may not require single family residences to use geotextile.
4. Stone - crushed aggregate (2" to 3") or reclaimed or recycled concrete equivalent shall be placed at least 6" deep over the length and width of the entrance.
5. Surface Water - all surface water flowing to or diverted toward construction entrances shall be piped through the entrance, maintaining positive drainage. Pipe installed through the stabilized construction entrance shall be protected with a mountable berm with 5:1 slopes and a minimum of 6" of stone over the pipe. Pipe has to be sized according to the drainage. When the SCE is located at a high spot and has no drainage to convey a pipe will not be necessary. Pipe should be sized according to the amount of runoff to be conveyed. A 6" minimum will be required.
6. Location - A stabilized construction entrance shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must travel over the entire length of the stabilized construction entrance.

SEDIMENT BASIN BAFFLES



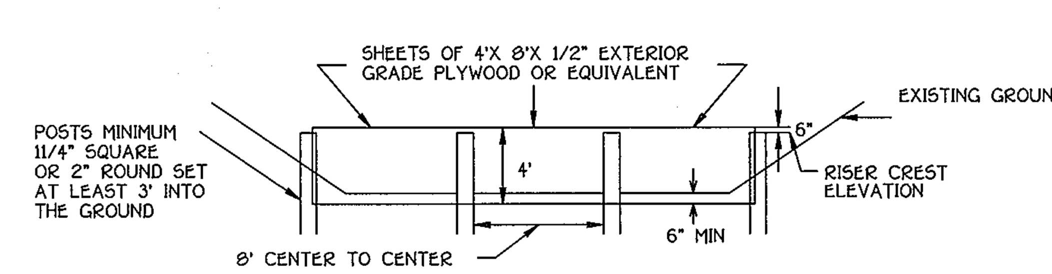
D = DISTANCE BETWEEN INFLOW AND OUTFLOW = 100'

A = AREA OF NORMAL POOL @459.75 = 11,000

W_e = EFFECTIVE WIDTH = A/D = 110'

L_e = TOTAL DISTANCE FROM THE INFLOW POINT AROUND THE BAFFLES TO THE RISER

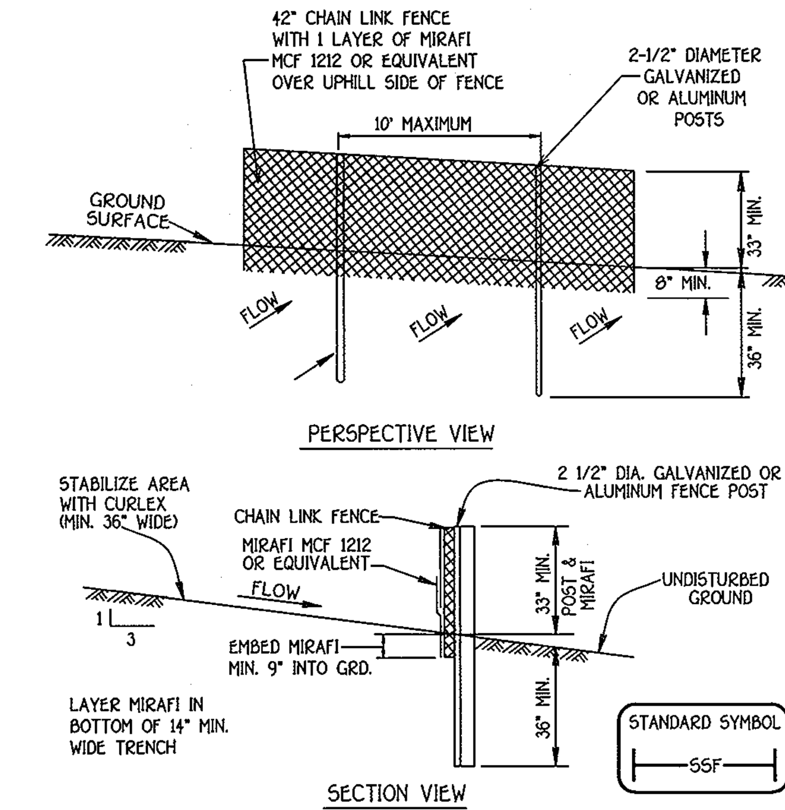
FORMULA: $\frac{L_e}{W_e} \geq 2$ Le = 220' MIN.



BAFFLE DETAIL

SUPER SILT FENCE DETAIL

NOT TO SCALE



CONSTRUCTION SPECIFICATIONS

1. FENCING SHALL BE 42" HIGH CHAIN CONSTRUCTED IN ACCORDANCE WITH THE LATEST MARYLAND STATE HIGHWAY ADMINISTRATION STANDARD DETAILS 690.01 AND 690.02 FOR CHAIN U FENCING. THE SPECIFICATIONS FOR A 6'-0" FENCE SHALL BE USED, SUBSTITUTING 42" FABRIC AND 8' POSTS. POSTS SHALL BE PLACED WITHOUT CONCRETE EMBEDMENT.
2. CHAIN LINK FENCE SHALL BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. THE LOWER TENSION WIRE, BRACE AND TRUSS RODS, ANCHORS AND POST CAPS ARE NOT REQUIRED EXCEPT ON THE ENDS OF THE FENCE.
3. FILTER CLOTH TO BE FASTENED SECURELY TO CHAIN LINK FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
4. FILTER CLOTH SHALL BE IMBEDDED A MINIMUM OF 9" INTO THE GROUND.
5. WHEN TWO SECTIONS OF DIVERSION CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
6. MAINTENANCE SHALL BE PERFORMED AS NEEDED.

Fabric Properties	Value	Test Method
Grab Tensile Strength (lbs.)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs.)	40	ASTM D751
Slurry Flow Rate (gal/min/sf)	0.3	Virginia DOT VTM-51
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Utraviolet Radiation Stability (%)	90	ASTM G-26

Design Criteria

Slope	Slope Steepness	Slope Length (maximum)	Silt Fence Length (maximum)
0 - 10%	0 - 10:1	Unlimited	Unlimited
10 - 20%	10:1 - 5:1	400 feet	1,500 feet
20 - 33%	5:1 - 3:1	300 feet	1,000 feet
33 - 50%	3:1 - 2:1	200 feet	500 feet
50% +	2:1 +	100 feet	250 feet

SEDIMENT CONTROL NOTES

1) A MINIMUM OF 48 HOURS NOTICE MUST BE GIVEN TO THE HOWARD COUNTY DEPARTMENT OF INSPECTIONS, LISCENSES 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) 7 CALENDAR DAYS FOR ALL PERIMETER SEDIMENT CONTROL STRUCTURES, DIKES, PERIMETER SLOPES AND ALL SLOPES STEEPER THAN 3:1, b) 14 DAYS AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE.
4) ALL SEDIMENT TRAPS/BASINS SHOWN MUST BE FENCED AND WARNING SIGNS POSTED AROUND THEIR PERIMETER IN ACCORDANCE WITH VOL. 1, CHAPTER 12, OF THE HOWARD COUNTY DESIGN MANUAL, STORM DRAINAGE.
5) ALL DISTURBED AREAS MUST BE STABILIZED WITHIN THE TIME PERIOD SPECIFIED ABOVE IN ACCORDANCE WITH THE 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL FOR PERMANENT SEEDING (SEC. 51), SOD (SEC. 54), TEMPORARY SEEDING (SEC. 50), AND MULCHING (SEC. 52). TEMPORARY STABILIZATION WITH MULCH ALONE CAN ONLY BE DONE WHEN RECOMMENDED SEEDING DATES DO NOT ALLOW FOR PROPER GERMINATION AND ESTABLISHMENT OF GRASSES.
6) 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.
7) SITE ANALYSIS:

TOTAL AREA OF SITE	171.768	ACRES
AREA DISTURBED	12.05	ACRES
AREA TO BE ROOFED OR PAVED	1.12	ACRES
AREA TO BE VEGETATIVELY STABILIZED	10.93	ACRES
TOTAL CUT	1683	CU.YDS.
TOTAL FILL	47041	CU.YDS.
OFFSITE WASTE/BORROW AREA LOCATION	ON-SITE (SDP-09-039)	

8) ANY SEDIMENT CONTROL PRACTICE WHICH IS DISTURBED BY GRADING ACTIVITY FOR PLACEMENT OF UTILITIES MUST BE REPAIRED ON THE SAME DAY OF DISTURBANCE.
9) ADDITIONAL SEDIMENT CONTROLS MUST BE PROVIDED, IF DEEMED NECESSARY BY THE HOWARD COUNTY SEDIMENT CONTROL INSPECTOR.
10) 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.
11) TRENCHES FOR THE CONSTRUCTION OF UTILITIES IS LIMITED TO THREE PIPE LENGHTS OR THAT WHICH SHALL BE BACK-FILLED AND STABILIZED WITHIN ONE WORKING DAY, WHICHEVER IS SHORTER.

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION, HOLE IN THE DOUGHNUT, LLC, & GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

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(443-367-0422)

ALDO ... _______ 7-29-09 DATE

"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

SEDIMENT CONTROL NOTES AND DETAILS

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC

TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4

THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND

DATE: JULY 28, 2009

SHEET 8 OF 26

F-09-057

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ENGINEER'S CERTIFICATE

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Signature Of Engineer — 7-29-09 Date

DEVELOPER'S CERTIFICATE

"I/We Certify That All Development And Construction Will Be Done According To This Plan Of Development And Plan For Erosion And Sediment Control And That All Responsible Personnel Involved In The Construction Project Will Have A Certificate Of Attendance At A Department Of Natural Resources 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 Or Their Authorized Agents, As Are Deemed Necessary."

Signature Of Developer — 8/5/09 Date

Approved: This Development Is Approved For Erosion And Sediment Control By The Howard Soil Conservation District.

District Howard Soil Conservation Dist. — 8/18/09 Date

Approved: Department Of Planning And Zoning

Chief, Division Of Land Development — 9/24/09 Date

Chief, Development Engineering Division — 8/31/09 Date

Approved: Howard County Department Of Public Works

Chief, Bureau Of Highways — 8-27-09 Date

20.0 STANDARDS AND SPECIFICATIONS FOR VEGETATIVE STABILIZATION

DEFINITION

Using vegetation as cover for barren soil to protect it from forces that cause erosion.

PURPOSE

Vegetative stabilization specifications 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, and improving wildlife habitat and visual resources.

CONDITIONS WHERE PRACTICE APPLIES

This practice shall be used on denuded areas as specified on the plans and may be used on highly erodible or critically eroding areas. This specification is divided into Temporary Seeding, to quickly establish vegetative cover for short duration (6up to one year), and Permanent Seeding, for long term vegetative cover. Examples of applicable areas for Temporary Seeding are temporary Soil Stockpiles, cleared areas being left idle between construction phases, earth dikes, etc. and for Permanent Seeding are lawns, dams, cut and fill slopes and other areas at final grade, former stockpile and staging areas, etc.

EFFECTS ON WATER QUALITY AND QUANTITY

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. Vegetation, over time, 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 devices must remain in place during grading, seedbed preparation, seeding, mulching and vegetative establishment to prevent large quantities of sediment and associated chemicals and nutrients from washing into surface waters.

SECTION 1 - VEGETATIVE STABILIZATION METHODS AND MATERIALS

A. Site Preparation
   i. Install erosion and sediment control structures (either temporary of permanent) such as diversions, grade stabilization structures, berms, waterways, or sediment control basins.
   ii. Perform all grading operations at right angles to the slope. Final grading and shaping is not usually necessary for temporary seeding.
   iii. Schedule required soil tests to determine soil amendment composition and application rates for sites having disturbed area over 5 acres.
B. Soil Amendments (Fertilizer and Lime Specifications)
   i. Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas over 5 acres. Soil analysis may be performed by the University of Maryland or a recognized commercial laboratory. Soil samples taken for engineering purposes may also be used for chemical analyses.
   ii. Fertilizers shall be uniform in composition, free flowing and suitable for accurate application by approved equipment. Manure may be substituted for fertilizer with prior approval from the appropriate Approval Authority. Fertilizers shall all be delivered to the site fully labeled according to the applicable state fertilizer laws and shall bear the name, trade name or trademark and warantee of the producer.
   iii. Lime materials shall be ground limestone (hydrated or burnt lime may be substituted which contains at least 50% total oxides (calcium oxide plus magnesium oxide). Limestone shall be ground to such fineness that at least 50% will pass through a #100 mesh sieve and 98-100% will pass through a #20 mesh sieve.
   iv. Incorporate lime and fertilizer into the top 3-5" of soil by disking or other suitable means.
C. Seedbed Preparation
   i. Temporary Seeding
      a. Seedbed preparation shall consist of loosening soil to a depth of 3" to 5" 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 should not be rolled or dragged smooth, but left in the roughened condition. Sloped areas (greater than 3:1) should be tracked leaving the surface in an irregular condition 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 3-5" of soil by disking or other suitable means.
   ii. Permanent Seeding
      a. Minimum soil conditions required for permanent vegetative establishment:
         1. Soil pH shall be between 6.0 and 7.0.
         2. Soluble salts shall be less than 500 parts per million (ppm).
         3. The soil shall contain less than 40% clay, but enough fine grained material (>30% silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception is if lovegrass or sereala lespedeza is to be planted, then a sandy soil (<30% silt plus clay) would be acceptable.
         4. Soil shall contain 1.5% minimum organic matter by weight.
         5. Soil must contain sufficient pore space to permit adequate root penetration.
         6. If these conditions cannot be met by soils on site, adding topsoil is required in accordance with Section 21 Standard and Specification for Topsoil.
      b. Areas previously graded in conformance with the drawings shall be maintained in a true and even grade, then scarified or otherwise loosened to a depth of 3-5" to permit bonding of the topsoil to the surface area and to create horizontal erosion check slots to prevent topsoil to the surface area and to create horizontal erosion check slots to prevent topsoil from sliding down a slope.
      c. Apply soil amendments as per soil test or as included on the plans.
      d. Mix soil amendments into the top 3-5" of topsoil by disking or other suitable means. Lawn areas should be raked to smooth the surface, remove large objects like stones and branches, and ready the area for seed and application. Where site conditions will not permit normal seedbed preparation, loosen surface soil by dragging with a heavy chain or other equipment to roughen the surface. Steep slopes (steeper than 3:1) should be tracked by a dozer leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. The top 1-3" of soil should be loose and friable. Seedbed loosening may not be necessary on newly disturbed areas.
D. Seed Specifications
   i. All seed must meet the requirements of the Maryland State Seed Law. All seed shall be subject to re-testing by a recognized seed laboratory. All seed used shall have been tested within the 6 months immediately preceding the date of sowing such material on this job.
   Note: Seed tags shall be made available to the inspector to verify type and rate of seed used.
   ii. Inoculant - The inoculant for treating legume seed in the seed mixtures shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container. Add fresh inoculant as directed on package. Use four times the recommended rate when reinoculating. Note: It is very important to keep inoculants as cool as possible until used. Temperatures above 75°-80° F. can weaken bacteria and make the inoculant less effective.
E. Methods of Seeding
   i. Hydroseeding - Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer), broadcast or drop seeded, or a cultipacker seeder.
      a. If fertilizer is being applied at the time of seeding, the application rates amounts will not exceed the following: nitrogen maximum of 100 lbs. per acre total of soluble nitrogen P205 (phosphorous) 200 lbs/ac; K20 (potassium) 200 lbs/ac.
      b. 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.
      c. Seed and fertilizer shall be mixed on site and seeding shall be done immediately and without interruption.
   ii. Dry Seeding: This includes use of conventional drop or broadcast spreaders.
      a. Seed spread dry shall be incorporated into the subsoil at the rates prescribed on the Temporary or Permanent Seeding Summaries or Tables 265 or 26. The seeded area shall then be rolled with a weighted roller to provide good seed to soil contact.
      b. Where practicsl, seed should be applied in two directions perpendicultr to each other. Apply half the seeding rate in each direction.
   iii. Drill or Cultipacker Seeding. Mechanized seeders that apply and cover seed with soil.
      a. 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.
      b. Where practicsl, seed should be applied in two directions perpendicultr to each other. Apply half the seeding rate in each direction.
F. Mulch Specifications (in order of preference)
   i. Straw shall consist of thoroughly threshed wheat, rye or oat straw, reasonable bright in color, and shall not be musty, moldy, caked, decayed, or excessively dusty and shall be free of noxious weed seeds as specified in the Maryland Seed Law.
   ii. Wood Cellulose Fiber Mulch (WCFM)
      a. WCFM shall consist of specially prepared wood cellulose processed into a uniform fibrous physical state.
      b. WCFM shall 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.
      c. WCFM, including dye, shall contain no germination or growth inhibiting factors.
      d. WCFM materials shall 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 shall form a blotter-like ground cover, on application, having moisture absorption and percolation properties and shall cover and hold grass seed in contact with the soil without inhibiting the growth of the grass seedlings.
      e. WCFM material shall contain no elements or compounds at concentration levels that will be phytol-toxic.
      f. WCFM must conform to the following physical requirements: fiber length to approximately 10 mm., diameter approximately 1 mm., pH range of 4.0 to 8.5, ash content of 1.6% maximum and water holding capacity of 90% minimum.
   Note: Only sterile straw mulch should be used in areas where one species of grass is desired.
G. Mulching Seeded Areas - Mulch shall be applied to all seeded areas immediately after seeding.
   i. If grading is completed outside of the seeding season, mulch along shall be applied as prescribed in this section and maintained until the seeding season returns and seeding can be performed in accordance with these specifications.
   ii. When straw mulch is used, it shall be spread over all seeded areas at the rate of 2 tons/acre. Mulch shall be applied to a uniform loose depth of between 1" and 2". Mulch applied shall achieve a uniform distribution and depth so that the soil surface is not exposed. If a mulch anchoring tool is to be used, the rate should be increased to 2.5 tons/acre.
   iii. Wood cellulose fiber used as a mulch shall be applied at a net dry weight of 1,500 lbs. per acre. The wood cellulose fiber shall be mixed with water, and the mixture shall contain a maximum of 50 lbs. of wood cellulose fiber per 100 gallons of water.
H. Securing Straw Mulch (Mulch Anchoring): Mulch anchoring shall be performed immediately following mulch application to minimize loss by wind or water. This may be done by one of the following methods (listed by preference), depending upon size of 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 two (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 be used on the contour if possible.
   ii. Wood cellulose fiber may be used for anchoring straw. The fiber binder shall be applied at a net dry weight of 750 pounds/acre. The wood cellulose fiber shall be mixed with water and the mixture shall contain a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.
   iii. Application of liquid binders should be heavier at the edges where wind catches mulch, such as in valleys and crest of banks. The remainder of area should be appear uniform after binder application. Synthetic binders - such as Acrylic DLR (Agro-Tack), DCA-70 Petrosett, Terra Tax II, Terra Tack AR or other approved equal may be used at rates recommended by the manufacturer to anchor mulch.
   iv. Lightweight plastic netting may be stapled over the mulch according to manufacturer's recommendations. Netting is usually available in rolls 4' to 15' feet wide and 300 to 3,000 feet long.
I. Incremental Stabilization - Cut Slopes
   i. All cuts slopes shall be dressed, prepared, seeded and mulched as the work progresses. Slopes shall be excavated and stabilized in equal increments not to exceed 15'.
   ii. Construction sequence (Refer to Figure 3 below):
      a. Excavate and stabilize all temporary swales, side ditches, or berms that will be used to convey runoff from the excavation.
      b. Perform Phase 1 excavation, dress, and stabilize.
      c. Perform Phase 2 excavation, dress and stabilize. Overseed Phase 1 areas as necessary.
      d. Perform final phase excavation, dress 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 int he operation of completing the operation out of the seeding season will necessitate the application of temporary stabilization.

J. Incremental Stabilization of Embankments - Fill Slopes
   i. Embankments shall be constructed in lifts as prescribed on the plans.
   ii. Slopes shall be stabilized immediately when the vertical height of the multiple lifts reaches 15', or when the grading operation ceases as prescribed in the plans.
   iii. At the end of each day, temporary berms and pipe slope drains should be constructed along the top edge of the embankment to intercept surface runoff and convey it down the slope in a non-erosive manner to a sediment trapping device.
   iv. Construction sequence: Refer to Figure 4 (below).
      a. Excavate and stabilize all temporary swales, side ditches, or berms that will be used to divert runoff around the fill. Construct slope silt fence on low side of fill as shown in Figure 5, unless other methods shown on the plans address this area.
      b. Place Phase 1 embankment, dress and stabilize.
      c. Place Phase 2 embankment, dress and stabilize.
      d. Place final phase embankment, dress 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 and placement of topsoil (if required) grading 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.

SECTION 2 - TEMPORARY SEEDING

Vegetation - annual grass or grain used to provide cover on disturbed areas for up to 12 months.
For longer duration of vegetative cover, Permanent Seeding is required.

A. Seed mixtures - Temporary Seeding
   i. Select one or more of the species or mixtures listed in Table 26 for the appropriate Plant Hardiness Zone (from Figure 5) 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 plans and completed, then Table 26 must be put on the plans.
   ii. For sites having soil tests performed, the rates shown on this table shall be deleted and the rates recommended by the testing agency shall be written in. Soil tests are not required for Temporary Seeding.

Seed Mixture (Hardiness Zone 6b From Table 26)					Fertilizer Rate (10-10-10)	Lime Rate
No.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths		
1	BARLEY	122	3/1 - 5/15, 8/15 - 10/15	1" - 2"	600 lb/ac (15 lb/1000sf)	2 tons/ac (100 lb/1000sf)
	OATS	96		1" - 2"		
	RYE	140		1" - 2"		

SECTION 3 - PERMANENT SEEDING

Seeding grass and legumes to establish growing cover for a minimum of one year on disturbed areas generally receiving low maintenance.

A. Seed mixtures - Permanent Seeding
   i. Select one or more of the species or mixtures listed in Table 25 for the appropriate Plant Hardiness Zone (from Figure 5) and enter them in the Permanent Seeding Summary below, along with application rates and seeding dates. Seeding depths can be estimated using Table 26. If this summary is not put on the construction plans and completed, then Table 25 must be put on the plans. Additional planting specifications for exceptional sites such as shorelines, streambanks, or dunes or for special purposes such as wildlife or aesthetic treatment may be found in USDA-SCS Technical Field Office Guide, Section 342 - Critical Area Planting. For special lawn maintenance areas, see Sections IV Sod and V Turfgrass.
   ii. For sites having disturbed area over 5 areas, the rates shown on this table shall be deleted and the rates recommended by the soil testing agency shall be written in.
   iii. For areas receiving low maintenance, apply ureaform fertilizer (46-0-0) at 3 1/2 lbs/1000 sq. ft. (150 lbs/ac), in addition to the above soil amendments shown in the table below, to be performed at the time of seeding.

Seed Mixture (Hardiness Zone 6b From Table 25					Fertilizer Rate (10-20-20)			Lime Rate
No.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths	N	P205	K20	
3	TALL FESCUE (85lb) PERENNIAL RYE GRASS (10lb) KENTUCKY BLUEGRASS (5lb)	105 15 10	3/1 - 5/15, 8/15 - 10/15	1" - 2"	90 lb/ac (2.0 lb/ 1000sf)	175 lb/ac (4 lb/ 1000sf)	175 lb/ac (4 lb/ 1000sf)	2 tons/ac (100 lb/ 1000sf)
10	TALL FESCUE (60lb) HARD FESCUE (20lb)	120 30	3/1 - 5/15, 8/15 - 10/15	1" - 2"				

Sequence of Construction

1. OBTAIN A GRADING PERMIT AND MDE/CORPS OF ENGINEERS PERMITS AS REQUIRED, *PER G.N. 23.*
2. NOTIFY 'MISS UTILITY "AT LEAST 48 HOURS BEFORE BEGINNING ANY WORK AT 1-800-257-7777. NOTIFY THE HOWARD COUNTY OFFICE OF CONSTRUCTION/INSPECTION AT 410-313-1330 24-HOURS BEFORE STARTING WORK.
3. CONTRACTOR SHALL UTILIZE THE EXISTING DRIVEWAY CROSSING FOR ACCESS TO THE WESTERN SIDE OF THE STREAM FOR CONSTRUCTION ACCESS. UPON COMPLETION OF THE TWIN ARCH BARNSLEY WAY ROADWAY REMOVAL OF THIS DRIVEWAY SHALL BE REMOVED, GRADED & STABILIZED IN ACCORDANCE WITH THE MDE PERMIT CONDITIONS OF APPROVAL AND ASSOCIATED FINAL MITIGATION PLAN. SEE S.O.C. SPECIFIC TO MITIGATION WORK ON SHEET 25.
4. CLEAR AND GRUB FOR SEDIMENT CONTROL MEASURES ONLY. INSTALL STABILIZED CONSTRUCTION ENTRANCE FOR THE STAGING AREA NEAR THE INTERSECTION OF WARWICK WAY AND MARRIOTTSVILLE ROAD. (2 weeks)
5. INSTALL THE REMAINING SEDIMENT CONTROL MEASURES. THIS WOULD INLCUDE THE SEDIMENT BASIN #1, TREE PROTECTION FENCE, EARTH DIKES AND SILT FENCE AS INDICATED ON THESE PLANS. (2 weeks)
6. OBTAIN PERMISSION OF THE SEDIMENT CONTROL INSPECTOR PRIOR TO PROCEEDING.
7. CLEAR AND GRUB FOR THE REMAINDER OF THE STAGING AREA SITE TO BE USED FOR THE STREAM CROSSING TWIN ARCH PIPES CONSTRUCTION. THE REMAINDER OF THE SITE MAY BE GRADED PRIOR TO THE STREAM CROSSING BASED ON THE CONTRACTORS PREFERENCE. (4 weeks)
8. GRADE THE CUL-DE-SAC AREAS TO THE PROPOSED SUBGRADE AND INSTALL THE STORM DRAIN SYSTEM AND UTILITIES. STABLIZE ALL ROADWAY SLOPES IMMEDIATELY UPON COMPLETION OF GRADING AS SHOWN. SEQUENCE THE CONSTRUCTION OF STORM DRAIN FROM S-1 TO I-4 TO OCCUR AFTER THE MASS GRADING OF THIS AREA. (8 weeks)
9. CONSTRUCT THE PROPOSED TWIN PIPE ARCHES AND ASSOCITED SCOUR PROTECTION. GRADE THE PROPOSED BARNSLEY WAY TO THE PROPOSED SUBGRADE. INSTALL UTILITIES AS REQUIRED. (10 Weeks)
10. INSTALL BASE COURSE PAVING FOR THE PROPOSED ROADS. (2 weeks)
11. STABILIZE ALL AREAS AND OBTAIN PERMISSION FROM THE SEDIMENT CONTROL INSPECTOR PRIOR TO PROCEEDING.
12. APPLY TACK COAT TO BASE COURSE AND LAY SURFACE COURSE PAVING. (1 week)
13. WHEN ALL CONTRIBUTING AREAS TO THE SEDIMENT CONTROL MEASURES HAVE BEEN STABILIZED AND WITH THE PERMISSION OF THE SEDIMENT CONTROL INSPECTOR, THE TEMOPRARY DEVICE MAY BE REMOVED, BACKFILLED OR REGRADED TO THE PROPOSED FINAL GRADES. STABILIZE ALL REMAINING AREAS WITH PERMANENT SEEDING NOTES. (4 weeks)
14. NOTIFY HOWARD COUNTY OFFICE OF INSPECTIONS AND PERMITS FOR A FINAL INSPECTION OF THE COMPLETED PROJECT.

SEQUENCE NOTE: THE CONTRACTOR SHALL INSPECT AND PROVIDE NECESSARY MAINTENANCE ON ALL SEDIMENT AND EROSION CONTROL STRUCTURES SHOWN HEREON AFTER EACH RAINFALL EVENT AND ON A DAILY BASIS.

TOPSOIL NOTES

Definition

Placement of topsoil over a prepared subsoil prior to establishment of permanent vegetation.

Purpose

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.

Conditions where Practice Applies

I. This practice 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.

II. For the purpose of these Standards and Specifications, areas having slopes steeper than 2:1 require special consideration and design for adequate stabilization. Areas having slopes steeper than 2:1 shall have the appropriate stabilization shown on the plans.

Construction and Material Specifications

I. Topsoil salvaged from the existing site may be used provided that 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-SCS in cooperation with Maryland Agricultural Experimental Station.

II. Topsoil Specifications - Soil to be used as topsoil must meet the following:
   i. Topsoil shall be a loam, sandy loam, clay loam, silt loam, sandy clay loam, loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by the appropriate approval authority. Regardless, topsoil shall not be a mixture of contrasting textured subsoils and shall contain less than 5% by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than 1½" in diameter.
   ii. Topsoil must be free of plants or plant parts such as bermuda grass, quackgrass, Johnsongrass, nutsedge, poison ivy, thistle, or others as specified.
   iii. Where the subsoil is either highly acidic or composed of heavy clays, ground limestone shall be spread at the rate of 4-8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of topsoil. Lime shall be distributed uniformly over designated areas and worked into the soil in conjunction with tillage operations as described in the following procedures.

II. For sites having, disturbed areas under 5 acres:
   i. Place topsoil (if required) and Apply soil amendments as specified in 20.0 Vegetative Stabilization - Section I - Vegetative Stabilization Methods and Materials.

III For sites having disturbed areas over 5 acres:
   i. On soil meeting Topsoil specifications, obtain test results dictating fertilizer and lime amendments required to bring the soil into compliance with the following:
      a. pH for topsoil shall be between 6.0 and 7.5. If the tested soil demonstrates a pH of less than 6.0, sufficient lime shall be persscribed to raise the pH to 6.5 or higher.
      b. Organic content of topsoil shall be not less than 1.5 percent by weight.
      c. Topsoil havinh soluble salt content greater than 500 parts per million shall not be used.
      d. No sod or seed shall 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.

   Note: 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.
   ii. Place topsoil (if required) and apply soil amendments as specified in 20.0 Vegetative Stabilization - Section I - Vegetative Stabilization Methods and Materials.

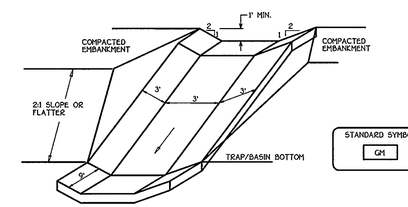
V. Topsoil Application
   i. When topsoiling, maintain needed erosion and sediment control practices such as diversions, Grade Stabilization Structures, Earth Dikes, Slope Silt Fence and Sediment Traps and Basins.
   ii. Grades on the areas to be topsoiled, which have been previously established, shall be maintained, albeit 4" - 8" higher in elevation.
   iii. Topsoil shall be uniformly distributed in a 4" - 8" layer and lightly compacted to a minimum thickness of 4". Spreading shall be performed in such a manner that sodding or seedine can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets.
   iv. Topsoil shall not be placed while 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.

VI. Alternative for Permanent Seeding - Instead of applying the full amounts of lime and commercial fertilizer, composted sludge and amendments may be applied as specified below:
   i. Composted Sludge Material for use as a soil conditioner for sites having disturbed areas over 5 acres shall be tested to prescribe amendments and for sites having disturbed areas under 5 acres shall conform to the following requirements:
      a. Composted sludge shall be supplied by, or originate from, a person or persons that are permitted (at the time of acquisition of the compost) by the Maryland Department of the Environment under COMAR 26.04.06.
      b. Composted sludge shall contain at least 1 percent nitrogen, 1.5 percent phosphorus, and 0.2 percent potassium and have a Ph of 7.0 to 8.0. If compost does not meet these requirements, the appropriate constituents must be added to meet the requirements prior to use.
      c. Composted sludge shall be applied at a rate of 1 ton/1,000 square feet.
   iv. Composted sludge shall be amended with a potassium fertilizer applied at the rate of 4 lb/1,000 squire feet, and 1/3 the normal lime application rate.

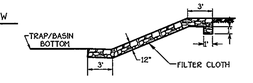
References: Guideline Specifications, Soil Preparation and Sodding. MD-VA, Pub. 41, Cooperative Extension Service, University of Maryland and Virginia Polytechnic Institutes. Revised 1973.

GABION INFLOW PROTECTION

NOT TO SCALE



PERSPECTIVE VIEW



PROFILE ALONG CENTERLINE

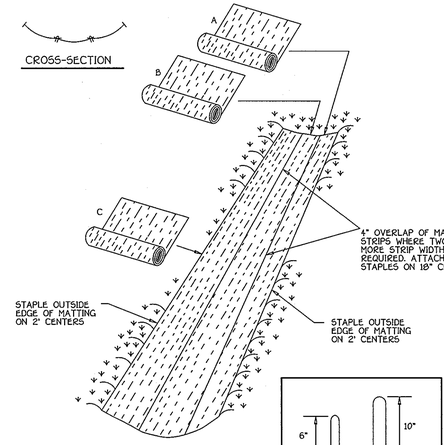
Construction Specifications

1. Gabion inflow protection shall be constructed of 9' x 3' x 9" gabion baskets forming a trapezoidal cross section 1' deep, with 2:1 side slopes, and a 3' bottom width.
2. Geotextile Class C shall be installed under all gabion baskets.
3. The stone used to fill the gabion baskets shall be 4" - 7".
4. Gabions shall be installed in accordance with manufacturers recommendations.
5. Gabion Inflow Protection shall be used where concentrated flow is present on slopes steeper than 4:1.

