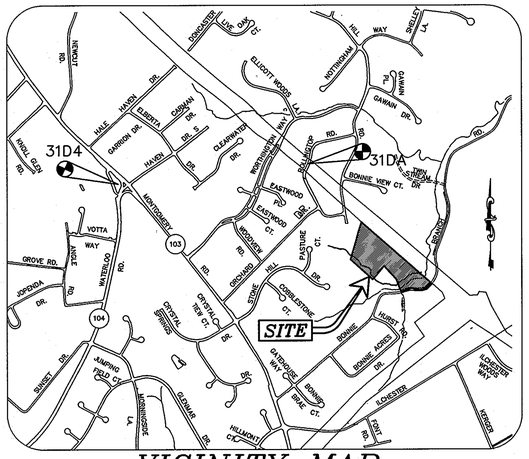
ROAD CONSTRUCTION PLANS
BONNIE BRANCH WOODS
LOTS 1-15 AND
OPEN SPACE LOTS 16-22
SECOND ELECTION DISTRICT
HOWARD COUNTY, MARYLAND

SHEET INDEX



VICINITY MAP

SCALE: 1"= 2000'
ADC MAP 4936 (D4)

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS AND SPECIFICATIONS OF HOWARD COUNTY.
2. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS/ BUREAU OF ENGINEERING/ /CONSTRUCTION INSPECTION DIVISION AT (410)313-1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF WORK.
3. THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777 AT LEASE 48 HOURS PRIOR TO ANY EXCAVATION WORK BEING DONE.
4. TRAFFIC CONTROL DEVICES, MARKINGS AND SIGNING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
5. STREET LIGHT PLACEMENT AND THE TYPE OF FIXTURE AND POLE SHALL BE IN ACCORDANCE WITH THE HOWARD COUNTY DESIGN MANUAL, VOLUME III (2006) SECTION 5.5.A.
   A MINIMUM SPACING OF 20' SHALL BE MAINTAINED BETWEEN ANY STREET LIGHT AND ANY STREET TREE.
6. THE STREET LIGHT LOCATIONS AND TYPES OF LIGHTS SHOWN ON SHEETS 2 & 3 ARE AS FOLLOWS:
   - 150-WATT HPS VAPOR PREMIER POST TOP FIXTURE MOUNTED ON A 14-FOOT BLACK FIBERGLASS POLE, STATION 0+24, 20' RIGHT (CORNER OF GOOD MEMORY LANE AND BONNIE BRANCH ROAD).
   - 100-WATT HPS VAPOR "PREMIER" POST TOP FIXTURE ON A 14' BLACK FIBERGLASS POLE AT GOOD MEMORY LANE STATION 2+43, 15' LEFT, STATION 5+90, 21' RIGHT, LP STATION 0+75, 3' BACK.
7. THE EXISTING TOPOGRAPHY IS TAKEN FROM AERIAL SURVEY WITH MAXIMUM TWO FOOT CONTOUR INTERVALS PREPARED BY WINGS TOPOGRAPHY INC. DATED JUNE 2008.
8. COORDINATES SHOWN HEREON ARE BASED UPON HOWARD COUNTY GEODETIC CONTROL WHICH IS BASED UPON MARYLAND STATE PLANE COORDINATE SYSTEM. HOWARD COUNTY MONUMENT NOS. 31DA AND 31D4 WERE USED FOT THIS PROJECT.

STA. No. 31D4	N 571,700.693	E 1,369,606.348	ELEV. 494.421
STA. No. 31DA	N 571,982.686	E 1,372,145.055	ELEV. 481.585

9. WATER IS PUBLIC. CONTRACT NO. 14-4594-D.
10. SEWER IS PUBLIC. CONTRACT NO. 14-4594-D.
11. STORMWATER MANAGEMENT IS PROVIDED BY THREE (3) SAND-FILTER FACILITIES , MULTIPLE ON-LOT RAINGARDENS, ONE (1) INFILTRATION TRENCH AND A DRY DETENTION POND IN ACCORDANCE WITH THE 2000 MARYLAND STORMWATER DESIGN MANUAL.
    DRY DETENTION POND WILL BE JOINTLY MAINTAINED WITH HOWARD COUNTY.
12. EXISTING UTILITIES SHOWN HEREON ARE BASED ON AERIAL SURVEY PREPARED BY WINGS INC. TOPOGRAPHY DATED JUNE 2008, AS-BUILT PLANS AND VERIFIED IN THE FIELD.
13. THE FLOODPLAIN STUDY FOR THIS PROJECT WAS PREPARED BY MILDENBERG, BOENDER AND ASSOCIATES, INC. DATED. AUGUST 2008.
14. FOREST STAND AND WETLANDS DELINEATION PREPARED BY HILLIS-CARNES ENGINEERING ASSOCIATES, INC. DATED JUNE 2008, UPDATED ON DECEMBER 2008.
15. APFO ROAD TEST PREPARED BY TRAFFIC GROUP, DATED NOVEMBER 2008, AND APPROVED ON MAY 18, 2009,. UNDER SP-09-002.
16. PROJECT BACKGROUND:
    TAX MAP : 31 , PARCEL : 101 , GRID: 9 AND 15.
    ELECTION DISTRICT : SECOND
    ZONING: R-20
    DEED REFERENCE : 6911/243
    ADDRESS: 5036 BONNIE BRANCH RD., ELLICOTT CITY, MD 21043
17. AREA TABULATION

GROSS AREA OF PROPERTY TRACT:	9.88 AC.±
AREA OF FLOODPLAIN:	0.88 AC.±
NUMBER OF BUILDABLE LOTS PROPOSED:	15 LOTS
MINIMUM LOT AREA ALLOWED:	12,000 S.F.
AREA OF PROPOSED LOTS:	4.22 AC.±
AREA OF OPEN SPACE REQUIRED:	40% = 3.95 AC±
AREA OF OPEN SPACE PROVIDED:	4.11 AC±
AREA OF CREDITED OPEN SPACE PROVIDED:	4.04 AC± (41.2%)
AREA OF NON-CREDITED OPEN SPACE PROVIDED:	0.07 AC±
AREA OF REC. OPEN SPACE REQUIRED:	200 SQ.FT./LOT =3,000 SQ.FT.
AREA OF REC. OPEN SPACE PROVIDED:	4,500 SQ.FT.
AREA OF PUBLIC ROAD DEDICATION:	11,237 SQ.FT. (0.26 AC.±)
AREA OF PUBLIC ROAD ROW:	56,192 SQ.FT. (1.29 AC.±)

18. NO HISTORIC STRUCTURES, CEMETERIES, OR GRAVE SITES EXIST ON-SITE. SITE IS ADJACENT TO A DESIGNATED SCENIC ROAD.
19. SOIL DELINEATION IS BASED ON HOWARD COUNTY SOIL SURVEY MAP, PAGE 23.
20. THE FOREST CONSERVATION OBLIGATIONS PER SECTION 16.1202 OF THE HOWARD COUNTY CODE AND FOREST CONSERVATION ACT FOR THIS SUBDIVISION HAVE BEEN FULFILLED BY PROVIDING RETENTION OF 2.08 ACRES OF FOREST, AFFORESTATION OF 0.42ACRES AND FEE-IN-LIEU OF 0.40 ACRES.
    FINANCIAL SURETY FOR THE ON-SITE RETENTION FOR THE AMOUNT OF $18,121.00, AND AFFORESTAION FOR THE AMOUNT OF $9,148.00, FOR A TOTAL OF $27,269.00 WILL BE POSTED AS PART OF DEVELOPERS AGREEMENT.
    0.40 ACRES OF REQUIRED FOREST CONSERVATION WILL BE ADDRESSED VIA FEE-IN-LIEU INTHE AMOUNT OF $13,068.00
21. ALL EXISTING STRUCTURES ARE TO BE REMOVED UNLESS OTHERWISE NOTED.
22. AGE OF THE EXISTING STRUCTURES ARE ESTIMATED.
23. THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 16.124 OF THE HOWARD COUNTY CODE AND THE LANDSCAPE MANUAL.
24. FINANCIAL SURETY FOR THE REQUIRED LANDSCAPING IS TO BE POSTED FOR 44 SHADE AND 29 EVERGREEN TREES IN THE AMOUNT OF $17,550.00 AS PART OF THE DPW DEVELOPERS AGREEMENT.
25. DUE TO EXTENSIVE ENVIRONMENTAL FEATURES AND ASSOCIATED REQUIRED BUFFERS, FUTURE SUBDIVISION OF PARCEL 102 WOULD BE NON-EXISTENT OR EXTREMELY LIMITED AND ACCESS TO THE PARCEL THROUGH THE PROPOSED PETERSON PROPERTY SUBDIVISION IS NOT REQUIRED.
26. SUBJECT PROPERTY IS ZONED R-20 PER THE 2/2/04 COMPREHENSIVE ZONING PLAN AND PER THE COMP LITE ZONING REGULATION AMENDMENTS EFFECTIVE 7/28/06.
27. DRIVEWAYS SHALL BE PROVIDED PRIOR TO RESIDENTIAL OCCUPANCY TO ENSURE SAFE ACCESS FOR FIRE AND EMERGENCY VEHICLES PER THE FOLLOWING MINIMUM REQUIREMENTS:
    A) WIDTH – 12 FEET (16 FEET SERVING MORE THAN ONE RESIDENT).
    B) SURFACE – 6 INCHES OF COMPACTED CRUSHER RUN BASE WITH TAR AND CHIP COATING (1.5" MIN).
    C) GEOMETRY – MAX. 14% GRADE, MAX. 10% GRADE CHANGE AND MIN. OF 45 FOOT TURNING RADIUS.
    D) STRUCTURES (CULVERT/BRIDGES) – CAPABLE OF SUPPORTING 25 GROSS TONS (H25 LOADING).
    E) DRAINAGE ELEMENTS – CAPABLE OF SAFELY PASSING 100 YEAR FLOOD PLAIN WITH NO MORE THAN 1 FOOT OF DEPTH OVER DRIVEWAY SURFACE.
    F) STRUCTURE CLEARANCES – MINIMUM 12 INCHES
    G) MAINTENANCE – SUFFICIENT TO ENSURE ALL WEATHER USE.
28. NO GRADING, REMOVAL OF VEGETATIVE COVER OF TREES, PAVING AND NEW STRUCTURES SHALL BE PERMITTED WITHIN LIMITS OF WETLANDS, STREAMS OR THEIR REQUIRED BUFFERS, FLOODPLAIN AND FOREST CONSERVATION EASEMENT AREAS, EXCEPT AS DETERMINED TO BE NECESSARY DISTURBANCE.
29. FOR FLAG OR PIPE STEM LOTS, REFUSE COLLECTION, SNOW REMOVAL AND ROAD MAINTENANCE ARE PROVIDED TO THE JUNCTION OF THE FLAG OR PIPE STEM AND THE ROAD RIGHT OF WAY LINE AND NOT ONTO THE FLAG OR PIPE STEM LOT DRIVEWAY.
30. ROAD CONSTRUCTION, STORMWATER MANAGEMENT OUTFALL AND LOCATIONS OF WATER AND SEWER MAINS HAVE BEEN DETERMINED AS NECCESSARY DISTURBANCE. AND HAVE BEEN APPROVED UNDER SP-09-002.
31. FOREST CONSERVATION EASEMENT AREA MUST BE DEVOID OF TRASH, DEBRIS, STRUCTURES, FENCING, ETC. IT IS DEVELOPERS RESPONSIBILITY TO KEEP FCE AREA CLEAN OF DEBRIS AND ENCROACHEMENT FOR 2 YEAR MAINTENENCE PERIOD.
32. USE HOWARD COUNTY STANDARD R-3.01 MODIFIED CURB AND GUTTER . UNLESS OTHERWISE NOTTED.
33. 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 A 2-1/2" GALVANIZED STEEL , PERFORATED SQUARE TUBE SLEEVE (12 GAUGE) - 3' LONG. A GALVANIZED STEEL POLE CAP SHALL BE MOUNTED ON TOP OF EACH POST.
34. THE TRAFFIC CONTROL SIGN LOCATIONS AND TYPES SHOWN ARE AS FOLLOWS:
    - R1-1 "STOP" SIGN AT STA. 0+40, LEFT
    - R2-1 "SPEED LIMIT" SIGN AT STA. 1+25, RIGHT
    - W3-1 "STOP AHEAD" WARNING SIGN AT STA. 3+30, LEFT
35. MDE PERMIT TRACKING #: 200963162.
36. ENTIRE OPEN SPACE LOT 21 IS SUBJECT TO PUBLIC SWM & UTILITY EASEMENT.

LEGEND

▩	SLOPES GREATER THAN 25%
▨	15% TO 25% SLOPES
▒	FLOODPLAIN
⁘	WETLANDS
◌	FOREST CONSERVATION EASEMENT (RETENTION)
× × ×	FOREST CONSERVATION (AFFORESTATION)
⌒⌒⌒	EXISTING TREE LINE
LOD — — —	LIMIT OF DISTURBANCE
—SSF—	SUPER SILTFENCE
—TPF—	TREE PROTECTION FENCE
▲	DENOTES FOREST CONSERVATION SIGNAGE
(#)	DENOTES PERIMETER LANDSCAPE EDGE
—▬—	DENOTES CURB TRANSITION
▨	AREA DEDICATED TO HO.CO. FOR PURPOSE OF PUBLIC ROAD
▨	NON-CREDITED OPEN SPACE
▥	RECREATIONAL OPEN SPACE
▨	PUBLIC WATER AND SEWER EASEMENT
▩	PRIVATE USE-IN-COMMON ACCESS EASEMENT

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 5/6/10

JOHN DOUGLAS CASHMERE
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 5/6/10

R. JACOB HIKMAT
PRINTED NAME OF ENGINEER

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

HOWARD SOIL CONSERVATION DISTRICT — DATE 5/19/10

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONNING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

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. 17942, EXP DATE 9/3/10.

R. JACOB HIKMAT
No. 17942

H:\08-007\DWG\SINAL\FINAL-R-20.DAG

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

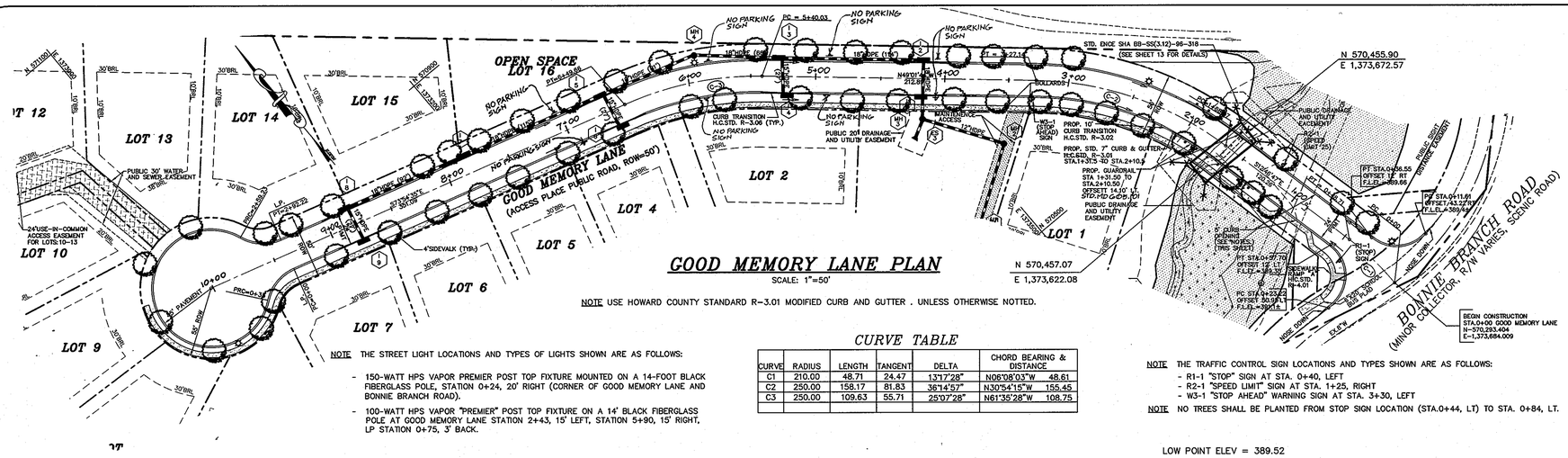
project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
1"=50'	RJH

no.	description	date
	revisions	

BONNIE BRANCH WOODS
TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT HOWARD COUNTY, MARYLAND
COVER SHEET

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

F-10-042



GOOD MEMORY LANE PLAN

SCALE: 1"=50'

NOTE USE HOWARD COUNTY STANDARD R-3.01 MODIFIED CURB AND GUTTER . UNLESS OTHERWISE NOTTED.

NOTE THE STREET LIGHT LOCATIONS AND TYPES OF LIGHTS SHOWN ARE AS FOLLOWS:

- 150-WATT HPS VAPOR PREMIER POST TOP FIXTURE MOUNTED ON A 14-FOOT BLACK FIBERGLASS POLE, STATION 0+24, 20' RIGHT (CORNER OF GOOD MEMORY LANE AND BONNIE BRANCH ROAD).
- 100-WATT HPS VAPOR "PREMIER" POST TOP FIXTURE ON A 14' BLACK FIBERGLASS POLE AT GOOD MEMORY LANE STATION 2+43, 15' LEFT, STATION 5+90, 15' RIGHT, LP STATION 0+75, 3' BACK.

CURVE TABLE

CURVE	RADIUS	LENGTH	TANGENT	DELTA	CHORD BEARING & DISTANCE
C1	210.00	48.71	24.47	13°17'28"	N06°08'03"W 48.61
C2	250.00	158.17	81.83	36°14'57"	N30°54'15"W 155.45
C3	250.00	109.63	55.71	25°07'28"	N61°35'28"W 108.75

NOTE THE TRAFFIC CONTROL SIGN LOCATIONS AND TYPES SHOWN ARE AS FOLLOWS:

- R1-1 "STOP" SIGN AT STA. 0+40, LEFT
- R2-1 "SPEED LIMIT" SIGN AT STA. 1+25, RIGHT
- W3-1 "STOP AHEAD" WARNING SIGN AT STA. 3+30, LEFT

NOTE NO TREES SHALL BE PLANTED FROM STOP SIGN LOCATION (STA.0+44, LT) TO STA. 0+84, LT.

GOOD MEMORY LANE LINEAR PROFILE

SCALE: HOR. 1"=50'
VER.1"=5'

GOOD MEMORY LANE PROFILE

(ACCESS PLACE PUBLIC ROAD, DESIGN SPEED = 25 MPG, ROW=50')

SCALE: HOR. 1"=50'
VER.1"=5'

GOOD MEMORY LANE LEFT FILLET PROFILE

SCALE: HOR. 1"=20'
VER.1"=2'

GOOD MEMORY LANE RIGHT FILLET PROFILE

SCALE: HOR. 1"=20'
VER.1"=2'

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. 17942, EXP DATE 9/3/10.

APPROVED: DEPARTMENT OF PUBLIC WORKS

William R. Malloy HS — 6-11-10
CHIEF BUREAU OF HIGHWAYS — DATE

APPROVED: DEPARTMENT OF PLANNING AND ZONNING

Kent Sheubrooks — 6/22/10
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE

6/18/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE

R. JACOB HIKMAT No. 17942

H:\08-007\DWG\FINAL\FINAL-R-20.DWG

PAVING SECTION P-2

N.T.S.

NOTE DEPTH OF SUPERPAVE BASE AND GRADED AGGREGATE BASE DEPEND ON CBR.

TYPICAL ROADWAY SECTION
CLASSIFICATION: ACCESS PLACE
DESIGN SPEED: 25 MPH

GOOD MEMORY LANE
SECTION NOT TO SCALE

TRAFFIC BEARING SIDEWALK TYP. DETAIL

N.T.S.

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
AS SHOWN	RJH

no.	description	date
	revisions	

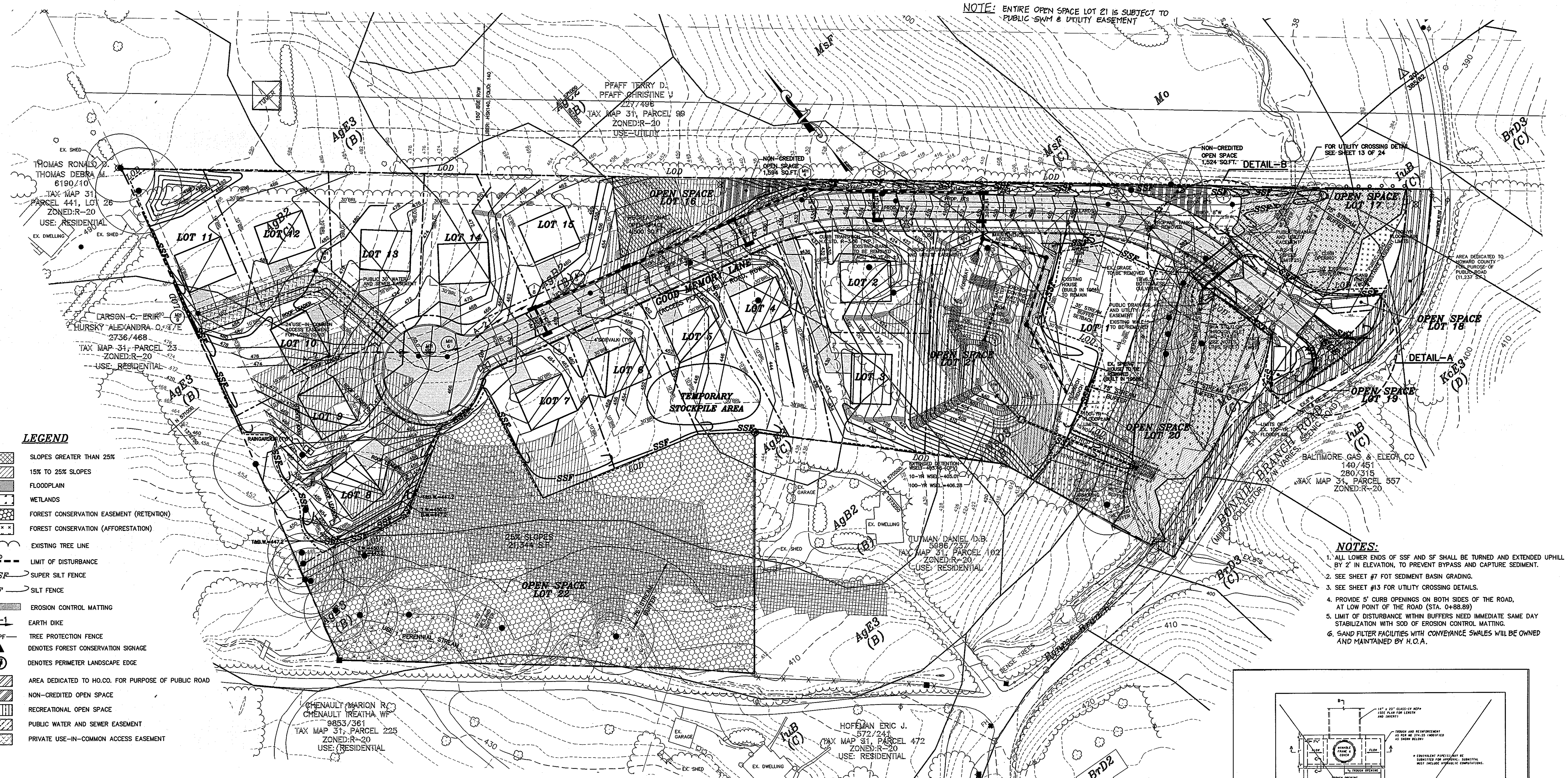
BONNIE BRANCH WOODS

TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT HOWARD COUNTY, MARYLAND

ROAD PLAN AND PROFILES

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

F-10-042

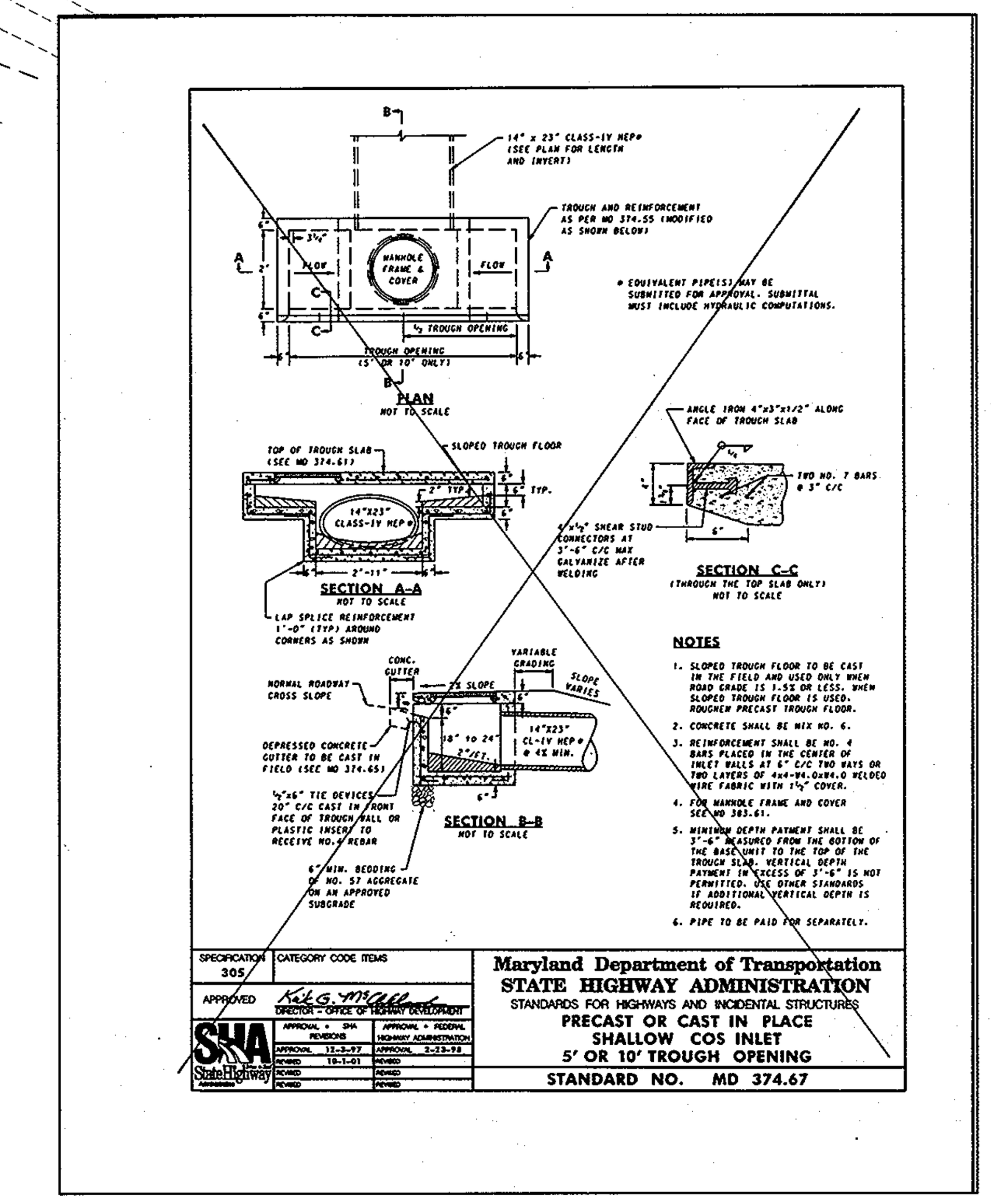


LEGEND

- SLOPES GREATER THAN 25%
- 15% TO 25% SLOPES
- FLOODPLAIN
- WETLANDS
- FOREST CONSERVATION EASEMENT (RETENTION)
- FOREST CONSERVATION (AFFORESTATION)
- EXISTING TREE LINE
- LOD — LIMIT OF DISTURBANCE
- SSF — SUPER SILT FENCE
- SF — SILT FENCE
- EROSION CONTROL MATTING
- A-1 — EARTH DIKE
- TPF — TREE PROTECTION FENCE
- ▲ DENOTES FOREST CONSERVATION SIGNAGE
- # DENOTES PERIMETER LANDSCAPE EDGE
- AREA DEDICATED TO HO.CO. FOR PURPOSE OF PUBLIC ROAD
- NON-CREDITED OPEN SPACE
- RECREATIONAL OPEN SPACE
- PUBLIC WATER AND SEWER EASEMENT
- PRIVATE USE-IN-COMMON ACCESS EASEMENT

NOTES:

1. ALL LOWER ENDS OF SSF AND SF SHALL BE TURNED AND EXTENDED UPHILL BY 2' IN ELEVATION, TO PREVENT BYPASS AND CAPTURE SEDIMENT.
2. SEE SHEET #7 FOT SEDIMENT BASIN GRADING.
3. SEE SHEET #13 FOR UTILITY CROSSING DETAILS.
4. PROVIDE 5' CURB OPENINGS ON BOTH SIDES OF THE ROAD, AT LOW POINT OF THE ROAD (STA. 0+88.89)
5. LIMIT OF DISTURBANCE WITHIN BUFFERS NEED IMMEDIATE SAME DAY STABILIZATION WITH SOD OF EROSION CONTROL MATTING.
6. SAND FILTER FACILITIES WITH CONVEYANCE SWALES WILL BE OWNED AND MAINTAINED BY H.O.A.



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 5/6/10

JOHN DOUGLAS CASHMERE
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 5/6/10

R. JACOB HIKMAT
PRINTED NAME OF ENGINEER

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

HOWARD SOIL CONSERVATION DISTRICT — DATE 5/19/10

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONNING

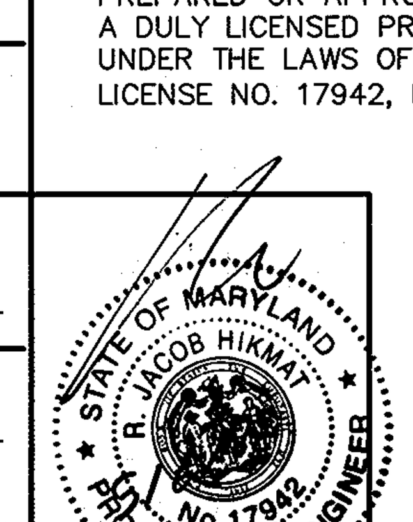
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

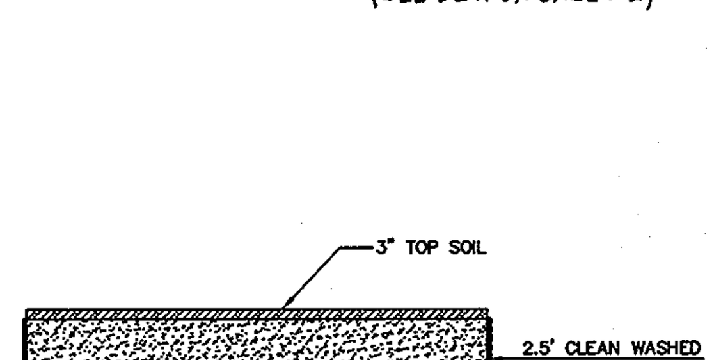
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

H:\08-007\DWG\PRELIMINARY\PRELIMINARY-R-20\PRELIMINARY

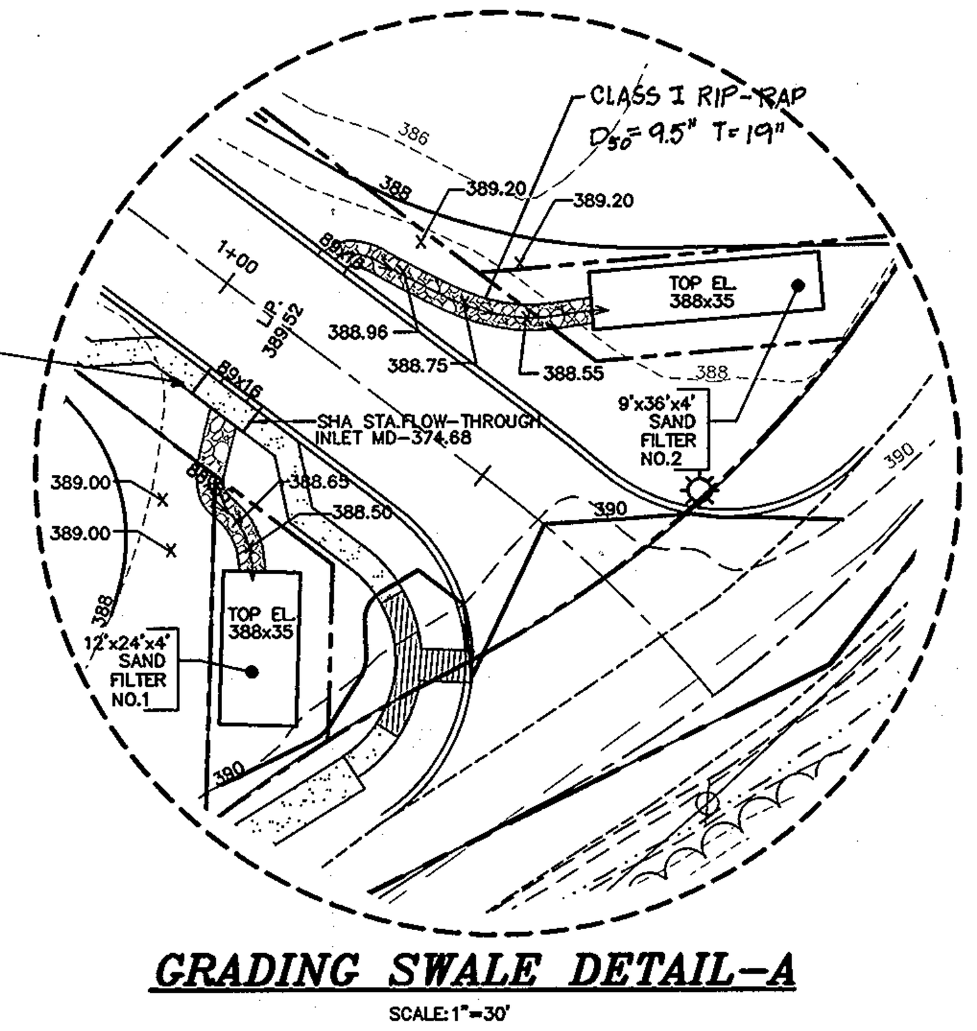
SOIL TYPE	HYDRIC	K-VALUE	WOODLAND SUITABILITY GROUP	NATIVE VEGETATION
AgF2 (B) AURA GRAVELLY LOAM 1-5% SLOPES, MODERATELY ERODED	NO	0.43	12	OAKS AND OTHER UPLAND HARDWOODS
AgE3 (B) AURA GRAVELLY LOAM 10-30% SLOPES, SEVERELY ERODED	NO	0.43	17	OAKS AND OTHER UPLAND HARDWOODS
BrD2 (B) BRANDYWINE LOAM 15-25% SLOPES, MODERATELY ERODED	NO	0.24	41	OAKS AND OTHER UPLAND HARDWOODS
LuB (C) IUKA LOAM, LOCAL ALLUVIUM 1-5% SLOPES	YES	0.37	4	MIXED HARDWOODS WATER TOLERANT
KcE3 (D) KELLY CLAY LOAM 15-30% SLOPES, SEVERELY ERODED	NO	0.32	34	MIXED HARDWOODS MAINLY WHITE OAKS
Mo (C) MOXED ALLUVIAL LAND	NO	0.43	2	MIXED HARDWOODS WATER TOLERANT
MsC (C) MONTALTO AND RELAY VERY STONY SILT LOAMS,15-30% SLOPES	NO	0.32	32	MIXED HARDWOODS MAINLY OAKS
NsD3 (C) NESHAMINY SILTY LOAM 15-30% SLOPES, SEVERELY ERODED	NO	0.28	31	MIXED HARDWOODS MAINLY OAKS

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. 17942, EXP DATE 9/3/10.

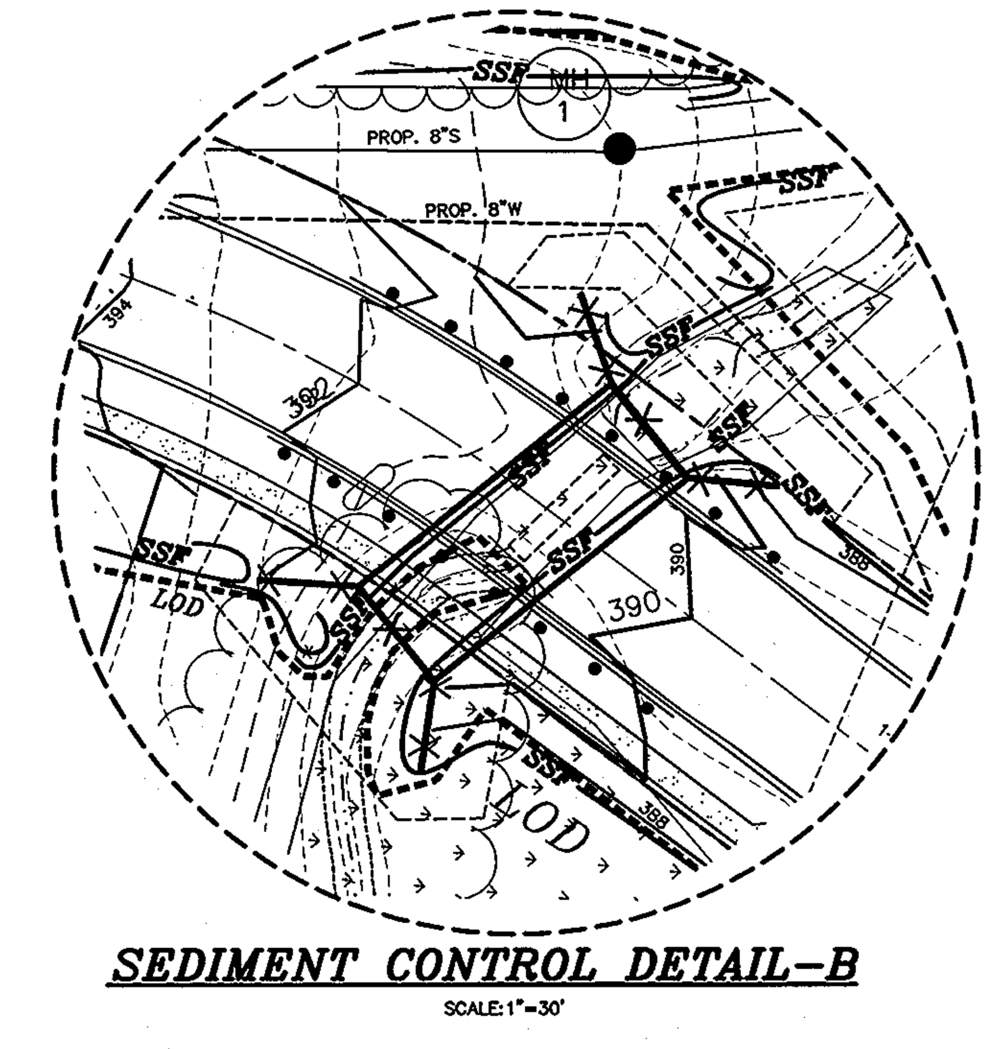




SAND FILTER TYP. DETAIL
SCALE:1"=5'



GRADING SWALE DETAIL-A
SCALE:1"=30'



SEDIMENT CONTROL DETAIL-B
SCALE:1"=30'

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
1"=50'	RJH

no.	description	date
	revisions	

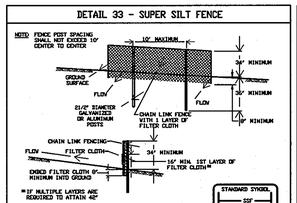
BONNIE BRANCH WOODS

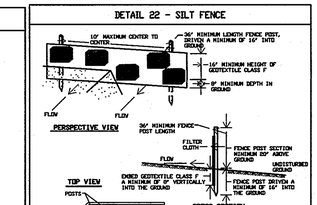
TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT — HOWARD COUNTY, MARYLAND

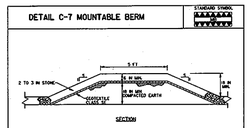
FINAL GRADING AND SEDIMENT CONTROL PLAN

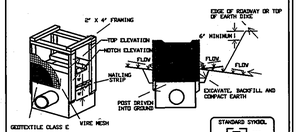
MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

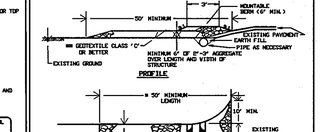
F-10-042











HOWARD SOIL CONSERVATION DISTRICT
PERMANENT SEEDING NOTES

APPLY TO GRADED OR CLEARED AREAS NOT SUBJECT TO IMMEDIATE FURTHER DISTURBANCE WHERE A PERMANENT LONG-LIVED VEGETATIVE COVER IS NEEDED.

SEEDBED PREPARATION: LOOSEN UPPER THREE INCHES OF SOIL BY RAKING , DISKING OR OTHER ACCEPTABLE MEANS BEFORE SEEDING, IF NOT PREVIOUSLY LOOSENED.

SOIL AMENDMENTS: IN LIEU OF SOIL TEST RECOMMENDATIONS, USE ONE OF THE FOLLOWING SCHEDULES:
1) PREFERRED – APPLY 2 TONS PER ACRES DOLOMITIC LIMESTONE (92 LBS/1000 SQ.FT.) AND 600 LBS. PER ACRE 10-10-10 FERTILIZER (14 LBS/1000 SQ.FT.) BEFORE SEEDING. HARROW OR DISK INTO UPPER THREE INCHES OF SOIL. AT TIME OF SEEDING , APPLY 400 LBS. PER ACRE 30-0-0 UREAFORM FERTILIZER (9 LBS./1000 SQ.FT.).
2) ACCEPTABLE – APPLY 2 TONS PER ACRE DOLOMITIC LIMESTONE (92 LBS./1000 SQ.FT.) AND 1000 LBS. PER ACRE 10-10-10 FERTILIZER (23 LBS./1000 SQ.FT.) BEFORE SEEDING. HARROW OR DISK INTO UPPER THREE INCHES OF SOIL.

SEEDING – FOR THE PERIODS MARCH 1 THRU APRIL 30, AND AUGUST 1 THRU OCTOBER 15, SEED WITH 60 LBS. PER ACRE 1.4 LBS/1000 SQ.FT.) OF KENTUCKY 31 TALL FESCUE. FOR THE PERIOD MAY 1 THRU JULY 31, SEED WITH 60 LBS. KENTUCKY 31 TALL FESCUE PER ACRE AND 2 LOBS. PER ACRE (.05 LBS./1000 SQ.FT.) OF WEEPING LOVEGRASS. DURING THE PERIOD OF OCTOBER 16 THRU FEBRUARY 28, PROTECT SITE BY: OPTION (1) – 2 TONS PER ACRE OF WELL ANCHORED STRAW MULCH AND SEED AS SOON AS POSSIBLE IN THE SPRING. OPTION (2) – USE SOD. OPTION (3) – SEED WITH 60 LBS./ACRE KENTUCKY 31 TALL FESCUE AND MULCH WITH 2 TONE/ACRE WELL ANCHORED STRAW.

MULCHING – APPLY 1-1/2 TO 2 TONS PER ACRE (70 TO 90 LBS./1000 SQ.FT) OF UNROTTED SMALL GRAIN STRAW IMMEDIATELY AFTER SEEDING. ANCHOR MULCH IMMEDIATELY AFTER APPLICATION USING MULCH ANCHORING TOOL OR 218 GALLONS PER ACRE (5 GAL/1000 SQ.FT.) OF EMULSIFIED ASPHALT ON FLAT AREAS. ON SLOPES 8 FEET OR HIGHER, USE 348 GALLONS PER ACRE (8 GAL/1000 SQ.FT.) FOR ANCHORING.

MAINTENANCE – INSPECT ALL SEEDING AREAS AND MAKE NEEDED REPAIRS, REPLACEMENTS AND RESEEDINGS.

TEMPORARY SEEDING NOTES

APPLY TO GRADED OR CLEARED AREAS LIKELY TO BE REDISTURBED WHERE A SHORT-TERM VEGETATIVE COVER IS NEEDED.

SEEDBED PREPARATION: LOOSEN UPPER THREE INCHES OF SOIL BY RAKING, DISKING OR OTHER ACCEPTABLE MEANS BEFORE SEEDING, FOR NOT PREVIOUSLY LOOSENED.

SOIL AMENDMENTS: APPLY 600 LBS. PER ACRE 10-10-10 FERTILIZER (14 LBS./1000 SQ.FT.)

SEEDING: FOR PERIODS MARCH 1 THRU APRIL 30 AND FROM AUGUST 15 THRU OCTOBER 15, SEED WITH 2-1/2 BUSHEL PER ACRE OF ANNUAL RYE (3.2 LBS./1000 SQ.FT.) FOR THE PERIOD MAY 1 THRU AUGUST 14, SEED WITH 3 LBS. PER ACRE OF WEEPING LOVEGRASS (.07 LBS./1000 SQ.FT.). FOR THE PERIOD NOVEMBER 16 THRU NOVEMBER 28, PROTECT SITE BY APPLYING 2 TONS PER ACRE OF WELL ANCHORED STRAW MULCH AND SEED AS SOON AS POSSIBLE IN THE SPRING, OR USE SOD.
MULCHING: APPLY 1-1/2 TO 2 TONS PER ACRE (70 TO 90 LBS./1000 SQ.FT.) OF UNROTTED WEED FREE SMALL GRAIN TOOL OR 218 GAL PER ACRE (5 GAL/1000 SQ.FT.) OF EMULSIFIED ASPHALT ON FLAT AREAS. ON SLOPES 8 FEET OR
STRAW IMMEDIATELY AFTER SEEDING. ANCHOR MULCH IMMEDIATELY AFTER APPLICATION USING MULCH ANCHORING HIGHER, USE 348 GAL PER ACRE (8 GAL/1000 SQ.FT.) FOR ANCHORING.
REFER TO THE 1983 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL FOR ADDITIONAL RATES AND METHODS NOT COVERED.

STANDARD SEDIMENT CONTROL NOTES

1) A MINIMUM OF 48 HOURS NOTICE MUST BE GIVEN TO THE HOWARD COUNTY DEPARTMENT OF INSPECTIONS, LICENSES AND PERMITS, SEDIMENT CONTROL DIVISION PRIOR TO THE START OF NAY 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 REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITHIN: A) 7 CALENDAR DAYS FOR ALL PERIMETER SEDIMENT CONTROL STRUCTURES, DIKES, PERIMETER SLOPES AND ALL SLOPES GREATER 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 1991 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: 9.88 ACRES
AREA DISTURBED: 6.46 ACRES
AREA TO BE ROOFED OR PAVED: 1.78 ACRES
AREA TO BE VEGITATIVELY STABILIZED: 4.68 ACRES
TOTAL CUT: 9,500 CU. YDS.
TOTAL FILL: 9,500 CU. YDS.
TOTAL WASTE/BORROW AREA LOCATION: N/A

THESE QUANTITIES ARE FOR PERMIT PURPOSES ONLY.
CONTRACTOR IS REQUIRED TO PROVIDE HIS OWN QUANTITIES MEASUREMENTS.

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 CONTROL 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 LENGTHS OR THAT WHICH CAN BE BACK FILLED AND STABILIZED WITHIN ONE WORKING DAY, WHICHEVER IS SHORTER.

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 5/6/10
JOHN DOUGLAS CASHMERE
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 5/6/10
R. JACOB HIKMAT
PRINTED NAME OF ENGINEER

THIS DEVELOPMENT PLAN IS APPROVED FOR SOIL EROSION AND SEDIMENT CONTROL BY THE HOWARD SOIL CONSERVATION DISTRICT.
HOWARD SOIL CONSERVATION DISTRICT — DATE 5/19/10

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF BUREAU OF HIGHWAYS HS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONNING
Kent Sheubrooks
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION AW — DATE 6/18/10

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. 17942, EXP DATE 9/3/10.

R. JACOB HIKMAT No. 17942
5/6/10

H:\08-007\DWG\PRELIMINARY\FINAL\FINAL-R-20.DWG

STANDARD AND SPECIFICATIONS FOR TOPSOIL

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 SPECIFICATION. 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 1 1/2" IN DIAMETER.
  ii. TOPSOIL MUST BE FREE OF PLANTS OR PLANT PARTS SUCH AS BERMUDA GRASS, QUACKGRASS, JOHNSONSON GRASS, 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.

III. 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.

IV. 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 TOPSOILS SHALL BE BETWEEN 6.0 AND 7.5. IF THE TESTED SOIL DEMONSTRATES A pH OF LESS THAN 6.0, SUFFICIENT LIME SHALL BE PERSCRIBED 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 HAVING 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 APPLLICATION
  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" TO 8" LAYER AND LIGHTLY COMPACTED TO A MINIMUM THICKNESS OF 4". SPREADING SHALL BE PERFORMED IN SUCH A MANNER THAT SODDING OR SEEDING CAN PROCEED WITH A MINIMUM OF ADDITIONAL SOIL PREPARATION AND TILLAGE. ANY IRREGULARITIES IN THE SURFACE RESULTING FROM TOPSOILING OR OTHER OPERATIONS 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 AREAS UNDER 5 ACRES SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
    a. COMPOSTED SLUDGE SHALL BE SUPPLIED BY, OR ORIGINATE FROM, A PERSON OR PERSONS WHO 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 LEASE 1 PERCENT NITROGEN, 1.5 PERCENT PHOSPHOURUS, 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 FERTILLIZER APPLIED AT THE RATE OF 4 LB/1,000 SQUARE FEET, AND 1/3 THE NORMAL LIME APPLICATION RATE.

REFERENCES: GUIDELINE SPECIFICATIONS, SOIL PREPARATION AND SODDING. MD-VA, PUB. #1, COOPERATIVE EXTENSION SERVICE, UNIVERSITY OF MARYLAND AND VIRGINIA POLYTECHNIC INSTITUTES. REVISED 1973.

TEMPORARY DUST CONTROL MEASURES

1. MULCHES – SEE STANDARDS FOR VEGETATIVE STABILIZATION WITH MULCHES ONLY. MULCH SHOULD BE CRIMPED OR TACKED TO PREVENT BLOWING.
2. VEGETATIVE COVER – SEE STANDARDS FOR TEMPORARY VEGETATIVE COVER.
3. TILLAGE – TO ROUGHTN SURFACE AND BRING CLODS TO THE SURFACE. THIS IS AN EMERGENCY MEASURE WHICH SHOULD BE USED BEFORE SOIL BLOWING STARTS. BEGIN PLOWING ON WINDWARD SIDE OF SITE. CHISEL-TYPE PLOWS APCED ABOUT 12" APART, SPRING-TOOTHED HARROWS, AND SIMILAR PLOWS ARE EXAMPLES OF EQUIPMENT WHICH MAY PRODUCE THE DESIRED EFFECT.
4. IRRIGATION – THIS IS GENERALLY DONE AS AN EMERGENCY TREATMENT. SITE IS SPRINKLED WITH WATER UNTIL THE SURFACE IS MOIST. REPEAT AS NEEDED. AT NO TIME SHOULD THE SITE BE IRRIGATED TO THE POINT THAT RUNOFF BEGINS TO FLOW.
5. BARRIERS – SOLID BOARD FENCES, SILT FENCES, SNOW FENCES, BURLAP FENCES, STRAW BALES, AND SIMILAR MATERIAL CAN BE USED TO CONTROL AIR CURRENTS AND SOIL BLOWING. BARRIERS PLACED AT RIGHT ANGLES TO PREVAILING CURRENTS AT INTERVALT OF ABOUT 10 TIMES THEIR HEIGHT ARE EFFECTIVE IN CONTROLLING SOIL BLOWING.
6. CALCIUM CHLORIDE – APPLY AT RATES THAT WILL KEEP SURFACE MOIST. MAY NEED RETREATMENT.

EROSION AND SEDIMENT CONTROL NOTES
FOR UTILITY CONSTRUCTION

1. ALL SEDIMENT CONTROL OPERATIONS ARE TO BE DONE IN ACCORDANCE WITH SECTION 219 OF THE HOWARD COUNTY VOLUME IV DESIGN MANUAL AND THE STANDARDS AND SPECIFICATIONS FOR SEDIMENT CONTROL IN DEVELOPING AREAS.
2. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSTALLED AS THE FIRST ORDER OF BUSINESS.
3. ALL EXCAVATED MATERIALS SHALL BE STOCKPILED ON THE UPGRADE SIDE OF THE MAIN TRENCH.
4. EXCAVATION AND BACKFILL SHALL BE LIMITED TO THAT WHICH CAN BE STABILIZED WITHIN ONE WORKING DAY.
5. IMMEDIATELY FOLLOWING BACKFILL OF THE SEWER TRENCH, ALL DISTURBED AREAS ARE TO BE STABILIZED IN ACCORDANCE WITH THE PERMANENT STABILIZATION AND SEEDING NOTES SHOWN ON THIS SHEET.
6. THROUGHOUT THE PROJECT, THE CONTRACTOR SHALL REGULARLY INSPECT ALL SEDIMENT CONTROL DEVICES AND PROVIDE ALL NECESSARY MAINTENANCE TO INSURE THAT ALL DEVICES ARE IN OPERATIVE CONDITION.
7. ALL SEDIMENT CONTROL FACILITIES SHALL REMAIN IN PLACE UNTIL PERMISSION FOR THEIR REMOVAL HAS BEEN OBTAINED FROM THE HOWARD COUNTY SEDIMENT CONTROL INSPECTOR.

SUPER SILT FENCE

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

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE — PAGE H - 26 - 3 — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

SILT FENCE

Silt Fence Design Criteria

Slope Steepness	(Maximum) Slope Length	(Maximum) Silt Fence Length
Flatter than 50:1	unlimited	unlimited
50:1 to 10:1	125 feet	1,000 feet
10:1 to 5:1	100 feet	750 feet
5:1 to 3:1	60 feet	500 feet
3:1 to 2:1	40 feet	250 feet
2:1 and steeper	20 feet	125 feet

Note: In areas of less than 2% slope and sandy soils (USDA general classification system, soil Class A) maximum slope length and silt fence length will be unlimited. In these areas a silt fence may be the only perimeter control required.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE — PAGE E - 15 - 3A — MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

SEQUENCE OF CONSTRUCTION

1. OBTAIN GRADING PERMIT.
2. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCES, WITH MOUNTABLE BERM, AT LOCATIONS SHOWN. (1 DAY)
3. CONSTRUCT SUPER SILT FENCES AND SILT FENCES. (3 DAYS)
4. CONSTRUCT SEDIMENT BASIN WITH ALL BASIN CONSTRUCTION MATERIALS TO BE ON SITE BEFORE START.(10 DAYS)
   CONSTRUCT HEADWALL INDICATED, ATTACH PLATE WITH 4' ORIFICE AT HEADWALL OF LOW FLOW PIPE.
   BARREL WITHIN STREAM BUFFER SHOULD BE CONSTRUCTED IN 1 DAY.
5. INSTALL DIVERSION DIKE AS INDICATED. (2 DAYS)
6. CONSTRUCT BOTTOMLESS BULVERT. (30 DAYS)
   (CONSTRUCTION OF BOTTOMLESS CULVERT MAY OCURE ON ANY STAGE PRIOR TO STAGE 12).
   A. EXCAVATE AROUND EXISTING 42" CMP CULVERT. DO NOT DISTURB THE STREAM. CHECK WEATHER REPORT TO BE SURE THAT IT WILL BE A MINIMUM FIVE (5) DAYS WITHOUT RAIN.
   B. CONSTRUCT BOTTOMLESS CULVERT FOOTING (5 DAYS)
   C. INSTALL 19'x6.5' CULVERT (5 DAYS)
   D. REMOVE EXISTING 42" CMP PIPE. (MUST BE DONE PRIOR TO MARCH 1, OR AFTER JUNE 15.)
   E. CONSTRUCT WINGWALLS. (6 DAYS)
   F. STABILIZE DISTRUBED AREAS PER BEST MANAGEMENT PRACTICES.
6. WITH PERMISSION OF INSPECTOR, BRING SITE TO GRADE, (30 DAYS) DELAY CONSTRUCTION OF SAND FILTERS.
7. CONSTRUCT STORM DRAIN, WATER, AND SEWER SYSTEMS. (10 DAYS)
8. BLOCK INLETS. (5 DAYS)
9. CONSTRUCT PAVEMENT AND CURB AND GUTTER AS INDICATED. (35 DAYS)
10. WHEN ALL CONTRIBUTING AREAS TO THE SEDIMENT BASIN HAVE BEEN STABILIZED, AND WITH APPROVAL OF SEDIMENT INSPECTOR, CONVERT SEDIMENT BASIN TO PERMANENT STORMWATER MANAGEMENT POND. (45 DAYS)
11. CONSTRUCT INFILTRATION TRENCH AND SAND FILTERS # 1 AND #2 .
12. WITH PERMISSION OF SEDIMENT CONTROL INSPECTOR, REMOVE ALL OLD AND NEW JUNK,TRASH AND DEBRIS FROM THE FLOODPLAINS, STREAMS, WETLAND AND THEIR BUFFERS, AND FROM FOREST CONSERVATION AREAS.
13. WHEN ALL CONTRIBUTING DRAINAGE AREAS TO SEDIMENT CONTROL DEVICES HAVE BEEN STABILIZED AND WITH THE APPROVAL OF THE SEDIMENT CONTROL INSPECTOR, REMOVE SEDIMENT CONTROL DEVICES (EXCEPT SILT FENCES AND SUPER SILT FENCES WHICH SHOULD BE USED FOR SDP-CONSTRUCTION OF THE HOUSES) AND STABILIZE REMAINING DISTURBED AREAS. (3 DAYS) PROVIDE A COPY OF THE POND AS-BUILT APPROVAL LETTER FROM THE HOWARD SCD TO THE INSPECTOR.