EROSION CONTROL MATTING

NOT TO SCALE

CROSS-SECTION



Construction Specifications

1. Key-in the matting by placing the top ends of the matting in a narrow trench, 6" in depth. Backfill the trench and tamp firmly to conform to the channel cross-section. Secure with a row of staples about 4" down slope from the trench. Spacing between staples is 6".
2. Staple the 4" overlap in the channel center using an 18" spacing between staples.
3. Before stapling the outer edges of the matting, make sure the matting is smooth and in firm contact with the soil.
4. Staples shall be placed 2' apart with 4 rows for each strip, 2 outer rows, and 2 alternating rows down the center.
5. Where one roll of matting ends and another begins, the end of the top strip shall overlap the upper end of the lower strip by 4", shiplap fashion. Reinforce the overlap with a double row of staples spaced 6" apart in a staggered pattern on either side.
6. The discharge end of the matting liner should be similarly secured with 2 double rows of staples.

Note: If flow will enter from the edge of the matting then the area effected by the flow must be keyed-in.

SEDIMENT CONTROL NOTES AND DETAILS

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC

TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4

THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND

DATE: JULY 28, 2009

SHEET 9 OF 25

F-09-057

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC, &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

ALDO [illegible] — 7-27-09 DATE

"Professional Engineer 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. 20748, Expiration Date 2-22-11."

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 8-9 SED CONTROL DETAILS.dwg, 7/28/2009 3:49:17 PM, jamesl,
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STRUCTURE SCHEDULE

STRUCTURE NO.	TOP ELEVATION	INV.IN	INV.OUT	LOCATION	ROAD STA./ COORDINATE	OFFSET	TYPE AND WIDTH	REMARKS
I-1	* * 475.06	462.27 (24"), 466.60 (18")	461.27 (36")	----	N 537385.85 E 827811.90	-	DOUBLE TYPE 'S'	D - 4.23
I-4	469.37	464.10 (24"), 464.60 (18")	464.00 (24")	----	N 537593.17 E 827918.74	-	A-10	D - 4.03
I-11	* 470.24	467.17 (15")	466.92 (18")	BARNSLEY WAY	5+50	20'L	A-5 (PUBLIC)	D - 4.01
I-12	* 470.24	----	467.39 (15")	BARNSLEY WAY	5+50	20'R	A-5 (PUBLIC)	D - 4.01
M-1	468.00	461.92 (18"), 460.68 (36")	460.58 (36"), 459.26 (6")	----	N 537323.59 E 827912.19	-	5' DIA. MANHOLE	G - 5.13
M-3	475.35	463.42 (18"), FUT. 470.69 (18")	463.16 (18")	----	N 537123.42 E 827846.58	-	4' DIA. MANHOLE	G - 5.12
M-7	470.20	463.82 (24")	463.67 (24")	----	N 537557.15 E 827920.92	-	5' DIA. MANHOLE	G - 5.13
M-8	474.05	466.35 (18")	466.10 (18")	BARNSLEY WAY	6+65	33.4'L	4' DIA. MH (PUBLIC)	G - 5.12
S-1	463.50	460.42 (36")	----	----	N 537317.56 E 827935.80	-	36" CONC. END SECTION	D - 5.51
HW-1	461.75	457.25	----	----	N 537217.33 E 828030.74	-	36" TYPE 'A' HEADWALL	D - 5.11
R-1	464.75	458.25 (6")	458.00 (36")	----	N 537259.22 E 827966.33	-	CONC. RISER	SEE SHEET 7

* - DENOTES THROAT ELEVATION
* * - DENOTES GRATE ELEVATION AT FLOWLINE

PIPE SCHEDULE (PUBLIC)

SIZE	CLASS	LENGTH
15"	RCCP, CL IV.	43 L.F.
18"	RCCP, CL IV.	114 L.F.

NOTE: RCCP, CL. IV MAY BE SUBSTITUTED WITH HDPE PIPE MATERIAL.

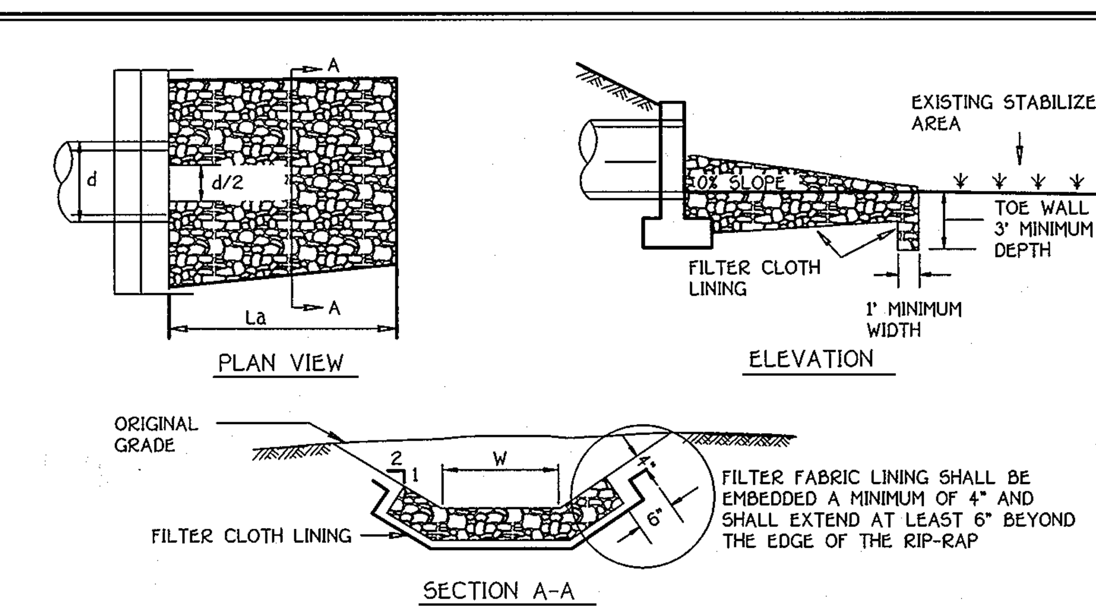
PIPE SCHEDULE (PRIVATE)

SIZE	CLASS	LENGTH
18"	RCCP, CL IV.	222 L.F.
18"	RCCP, CL IV. ASTM C-76	262 L.F.
24"	RCCP, CL IV. ASTM C-76	239 L.F.
36"	RCCP, CL IV. ASTM C-76	142 L.F.
6"	PVC, SCH. 40	70 L.F.
8"	D.I.P. DRAIN PIPE	15 L.F.

NOTE: RCCP, CL. IV MAY BE SUBSTITUTED WITH HDPE PIPE MATERIAL.

CONSTRUCTION SPECIFICATIONS FOR RIP-RAP OUTFALLS

1. The subgrade for the filter, riprap or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.
2. The rock or gravel shall conform to the specified grading limits when installed respectively in the riprap or filter.
3. Filter cloth shall be protected from punching, cutting or tearing. Any damage other than an occasional shall hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.
4. Stone for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The stone for riprap or gabion outlets shall be delivered and placed in a manner that will insure that it is reasonably homogenous with the smaller stones and spalls filling the voids between the larger stones. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.



RIP-RAP CHANNEL DETAIL

NO SCALE

NOTE: FILTER CLOTH SHALL BE GEOTEXTILE CLASS C

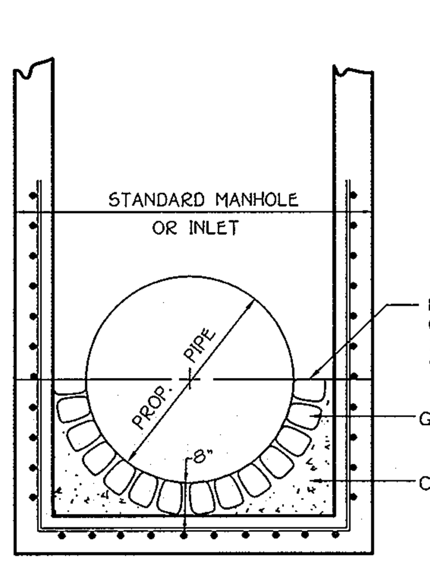
RIP-RAP CHANNEL DESIGN DATA

STRUCTURE	AREA (S.F.)	WETTED PERIMETER	R	$R^{2/3}$	S	$S^{1/2}$	W	d	n	V (f.p.s.)	Q (c.f.s.)	RIP-RAP SIZE D_{50}	RIP-RAP SIZE D_{MAX}	BLANKET THICKNESS	PIPE SIZE	La
S-1	13.56	14.96	0.9064	0.9363	0.005	0.0707	10.00'	1.11'	0.04	2.46	33.13	9.5"	15"	19"	36"	20'

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — 8-27-09 DATE
APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — 8/29/09 DATE
CHIEF, DEVELOPMENT ENGINEERING DIVISION — 8/31/09 DATE

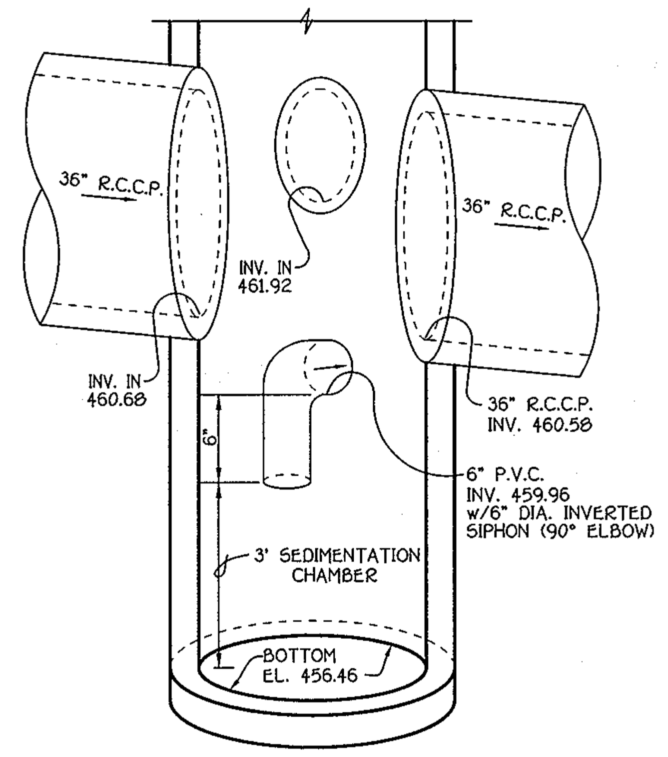
OPERATION AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED STORMWATER INFILTRATION TRENCHES FOR Rev (I-1)

1. The monitoring wells and structures shall be inspected on a quarterly basis and after every large stone event.
2. Water levels and sediment build up in the monitoring wells shall be recorded over a period of several days to insure trench drainage.
3. A logbook shall be maintained to determine the rate at which the facility drains.
4. When the facility becomes clogged so that it does not drain down within the 72 hour time period, corrective action shall be taken.
5. The maintenance logbook shall be available to Howard County for inspection to insure compliance with operation and maintenance criteria.
6. Once the performance characteristics of the infiltration facility have been verified, the monitoring schedule can be reduced to an annual basis unless the performance data indicates that a more frequent schedule is required.



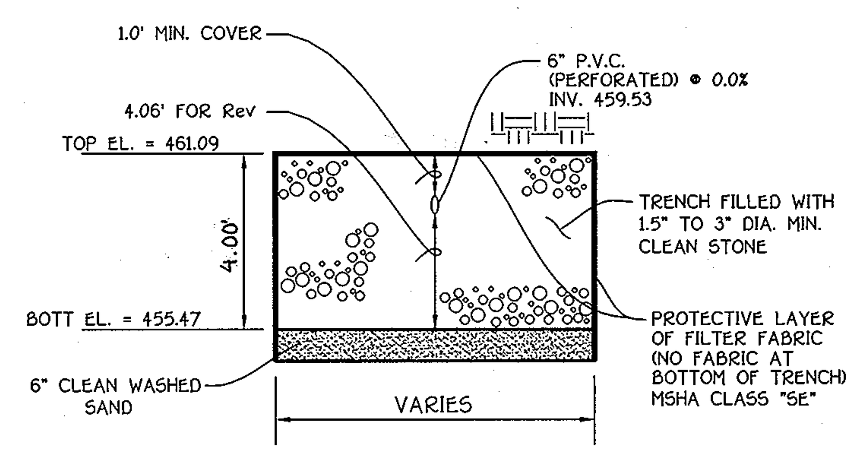
GRANITE BLOCK DETAIL

NOT TO SCALE



MANHOLE DETAIL (M-1)

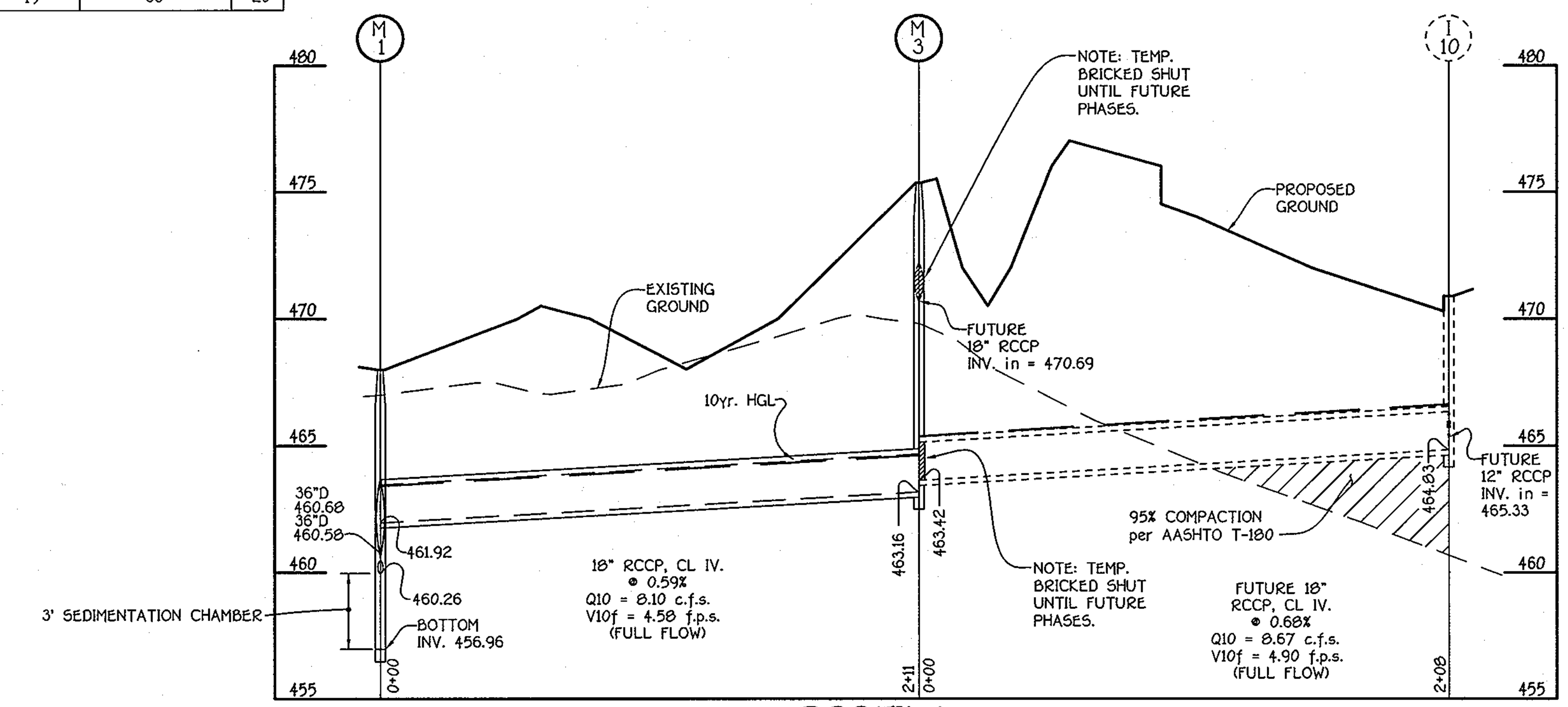
NO SCALE



OFF-LINE STONE RESERVOIR SECTION FOR Rev

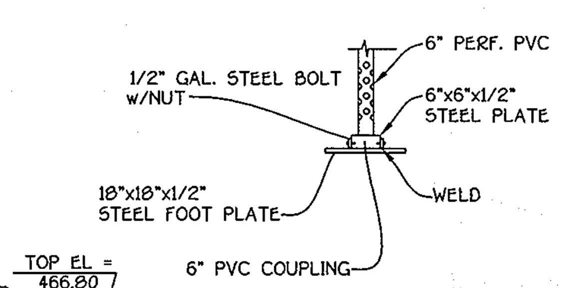
NO SCALE

NOTE:
STONE RESERVOIR TO MEET PART OF GROUND WATER RECHARGE REQUIREMENT

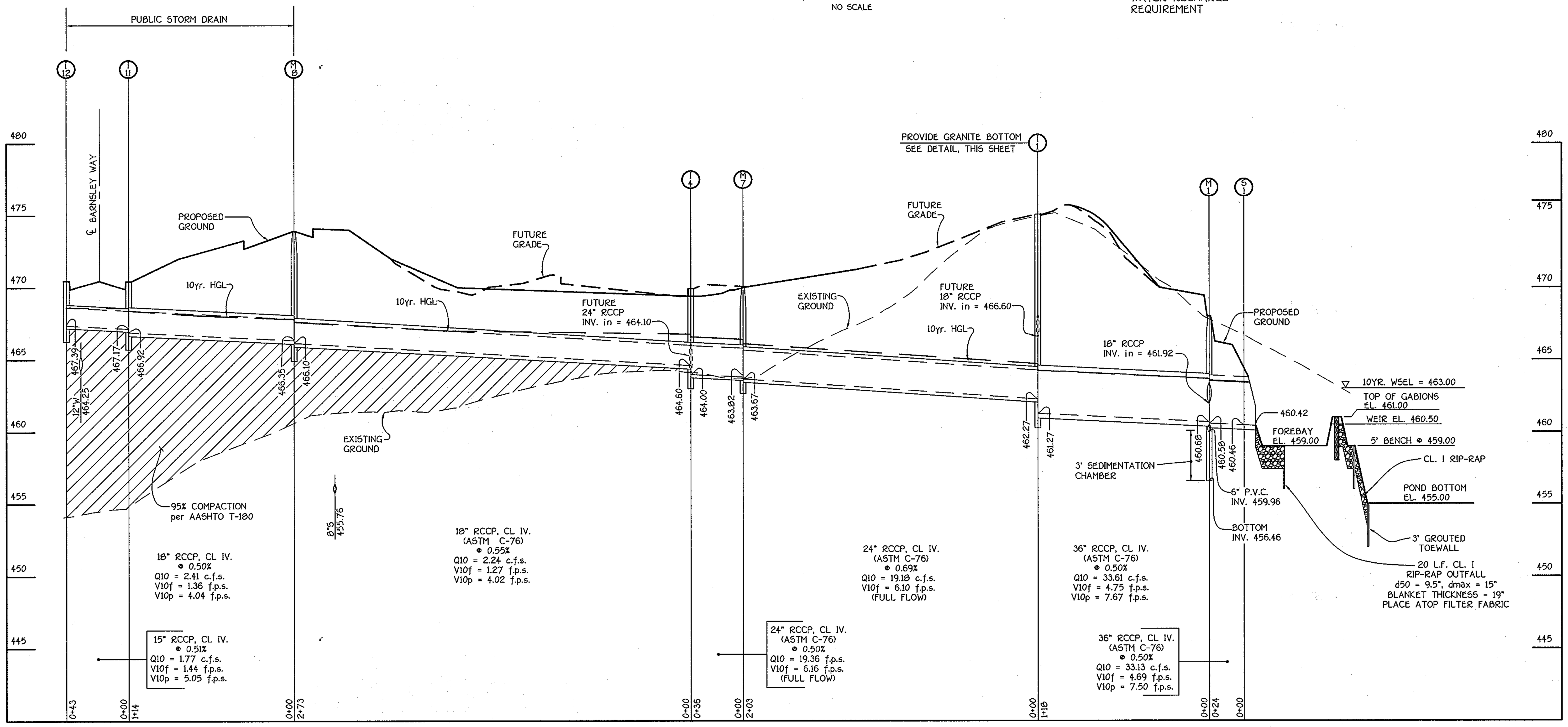


PROFILE

SCALE: HORIZ. : 1" = 50'
VERT. : 1" = 5'

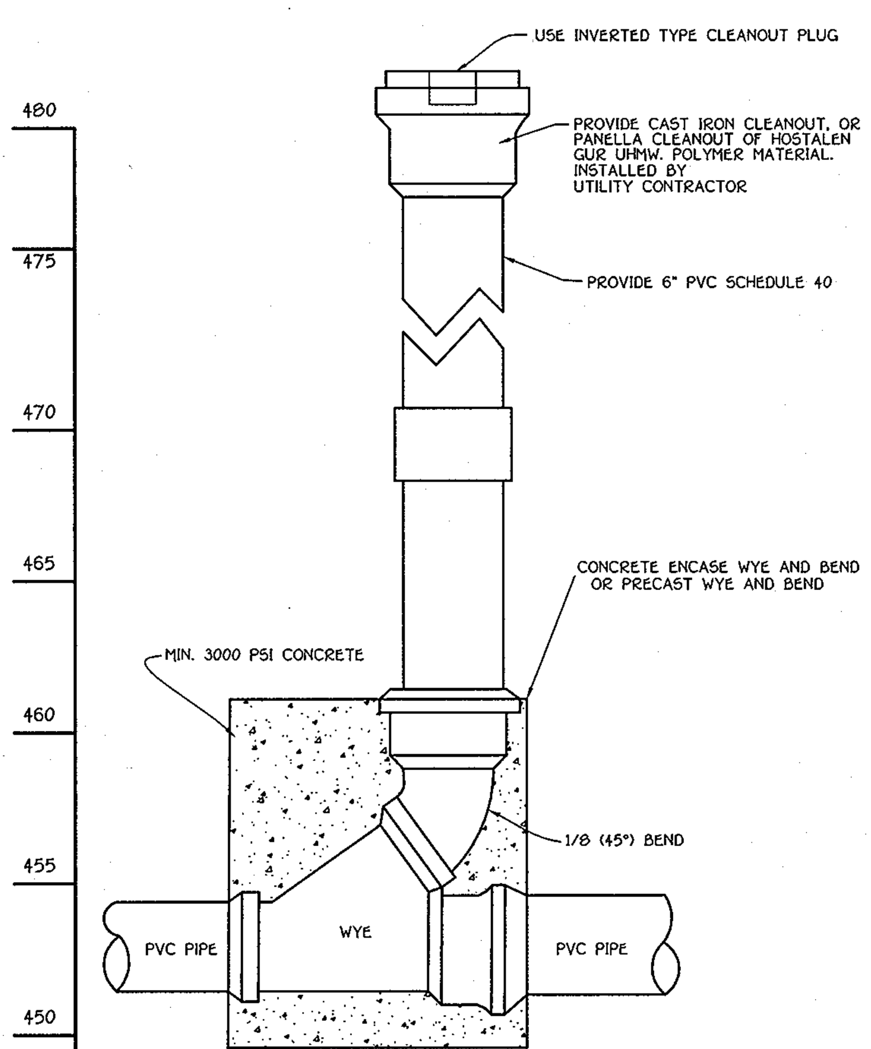


DETAIL



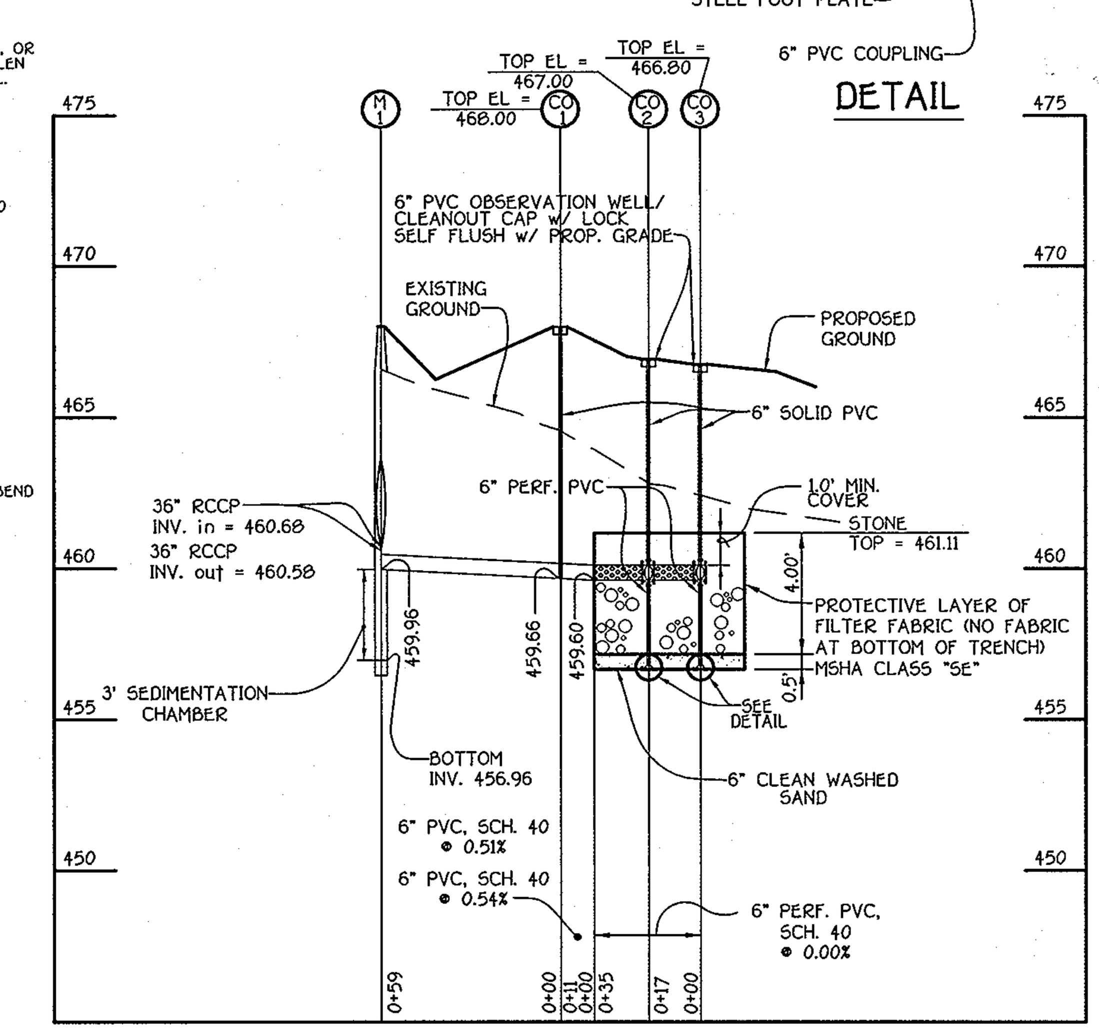
PROFILE

SCALE: HORIZ. : 1" = 50'
VERT. : 1" = 5'



CLEAN-OUT DETAIL

NO SCALE



PROFILE Rev LOCATION NO. 1

SCALE: HORIZ. : 1" = 50'
VERT. : 1" = 5'

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC, &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

ALDO M. VITUCCI, P.E. — 7-29-09 DATE
"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

STORM DRAIN PROFILES

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 10 OF 26

F-09-057

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 10 SD PROFILES.dwg, 7/28/2009 3:55:34 PM, jamesl, 1:50

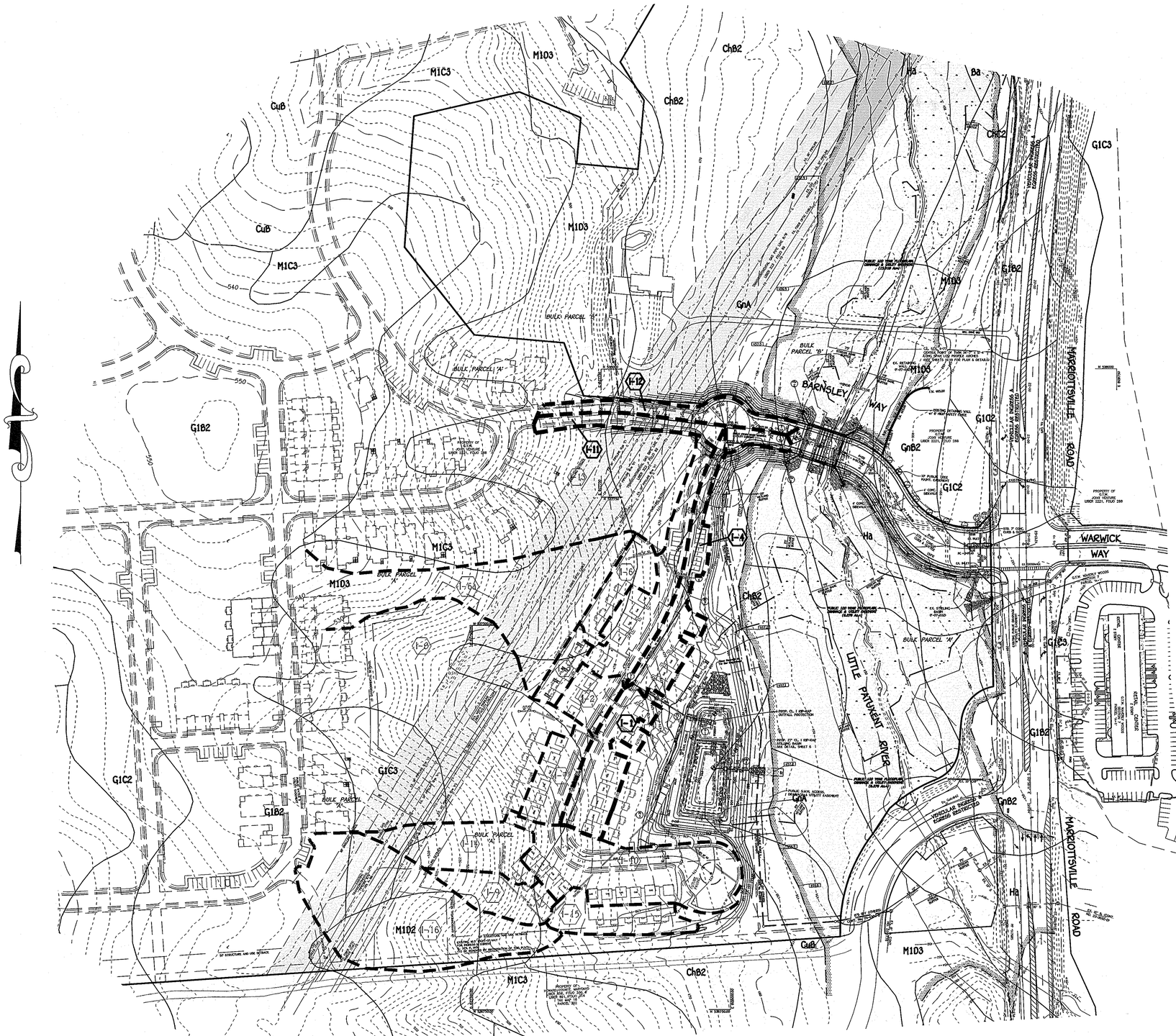
APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 8-27-09

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 9/29/09

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 8/31/09



PLAN

SCALE: 1" = 100'

DRAINAGE AREA DATA			
STRUCTURE NO.	AREA (AC.)	"C"	% IMP.
I-1	0.51	0.61	52
FUTURE I-2	0.23	0.92	95
FUTURE I-3	0.21	0.78	75
I-4	0.49	0.87	89
FUTURE I-5	0.79	0.78	75
FUTURE I-6	0.36	0.71	65
FUTURE I-7	0.30	0.81	80
FUTURE I-8	3.15	0.71	65
FUTURE I-9	0.39	0.71	65
FUTURE I-10	1.03	0.86	86
I-11	0.10	0.90	93
I-12	0.34	0.90	93
FUTURE I-13	2.40	0.71	65
FUTURE I-14	0.47	0.31	8
FUTURE I-6A	2.37	0.71	65
FUTURE I-15	0.45	0.45	29
FUTURE I-16	1.68	0.27	2

SOIL CLASSIFICATION		
Soil Sym.	Name	HYDROLOGIC GROUP
* Ba	Baile silt loam	D
BrB2	Beltsville silt loam	C
BrC2	Beltsville silt loam	C
BrC3	Beltsville silt loam	C
BrD2	Beltsville silt loam	C
BrF	Brandywine loam	C
ChA	Chester silt loam	B
ChB2	Chester silt loam	B
ChC2	Chester silt loam	B
ChC3	Chester silt loam	B
CgC2	Chester silt loam	B
** Co	Codorus silt loam	C
** CuB	Cornus silt loam	B
** DeA	Delanco silt loam	C
** DeB2	Delanco silt loam	C
EkB2	Elioak silt loam	B
EkC3	Elioak silty clay loam	B
EkD3	Elioak silty clay loam	B
EnB2	Elsinboro loam	B
EnC2	Elsinboro loam	B
GlA	Glenelg loam	B
GlB2	Glenelg loam	B
GlC2	Glenelg loam	B
GlC3	Glenelg loam	B
GlD2	Glenelg loam	B
GlD3	Glenelg loam	B
** GnA	Glenville silt loam	C
** GnB2	Glenville silt loam	C
* Ha	Hatboro silt loam	D
* Kn	Kinkora silt loam	D
MgB2	Manor gravelly loam	B
MgC2	Manor gravelly loam	B
MlA	Manor loam	B
MlB2	Manor loam	B
MlC2	Manor loam	B
MlC3	Manor loam	B
MlD2	Manor loam	B
MlD3	Manor loam	B
MlE	Manor loam	B

* HYDRIC SOILS
** SOILS SUBJECT TO HYDRIC CONDITIONS

SOILS MAP - Pg 8 & Pg 9

FISHER, COLLINS & CARTER, INC.
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(443-367-0422)

STATE OF MARYLAND — ALDO ORLANDO VITALE — No. 21459 — REGISTERED PROFESSIONAL ENGINEER

ALDO O. VITALE — DATE 7-24-09

"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20746, Expiration Date 2-22-11."