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 ON 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 100-YEAR FLOODPLAIN.
3. DO NOT USE EXCAVATED MATERIALS 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 MATERIALS. OR OTHER DELETERIOUS SUBSTANCE.
4. PLACE HEAVY EQUIPMENT IN MATS OR SUITABLY OPERATE THE EQUIPMENT OT PREVENT DAMAGE TO NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, WATERWAYS, OR 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 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 WETLANDS AND NONTIDAL WETLAND BUFFER SHALL CONSIST OF THE FOLLOWING SPECIES: ANNUAL RYEGRASS (LOLIUM MULTIFLORUM), MILLET (SETARIA ITALICA) BARLEY (HORDEUM SP.) OATS (UNIOLA SP. /OR RYE ((SECALE CEREALE). THESE SPECIES WILL ALLOW FOR T HE STABILIZATION OF THE SITE WHILE ALSO ALLOWING FOR THE VOLUNTARY REVEGETATION OF NATURAL WETLAND SPECIES. OTHER NON-PERSISTENT VEGETATION MAY BE ACCEPTABLE, BUT MUST BE APPROVED BY THE NONTIDAL WETLANDS AND WATERWAYS DIVISION. KENTUCKY 31 FESCUE SHALL NOT BE UTILIZED IN WETLAND OR BUFFER AREAS, THE AREA SHOULD BE SEEDED AND MULCHED TO REDUCE EROSION AFTER CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED.
8. AFTER INSTALLATION HAS BEEN COMPLETED, MAKE POST-CONSTRUCTION GRADES AND ALAVETIONS THE SAME AS THE ORIGINAL GRADES AND ELEVATIONS IN TEMPORARILY IMPACTED AREAS.
9. TO PROTECT AQUATIC SPECIES, IN-STREAM WORK IS PROHIBITED AS DETERMINED BY THE CLASSIFICATION OF THE STREAM:
   -USE I WATERS: IN-STREAM WORK SHALL NOT BE CONDUCTED DURING THE PERIOD MARCH 1 THROUGH JUNE 15, INCLUSIVE, DURING ANY YEAR.
   -USE III WATERS: IN-STREAM WORK SHALL NOT BE CONDUCTED DURING THE PERIOD OCTOBER 1 THROUGH APRIL 30, INCLUSIVE, DURING ANY YEAR.
   -USE IV WATERS: IN-STREAM WORK SHALL NOT BE CONDUCTED DURING THE PERIOD MARCH 1 THROUGH MAY 31, INCLUSIVE, DURING ANY YEAR.
10. STORMWATER RUNOFF FROM IMPERVIOUS SURFACE SHALL BE CONTROLLED TO PREVENT THE WASHING OF DEBRIS INTO THE WATERWAY.
11. CULVERTS SHALL BE CONSTRUCTED AND ANY RIP RAP PLACED SO AS NOT TO OBSTRUCT THE MOVEMENT OF AQUATIC SPECIES, UNLESS THE PURPOSE OF ACTIVITY IS TO IMPOUND WATER.

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
AS SHOWN	RJH

no.	description	date
	revisions	

BONNIE BRANCH WOODS
TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT HOWARD COUNTY, MARYLAND
SEDIMENT CONTROL NOTES AND DETAILS

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

SOIL SCHEDULE

AgB2	(B)	AURA GRAVELLY LOAM, 1–5% SLOPES, MODERATELY ERODED.
AgE3	(B)	AURA GRAVELY LOAM, 1030% SLOPES, SEVERELY ERODED
BrD2	(C)	BRANDYWINE LOAM, 15–25% SLOPES, MODERATELY ERODED
luB	(C)	IUKA LOAM, LOCAL ALLUVIUM, 105% SLOPES.
KCE3	(D)	KELLY CLAY LOAM, 15–30% SLOPES, SEVERELY ERODED
Mo	(C)	MIXED ALLUVIAL LAND
MsF	(C)	MONTALTO AND RELAY VERY STONY SILT LOAMS, 25–60% SLOPES.
NsD3	(C)	NESHAMINY SILTY LOAM, 15–25% SLOPES, SEVERELY ERODED

DA=0.64 AC | I-8 | C=0.52
DA=0.93 AC | I-7 | C=0.34
DA=0.27 AC | I-5 | C=0.33
DA=0.07 AC | I-3 | C=0.74
DA=0.10 AC | I-2 | C=0.55
DA=0.41 AC | I-9 | C=0.59
DA=0.29 AC | I-6 | C=0.46
DA=0.18 AC | I-4 | C=0.56
DA=0.15 AC | I-1 | C=0.62

100-YEAR WSEL

SECTION	EX. EL.	PR. EL.
1	381.66	381.90
2	381.76	381.78
3	386.81	386.85
4	386.79	386.82
5	386.17	386.71
6	390.50	388.01
7	390.50	388.58
8	390.49	389.28
9	391.12	391.17
10	392.90	392.96

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. 17942, EXP DATE 9/3/10.

STATE OF MARYLAND — R. JACOB HIMMIT — No. 17942 — PROFESSIONAL ENGINEER

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

project 08-007 | date MAY 2010
illustration MMM | engineering MMM
scale 1"=50' | approval RJH

no.	description	date
	revisions	

BONNIE BRANCH WOODS

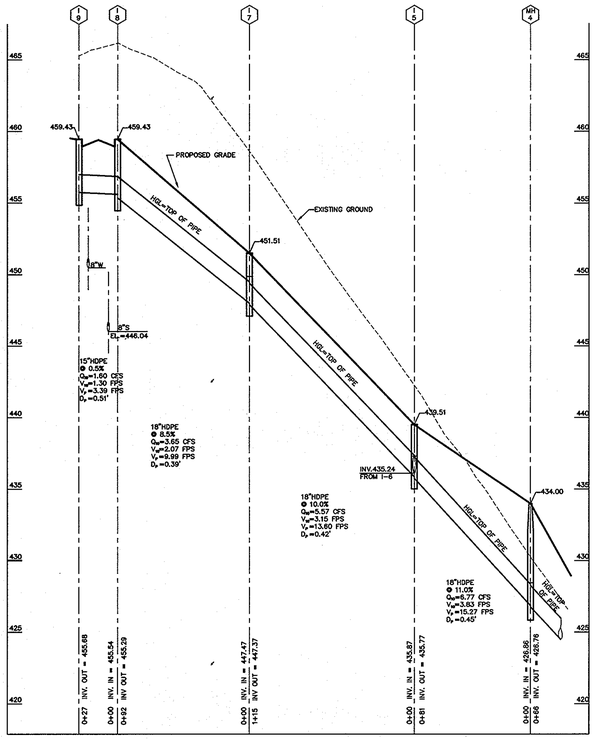
TAX MAP: 31 PARCEL: 101 HOWARD COUNTY, MARYLAND
SECOND ELECTION DISTRICT

STORM DRAIN DRAINAGE AREA MAP

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

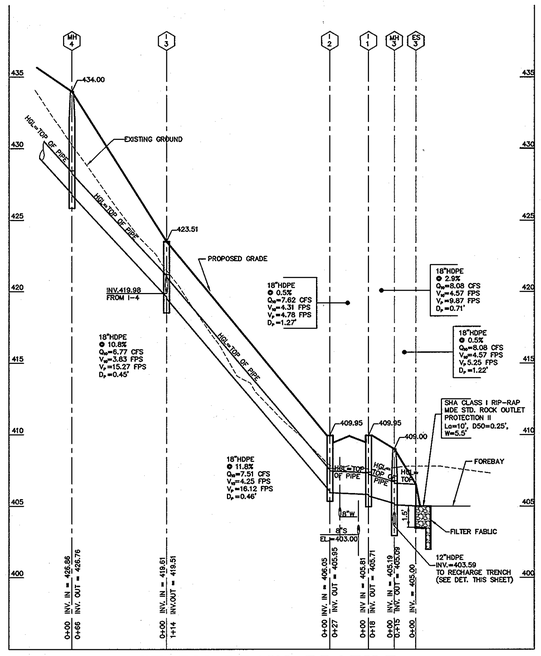
F-10-042

H:\08-007\DWG\FINAL\FINAL-R-20.DWG



STORM DRAIN PEOFILE I-5 TO MH-4

SCALE: HOR. 1"=50'
VER.1"=5'



STORM DRAIN PROFILE MH-4 TO EI-1

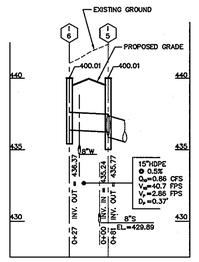
SCALE: HOR. 1"=50'
VER.1"=5'

STRUCTURE SCHEDULE

NO.	LOCATION*	TOP**	INV. IN	INV. OUT	COMMENTS
EW-1	N 570,497.0 E 1,373,395.4	–	–	398.00	END WALL TYPE C (HO.CO.STD. D-5-21)
ES-1	N 570,356.7 E 1,373,454.0	–	–	390.31	END SECTION (HO.CO.STD. D-5.51)
ES-2	N 570,546.4 E 1,373,520.4	–	–	402.00	6" PVC END SECTION
ES-3	N 570,318.9 E 1,373,473.5	–	–	405.00	18" HDPE END SECTION
I-1	GOOD MEMORY LANE STA.4+15.0 OFFSET 12.52 LT.	409.95	405.81	405.71	INLET TYPE A-10 (HO. CO. STD D-4.03)
I-2	GOOD MEMORY LANE STA.4+15.0 OFFSET 12.52 RT.	409.95	406.05	405.95	INLET TYPE A-10 (HO. CO. STD D-4.03)
I-3	GOOD MEMORY LANE STA.5+28.0 OFFSET 12.52 RT.	423.51	419.98 419.61	419.51	INLET TYPE A-10 (HO. CO. STD D-4.03)
I-4	GOOD MEMORY LANE STA.5+28.0 OFFSET 12.52 LT.	423.51	–	420.11	INLET TYPE A-10 (HO. CO. STD D-4.03)
I-5	GOOD MEMORY LANE STA.6-65.5 OFFSET 12.52 RT.	440.01	436.24 435.87	435.77	INLET TYPE A-10 (HO. CO. STD D-4.03)
I-6	GOOD MEMORY LANE STA.6-65.5 OFFSET 12.52 LT.	440.01	–	436.37	INLET TYPE A-10 (HO. CO. STD D-4.03)
I-7	GOOD MEMORY LANE STA.7-80.5 OFFSET 12.52 RT.	450.48	446.72	446.62	INLET TYPE A-10 (HO. CO. STD D-4.03)
I-8	GOOD MEMORY LANE STA.8+71.0 OFFSET 12.52 RT.	455.91	452.06	451.81	INLET TYPE A-10 (HO. CO. STD D-4.03)
I-9	GOOD MEMORY LANE STA.8+71.0 OFFSET 12.52 LT.	455.91	–	452.19	INLET TYPE A-10 (HO. CO. STD D-4.03)
MH-1	N 470,513.4 E 1,373,439.1	407.50	401.84	401.74	MH (HO. CO. STD G 5.12)
MH-2	N 570,571.2 E 1,373,521.5	405.00	402.29	402.19	MH (HO. CO. STD G 5.12)
MH-3	N 570,626.4 E 1,373,485.4	409.00	405.19	405.09 403.19	MH (HO. CO. STD G 5.12)
MH-4	GOOD MEMORY LANE STA.5+89.0 OFFSET 12.52 RT.	430.50	426.86	426.76	MH (HO. CO. STD G 5.12)

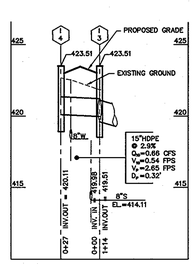
* STATIONS GIVEN TO CENTERLINE FACE OF INLET AT TOP OF CURB FOR INLETS LOCATED WITHIN THE ROAD RIGHT-OF-WAY. STATIONS FOR YARD INLETS TO CL OF INLET. LOCATION OF MANHOLES IS TO CL OF MANHOLE COVER. END SECTION GIVEN TO THE CENTERLINE OF PIPE AT THE CONNECTION OF THE STORM DRAIN PIPE TO THE END SECTION.

** ELEVATIONS MEASURED TO CENTER OF ALL INLETS.



STORM DRAIN PROFILE I-6 TO I-5

SCALE: HOR. 1"=50'
VER.1"=5'

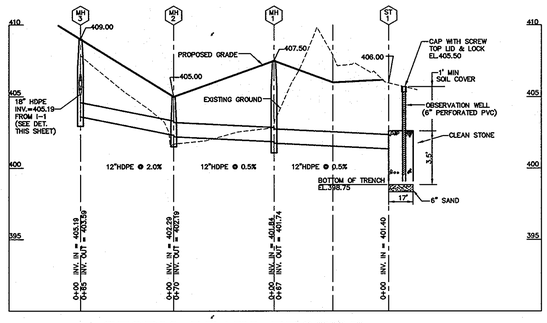


STORM DRAIN PROFILE I-4 TO I-3

SCALE: HOR. 1"=50'
VER.1"=5'

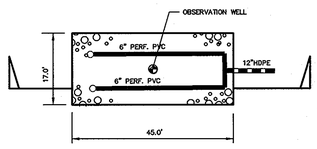
PIPE SCHEDULE

QUANTITY	PIPE SIZE
214	12" HDPE
289	15" HDPE
428	18" HDPE
85	6" PERFOREATE PVC



STORM DRAIN PROFILE MH-3 TO ST-1

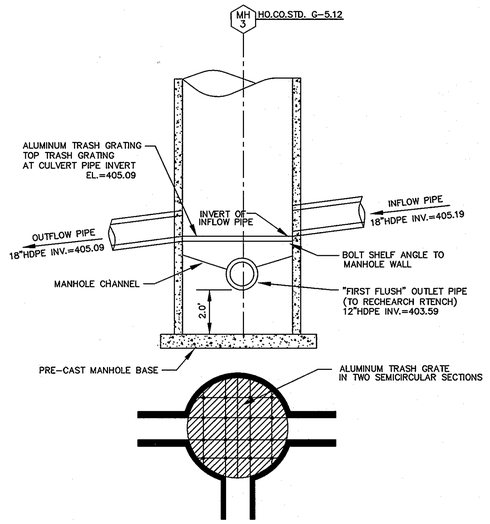
SCALE: HOR. 1"=50'
VER.1"=5'



1). FILTER FABRIC (CLASS C) TOP AND ALL SIDES EXCEPT BOTTOM
2). AGGREGATE SIZE 1.5" TO 3" MINIMUM WITH NO FINES
3). CAP ALL ENDS OF PIPE.
4). USE SCHEDULE SDR 35 OR 40.
5). PERFORATIONS 3/8" DIAMETER. TERMINATE PERFORATIONS A MINIMUM 1' FROM END OF TRENCH.
(6). GRASSES OF THE FESCUE FAMILY SHOLD BE PLANTED AROUND OBSERVATION WELL.

STONE RECHARGE TRENCH

NOTE: STORM DRAIN FROM MH-3 TO ST-1 AND STONE RECHARGE TRENCH SHALL BE OWNED AND MAINTAIN BY HOA.



DIVERSION MANHOLE #3 DETAIL

NTS

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. 17942, EXP DATE 9/3/10.

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONNING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

STATE OF MARYLAND
JACOB HIKMAT
No. 17942
PROFESSIONAL ENGINEER

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0298

project 08-007 | date MAY 2010
illustration | engineering MMM
scale 1"=50' | approval RJH

no. | description | date
revisions

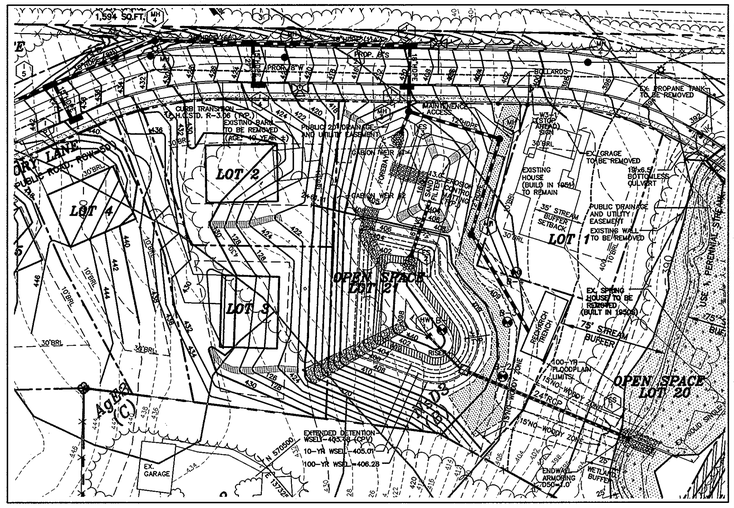
BONNIE BRANCH WOODS

TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT HOWARD COUNTY, MARYLAND
STORM DRAIN PROFILES

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Dall. (410) 997-0298 Fax.

F-10-042

H:\08-007\DWG\FINAL\FINAL-R-20

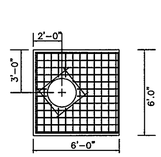


STORMWATER MANAGEMENT PLAN

SCALE: 1"=50'

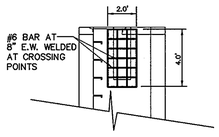
POND DATA:

HAZARD CLASSIFICATION:	"A"
F-1 SAND FILTER, EXTENDED DETENTION	
DRAINAGE AREA:	5.55 AC
PROPOSED RCN:	72
PROPOSED Tc:	0.26
SAND FILTER AREA (WQv):	200 S.F.
EXTENDED DETENTION WSEL:	403.48
10-YR CLOGGED Q:	10.79 CFS
10-YR CLOGGED WSEL:	405.36
10-YR Q:	8.04 CFS
10-YR WSEL:	405.01
100-YR Q:	18.88 CFS
100-YR WSEL:	406.28
Wqv REQUIRED:	4,182 C.F.
Wqv PROVIDED:	4,182 C.F.
Rev REQUIRED:	1,179 C.F.
Rev PROVIDED:	1,179 C.F.
MAINTENANCE:	JOINTLY MAINTAINED
OWNERSHIP:	PRIVATE



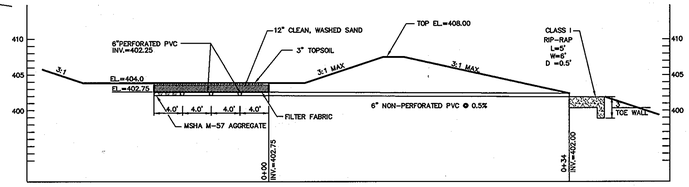
TOP SLAB DETAIL

SCALE: 1"=5'



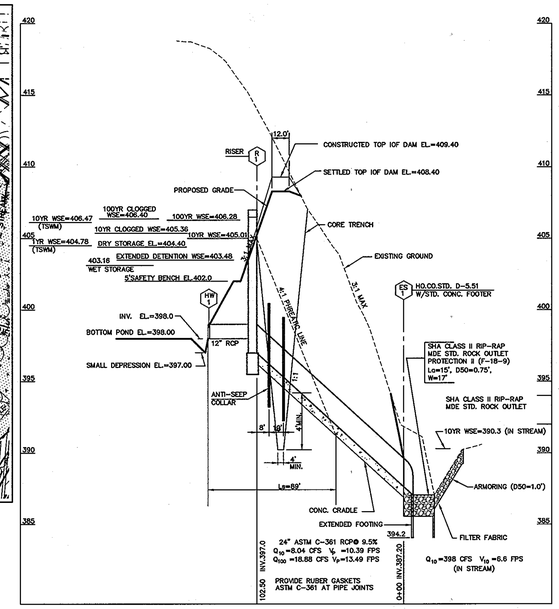
ELEVATION OF TRASH RACK

SCALE: 1"=5'



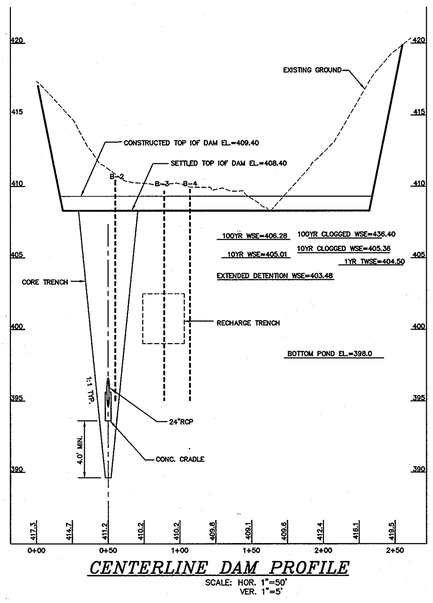
SAND FILTER PROFILE

SCALE: 1"=10'



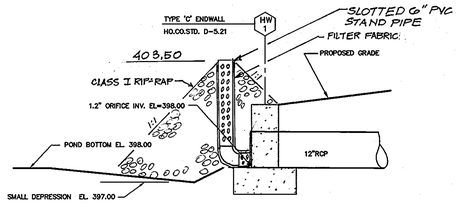
PRINCIPLE SPILLWAY PROFILE

SCALE: HOR. 1"=50'
VER. 1"=5'



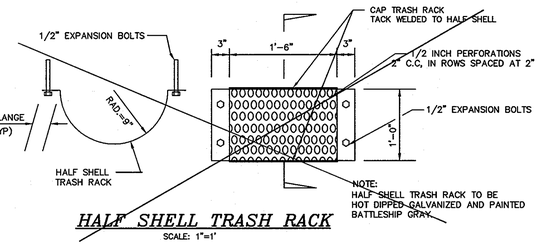
CENTERLINE DAM PROFILE

SCALE: HOR. 1"=50'
VER. 1"=5'



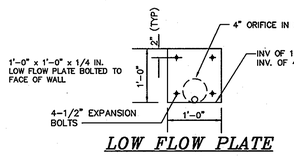
HEAD WALL DETAIL

SCALE: 1"=2'



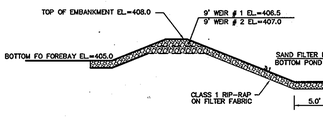
HALF SHELL TRASH RACK

SCALE: 1"=1'



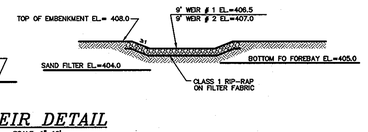
LOW FLOW PLATE

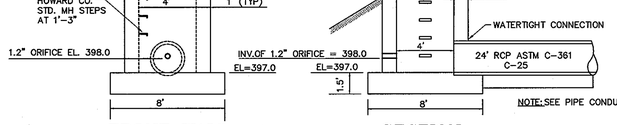
N.T.S.



WEIR DETAIL

SCALE: 1"=10'





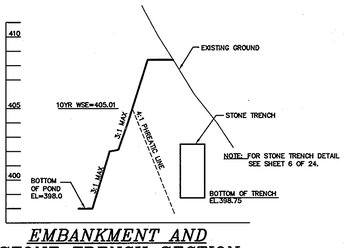
FRONT WALL

SECTION

SWM RISER STRUCTURE

SCALE: 1"=5'

NOTE: SEE PIPE CONDUICT SPECIFICATIONS (SHEET 9)



EMBANKMENT AND STONE TRENCH SECTION

SCALE: HOR. 1"=50'
VER. 1"=5'

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 5/6/10

JOHN DOUGLAS CASHMERE
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 5/6/10

R. JACOB HIMMAT
PRINTED NAME OF ENGINEER

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

HOWARD SOIL CONSERVATION DISTRICT — DATE 5/19/10

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF BUREAU OF HIGHWAYS — DATE 6-1-10

APPROVED: DEPARTMENT OF PLANNING AND ZONNING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

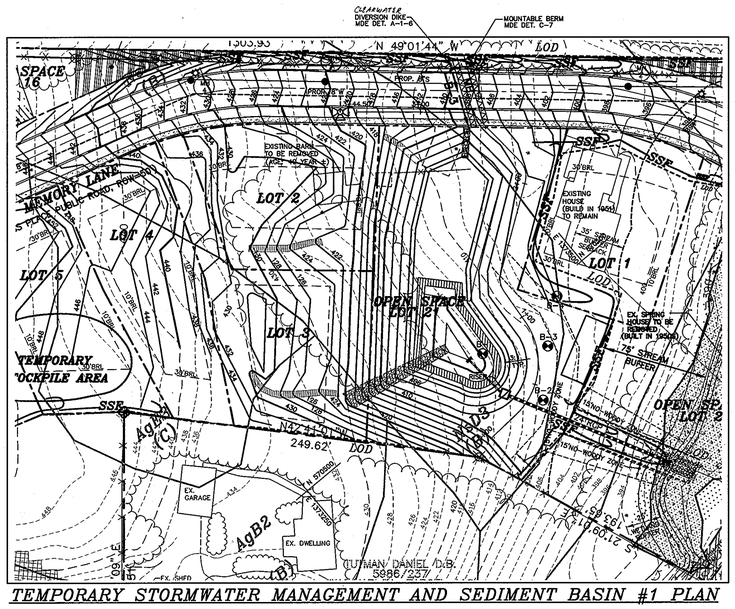
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

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. 17942, EXP DATE 9/3/10.

STATE OF MARYLAND — R. JACOB HIMMAT — 17942 — REGISTERED PROFESSIONAL ENGINEER

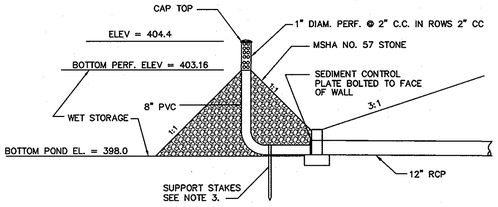
SEDIMENT BASIN #1: SCHEDULE

EXISTING DRAINAGE AREA = 4.20 AC.
PROPOSED DRAINAGE AREA = 5.55 AC.
STORAGE REQUIRED = 19,980 CU. FT.
STORAGE PROVIDED = 19,980 @ EL. 404.40
BARREL SIZE = 24"RCP
BARREL SIZE = 24" RCP
DEPTH BELOW OUTLET EL. = 5.16'
EMBANKMENT EL. = 408.40
OUTLET ELEV. = 403.16
CLEANOUT ELEV. = 402.32
BOTTOM ELEV. = 398.0
BOTTOM DIMENSIONS = 17.5'x19.5'x30.0'
EXISTING Q_2 = 1.42 CFS
PROPOSED Q_2 = 14.6 CFS



TEMPORARY STORMWATER MANAGEMENT AND SEDIMENT BASIN #1 PLAN

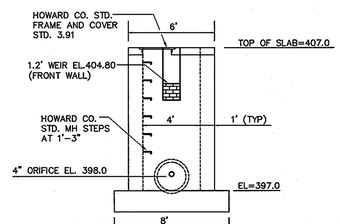
SCALE: 1"=50'



1. PERFORATIONS IN THE DRAW DOWN DEVICE MAY NOT EXTEND INTO THE WET STORAGE
2. THE TOTAL AREA OF THE PERFORATIONS MUST BE GREATER THAN 4 TIMES THE AREA OF THE ORIFICE.
3. PROVIDE SUPPORT OF DRAW DOWN DEVICE TO PREVENT SAGGING AND FLOTAION. AN ACCEPTABLE PREVENTATIVE MEASURE IS TO STAKE BOTH SIDES OF DRAW DOWN DEVICE WITH 1" STEEL ANGLE OR 1"X4" SQUARE OR 2" ROUND WOODEN POSTS SET 3' INTO THE GROUND, THEN JOINING THEM TO THE DEVICE BY WRAPPING WITH 12 GUAGE WIRE.
4. THE PERFORATED PORTION OF THE DRAW DOWN DEVICE SHALL BE WRAPPED WITH 1/2" HARDWARE CLOTH AND GEOTECTILE FABRIC. THE GEOTEXTILE FABRIC SHALL MEET THE SPECIFICATIONS FOR GEOTEXTILE CLASS E.

TEMPORARY DEWATERING STANDPIPE

SCALE: 1"=5'



TSWM BLOCKING DETAIL

SCALE: 1"=5'

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
AS SHOWN	RJH

no.	description	date
	revisions	

BONNIE BRANCH WOODS

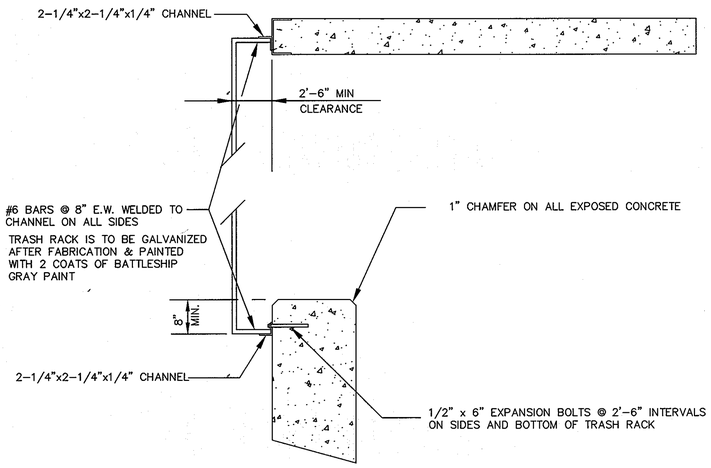
TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT
HOWARD COUNTY, MARYLAND

SWM AND SEDIMENT BASIN PLANS, PROFILES AND DETAILS

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

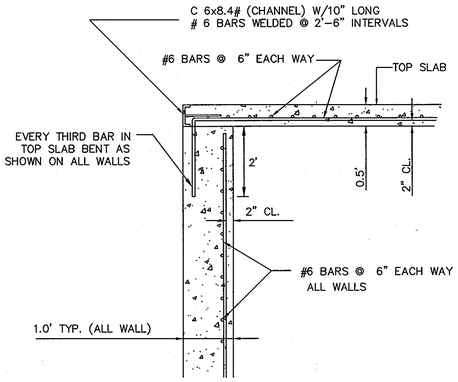
F-10-042

H:\08-007\DWG\PRELIMINARY\FINAL\FINAL-R-20.DWG



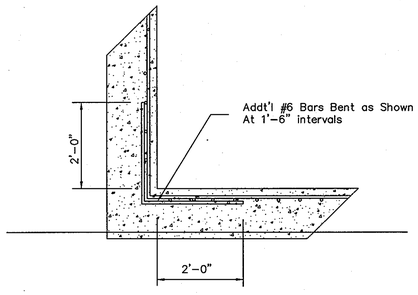
TRASH RACK DETAIL

N.T.S.