STORM DRAIN DRAINAGE AREA MAP

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC

TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4

THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND

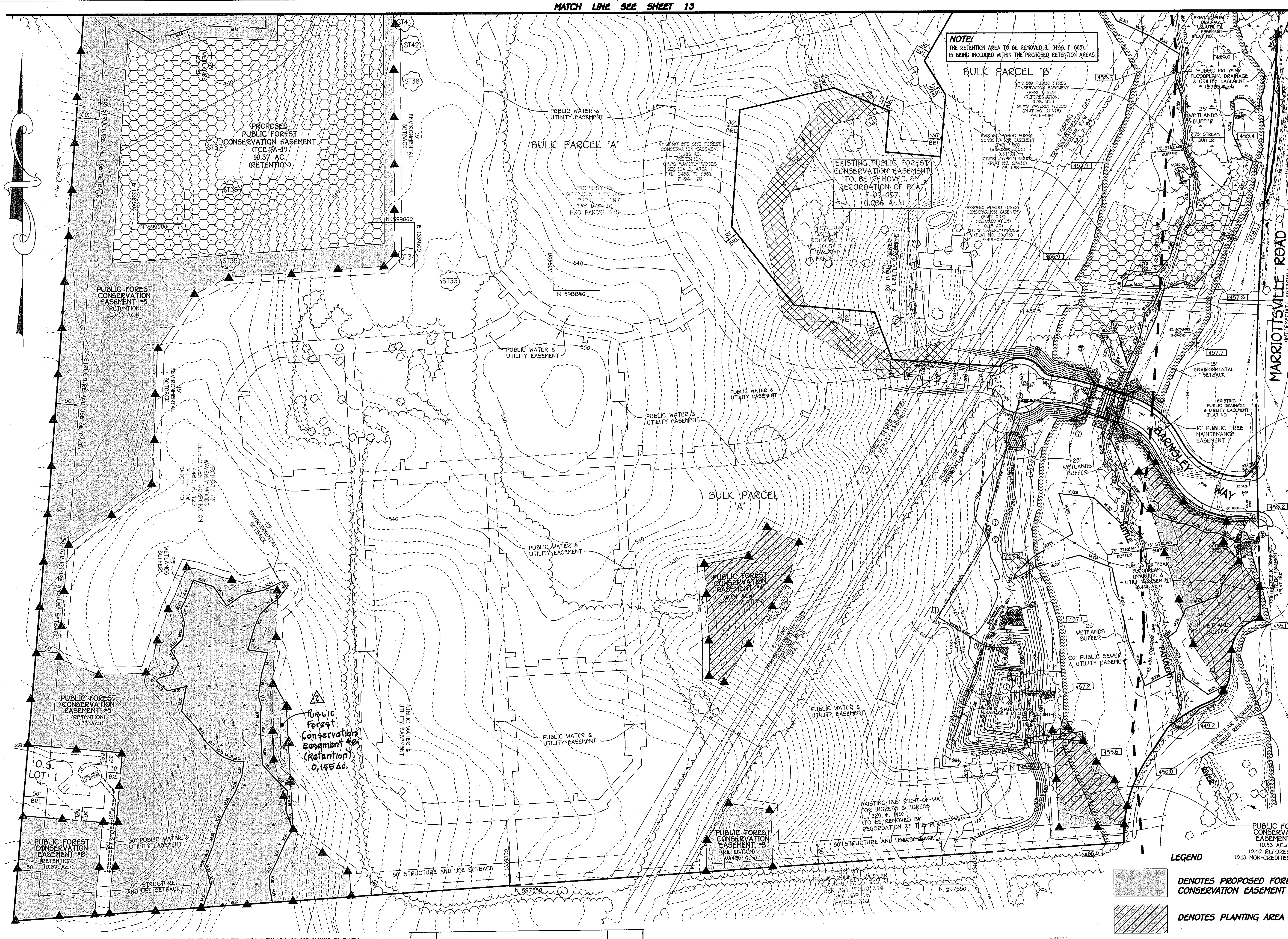
DATE: JULY 28, 2009

SHEET 11 OF 26

F-09-057

K:\SDSR\PROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 11 SD DA MAP.dwg, 7/29/2009 10:15:10 AM, jamesL

APPROVED: DEPARTMENT OF PUBLIC WORKS	
CHIEF, BUREAU OF HIGHWAYS [signature]	8-27-09 DATE
APPROVED: DEPARTMENT OF PLANNING AND ZONING	
CHIEF, DIVISION OF LAND DEVELOPMENT [signature]	9/29/09 DATE
CHIEF, DEVELOPMENT ENGINEERING DIVISION [signature]	8/31/09 DATE



Note: THE FOREST CONSERVATION EASEMENT(S) WILL BE ESTABLISHED TO FULFILL THE REQUIREMENTS OF SECTION 16.1200 OF THE HOWARD COUNTY FOREST CONSERVATION ACT. NO CLEARING, GRADING OR CONSTRUCTION IS PERMITTED WITHIN THE FOREST CONSERVATION EASEMENT, EXCEPT AS SHOWN ON AN APPROVED ROAD CONSTRUCTION DRAWING. HOWEVER, FOREST MANAGEMENT PRACTICES AS DEFINED IN THE DEED OF FOREST CONSERVATION EASEMENT ARE ALLOWED.

FCE Planting Area # 1 – 1.06 acres

Planting required: (350 WHIPS PER ACRE) x 1.06 x 350 = 371 WHIPS
Planting provided: (340 whips and 18 - 1" trees)

Qty	Species	Size	Spacing
6	Acer rubrum - Red maple	1" cal.	15' o.c.
12	Quercus alba - White oak	1" cal.	15' o.c.
	18 Total 1" caliper trees		
75	Acer rubrum - Red maple	2-3' whip	11' o.c.
75	Cercis canadensis - Red bud	2-3' whip	11' o.c.
50	Cornus florida - Flowering dogwood	2-3' whip	11' o.c.
50	Liriodendron tulipifera - Tulip poplar	2-3' whip	11' o.c.
25	Prunus serotina - Black cherry	2-3' whip	11' o.c.
25	Robinia pseudo-acacia - Black locust	2-3' whip	11' o.c.
20	Quercus alba - White oak	2-3' whip	11' o.c.
20	Viburnum prunifolium - Blackhaw	2-3' whip	11' o.c.
	340 Total whip plantings		

1" CAL. TREES = 200/ACRE (18 TREES/200) = 0.09 AC.
WHIPS w/shelters = 350/ACRE = (350 x 0.97 AC. (0.432 - 0.09)) = 340 WHIPS

FCE Planting Area # 2 – 0.40 acres

Planting required: (350 WHIPS PER ACRE) x 0.40 x 350 = 140 WHIPS
Planting provided: (140 whips)

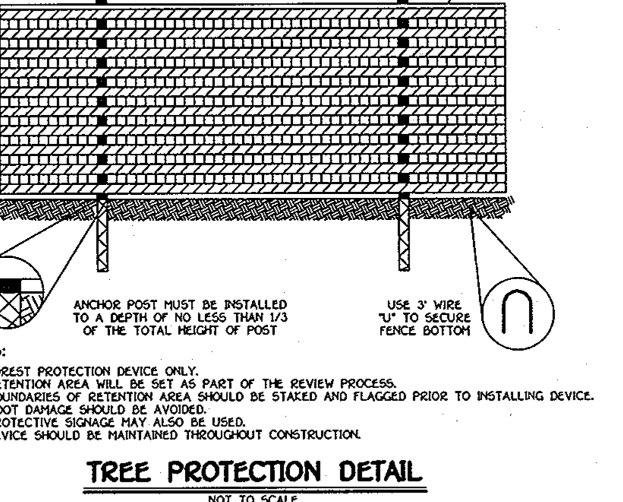
Qty	Species	Size	Spacing
25	Acer rubrum - Red maple	2-3' whip	11' o.c.
25	Cercis canadensis - Red bud	2-3' whip	11' o.c.
25	Cornus florida - Flowering dogwood	2-3' whip	11' o.c.
15	Liriodendron tulipifera - Tulip poplar	2-3' whip	11' o.c.
15	Prunus serotina - Black cherry	2-3' whip	11' o.c.
15	Robinia pseudo-acacia - Black locust	2-3' whip	11' o.c.
10	Quercus alba - White oak	2-3' whip	11' o.c.
10	Viburnum prunifolium - Blackhaw	2-3' whip	11' o.c.
	140 Total whip plantings		

FCE Planting Area # 4 – 0.84 acres

Planting required: (350 WHIPS PER ACRE) x 0.84 x 350 = 294 WHIPS
Planting provided: (263 whips and 18 - 1" trees)

Qty	Species	Size	Spacing
6	Acer rubrum - Red maple	1" cal.	15' o.c.
12	Quercus alba - White oak	1" cal.	15' o.c.
	18 Total 1" caliper trees		
50	Acer rubrum - Red maple	2-3' whip	11' o.c.
50	Cercis canadensis - Red bud	2-3' whip	11' o.c.
25	Cornus florida - Flowering dogwood	2-3' whip	11' o.c.
25	Liriodendron tulipifera - Tulip poplar	2-3' whip	11' o.c.
25	Prunus serotina - Black cherry	2-3' whip	11' o.c.
25	Robinia pseudo-acacia - Black locust	2-3' whip	11' o.c.
30	Quercus alba - White oak	2-3' whip	11' o.c.
33	Viburnum prunifolium - Blackhaw	2-3' whip	11' o.c.
	263 Total whip plantings		

1" CAL. TREES = 200/ACRE (18 TREES/200) = 0.09 AC.
WHIPS w/shelters = 350/ACRE = (350 x 0.75 AC. (0.84 - 0.09)) = 263 WHIPS



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 DEVICE.
4. ROOT DAMAGE SHOULD BE AVOIDED.
5. PROTECTIVE SIGNAGE MAY ALSO BE USED.
6. DEVICE SHOULD BE MAINTAINED THROUGHOUT CONSTRUCTION.

TREE PROTECTION DETAIL
NOT TO SCALE

FCP 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. Forested areas occurring outside of the FCE shall not be considered part of the FCE and shall not be subject to protective land covenants.
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 Forest Conservation Act requirements will be met through the onsite retention of 17.46 acres of forest, 4.68 acres of onsite reforestation and 10.43 acres of off-site reforestation. Total Forest Conservation Obligation = 32.57 ac.

LEGEND

- DENOTES PROPOSED FOREST CONSERVATION EASEMENT
- DENOTES PLANTING AREA
- DENOTES RETENTION AREA TO BE RELOCATED

NOTE: *SEE SHEET 21 FOR MASTER OVERALL FOREST CONSERVATION WORKSHEET.*

No.	DESCRIPTION	DATE
2	ADD FCE #8 - 0.155 ACRES RETENTION	7-10-13

REVISIONS

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
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(443-367-0422)

Eco-Science Professionals, Inc.
CONSULTING ECOLOGISTS

MD DNR Qualified Professional
USACOE Wetland Delineator
Certification # DCP93MD0610044B
JOHN P. CANOLES 9/2/09

ALDO M. VITUCCI [signature] 7-29-09 DATE
"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

FOREST CONSERVATION PLAN

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 12 OF 27

F-09-057

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 12-13 FOREST PLANS.dwg, 7/29/2009 1:17:26 PM, jamesl, 1:1

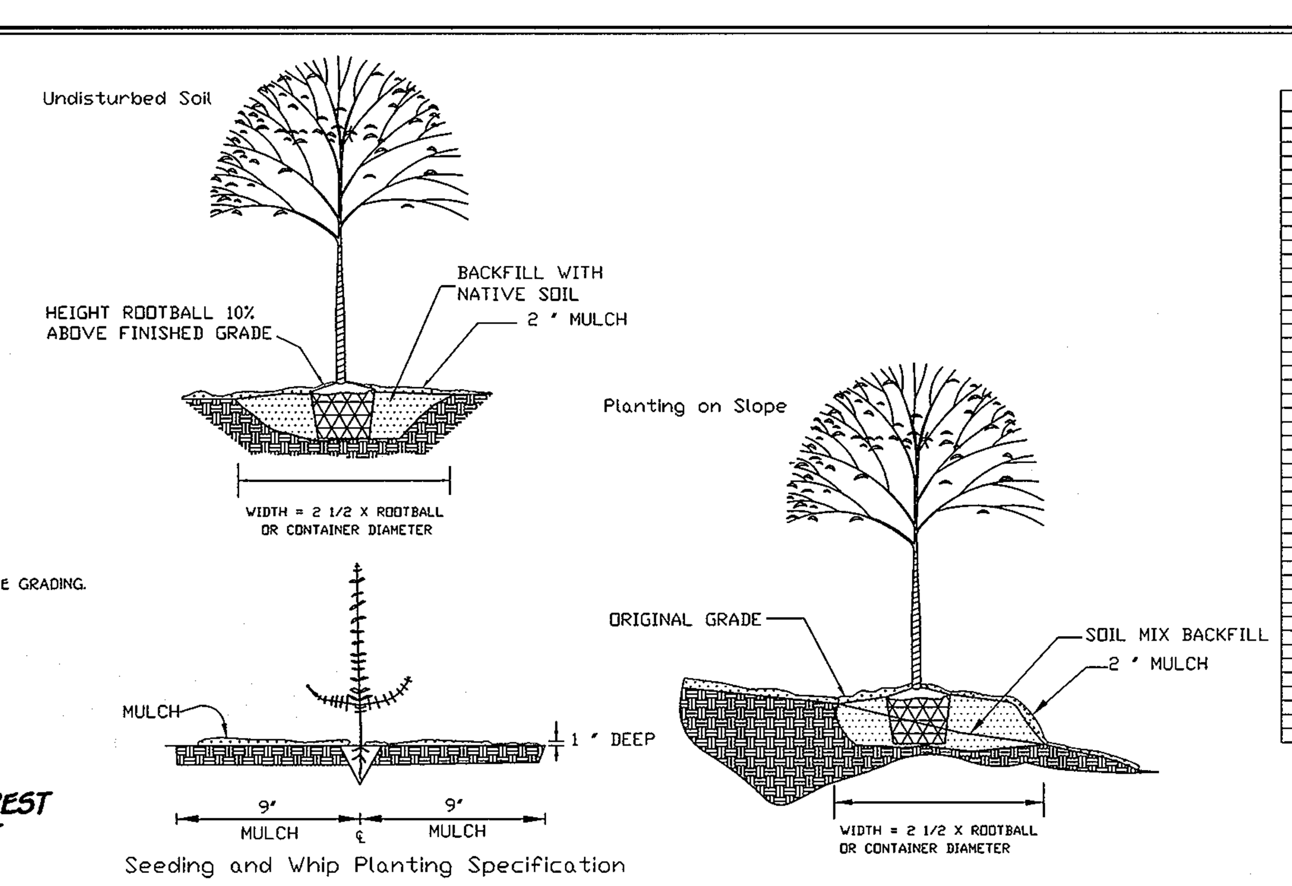
FCE Planting Area # 7 - 2.38 acres

Planting required: (350 WHIPS PER ACRE) x 2.38 x 350 = 833 WHIPS
Planting provided: (790 whips and 25 - 1" trees)

Qty	Species	Size	Spacing
10	Acer rubrum - Red maple	1" cal.	15' o.c.
15	Quercus alba - White oak	1" cal.	15' o.c.
			25 Total 1" caliper trees
125	Acer rubrum - Red maple	2-3' whip	11' o.c.
125	Cercis canadensis - Red bud	2-3' whip	11' o.c.
75	Cornus florida - Flowering dogwood	2-3' whip	11' o.c.
75	Liriodendron tulipifera - Tulip poplar	2-3' whip	11' o.c.
125	Prunus serotina - Black cherry	2-3' whip	11' o.c.
140	Robinia pseudo-acacia - Black locust	2-3' whip	11' o.c.
75	Quercus alba - White oak	2-3' whip	11' o.c.
50	Viburnum prunifolium - Blackhaw	2-3' whip	11' o.c.
			790 Total whip plantings

1" CAL. TREES = 200/ACRE (25 TREES/200) = 0.125 AC.
WHIPS w/shelters = 350/ACRE = (350 x 2.255 AC. (2.38 - 0.125)) = 790 WHIPS

NOTE:
THE PLANTING AREAS SHOWN WITHIN F.C.E. No. 7 ARE AREAS THAT WILL HAVE FUTURE GRADING.



LEGEND

- DENOTES PROPOSED FOREST CONSERVATION EASEMENT
- DENOTES PLANTING AREA
- DENOTES RETENTION AREA TO BE RELOCATED

NOTE:
THE RETENTION AREAS TO BE REMOVED WITHIN FCE 'A', 'C' & 'D' ARE BEING INCLUDED WITHIN THE PROPOSED RETENTION AREAS.

WETLAND TABLE

LINE	LENGTH	BEARING	LINE	LENGTH	BEARING	LINE	LENGTH	BEARING	LINE	LENGTH	BEARING	LINE	LENGTH	BEARING	LINE	LENGTH	BEARING	LINE	LENGTH	BEARING	LINE	LENGTH	BEARING
WL1	31.00	S 45°31'42" W	WL45	34.75	N 6°28'41" E	WL89	58.33	S 42°6'40" E	WL133	30.72	N 8°3'29" W	WL177	17.53	S 46°10'30" W	WL221	16.38	S 36°14'25" E	WL265	96.35	S 22°39'53" E	WL309	1.45	N 1°47'59" E
WL2	30.34	S 23°35'13" W	WL46	32.27	N 13°25'37" W	WL90	64.21	S 83°8'43" W	WL134	22.86	N 26°35'36" W	WL178	29.54	S 22°53'31" W	WL222	30.35	N 81°4'3" E	WL266	61.03	S 54°1'46" E	WL310	82.05	N 86°7'38" W
WL3	51.64	S 16°39'15" W	WL47	18.61	N 27°46'21" E	WL91	69.44	S 13°31'45" W	WL135	168.85	S 76°47'50" E	WL179	27.70	S 62°47'19" E	WL223	23.68	S 36°46'40" E	WL267	43.81	N 63°37'24" E	WL311	13.79	N 7°12'24" E
WL4	43.73	S 81°22'28" E	WL48	49.79	N 22°10'43" E	WL92	17.10	S 33°44'3" E	WL136	40.30	N 67°26'24" E	WL180	19.40	S 20°14'0" E	WL224	4.88	S 7°28'34" W	WL268	36.00	S 26°28'29" W	WL312	29.33	N 50°59'38" E
WL5	46.38	S 16°54'39" W	WL49	46.07	S 71°21'36" E	WL93	55.74	S 79°11'27" W	WL137	29.95	N 81°47'53" E	WL181	10.63	S 29°33'46" W	WL225	49.85	S 37°53'42" W	WL269	46.06	S 65°44'42" W	WL313	51.36	S 88°12'54" E
WL6	51.68	S 8°2'29" W	WL50	51.14	S 34°14'2" E	WL94	139.17	N 9°31'19" W	WL138	18.33	S 36°24'30" E	WL182	28.22	S 14°23'46" E	WL226	33.84	S 21°21'32" W	WL270	24.85	S 43°31'40" W	WL314	42.41	N 40°54'46" E
WL7	21.69	S 16°39'34" E	WL51	40.21	N 54°24'39" E	WL95	109.32	N 86°55'13" E	WL139	32.24	S 35°19'0" W	WL183	20.55	S 71°54'28" E	WL227	28.91	S 55°38'17" W	WL271	34.17	S 50°32'55" W	WL315	64.81	N 17°39'7" E
WL8	30.77	S 5°4'13" W	WL52	48.33	N 76°59'29" E	WL96	8.05	S 4°49'40" E	WL140	20.80	S 44°9'8" W	WL184	48.06	S 39°16'31" E	WL228	28.80	S 16°42'48" E	WL272	14.03	N 60°31'12" W	WL316	54.11	N 24°37'44" E
WL9	51.67	S 2°10'13" E	WL53	43.89	N 65°22'27" E	WL97	74.10	N 83°26'24" E	WL141	27.12	S 27°28'11" E	WL185	29.47	S 6°56'45" E	WL229	109.27	S 19°46'30" W	WL273	32.74	N 26°8'29" E	WL317	59.30	N 0°26'59" E
WL10	45.41	S 3°18'8" E	WL54	16.96	S 35°19'8" E	WL98	47.45	S 83°11'38" E	WL142	27.67	S 9°7'35" W	WL186	35.02	S 37°23'6" E	WL230	21.05	S 4°53'37" W	WL274	43.99	N 10°2'32" W	WL318	17.99	S 77°24'54" W
WL11	35.15	S 41°28'45" E	WL55	32.84	S 38°48'46" W	WL99	21.20	N 2°25'22" W	WL143	29.26	S 27°13'5" W	WL187	19.44	N 70°58'33" E	WL231	40.18	N 48°7'6" W	WL275	43.29	N 4°58'20" W	WL319	31.20	N 14°33'50" W
WL12	44.32	S 44°13'1" E	WL56	17.94	S 57°0'13" W	WL100	46.99	S 83°52'48" W	WL144	43.45	S 23°58'53" E	WL188	10.20	S 42°19'5" E	WL232	24.24	S 85°58'43" W	WL276	72.27	S 63°56'41" W	WL320	8.19	N 82°1'13" E
WL13	42.05	S 5°14'31" W	WL57	93.28	S 39°32'27" W	WL101	56.74	S 84°32'27" W	WL145	38.43	S 49°58'51" E	WL189	30.96	S 53°44'47" W	WL233	30.98	S 1°31'57" E	WL277	100.46	N 19°49'23" W	WL321	23.89	S 43°32'21" E
WL14	44.75	S 18°40'39" E	WL58	47.39	S 13°38'42" W	WL102	18.19	S 72°5'22" W	WL146	48.33	S 78°37'59" E	WL190	53.63	S 15°18'15" W	WL234	42.98	S 6°2'20" W	WL278	167.34	N 12°33'45" W	WL322	7.12	N 78°57'48" E
WL15	34.21	S 29°46'14" W	WL59	44.31	S 19°2'51" W	WL103	28.41	N 0°20'23" E	WL147	38.73	N 32°29'35" E	WL191	25.45	S 71°26'51" W	WL235	53.88	S 23°14'25" E	WL279	75.55	N 68°59'11" W	WL323	26.77	N 15°19'39" W
WL16	42.23	S 24°8'39" W	WL60	68.54	S 8°59'3" W	WL104	33.07	S 71°42'47" E	WL148	32.47	N 51°22'33" W	WL192	25.57	S 30°19'29" W	WL236	26.11	S 63°52'57" E	WL280	98.72	S 75°3'52" W	WL324	20.71	N 24°41'59" W
WL17	37.13	S 26°16'18" W	WL61	59.52	S 48°32'26" E	WL105	21.92	S 10°9'31" E	WL149	33.47	N 29°49'11" E	WL193	16.71	S 55°57'32" E	WL237	99.84	S 16°23'14" W	WL281	53.71	S 61°16'0" W	WL325	13.58	N 11°51'11" W
WL18	27.08	S 2°12'52" E	WL62	63.39	S 22°16'1" W	WL106	21.41	S 86°7'14" W	WL150	39.90	N 36°39'45" E	WL194	31.72	N 88°4'19" E	WL238	140.68	S 23°32'22" W	WL282	13.18	N 19°46'7" E	WL326	30.96	N 9°9'41" E
WL19	30.42	S 10°2'55" E	WL63	165.59	S 24°56'50" E	WL107	14.93	N 70°28'0" W	WL151	34.38	S 88°9'0" E	WL195	29.20	S 4°52'19" W	WL239	63.69	S 42°54'44" W	WL283	52.53	N 46°53'53" E	WL327	58.49	N 9°56'42" W
WL20	151.17	S 86°11'47" W	WL64	175.44	S 33°2'23" E	WL108	42.87	S 84°35'26" W	WL152	33.40	S 85°8'54" E	WL196	80.88	S 62°44'31" W	WL240	21.05	N 66°16'41" W	WL284	99.10	N 59°46'9" E	WL328	21.47	N 2°45'24" E
WL21	50.35	N 20°2'22" E	WL65	115.45	S 39°49'55" E	WL109	72.33	S 6°47'48" W	WL153	25.05	N 83°10'6" E	WL197	32.78	S 9°5'26" W	WL241	48.57	S 71°29'2" W	WL285	93.02	N 18°21'9" W	WL329	44.04	N 17°30'13" W
WL22	28.37	N 13°3'18" W	WL66	272.11	S 0°19'15" E	WL110	19.06	N 71°11'36" W	WL154	31.55	N 41°31'45" E	WL198	27.72	S 15°18'33" E	WL242	61.56	S 15°17'33" W	WL286	75.48	S 83°17'18" E	WL330	53.47	N 9°23'8" E
WL23	16.83	N 22°5'24" W	WL67	143.92	N 87°11'35" W	WL111	68.53	N 8°50'34" W	WL155	31.00	S 85°58'8" E	WL199	40.39	S 7°51'16" W	WL243	153.04	S 24°25'49" W	WL287	89.72	S 45°31'49" E	WL331	74.96	N 58°2'48" W
WL24	17.34	N 23°22'11" E	WL68	106.42	S 71°42'41" W	WL112	48.19	N 5°14'45" W	WL156	22.04	S 89°53'37" E	WL200	26.46	S 51°44'6" W	WL244	44.66	S 26°37'0" W	WL288	24.84	N 6°12'46" E	WL332	37.96	N 65°0'7" W
WL25	32.21	N 21°43'45" E	WL69	118.22	N 59°2'5" W	WL113	2.24	N 24°38'0" E	WL157	43.37	S 29°26'47" W	WL201	30.04	S 8°29'30" W	WL245	34.88	S 8°4'58" W	WL289	46.32	N 9°20'56" E	WL333	41.35	N 65°13'21" W
WL26	46.57	N 14°32'32" E	WL70	94.20	N 12°6'31" E	WL114	15.29	N 27°29'31" E	WL158	25.83	S 46°1'58" E	WL202	24.14	S 68°46'1" E	WL246	26.86	S 10°13'41" W	WL290	28.61	N 49°12'26" W	WL334	73.77	N 29°14'44" W
WL27	36.90	N 25°1'38" E	WL71	118.20	N 2°7'56" E	WL115	28.44	N 11°58'22" E	WL159	38.67	S 44°12'55" E	WL203	26.70	S 81°43'20" E	WL247	28.34	S 16°9'7" W	WL291	30.06	N 12°27'27" W	WL335	55.23	N 2°50'38" E
WL28	41.78	N 29°34'2" E	WL72	125.06	N 9°27'0" W	WL116	52.52	N 25°39'45" E	WL160	35.76	N 39°17'55" E	WL204	31.38	S 5°18'37" E	WL248	55.79	S 22°41'23" E	WL292	29.81	N 45°7'31" W	WL336	65.89	N 20°25'36" W
WL29	37.63	N 22°21'46" E	WL73	69.20	N 7°44'24" E	WL117	52.40	N 65°24'34" W	WL161	41.75	N 34°2'28" E	WL205	32.71	S 13°39'44" W	WL249	37.43	S 17°10'38" E	WL293	51.59	N 5°41'7" W	WL337	42.67	N 50°36'42" W
WL30	32.74	N 8°34'19" E	WL74	59.58	N 4°13'5" W	WL118	14.11	S 28°36'4" W	WL162	47.05	N 35°35'54" E	WL206	30.73	S 87°11'18" E	WL250	76.68	S 32°46'52" E	WL294	37.47	N 17°31'25" E	WL338	53.08	N 17°57'35" W
WL31	16.52	S 85°14'32" W	WL75	48.68	N 6°49'52" W	WL119	57.09	N 49°45'24" W	WL163	51.55	N 35°0'19" E	WL207	35.73	N 65°6'29" E	WL251	35.08	S 56°43'12" E	WL295	73.65	N 15°46'13" E	WL339	75.93	N 31°3'24" W
WL32	29.00	N 69°55'58" W	WL76	18.84	N 18°39'5" W	WL120	33.89	S 58°27'29" W	WL164	53.63	N 24°42'37" E	WL208	41.11	S 19°10'59" E	WL252	73.68	S 74°29'12" E	WL296	46.91	N 21°43'40" E	WL340	14.59	N 9°31'3" E
WL33	17.66	N 54°29'13" W	WL77	12.05	N 31°45'46" W	WL121	45.17	N 60°26'57" W	WL165	25.12	S 81°51'57" E	WL209	31.15	S 71°37'16" E	WL253	30.13	S 63°44'12" E	WL297	32.52	N 57°5'25" W	WL341	11.01	N 67°15'56" W
WL34	33.16	N 45°53'0" W	WL78	135.76	N 4°10'6" E	WL122	49.13	N 67°11'16" W	WL166	29.67	S 70°0'17" E	WL210	41.08	S 17°2'13" W	WL254	31.64	S 84°55'23" E	WL298	26.48	N 14°9'28" W	WL342	35.53	N 37°46'22" W
WL35	40.95	N 34°26'24" W	WL79	26.55	N 48°22'52" E	WL123	47.57	N 40°25'37" W	WL167	43.66	S 10°46'43" E	WL211	17.62	S 10°50'35" E	WL255	46.09	S 64°39'43" E	WL299	1.41	N 13°16'27" E	WL343	25.96	S 71°18'0" W
WL36	44.63	N 40°57'44" W	WL80	38.59	N 24°29'53" W	WL124	18.44	N 41°38'16" E	WL168	31.55	S 18°55'25" E	WL212	17.97	S 56°10'44" E	WL256	5.92	S 73°24'17" E	WL300	38.10	N 26°36'27" W	WL344	30.14	N 3°26'43" E
WL37	55.06	N 10°37'32" E	WL81	7.78	N 4°10'6" E	WL125	34.76	S 31°51'33" E	WL169	13.85	S 15°44'27" E	WL213	14.08	S 0°51'16" E	WL257	17.57	S 0°46'35" W	WL301	35.34	N 86°9'47" E	WL345	58.31	N 31°6'55" E
WL38	42.08	S 77°35'0" W	WL82	105.92	N 35°19'48" E	WL126	26.20	N 41°16'26" E	WL170	23.14	S 24°13'56" E	WL214	25.41	S 29°1'45" E	WL258	27.50	S 7°6'29" E	WL302	71.48	S 16°54'48" E	WL346	44.56	N 54°10'43" E
WL39	32.87	N 47°8'14" W	WL83	104.32	N 10°59'16" W	WL127	32.27	N 30°51'37" E	WL171	50.14	S 50°30'14" E	WL215	15.27	S 37°32'33" W	WL259	27.37	S 55°3'5" W	WL303	49.99	N 26°27'9" E	WL347	21.30	N 53°44'2" E
WL40	8.13	N 47°38'41" E	WL84	28.78	S 77°13'23" W	WL128	22.16	N 15°4'16" W	WL172	12.76	S 79°5'54" E	WL216	24.48	N 85°13'17" W	WL260	34.23	S 37°15'7" W	WL304	23.44	N 18°43'0" E	WL348	46.79	N 37°0'7" W
WL41	31.16	N 72°58'9" E	WL85	125.35	N 4°10'6" E	WL129	37.72	N 28°14'53" W	WL173	14.82	S 5°21'56" E	WL217	29.12	S 83°41'59" W	WL261	26.98	S 11°24'10" W	WL305	44.40	N 12°1'28" E	WL349	43.94	N 20°29'28" W
WL42	26.48	N 27°44'9" E	WL86	191.13	N 86°55'13" E	WL130	40.98	N 79°16'19" W	WL174	26.33	S 1°53'36" E	WL218	28.50	S 25°41'36" E	WL262	79.42	S 69°10'52" W	WL306	12.60	N 38°35'52" E	WL350	42.77	N 39°12'51" W
WL43	32.05	N 29°28'49" W	WL87	41.17	S 30°0'4" W	WL131	18.69	N 13°36'12" E	WL175	3.56	S 26°6'5" W	WL219	30.90	S 38°24'24" W	WL263	54.36	S 22°49'21" W	WL307	10.71	N 54°39'36" E	WL351	18.21	N 17°37'29" W
WL44	35.21	N 46°5'10" E	WL88	61.85	S 13°25'5" W	WL132	22.14	N 16°49'42" W	WL176	24.91	S 9°30'44" W	WL220	24.61	S 86°44'4" E	WL264	21.77	S 54°29'45" W	WL308	38.63	N 24°6'28" E	WL352	61.72	N 34°26'58" W
																					WL353	0.22	N 40°37'15" W

APPROVED: DEPARTMENT OF PUBLIC WORKS

[signature] 8-27-09
CHIEF, BUREAU OF HIGHWAYS — DATE

APPROVED: DEPARTMENT OF PLANNING AND ZONING

[signature] 9/29/09
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE

[signature] 8/31/09
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE

FOREST CONSERVATION DATA (ON-SITE)

EASEMENT NO.	CREDITED RETENTION AREA	PLANTING AREA	NON-CREDITED RETENTION AREA	TOTAL EASEMENT AREA
1	---	1.06 AC.	0.194 AC.	1.254 AC.
2	---	0.40 AC.	0.13 AC.	0.53 AC.
3	0.406 AC.	---	---	0.406 AC.
4	---	0.84 AC.	---	0.84 AC.
5	13.33 AC.	---	---	13.33 AC.
6	0.66 AC.	---	---	0.66 AC.
7	3.68 AC.	2.38 AC.	---	6.06 AC.
8	0.87 AC.	---	---	0.87 AC.
9	0.13 AC.	---	---	0.13 AC.
TOTAL	19.076 AC.	4.68 AC.	0.324 AC.	24.08 AC.