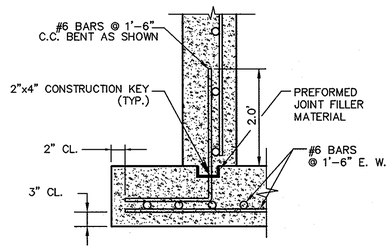
REINFORCEMENT DETAIL

N.T.S.



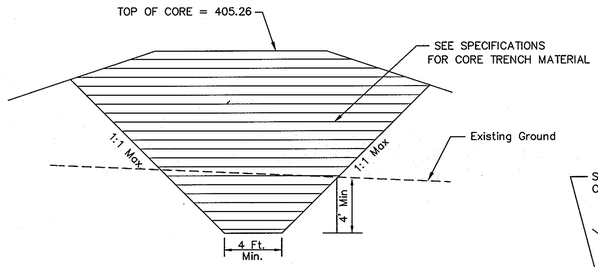
CORNER TREATMENT DETAIL

N.T.S.



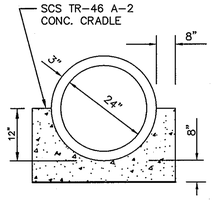
WALL TO BOTTOM SLAB CONNECTION DETAIL

N.T.S.



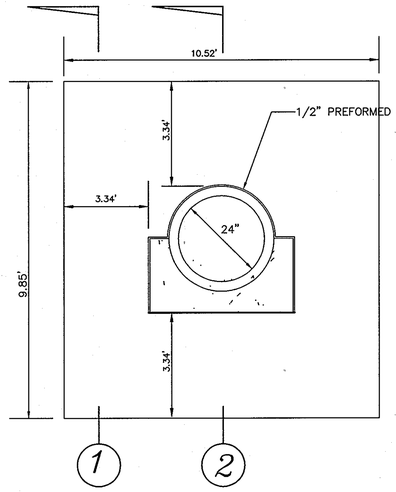
CORE TRENCH DETAIL

N.T.S.



DETAIL OF CONCRETE CRADLE

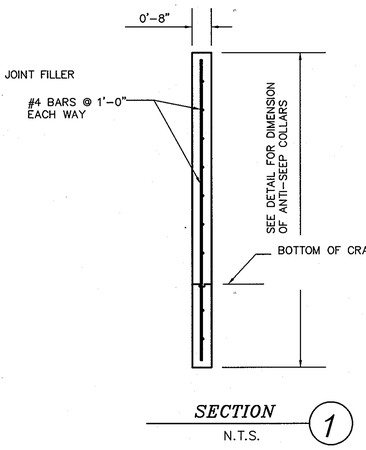
N.T.S.



ANTI-SEEP COLLAR DETAIL

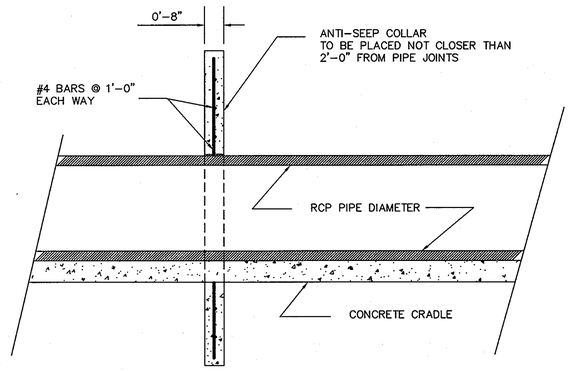
N.T.S.

NOTE:
ASPHALT OR NEOPRENE JOINT FILLER MATERIAL BETWEEN ALL CONCRETE SURFACES, EXCEPT THE PIPE AND CRADLE.



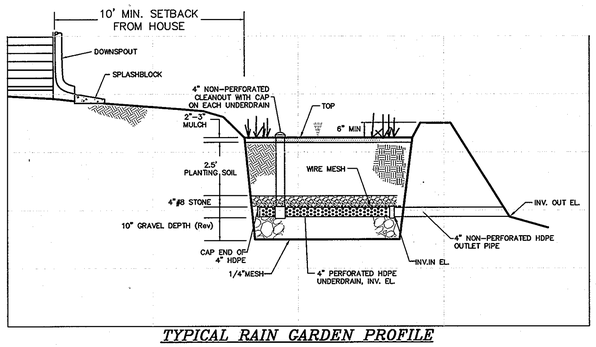
SECTION 1

N.T.S.

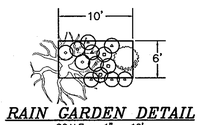


SECTION 2

N.T.S.



TYPICAL RAIN GARDEN PROFILE



RAIN GARDEN DETAIL

SCALE : 1" = 10'

PLANT LIST

QUANTITY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE
1		PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	2-1/2" - 3" CAL.
1		ILEX GLABRA	INK BERRY	2' - 3' HT.
6		LOBELIA SIPHILITICA	GREAT BLUE LOBELIA	1 GAL. CONTAINER
4		ONOCLEA SENSIBILIS	SENSITIVE FERN	1 GAL. CONTAINER
3		ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	1 GAL. CONTAINER

TOTAL: 13 PERENNIALS, 1 SHRUB, 1 TREE (PER EACH RAIN GARDEN)

NOTE: FINAL DESIGN OF THE RAIN GARDENS WILL BE PROVIDED AT SDP STAGE.

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 5/6/10

JOHN DOUGLAS CASHMERE
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 5/6/10

R. JACOB HIKMAT
PRINTED NAME OF ENGINEER

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

HOWARD SOIL CONSERVATION DISTRICT — DATE 5/19/10

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONNING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

STATE OF MARYLAND · R. JACOB HIKMAT · 17942 · 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. 17942, EXP DATE 9/3/10.

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

H:\08-007\DWG\PRELIMINARY\FINAL\FINAL-R-20.DWG

project 08-007 | date MAY 2010
illustration MMM | engineering MMM
scale AS SHOWN | approval RJH

no. | description revisions | date

BONNIE BRANCH WOODS

TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT — HOWARD COUNTY, MARYLAND

SWM DETAILS

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax

F-10-042

MD-378 POND SPECIFICATIONS (JANUARY 2000)

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 STORM WATER 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 DRAIN 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 CC, 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.

STRUCTURAL 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 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 TAMPER 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 THAT SPECIFIED FOR THE CORE OF THE EMBANKMENT OR OTHER EMBANKMENT MATERIALS.

PIPE CONDUIT

ALL PIPES SHALL BE CIRCULAR IN CROSS SECTION.

CORRUGATED METAL PIPE – ALL OF THE FOLLOWING CRITERIA SHALL APPLY FOR CORRUGATED METAL PIPE:

I. 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 STEEL 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-21 L WITH WATERTIGHT COUPLING BANDS 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, PRE-PUNCHED TO THE FLANGE BOLT CIRCLE, SANDWICHED BETWEEN ADJACENT FLANGES; A 12-INCH WIDE STANDARD LAP TYPE BAND

TYPE BAND WITH O-RING GASKETS HAVING A MINIMUM DIAMETER OF ½ 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 SEARNS 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
WHERE A CONCRETE CRADLE IS NOT NEEDED FOR STRUCTURAL REASONS, FLOWABLE FILL MAY BE USED AS DESCRIBED IN THE "STRUCTURE 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 D1785 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 REQUIREMENTS OF AASHTO M252 TYPE S, AND 12" THROUGH 24" INCH SHALL MEET THE REQUIREMENTS 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. BACKFILL 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, MAINTENANCE AND INSPECTION

INSPECTION OF THE POND(S) SHOWN HEREON SHALL BY PERFORMED AT LEAST ANNUALLY, IN ACCORDANCE WITH THE CHECKLIST AND REQUIREMENTS CONTAINED WITHIN USDA SCS "STANDARDS AND SPECIFICATIONS FOR PONDS" (MD-378), THE POND OWNER(S) AND THE HEIRS SUCCESSORS OR ASSIGNS SHALL BE RESPONSIBLE FOR THE SAFETY OF THE POND AND THE CONTINUED OPERATION, SURVEILLANCE, INSPECTION AND MAINTENANCE THEREOF. THE POND OWNER(S) SHALL PROMPTLY NOTIFY THE SOIL CONSERVATION DISTRICT OF ANY UNUSUAL OBSERVATIONS THAT MAY BE INDICATIONS OF DISTRESS SUCH AS EXCESSIVE SEEPAGE, TURBID SEEPAGE, SLIDING OR SLUMPING.

OPERATION, AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED SWM POND

JOINTLY

ROUTINE MAINTENENCE: (PROVIDED BY HOA)

1. FACILITY SHALL BE INSPECTED ANNUALLY AND AFTER MAJOR STORMS. INSPECTIONS SHALL BE PERFORMED 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 PER YEAR, ONCE IN JUNE AND ONCE IN SEPTEMBER. OTHER SITE SLOPES AND MAINTENANCE ACCESS SHALL 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 SHALL BE REPAIRED AS SOON AS IT IS NOTICED.

NON-ROUTINE MAINTENENCE: (PROVIDED BY HOWARD COUNTY)

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 FOREBEAY, 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.

OPERATION, AND MAINTENANCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED SURFACE SWM FILTRATION TRENCH

1. THE MONITORING WELLS AND STRUCTURES SHALL BE INSPECTED ON A QUARTERLY BASIS AND AFTER EVERY LARGE STORM EVENT.
2. WATER LEVEL AND SEDIMENT BUILD UP IN THE MONITORING WELLS SHALL BE RECORDED OVER A PERIOD OF SEVERAL DAYS TO ENSURE 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 A 72 HOUR TIME PERIOD, CORRECTIVE ACTION SHALL BE TAKEN.
5. THE MAINTENANCE LOGBOOK SHALL BE AVAILABLE TO HOWARD COUNTY FOR INSPECTION TO ENSURE COMPLIANCE WITH OPERATION AND MAINTENANCE CRITERIA.
6. ONCE THE PERFORMANCE CHARACTERISTICS OF THE INFILTRATION FACILITY HAVE BEEN VERIFIED, THE MONITORING SCHEDULE CAN BE REDUCED TO AN ANNUAL BASIS UNLESS THE PERFORMANCE DATA INDICATES THAT A MORE FREQUENT SCHEDULE IS REQUIRED.

OPERATION, AND MAINTENANCE SCHEDULE FOR RAIN GARDENS

1. ANNUAL MAINTENANCE OF PLANT MATERIAL, MULCH LAYER AND SOIL LAYER IS REQUIRED. MAINTENANCE OF MULCH AND SOIL IS LIMITED TO CORRECTING AREAS OF EROSION OR WASH OUT. ANY MULCH REPLACEMENT SHALL BE DONE IN THE SPRING. PLANT MATERIAL SHALL BE CHECKED FOR DISEASE AND INSECT INFESTATION AND MAINTENANCE WILL ADDRESS DEAD MATERIAL AND PRUNING.
2. SCHEDULE OF PLANT INSPECTION WILL BE TWICE A YEAR, IN SPRING AND FALL. THIS INSPECTION WILL INCLUDE REMOVAL OF DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, TREATMENT OF ALL DISEASED TREES AND SHRUBS AND REPLACEMENT OF ALL DEFICIENT STAKES AND WIRES.
3. MULCH SHALL BE INSPECTED EACH SPRING. REMOVE PREVIOUS MULCH LAYER BEFORE APPLYING NEW LAYER ONCE EVERY 2 TO 3 YEARS.
4. SOIL EROSION TO BE ADDRESSED ON AN AS NEEDED BASIS, WITH A MINIMUM OF ONCE PER MONTH AND AFTER HEAVY STORM EVENTS.

OPERATION AND MAINTENENCE SCHEDULE FOR PRIVATELY OWNED AND MAINTAINED SURFACE STORMWATER FILTRATION SYSTEM

1. THE STORMWATER WETLAND FACILITY SHALL BE INSPECTED ANNUALLY AND AFTER MAJOR STORMS. INSPECTIONS SHALL BE PERFORMED DURING WET WEATHER TO DETERMINE IF THE FACILITY IS FUNCTIONING PROPERLY.
2. THE TOP AND SIDE SLOPES OF THE EMBANKMENT SHALL BE MOWED A MINIMUM OF ONCE PER YEAR, WHEN VEGETATION REACHES 18" IN HEIGHT OR AS NEEDED.
3. DEBRIS AND LITTER SHALL BE REMOVED DURING REGULAR MOWING OPERATION AND AS NEEDED.
4. VISIBLE SIGNS OF EROSION IN THE FACILITY SHALL BE REPAIRED AS SOON AS IT IS NOTICED.
5. REMOVE SILT WHEN IT EXCEEDS FOUR (4) INCHES DEEP IN THE FOREBAY.
6. EACH FOREBAY SHALL BE INSPECTED NO LESS THAN EVERY OTHER MONTH. DEBRIS AND ACCUMULATED SEDIMENT SHALL BE REMOVED FORM THE FOREBAYS.
7. THE MICRO-POOL AREA OF SWM FACILITY SHALL BE INSPECTED CONCURRENTLY WITH THE FOREBAYS. DEBRIS SHALL BE REMOVED FROM THE PERMANENT POOL AREA NO LESS THAN A BI-MONTHLY BASIS.
8. THE LOW FLOW OULET SHALL BE VISUALLY INSPECTED AND ACCUMULATED DEBRIS SHALL BE REMOVED FROM THE HALF SHELL TRASH RACK AT NO LESS THAN BI-MONTHLY BASIS.
9. LANDSCAPE PLANTINGS SHALL BE INSPECTED A MINIMUM OF TWICE YEARLY AND REPLACED REQUIRED.

MAINTENENCE AND INSPECTION

MAINTENENCE

1. MAINTENANCE SHALL BE ACCORDING TO PROVISIONS SPECIFIED IN THE CURRENT EDITION OF THE MARYLAND SWM DESIGN MANUAL, VOLUME I, AND II FOR EACH SPECIFIC TYPE OF SWM SYSTEDM:

INSPECTION DURING CONSTRUCTION

1. AT A MINIMUM, REGULAR INSPECTIONS SHALL BE MADE AND DOCUMENTED AT THE FOLLOWING SPECIFIED STAGES OF CONSTRUCTION:

PONDS:

1. UPON COMPLETION OF EXCAVATION TO SUB-FOUNDATION AND WHEN REQUIRED, INSTALLATION OF STRUCTURAL SUPPORTS OF REINFORCEMENT FOR STRUCTURES, INCLUDING BU NOT LIMITED TO CORE TRENCHES FOR STRUCTURAL EMBANKMENTS, INLET AND OUTLET STRUCTURES ANTI-SEEP COLLARS OR FILTER DIAPHRAGMS, WATERTIGHT CONNECTORS OR PIPES AND TRENCHED FOR ENCLOSED STORM DRAIN FACILITIES:
2. DURING PLACEMENT OF STRUCTURAL FILL, CONCRETE AND INSTALLATION OF PIPING AND CATCH BASINS.
3. DURING BACKFILL OF FOUNDATION AND TRENCHES.
4. DURING EMBANKMENT CONSTRUCTION.
5. UPON REMOVAL OF ANY TEMPORARY SEDIMENT CONTROL FEATURE OD DEVICES.
6. UPON COMPLETION OF FINAL GRADING AND ESTABLISHMENT OF PERMANENT STABILIZATION.

INFILTRATION TRENCHES:

1. DURING EXCAVATION TO SUBGRADE.
2. DURING PLACEMENT OF BACKFILL OF UNDERDRAIN SYSTEM AND OBSERVATION WELLS.
3. DURING PLACEMENT OF GEOTEXTILES AND ALL FILTER MEDIA.
4. DURING CONSTRUCTION OF APPURTENANT CONVEYANCE SYSTEMS SUCH AS DIVERSION STRUCTURES, PRE-FILTERS FILTERS, OUTLETS AND FLOW DISTRIBUTION STRUCTURES.
5. UPON COMPLETION OF FINAL GRADING AND ESTABLISHMENT OF PERMANENT STABILIZATION.

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

Project Name Peterson Property SWM Boring No. B-3
Location Howard County, Maryland Job # 08410A
SAMPLER
Datum ___ Hammer Wt. 140 lbs. Hole Diameter 6" Foreman Lamont Smith
Surf. Elev. 409 Ft. Hammer Drop 30 in. Rock Core Diameter ___ Inspector ___
Date Started 8/13/08 Pipe Size 2.0 in. Boring Method HSA Date Completed 8/13/08

Elevation/ Depth	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Rec.	NM	SPT Blows	N
0	D	Brown, orange, tan, moist, medium dense to very dense, silty SAND and GRAVEL(GM-SM)	3" Topsoil	14"		3-7-12	19
	D			7"		36-21-33	54
5	D	Decomposed rock Bottom of boring at 6.5 ft	No groundwater encountered while drilling	14"		44-36-51/5"	100+

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
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.

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

Project Name Peterson Property SWM Boring No. B-2
Location Howard County, Maryland Job # 08410A
SAMPLER
Datum ___ Hammer Wt. 140 lbs. Hole Diameter 6" Foreman Lamont Smith
Surf. Elev. 409 Ft. Hammer Drop 30 in. Rock Core Diameter ___ Inspector ___
Date Started 8/13/08 Pipe Size 2.0 in. Boring Method HSA Date Completed 8/13/08

Elevation/ Depth	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Rec.	NM	SPT Blows	N
0	D	Brown, tan, moist, medium dense, silty SAND, with roots, trace rock fragments(SM)	3" Topsoil	7"		4-5-20	25
	D	Brown, tan, white, moist, very dense, silty SAND, with rock fragments(SM)		2"		51/6"	100+
5	D	Decomposed rock Bottom of boring at 5.25 ft	No groundwater encountered while drilling	3"		51/3"	100+

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
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.

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

Project Name Peterson Property SWM Boring No. B-3
Location Howard County, Maryland Job # 08410A
SAMPLER
Datum ___ Hammer Wt. 140 lbs. Hole Diameter 6" Foreman Lamont Smith
Surf. Elev. 409 Ft. Hammer Drop 30 in. Rock Core Diameter ___ Inspector ___
Date Started 8/13/08 Pipe Size 2.0 in. Boring Method HSA Date Completed 8/13/08

Elevation/ Depth	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Rec.	NM	SPT Blows	N
0	D	Brown, orange, tan, moist, medium dense to very dense, silty SAND and GRAVEL(GM-SM)	3" Topsoil	14"		3-7-12	19
	D			7"		36-21-33	54
5	D	Decomposed rock Bottom of boring at 6.5 ft	No groundwater encountered while drilling	14"		44-36-51/5"	100+

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
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.

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

Project Name Peterson Property SWM Boring No. B-4
Location Howard County, Maryland Job # 08410A
SAMPLER
Datum ___ Hammer Wt. 140 lbs. Hole Diameter 6" Foreman Lamont Smith
Surf. Elev. 404 Ft. Hammer Drop 30 in. Rock Core Diameter ___ Inspector ___
Date Started 8/13/08 Pipe Size 2.0 in. Boring Method HSA Date Completed 8/13/08

Elevation/ Depth	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Rec.	NM	SPT Blows	N
0	D	Brown, moist, dense, sandy SILT, trace clay(ML)	3" Topsoil	13"		5-13-27	40
	D	Brown, tan, moist, very dense, silty SAND and GRAVEL(GM-SM)		14"		23-25-29	54
5	D	Brown, orange, gray, moist, medium dense to very dense, sandy SILT(ML)		17"		9-11-11	22
	D		No groundwater encountered while drilling	12"		6-10-41	51
10	D	Decomposed rock Bottom of boring at 11.0 ft		12"		24-51/6"	75

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
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.

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 5/6/10
JOHN DOUGLAS CASHMERE
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 5/6/10
R. JACOB HIKMAT
PRINTED NAME OF ENGINEER

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

HOWARD SOIL CONSERVATION DISTRICT — DATE 5/19/10

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONNING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION AW — DATE 6/18/10

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. 17942, EXP DATE 9/3/10.

R. JACOB HIKMAT No. 17942

H:\08-007\DWG\PRELIMINARY\FINAL\FINAL-R-20.DWG

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

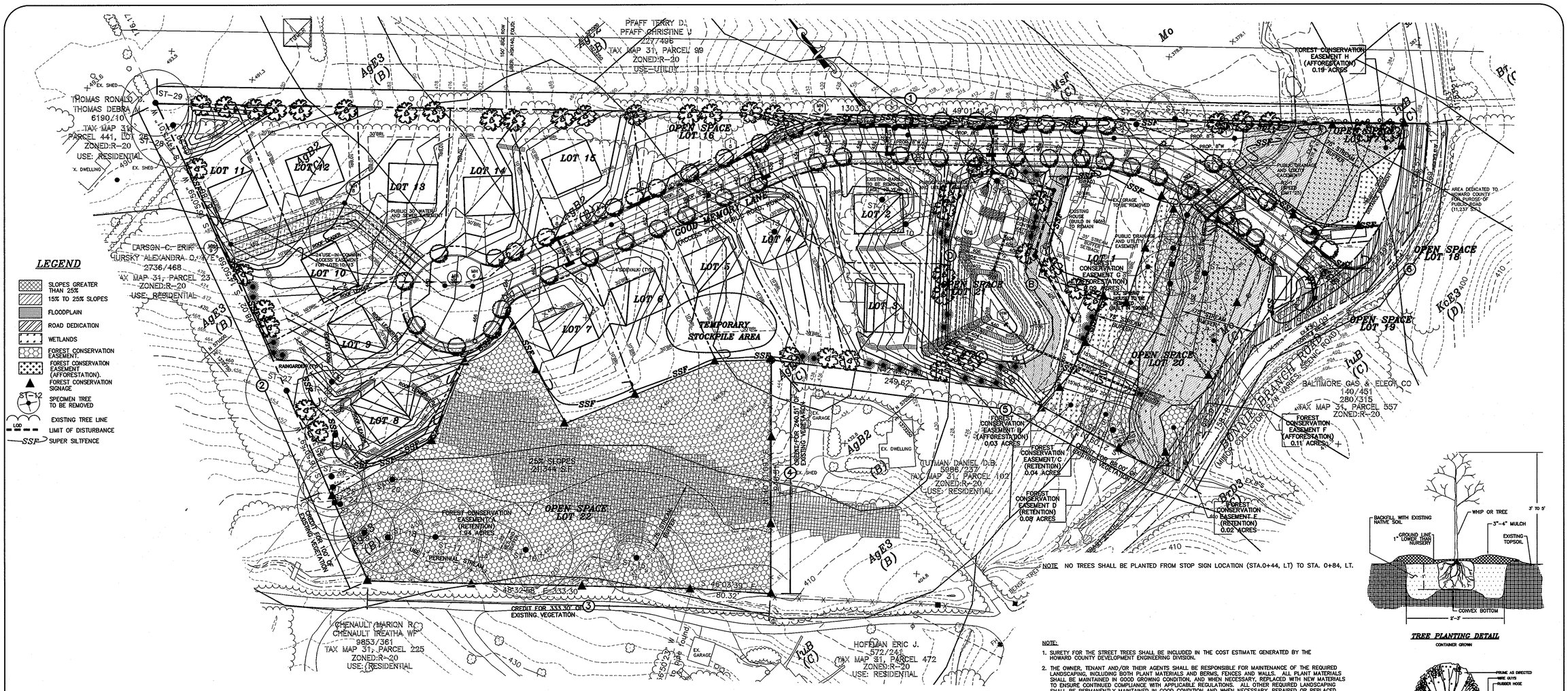
project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
AS SHOWN	RJH

no.	description	date
	revisions	

BONNIE BRANCH WOODS
TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT HOWARD COUNTY, MARYLAND
SWM SPECIFICATIONS AND SOIL BORINGS

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

F-10-042



NOTE NO TREES SHALL BE PLANTED FROM STOP SIGN LOCATION (STA.0+44, LT) TO STA. 0+84, LT.

TREE PLANTING DETAIL

CONTAINER GROWN

TYPICAL DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE

TYPICAL EVERGREEN TREE PLANTING DETAIL

NOT TO SCALE

NOTE:

1. SURETY FOR THE STREET TREES SHALL BE INCLUDED IN THE COST ESTIMATE GENERATED BY THE HOWARD COUNTY DEVELOPMENT ENGINEERING DIVISION.
2. THE OWNER, TENANT AND/OR THEIR AGENTS SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE REQUIRED LANDSCAPING, INCLUDING BOTH PLANT MATERIALS AND BERMS, FENCES AND WALLS. ALL PLANT MATERIALS SHALL BE MAINTAINED IN GOOD GROWING CONDITION, AND WHEN NECESSARY, REPLACED WITH NEW MATERIALS TO ENSURE CONTINUED COMPLIANCE WITH APPLICABLE REGULATIONS. ALL OTHER REQUIRED LANDSCAPING SHALL BE PERMANENTLY MAINTAINED IN GOOD CONDITION AND WHEN NECESSARY, REPAIRED OR REPLACED.
3. AT THE TIME OF INSTALLMENT, ALL SHRUBS AND OTHR PLANTINGS HEREWITH LISTED AND APPROVED FOR THIS SITE, SHALL BE OF THE PROPER HEIGHT REQUIREMENTS IN ACCORDANCE WITH THE HOWARD COUNTY LANDSCAPING MANUAL. IN ADDITION, NO SUBSTITUTIONS OR RELOCATION OF REQUIRED PLANTINGS MAY BE MADE WITHOUT PRIOR REVIEW AND APPROVAL FROM THE DEPARTMENT OF PLANNING AND ZONING. ANY DEVIATION FROM THIS APPROVED LANDSCAPE PLAN MAY RESULT IN DENIAL OR DELAY IN THE RELEASE OF LANDSCAPE SURETY UNTIL SUCH TIME AS ALL REQUIRED MATERIALS ARE PLANTED AND/OR REVISIONS ARE MADE TO APPLICABLE PLANS AND CERTIFICATES.
4. SHOULD ANY TREE DESIGNATED FOR PRESERVATION FOR WHICH LANDSCAPING CREDIT IS GIVEN, DIE PRIOR TO RELEASE OF BONDS, THE OWNER WILL BE REQUIRED TO REPLACE THE TREE WITH THE EQUIVALENT SPECIES OR WITH A TREE WHICH WILL OBTAIN THE SAME HEIGHT, SPREAD AND GROWTH CHARACTERISTICS. THE REPLACEMENT TREE MUST BE A MINIMUM OF 3 INCHES IN CALIPER AND INSTALLED AS REQUIRED IN THE HOWARD COUNTY LANDSCAPE MANUAL

SCHEDULE A : PERIMETER LANDSCAPED EDGE

CATEGORY	ADJACENT TO PERIMETER PROPERTIES					ADJACENT TO ROADWAYS	
LANDSCAPE TYPE	A (PERIMETER 1)	A (PERIMETER 2)	A (PERIMETER 3)	A (PERIMETER 4)	A (PERIMETER 5)	B (PERIMETER 6)	TOTAL
LINEAR FEET OF PERIMETER	1278 LF	536.26' LF	333.30 LF	240.51 LF	418 LF	485 LF	
CREDIT FOR EXISTING VEGETATION (YES, NO, LINEAR FEET)	NO	YES, 100 LF.	YES, 333.30 LF.	YES, 240.51 LF.	YES, 88.00 LF.	N/A	
CREDIT FOR WALL, FENCE, OR BERM (YES, NO, LINEAR FEET)	NO	NO	NO	NO	NO	N/A	
NUMBER OF PLANTS REQUIRED SHADE TREES EVERGREEN TREES SHRUBS	21 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	7 SHADE TREE 0 EVERGREEN TREES 0 SHRUBS	0 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	0 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	6 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	0 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	34 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS
NUMBER OF PLANTS PROVIDED SHADE TREES EVERGREEN TREES SHRUBS	21 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	7 SHADE TREE 5 EVERGREEN TREES 0 SHRUBS	0 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	0 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	4 SHADE TREES * 9 EVERGREEN TREES 0 SHRUBS	0 SHADE TREES 0 EVERGREEN TREES 0 SHRUBS	32 SHADE TREES 14 0 SHRUBS

* TWO (2) SHADE TREES HAVE BEEN SUBSTITUTED WITH FOUR (4) EVERGREEN TREES, IN ADDITION, 5 EVERGREEN TREES ARE PROPOSED TO PROVIDE YEAR-LONG SCREENING ALONG THE PERIMETER 6.

PERIMETER LANDSCAPE PLANTING SCHEDULE

QUANTITY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE
32	✿	ACER SACCHARUM 'GREEN MOUNTAIN'	GREEN MOUNTAIN SUGAR MAPLE OR EQUIVALENT	2 1/2" - 3" CAL.
14	✺	PINUS THUNBERGIANA	JAPANESE BLACK PINE OR EQUIVALENT	

TOTAL
46 TREES(32 SHADE TREES, 14 EVERGREENS)

STREET TREE PLANTING SCHEDULE

QUANTITY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE
50	○	Prunus sargentii OR EQUIVALENT	Sargent Cherry OR EQUIVALENT	2 1/2" - 3" CAL.