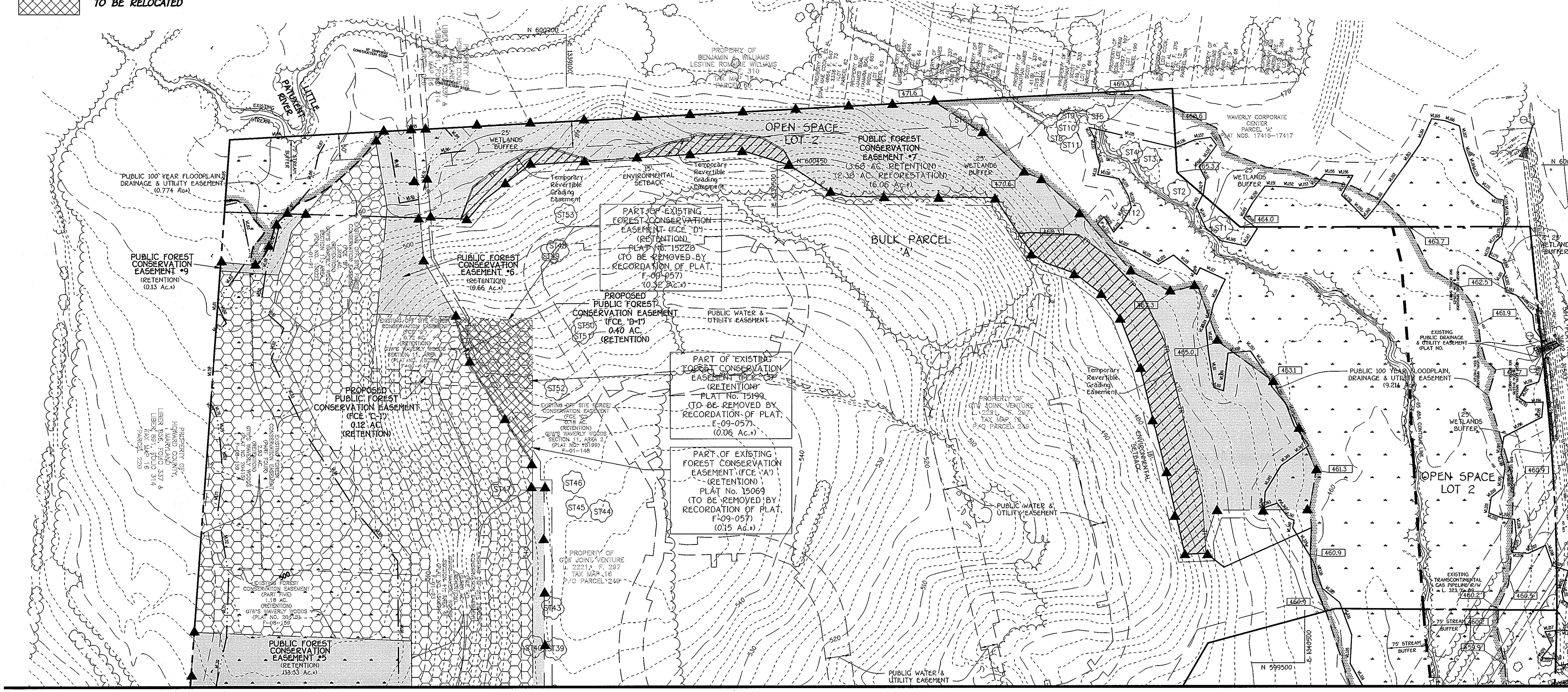
ON-SITE SIGNAGE

FOREST CONSERVATION EASEMENT

UNAUTHORIZED DISTURBANCE OF VEGETATION IS PROHIBITED. VIOLATORS SUBJECT TO PENALTIES UNDER THE HOWARD COUNTY FOREST CONSERVATION ACT OF 1991.

TREES FOR YOUR FUTURE

15" MINIMUM
11" MINIMUM



MATCH LINE SEE SHEET 12

NOTE:
SEE SHEET 21 FOR MASTER OVERALL FOREST CONSERVATION WORKSHEET.

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC, &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

Eco-Science Professionals, Inc.
CONSULTING ECOLOGISTS

MD DNR Qualified Professional
USACOE Wetland Delineator
Certification # WDCP93MD0610044B
[signature] 9/21/09
JOHN P. CANOLES

[signature] 7-29-09
ALDO M. VITTUCCI, P.E. — DATE
"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

FOREST CONSERVATION PLAN

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND
OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 13 OF 26

F-09-057

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 12-13 FOREST PLANS.dwg, 7/29/2009 1:19:17 PM, jamesl, 1:1

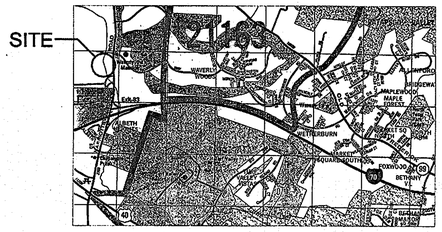
GTW's WAVERLY WOODS, SECTION 14

BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2 ZONING: PSC & PEC
TAX MAP No. 16 PARCEL Nos. 120,221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT, HOWARD COUNTY, MD

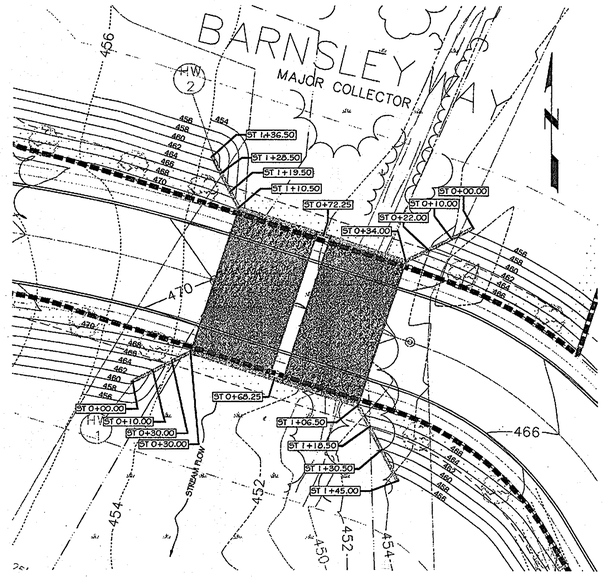
34'7"x11'4" 3ga PLATE ARCH CULVERT
STRUCTURAL DESIGN

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.



VICINITY MAP
SCALE: N.T.S.



SITE PLAN
SCALE: 1" = 30'

RYAN & ASSOCIATES

A Division of WKR Consulting, Inc.
CONSULTING & DESIGN ENGINEERS

HAGERSTOWN, MD OFFICE
1825 HOWELL RD, SUITE 3
HAGERSTOWN, MD 21740
PHONE: (301) 671-3200
FAX: (301) 360-9574

FREDERICK, MD OFFICE
2412 WYNFIELD CT.
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FAX: (301) 360-9574

e-mail: info@ryanandassociates.net

SPECIALIZING IN STRUCTURAL ENGINEERING, GEOTECHNICAL ENGINEERING AND RETAINING WALL DESIGN

www.ryanandassociates.net

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.

Scope: The plate arch culvert engineer's (Ryan & Associates) scope consists of preparing the culvert design to enable the contractor to obtain necessary permits and properly construct the arch. The design considers the internal and local stability of the arch and is in accordance with acceptable engineering practice and these specifications. Services outside this scope such as responding to the owner's engineering firm (civil, structural, geotechnical or otherwise), provision of quality control testing & inspection, certification of arch construction, investigation of failed or non-conforming arches 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.

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

PLATE ARCH MATERIALS: Structural Plate Arch to be supplied by Lane Enterprises, Inc. and to be 3 gauge steel (.249" thick). Structure type to be LA4108 low profile arch.

CONSTRUCTION REVIEW & CERTIFICATION: CONSTRUCTION INSPECTION, TESTING AND CERTIFICATION BY A STRUCTURAL/GEOTECHNICAL ENGINEER QUALIFIED IN THE DESIGN OF STEEL PLATE ARCH STRUCTURES IS A REQUIREMENT OF THESE PLANS. ACCEPTANCE OF THE USE OF THESE PLANS INDICATES AGREEMENT FOR PROFESSIONAL ENGINEERING CONSTRUCTION REVIEW AND CERTIFICATION

DRAWING INDEX

Sheet 1 - Cover Sheet
Sheet 2 - Head Walls, Wing Walls and Culvert Footings Plan
Sheet 3 - Wall and Arch Profiles
Sheet 4 - Culvert & Footing Cross-Sections
Sheet 5 - Plate Arch Sections & Details
Sheet 6 - Specifications

1

PROJECT INFORMATION

Project : Courtyards at Waverly Woods - West Stream Crossing
Location : Marriotsville Rd., North Side of I-70, Howard County, MD
Jurisdiction : Howard County, MD
Contractor : UNKNOWN
Site Civil Engineer : Fisher, Collins & Carter, Inc.
Owner/Developer : Land Design & Development, Inc.
RA Project Manager : Chris Heyrend

OWNERS
WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC, &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER
WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT,
INC. 5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 8-27-09

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 7/30/09
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 8/24/09

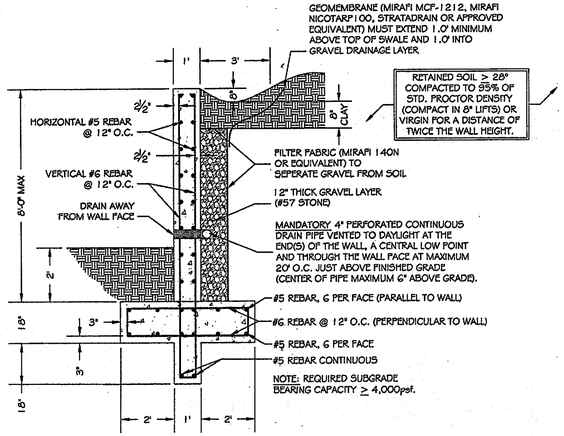
STATE OF MARYLAND WILLIAM K. RYAN No. 21588 REGISTERED PROFESSIONAL ENGINEER
ENGINEER SEAL

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: 21588
Expiration Date: 05/09/2011

SHEET
14 of 26

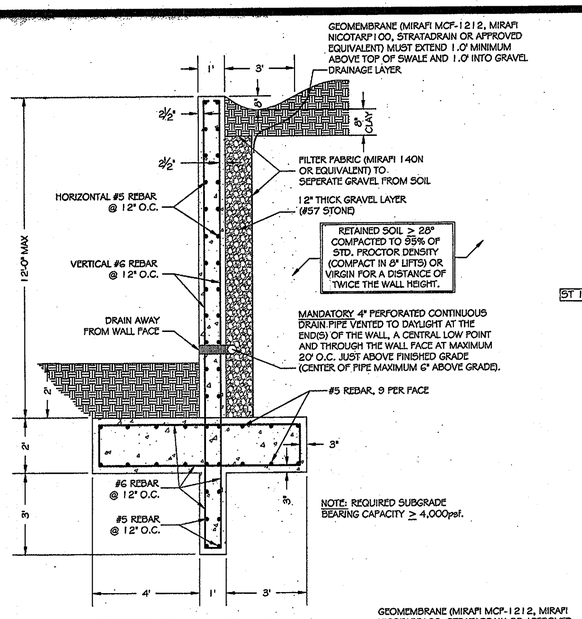
PLOT DATE: 08-11-09 BY: CJH RA JOB#: 1101-08-04.1

F-09-057



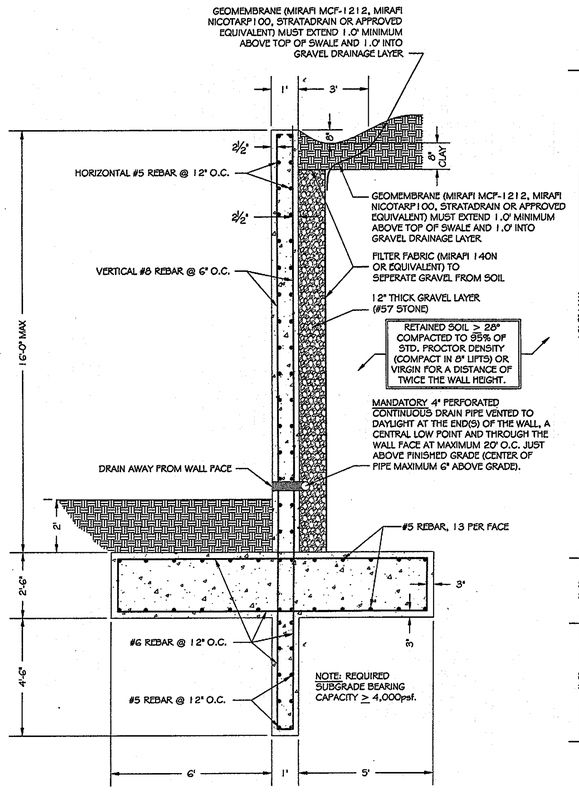
WALL SECTION-1

SCALE: 3/8" = 1'-0"



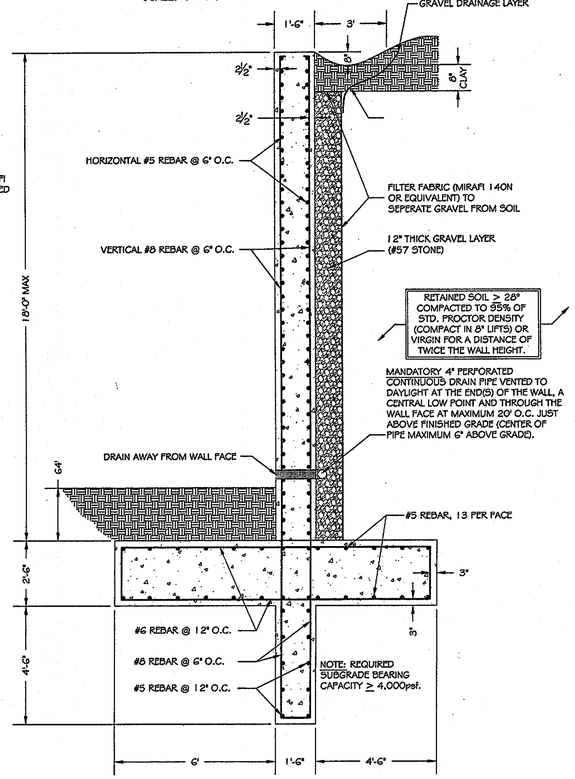
WALL SECTION-2

SCALE: 3/8" = 1'-0"



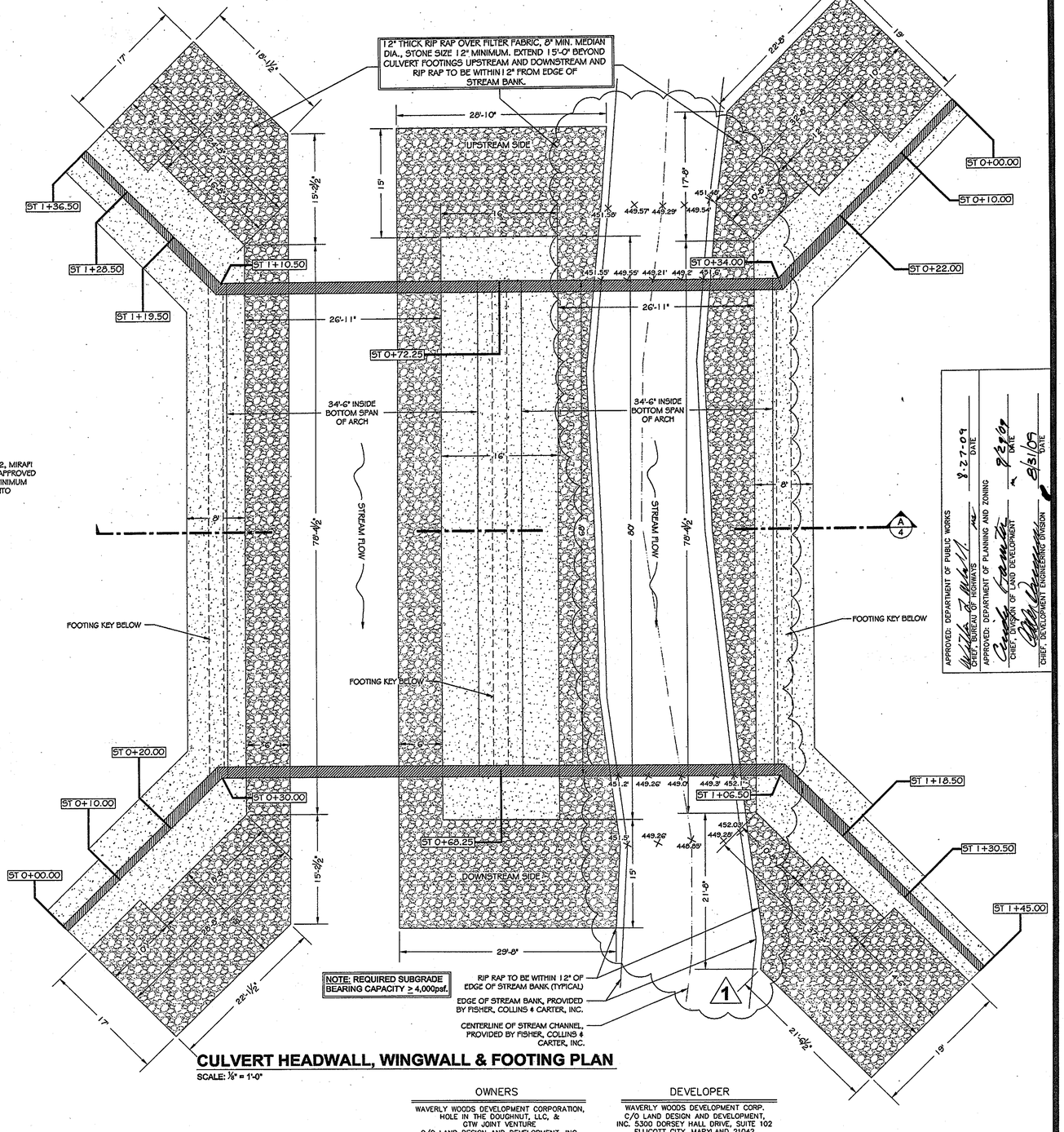
WALL SECTION-3

SCALE: 3/8" = 1'-0"



WALL SECTION-4

SCALE: 3/8" = 1'-0"



CULVERT HEADWALL, WINGWALL & FOOTING PLAN

SCALE: 1/8" = 1'-0"

APPROVED: DEPARTMENT OF PUBLIC WORKS — CHIEF, BUREAU OF HIGHWAYS — DATE 8.27.09
APPROVED: DEPARTMENT OF PLANNING AND ZONING — CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 8/28/09
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 8/31/09

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION, HOLE IN THE DOUGHNUT, LLC, & GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC. 5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

REVISIONS

No.	DATE	BY	DESCRIPTION
1	07/27/09	AJH	DESIGN MODIFICATIONS BASED ON REVISED TOPO AND MDE PERMIT REVISIONS FROM FISHER, COLLINS & CARTER

DRAWN BY: CJH
DESIGN BY: CJH
CHECKED BY: WKR
DATE: 07/27/09

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

CLIENT: LONG SPAN BRIDGE & CULVERT, LLC
OWNER: LAND DESIGN & DEVELOPMENT, INC.
JOB No: 1101-08-04

Ryan & Associates
A Division of WKR Consulting Inc.

Hagerstown, MD Office
1825 Howell Road, Suite 3
Hagerstown, MD 21740
301-671-3200 (ph)
301-360-9574 (fx)

Frederick, MD Office
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Frederick, MD 21702
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PLATE ARCH CULVERT STRUCTURAL DESIGN
CULVERT, HEADWALLS, WINGWALLS & FOOTINGS PLAN

GTW's WAVERLY WOODS, SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2 ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120,221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT, HOWARD COUNTY, MD

ENGINEER SEAL

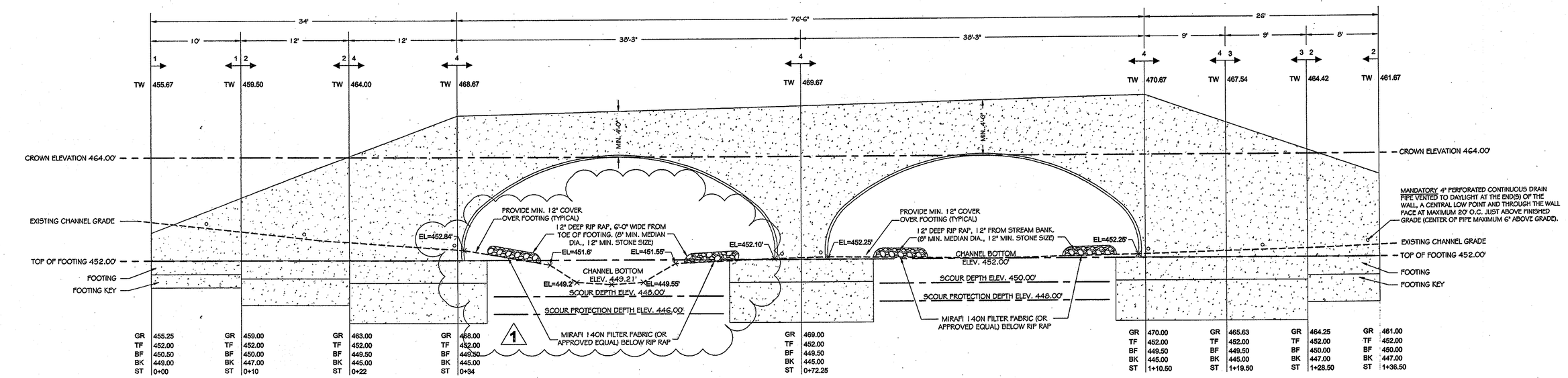
PROFESSIONAL CERTIFICATION

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: 21668
Expiration Date: 09/09/2011

SHEET
15 of 26

F-09-057



KEY

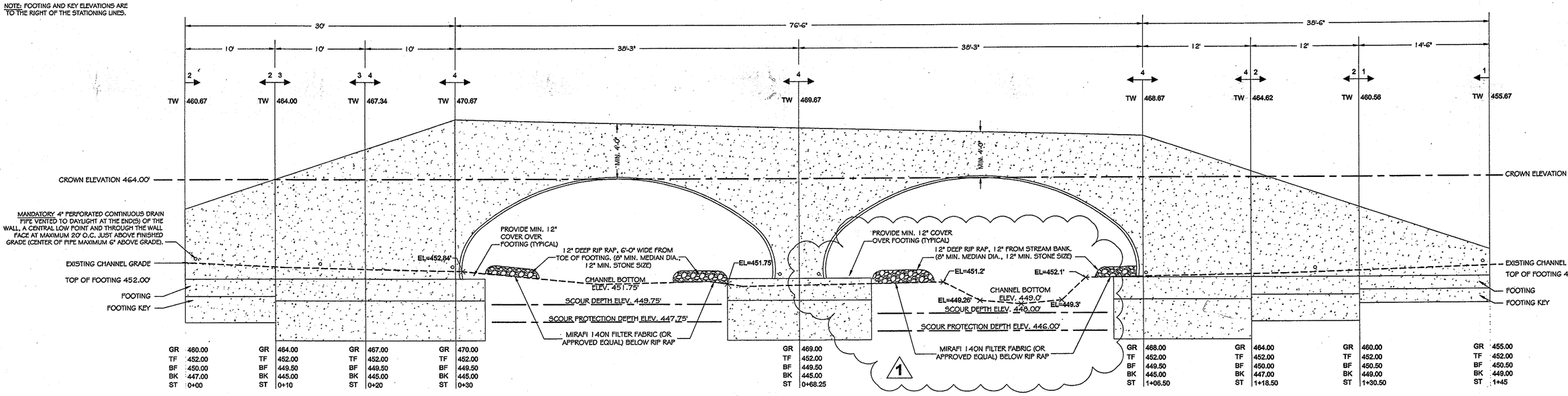
GR - PROPOSED GRADE BEHIND WALL
TF - TOP OF FOOTING
BF - BOTTOM OF FOOTING
BK - BOTTOM OF KEY
ST - STATION

NOTE: FOOTING AND KEY ELEVATIONS ARE TO THE RIGHT OF THE STATIONING LINES.

NOTE: SCOUR PROTECTION DEPTH IS AS INDICATED ON THESE PLANS OR 4' BELOW GRADE ELEVATION NEXT TO TOP OF FOOTING, WHICHEVER IS DEEPER. SCOUR DEPTH BASED ON SCOUR ANALYSIS REPORT BY RYAN AND ASSOCIATES DATED 06/19/08. AT A MINIMUM LEAN CONCRETE SHALL BE POURED TO SCOUR PROTECTION DEPTH.

UPSTREAM WALL PROFILE

SCALE: 3/16" = 1'-0"



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DOWNSTREAM WALL PROFILE

SCALE: 3/16" = 1'-0"

NOTE: THE ROAD GRADES & ELEVATIONS SHOWN ON THESE PLANS ARE BASED ON THE CIVIL ENGINEERS DRAWINGS. IF A DISCREPANCY EXISTS BETWEEN THESE PLANS AND THE CIVIL ENGINEERS, THE CIVIL ENGINEERS GRADES GOVERN AND SHALL BE USED.

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
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GTW JOINT VENTURE
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5300 DORSEY HALL DRIVE, SUITE 102
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APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 8-27-09

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CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 9/29/09
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PLATE ARCH CULVERT STRUCTURAL DESIGN
WING WALL, HEAD WALL & ARCH PROFILES
GTW's WAVERLY WOODS, SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2 ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120,221 & P/O 249 GRID Nos. 3 & 4
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ENGINEER SEAL

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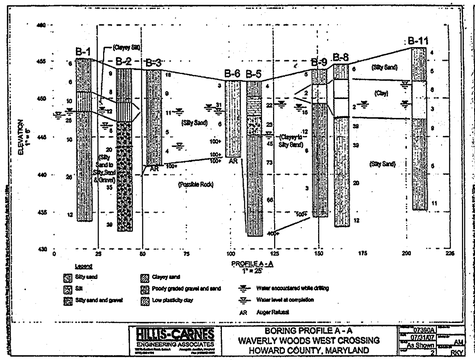
William K. Ryan, P.E.
License No: 21566
Expiration Date: 05/08/2011

SHEET
16 of 26

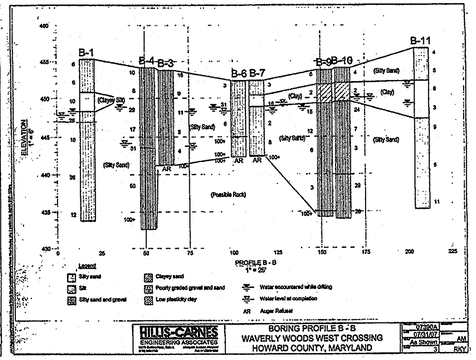
F-09-057



HILLIS-CARNES ENGINEERING ASSOCIATES

BORING PROFILE A - A
WAVERLY WOODS WEST CROSSING
HOWARD COUNTY, MARYLAND

07350A | 07/31/07 | As Shown | 2 | AM | RKV



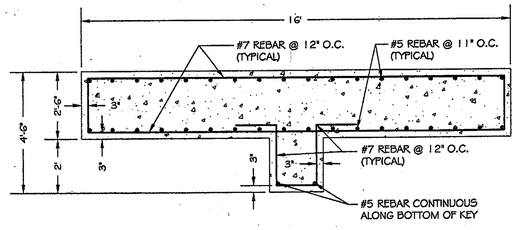
HILLIS-CARNES ENGINEERING ASSOCIATES

BORING PROFILE B - B
WAVERLY WOODS WEST CROSSING
HOWARD COUNTY, MARYLAND

07350A | 07/31/07 | As Shown | 3 | AM | RKV

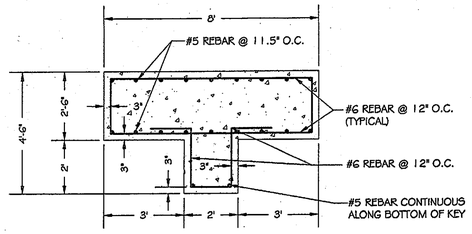
BORING PROFILES

SCALE: N.T.S.
(REFER TO SHEET-5 FOR LOCATION MAP)



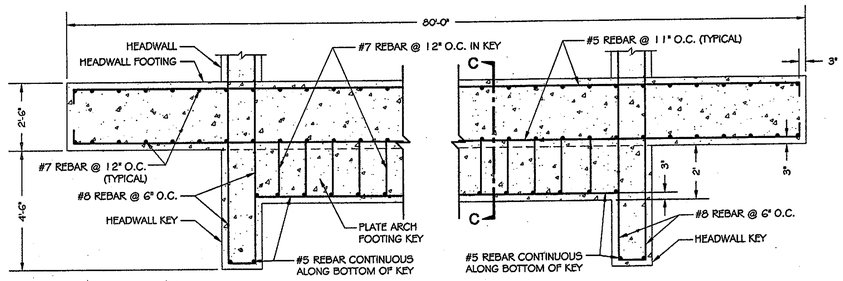
COMBINED FOOTING CROSS-SECTION C-C

SCALE: 3/8" = 1'-0"



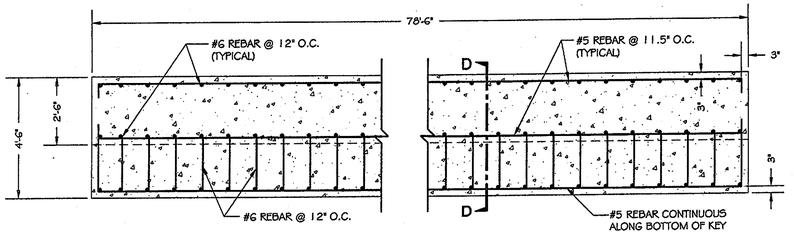
FOOTING CROSS-SECTION D-D

SCALE: 3/8" = 1'-0"



LONGITUDINAL FOOTING SECTION B-B

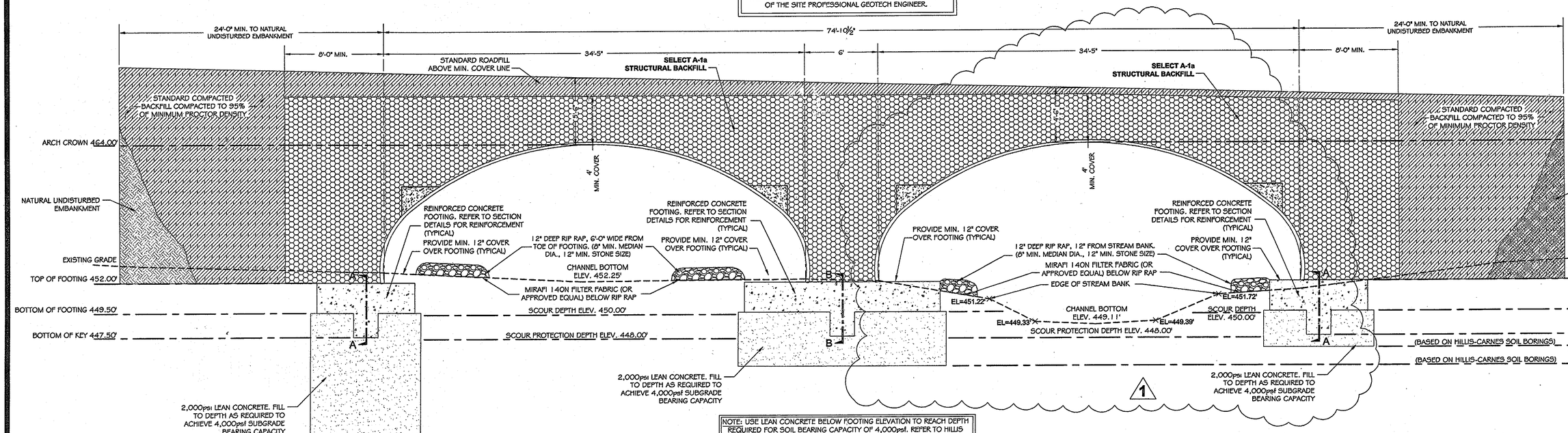
SCALE: 3/8" = 1'-0"



LONGITUDINAL FOOTING SECTION A-A

SCALE: 3/8" = 1'-0"

NOTE: NO BACKFILL MAY BE PLACED AGAINST THE LONGSPAN ARCH OR IN THE SELECT BACKFILL ZONE WITHOUT THE PRESENCE OF A TECHNICIAN UNDER THE SUPERVISION OF THE SITE PROFESSIONAL GEOTECH ENGINEER.



NOTE: USE LEAN CONCRETE BELOW FOOTING ELEVATION TO REACH DEPTH REQUIRED FOR SOIL BEARING CAPACITY OF 4,000psf. REFER TO HILLIS CARNES GEOTECHNICAL ENGINEERING STUDY DATED AUGUST 6TH, 2007. PAY ESPECIAL ATTENTION TO BORING PROFILES A-A & B-B THIS SHEET.