TOTAL
50 STREET TREES

STREET TREE CALCULATIONS

GOOD MEMORY LANE - 2000 / 40 = 50

TOTAL TREES REQUIRED = 50 TREES
TOTAL TREES PROVIDED = 50 TREES

SCHEDULE B : STORMWATER MANAGEMENT AREA LANDSCAPING

LINEAR FEET OF PERIMETER	(A) 557 LF
CREDIT FOR EXISTING VEGETATION (NO, YES AND LINEAR FEET)	N/A
CREDIT FOR OTHER LANDSCAPING (NO, YES AND %)	N/A
NUMBER OF TREES REQUIRED SHADE TREES EVERGREEN TREES	12 SHADE TREES 15 EVERGREEN TREES

SWM PERIMETER		EDGE TYPE
SWM PERIMETER A - 75 LF		B
1 SHADE TREE / 50 LF	2	
1 EVERGREEN / 40 LF	2	
SWM PERIMETER B - 220 LF		B
1 SHADE TREE / 50 LF	4	
1 EVERGREEN / 40 LF	6	
SWM PERIMETER C - 82 LF		B
1 SHADE TREE / 50 LF	2	
1 EVERGREEN / 40 LF	2	
SWM PERIMETER D - 180 LF		B
1 SHADE TREE / 50 LF	4	
1 EVERGREEN / 40 LF	5	

TOTAL PLANTING OBLIGATION
SHADE TREES 12
EVERGREEN TREES 15

STORMWATER MANAGEMENT AREA PLANTING SCHEDULE

QUANTITY	SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE
12	✿	ACER SACCHARUM 'GREEN MOUNTAIN'	GREEN MOUNTAIN SUGAR MAPLE OR EQUIVALENT	2 1/2" - 3" CAL.
15	✺	PINUS THUNBERGIANA	JAPANESE BLACK PINE OR EQUIVALENT	6' - 8' HT.

6' - 8' HT.

TOTAL
27 TREES(11 SHADE TREES, 14 EVERGREENS)

DEVELOPER'S/OWNER'S CERTIFICATE

I/WE CERTIFY THAT THE LANDSCAPING SHOWN ON THIS PLAN WILL BE DONE IN 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 CERTIFICATION OF LANDSCAPE INSTALLATION, ACCOMPANIED BY AN EXECUTED ONE YEAR GUARANTEE OF PLANT MATERIALS, WILL BE SUBMITTED TO THE DEPARTMENT OF PLANNING AND ZONING.

NAME
5/6/10
DATE

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. 17942, EXP DATE 9/3/10.

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF BUREAU OF HIGHWAYS HS
6-11-10
DATE

APPROVED: DEPARTMENT OF PLANNING AND ZONNING
CHIEF, DIVISION OF LAND DEVELOPMENT
6/22/10
DATE

CHIEF, DEVELOPMENT ENGINEERING DIVISION AW
6/18/10
DATE

R. JACOB HIKMAT
No. 17942

H:\08-007\DWG\FINAL\FINAL-R-20.DWG

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
1"=50'	RJH

no.	description	date
	revisions	

BONNIE BRANCH WOODS

TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT HOWARD COUNTY, MARYLAND

LANDSCAPING AND FOREST CONSERVATION PLAN

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

F-10-042

PLANTING SPECIFICATIONS AND NOTES

SITE PREPARATION AND SOILS

1. PROTECTION FENCING AND SILT FENCES FOR SEDIMENT AND EROSION CONTROL ARE TO BE INSTALLED AS A FIRST ORDER OF BUSINESS. SEE PLAN FOR LOCATIONS.
2. DISTURBANCE OF SOILS SHOULD BE LIMITED TO THE PLANTING FIELD FOR EACH PLANT. AS SHOWN ON THE DETAIL VIEW, A PLANTING FIELD OF RADIUS = 5 X DIAMETER OF THE ROOT BALL OR CONTAINER IS RECOMMENDED.
3. SOIL MIX FOR ALL PLANTS EXCEPT ERICACEOUS MATERIAL: SOIL MIX SHALL CONSIST OF EXISTING NATIVE TOPSOIL MIXTURE AT EACH PLANTING FIELD LOCATION INTO WHICH THE CONTRACTOR SHALL THOROUGHLY INCORPORATE 25% BY VOLUME OF COMPOSTED SLUDGE.
4. SOIL MIX FOR ERICACEOUS MATERIAL: SOIL MIX SHALL CONSIST OF EXISTING NATIVE TOPSOIL MIXTURE AT EACH PLANTING FIELD LOCATION INTO WHICH THE CONTRACTOR SHALL THOROUGHLY INCORPORATE 25% BY VOLUME PEAT MOSS.
5. ALL MIXING IN 3 AND 4 SHALL BE LIMITED TO CONTAINER GROWN OR BALL AND BURLAP STOCK ONLY AND CONFINED TO THE PLANTING FIELD AND IMMEDIATE ADJACENT SOIL SURFACE AREA AND SHALL BE DONE TO THE SATISFACTION OF THE DESIGN TEAM OR ENGINEER.

PLANT STORAGE AND INSPECTION

1. FOR CONTAINER GROWN NURSERY STOCK, PLANTING SHOULD OCCUR WITHIN 2 WEEKS AFTER DELIVERY TO THE SITE.
2. FOR BALL AND BURLAP NURSERY STOCK, PLANTING SHOULD OCCUR WITHIN THREE DAYS AFTER DELIVERY TO THE SITE.
3. PLANTING STOCK SHOULD BE INSPECTED PRIOR TO PLANTING. PLANTS NOT CONFORMING TO STANDARD NURSERYMAN SPECIFICATIONS FOR SIZE, FORM, VIGOR, ROOTS, TRUNK WOUNDS, INSECTS AND DISEASE SHOULD BE REPLACED.
4. UNTIL PLANTED, ALL PLANT STOCK SHALL BE KEPT IN A SHADED, COOL, AND MOISTENED ENVIRONMENT .

PLANT INSTALLATION

1. THE PLANTING FIELD SHOULD BE PREPARED AS SPECIFIED (SEE DETAIL). NATIVE STOCKPILED SOILS SHOULD BE USED FOR SOIL MIX AND BACKFILL FOR PLANTING FIELD. AFTER PLANT INSTALLATION, RAKE SOILS EVENLY OVER THE PLANTING FIELD AND COVER WITH AT LEAST 4 INCHES OF MULCH. WATER, GENEROUSLY, TO SETTLE SOIL BACKFILLED AROUND TREES.
2. PLANTING FIELD DIAMETERS SHOULD BE REDUCED OR PLANTING FIELD MOVED IF IT APPEARS THAT EXCESSIVE EXISTING ROOT DAMAGE MAY OCCUR DURING DIGGING OPERATION NEAR EXISTING FOREST.
3. CARE SHALL BE TAKEN WHEN DIGGING PLANTING FIELDS NOT TO CHOP THRU LARGER EXISTING ROOTS FROM EXISTING MATURE TREES. IF ROOTS GREATER THAN 1/2 INCH ARE ENCOUNTERED PLEASE TRY TO DIG AROUND THEM AS MUCH AS POSSIBLE TO MINIMIZE IMPACT TO EXISTING TREES. THEY WERE HERE FIRST.
4. CONTAINER GROWN STOCK SHOULD BE REMOVED FROM THE CONTAINER AND ROOTS GENTLY LOOSENED FROM THE SOIL. IF THE ROOTS ENCIRCLE THE ROOT BALL, SUBSTITUTION IS STRONGLY RECOMMENDED. J-SHAPED OR KINKED ROOT SYSTEMS SHOULD ALSO BE NOTED. ROOTS MAY NOT BE TRIMMED ON SITE, DUE TO THE INCREASED CHANCES OF SOIL BORNE DISEASES.
5. FOR BALL AND BURLAP STOCK, PLACE TREE IN PREPARED PLANTING FIELD AND REMOVE WIRE AND/OR STRING FROM ROOT BALL. THEN PEEL BACK BURLAP TO BASE OF ROOT BALL AND COVER ENTIRE ROOT BALL WITH TOPSOIL MIXTURE INDICATED ABOVE AND WATER GENEROUSLY.
6. FOR TREES PLANTED IN THE AFFORESTATION AREA, CONTRACTOR SHALL EVENLY DISPERSE SPECIES IN GROUPS OF TWO (2) TO FOUR (4), PER SPECIES, OVER THE ENTIRE DESIGNATED AREA TO BE PLANTED WHILE MAINTAINING AN AVERAGE RANDOM SPACING OF INDIVIDUAL TREES AT PROPER SPACING INDICATED ON PLANT LIST.
7. AVOID PLANTING IN A STRAIGHT GRID PATTERN. TREES SHALL BE PLANTED ON AN AVERAGE SPACING AS INDICATED ON PLANT LISTS TO OBTAIN A MORE NATURAL APPEARANCE.
8. NEWLY PLANTED TREES MAY NEED WATERING AS MUCH AS ONCE A WEEK FOR THE ENTIRE GROWING SEASON, DUE TO THE WELL DRAINED NATIVE SOILS FOUND ON THIS SITE COMBINED WITH THE LOOSENESS OF THE BACKFILLED AREA WITHIN THE PLANTING FIELD. THE NEXT TWO YEARS MAY REQUIRE WATERING ONLY A FEW TIMES A YEAR DURING SUMMER AND DRY MONTHS. AFTER THAT PERIOD, TREES SHOULD ONLY NEED WATER IN SEVERE DROUGHTS. ANY WATERING PLAN SHOULD COMPENSATE FOR RECENT RAINFALL PATTERNS.

FERTILIZING

1. DO NOT FERTILIZE NEWLY PLANTED TREES WITHIN THE FIRST GROWING SEASON AFTER PLANTING. DOING SO MAY CAUSE A SPURT OF CANOPY GROWTH WHICH THE ROOTS CANNOT SUPPORT AND ADD ADDITIONAL SHOCK TO THE ALREADY DISTURBED PLANT.
2. NOTHING SHOULD BE ADDED TO THE SOIL WITHOUT TESTING IT FIRST TO DETERMINE ITS NEEDS.
3. IF AND WHEN IT IS TIME TO FERTILIZE, ORGANIC FERTILIZERS ARE PREFERRED TO SYNTHETIC FERTILIZERS. BONE MEAL OR SEAWEED BASED PRODUCTS ARE AVAILABLE COMMERCIALLY AND ARE RECOMMENDED. THEY HAVE THE ABILITY TO SUPPLY NUTRIENTS TO THE PLANT AS NEEDED WHILE MINIMIZING THE RISK OF EXCESS NUTRIENTS ENTERING THE FOREST SYSTEM AND WATER SUPPLY.

POST CONSTRUCTION PERIOD PROTECTION AND MANAGEMENT PROGRAM

1. ANNUAL MAINTENANCE DURING THE GROWING SEASON, FOR A THREE YEAR PERIOD.
2. ASSESS TREE MORTALITY OF PLANTING STOCK, REMOVE AND REPLACE ANY DEAD OR DISEASED PLANTINGS.
3. VOLUNTEER SEEDING OF NATIVE, LOCAL AND ENDEMIC VEGETATION IS TO BE EXPECTED. DO NOT DISCOURAGE THIS EFFORT UNLESS IT IS NEGATIVELY EFFECTING THE PLANTED STOCK.
4. REMOVE THROUGH MANUAL MEANS (GRUBBING, PULLING, CUTTING) AGGRESSIVE, NOXIOUS, INVASIVE SPECIES AND ALL HERBACEOUS VEGETATION WITHIN A 3-FOOT RADIUS SURROUNDING THE PLANTED WOODY NURSERY STOCK.
5. REMOVE AND DISPOSE OF MAN-MADE TRASH, INCLUDING ITEMS CONTAINED WITHIN ENTIRE PLANTING AREA. DO NOT REMOVE DOWN AND DEAD MATERIAL NATURALLY OCCURRING OR ACCUMULATING, UNLESS IT IS SMOTHERING PLANTING STOCK.
6. A 75 PERCENT SURVIVAL OF PLANTED STOCK MUST BE ACHIEVED AT THE END OF THE 24 MONTH MANAGEMENT PERIOD. IF NOT, ADDITIONAL PLANTINGS MAY BE REQUIRED TO ACHIEVE THIS GOAL.

SUPERVISION

ALL FOREST CONSERVATION ACTIVITIES SHALL BY DONE UNDER THE DIRECT SUPERVISION OF SOMEONE FROM THE DESIGN TEAM OR OTHER "QUALIFIED PROFESSIONAL" AS DETERMINED BY THE REQUIREMENTS OF COMAR 08.19.06.01 AND THE MARYLAND DEPARTMENT OF NATURAL RESOURCES, PUBLIC LANDS AND FORESTRY DIVISION.

STANDARD SPECIMEN TREE NON-DISTURBANCE NOTE:

"THERE SHALL BE NO CLEARING, GRADING, CONSTRUCTION, SOIL COMPACTION OR EXCAVATION, INTRODUCTION OF TOXIC CHEMICALS OR OTHER DISTURBANCES DETRIMENTAL TO THE LIVE SPECIMEN TREES OR CRITICAL ROOT ZONES FOR THESE TREES EXCEPT AS PERMITTED BY HOWARD COUNTY"

CONSTRUCTION PERIOD PROTECTION AND MANAGEMENT PROGRAM

1. ALL FOREST RETENTION AREAS AND ISOLATED POTENTIAL SPECIMEN TREES SHALL BE TEMPORARILY PROTECTED BY WELL ANCHORED, BLAZE ORANGE PLASTIC MESH FENCING AND SIGNAGE AS INDICATED ON THE PLANS. THE DEVICES SHALL BE INSTALLED ALONG THE FOREST RETENTION BOUNDARY AND AROUND ISOLATED POTENTIAL SPECIMEN TREES PRIOR TO ANY LAND CLEARING, GRUBBING, OR GRADING ACTIVITIES.
2. SUPER SILT FENCE SHALL BE INSTALL AS SHOWN ON THE PLAN. BLAZE ORANGE PLASTIC MESH FENCING SHALL BE INSTALLED ALONG THE REFORESTATION BOUNDARY WHERE THERE IS NO SUPER SILT FENCE PROPOSED, AFTER THE PLANTING OF THE EASEMENT.
3. THE FOREST PROTECTION DEVICES SHALL BE INSTALLED SUCH THAT THE CRITICAL ROOT ZONES OF ALL TREES WITHIN THE RETENTION AREA NOT OTHERWISE PROTECTED WILL BE WITHIN FOREST PROTECTION DEVICES. IT IS UNDERSTOOD THAT THE INSTALLATION OF THE FENCING IN THIS MANNER WILL CREATE AN IRREGULAR EDGE.
4. ALL PROTECTION DEVICES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION. ALL DEVICES SHALL REMAIN IN PLACE UNTIL ALL CONSTRUCTION HAS CEASED IN THE IMMEDIATE VICINITY.
5. ATTACHMENT OF SIGNS, OR ANY OTHER OBJECTS TO TREES IS PROHIBITED. NO EQUIPMENT, MACHINERY, VEHICLES, MATERIALS OR EXCESSIVE PEDESTRIAN TRAFFIC SHALL BE ALLOWED WITHIN THE PROTECTED AREAS.
6. INSTALLATION AND MAINTENANCE OF PROTECTIVE FENCING AND SIGNAGE SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. THE GENERAL CONTRACTOR SHALL TAKE THE UTMOST CARE TO PROTECT TREE ROOT SYSTEMS DURING ALL CONSTRUCTION ACTIVITIES. TREE ROOT SYSTEMS SHALL BE PROTECTED FROM SMOTHERING, FLOODING, EXCESSIVE WETTING FROM DE-WATERING OPERATIONS, OFF-SITE RUN OFF, SPILLAGE AND DRAINING OF MATERIALS THAT MAY BE HARMFUL TO TREES.
7. THE GENERAL CONTRACTOR SHALL PREVENT PARKING OF CONSTRUCTION VEHICLES AND EQUIPMENT, AND THE STORING OF BUILDING SUPPLIES OR STOCKPILING OF EARTH WITHIN FOREST CONSERVATION EASEMENTS.
8. REMOVAL OF TOPSOIL OR ROOT MAT WITHIN THE TREE PRESERVATION AREA SHALL BE PROHIBITED.
9. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ANY TREES DAMAGED OR DESTROYED WITHIN THE FOREST CONSERVATION EASEMENTS.
10. ROOT PRUNING SHALL BE USED AT THE LIMIT OF DISTURBANCE OR LIMIT OFGRADING WITHIN AND ADJACENT TO ALL FORESTED AREAS. PLEASE REFER TO ROOT PRUNING DETAIL THIS SHEET.

PRE-CONSTRUCTION MEETING

1. AFTER THE BOUNDARIES OF THE FOREST RETENTION AREAS HAVE BEEN FIELD LOCATED AND MARKED, AND AFTER THE FOREST PROTECTION DEVICES HAVE BEEN INSTALLED, BUT BEFORE ANY OTHER DISTURBANCE HAS TAKEN PLACE ON SITE, A PRE-CONSTRUCTION MEETING SHALL TAKE PLACE ON SITE. THE DEVELOPER, CONTRACTOR OR PROJECT MANAGER, AND HOWARD COUNTY INSPECTORS SHALL ATTEND. THE PURPOSE OF THIS MEETING WILL BE:
   A. TO IDENTIFY THE LOCATIONS OF THE FOREST RETENTION AREAS, SPECIMEN TREES WITHIN 50 FEET OF THE LIMIT OF DISTURBANCE, LIMITS OF CONSTRUCTION, EMPLOYEE PARKING AREAS AND EQUIPMENT STAGING AREAS;
   B. INSPECT ALL FLAGGED BOUNDARIES AND PROTECTION DEVICES;
   C. MAKE ALL NECESSARY ADJUSTMENTS;
   D. ASSIGN RESPONSIBILITIES AS APPROPRIATE AND DISCUSS PENALTIES.

CONSTRUCTION MONITORING

1. THE SITE SHALL BE INSPECTED PERIODICALLY DURING THE CONSTRUCTION PHASE OF THE PROJECT. A QUALIFIED PROFESSIONAL SHALL BE RESPONSIBLE FOR IDENTIFYING DAMAGE TO PROTECTED FOREST AREAS OR INDIVIDUAL TREES WHICH MAY HAVE BEEN CAUSED BY CONSTRUCTION ACTIVITIES, SUCH AS SOIL COMPACTION, ROOT INJURY, TRUNK WOUNDS, LIMB INJURY, OR STRESS CAUSED BY FLOODING OR DROUGHT CONDITIONS.
2. ANY SUCH DAMAGE THAT MAY OCCUR SHALL BE REMEDIED IMMEDIATELY USING APPROPRIATE MEASURES. SEVERE PROBLEMS MAY REQUIRE CONSULTATION WITH A PROFESSIONAL ARBORIST.

LIMITS OF WORK

THE CONSTRUCTION PROCEDURE SHALL NOT DAMAGE AREAS OUTSIDE OF THE LIMITS OF DISTURBANCE AS DESIGNATED ON THE PLANS. ANY DAMAGE SHALL BE RESTORED BY THE CONTRACTOR AT HIS EXPENSE AND TO THE SATISFACTION OF THE DESIGN TEAM OR ENGINEER.

NOTES:

1. THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 16.124 OF THE HOWARD COUNTY CODE AND THE LANDSCAPE MANUAL.
2. FINANCIAL SURETY FOR THE REQUIRED LANDSCAPING IS TO BE POSTED FOR 44 SHADE AND 29 EVERGREEN TREES IN THE AMOUNT OF $17,550.00 AS PART OF THE DPW DEVELOPERS AGREEMENT.
3. THE FOREST CONSERVATION REQUIREMENTS PER SECTION 16.1202 OF THE HOWARD COUNTY CODE FOR FOREST CONSERVATION BY RETENTION OF 2.08 ACRES OF FOREST, AFFORESTATION OF 0.42 ACRES AND FEE-IN-LEIU OF 0.40 ACRES. FINANCIAL SURETY FOR THE ON-SITE RETENTION FOR THE AMOUNT OF $ 18,121.00, AND AFFORESTATION FOR THE AMOUNT OF $ 9,148.00 FOR. A TOTAL OF $ 27,269.00 WILL BE POSTED AS PART OF THE DEVELOPERS AGREEMENT.
   NO CLEARING , GRADING OR CONSTRUCTION IS PERMITTED WITHIN THE FOREST CONSERVATION EASEMENT; HOWEVER FOREST MANAGEMENT PRACTICES AS DEFINED IN THE DEED OF FOREST CONSERVATION EASEMENT ARE ALLOWED.
   0.40 ACRES OF REQUIRED FOREST CONSERVATION WILL BE ADDRESSED VIA FEE-IN-LIEU INTHE AMOUNT OF $13.068.00
4. SIGNAGE SHALL BE PLACED FOR PERPETUITY
5. THE OWNER, TENANT AND/OR THEIR AGENTS SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE REQUIRED LANDSCAPING, INCLUDING BOTH PLANT MATERIALS AND BERMS, FENCES AND WALLS. ALL PLANT MATERIALS SHALL BE MAINTAINED IN GOOD GROWING CONDITION, AND WHEN NECESSARY, REPLACED WITH NEW MATERIALS TO ENSURE CONTINUED COMPLIANCE WITH APPLICABLE REGULATIONS. ALL OTHER REQUIRED LANDSCAPING SHALL BE PERMANENTLY MAINTAINED IN GOOD CONDITION AND WHEN NECESSARY, REPAIRED OR REPLACED. AT THE TIME OF INSTALLMENT, ALL SHRUBS AND OTHR PLANTINGS HEREWITH LISTED AND APPROVED FOR THIS SITE, SHALL BE OF THE PROPER HEIGHT REQUIREMENTS IN ACCORDANCE WITH THE HOWARD COUNTY LANDSCAPING MANUAL. IN ADDITION, NO SUBSTITUTIONS OR RELOCATION OF REQUIRED PLANTINGS MAY BE MADE WITHOUT PRIOR REVIEW AND APPROVAL FROM THE DEPARTMENT OF PLANNING AND ZONING. ANY DEVIATION FROM THIS APPROVED LANDSCAPE PLAN MAY RESULT IN DENIAL OR DELAY IN THE RELEASE OF LANDSCAPE SURETY UNTIL SUCH TIME AS ALL REQUIRED MATERIALS ARE PLANTED AND/OR REVISIONS ARE MADE TO APPLICABLE PLANS AND CERTIFICATES.
6. PROPOSED TREE LINE IS COINCIDENT WITH THE LIMIT OF THE FOREST CONSERVATION EASEMENT.

NOTE:
1. NO RARE, THREATENED OR ENDANGERED SPECIES AND THEIR HABITATS WERE OBSERVED ON THE PROPERTY.
2. SURROUNDING LAND USE IS MEDIUM DENSITY RESIDENTIAL AND FOREST.
3. SUBJECT PROPERTY IS IN PATAPSCO RIVER NORTH BRANCH WATER SHED, NO. 2130906.
4. NO HISTORIC STRUCTURES, CEMETERIES, RARE, THREATENED OR ENDANGERED SPECIES AND THEIR HABITATS EXIST ON-SITE.

KEY	FOREST STAND # 1	FOREST STAND # 2	FOREST STAND # 3
A-TYPE OF COMMUNITY	RIPARIAN FOREST	PONEER FOREST	MIXED DECIDUOUS FOREST
B-AREA	0.47 AC±	0.30 AC±	5.70 AC±
C-SOIL INFORMATION			
1-SOIL TYPE	Mo, MsF	AgB2, AgE3, NsD3	AgB2, AgE3, LuB
2-TYPICAL FOREST COVER	SEE SOIL TABLE	SEE SOIL TABLE	SEE SOIL TABLE
3-WOODLAND SUITABILITY INDEX	SEE SOIL TABLE	SEE SOIL TABLE	SEE SOIL TABLE
D-EXISTING VEGETATION (DOMINANT SPECIES AND APPROX. SITE PERCENTAGE)	LIRIODENDRON TULIPIFERA (40) FAGUS GRANDIFOLIA (30) NEW YPRK FERN (10)	LIRIODENDRON TULIPIFERA (30) ROBINIA PSEUDO ACACIA (30) PINUS VIRGINIANA (15) ROSA MULTIFLORA (20) RUBUS PENSYLVANICUS (20) LONICERA JAPONICA (30)	LIRIODENDRON TULIPIFERA (30) QUERCUS ALBA (15) QUERCUS RURBA (15) QUERCUS VELUTINA (15) NYSSA SYLVATICA (10) ACER RUBUM (10) SIMILAX ROTUNDIFOLIA (5) PARTHENOCISSUS QUINQUEFOLIA (5)
E-STANDARD CHARACTERISTICS			
1-SIZE (DBH)	12"-30" DBH	6"-16" DBH	12"-30" DBH
2-AGE	70	30	70
3-GENERAL CONTITIONS	GOOD	GOOD	GOOD
F- FOREST AREA IN SENSITIVE ENVIRONMENTS	0.47 AC±	0.10 AC±	0.47 AC±
G- HABITAT VALUE	GOOD	FAIR	GOOD

SOIL TYPE	HYDRIC	K-VALUE	WOODLAND SUITABILITY GROUP	NATIVE VEGETATION
AgF2 (B) AURA GRAVELLY LOAM 1-5% SLOPES, MODERATELY ERODED	NO	0.43	12	OAKS AND OTHER UPLAND HARDWOODS
AgE3 (B) AURA GRAVELLY LOAM 10-30% SLOPES, SEVERELY ERODED	NO	0.43	17	OAKS AND OTHER UPLAND HARDWOODS
BrD2 (B) BRANDYWINE LOAM 15-25% SLOPES, MODERATELY ERODED	NO	0.24	41	OAKS AND OTHER UPLAND HARDWOODS
LuB (C) IUKA LOAM, LOCAL ALLIVIUM 1-5% SLOPES	YES	0.37	4	MIXED HARDWOODS WATER TOLERANT
KcE3 (D) KELLY CLAY LOAM 15-30% SLOPES, SEVERELY ERODED	NO	0.32	34	MIXED HARDWOODS MAINLY WHITE OAKS
Mo (C) MOXED ALLUVIAL LAND	NO	0.43	2	MIXED HARDWOODS WATER TOLERANT
MsC (C) MONTALTO AND RELAY VERY STONY SILT LOAMS,15-30% SLOPES	NO	0.32	32	MIXED HARDWOODS MAINLY OAKS
NsD3 (C) NESHAMINY SILTY LOAM 15-30% SLOPES, SEVERELY ERODED	NO	0.28	31	MIXED HARDWOODS MAINLY OAKS

SPECIMEN TREE (ST)#	COMMON NAME	BITANICAL NAME	SIZE DBH	CONDITION
1	RED MAPLE (TO BE RETAINED)	ACER RUBRUM	30"	FAIR
2	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	31.5"	GOOD
3	GREEN ASH (TO BE RETAINED)	FRAXINUS PENSYLVANICUS	31.5"/30.5"	GOOD
4	WHITE OAK (TO BE RETAINED)	QUERCUS ALBA	32"/25"	GOOD
5	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	31"/18"/32"	GOOD
6	RED OAK (TO BE RETAINED)	QUERCUS RUBRA	35.5"	FAIR
7	RED MAPLE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	30"	EXC.
8	TULIPTREE (TO BE REMOVED)	LIRIODENDRON TULIPIFERA	40"	GOOD
9	TULIPTREE (TO BE REMOVED)	LIRIODENDRON TULIPIFERA	38"	GOOD
10	TULIPTREE (TO BE REMOVED)	LIRIODENDRON TULIPIFERA	31"	GOOD
11	TULIPTREE (TO BE REMOVED)	LIRIODENDRON TULIPIFERA	31"	GOOD
12	TULIPTREE (TO BE REMOVED)	LIRIODENDRON TULIPIFERA	35"	EXC.
13	TULIPTREE (TO BE REMOVED)	LIRIODENDRON TULIPIFERA	39"	GOOD
14	TULIPTREE (TO BE REMOVED)	LIRIODENDRON TULIPIFERA	32"	GOOD
15	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	38"/17"	GOOD
16	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	49"	POOR
17	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	47"	GOOD
18	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	37.5"	GOOD
19	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	31.5"	GOOD
20	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	31"	GOOD
21	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	31"/10"	POOR
22	TULIPTREE (TO BE REMOVED)	LIRIODENDRON TULIPIFERA	30"	GOOD
23	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	33"/32"	GOOD
24	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	38.5"	GOOD
25	BLACK OAK (TO BE RETAINED)	QUERCUS VELUTINA	30.5"	FAIR
26	BLACK OAK (TO BE RETAINED)	QUERCUS VELUTINA	34"	FAIR
27	BLACK OAK (TO BE RETAINED)	QUERCUS VELUTINA	42"	GOOD
28	CHESTNUT OAK (TO BE RETAINED)	QUERCUS MONTANA	43"	EXC.
29	WHITE OAK (TO BE RETAINED)	QUERCUS ALBA	34"	EXC.
30	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	41"	EXC.
31	TULIPTREE (TO BE RETAINED)	LIRIODENDRON TULIPIFERA	31"	EXC.

FOREST CONSERVATION WORKSHEET

NET TRACT AREA:
A. Total tract area...= 9.88
B. Area within 100 year floodplain & overhead transmission line = 0.88
C. Area to remain in agricultural production..............................= 0.00
D. Net tract area...= 9.00

LAND USE CATEGORY:
Input the number "1" under the appropriate land use zoning, and limit to only one entry.

ARA	MDR	IDA	HDR	MPD	CIA
0	0	0	1	0	0

E. Afforestation Threshold.................. 15% x D = 1.35
F. Conservation Threshold.................. 20% x D = 1.80

EXISTING FOREST COVER:
G. Existing forest cover (excluding floodplain).........................= 6.47
H. Area of forest above afforestation threshold.........................= 5.12
I. Area of forest above conservation threshold..........................= 4.67

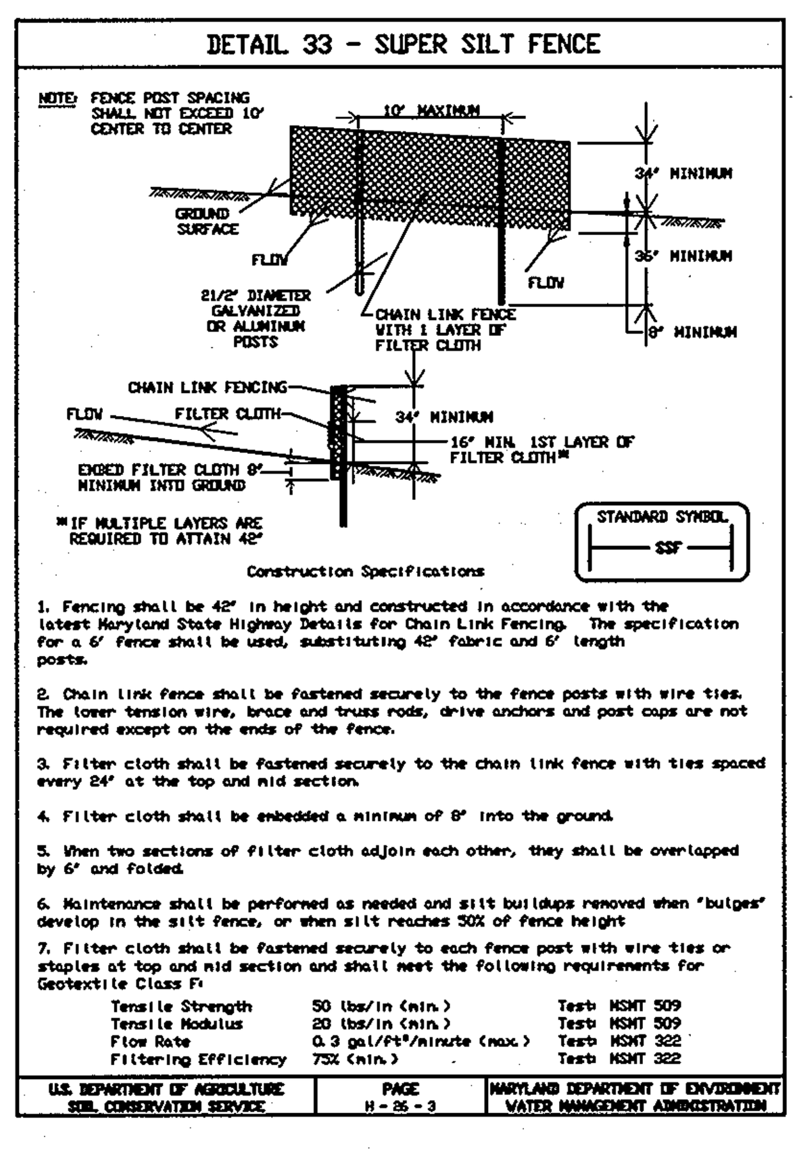
BREAK EVEN POINT:
J. Forset retention above threshold with no mitigation................= 2.73
K. Clearing permitted without mitigation....................................= 3.74

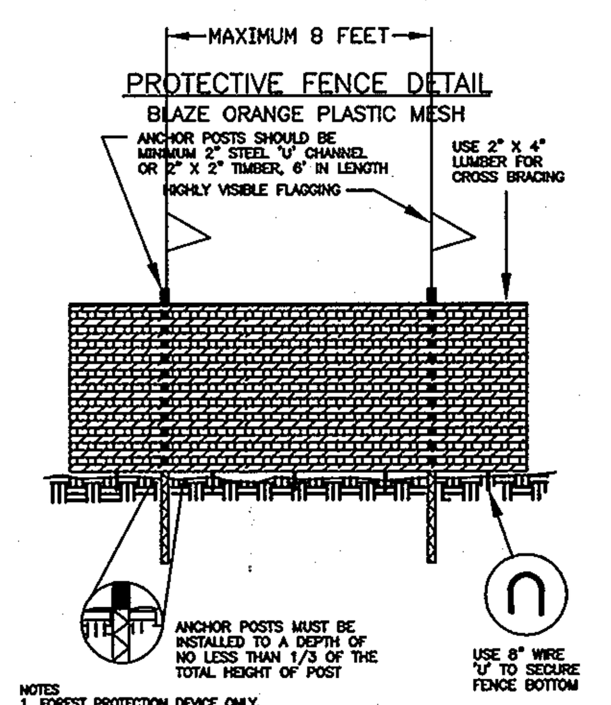
PROPOSED FOREST CLEARING
L. Total area of forest to be cleared...= 4.39
M. Total area of forest to be retained.......................................= 2.08

PLANTING REQUIREMENTS:
N. Reforestation for clearing above conservation threshold.......= 1.10
P. Reforestation for clearing below conservation threshold........= 0.00
Q. Credit for retention above conservation threshold................= 0.28
R. Total reforestation required..= 0.82
S. Total afforestation required..= 0.00
T. Total reforestation and afforestation required........................= 0.82
Total reforestation and afforestation provided...........................= 0.42

0.40 ACRES OF REQUIRED FOREST CONSERVATION WILL BE ADDRESSED VIA FEE-IN-LIOU IN THE AMMOUNT OF $13,068

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. 17942, EXP DATE 9/3/10.





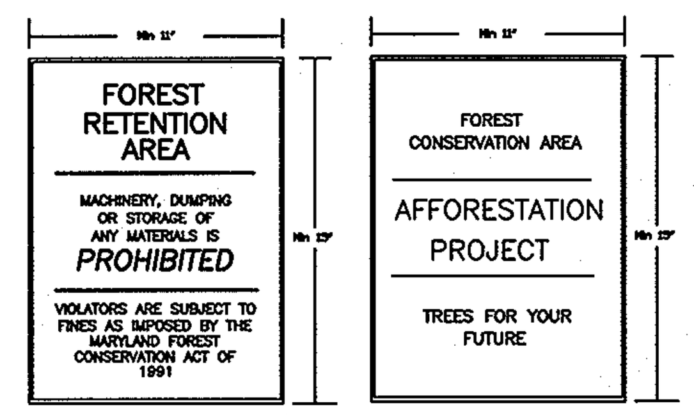
NOTES
1. FOREST PROTECTION DEVICE ONLY.
2. RETENTION AREA WILL BE SET AS PART OF THE REVIEW PROCESS.
3. BOUNDARIES OF RETENTION AREA SHOULD BE STAKED AND FLAGGED PRIOR TO INSTALLING DEVICE.
4. ROOT DAMAGE SHOULD BE AVOIDED.
5. PROTECTIVE SIGNAGE MAY ALSO BE USED.
6. DEVICE SHOULD BE MAINTAINED THROUGHOUT CONSTRUCTION.

AFFORESTATION PLANT LISTS

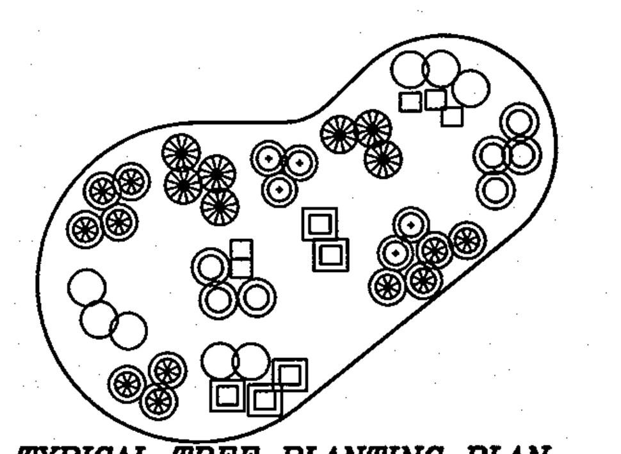
QTY.	SPECIES	SHADE TOL.	MOIST. REGIME	WET. STATUS	MIN.O.C. SPACING	SIZE & REMARKS
7	Acer rubrum Red Maple	VT	D-W	FAC	15'	CONT/B & B 1" CALIPER
41	Liriodendron tulipifera Tuliptree	MT	D-M	FAC	15'	CONT/B & B 1" CALIPER
20	Nyssa sylvatica Black Gum	T	M-W	FAC	15'	CONT/B & B 1" CALIPER
20	Fagus grandiolia American Beech	T	M-W	FAC	15'	CONT/B & B 1" CALIPER

TOTAL
88 TREES

NOTE : WHIPS OR SEEDLINGS MAY BE SUBSTITUTED FOR THE 1" CALIPER OR 3' - 5'. IF WHIPS OR SEEDLINGS ARE TO BE USED, MULTIPLY THE QUANTITIES BY 3.5 TO DETERMINE THE NUMBER OF TREES REQUIRED.



SIGNAGE DETAILS
NOT TO SCALE



TYPICAL TREE PLANTING PLAN
NOT TO SCALE

- SEE GENERAL NOTES 6 & 7 UNDER "PLANT INSTALLATION"
- GROUND PLANE TO BE MULCHED AFTER INSTALLATION OF PLANT MATERIAL.

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

STATE OF MARYLAND PROFESSIONAL ENGINEER No. 17942

MD DNR QUALIFIED PROFESSIONAL
MASHID TRINIDA 5/6/10

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

H:\08-007\DWG\PRELIMINARY\FINAL\FINAL-R-20

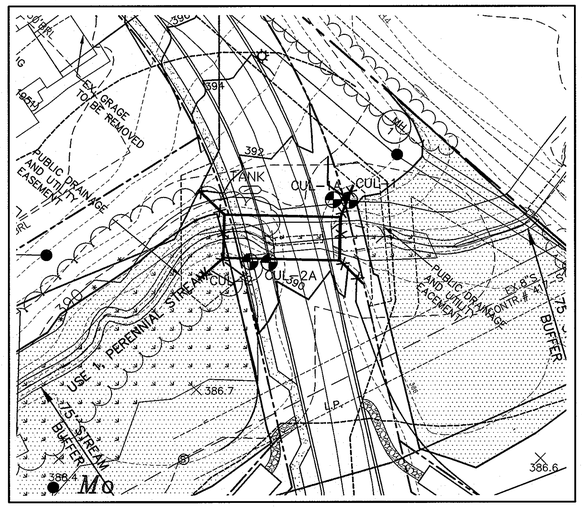
BONNIE BRANCH WOODS

TAX MAP: 31 PARCEL: 101
SECOND ELECTION DISTRICT HOWARD COUNTY, MARYLAND
FOREST CONSERVATION NOTES AND DETAILS

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

project 08-007 | date MAY 2010 | engineering MMM | illustration MMM | approval RJH | scale 1"=50'

no. | description | date — revisions



SOIL BORINGS LOCATION PLAN

SCALE: 1"=30'

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: Peterson Property Culvert — Boring No.: CUL-1
Location: Northeast Corner of Culvert — Job #: 09345A

SAMPLER

Datum: ____ Hammer Wt. 140 lbs. Hole Diameter 8" Foreman S. McManus
Surf. Elev. N/A Ft. Hammer Drop 30 in. Rock Core Diameter N/A Inspector ____
Date Started 9/25/2009 Pipe Size 2.0 in. Boring Method HSA Date Completed 9/25/2009

Elevation/ Depth	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Rec.	NM	SPT Blows	N
0	D	Brown to gray, moist to wet, stiff to very stiff to soft to very hard, sandy silty lean CLAY, trace fine to coarse sand, trace clay, trace root matter	Ground surface at boring approximately 8' above stream bed.	9		3-3-6	9
	D		1-inch topsoil	4		5-4-7	11
5	D		S-2: NM%=21.4%, PL= 24, LL=38, PI=14, USCS=CL, AASHTO= A-6(7)	6		8-12-11	23
	D		S-4: NM%=27.5%	3		1-2-1	3
10	D	Bottom of boring at 10.6 feet	Groundwater encountered at 9.5' while drilling Auger refusal at 10.6 feet	3		13-50/1	50/1

SPT Blows/Foot Curve: 10 30 50

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.	8.0' ft.
AFTER 24 HRS.	ft.	ft.
AFTER 72 HRS.	7.0' ft.	7.5' 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.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: Peterson Property Culvert — Boring No.: CUL-1A
Location: Northeast Corner of Culvert- offset 5' from CUL-1, 6.5' away from driveway — Job #: 09345A

SAMPLER

Datum: ____ Hammer Wt. 140 lbs. Hole Diameter 8" Foreman S. McManus
Surf. Elev. N/A Ft. Hammer Drop 30 in. Rock Core Diameter N/A Inspector ____
Date Started 9/25/2009 Pipe Size 2.0 in. Boring Method HSA Date Completed 9/25/2009

Elevation/ Depth	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Rec.	NM	SPT Blows	N
0		Augered down to 15.0 feet	1-inch topsoil No groundwater encountered while drilling				
15	D	Light brown, moist, very dense, sand, trace silt, trace fine gravel Bottom of auger boring at 16.0 feet	Auger refusal at 16.0'	4		50/4	50/4

SPT Blows/Foot Curve: 10 30 50

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	12.0' ft.	12.2' ft.
AFTER 24 HRS.	ft.	ft.
AFTER 72 HRS.	7.0' ft.	8.0' 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.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: Peterson Property Culvert — Boring No.: CUL-2
Location: Southwest Corner of Culvert — Job #: 09345A

SAMPLER

Datum: ____ Hammer Wt. 140 lbs. Hole Diameter 8" Foreman S. McManus
Surf. Elev. N/A Ft. Hammer Drop 30 in. Rock Core Diameter N/A Inspector ____
Date Started 9/25/2009 Pipe Size 2.0 in. Boring Method HSA Date Completed 9/25/2009

Elevation/ Depth	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Rec.	NM	SPT Blows	N
0	D	Brown to gray, moist, stiff to medium stiff to soft to medium stiff, sandy, silty lean CLAY, trace fine-coarse sand, trace clay	Ground surface at boring approximately 3' above stream bed.	9		1-4-5	9
	D		1-inch topsoil S-2: NM%=15.6%	10		5-4-3	7
5	D			4		1-2-1	3
	D	Brown, moist, loose, silty, clayey SAND, little fine-medium gravel Bottom of boring at 9.5 feet	S-4: NM%=14.6%, PL= 20, LL=27, PI=7, USCS=SC-SM, AASHTO= A-2-4(0) Auger refusal at 9.5'	9		1-3-4	7

SPT Blows/Foot Curve: 10 30 50

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.	8.5' ft.
AFTER 24 HRS.	ft.	ft.
AFTER 72 HRS.	4.0' ft.	4.5' 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.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: Peterson Property Culvert — Boring No.: CUL-2A
Location: Southwest Corner of Culvert- offset 5' from CUL-2 and 8' away from driveway — Job #: 09345A

SAMPLER

Datum: ____ Hammer Wt. 140 lbs. Hole Diameter 8" Foreman S. McManus
Surf. Elev. N/A Ft. Hammer Drop 30 in. Rock Core Diameter N/A Inspector ____
Date Started 9/25/2009 Pipe Size 2.0 in. Boring Method HSA Date Completed 9/25/2009

Elevation/ Depth	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Rec.	NM	SPT Blows	N
0		Augered down to 12.4 feet	1-inch topsoil				
		Bottom of boring at 12.4 feet	Auger refusal at 12.4 feet				

SPT Blows/Foot Curve: 10 30 50

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.	10.4' ft.
AFTER 24 HRS.	ft.	ft.
AFTER 72 HRS.	3.0' ft.	3.5' 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.

TEMPORARY TRAFFIC CONTROL TYPICAL APPLICATION

IMPORTANT:
THIS DRAWING SHALL BE USED IN COMBINATION WITH THE GENERAL NOTES MD 104.00-01 - MD 104.00-18 AND STANDARD DETAILS MD 104.01-01 - MD 104.01-62

NOTES:
SHOULDER CLOSED SIGNS ARE REQUIRED IN PLACE OF SHOULDER WORK SIGNS WHEN THE SHOULDER IS CLOSED BY A PHYSICAL BARRIER REFER TO STANDARD NO. MD 104.06-14.

WHEN WORK INVOLVES A PAVEMENT EDGE DROP-OFF, REFER TO STANDARD NOS. MD 104.06-11 TO MD 104.06-15.

KEY:

■ ■	CHANNELIZING DEVICES
┻	SIGN SUPPORT FACE OF SIGN
⇧	DIRECTION OF TRAFFIC
▨	WORK SITE

SPECIFICATION 104	CATEGORY CODE ITEMS
APPROVED	DIRECTOR - OFFICE OF TRAFFIC AND SAFETY

APPROVAL - SHA REVISIONS	APPROVAL - FEDERAL HIGHWAY ADMINISTRATION
APPROVAL 9-20-03	APPROVAL 9-23-03
REVISED	REVISED
REVISED	REVISED
REVISED	REVISED

SHA State Highway Administration

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

SHOULDER WORK/2-LANE, 2-WAY
EQL/LESS THAN 40 MPH

STANDARD NO. MD 104.02-02

PAVEMENT MARKING

SCALE: 1"=30'

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."

5/6/10
SIGNATURE OF DEVELOPER — DATE
JOHN DOUGLAS CASHMERE
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."

5/6/10
SIGNATURE OF ENGINEER — DATE
R. JACOB HIKMAT
PRINTED NAME OF ENGINEER

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

~~HOWARD SOIL CONSERVATION DISTRICT — DATE~~

APPROVED: DEPARTMENT OF PUBLIC WORKS

6-11-10
CHIEF BUREAU OF HIGHWAYS — DATE

APPROVED: DEPARTMENT OF PLANNING AND ZONING

6/22/10
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE

6/18/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE

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. 17942, EXP DATE 9/3/10.

R. JACOB HIKMAT
No. 17942

H:\08-007\DWG\PRELIMINARY\FINAL\FINAL-R-20.DWG

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC., INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
AS SHOWN	RJH

no.	description	date
	revisions	

BONNIE BRANCH WOODS

SECOND ELECTION DISTRICT TAX MAP: 31 PARCEL: 101 HOWARD COUNTY, MARYLAND

CULVERT SOIL BORINGS AND PAVEMENT MARKING DETAILS

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

F-10-042

MGWC 4.2: UTILITY CROSSING

Temporary in-stream construction

DESCRIPTION

The work should consist of installing erosion control devices in and adjacent to the construction of utility crossings.

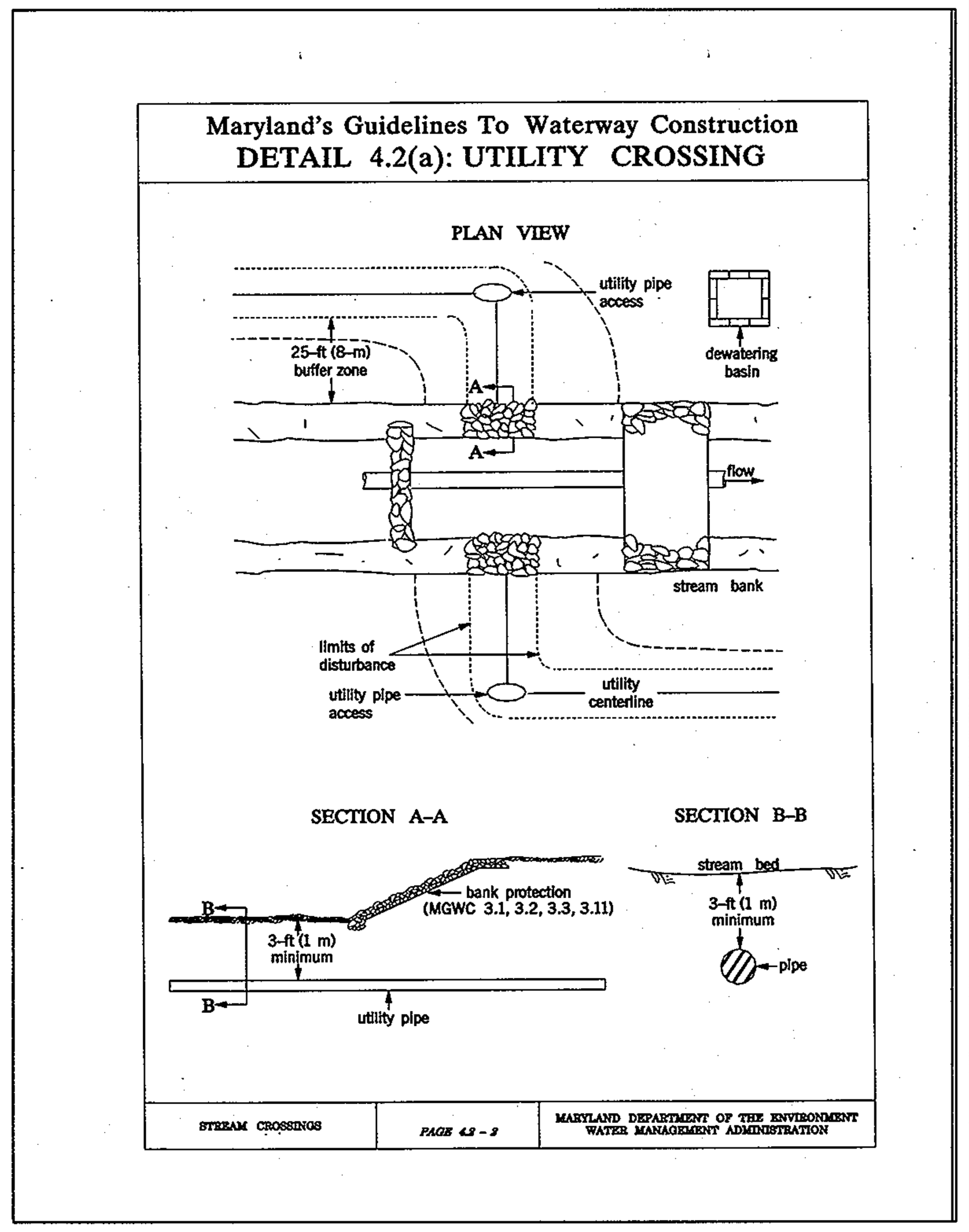
INSTALLATION GUIDELINES

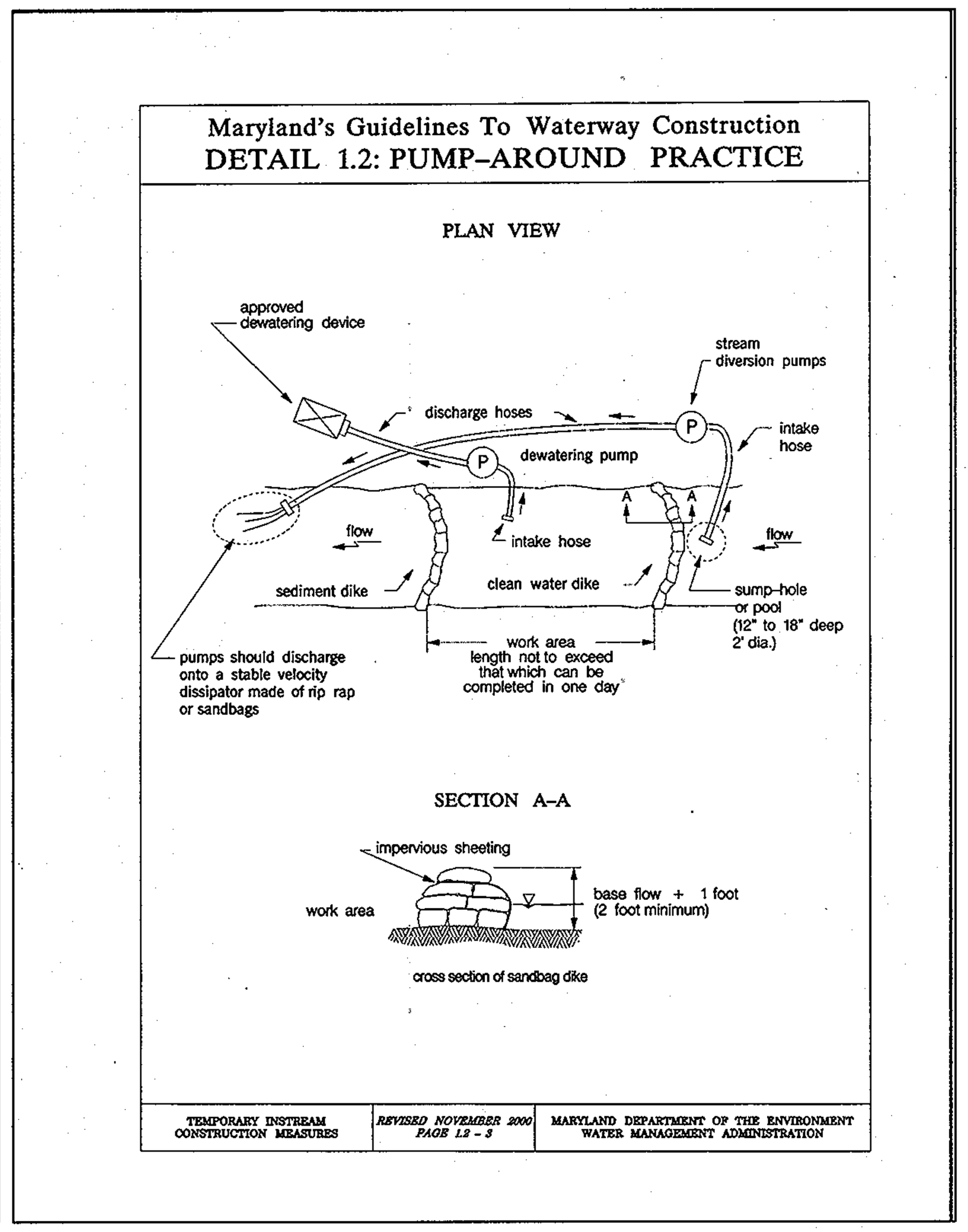
All erosion and sediment control devices, including dewatering basins, should be implemented as the first order of business according to a plan approved by the WMA or local authority. (See *the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control.*) The proposed construction sequence is as follows (refer to Detail 4.2):

1. The contractor should insure that a continuous perimeter control barrier is in place to minimize the amount of pollutants entering the flow. A diversion pipe as shown in MGWC 1.4: Diversion Pipe or other measure should be installed and sandbag or stone barriers as shown in MGWC 1.5: Sandbag/Stone Diversion should be constructed according to specifications to divert the streamflow.
2. Excavated topsoil and subsoil should be kept separate, placed on the upland side of the excavation, and replaced in their natural order.
3. All construction should take place during stream low flows. The length of construction time should be limited to a maximum of 5 consecutive days for each crossing.
4. All utility crossings should be placed a minimum of 3 feet (1 meter) beneath the stream bed unless an alternative section is specifically approved by the WMA. For instances where a 3-foot cover is not viable, two alternate stabilization options are given in the Detail 4.2. A low flow channel shall be constructed through all riprap placements across the stream bed.
5. The stream should be diverted by an approved temporary stream diversion, the construction area should be dewatered, and any disturbed banks should be stabilized. The contractor may elect to construct the utility crossing in two stages. In this case, a WMA approved flow barrier may be constructed to keep the construction area dry.
6. Once the crossing 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.

STREAM CROSSINGS — *MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000*

PAGE 4.2 - 1





MGWC 1.2: PUMP-AROUND PRACTICE

Temporary measure for dewatering in-channel construction sites

DESCRIPTION

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

IMPLEMENTATION SEQUENCE

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

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

TEMPORARY INSTREAM CONSTRUCTION MEASURES — *MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000*

PAGE 1.2 - 1

MGWC 1.2: PUMP-AROUND PRACTICE

7. Water from the work area should be pumped to a sediment filtering measure such as a dewatering basin, sediment bag, or other approved source. The measure should be located such that the water drains back into the channel below the downstream sandbag dike.
8. Traversing a channel reach with equipment within the work area where no work is proposed should be avoided. If equipment has to traverse such a reach for access to another area, then timber mats or similar measures should be used to minimize disturbance to the channel. Temporary stream crossings should be used only when necessary and only where noted on the plans or specified. (*See Section 4, Stream Crossings, Maryland Guidelines to Waterway Construction*).
9. All stream restoration measures should be installed as indicated by the plans and all banks graded in accordance with the grading plans and typical cross- sections. All grading must be stabilized at the end of each day with seed and mulch or seed and matting as specified on the plans.
10. After an area is completed and stabilized, the clean water dike should be removed. After the first sediment flush, a new clean water dike should be established upstream from the old sediment dike. Finally, upon establishment of a new sediment dike below the old one, the old sediment dike should be removed.
11. A pump around must be installed on any tributary or storm drain outfall which contributes baseflow to the work area. This should be accomplished by locating a sandbag dike at the downstream end of the tributary or storm drain outfall and pumping the stream flow around the work area. This water should discharge onto the same velocity dissipater used for the main stem pump around.
12. If a tributary is to be restored, construction should take place on the tributary before work on the main stem reaches the tributary confluence. Construction in the tributary, including pump around practices, should follow the same sequence as for the main stem of the river or stream. When construction on the tributary is completed, work on the main stem should resume. Water from the tributary should continue to be pumped around the work area in the main stem.
13. The contractor is responsible for providing access to and maintaining all erosion and sediment control devices until the sediment control inspector approves their removal.
14. After construction, all disturbed areas should be regraded and revegetated as per the planting plan.