A/4 CULVERT CROSS SECTION AT ROAD CENTERLINE LOOKING UPSTREAM

SCALE: ¼" = 1'-0"

OWNERS

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PLATE ARCH CULVERT STRUCTURAL DESIGN
CULVERT & FOOTING CROSS-SECTIONS
GTW's WAVERLY WOODS, SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2 ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120,221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT, HOWARD COUNTY, MD

STATE OF MARYLAND — WILLIAM K. RYAN — No. 21068 — REGISTERED PROFESSIONAL ENGINEER — 8/31/09

ENGINEER SEAL

PROFESSIONAL CERTIFICATION

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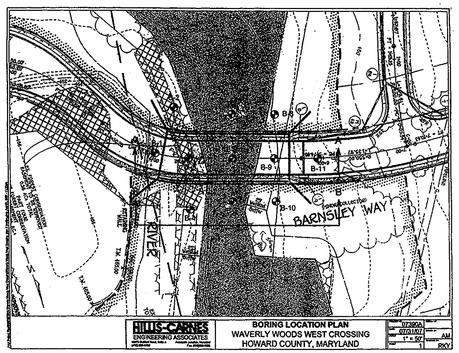
William K. Ryan, P.E.
License No: 21068
Expiration Date: 05/09/2011

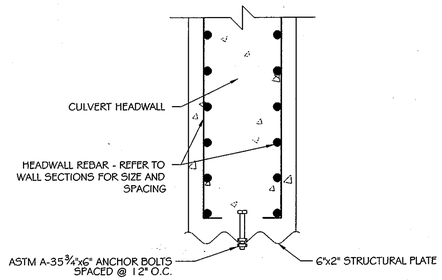
SHEET
17 of 26

F-09-057



BORING LOCATION MAP

SCALE: N.T.S.
(REFER TO SHEET-4 FOR BORING PROFILES)



HEADWALL CONNECTION DETAIL

SCALE: 1" = 1'-0"

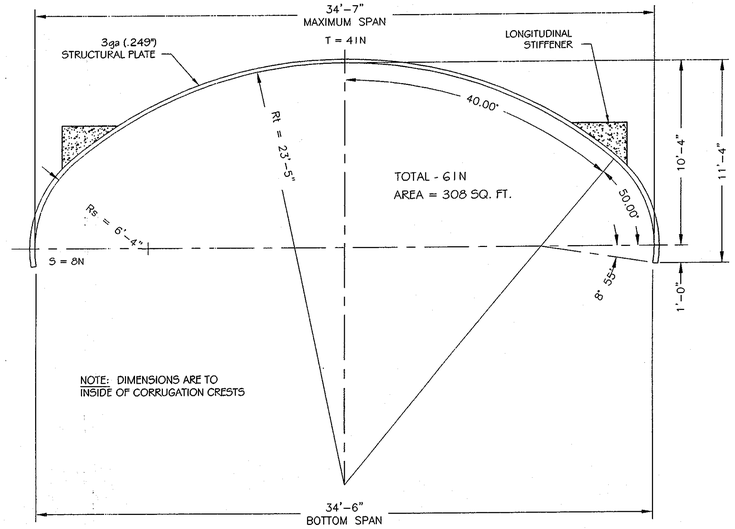
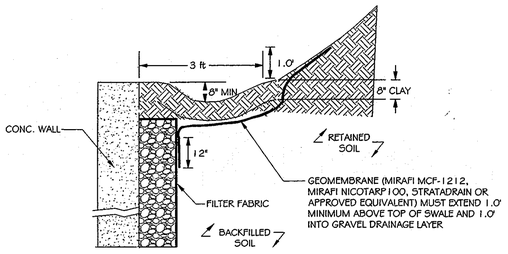


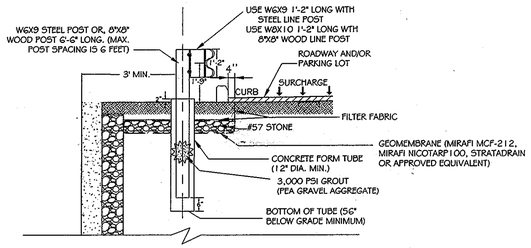
PLATE ARCH CROSS-SECTION

SCALE: 3/4" = 1'-0"



GEOMEMBRANE LINED SWALE

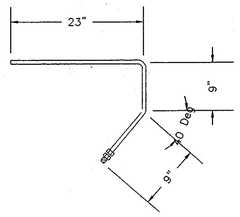
N.T.S.



NOTES:
1. ENSURE PROPER SLOPE BETWEEN GUARDRAIL AND WALL SO AS TO DIVERT WATER AWAY FROM WALL.
2. ALL STRUCTURAL STEEL SHALL CONFIRM TO ASTM A36.
3. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 3000 PSI AT 28 DAYS.
4. THE WALL INSTALLER TO PLACE THE GUARD RAIL POST SONOTUBES IN ACCORDANCE WITH THIS DETAIL FOR THE FENCE INSTALLER TO INSTALL GAURDRAIL POSTS AT A LATER DATE. THE SONOTUBES MUST BE COVERED WITH A SECURED PLASTIC SHEET TO PREVENT RAINWATER OR WATER RUN-OFF TO ENTER THE POST HOLES. IT IS HIGHLY RECOMMENDED THAT THE GUARDRAIL BE INSTALLED WITHIN A FEW DAYS OF WALL CONSTRUCTION COMPLETION.

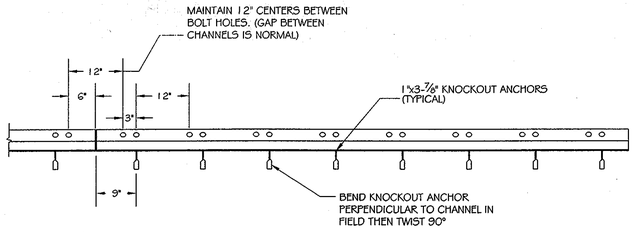
GUARDRAIL DETAIL

N.T.S.



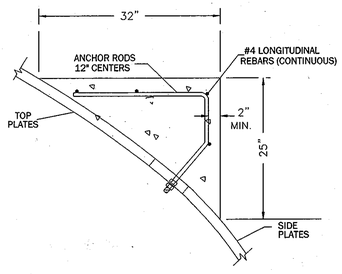
LONGITUDINAL STIFFENER BAR BENDING DETAIL

SCALE: N.T.S.



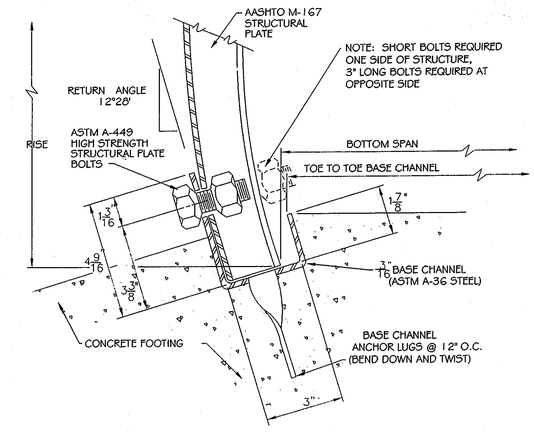
BASE CHANNEL DETAIL

SCALE: 3/4" = 1'-0"



LONGITUDINAL STIFFENER DETAIL

SCALE: N.T.S.



BASE CHANNEL SECTION

SCALE: N.T.S.

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PLATE ARCH CULVERT STRUCTURAL DESIGN
PLATE ARCH SECTIONS & DETAILS
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William K. Ryan, P.E.
License No: 21586
Expiration Date: 05/09/2011

SHEET
18 of 26

F-09-057

STRUCTURAL NOTES & SPECIFICATIONS

1: DEFINITIONS

1.01 Owner: Land Design and Development, Inc., Ellicott City, MD 21042

1.02 Contractor: TBD

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

1.04 Site Civil Engineer: Fisher, Collins & Carter, Ellicott City, MD 21042

1.05 Site Geotechnical Engineer: Hillis Carnes Engineering Associates, Inc., Annapolis Junction, MD 20701

If any of the above responsibilities change it is the owner's responsibility to notify LSBC 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, 3rd Edition, 2004
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 oversite review engineer 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 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 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.

4: GEOTECHNICAL NOTES

4.01 Geotechnical site information provided by Hillis Carnes Engineering Associates, Inc.

4.02 All structural fill soils will have a minimum dry density of 105PCF 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. 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 site Geotechnical 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 registered professional site Geotechnical Engineer or their representative prior to pouring concrete. Footings may be lowered to achieve the minimum footing subgrade bearing capacity of 4,000 PSF. Undercut footing sub-grade as neccesary to achieve 4,000psf bearing capacity and fill with unreinforced concrete.

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 ...1 ½"
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 ... 1 ½"

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)

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 Engineer 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 professional Site Geotechnical Engineer 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 professional Site Geotechnical Engineer 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) should be notified immediately. The material, which the contractor believes to be a changed condition, should not be disturbed so that LSBC 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.

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 Site Geotechnical Engineer or their representative. The excavation for the footing wall foundations shall be observed and subgrade-bearing capacity certified by the Site Geotechnical Engineer upon completion of this task. At the direction of the Site Geotechnical Engineer or their representative, soft material will be removed to a depth directed by the Site Geotechnical Engineer 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 If a shape control technician is supplied by LSBC, no select granular backfill may be placed, without being observed by LSBC'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 Site Geotechnical Engineer 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. 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 Site Geotechnical Engineer. 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 Site Geotechnical Engineer.

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 Site Geotechnical Engineer 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. Field nuclear density test 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) 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, 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 review, Civil, Structural and Geotechnical Engineers must provide LSBC 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 These plans do not address environmental permitting requirements, which must be addressed and applied for with the state 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 and RA is responsible for that only. Acceptance of the plan drawings by our client & the owner means they agree to our scope and responsibilities.

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

13.01 Long Span Bridge & Culvert, LLC (LSBC) 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 3ga (.249" thick) steel.

13.02 LSBC 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 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.

13.04 LSBC will require the Site Contractor to unload the structure plates and base channel. LSBC 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

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC, &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT,
INC. 5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 8-27-09

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 9/29/09
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 8/21/09

REVISIONS

No.	DATE	BY	DESCRIPTION
1	07/27/09	AJH	DESIGN MODIFICATIONS BASED ON REVISED TOPO AND MDE PERMIT REVISIONS FROM FISHER, COLLINS & CARTER

DRAWN BY: CJH
DESIGN BY: CJH
CHECKED BY: WKR
DATE: 07/27/09
DO NOT SCALE THIS DRAWING. DIMENSIONS AND NOTES HAVE PRECEDENCE OVER DRAWING

CLIENT: LONG SPAN BRIDGE & CULVERT, LLC
OWNER: LAND DESIGN & DEVELOPMENT, INC.
JOB No: 1101-08-04

Ryan & Associates
A Division of WKR Consulting Inc.

Hagerstown, MD Office
1825 Howell Road, Suite 3
Hagerstown, MD 21740
301-671-3200 (ph)
301-360-9574 (fx)

Frederick, MD Office
2412 Wynfield Ct.
Frederick, MD 21702
301-360-9534 (ph)
301-360-9574 (fx)

PLATE ARCH CULVERT STRUCTURAL DESIGN SPECIFICATIONS
GTW's WAVERLY WOODS, SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOTS 1 & 2 ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120,221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT, HOWARD COUNTY, MD

ENGINEER SEAL

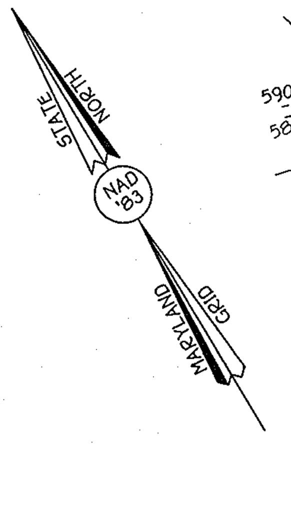
PROFESSIONAL CERTIFICATION

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.

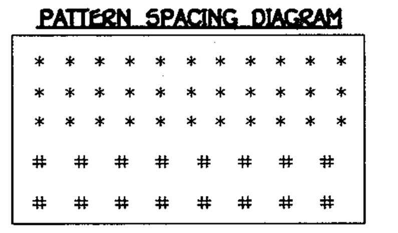
William K. Ryan, P.E.
License No: 21586
Expiration Date: 05/09/2011

SHEET
19 of 26

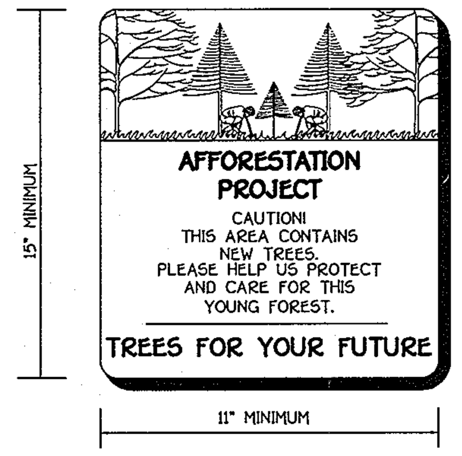
F-09-057



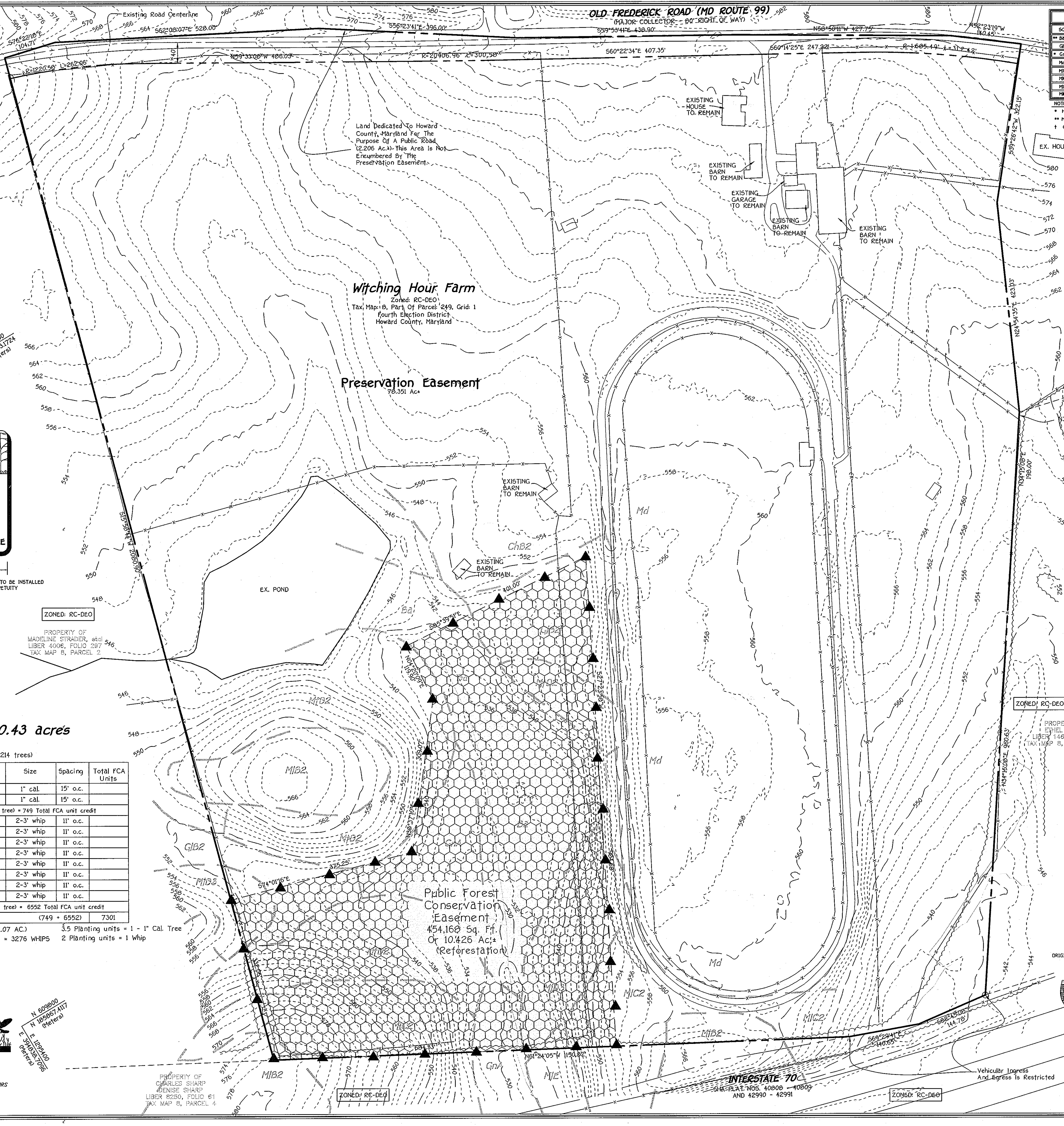
PATTERN SPACING DIAGRAM



* - whip w/shelter 11' on center spacing
\# - 1" caliper tree 15' on center spacing
Species shall be randomly interspersed, rows should be planting along contours



▲ - DENOTES PROPOSED AFFORESTATION PROJECT SIGN TO BE INSTALLED
- PROTECTIVE SIGNAGE SHALL BE IN PLACE FOR PERPETUITY



FCE Planting Area - 10.43 acres

Planting units required: 7301 (3651 whips)
Planting units provided: 7301 (3276 whips and 214 trees)

Qty	Species	Size	Spacing	Total FCA Units
107	Acer rubrum - Red maple	1" cal.	15' o.c.	
107	Quercus alba - White oak	1" cal.	15' o.c.	
214 Total 1" caliper trees (3.5 planting units per tree) = 749 Total FCA unit credit				
500	Acer rubrum - Red maple	2-3' whip	11' o.c.	
500	Cercis canadensis - Red bud	2-3' whip	11' o.c.	
450	Cornus florida - Flowering dogwood	2-3' whip	11' o.c.	
476	Liriodendron tulipifera - Tulip poplar	2-3' whip	11' o.c.	
375	Prunus serotina - Black cherry	2-3' whip	11' o.c.	
375	Robinia pseudo-acacia - Black locust	2-3' whip	11' o.c.	
300	Quercus alba - White oak	2-3' whip	11' o.c.	
300	Viburnum prunifolium - Blackhaw	2-3' whip	11' o.c.	
3276 Total whip plantings (2 planting units per tree) = 6552 Total FCA unit credit				
	Total Unit Credit		(749 + 6552)	7301

1" CAL. TREES = 200/ACRE (214 TREES/200 = 1.07 AC.)
WHIPS w/shelters = 350/ACRE = 350 x 9.36 AC. = 3276 WHIPS

3.5 Planting units = 1 - 1" Cal. Tree
2 Planting units = 1 Whip

MD DNR Qualified Professional
USACOE Wetland Delineator
Certification # WDCP93MD0610044B
[signature]
JOHN P. CANOLES

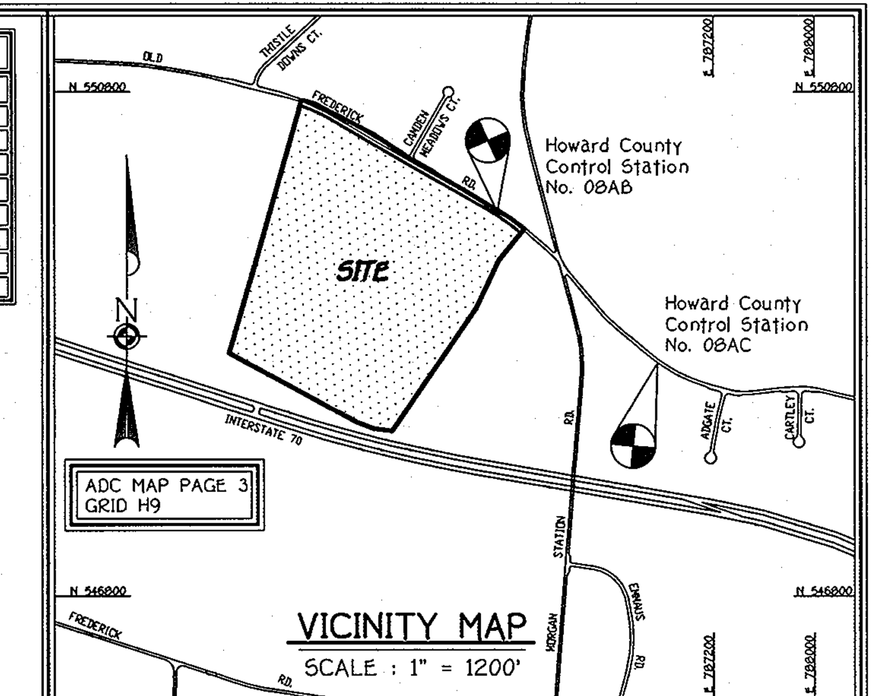
Eco-Science Professionals, Inc.
CONSULTING ECOLOGISTS

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

SOILS LEGEND

SOIL	NAME	CLASS
** Ba	Baile silt loam	D
GlB2	Glenelg loam, 3 to 8 percent slopes, moderately eroded	B
* GnA	Glenville silt loam, 0 to 3 percent slopes	C
Md	Made land	Md
MlB2	Manor loam, 3 to 8 percent slopes, moderately eroded	B
MlC2	Manor loam, 8 to 15 percent slopes, moderately eroded	B
MlD3	Manor loam, 15 to 25 percent slopes, severely eroded	B
MlE	Manor loam, 25 to 45 percent slopes	B

NOTES:
* Hydric soils and/or contains hydric inclusions
** May contain hydric inclusions
† Generally only within 100-year floodplain areas



VICINITY MAP
SCALE : 1" = 1200'

APPROVED: DEPARTMENT OF PUBLIC WORKS
N.A. MAILED FCP
CHIEF, BUREAU OF HIGHWAYS — DATE

APPROVED: DEPARTMENT OF PLANNING AND ZONING
[signature] 9/29/09
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE
[signature] 8/31/09
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE

PLANTING/SOIL SPECIFICATIONS

1. PLANTING OF NURSERY STOCK SHALL TAKE PLACE BETWEEN MARCH 15th. AND APRIL 30th. OR SEPTEMBER 15th. AND NOVEMBER 15th.
2. A TWELVE (12) INCH LAYER OF TOPSOIL SHALL BE SPREAD OVER ALL FORESTATION AREAS IMPACTED BY SITE GRADING TO ASSURE A SUITABLE PLANTING AREA. DISTURBED AREAS SHALL BE SEEDED AND STABILIZED AS PER GENERAL CONSTRUCTION PLAN FOR PROJECT. PLANTING AREAS NOT IMPACTED BY SITE GRADING SHALL HAVE NO ADDITIONAL TOPSOIL INSTALLED.
3. ALL BAREROOT PLANTING STOCK SHALL HAVE THEIR ROOT SYSTEMS DIPPED INTO AN ANTI-DESICCANT GEL PRIOR TO PLANTING.
4. PLANTS SHALL BE INSTALLED SO THAT THE TOP OF ROOT MASS IS LEVEL WITH THE TOP OF EXISTING GRADE. BACKFILL IN THE PLANTING PITS SHALL CONSIST OF 3 PARTS EXISTING SOIL TO 1 PART PINE FINES OR EQUIVALENT.
5. FERTILIZER SHALL CONSIST OF AGRIFORM 22-8-2, OR EQUIVALENT, APPLIED AS PER MANUFACTURER'S SPECIFICATIONS.
6. A TWO (2) INCH LAYER OF HARDWOOD MULCH SHALL BE PLACED OVER THE ROOT AREA OF ALL PLANTINGS.
7. PLANT MATERIAL SHALL BE TRANSPORTED TO THE SITE IN A TARPED OR COVERED TRUCK. PLANTS SHALL BE KEPT MOIST PRIOR TO PLANTING.
8. ALL NON-ORGANIC DEBRIS ASSICIATED WITH THE PLANTING OPERATION SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.

SEQUENCE OF CONSTRUCTION

1. SEDIMENT CONTROL AND TREE PROTECTION DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH GENERAL CONSTRUCTION PLAN FOR SITE. SITE SHALL BE GRADED IN ACCORDANCE WITH GENERAL CONSTRUCTION PLANS.
2. PROPOSED FORESTATION AREAS IMPACTED BY SITE GRADING SHALL BE TOPSOILED AND STABILIZED AS PER NOTE NO. 2 OF PLANTING/SOIL SPECIFICATIONS FOR PROJECT.
3. PLANTS SHALL BE INSTALLED AS PER PLANT SCHEDULE AND THE PLANTING/SOIL SPECIFICATIONS FOR THE PROJECT.
4. UPON COMPLETION OF THE PLANTING, SIGNAGE SHALL BE INSTALLED AS PER THE FOREST PROTECTION DEVICES SHOWN ON THE FOREST CONSERVATION PLAN.
5. PLANTINGS SHALL BE MAINTAINED AND GUARANTEED IN ACCORDANCE WITH THE MAINTENANCE AND GUARANTEE REQUIREMENTS FOR PROJECT.

MAINTENANCE OF PLANTINGS

1. MAINTENANCE OF PLANTINGS SHALL LAST FOR A PERIOD OF 26 MONTHS.
2. ALL PLANT MATERIAL SHALL BE WATERED TWICE A MONTH DURING THE 1st. GROWING SEASON. WATERING MAY BE MORE OR LESS FREQUENT DEPENDING IN WEATHER CONDITIONS. DURING 2nd. GROWING SEASON, ONCE A MONTH DURING MAY-SEPTEMBER, IF NEEDED.
3. INVASIVE EXOTICS AND NOXIOUS WEEDS WILL BE REMOVED FROM FORESTATION AREAS. OLD FIELD SUCCESSIONAL SPECIES WILL BE RETAINED.
4. PLANTS WILL BE EXAMINED A MINIMUM TWO TIMES DURING THE GROWING SEASON FOR SERIOUS PLANT PESTS AND DISEASES. SERIOUS PROBLEMS WILL BE TREATED WITH THE APPROPRIATE AGENT.
5. DEAD BRANCHES WILL BE PRUNED FROM PLANTINGS.

GUARANTEE REQUIREMENTS

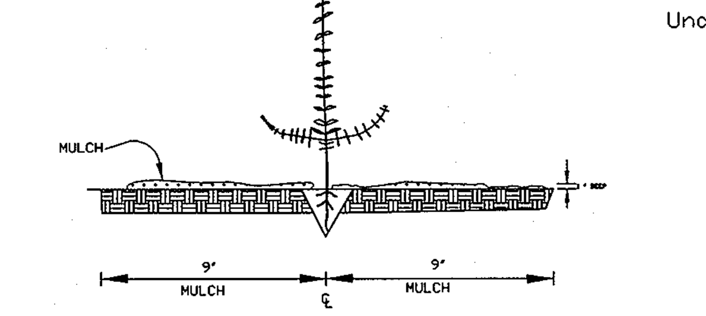
1. A 75 PERCENT SURVIVAL RATE OF FORESTATION PLANTINGS WILL BE REQUIRED AT THE END OF THE 24 MONTH MAINTENANCE PERIOD. ALL PLANT MATERIAL BELOW THE 75 PERCENT THRESHOLD WILL BE REPLACED AT THE BEGINNING OF THE NEXT GROWING SEASON.

SURETY FOR FORESTATION

1. THE DEVELOPER SHALL POST A SURETY (BOND, LETTER OF CREDIT) TO ENSURE THAT REFORESTATION PLANTINGS ARE COMPLETED. UPON ACCEPTANCE OF THE PLANTINGS BY THE COUNTY, THE BOND SHALL BE RELEASED.
2. SURETY FOR OFF-SITE REFORESTATION (10.43 AC. x 43,560/AC X 0.50/Sq.Ft. = $227,165.00) SHALL BE POSTED WITH THE DEVELOPER'S AGREEMENT ASSOCIATED WITH G.T.W. WEST PROPERTY RECORDED PLAT (F-09-57).

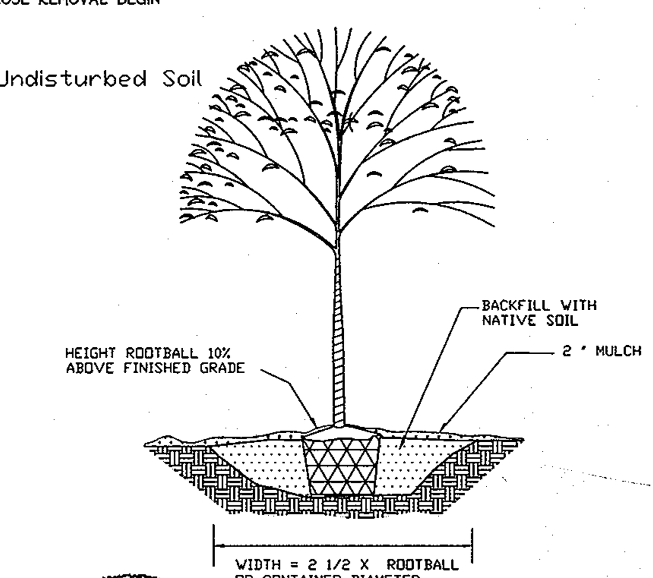
MULTIFLORA ROSE CONTROL NOTE:

PRIOR TO PLANTING ALL MULTIFLORA ROSE WITHIN PLANTING AREAS 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 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.

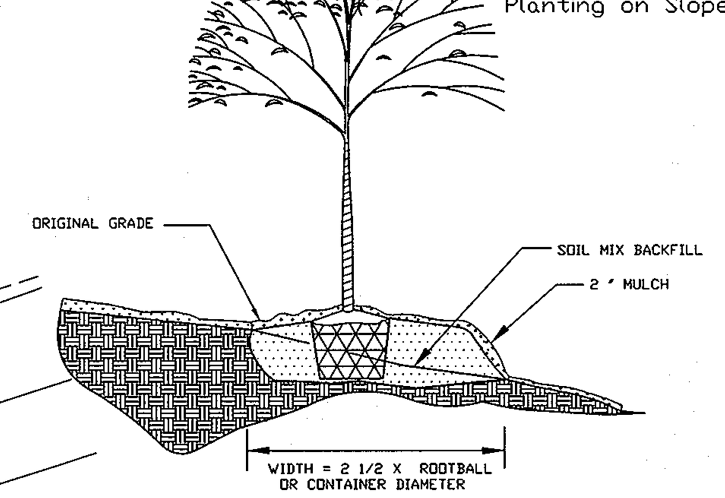


Seeding and Whip Planting Specification

Undisturbed Soil



Planting on Slope



[signature] 8-28-09
ALDO M. VITI, P.E. — DATE
"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. 20748, Expiration Date 2-22-11."