TEMPORARY INSTREAM CONSTRUCTION MEASURES — *MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2000*

PAGE 1.2 - 2

MDE DETAILS

GENERAL NOTES

Specifications: Latest SHA Specifications and Special Provisions for materials and construction. Latest AASHTO Standard Specifications for Highway Bridges for design.

Materials: Posts and rails shall conform to ASTM F-1083, Schedule 80. Fabric shall be 6 gauge, 2" PVC coated mesh conforming to 914.01.

All posts, braces, fittings and hardware shall be PVC coated. Coating shall conform to 914.03 except that nuts, bolts and washers shall also be PVC coated and touched up after installation.

All plates shall be steel conforming to ASTM A 709 Grade 36.

Anchor studs or anchor bolts shall conform to ASTM A 276, Type 430 or Type 304 stainless steel annealed, hot-finished, ultimate strength 70 000 psi min., 20% min. elongation. Threads may be rolled or cut.

Epoxy grout for anchor studs in cored holes shall conform to 902.11 (d).

PVC color for all elements of fence shall be black unless otherwise noted.

Construction: All longitudinal rails shall be parallel to top of wall.

All posts shall be set normal to top of wall for roadway grades 6% or less. For grades over 6% posts shall be set plumb.

The chain link fence shall be true to line, taut, tight fit to top of wall (½" maximum gap) and shall comply with the best practice for fence construction of this type.

Post and rails shall be permanently positioned before fabric is placed.

For post spacing see pertinent structure sheets.

Precoated longitudinal rails, if cut, shall have the cut end coated with PVC touch up material supplied by the manufacturer prior to erection.

If Contractor elects to place anchor studs after placing concrete wall, newly placed rebars shall be located so that coring does not damage same, all holes shall be cored (not drilled) and the diameter of the cored holes for the anchor studs shall be ⅞".

Measurement and Payment: The furnishing, fabricating, erecting, etc., of all new chain link fence on the retaining wall or culvert headwalls and wing walls, complete in place, will not be measured for payment but all costs thereof shall be included in the Contract lump sum prices for the pertinent Retaining Wall or Box Culvert Item(s).

Any defects uncovered by the inspection of welds on base plates and poles shall be repaired or replaced by new members at no additional cost to the Administration.

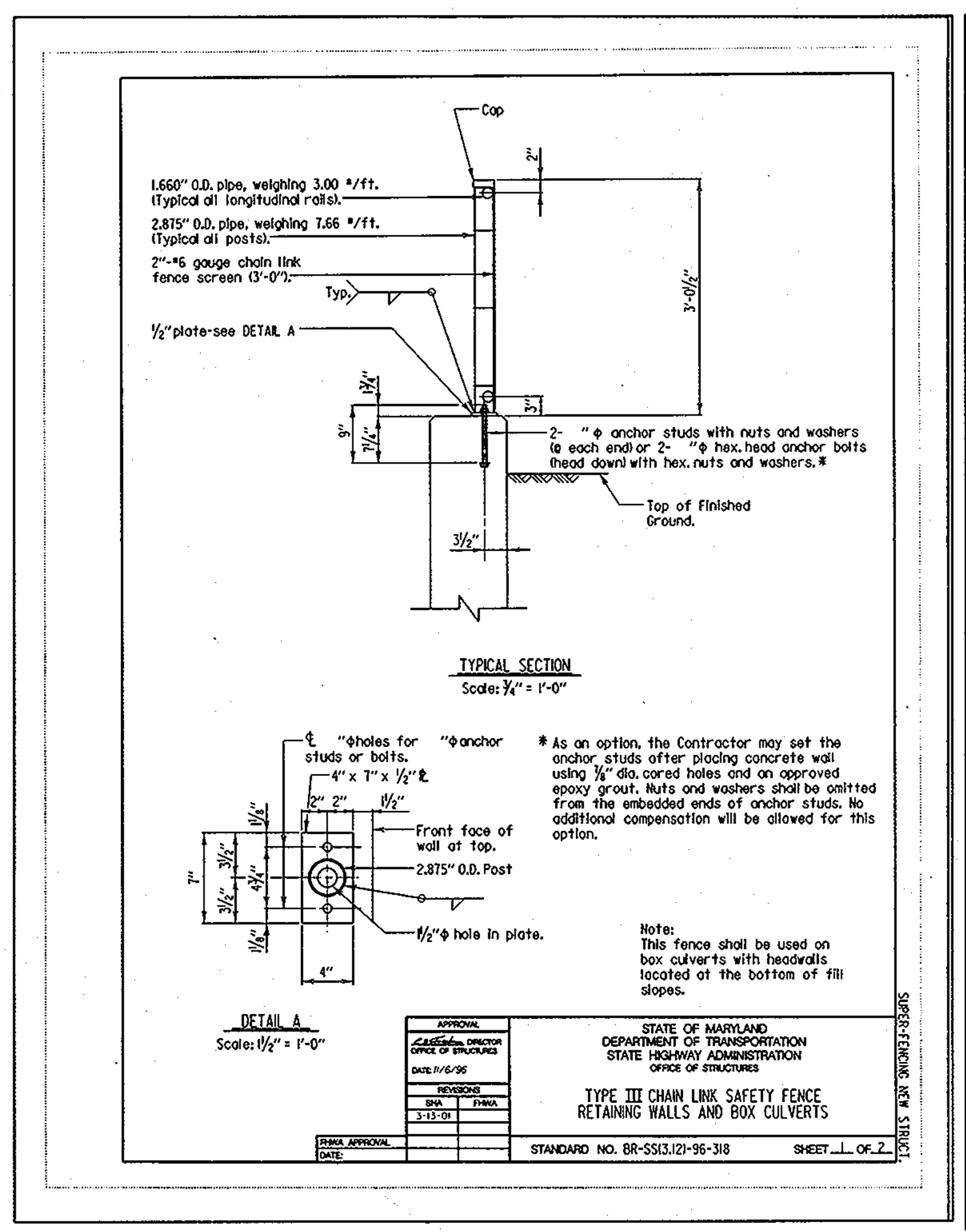
APPROVAL — DIRECTOR OFFICE OF STRUCTURES — DATE: 11/6/96 — REVISIONS: SHA 3-13-01, 7-24-01 — FHWA APPROVAL DATE

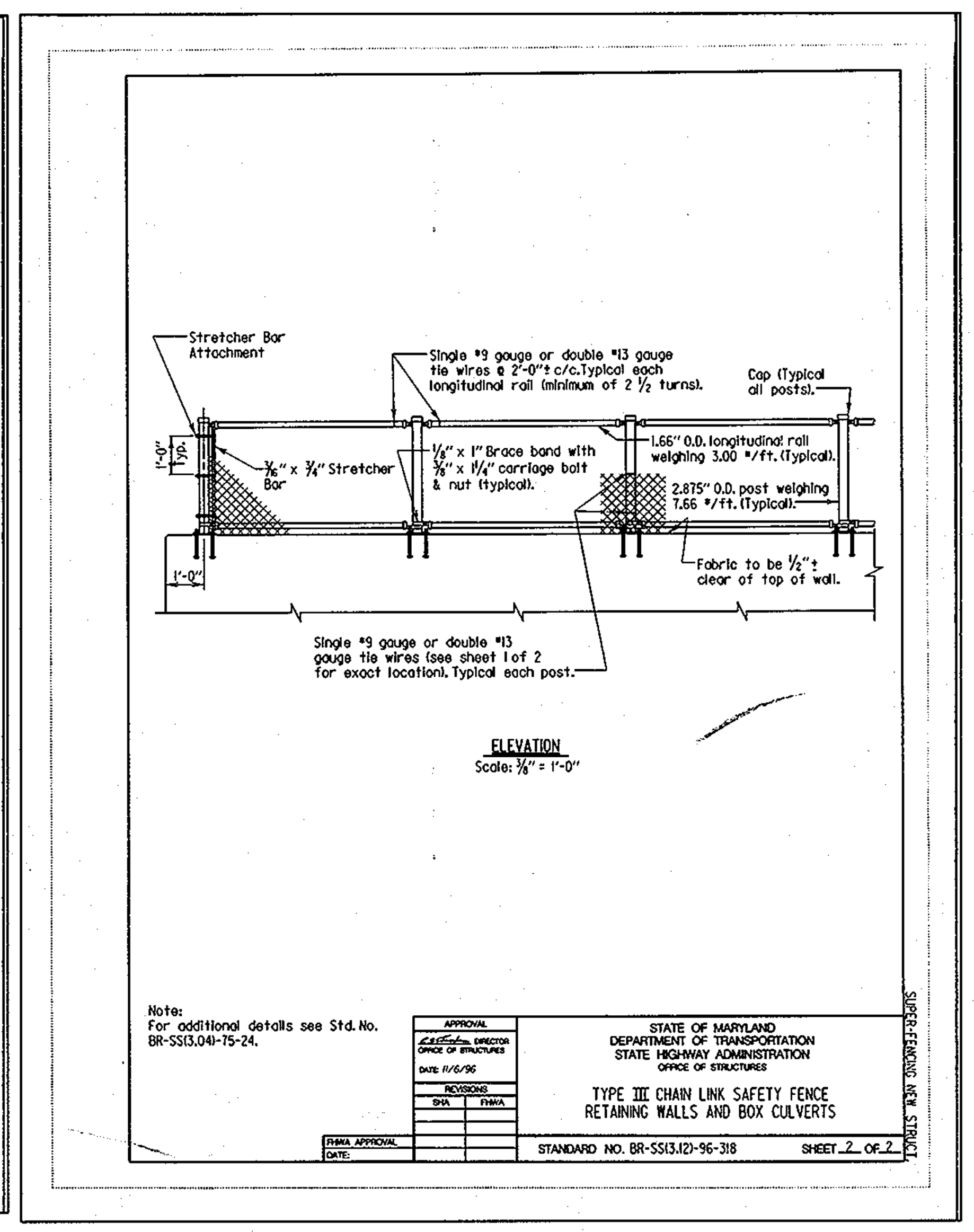
STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES

CHAIN LINK SAFETY FENCE RETAINING WALLS AND BOX CULVERTS GENERAL NOTES

STANDARD NO. BR-SS(3.11)-96-317 SHEET 1 OF 1

SUPER-FENCING NEW STRUCT.





MD. SHA DETAILS

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

STATE OF MARYLAND — R. JACOB HIKMAT — No. 17942 — 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. 17942, EXP DATE 9/3/10.

OWNER/DEVELOPER

BONNIE BRANCH WOODS INC.
C/O MILDENBERG, BOENDER AND ASSOC.,INC.
6800 DEERPATH ROAD, SUITE 150
ELKRIDGE, MARYLAND 21075
410-997-0296

H:\08-007\DWG\FINAL\FINAL-R-20.DWG

BONNIE BRANCH WOODS

TAX MAP: 31 PARCEL: 101

SECOND ELECTION DISTRICT — HOWARD COUNTY, MARYLAND

MISCELANOUS DETAILS

MILDENBERG, BOENDER & ASSOC., INC.
Engineers Planners Surveyors
6800 Deerpath Road, Suite 150, Elkridge, Maryland 21075
(410) 997-0296 Balt. (410) 997-0298 Fax.

project	date
08-007	MAY 2010
illustration	engineering
MMM	MMM
scale	approval
AS SHOWN	RJH

no.	description	date
	revisions	

BONNIE BRANCH WOODS
HOWARD COUNTY, MARYLAND

NOTES
GENERAL NOTES:

1. THIS BRIDGE HAS BEEN DESIGNED FOR GENERAL SITE CONDITIONS. THE PROJECT ENGINEER SHALL BE RESPONSIBLE FOR THE STRUCTURE'S SUITABILITY TO THE EXISTING SITE CONDITIONS AND FOR THE HYDRAULIC EVALUATION -- INCLUDING SCOUR AND CONFIRMATION OF SOIL CONDITIONS.

2. PRIOR TO CONSTRUCTION, CONTRACTOR MUST VERIFY ALL ELEVATIONS SHOWN THROUGH THE ENGINEER.

3. ONLY CONTECH BRIDGE SOLUTIONS INC. THE CON/SPAN® APPROVED PRECASTER IN MARYLAND MAY PROVIDE THE STRUCTURE DESIGNED IN ACCORDANCE WITH THESE PLANS.

4. THE USE OF ANOTHER PRECAST STRUCTURE WITH THE DESIGN ASSUMPTIONS USED FOR THE CON/SPAN® STRUCTURE MAY LEAD TO SERIOUS DESIGN ERRORS. USE OF ANY OTHER PRECAST STRUCTURE WITH THIS DESIGN AND DRAWINGS VOIDS ANY CERTIFICATION OF THIS DESIGN AND WARRANTY. CONTECH BRIDGE SOLUTIONS INC. ASSUMES NO LIABILITY FOR DESIGN OF ANY ALTERNATE OR SIMILAR TYPE STRUCTURES.

5. ALTERNATE STRUCTURES MAY BE CONSIDERED, PROVIDED THAT SIGNED AND SEALED DESIGN DRAWINGS (AND CALCULATIONS) ARE SUBMITTED TO THE ENGINEER 2 WEEKS PRIOR TO THE BID DATE FOR REVIEW AND APPROVAL.

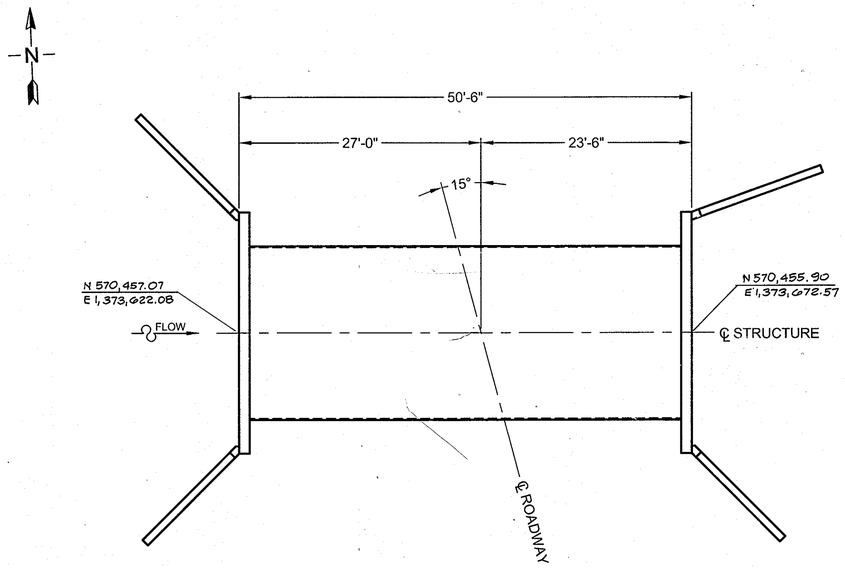
DESIGN DATA

DESIGN LOADING:
HEADWALLS: EARTH PRESSURE + LIVE LOAD SURCHARGE
WINGWALLS: EARTH PRESSURE ONLY
HEADWALL DESIGN FILL HEIGHT: 1'-6 MIN. FROM TOP OF CORRUGATED STRUCTURE TO BOTTOM OF FLEXIBLE PAVEMENT/ 2'-0" MAX. FROM TOP OF CORRUGATED STRUCTURE TO TOP OF ROADWAY
DESIGN METHOD: LOAD FACTOR PER AASHTO SPECIFICATION
NET ALLOWABLE SOIL BEARING PRESSURE: 2500 PSF *
GROSS ALLOWABLE SOIL BEARING PRESSURE: 2500 PSF *

*FOUNDATION EXCAVATION AND SUBGRADE PREPARATION SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL REPORT FOR THIS PROJECT PREPARED BY HILLIS-CARNES DATED OCTOBER 13, 2009.

MATERIALS

PRECAST UNITS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH CON/SPAN® SPECIFICATIONS. CONCRETE FOR FOOTINGS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI. REINFORCING STEEL FOR FOOTINGS SHALL CONFORM TO ASTM A615 OR A996-GRADE 60.



LOCATION PLAN

NOT TO SCALE

NOTE:
WINGWALL & HEADWALL PRECAST UNITS & FOUNDATIONS DESIGNED BY CONTECH

NOTE:
BRIDGE AND BRIDGE FOUNDATION DESIGNED BY CBC ENGINEERS

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. 36225, EXPIRATION DATE: 8/19/2010.

2/9/10
STATE OF MARYLAND · PHILIP A. GREINER · LIC. No. 36225 · PROFESSIONAL ENGINEER

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

MARK	DATE	REVISION DESCRIPTION	BY
JMF	2/8/2010	NO CHANGES ON THIS SHEET	JMF

CONTECH®
CONSTRUCTION PRODUCTS INC.
www.contech-cpi.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CON/SPAN® BRIDGE SYSTEMS
CONTECH CONTRACT DRAWING

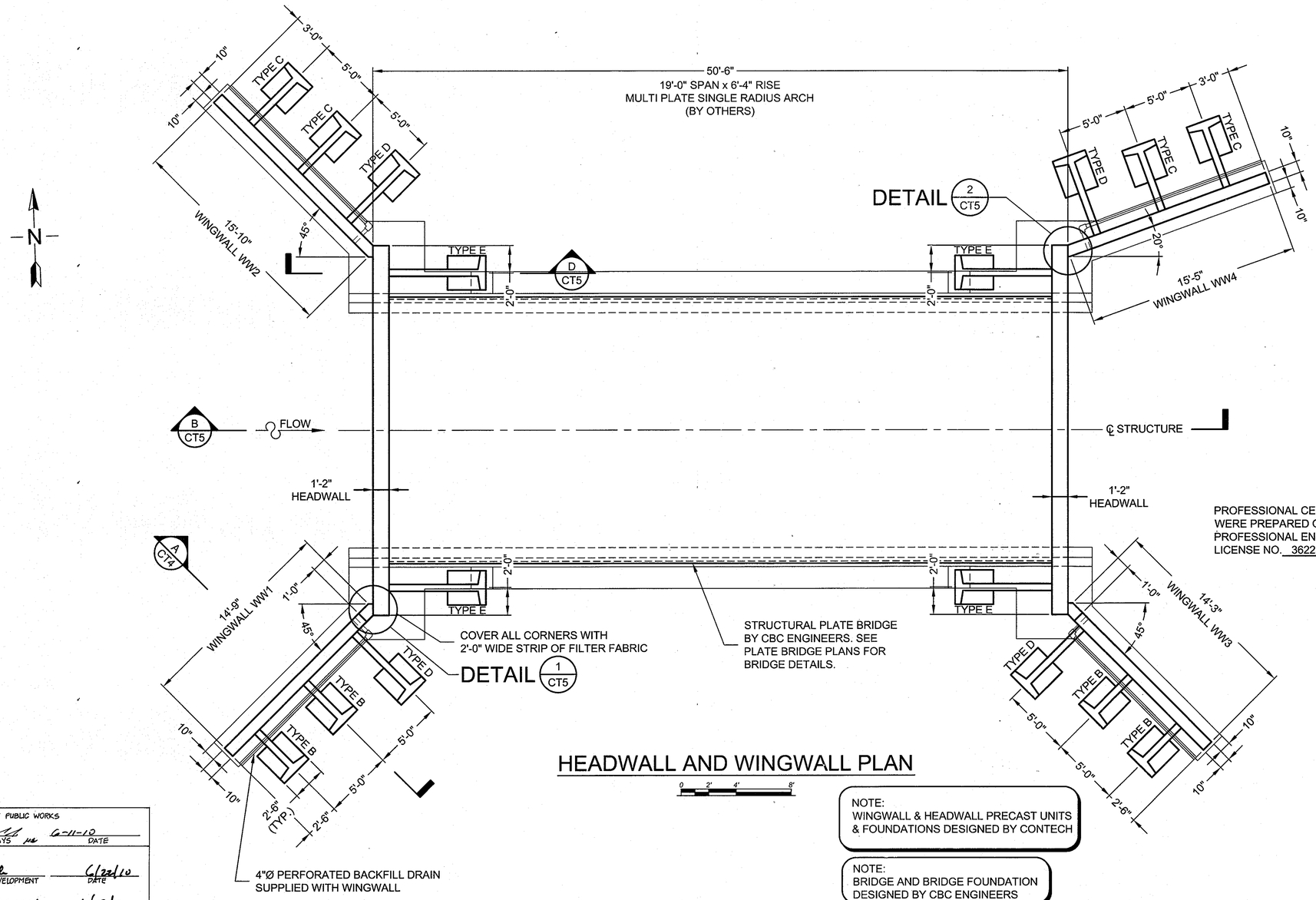
BONNIE BRANCH WOODS

HOWARD COUNTY, MARYLAND

PROJECT No.:	SEQ. No.:	DATE:
402195	001	11/13/2009
DESIGNED: JMF		DRAWN: ZWM
CHECKED: DMR		APPROVED: PAC
SHEET NO.: 14 OF 24 CT1 OF CT7		

F-10-042

I:\MERLIN\PROJECTS\ACTIVE\402100\402195\402195-1-NULL\T_PLATE\DRAWINGS\CONTRACT\PRE-402195-001-CS-CON-B.DWG 2/9/2010 11:29 AM



HEADWALL AND WINGWALL PLAN

0 2' 4' 8'

NOTE:
WINGWALL & HEADWALL PRECAST UNITS
& FOUNDATIONS DESIGNED BY CONTECH

NOTE:
BRIDGE AND BRIDGE FOUNDATION
DESIGNED BY CBC ENGINEERS

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. 36225, EXPIRATION DATE: 8/19/2010.

STATE OF MARYLAND · PHILIP A. CREAMER · Lic. No. 36225 · PROFESSIONAL ENGINEER

2/9/10

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED:

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

MARK	DATE	REVISION DESCRIPTION	BY
JMF	2/8/2010	NO CHANGES ON THIS SHEET	JMF

CONTECH® CONSTRUCTION PRODUCTS INC.
www.contech-cpi.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONSPAN® BRIDGE SYSTEMS
CONTECH CONTRACT DRAWING

BONNIE BRANCH WOODS

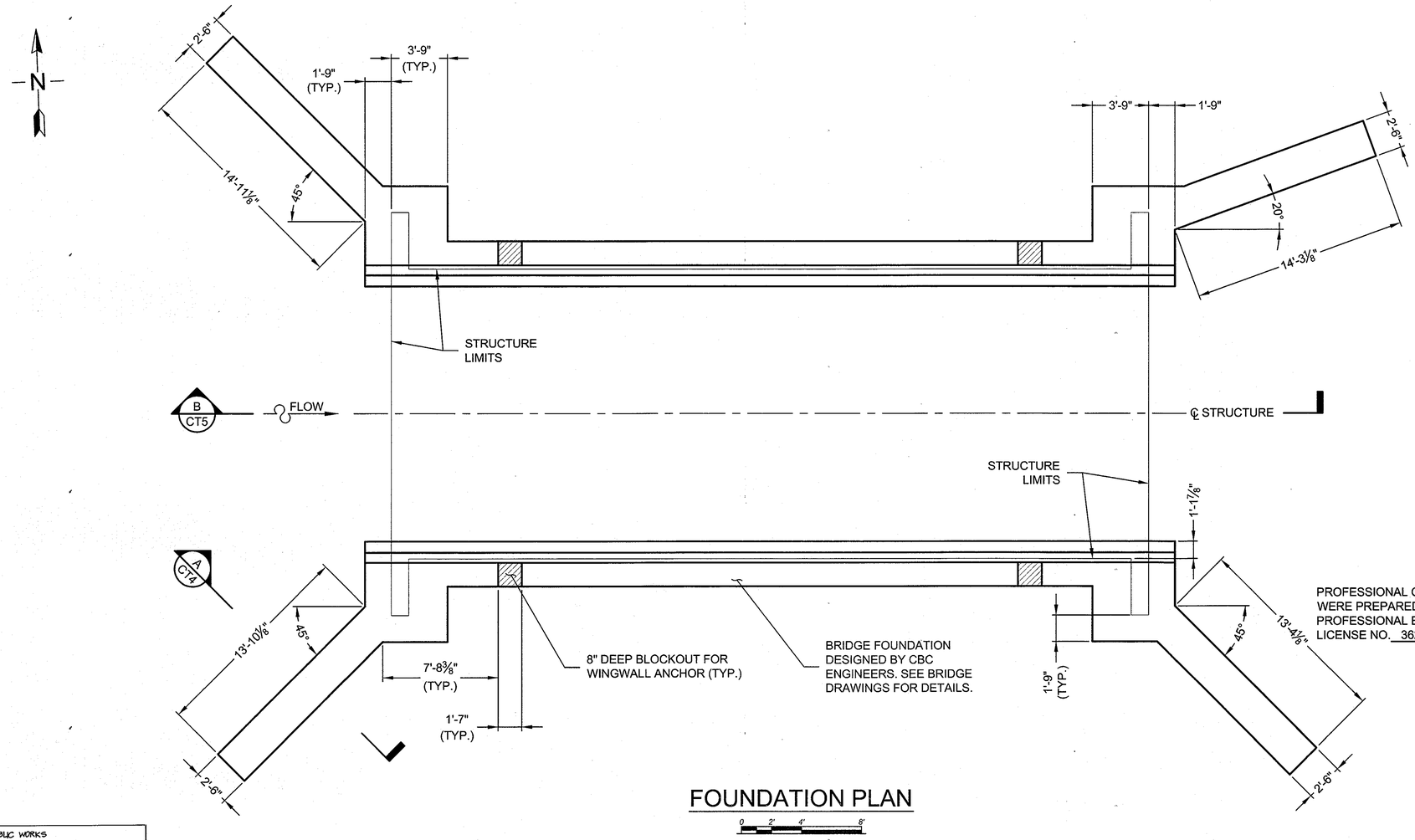
HOWARD COUNTY, MARYLAND

PROJECT No.:	SEQ. No.:	DATE:
402195	001	11/13/2009
DESIGNED: JMF		DRAWN: ZWM
CHECKED: DMR		APPROVED: PAC

SHEET NO.: 15 OF 24
CT2 OF CT7

F-10-042

I:\MERLIN\PROJECTA\CTIVE\402100\402195\402195-1-MULTI_PLATE\DRAWINGS\CONTRACT\PRE-402195-001-CS-CON-B.DWG 2/9/2010 11:30 AM



FOUNDATION PLAN

NOTE:
WINGWALL & HEADWALL PRECAST UNITS & FOUNDATIONS DESIGNED BY CONTECH

NOTE:
BRIDGE AND BRIDGE FOUNDATION DESIGNED BY CBC ENGINEERS

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. 36225, EXPIRATION DATE: 8/19/2010.