OWNER
WITCHING HOUR FARM, LLC
15475 OLD FREDERICK ROAD
WOODBINE MD, 21797-8745
(301) 854-6895

OFF-SITE FOREST CONSERVATION PLAN
GTW'S WAVERLY WOODS
SECTION 14
BULK PARCELS 'A' & 'B' AND OPEN SPACE LOT 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: MAY 18, 2009
SHEET 20 OF 26

F-09-057

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 20 OFFSITE FOREST PLANS.dwg, 8/28/2009 8:18:35 AM, jamesl, 1:100

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 9-25-09

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 9/29/09

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 8/31/09

Master Overall Forest Conservation - GTW's Waverly Woods

SECTION/AREA DESIGNATION LEGEND	HOWARD COUNTY DPZ FILE No.	FOREST RECORDING REFERENCE	AREA OF FOREST RETENTION REQUIRED	AREA OF CREDITED FOREST RETENTION PROVIDED	AREA OF FOREST PLANTING REQUIRED	AREA OF CREDITED PLANTING PROVIDED	AREA OF SURPLUS FOREST RETENTION	AREA OF SURPLUS FOREST PLANTING
SECTION 4/AREA 1 SECTION 4/AREA 2	F-95-173 F-95-174	PLAT No. 12249 PLAT No. 12250	4.09 AC.±	O.S. LOT 19 = 3.10 AC.± O.S. LOT 10 = 0.98 AC.± OFF-SITE = 0.18 AC.± TOTAL = 4.26 AC.±	8.11 AC.±	WEST FRIENDSHIP ESTATES PRES. PARCEL 'B' TOTAL = 8.13 AC.±	+0.17 AC.±	+0.02 AC.±
SECTION 5	F-96-179	PLAT No. 12717 PLAT No. 12718	2.58 AC.±	O.S. LOT 55 = 1.97 AC.± O.S. LOT 6 = 0.62 AC.± TOTAL = 2.59 AC.±	2.55 AC.±	O.S. LOT 55 = 1.77 AC.± O.S. LOT 6 = 0.78 AC.± TOTAL = 2.55 AC.±	+0.01 AC.±	+0.00 AC.±
SECTION 6	F-98-88 F-98-88 F-98-88 F-98-88 F-98-88 F-98-88 F-98-88 F-98-88 F-98-88 F-98-88	PLAT No. 13513 PLAT No. 13514 PLAT No. 13515 PLAT No. 13516 PLAT No. 13516 PLAT F-98-88-J-2 (Part No. 1) PLAT F-98-88-J-2 (Part No. 2) PLAT F-98-88-J-2 (Part No. 3) PLAT F-98-88-J-2 (Part No. 4) PLAT F-98-88-J-1 (Part No. 1) PLAT F-98-88-J-1 (Part No. 2)	2.01 AC.±	0.42 AC.± 1.83 AC.± 0.00 AC. 0.00 AC. 0.34 AC.± 0.00 AC. 0.00 AC. 0.00 AC. 0.00 AC. TOTAL = 2.59 AC.±	4.77 AC.±	0.00 AC.± 0.00 AC.± 0.26 AC.± 0.02 AC.± 0.67 AC.± 0.28 AC.± 0.81 AC.± 0.62 AC.± 1.46 AC.± 0.27 AC.± (O.S. LOT 19, 54, A1) 0.84 AC.± (O.S. LOT 19, 54, A1) TOTAL = 5.23 AC.±	+0.58 AC.±	+0.46 AC.±
SECTION 7	F-97-180 F-00-133	PLAT No. 13439 & 13440 PLAT No. 14271	13.14 AC.	O.S. LOT 1 & PARCEL B = 7.019 Ac O. S. LOT 1 = 8.944 Ac	0.00 AC.	0.00 AC.±	2.823 AC.	0.00 AC.±
SECTION 10	F-00-06 F-00-06	PLAT No. 14140 PLAT No. 14119	0.00 AC.	0.00 AC. 0.00 AC. TOTAL = 0.00 AC.	0.62 AC.	O.S. LOT 34 = 0.71 AC.± O.S. LOT 34 (SECT. 6) = 0.84 AC.± TOTAL = 1.55 AC.±	+0.00 AC.	+0.93 AC±
SECTION 11, AREA 1	F-01-91	PLAT No. 15022	1.30 AC.	WEST SIDE MARRIOTTSVILLE ROAD 1.30 AC. (SEE SHEET 10 OF 11 ROAD PLANS)	0.00 AC.	0.00 AC.	+0.00 AC.	0.00 AC.
SECTION 11, AREA 2	F-01-148	PLAT No. 15199	0.18 AC.	0.18 AC	0.00 AC.	0.00 AC.	+0.00 AC.	+0.00 AC.
SECTION 11, AREA 3	F-01-147	PLAT No. 15228 PLAT No. 15223	1.13 AC.	WEST SIDE MARRIOTTSVILLE ROAD 0.72 AC. (SEE ROAD SHEET 8) O.S. LOT 11 = 0.41 Ac. TOTAL = 1.13 Ac.	0.00 AC.	0.00 AC.	+0.00 AC.	+0.00 AC.
SECTION 11, AREA 4	F-01-93	PLAT No. 15069 PLAT No. 15060 THRU 15063	14.59 AC.	WEST SIDE MARRIOTTSVILLE ROAD 10.52 AC. (SEE ROAD SHEET 12) O.S. LOT 22 = 74, 75= 4.07 Ac TOTAL = 14.59 Ac	0.00 AC.	0.00 AC.	+0.00 AC.	+0.00 AC.
SECTION 12	F-01-31 F-01-31 F-01-31	PLAT No. 14792 PLAT No. 14790 PLAT No. 14791	0.00 AC.	0.00 AC. TOTAL = 0.00 AC.	1.86 AC.	O.S. LOT 8 = 0.40 AC.± O.S. LOT 48 = 0.31 AC.± O.S. LOT 97 = 0.26 AC.± TOTAL = 0.97 AC.±	+0.00 AC.	(-)0.89 AC.
SECTION 13	F-04-58 F-04-58	PLAT NO. 16941-16952 PLAT NO. 16963	23.99 AC. 0.00 AC.	23.99 AC.± 0.00 AC	30.90 AC. 0.00 AC.	O.S. LOT 3 = 4.13 AC± HOWARD HUNT PROPERTIES 41.00 AC± TOTAL = 45.13 AC±	+0.00 AC.	+14.23 AC.
AMENDED PLATS SECTION 4, AREA 1; SECTION 5; SECTION 7; SECTION 11, AREA 2; AND SECTION 11, AREA 3	F-04-105	PLAT NO. 17248-17264	0.00 AC.	11.283 AC.±	0.00 AC.	7.766 Ac.	11.283 AC.	7.766 Ac.
GAITHER HUNT SECTION 1 AREA 1 NON-BUILDABLE PRESERVATION PARCEL 'B'	F-05-100	PLAT NO. 17243-17247	0.00 AC.	0.00 AC.±	0.00 AC.	6.14 Ac.	0.00 AC.	6.14 Ac.
AMENDED PLATS GTW'S WAVERLY WOODS SECTION 13, OPEN SPACE LOT 5	F-06-175	PLAT NO. 18625-18627	0.00 AC.	0.36 AC.±	0.00 AC.	0.00 Ac.	0.36 AC.	0.00 Ac.
AMENDED PLATS HOWARD COUNTY CONSERVANCY, INC.	F-07-33	PLAT NO. 18611-18613	0.00 AC.	0.00 AC.±	0.00 AC.	16.22 Ac.	0.00 AC.	16.22 Ac.
AMENDED PLAT GTW'S WAVERLY WOODS SECTION 13, OPEN SPACE LOTS 2 AND 7	F-08-	PLAT NO.	0.00 AC.	0.00 AC.± (SEE NOTE 2)	0.00 AC.	0.00 AC.± (SEE NOTE 2)	0.00 AC.	0.00 Ac.
REVISION PLAT OPEN SPACE LOT 19 SECTION 4, AREA 1	F-08-202	PLAT NO.	0.00 AC.	0.00 AC.± (SEE NOTE 1)	0.00 AC.	0.00 AC.± (SEE NOTE 1)	0.00 AC.	0.00 Ac.
PROPERTY OF GTW JOINT VENTURE	F-08-159	PLAT NO.	0.00 AC.	0.00 AC.± (SEE NOTE 3)	0.00 AC.	0.00 AC.± (SEE NOTE 3)	0.00 AC.	0.00 Ac.
SECTION 14	F-09-057	PLAT NO.	17.46 AC.±	FCE NOS. 1 THRU 7 = 19.08 AC. ABANDONED FCE AREA = 1.62 AC.	15.11 AC.±	FCE NOS. 1 THRU 7 = 4.68 AC. OFF-SITE WITCHING HOUR FARM PROPERTY= 10.43 AC.	0.00 AC.	0.00 Ac.
TOTALS			80.47 AC.±	95.70 AC.±	63.92 AC.±	108.80 AC.	15.23 AC.±	44.88 AC.

Residential And Golf Use
FOREST CONSERVATION WORKSHEET
VERSION 1.0

BASIC SITE DATA:

GROSS SITE AREA	497.2
AREA WITHIN 100 YEAR FLOODPLAIN	10.0
AREA TWITHIN AGRICULTURAL USE OR PRESERVATION PARCEL	-----
AREA WITHIN OVERHEAD TRANSMISSION LINES	-----
NET TRACT AREA (NTA)	487.2

LAND USE CATEGORY: Residential And Golf Use

INFORMATION FOR CALCULATIONS:

NET TRACT AREA (NTA)		487.2
FOREST CONSERVATION THRESHOLD	20% X NTA	97.4
AFFORESTATION THRESHOLD	15% X NTA	73.1

EXISTING FOREST COVER:

EXISTING FOREST ON NTA	193.6
EXISTING FOREST ABOVE CONSERVATION THRESHOLD	96.2
BREAK EVEN POINT: (IF APPLICABLE) (96.2 x 0.2) + 97.4	115.6
FOREST TO BE CLEARED	135.3
FOREST TO BE RETAINED	58.3

REFORESTATION CALCULATIONS

CLEARING ABOVE THRESHOLD

CLEARED ABOVE THRESHOLD — X1/4: — ACRES

FOREST RETAINED ABOVE THRESHOLD: — ACREA

REFORESTATION REQUIRED (a-b)

CLEARING BELOW THRESHOLD

a. FOREST CLEARED ABOVE THRESHOLD - 96.2 x 1/4: 24.1 ACRES
b. FOREST CLEARED BELOW THRESHOLD - 39.1 x 2: 78.2 ACRES

REFORESTATION REQUIRED (a-b) 102.3

Commercial And Golf Use
FOREST CONSERVATION WORKSHEET
VERSION 1.0

BASIC SITE DATA:

GROSS SITE AREA	208.2
AREA WITHIN 100 YEAR FLOODPLAIN	37.9
AREA TWITHIN AGRICULTURAL USE OR PRESERVATION PARCEL	-----
AREA WITHIN OVERHEAD TRANSMISSION LINES	-----
NET TRACT AREA (NTA)	170.3

LAND USE CATEGORY: Commercial And Golf Use

INFORMATION FOR CALCULATIONS:

NET TRACT AREA (NTA)		170.3
FOREST CONSERVATION THRESHOLD	15% X NTA	25.5
AFFORESTATION THRESHOLD	15% X NTA	25.5

EXISTING FOREST COVER:

EXISTING FOREST ON NTA	110.9
EXISTING FOREST ABOVE CONSERVATION THRESHOLD	85.4
BREAK EVEN POINT: (IF APPLICABLE) (85.4 X 0.2) + 25.5	42.6
FOREST TO BE CLEARED	73.5
FOREST TO BE RETAINED	37.4

REFORESTATION CALCULATIONS

CLEARING ABOVE THRESHOLD

CLEARED ABOVE THRESHOLD 73.5 X1/4: 18.4 ACRES

FOREST RETAINED ABOVE THRESHOLD: 11.9 ACREA

REFORESTATION REQUIRED (a-b) 6.5

CLEARING BELOW THRESHOLD

a. FOREST CLEARED ABOVE THRESHOLD
b. FOREST CLEARED BELOW THRESHOLD

REFORESTATION REQUIRED (a-b)

NOTE NO. 1: THIS REVISION PLAT DOES NOT CREATE ANY NEW FOREST CONSERVATION EASEMENT.

The Purpose Of This Plat Is To Identify 'Part One' 0.268 Acres And 'Part Two', 0.837 Acres To Establish New Forest Conservation Easements Within Open Space Lot 19, GTW's Waverly Woods, Section 4, Area 1 - Plat No. 12246 Thru 12251, As Shown On Final Road Plans, GTW'S Waverly Woods, Section 6 (F-98-88) To Be Associated With A New Forest Conservation Developer's Agreement As A Replacement For The Abandonment Of 1.105 Acres Of FCE Reforestation As Shown On F-98-088, Plat No. 13512 Thru 13517.

NOTE NO. 2: THIS REVISION PLAT DOES NOT CREATE ANY NEW FOREST CONSERVATION EASEMENT.

The Purpose Of This Plat Is To Abandon 0.125 Acres Forest Retention In Existing Forest Conservation Easement No. 9A And To Abandon 0.464 Acres Forest Retention In Existing Forest Conservation Easement No. 11 On GTW'S Waverly Woods, Section 13 Plat Nos. 16950 And 16952. The Total 0.59 Acres Forest Retention Is Relocated On GTW'S Waverly Woods Section 14 (F-07-159).

NOTE NO. 3: THIS REVISION PLAT DOES NOT CREATE ANY NEW FOREST CONSERVATION EASEMENT.

The Purpose Of This Plat Is To:

(1) Create Forest Conservation Easement, Part One, Containing 0.28 Acres Reforestation Approved As Area 'G' Under GTW's Waverly Woods, Section 6, F-98-88 Road Plans,
(2) Create Forest Conservation Easement, Part Two, Containing 0.61 Acres Reforestation Approved As Area 'E' Under GTW's Waverly Woods, Section 6, F-98-88 Road Plans,
(3) Create Forest Conservation Easement, Part Three, Containing 0.58 Acres Reforestation Approved As Area 'D' Under GTW's Waverly Woods, Section 6, F-98-88 Road Plans,
(4) Create Forest Conservation Easement, Part Four, Containing 2.93 Acres Forest Retention To Replace Forest Conservation Easement, Area 'G' Forest Planting Containing 1.46 Acres For GTW's Waverly Woods, Section 6, F-98-88,
(5) Create Forest Conservation Easement, Part Five, Containing 1.18 Acres Forest Retention To Replace 0.59 Acres Forest Planting Removed From GTW's Waverly Woods, Section 13, Plat Nos. 17217 Thru 17223, And
(6) Create Three (3) Public Drainage And Utility Easements For Marriottsville Road Mitigation Plan, F-07-032.

STATE OF MARYLAND — JOHN P. CANOLES — 9-2-09

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

Eco-Science Professionals, Inc.
CONSULTING ECOLOGISTS

MD DNR Qualified Professional
USACOE Wetland Delineator
Certification # WDCP93MD0610044B
JOHN P. CANOLES

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC. &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT,
INC. 5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

MASTER OVERALL FOREST CONSERVATION CHART

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND
OPEN SPACE LOT 1 & 2
(A SUBDIVISION OF THE PROPERTY OF WAVERLY WOODS DEVELOPMENT CORPORATION, LIBER 4879, FOLIO 307)
ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 21 OF 26

F-09-057

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 21-22 FCE CHART STRIPING PLAN.dwg, 9/21/2009 2:28:12 PM, jamsd,

NOTES:

1. ALL LANE DESIGNATION TO BE THERMOPLASTIC LINE STRIPING.
2. ALL PAVEMENT MARKINGS SHALL BE 5" WIDE UNLESS NOTED OTHERWISE.
3. ANY RELOCATED SIGNS ARE TO BE INSTALLED ON NEW 2" GALVANIZED STEEL, PERFORATED, SQUARE TUBE POSTS (14 GAUGE) INSERTED INTO A 2-1/2" GALVANIZED STEEL, PERFORATED, SQUARE TUBE SLEEVES (12 GAUGE) 3' LONG WITH A GALVANIZED STEEL CAP ON THE TOP OF POST.

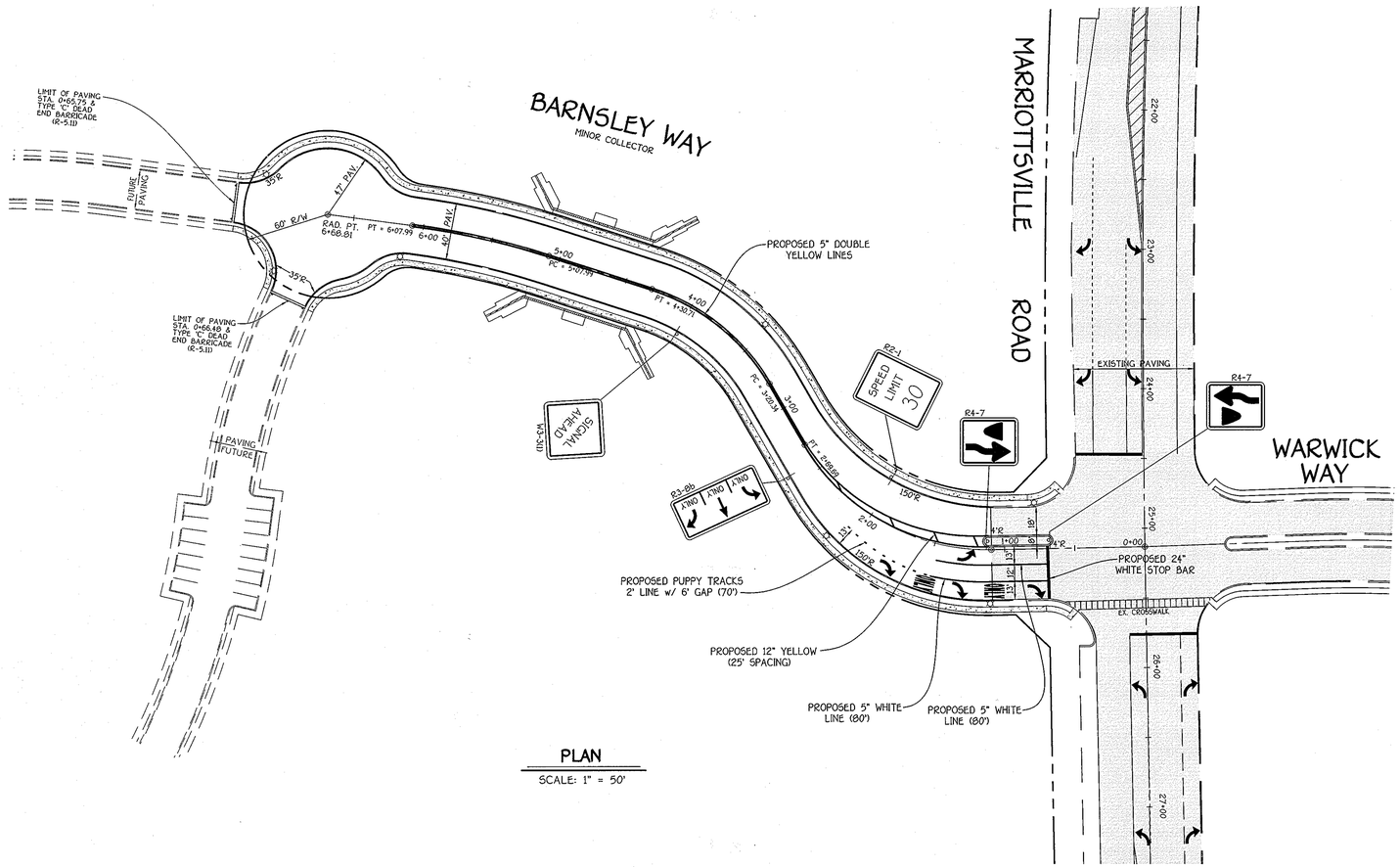
APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 8-27-09

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 9/29/09

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 8/31/09



PLAN

SCALE: 1" = 50'

NOTE: CONTRACTOR SHALL CONTACT PARRIS ZIRKENBACH AT (410) 313-2430 HOWARD COUNTY TRAFFIC PRIOR TO STARTING ANY PAVEMENT MARKINGS.

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

STATE OF MARYLAND — ROBERT MICHAEL FISHER — No. 21676 — REGISTERED PROFESSIONAL ENGINEER

7-27-09

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC. &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT,
INC. 5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

BARNSLEY WAY - STRIPING PLAN

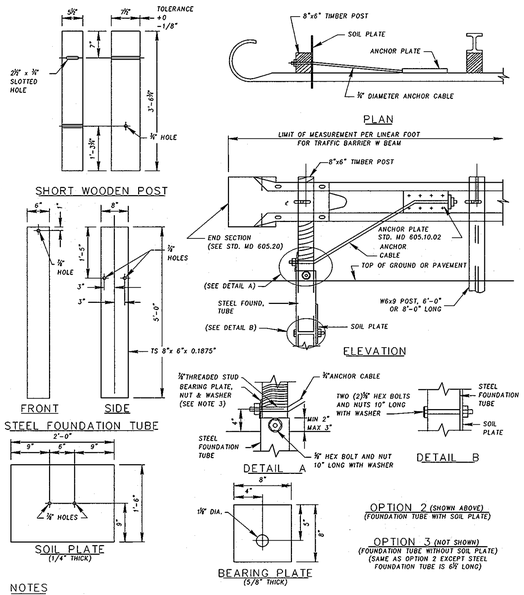
GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND
OPEN SPACE LOT 1 & 2

(A SUBDIVISION OF THE PROPERTY OF WAVERLY WOODS DEVELOPMENT CORPORATION, LIBER 4979, FOLIO 307)
ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 22 OF 26

F-09-057

K:\SDSPROJ\10779 BARNSLEY WAY\dwg\FINALS\10779 SHEET 21-22 PCE CHART STRIPING PLAN.dwg, 7/29/2009 10:23:26 AM, jamesl, 1:1

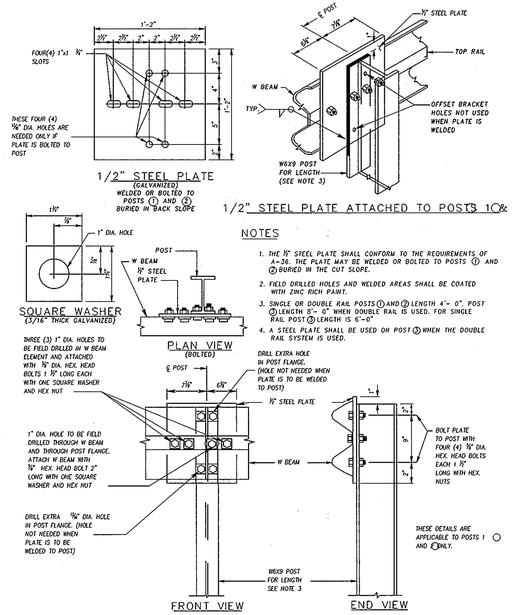


NOTES

1. NOTES ON STD. MD 605.10 APPLY TO OPTION 2 & 3.
2. IF THE FOUNDATION TUBE AND SOIL PLATE (OPTION 2) ARE DRIVEN INTO THE SOIL, PROPER CARE SHOULD BE TAKEN TO ENSURE THAT THE SOIL PLATE FASTENERS ARE NOT BROKEN DURING THE DRIVING PROCESS.
3. SECURE BEARING PLATE WITH 16 PENNY GALVANIZED NAIL TO PREVENT ROTATION OF PLATE.
4. SAME AS MD 605.01 NOTE 6

TYPE K TRAFFIC BARRIER END TREATMENT OPTION 2 & 3 ANCHORAGE

STANDARD NO. MD 605.10-01



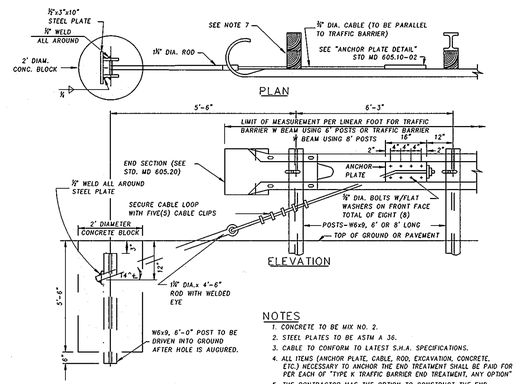
1/2" STEEL PLATE BOLTED TO POSTS 1 & 2

NOTES

1. THE 1/2" STEEL PLATE SHALL CONFORM TO THE REQUIREMENTS OF A-36. THE PLATE MAY BE WELDED OR BOLTED TO POSTS 1 AND 2 BURIED IN THE CUT SLOPE.
2. FIELD DRILLED HOLES AND WELDED AREAS SHALL BE COATED WITH ZINC RICH PAINT.
3. SINGLE OR DOUBLE RAIL POSTS 1 AND 2 LENGTH 4'- 6". POST 2 LENGTH 5'- 0" WHEN DOUBLE RAIL IS USED. FOR SINGLE RAIL POST 1 LENGTH IS 6'-0"
4. A STEEL PLATE SHALL BE USED ON POST 3 WHEN THE DOUBLE RAIL SYSTEM IS USED.

TRAFFIC BARRIER W BEAM WITH TYPE A END ANCHORAGE (OPTION 1)

STANDARD NO. MD 605.01-02



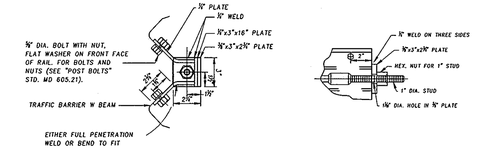
OPTION 1 - ANCHORAGE (OFFSET CONCRETE BLOCK)

NOTES

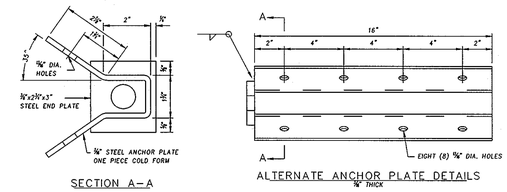
1. CONCRETE TO BE MIX NO. 2.
2. STEEL PLATES TO BE ASTM A 36.
3. CABLE TO CONFORM TO LATEST S.H.A. SPECIFICATIONS.
4. ALL ITEMS (ANCHOR PLATE, CABLE, ROD, EXCAVATION, CONCRETE, ETC.) NECESSARY TO ANCHOR THE END TREATMENT SHALL BE PAID FOR PER EACH OF "TYPE K TRAFFIC BARRIER END TREATMENT, ANY OPTION"
5. THE CONTRACTOR HAS THE OPTION TO CONSTRUCT THE END TREATMENT USING EITHER ONE OF THE THREE OPTIONS.
   OPTION 1 - OFFSET CONCRETE BLOCK;
   OPTION 2 - FOUNDATION TUBE WITH SOIL PLATE; (SEE STD. MD 605.10-01).
   OPTION 3 - FOUNDATION TUBE WITHOUT SOIL PLATE (SEE STD. MD 605.10-01).
6. TYPE K TRAFFIC BARRIER END TREATMENT NOT TO BE USED WHERE THERE IS OPPOSING TRAFFIC WITHIN 30 FT. OF THE END TREATMENT.
7. FOR ALTERNATIVE OFFSET BLOCKS SEE STD MD 605.21 NOTE 5.

TYPE K TRAFFIC BARRIER END TREATMENT OPTION 1 ANCHORAGE

STANDARD NO. MD 605.10



ANCHOR PLATE DETAILS



NOTE

1. FOR MOUNTING DETAILS SEE STD. MD 605.10.

END PLATE 3/4" THICK

TYPE K TRAFFIC BARRIER END TREATMENT ANCHORAGE DETAILS

STANDARD NO. MD 605.10-02

Approved: Department Of Public Works
Chief Bureau Of Highways — Date 8-27-09

Approved: Department Of Planning And Zoning
Chief, Division Of Land Development — Date 9/29/09
Chief, Development Engineering Division — Date 8/31/09

FISHER, COLLINS & CARTER, INC.
CIVIL ENGINEERING CONSULTANTS & LAND SURVEYORS
CENTENNIAL SQUARE OFFICE PARK - 10272 BALTIMORE NATIONAL PIKE
ELLICOTT CITY, MARYLAND 21042
(410) 461 - 2855

OWNERS

WAVERLY WOODS DEVELOPMENT CORPORATION,
HOLE IN THE DOUGHNUT, LLC, &
GTW JOINT VENTURE
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
C/O LAND DESIGN AND DEVELOPMENT, INC.
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

STATE OF MARYLAND — ALDO M. [illegible] — No. 21627 — REGISTERED PROFESSIONAL ENGINEER

7-29-09
DATE

"Professional Engineer's Certification: I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

GUARDRAIL DETAILS

GTW'S WAVERLY WOODS

SECTION 14
BULK PARCELS 'A' & 'B' AND
OPEN SPACE LOTS 1 & 2

ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 23 OF 26

F-09-057

K:\SDSI\PROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 23 GUARDRAIL DETAILS.dwg, 7/29/2009 10:29:45 AM, jjames,
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SOIL BORING PROFILES

HILLIS - CARNES ENGINEERING ASSOCIATES, INC. — RECORD OF SOIL EXPLORATION

Boring No. B-1 (Project Name: Waverly Woods West Crossing; Location: Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 0" Foreman L. Smith
Surf. Elev. 460.66 Ft. Hammer Drop 30 in. Rock Core Diameter ___ Inspector ___
Date Started 11/23/07 Pipe Size 2 in. Boring Method HSA Date Completed 11/23/07

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, soft to medium stiff, micaceous sandy SILT (ML)	Topsoil-6"	6"	1-2-2	4
	No groundwater encountered while drilling.	18"	3-4-5	9
		17"	4-5-5	10
Brown, moist, medium dense, SAND and GRAVEL (GP-SP)		10"	12-9-7	16
Brown, moist, soft, micaceous sandy SILT (ML)		18"	2-2-3-3	5
Bottom of Boring at 12.0'				

SAMPLER TYPE: DRIVEN SPLIT SPOON UNLESS OTHERWISE; PT - PRESSED SHELBY TUBE; CA - CONTINUOUS FLIGHT AUGER; RC - ROCK CORE
SAMPLE CONDITIONS: D - DISINTEGRATED; I - INTACT; U - UNDISTURBED; L - LOST
GROUND WATER / CAVE IN DEPTH: AT COMPLETION Dry ft. 5.0 ft.; AFTER 24 HRS. Dry ft. 4.5 ft.; AFTER ___ HRS. ___ ft. ___ ft.
BORING METHOD: HSA - HOLLOW STEM AUGERS; CFA - CONTINUOUS FLIGHT AUGERS; DC - DRIVING CASING; MD - MUD DRILLING
STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1" WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS.

Boring No. B-2 (Waverly Woods West Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6" Foreman L. Smith
Surf. Elev. 461.80 Ft. Hammer Drop 30 in. Pipe Size 2 in. Boring Method HSA
Date Started 11/23/07 Date Completed 11/23/07

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, very loose to medium dense, micaceous silty SAND, trace rock fragments (SM)	Topsoil-6"	10"	1-2-3	5
	No groundwater encountered while drilling.	18"	2-3-3	6
		12"	4-4-8	12
		9"	3-2-2	4
		18"	1-2-2-3	4
Bottom of Boring at 12.0'				

Ground water / Cave in depth: At completion Dry ft. 5.0 ft.; After 24 hrs. Dry ft. 5.5 ft.

Boring No. B-3 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 453.80 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, gray, moist to wet, very loose to very dense, silty sand, trace to no clay, roots, mica, and rock fragments.(SM)	Topsoil 3"	4.0"	5-10-8	18
		10"	5-5-4	9
		12"	4-5-6	11
		10"	3-3-2	5
		12.0"	3-2-2	4
Bottom of boring at 12.0'. Auger Refusal		0.0"	51/0	100+

Ground water / Cave in depth: At completion 5.5' ft. 8.2' ft.

Boring No. B-4 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 454.18 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist to wet, loose to very dense, silty sand, trace mica, trace to no roots and rock fragments.(SM)	Topsoil 4"	13"	2-4-6	10
		8.0"	6-4-4	8
	Groundwater encountered at 10.0' while drilling.	16"	12-15-14	29
		18"	3-6-11	17
		18"	11-14-17	31
		18"	8-15-35	50
Bottom of boring at 20.5'.		0.0"	51/5	100+

Ground water / Cave in depth: At completion 5.3' ft. 5.5' ft.

Boring No. B-5 (Waverly Woods West Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6" Foreman L. Smith
Surf. Elev. 460.88 Ft. Hammer Drop 30 in. Pipe Size 2 in. Boring Method HSA
Date Started 11/24/07 Date Completed 11/24/07

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown to light brown, moist, soft to medium stiff, micaceous sandy SILT (ML)	Topsoil-6"	18"	2-3-2	5
	No groundwater encountered while drilling.	13"	1-3-4	7
Brown, moist, loose to medium dense, micaceous silty SAND, trace rock fragments (SM)		18"	10-8-5	13
		12"	3-3-3	6
Light brown, moist, soft, micaceous sandy SILT (ML)		18"	2-2-3-4	5
Bottom of Boring at 12.0'				

Ground water / Cave in depth: At completion Dry ft. 6.0 ft.; After 24 hrs. Dry ft. 6.0 ft.

Boring No. B-1 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 455.32 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, loose, silty sand, trace organics.(SM)	Topsoil 4"	8.0"	1-2-4	6
		2.0"	5-3-3	6
Brown, moist, medium stiff silt, trace sand and clay (ML)	Groundwater encountered at 7.5' while drilling.	16"	2-5-5	10
Brown, orange, moist to wet, loose to medium dense, silty sand.(SM)		8.0"	17-17-9	26
		17"	4-4-6	10
		13"	10-12-14	26
		15"	7-5-7	12
Bottom of boring at 21.5'.				

Ground water / Cave in depth: At completion 7.0' ft. 11.0' ft.

Boring No. B-2 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 453.99 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, loose, silty sand.(SM)	Topsoil 4"	12"	1-3-6	9
		18"	3-4-4	8
Brown, gray, moist, stiff, clayey silt, trace sand and mica. (ML)	Groundwater encountered at 7.5' while drilling.	18"	7-7-5	12
Brown, orange, moist to wet, loose to dense, silty sand and gravel. (GM-SM)		3.0"	7-5-3	8
			5-10-10	20
		15"	20-18-17	35
		18"	20-19-20	39
Bottom of boring at 21.5'.				

Ground water / Cave in depth: At completion 5.5' ft. 8.5' ft.

Boring No. B-3 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 453.80 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, gray, moist to wet, very loose to very dense, silty sand, trace to no clay, roots, mica, and rock fragments.(SM)	Topsoil 3"	4.0"	5-10-8	18
		10"	5-5-4	9
		12"	4-5-6	11
		10"	3-3-2	5
		12.0"	3-2-2	4
Bottom of boring at 12.0'. Auger Refusal		0.0"	51/0	100+

Ground water / Cave in depth: At completion 5.5' ft. 8.2' ft.

Boring No. B-4 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 454.18 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist to wet, loose to very dense, silty sand, trace mica, trace to no roots and rock fragments.(SM)	Topsoil 4"	13"	2-4-6	10
		8.0"	6-4-4	8
	Groundwater encountered at 10.0' while drilling.	16"	12-15-14	29
		18"	3-6-11	17
		18"	11-14-17	31
		18"	8-15-35	50
Bottom of boring at 20.5'.		0.0"	51/5	100+

Ground water / Cave in depth: At completion 5.3' ft. 5.5' ft.

Boring No. B-5 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 452.25 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, loose, silty sand, trace roots, clay and mica.(SM)	Topsoil 4"	18"	1-2-2	4
Brown, gray, moist, medium dense, clayey sand, trace roots and gravel.(SC)	Groundwater encountered at 7.0' while drilling.	5.0"	2-10-12	22
Brown, damp, medium dense, sand and gravel.		3.0"	14-15-8	23
Brown, moist to wet, dense, to very dense, silty sand. (SM)		18"	9-17-28	45
		18"	16-37-36	73
		18"	32-37-29	66
Bottom of boring at 20.5'.		6.0"	51/6	100+

Ground water / Cave in depth: At completion 3.0' ft. 13.0' ft.

Boring No. B-6 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 452.33 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist to wet, very loose to very dense, silty sand, trace mica, trace to no clay and roots.(SM)	Topsoil 3"	6.0"	1-2-1	3
		17"	7-17-14	31
	Groundwater encountered at 4.0' while drilling.	14"	2-3-3	6
		6.0"	2-51/6	100+
Bottom of boring at 9.5'. Auger Refusal		0.0"	51/0	100+
		0.0"	51/0	100+

Ground water / Cave in depth: At completion 3.5' ft. 3.5' ft.

Boring No. B-7 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 452.39 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, very loose silty sand, trace clay.(SM)	Topsoil 5"	6.0"	1-1-2	3
Gray, moist, stiff, sandy clay, trace roots.(CL) Alluvial		12"	2-6-10	16
Gray, moist to wet, very loose to very dense, silty sand, trace mica.(SM)	Groundwater encountered at 3.0' while drilling.	6.0"	2-1-1	2
		13"	12-4-4	8
Bottom of boring at 9.6' Auger Refusal		0.0"	51/0	100+

Ground water / Cave in depth: At completion 4.0' ft. 4.5' ft.

Boring No. B-8 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 454.49 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, loose, silty sand, trace mica and roots.(SM)	Topsoil 3"	18"	1-3-3	6
Gray/Black, moist, very loose, silty sand, trace roots and clay.(SM) Alluvial		18"	WOH/12"-1	
Gray, very soft, sandy clay, trace roots. (CL) Alluvial	No groundwater encountered while drilling.opsoil 3"	17"	1-1-1	2
Brown, gray, moist to wet, medium dense to dense, silty sand. (SM)		18"	11-21-18	39
		15"	8-19-20	39
		18"	4-8-12	20
		18"	3-6-6	12
Bottom of boring at 21.5'.				

Ground water / Cave in depth: At completion 5.3' ft. 5.5 ft.

Boring No. B-9 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 453.82 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, loose, silty sand, trace mica and roots. (SM)	Topsoil 5"	11"	1-2-3	5
Gray, Black, moist, very soft, sandy clay, trace roots.(CL) Alluvial		18"	1-1-1	2
Brown, orange, moist to wet, loose to very dense, silty sand, trace mica, trace to no rock fragments.(SM)	No groundwater encountered while drilling.	13"	2-6-9	15
		16"	5-7-5	12
		18"	2-3-3	6
		18"	1-1-2	3
Bottom of boring at 19.5'.		5.0"	51/5	100+

Ground water / Cave in depth: At completion 5.0' ft. 11.0' ft.

Boring No. B-10 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 454.06 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, very loose, silty sand, trace mica, gravel and roots. (SM)	Topsoil 4"	6.0"	1-2-2	4
Dark gray, moist, very soft, silty clay, trace roots. (CL) Alluvial		12"	1-1-1	2
Brown, tan, moist to wet, very loose to medium dense, silty sand, trace mica.(SM)	Groundwater encountered at 4.0' while drilling	16"	4-9-15	24
		14"	2-2-5	7
		18"	1-1-2	3
		18"	6-11-18	29
		18"	4-9-17	26
Bottom of boring at 20.0'.				

Ground water / Cave in depth: At completion 4.0' ft. 7.0' ft.

Boring No. B-11 (Waverly Woods West Stream Crossing; Howard County, Maryland; Job # 07390A)

Hammer Wt. 140 lbs. Hole Diameter 6.0" Foreman Lamont Smith
Surf. Elev. 456.74 Ft. Hammer Drop 30 in. Pipe Size 2.0 in. Boring Method HSA
Date Started 06/22/2007 Date Completed 06/22/2007

Description	Boring and Sampling Notes	Rec.	SPT Blows	N
Brown, moist, very loose, silty sand, trace mica, roots, and clay.(SM)	Topsoil 4"	10"	1-2-2	4
		0.0"	2-2-3	5
Brown, tan, moist, very soft to medium stiff, silty clay, trace mica and rock fragments.(CL)	Groundwater encountered at 5.0' while drilling. Cobble layer, cannot retrieve sample.	11"	4-4-4	8
		18"	1-1-2	3
Brown, gray, moist to wet, loose, silty sand, trace mica.(SM)		6.0"	2-3-6	9
		18"	2-2-3	5
		15"	5-6-5	11
Bottom of boring at 21.5'.				

Ground water / Cave in depth: At completion 7.5' ft. 17.0' ft.

Approved: Department Of Public Works
Chief Bureau Of Highways — Date 8-27-09

Approved: Department Of Planning And Zoning
Chief, Division Of Land Development — Date 9/29/09
Chief, Development Engineering Division — Date 8/31/09

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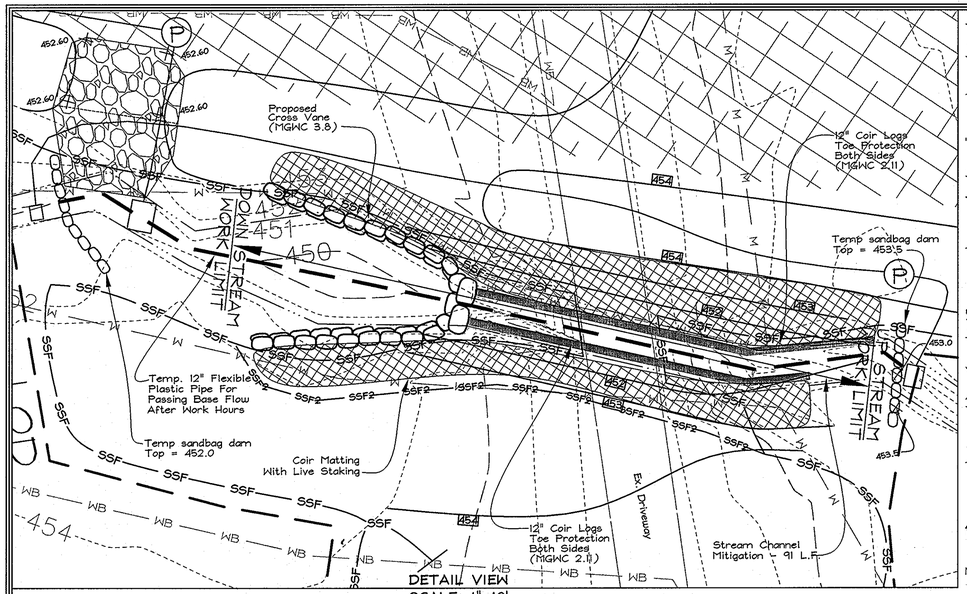
5300 DORSEY HALL DRIVE, SUITE 102
ELLICOTT CITY, MARYLAND 21042
(443-367-0422)

ALDO ... — DATE 7-29-09
"Professional Certification. I hereby certify that these documents were prepared by me, and that I am a duly Licensed Professional Engineer under the laws of the State of Maryland, License No. 20748, Expiration Date 2-22-11."

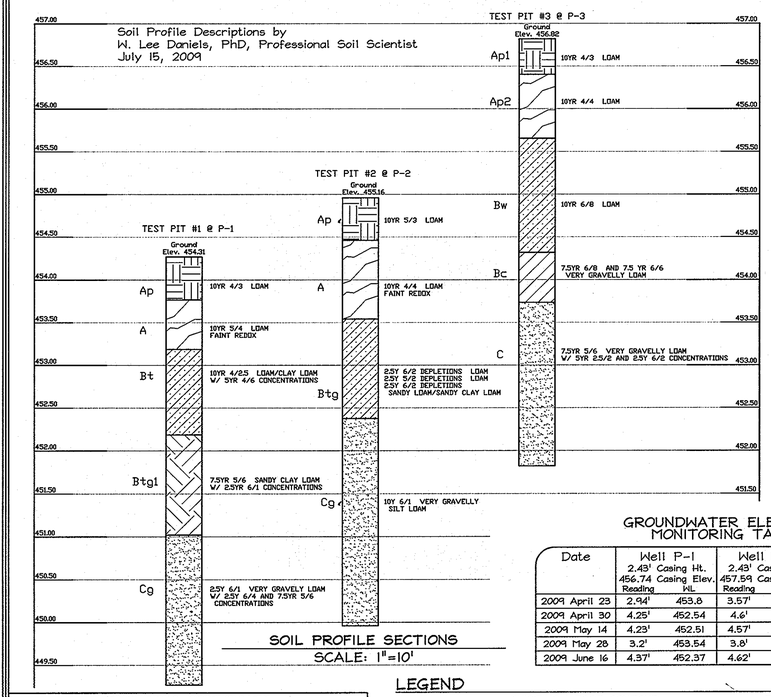
SOIL BORING PROFILES
GTW'S WAVERLY WOODS
SECTION 14
BULK PARCELS 'A' & 'B' AND
OPEN SPACE LOTS 1 & 2
ZONING: PSC & PEC
TAX MAP NO. 16 PARCEL Nos. 120, 221 & P/O 249 GRID Nos. 3 & 4
THIRD ELECTION DISTRICT HOWARD COUNTY, MARYLAND
DATE: JULY 28, 2009
SHEET 24 OF 26

F-09-057

K:\SDSKPROJ\30770 BARNSLEY WAY\dwg\FINALS\30770 SHEET 24 BORING LOGS.dwg, 7/29/2009 10:40:57 AM, jamesl, 1:1



DETAIL VIEW
SCALE: 1"=10'

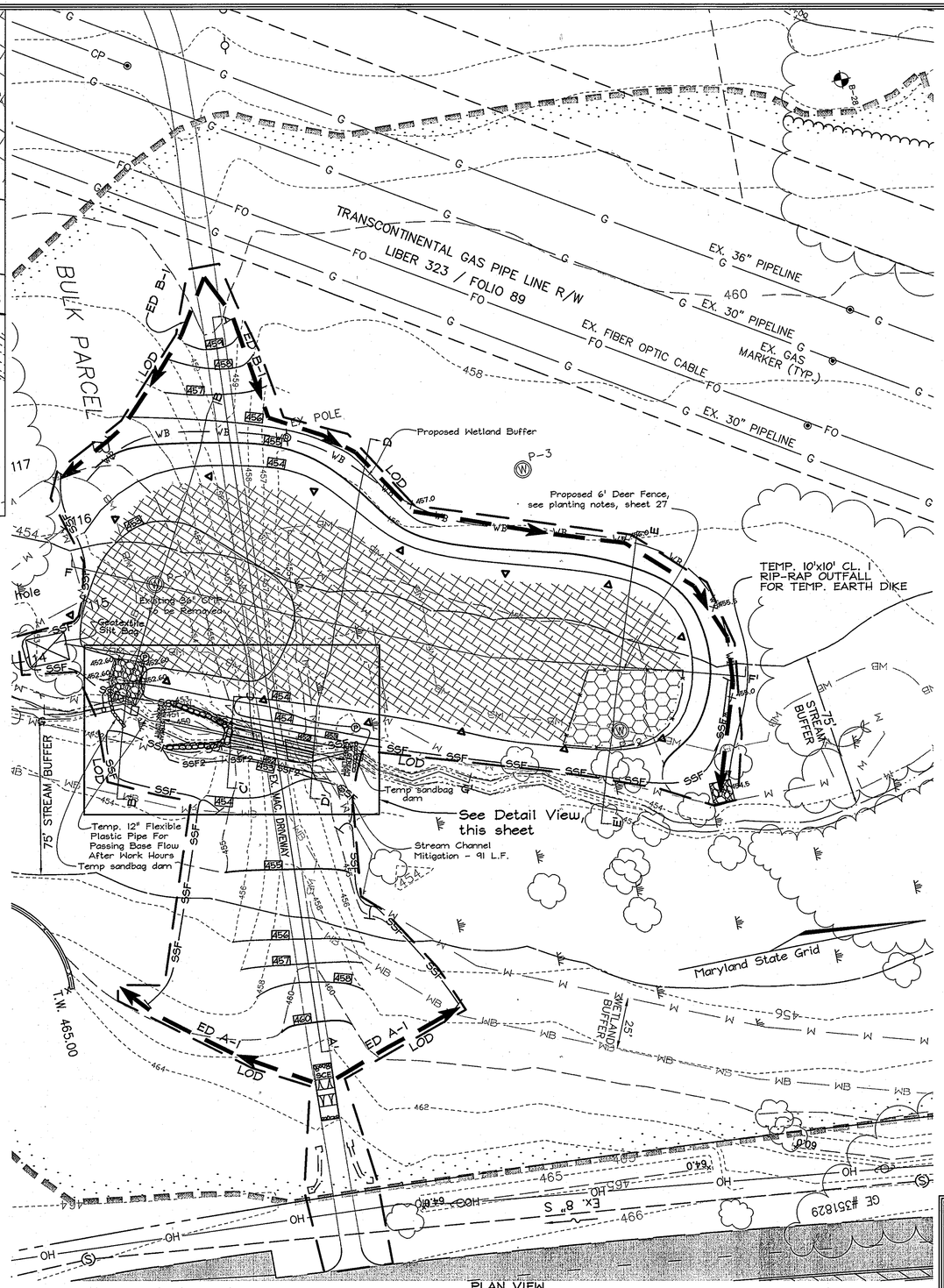


Soil Profile Descriptions by
W. Lee Daniels, PhD, Professional Soil Scientist
July 15, 2009

SOIL PROFILE SECTIONS
SCALE: 1"=10'

GROUNDWATER ELEVATION MONITORING TABLE

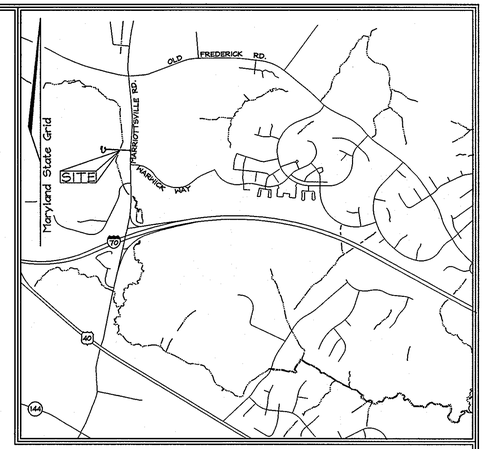
Date	Well P-1 2.43' Casing Ht. 456.74 Casing Elev. Reading	Well P-1 WL	Well P-2 2.43' Casing Ht. 457.59 Casing Elev. Reading	Well P-2 WL	Well P-3 1.6' Casing Ht. 458.69 Casing Elev. Reading	Well P-3 WL
2009 April 23	2.94'	453.8	3.57'	454.02	2.49'	456.20
2009 April 30	4.25'	452.54	4.6'	452.99	4.38'	454.31
2009 May 14	4.23'	452.51	4.57'	453.02	4.0'	454.69
2009 May 28	3.2'	453.54	3.8'	453.79	3.1'	455.59
2009 June 16	4.37'	452.37	4.62'	452.97	4.08'	454.61



PLAN VIEW
SCALE: 1"=30'

LEGEND

- EXISTING 1 FOOT CONTOUR
- EXISTING 5 FOOT CONTOUR
- EXISTING WETLAND LIMIT (W)
- EXISTING WETLAND BUFFER (WB)
- EXISTING STREAM
- EXISTING STREAM BUFFER
- TREE LINE
- FLOODPLAIN (100 YEAR)
- LIMIT OF DISTURBANCE (LOD) (COINCIDENT WITH SSF)
- SUPER SILT FENCE (SSF)
- PROPOSED 1 FOOT CONTOUR
- PROPOSED 5 FOOT CONTOUR
- MONITORING WELL LOCATION (P-3)
- COIR MATTING / LIVE STAKING
- WETLAND SEED MIX AREA
- SHRUB PLANTING AREA
- RIP RAP
- CROSS VANE BOULDERS
- EARTH DIKE (ED B-1)
- SUPER SILT FENCE, PHASE 2 (SSF2)
- WETLAND SIGNAGE



VICINITY MAP
SCALE: 1" = 2000'

PLAN NARRATIVE

The proposed wetland creation project will be designed to replace lost functions and values due to the unavoidable wetland impacts created as a result of construction of road widening along Marriottsville Road (Permit 20060925 / 09-NT-3085). **The nontidal wetlands impact is 18,666 square feet (sf) of palustrine emergent (PEM) wetland, plus 761 sf of palustrine scrub/shrub (PSS) wetland. In addition, 1930 sf of emergent wetland is temporarily impacted within the mitigation site. The proposed wetland creation project will compensate for these impacts by creating approximately 22,120 sf of wetland,** for a 1:1 replacement for the PEM wetland, a 2:1 replacement for the PSS wetland impacts, and a 1:1 restoration of the temporary PEM impact. The final required mitigation amount was reached by taking the initial area of mitigation required (18,666 + (761#2) = 20,188), and adding 1,930 sf to compensate for the area of existing wetland within the proposed mitigation site.

The wetland creation will be located in an existing cropland and within an area of an existing culvert and driveway crossing, which are to be removed. This site was chosen due to its close proximity to the impact area, the fact that it lies within a riparian area adjacent to the stream, and appears to have ideal hydrologic and topographic attributes for successful creation.

A soils investigation of the site revealed redoxymorphic features including depletions and concentrations present within 1.5 feet of the surface. It is expected that this overburden may be removed to expose the underlying hydric soil profile and create the requisite seasonal hydrology likely to sustain hydrophytes. Surface water will be sequestered within the depressions created by grading.

See Sheet 27 for Wetland Mitigation Performance Standards (Construction Note number 17).

The vegetative establishment of palustrine emergent wetland species within the mitigation basin will be accomplished through the application of a wetland seed mix immediately following finish grading. This seed mix will include wetland species common to wetland impact areas including Juncus effusus (FACW) and Carex vulpinoidea (OBL). Palustrine scrub/shrub plantings will include Cornus amomum (FACW), Viburnum dentatum (FAC) and Salix nigra (FACW), which will provide a native mix of indigenous species common to this area.

GENERAL NOTES

1. Base sheet provided by Fisher, Collins & Carter Inc.

CONSTRUCTION SEQUENCE

1. Obtain grading permit.
2. Notify Miss Utility (1-800-257-7777), Maryland Department of the Environment Enforcement Inspector (410-631-3510) and Howard County Department of Inspections, License and Permits (410-313-1880) at least 48 hours prior to beginning work.
3. Install erosion and sediment control features, including earth dikes, stabilized construction entrance (SCE), and super silt fence (SSF). (4 days) *Secure permission from signatory to proceed*
4. Grade wetland creation area, install rip rap outlet and stockpile topsoil and excess material in designated stockpile area (see sheet 4); grade wetland mitigation area to subgrade, spread wood chips, disc, and install 4-6" topsoil throughout. (1 week)
5. Apply wetland/upland seed mix and straw mulch to wetland mitigation area. (1 day)
6. Grade to remove 36" old driveway culvert. (2 days)
6. Install upstream and downstream sand bag dams and begin pump-around practice. Install 12" flexible plastic pipe to bypass base flow at end of each days work. (1 day)
7. Remove SSF where necessary to install cross vane and grading of channel. Remove 36" existing pipe, grade slopes and install cross vane, coir logs, and coir matting. (1 week)
8. Remove pump around, and install final stabilization measures including permanent seed stabilization, live staking*, and plantings on mitigation area. (2 days)
9. Install Phase 2 super silt fence (SSF2) at top of bank and grade to remove east portion of driveway.
10. Remove super silt fence and stabilize site with seed and mulch.
11. Upon stabilization of all disturbed areas and with the permission of the sediment control inspector, remove all sediment control measures and stabilize any remaining disturbed area. (1 week)

* Note: Live staking shall be installed during the dormant season only.

REVISED

GTW's WAVERLY WOODS
Section 14
Wetland Mitigation Erosion and Sediment Control Plan

TAX MAP 16
3rd ELECTION DISTRICT

PARCELS 120, 221, & p/o 249
HOWARD COUNTY, MARYLAND

ENGINEERS CERTIFICATE

"I 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.

SIGNATURE OF ENGINEER — DATE 4/30/10

APPROVED: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS

Chief, Bureau of Highways — Date 5-14-10

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING

Director — Date N/A

Chief, Division of Land Development — Date 5/19/10

Chief, Development Engineering Division — Date 5/19/10

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

HOWARD SCD — DATE 5/10/10

DEVELOPER'S CERTIFICATE

"I/WE CERTIFY THAT ALL DEVELOPMENT AND CONSTRUCTION WILL BE DONE ACCORDING TO THIS PLAN 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.

SIGNATURE OF DEVELOPER — DATE 4/30/10

STATE OF MARYLAND — LEE TAYLOR DANIELS — No. 34689 — PROFESSIONAL ENGINEER

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. #34689, Expiration Date: 07/08/11.

OWNER/DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
c/o Land Design and Development, Inc.
5300 Dorsey Hall Drive, Suite 102
Ellicott City, MD 21042
(443) 367-0422

EXPLORATION RESEARCH, INC.
ENVIRONMENTAL CONSULTANTS
6239 HOWARD LANE
ELKRIDGE, MARYLAND 21075
TEL: (410) 579-2210 FAX: (410) 796-1582

DESIGN BY: SLH
DRAWN BY: SMM
CHECKED BY: SLH
SCALE: As shown
DATE: Apr. 30, 2010
W.O. No.: 2000
SHEET No.: 25 OF 27

F-09-057

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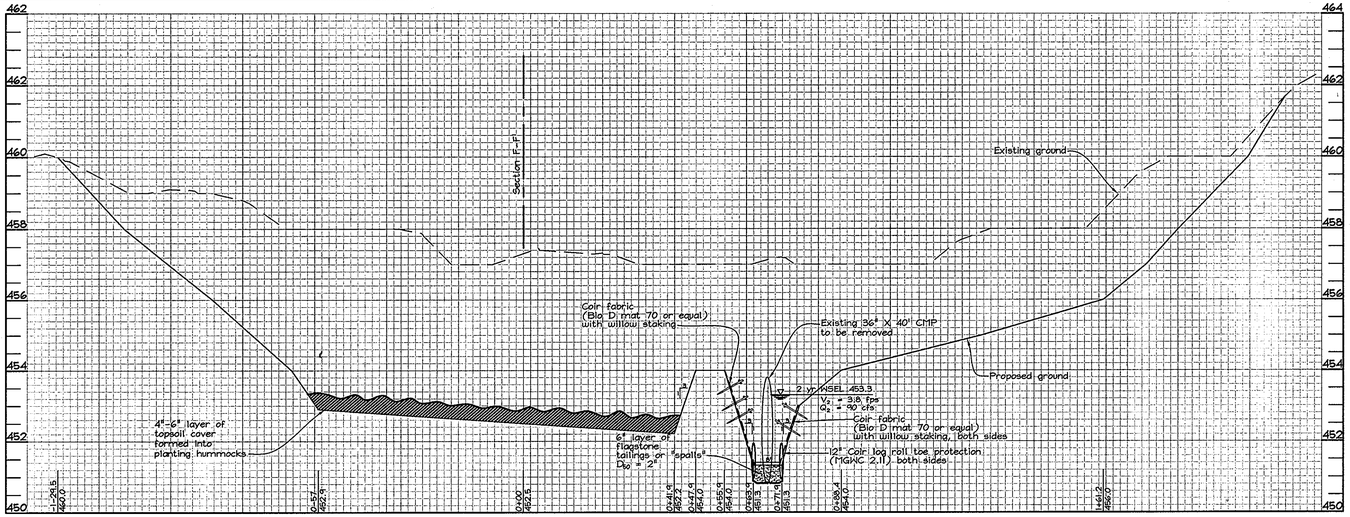
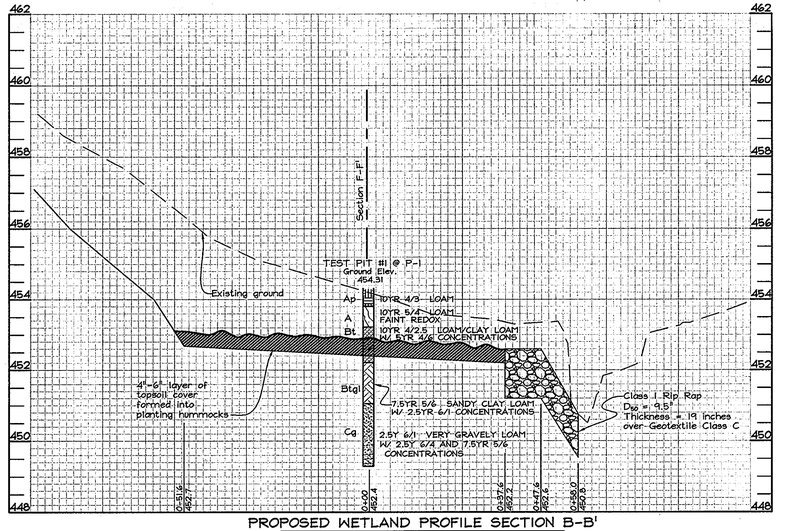
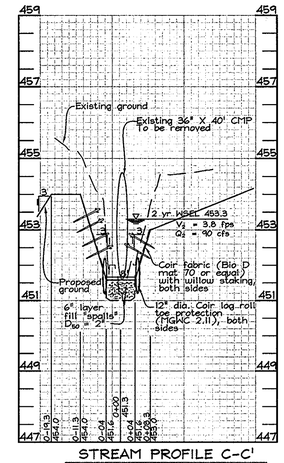


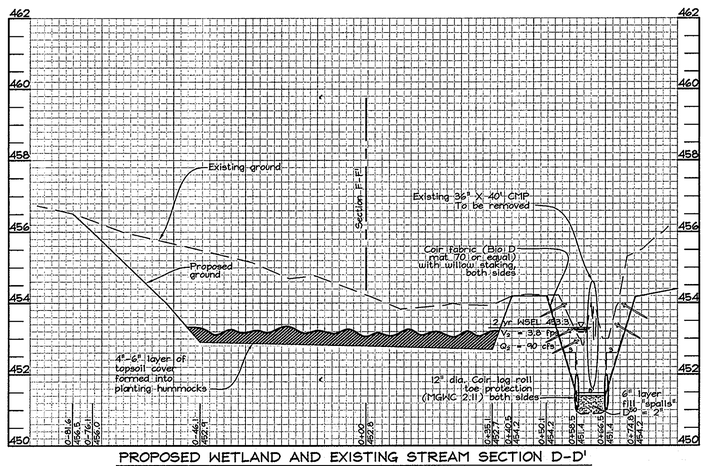
℄ DRIVEWAY PROFILE SECTION A-A'
SCALE: Horizontal: 1"=20'
Vertical: 1"=2'



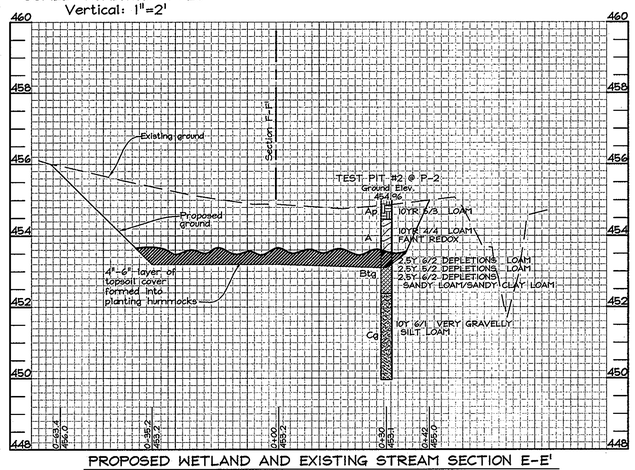
PROPOSED WETLAND PROFILE SECTION B-B'
SCALE: Horizontal: 1"=20'
Vertical: 1"=2'



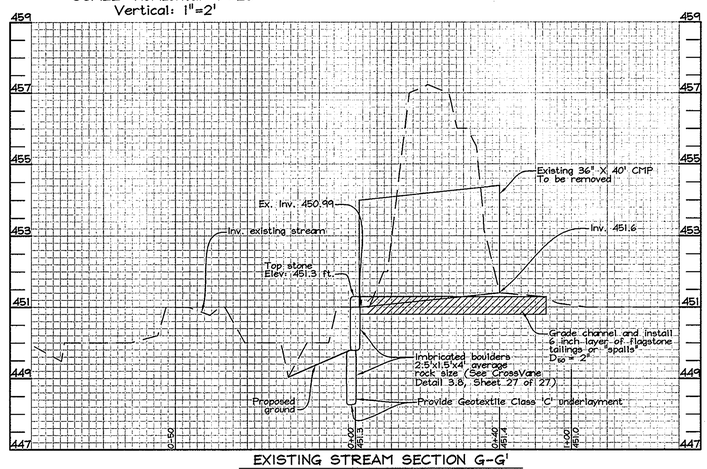
STREAM PROFILE C-C'
SCALE: Horizontal: 1"=20'
Vertical: 1"=2'



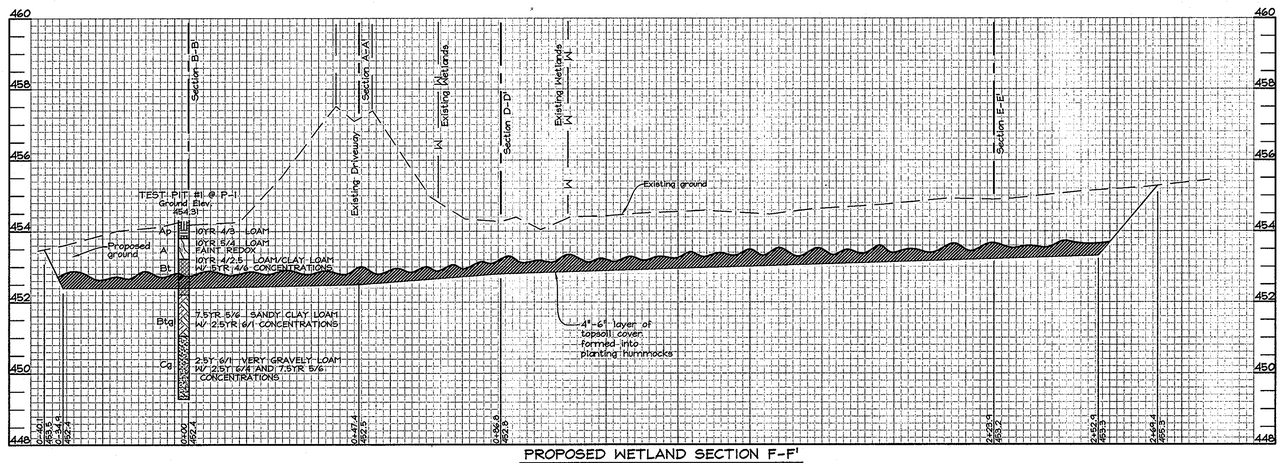
PROPOSED WETLAND AND EXISTING STREAM SECTION D-D'
SCALE: Horizontal: 1"=20'
Vertical: 1"=2'



PROPOSED WETLAND AND EXISTING STREAM SECTION E-E'
SCALE: Horizontal: 1"=20'
Vertical: 1"=2'



EXISTING STREAM SECTION G-G'
SCALE: Horizontal: 1"=20'
Vertical: 1"=2'



PROPOSED WETLAND SECTION F-F'
SCALE: Horizontal: 1"=20'
Vertical: 1"=2'

NOTE: Final grades shown at cross-section stations for wetland mitigation area are for subgrade beneath 4-6" of topsoil.

DEVELOPER'S CERTIFICATE

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SIGNATURE OF DEVELOPER — DATE 4/30/10

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SIGNATURE OF ENGINEER — DATE 4/30/10

APPROVED: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS

Chief, Bureau of Highways — Date 5-14-10

APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING

Director N/A — Date N/A

Chief, Division of Land Development — Date 5/19/10

Chief, Development Engineering Division — Date 5/18/10

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

HOWARD SCD — DATE 5/10/10

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. #34684, Expiration Date: 07/08/11.

STATE OF MARYLAND — MICHAEL TAYLOR — 34684 — PROFESSIONAL ENGINEER

OWNER/DEVELOPER

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c/o Land Design and Development, Inc.
5300 Dorsey Hall Drive, Suite 102
Ellicott City, MD 21042
(443) 367-0422

REVISED

GTW's WAVERLY WOODS Section 14

Wetland Mitigation Erosion and Sediment Control Plan

TAX MAP 16
3rd ELECTION DISTRICT

PARCELS 120, 221, & p/o 249
HOWARD COUNTY, MARYLAND

EXPLORATION RESEARCH, INC.
ENVIRONMENTAL CONSULTANTS
6330 HOWARD LANE
ELKRIDGE, MARYLAND 21075
TEL: (410) 567-5210 FAX: (410) 796-1562

DESIGN BY:	SLH
DRAWN BY:	SMM
CHECKED BY:	SLH
SCALE:	As shown
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SHEET No.:	26 OF 27

F-09-057

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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 STOCKPILES OR STORED IN NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, WATERWAYS, OR 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 FLOOD PLAIN.
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 RYE GRASS (LOLIUM MULTIFLORUM)
   MILLET (SETARIA ITALICA)
   BARLEY (HORDEUM SPECIES)
   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 FESCÚE 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 BE CONDUCTED DURING THE PERIOD MARCH 1 THROUGH JUNE 15, 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.

PLANTING NOTES

1. Riparian areas may be planted as soon as reasonable to do so. Late winter-early spring plantings are preferred. Earliest planting dates will vary from year to year but planting may generally begin as soon as the ground is no longer frozen. Alternate planting dates may be considered as condition warrants.
2. Soil amendments and fertilization recommendations will be made based upon the results of soil analysis for nitrogen, phosphorus, potassium, organic matter content and pH. If required, fertilizer will be provided using a slow release, soluble 16-8-16 analysis designed to last 5-8 years contained in polyethylene perforated bags such as manufactured by ADCO Works, P.O. Box 310 Hollins, N.Y. 11423 or approved equal.
3. Plant materials will be planted in accordance with the Planting Distribution Diagram, Planting Details and plant schedule.
4. Plant material shall be nursery grown and inspected prior to planting. Plants not conforming to the American Standard for Nursery Stock specifications for size, form, vigor, or roots, or due to trunk wounds, breakage, desiccation, insect or disease must be replaced.
5. Planting stock must be protected from desiccation at all times prior to planting. Materials held for planting shall be moistened and placed in cool shaded areas until ready for placement.
6. Newly planted trees may require watering at least once per week during the first growing season depending on rainfall in order to get established. The initial planting operation should allow for watering during installation to completely soak backfill material.
7. Planting holes should be excavated to a minimum diameter of 2.5 to 3 times the diameter of the root ball or container. Mechanical augering is preferred with scarification of the sides of each hole.
8. Mulch shall be applied in accordance with the diagram provided and shall consist of composted, shredded hardwood bark mulch, free of wood alcohol.
9. Eighty-five per cent (85%) survival of mitigation plantings shall be guaranteed for one (1) year. Replacement plantings shall be provided after first year's growing season.
10. Planting contractor must install 6' deer fence, Deerbusters item DEE-8106 or approved equivalent, and implement a deer protection management plan to protect plant materials during the warranty period.

ENGINEERS CERTIFICATE

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[signature] 4/30/10
SIGNATURE OF ENGINEER DATE

APPROVED: HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS

[signature] 5-14-10
Chief, Bureau of Highways Date

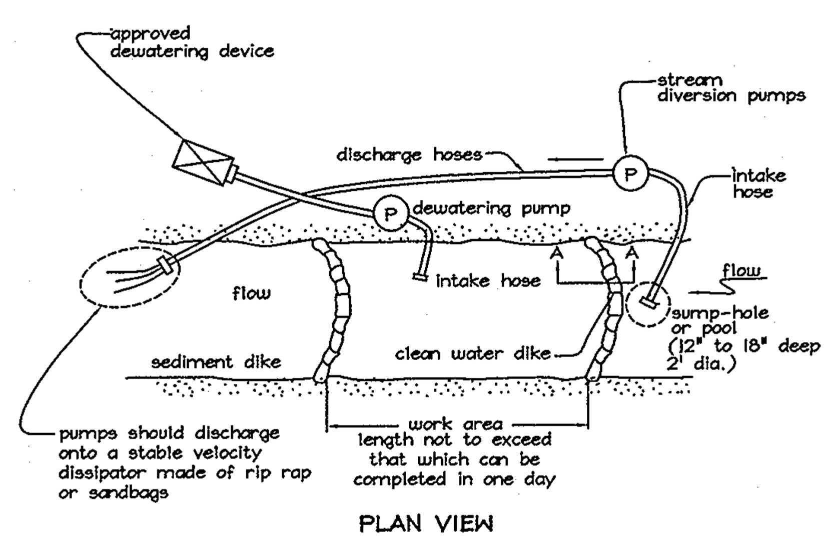
APPROVED: HOWARD COUNTY DEPARTMENT OF PLANNING & ZONING

N/A N/A
Director Date

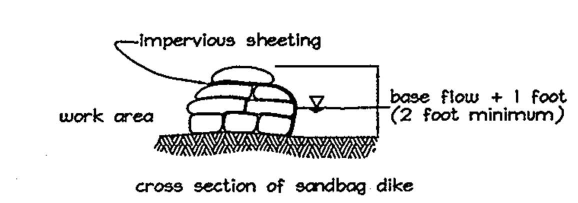
[signature] 5/13/10
Chief, Division of Land Development Date

[signature] 5/13/10
Chief, Development Engineering Division Date

DETAIL 1.2: PUMP-AROUND PRACTICE



PLAN VIEW



cross section of sandbag dike

SECTION A-A

Temporary Instream Construction Measures	REVISED NOVEMBER 2000 PAGE 1.2 - 3	Maryland Department of the Environment Water Management Administration

MONITORING PROTOCOL FOR MITIGATION PROJECTS LESS THAN OR EQUAL TO 0.5 ACRES

A. Compensatory mitigation projects required as a condition of a State Nontidal Wetlands and Waterways Permit for wetland impacts should achieve the goals and objectives established in the mitigation plan. Mitigation projects of less than or equal to one-half acres should conform to the following criteria, unless otherwise agreed to by the regulatory agencies.

1. After five (5) years, greater than 85% of the site shall be vegetated (either by planted or naturally revegetated plants) by native wetland species similar to those found in the nontidal wetland lost or by a species composition acceptable to the Nontidal Wetlands and Waterways Division; and
2. The entire site should have wetland hydrology.

B. An as-built design plan shall be submitted to the Nontidal Wetlands and Waterways Division within 120 days of the completion (this includes grading, planting and/or vegetative stabilization) of the mitigation project. If the project was built as planned, a notification stating that can substitute for the "as-built" plan.

C. The permittee will be responsible for submitting annual monitoring reports to the Nontidal Wetlands and Waterways Division, for a period of five (5) consecutive years from the completion of the construction of the mitigation site. If the U.S. Army Corps of Engineers requires a longer monitoring period, reports sent to them should also be sent to the Nontidal Wetlands and Waterways Division. In the case of longer monitoring periods, monitoring reports may not be required every year, but will be determined by the MDE and the Corps. Annual monitoring reports must be submitted to MDE by December 31 of each monitoring year. The first monitoring report is due the year the mitigation planting occurs, unless planting occurs after April 15, in which case the first monitoring report will not be due until the end of the next year. For each monitoring report, at least one monitoring visit should be conducted during the growing season for the vegetative monitoring (between May 1 and September 31 for forested/scrub-shrub systems and between June 15 and September 31 for emergent systems). These site visits should preferably be during a period with normal precipitation and groundwater levels. The following information should be included with the annual monitoring report.

1. Date of site inspection.
2. A brief paragraph describing the purpose of the approved project, acreage and type of aquatic resources impacted, and mitigation acreage and type of aquatic resources authorized to compensate for the aquatic impacts. Include the dates the mitigation construction was started and the planting was completed.
3. A narrative description of the mitigation site addressing its position in the landscape, adjacent waterbodies, and adjacent land use.
4. A narrative description of how the mitigation site has achieved the goals, objectives and project standards established for the project.
5. Estimate the percent cover by dominant plant species (including volunteer plants) and any invasive plant species. Estimate percent cover by plants with a wetland indicator status of FAC or wetter.
6. Estimate percent survival of woody planted material and estimate woody stem density per acre for trees/shrubs taller than 10 inches (including volunteers).
7. One set of photographs of the mitigation site taken any time during the months of May through September of each monitoring year. Photo location points should be identified on the appropriate maps and labeled with the direction in which the photo was taken.
8. Where invasive species (ex. Phragmites australis) become a problem, it may be necessary to undertake eradication measures. If eradication is warranted, the permittee should submit a ps impacted, and mitigation acreage and type of aquatic resources authorized to compensate for the aquatic impacts. Include the dates the mitigation construction was started and the planting was completed.
A narrative description of the mitigation site addressing its position in the landscape, adjacent waterbodies, and adjacent land use.
A narrative descr??ion to the regulatory agency detailing the method to be used.
9. Groundwater monitoring wells may be required as part of the monitoring plan. Water levels within each well should be measured, at a minimum, on a bi-monthly basis during the months of March through May and monthly from June through October. List these data (i.e., water levels and date measured) in the monitoring report.
10. Estimate percent cover of the site that is inundated or saturated to the surface on the dates of the site visits.
11. Stressors to the site (ex. deer browse, beaver, ATVs, etc.)
12. A description of any modifications which have been made or need to be made to implement the mitigation plan so as to meet the project standards.

D. Remedial measures proposed by the permittee are subject to review and approval by the regulatory agencies prior to implementation. In the event that remedial measures are implemented, the monitoring period may be extended on a case-by-case basis, but will not be extended for more than a three-year period. The treatment of non-native invasive plant species does not need the approval of the MDE Wetlands and Waterways Division, but should be completed at the correct time of year by someone with a current pesticide applicator certification and the required toxic materials permit.

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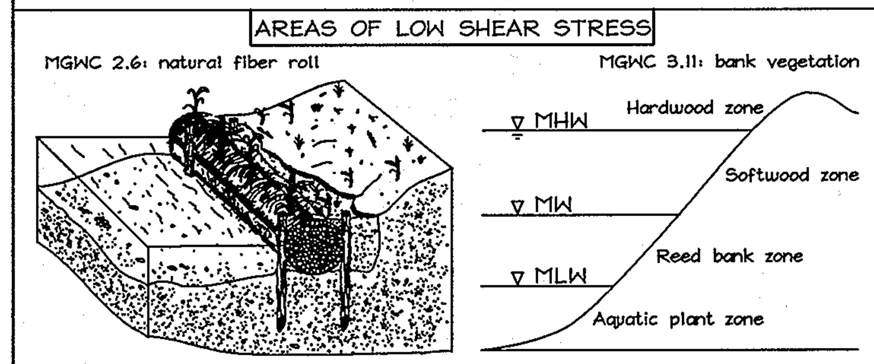
[signature] 4/30/10
SIGNATURE OF DEVELOPER DATE

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

[signature] 5/10/10
HOWARD SCD DATE

DETAIL 2.11(a): TOE PROTECTION



MATERIAL SPECIFICATIONS

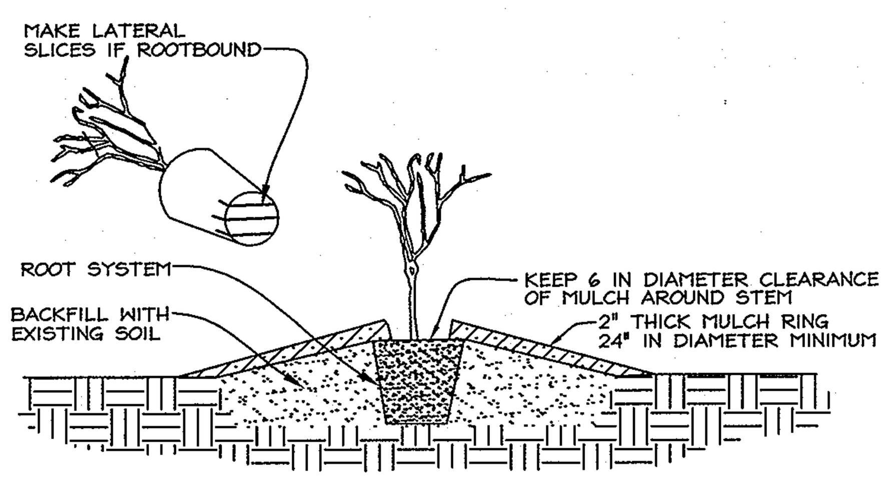
Plant species including woody varieties should be chosen by a plant specialist according to location within the riparian bank zone and adaptability to site-specific conditions and objectives. Refer to MGWC 2.4 (Live Stakes) for material and Detail 2.11 for placement and usage. The use of non-native plantings may result in reduced natural biodiversity.

Rock toe protection should be composed of angular stones sized to resist the near-bed channel velocities resulting from the design storm event according to MGWC 2.1 Riprap. The minimum toe trench depth should be sufficent to resist scour or at a minimum of 1.5 times the maximum riprap diameter.

INSTALLATION GUIDELINES

1. The stream should be redirected by an approved temporary stream diversion (See Section 1: Temporary Instream Construction Measures, Maryland's Guidelines to Waterway Construction), the construction area should be dewatered, and any disturbed banks should be stabilized.
2. The appropriateness of toe stabilization measures should be based primarily upon the magnitude of the imposed shear stress at the reach of interest among other considerations as shown in Detail 2.11. Installation will vary according to material used.
Vegetated Toe Protection Measures:
 Vegetation: Refer to MGWC 2.6: Natural Fiber Rolls
 Live Fascines: Refer to MGWC 2.5: Live Fascines
 Crib Walls: Refer to MGWC 2.9: Live Crib Walls
Rigid Toe Protection Measures:
 Riprap: a rock toe designed to withstand the near-bed velocities of the design storm event can be used to increase the effectiveness of toe protection measures in moderate to high shear stress areas. Rocks should be sized and filter layers designed according to MGWC 2.1: Riprap and Figure 2.1.
 Imbricated Riprap: Refer to MGWC 2.2: Imbricated Riprap
 Gabion: Refer to MGWC 2.3: Gabion
3. The use of rock vanes (MGWC 3.3: Rock Vanes) should be considered to break up high velocities at the toe of any embankment where bank stabilization measures are to be employed. Additionally, grade control structures
such as weirs and step pool sequences should be used to enhance channel bed stability in reaches that are actively incising or may be subjected to upstream migrating instabilities.
4. Once construction is completed, the diversion should be removed from upstream to downstream. Sediment control devices, including perimeter erosion controls, are to remain in place until all disturbed areas are stabilized in accordance with an approved sediment and erosion control plan and the inspection authority approves their removal.

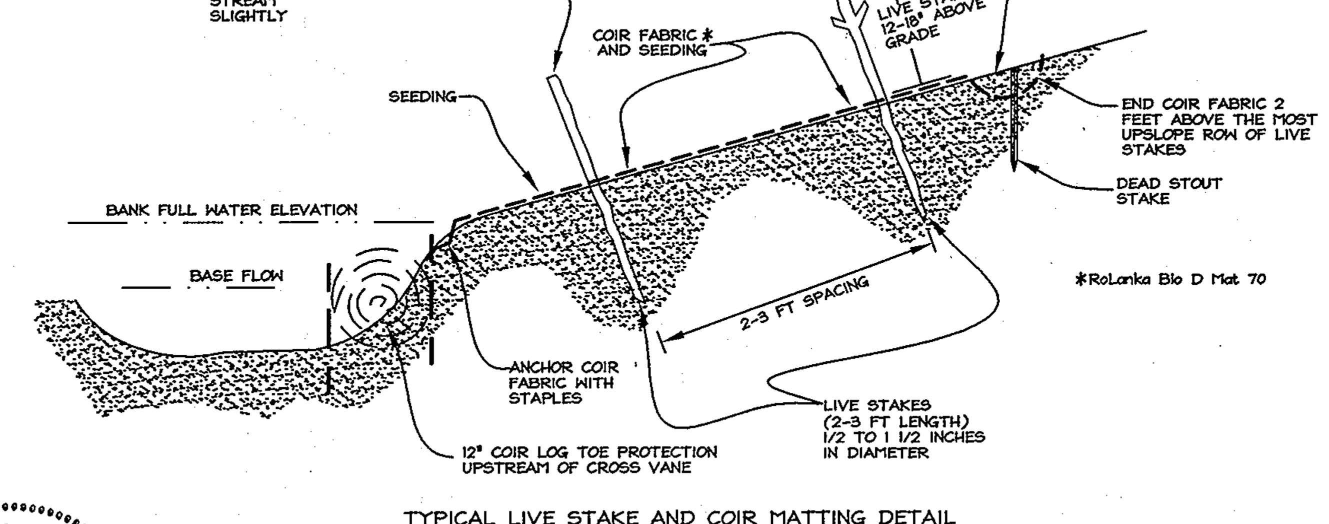
	REVISED NOVEMBER 2000 PAGE 2.4 - 5	MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION



CONTAINER PLANTING
NOT TO SCALE

PLANTING PROCEDURE FOR CONTAINER GROWN PLANTS

1. REMOVE THE PLANT EITHER BY CUTTING OR INVERTING THE CONTAINER
2. USE A KNIFE TO CUT THROUGH BOTTOM HALF OF THE ROOT BALL.
3. PLANT TREES AND SHRUBS ON FORMED UP MOUNDS 12" ABOVE THE EXISTING GRADE.
4. PLANTING HOLE TO BE 2-3 TIMES THE DIAMETER OF THE CONTIANER.
5. BACKFILL 2/3 OF THE ROOT BALL AND WATER.
6. AFTER WATER PERCOLATES, BACKFILL HOLE TO TOP OF ROOT BALL AND GENTLY TAMP SOIL TO FIRM CONTACT WITH PLANT.
7. APPLY MULCH RING AROUND PLANT KEEPING A 6 IN CLEARANCE FROM STEM.



TYPICAL LIVE STAKE AND COIR MATTING DETAIL
CROSS-SECTION VIEW (NOT TO SCALE)

MATERIAL SPECIFICATIONS AND INSTALLATION GUIDELINES FOR LIVE STAKING

1. All cuttings shall be freshly cut from live woody plants of the species indicated, such as willow, alder, and shrub dogwood, during the dormant season.
2. Basal end of stake should be cut on an angle with the top cut square.
3. Prepare cuttings from dormant .5 in. to 2 in. diameter stock cut in 18in. to 3 feet long stakes.
4. Keep cuttings moist at all times.
5. Install stakes with deadblow hammer, angled downstream, on 3.0 ft. centers.
6. Replace live stakes that have split or become mushroomed.
7. Install stakes with buds pointing upwards.

STATE OF MARYLAND · MICHAEL LEE TAYLOR · No. 34689 · PROFESSIONAL ENGINEER

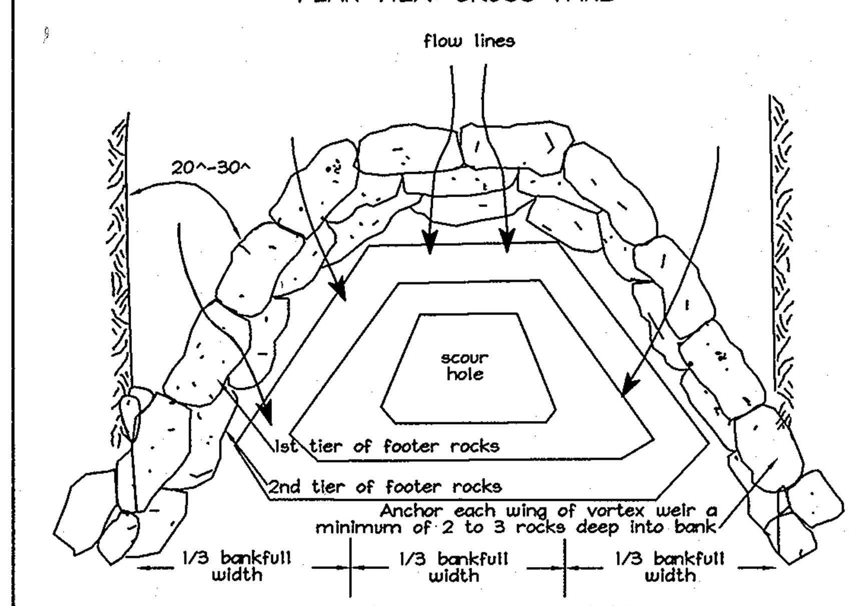
PROFESSIONAL CERTIFICATION

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. #34689, Expiration Date: 07/08/11.

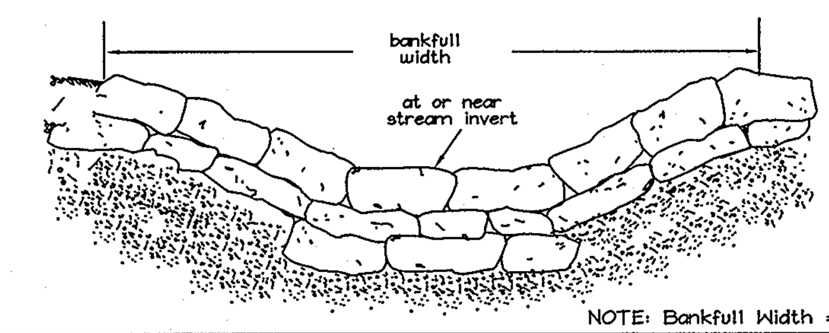
DETAIL 3.8(a): CROSS VANES

Source: Rosgen, 1999

PLAN VIEW: CROSS VANE



SECTION VIEW: CROSS VANE



	REVISED NOVEMBER 2000 PAGE 3.8 - 3	MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

MATERIAL SPECIFICATIONS FOR CROSS VANES (DETAIL 3.8)

Rock and boulder material for the construction of cross vanes should meet the following requirements:
Footer Rocks: Vortex rocks should be large enough to achieve the desired height when partially buried in the stream bed and should be sized to resist movement from shear stresses expected for the design flow. Footer rocks should be long and flat.
Riprap: Riprap for added stability, bank armoring, and toe protection should be capable of withstanding bankfull flow velocities according to MGWC 2.1: Riprap.

INSTALLATION GUIDELINES FOR CROSS VANES (DETAIL 3.8)

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 both cross vanes and weirs should proceed as follows (refer to Detail 3.8):
1. The stream should be diverted according to a WMA recommended measure, and the construction area should be dewatered.
2. Cross vanes are typically designed with a "U" shape such that the apex of the structure points upstream. The angle the arms make with the upstream bank should be approximately 20 to 30 degrees so that flows are directed away from the banks and deeper pool areas are created directly downstream of the vane or weir. All rocks should touch adjacent rocks to form a tight fit. Vane rocks shall be placed on top of footer rocks so that each vane rock rests upon two halves of each footer rock below, and so that the vane rock is offset in the upstream direction. Vane rocks shall be shingled upstream. On unstable bed substrates, two tiers of footer rocks may be required to prevent the downstream face of the vortex weir or cross vane from being undermined. The top elevation of the center rock(s), at the apex of the weir or vane, should be at or near bed level to permit fish passage at low flows, and the end rocks on either bank should be at bankfull level. Once the excavated portion of the bank has been backfilled, it should be armored with appropriately sized riprap, sod mats, or willow transplants.
3. Adjacent cross vanes should be spaced sufficiently far apart to allow for proper riffle or pool development according to step-pool and pool-riffle configurations as provided in MGWC 3.9: Step Pools. Additionally, it has been recommended that the overall maximum drop controlled by a set of weirs should be less than 2 feet (0.6 meters) for stability reasons.
4. All disturbed sections of the channel, including the banks and streambed, should be stabilized with methods approved by the WMA.
5. All cross vanes 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 ovement especially in the vicinity of the plunge pools.

MGWC 1.2: Pump-Around Practice

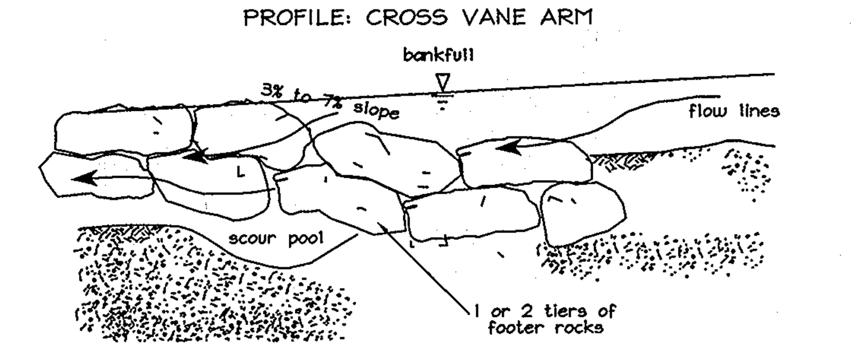
Description:
The work shall consist of installing a temporary pump around and supporting measures to divert flow around in-stream construction sites.
Implementation Sequence
Sediment control measures, pump arounds, and associated channel and bank construction shall be completed in the following sequence:

1. Construction activities including the installation of erosion and sediment control measures shall not begin until all necessary easements and/or right-of-ways have been acquired. All existing utilities shall be marked in the field prior to construction. The contractor is responsible for any damage to existing utilities that may result from construction and shall repair the damage at his/her own expense to the county's satisfaction.
2. The contractor shall notify the Maryland Department of the Environment or WMA sediment control inspector at least 5 days before beginning construction. Additionally, the contractor shall 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 shall 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 shall stake out all limits of disturbance prior to the pre-construction meeting.) 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 shall not be removed within the limit of disturbance without approval from the WMA or local authority.
4. Construction shall not begin until all sediment and erosion control measures have been installed and approved by the engineer and the sediment control inspector. The contractor shall 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 shall begin work at the upstream section and proceed downstream beginning with the establishment of stabilized construction entrances. The sequence of construction must be followed unless the contractor gets written approval for deviations from the WMA or local authority. The contractor shall 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 shall not be conducted in the channel during rain events.
6. Sandbag dikes shall be situated at the upstream and downstream ends of the work area as shown on the plans, and stream flow shall be pumped around the work area. The pump shall discharge onto a stable velocity dissipater made of riprap or sandbags.
7. Water from the work area shall be pumped to sediment filtering measure such as a sediment bag. The measure shall be located such that the water drains back into the channel below the downstream sandbag dike.
8. Traversing a channel reach with equipment 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 shall be used to minimize disturbance to the channel. Temporary stream crossings shall be used only when necessary and only where noted on the plans or specified by the engineer.
9. All steam restoration measures shall 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 permanently stabilized at the end of each day with seed and mulch or seed and matting as specified on the plans.
10. After an area is completed and stabilized, sandbag diversions, the water pump, and sediment filtering measure shall be moved to the next work area. This shall be accomplished by first moving the downstream sandbag dike to the new upstream pump around location and then by relocating the upstream sandbag dike, velocity dissipater, and sediment filter to the new downstream location.
11. A pump around must be installed on any tributary or storm drain outfall which contributes base-flow 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 steam 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, shall 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 shall resume. Water from the tributary shall 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 approved their removal.
14. After construction, all disturbed areas shall be regraded and revegetated as per the planting plan.

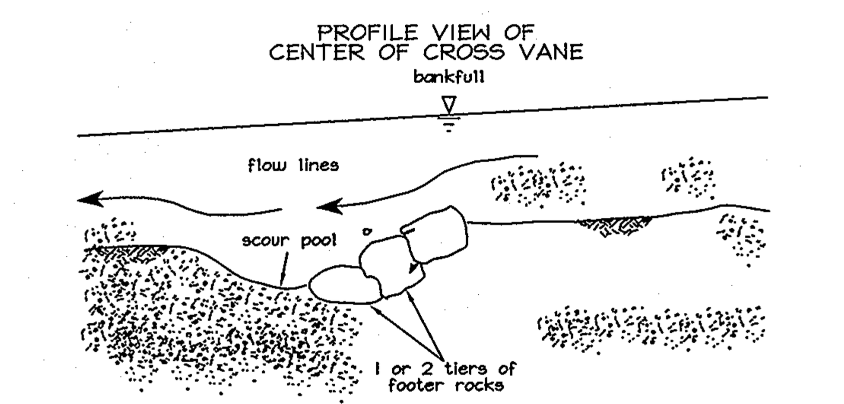
DETAIL 3.8(b): CROSS VANES

Source: Rosgen, 1999

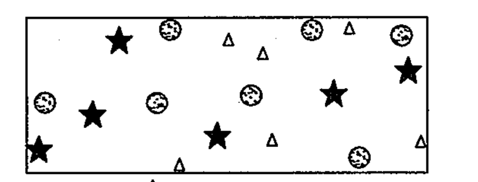
PROFILE: CROSS VANE ARM



PROFILE VIEW OF CENTER OF CROSS VANE



	REVISED NOVEMBER 2000 PAGE 3.8 - 4	MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

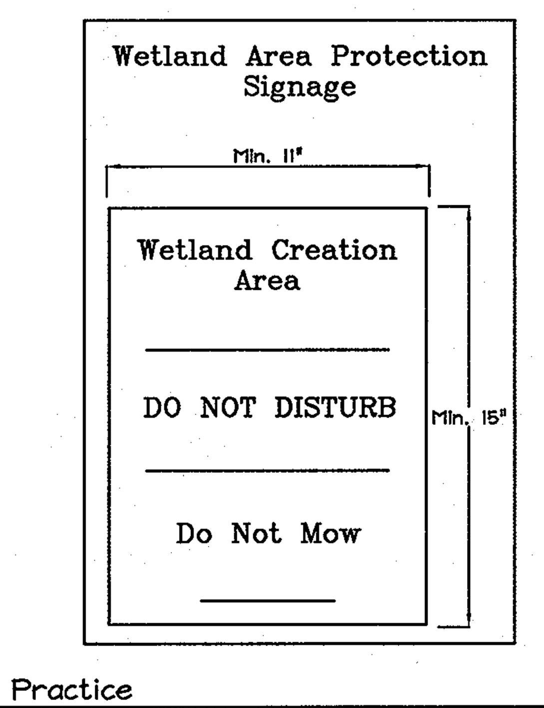


★ SPECIES 1
⊛ SPECIES 2
Δ SPECIES 3

1. Mix shrubs in staging area.
2. Spacing should be random, between 12' and 23' apart.

PLANTING DISTRIBUTION DIAGRAM

NOT TO SCALE



CONSTRUCTION NOTES/SPECIFICATIONS

1. The contractor shall install appropriate sediment and erosion control devices before project. All work to be performed at the direction of the stream restoration specialist and these drawings.
2. The foundation area shall be cleared of trees, stumps, roots, sod, loose rock, or other objectionable material.
3. The cross-section shall be excavated to the neat lines and grades as shown on the plans. Over-excavated areas shall be backfilled with moist soil compacted to the density of the surrounding material.
4. No abrupt deviations from the design grade or horizontal alignment shall be permitted unless authorized by the ERI Stream Restoration Specialist.
5. Filter, bedding, and rock rip-rap shall be placed to line and grade in the manner specified.
6. Construction operations shall be done in such a manner that erosion, air, and water pollution will be minimized and held within legal limits. The completed job shall present a workmanlike appearance. All disturbed areas shall be vegetated or otherwise protected against soil erosion.
7. Filter cloth shall be placed beneath rip-rap where indicated. The filter cloth shall consist of either woven or non-woven monofilament fiber and shall conform to the ASTM D 1777, ASTM D 1682, having a thickness of 20-60 Mils, and a grab strength of 90-120 LBS.
8. All boulders shall be well graded selected rip-rap boulders, natural in color and pre-approved by the Stream Restoration Specialist.
9. The subgrade for the filter, rip-rap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.
10. The rock or gravel shall conform to the specified grading limits when installed.
11. Geotextile shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of geotextile over the damaged part or by completely replacing the geotextile. All overlaps whether for repairs or for joining two pieces of geotextile shall be a minimum of one foot.
12. Stone and boulders for the rip-rap may be placed by equipment. It shall be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The stone for rip-rap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogeneous with the small stones and spalls filling the voids between the larger stones. Rip-rap shall be placed in a manner to prevent damage to the filter blanket or geotextile. Hand placement will be required to the extent necessary to prevent damage to the permanent works. Exact placement will be required as directed by the ERI Stream Specialist in the field.
13. The stone shall be placed so that it blends in with the existing grade. If the stone is placed too high, then the flow will be forced out of the channel and scour adjacent to the stone will occur.
14. The addition of a minimum 30 cubic yards of wood chips is required within the wetland mitigation area.
15. Wood chips must be spread evenly over the subgrade then 4"-6" topsoil overlayed. Disc or chisel plow the mitigation area to a minimum depth of 8" immediately after placement of wood chips and topsoil.
16. Add a minimum of one and 1/2 dump truck loads (three (3) dump truck loads per acre) of large (>/= 12" diameter) woody debris to the mitigation site.
17. PERFORMANCE STANDARDS: Maryland Department of the Environment (MDE) requires a five (5) year monitoring schedule establishing responsibility for the removal of exotic and nuisance vegetation, and permanent establishment of the nontidal wetland and its component parts. Monitoring shall be conducted according to MDE's Monitoring Protocol. If tree protection tubes or states are used, they must be removed prior to monitoring termination. After five (5) years from the completion of the mitigation project, greater than 85% of the mitigation site shall be vegetated (either by planted or naturally revegetated plants) by native wetland species similar to those found in the nontidal wetland lost or by a species composition acceptable to the Nontidal Wetlands and Waterways Division. Vegetative communities not acceptable to the Division would include communities dominated by nuisance vegetation or facultative upland species. Additionally for the project to be deemed successful, and the applicant to satisfy the mitigation responsibility, the entire wetland must have wetland hydrology.
18. Exploration Research, Inc shall be responsible for preparing and submitting the annual monitoring reports for this project.
19. Documentation that the selected protection mechanism has been executed must be submitted to MDE within sixty (60) days of the completion of construction of the mitigation project.

SEEDMIX SPECIFICATIONS

I. WETLAND SEED MIX APPLIED TO ALL DISTURBED AREAS IN BOTTOM OF WETLAND CREATION

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	APPLICATION RATE
FOWL MEADOWGRASS	POA PALUSTRIS	FACW	2 lbs. / Acre
VIRGINIA WILD RYE	ELYMUS VIRGINICUS	FACW-	5 lbs. / Acre
FOX SEDGE	CAREX VULPINOIDEA	OBL	5 lbs. / Acre
SOFT RUSH	JUNCUS EFFUSUS	FACW	5 lbs. / Acre

II. UPLAND SEED MIX TO BE APPLIED TO ALL OTHER DISTURBED AREAS.

COMMON NAME	SCIENTIFIC NAME	WETLAND INDICATOR	APPLICATION RATE
SWITCHGRASS	PANICUM VIRGATUM	FACU	4 lbs / Ac.
BROOM SEDGE	ANROPOGEN VIRGINICUS	FACW	2 lbs. / Ac.
LITTLE BLUE STEM	SCHIZACHYRIUM SCOPARIUM	FACU-	6 lbs. / Ac.
ANNUAL RYEGRASS	LOLIUM MULTIFLORUM	N/A	20 lbs. / Ac.
INDIAN GRASS	SORGHASTRUM NUTANS	UPL	6 lbs. / Ac.

WOODY PLANTING LIST - 0.04 Ac. (350 TPA)

COMMON NAME	SCIENTIFIC NAME	QUANITY	SPACING	SIZE
silky dogwood	Cornus amomum	5	Random 12' to 23' O.C.	24"-36" Gallon Container Grown
arrow wood	Viburnum dentatum	5		
black willow	Salix nigra	5		
black willow	Salix nigra	14	2-3' O.C.	Live Stake

OWNER/DEVELOPER

WAVERLY WOODS DEVELOPMENT CORP.
c/o Land Design and Development, Inc.
5300 Dorsey Hall Drive, Suite 102
Ellicott City, MD 21042
(443) 367-0422

REVISED

GTW's WAVERLY WOODS Section 14

Wetland Mitigation Erosion and Sediment Control Plan

TAX MAP 16 PARCELS 120, 221, & p/o 249
3rd ELECTION DISTRICT HOWARD COUNTY, MARYLAND

EXPLORATION RESEARCH, INC.
ENVIRONMENTAL CONSULTANTS
6339 HOWARD LANE
ELKRIDGE, MARYLAND 21075
TEL: (410) 567-5210 FAX:(410) 796-1562

DESIGN BY: SLH
DRAWN BY: SMM
CHECKED BY: SLH
SCALE: As shown
DATE: Apr. 30, 2010
W.O. No.: 2000
SHEET No.: 27 OF 27

F-09-057