STATE OF MARYLAND · PHILIP A CREAMER · Lic. No. 36225 · PROFESSIONAL ENGINEER
1/8/10

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

MARK	DATE	REVISION DESCRIPTION	BY
JMF	2/8/2010	NO CHANGES ON THIS SHEET	JMF

CONTECH® CONSTRUCTION PRODUCTS INC.
www.contech-cpi.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

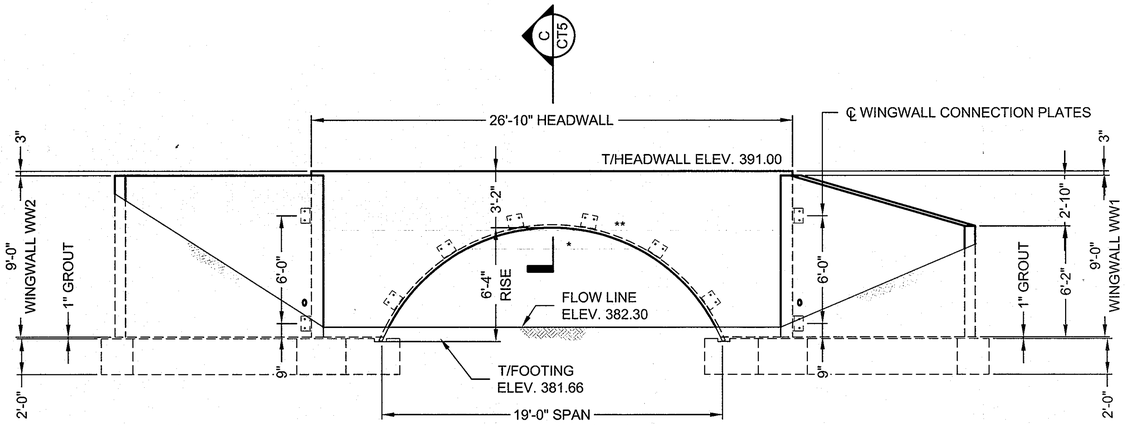
CONSPAN® BRIDGE SYSTEMS
CONTECH CONTRACT DRAWING

BONNIE BRANCH WOODS

HOWARD COUNTY, MARYLAND

PROJECT No.:	SEQ. No.:	DATE:
402195	001	11/13/2009
DESIGNED: JMF		DRAWN: ZWM
CHECKED: DMR		APPROVED: PAC
SHEET NO.: CT3 OF CT7		

10 OF 24
F-10-042

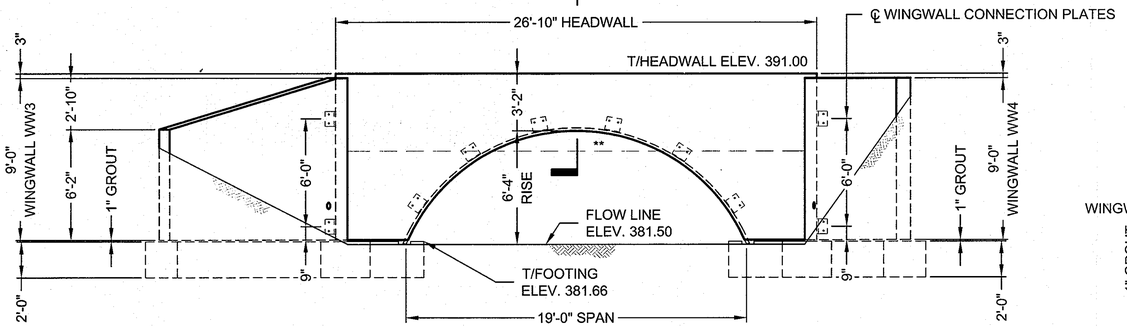


UPSTREAM END ELEVATION

0 2' 4' 8'

* 25 YEAR WATER LEVEL = 386.64; VELOCITY 8.49 CFS
** 100 YEAR FLOOD EVEVATION = 387.68
(INFORMATION PROVIDED BY OTHERS) 1

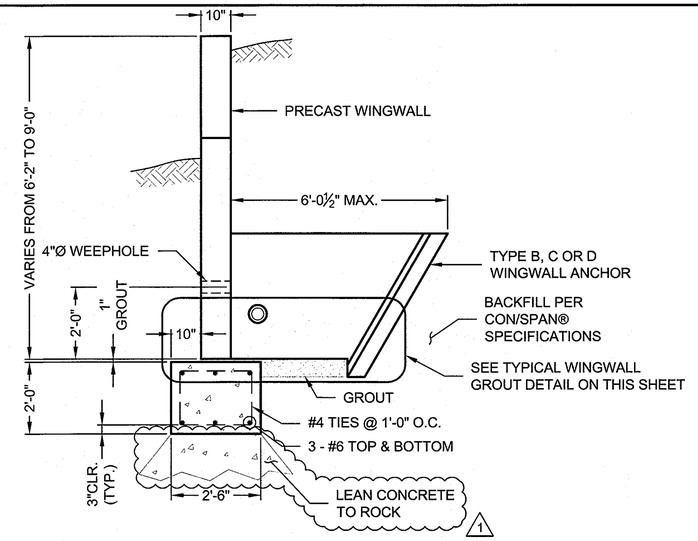
NOTE:
BRIDGE AND BRIDGE FOUNDATION DESIGNED BY CBC ENGINEERS



DOWNSTREAM END ELEVATION

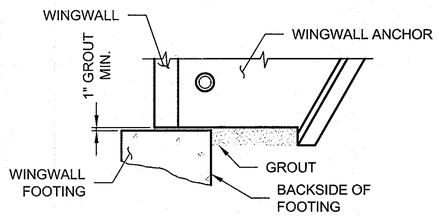
0 2' 4' 8'

** 100 YEAR FLOOD EVEVATION = 386.70
(INFORMATION PROVIDED BY OTHERS) 1



SECTION A CT2

0 1' 2' 4'



NOTES:
- MINIMUM 1" GROUT UNDER WINGWALL LEG & ANCHOR STEM.
- AREA BETWEEN WINGWALL FOOTING AND WINGWALL ANCHOR SHALL BE GROUTED SOLID BEFORE BACKFILL.
- FORM BACKSIDE OF FOOTING TO DIMENSIONS SHOWN ON FOUNDATION PLAN.

TYPICAL WINGWALL GROUT DETAIL

NOT TO SCALE

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. 36225, EXPIRATION DATE: 8/19/2010.

2/9/10
STATE OF MARYLAND · PHILIP A. CRAMER · Lic. No. 36225 · PROFESSIONAL ENGINEER

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

MARK	DATE	REVISION DESCRIPTION	BY
JMF	2/8/2010	REVISED PER REVIEW COMMENTS	JMF

CONTECH® CONSTRUCTION PRODUCTS INC.
www.contech-cpi.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CON/SPAN® BRIDGE SYSTEMS
CONTECH CONTRACT DRAWING

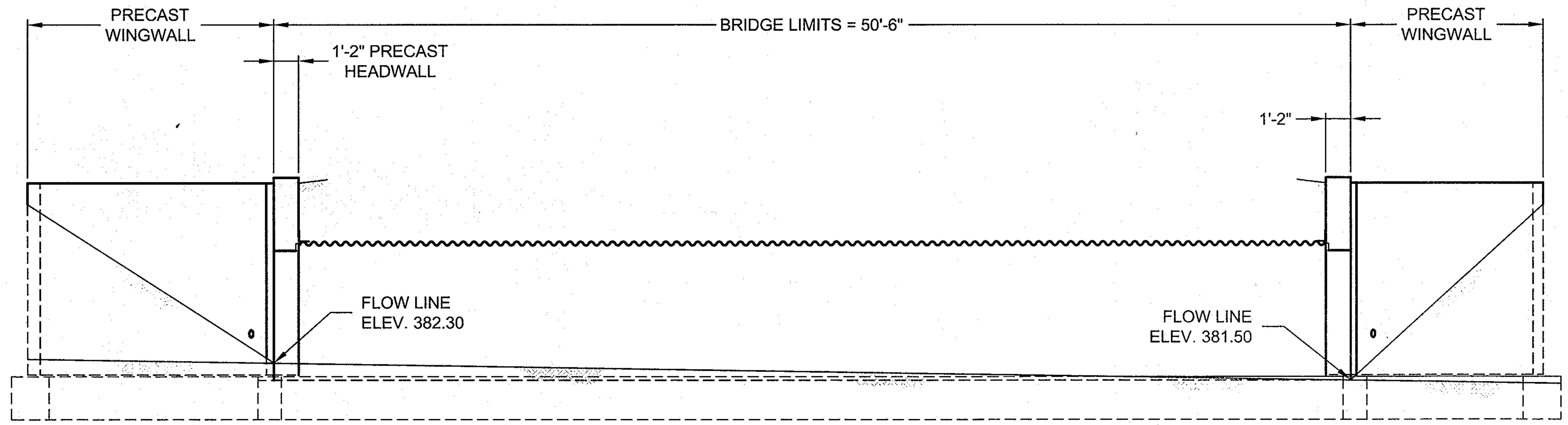
BONNIE BRANCH WOODS

HOWARD COUNTY, MARYLAND

PROJECT No.:	SEQ. No.:	DATE:
402195	001	11/13/2009
DESIGNED: JMF		DRAWN: ZWM
CHECKED: DMR		APPROVED: PAC

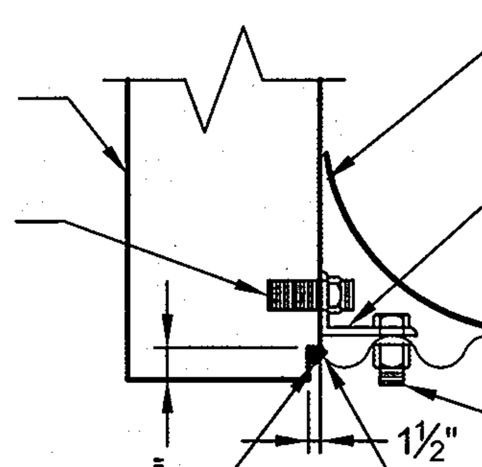
SHEET NO.: 17 OF 24
CT4 OF CT7
F-10-042

I:\MERLIN\PROJECT\ACTIVE\402100\402195\402195-1-MULTI_PLATE\DRAWINGS\CONTRACT\PRE-402195-001-CS-CON-B.DWG 2/9/2010 11:30 AM



SECTION (B / CT2)

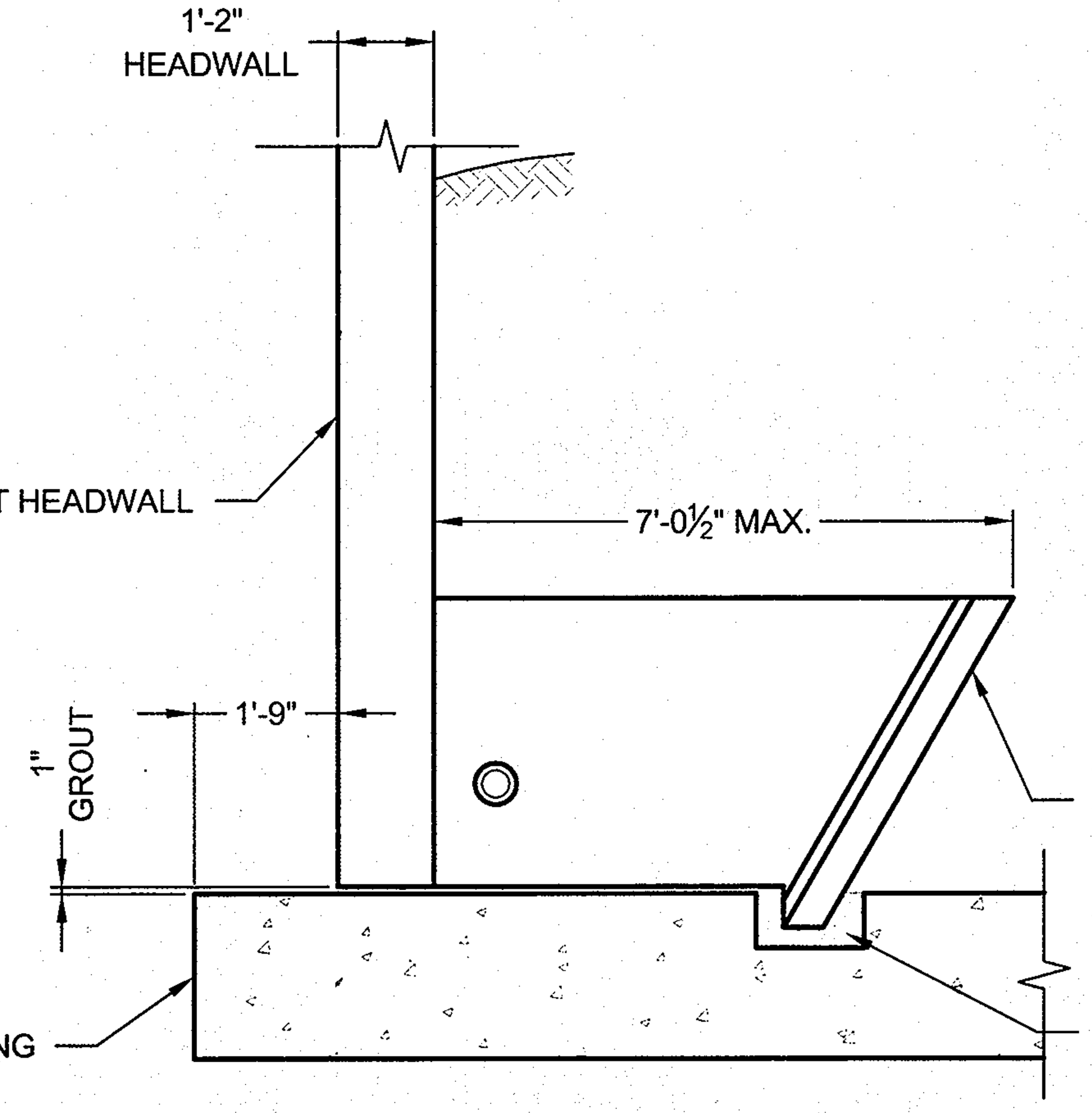
0 2' 4' 8'



SECTION (C / CT4)

NOT TO SCALE

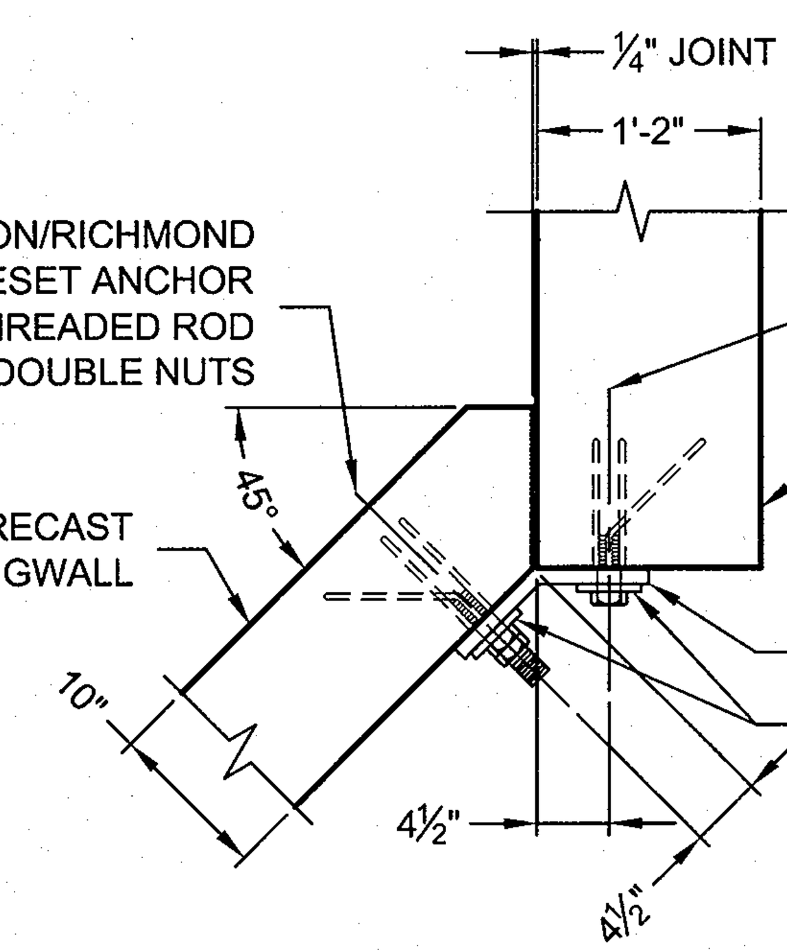
NOTE:
BRIDGE AND BRIDGE FOUNDATION DESIGNED BY CBC ENGINEERS



SECTION (D / CT2)

0 1' 2' 4'

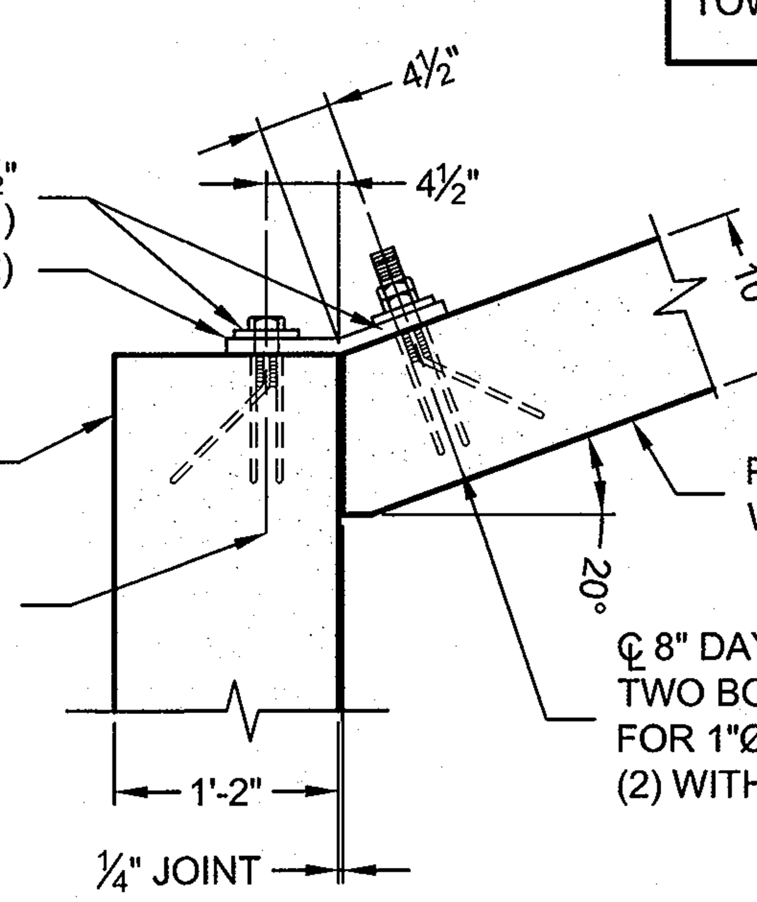
NOTE:
CONNECTION ℄'S (P-1) MUST BE POSITIONED WITH SMALL Ø HOLES TOWARD PRECAST HEADWALL



DETAIL (1 / CT2)

0 1' 2'

NOTE:
CONNECTION ℄'S (P-2) MUST BE POSITIONED WITH SMALL Ø HOLES TOWARD PRECAST HEADWALL



DETAIL (2 / CT2)

0 1' 2'

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. 36225, EXPIRATION DATE: 8/19/2010.

STATE OF MARYLAND — PROFESSIONAL ENGINEER — Lic. No. 36225 — 2/9/10

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

MARK	DATE	REVISION DESCRIPTION	BY
JMF	2/8/2010	NO CHANGES ON THIS SHEET	JMF

CONTECH CONSTRUCTION PRODUCTS INC.
www.contech-cpi.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CON/SPAN BRIDGE SYSTEMS
CONTECH CONTRACT DRAWING

BONNIE BRANCH WOODS

HOWARD COUNTY, MARYLAND

PROJECT No.: 402195	SEQ. No.: 001	DATE: 11/13/2009
DESIGNED: JMF		DRAWN: ZWM
CHECKED: DMR		APPROVED: PAC
SHEET NO.: 18 OF 24 — CT5 OF CT7		

F-10-042

I:\MERLIN\PROJECT\ACTIVE\402100\402195\402195-1-MULTI_PLATE\DRAWINGS\CONTRACT\PRE-402195-001-CS-CON-B.DWG 2/8/2010 11:30 AM

SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF CON/SPAN® BRIDGE SYSTEMS

1. DESCRIPTION
   1.1. TYPE - THIS WORK SHALL CONSIST OF FURNISHING AND CONSTRUCTING A CON/SPAN® BRIDGE SYSTEM IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN REASONABLY CLOSE CONFORMITY WITH THE LINES, GRADES, DESIGN AND DIMENSIONS SHOWN ON THE PLANS OR AS ESTABLISHED BY THE ENGINEER. IN SITUATIONS WHERE TWO OR MORE SPECIFICATIONS APPLY TO THIS WORK, THE MOST STRINGENT REQUIREMENTS SHALL GOVERN.
   1.2. DESIGNATION - PRECAST REINFORCED CONCRETE CON/SPAN® BRIDGE UNITS MANUFACTURED IN ACCORDANCE WITH THIS SPECIFICATION SHALL BE DESIGNATED BY SPAN AND RISE. PRECAST REINFORCED CONCRETE WINGWALLS AND HEADWALLS MANUFACTURED IN ACCORDANCE WITH THIS SPECIFICATION SHALL BE DESIGNATED BY LENGTH, HEIGHT, AND DEFLECTION ANGLE.

2. DESIGN
   2.1. SPECIFICATIONS - THE PRECAST ELEMENTS ARE DESIGNED IN ACCORDANCE WITH THE "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" 17TH EDITION, ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 2002. A MINIMUM OF ONE FOOT OF COVER ABOVE THE CROWN OF THE BRIDGE UNITS IS REQUIRED IN THE INSTALLED CONDITION. (UNLESS NOTED OTHERWISE ON THE SHOP DRAWINGS AND DESIGNED ACCORDINGLY.)

3. MATERIALS
   3.1. CONCRETE - THE CONCRETE FOR THE PRECAST ELEMENTS SHALL BE AIR-ENTRAINED WHEN INSTALLED IN AREAS SUBJECT TO FREEZE-THAW CONDITIONS, COMPOSED OF PORTLAND CEMENT, FINE AND COARSE AGGREGATES, ADMIXTURES AND WATER. AIR-ENTRAINED CONCRETE SHALL CONTAIN 6 ± 2 PERCENT AIR. THE AIR- ENTRAINING ADMIXTURE SHALL CONFORM TO AASHT0 M154. THE MINIMUM CONCRETE COMPRESSIVE STRENGTH SHALL BE AS SHOWN ON THE SHOP DRAWINGS.
      3.1.1. PORTLAND CEMENT - SHALL CONFORM TO THE REQUIREMENTS OF ASTM SPECIFICATIONS C150-TYPE I, TYPE II, OR TYPE III CEMENT.
      3.1.2. COARSE AGGREGATE - SHALL CONSIST OF STONE HAVING A MAXIMUM SIZE OF 1 INCH. AGGREGATE SHALL MEET REQUIREMENTS FOR ASTM C33.
      3.1.3. WATER REDUCING ADMIXTURE - THE MANUFACTURER MAY SUBMIT, FOR APPROVAL BY THE ENGINEER, A WATER-REDUCING ADMIXTURE FOR THE PURPOSE OF INCREASING WORKABILITY AND REDUCING THE WATER REQUIREMENT FOR THE CONCRETE.
      3.1.4. CALCIUM CHLORIDE - THE ADDITION TO THE MIX OF CALCIUM CHLORIDE OR ADMIXTURES CONTAINING CALCIUM CHLORIDE WILL NOT BE PERMITTED.
      3.1.5. MIXTURE - THE AGGREGATES, CEMENT AND WATER SHALL BE PROPORTIONED AND MIXED IN A BATCH MIXER TO PRODUCE A HOMOGENEOUS CONCRETE MEETING THE STRENGTH REQUIREMENTS OF THIS SPECIFICATION. THE PROPORTION OF PORTLAND CEMENT IN THE MIXTURE SHALL NOT BE LESS THAN 564 POUNDS (6 SACKS) PER CUBIC YARD OF CONCRETE.
   3.2. STEEL REINFORCEMENT
      3.2.1. THE MINIMUM STEEL YIELD STRENGTH SHALL BE 60,000 PSI, UNLESS OTHERWISE NOTED ON THE SHOP DRAWINGS.
      3.2.2. ALL REINFORCING STEEL FOR THE PRECAST ELEMENTS SHALL BE FABRICATED AND PLACED IN ACCORDANCE WITH THE DETAILED SHOP DRAWINGS SUBMITTED BY THE MANUFACTURER.
      3.2.3. REINFORCEMENT SHALL CONSIST OF WELDED WIRE FABRIC CONFORMING TO ASTM SPECIFICATION A 185 OR A 497, OR DEFORMED BILLET STEEL BARS CONFORMING TO ASTM SPECIFICATION A 615, GRADE 60. LONGITUDINAL DISTRIBUTION REINFORCEMENT MAY CONSIST OF WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS.
   3.3. STEEL HARDWARE
      3.3.1. BOLTS AND THREADED RODS FOR WINGWALL CONNECTIONS SHALL CONFORM TO ASTM A 307. NUTS SHALL CONFORM TO AASHTO M292 (ASTM A194) GRADE 2H. ALL BOLTS, THREADED RODS AND NUTS USED IN WINGWALL CONNECTIONS SHALL BE MECHANICALLY ZINC COATED IN ACCORDANCE WITH ASTM B695 CLASS 50.
      3.3.2. STRUCTURAL STEEL FOR WINGWALL CONNECTION PLATES AND PLATE WASHERS SHALL CONFORM TO AASHTO M 270 (ASTM A 709) GRADE 36 AND SHALL BE HOT DIP GALVANIZED AS PER AASHTO M111 (ASTM A123).
      3.3.3. INSERTS FOR WINGWALLS SHALL BE 1" DIAMETER TWO-BOLT PRESET WINGWALL ANCHORS AS MANUFACTURED BY DAYTON/RICHMOND CONCRETE ACCESSORIES, MIAMISBURG, OHIO, (800) 745-3700.
      3.3.4. FERRULE LOOP INSERTS SHALL BE F-64 FERRULE LOOP INSERTS AS MANUFACTURED BY DAYTON/RICHMOND CONCRETE ACCESSORIES, MIAMISBURG, OHIO, (800) 745-3700.
      3.3.5. HOOK BOLTS USED IN ATTACHED HEADWALL CONNECTIONS SHALL BE ASTM A307.
      3.3.6. INSERTS FOR DETACHED HEADWALL CONNECTIONS SHALL BE AISI TYPE 304 STAINLESS STEEL, F-58 EXPANDED COIL INSERTS AS MANUFACTURED BY DAYTON/RICHMOND CONCRETE ACCESSORIES, MIAMISBURG, OHIO, (800) 745-3700. COIL RODS AND NUTS USED IN HEADWALL CONNECTIONS SHALL BE AISI TYPE 304 STAINLESS STEEL. WASHERS USED IN HEADWALL CONNECTIONS SHALL BE EITHER AISI TYPE 304 STAINLESS STEEL PLATE WASHERS OR AASHTO M270 (ASTM A709) GRADE 36 PLATE WASHERS HOT DIP GALVANIZED AS PER AASHTO M111 (ASTM A123).
      3.3.7. REINFORCING BAR SPLICES SHALL BE MADE USING THE DOWEL BAR SPLICER SYSTEM AS MANUFACTURED BY DAYTON/RICHMOND CONCRETE ACCESSORIES, MIAMISBURG, OHIO, (800) 745-3700, AND SHALL CONSIST OF THE DOWEL BAR SPLICER (DB-SAE) AND DOWEL-IN (DI).

4. MANUFACTURE OF PRECAST ELEMENTS - SUBJECT TO THE PROVISIONS OF SECTION 5, BELOW, THE PRECAST ELEMENT DIMENSION AND REINFORCEMENT DETAILS SHALL BE AS PRESCRIBED IN THE PLAN AND SHOP DRAWINGS PROVIDED BY THE MANUFACTURER.
   4.1. FORMS - THE FORMS USED IN MANUFACTURE SHALL BE SUFFICIENTLY RIGID AND ACCURATE TO MAINTAIN THE REQUIRED PRECAST ELEMENT DIMENSIONS WITHIN THE PERMISSIBLE VARIATIONS GIVEN IN SECTION 5 OF THESE SPECIFICATIONS. ALL CASTING SURFACES SHALL BE OF A SMOOTH MATERIAL.
   4.2. PLACEMENT OF REINFORCEMENT
      4.2.1. PLACEMENT OF REINFORCEMENT IN PRECAST BRIDGE UNITS - THE COVER OF CONCRETE OVER THE OUTSIDE CIRCUMFERENTIAL REINFORCEMENT SHALL BE 2" MINIMUM. THE COVER OF CONCRETE OVER THE INSIDE CIRCUMFERENTIAL REINFORCEMENT SHALL BE 1½" MINIMUM, UNLESS OTHERWISE NOTED ON THE SHOP DRAWINGS. THE CLEAR DISTANCE OF THE END CIRCUMFERENTIAL WIRES SHALL NOT BE LESS THAN 1" NOR MORE THAN 2" FROM THE ENDS OF EACH SECTION. REINFORCEMENT SHALL BE ASSEMBLED UTILIZING SINGLE OR MULTIPLE LAYERS OF WELDED WIRE FABRIC (NOT TO EXCEED 3 LAYERS), SUPPLEMENTED WITH A SINGLE LAYER OF DEFORMED BILLET-STEEL BARS, WHEN NECESSARY. WELDED WIRE FABRIC SHALL BE COMPOSED OF CIRCUMFERENTIAL AND LONGITUDINAL WIRES MEETING THE SPACING REQUIREMENTS OF 4.3, BELOW, AND SHALL CONTAIN SUFFICIENT LONGITUDINAL WIRES EXTENDING THROUGH THE BRIDGE UNIT TO MAINTAIN THE SHAPE AND POSITION OF THE REINFORCEMENT. LONGITUDINAL DISTRIBUTION REINFORCEMENT MAY BE WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS AND SHALL MEET THE SPACING REQUIREMENTS OF 4.3, BELOW. THE ENDS OF THE LONGITUDINAL DISTRIBUTION REINFORCEMENT SHALL BE NOT MORE THAN 3" AND NOT LESS THAN 1½" FROM THE ENDS OF THE BRIDGE UNIT.
      4.2.2. BENDING OF REINFORCEMENT FOR PRECAST BRIDGE UNITS - THE OUTSIDE AND INSIDE CIRCUMFERENTIAL REINFORCING STEEL FOR THE CORNERS OF THE BRIDGE SHALL BE BENT TO SUCH AN ANGLE THAT IS APPROXIMATELY EQUAL TO THE CONFIGURATION OF THE BRIDGE'S OUTSIDE CORNER.
      4.2.3. PLACEMENT OF REINFORCEMENT FOR PRECAST WINGWALLS AND HEADWALLS - THE COVER OF CONCRETE OVER THE LONGITUDINAL AND TRANSVERSE REINFORCEMENT SHALL BE 2" MINIMUM. THE CLEAR DISTANCE FROM THE END OF EACH PRECAST ELEMENT TO THE END OF REINFORCING STEEL SHALL NOT BE LESS THAN ½" NOR MORE THAN 3". REINFORCEMENT SHALL BE ASSEMBLED UTILIZING A SINGLE LAYER OF WELDED WIRE FABRIC, OR A SINGLE LAYER OF DEFORMED BILLET-STEEL BARS. WELDED WIRE FABRIC SHALL BE COMPOSED OF TRANSVERSE AND LONGITUDINAL WIRES MEETING THE SPACING REQUIREMENTS OF 4.3, BELOW, AND SHALL CONTAIN SUFFICIENT LONGITUDINAL WIRES EXTENDING THROUGH THE ELEMENT TO MAINTAIN THE SHAPE AND POSITION OF THE REINFORCEMENT. LONGITUDINAL REINFORCEMENT MAY BE WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS AND SHALL MEET THE SPACING REQUIREMENTS OF 4.3, BELOW.
   4.3. LAPS, WELDS, SPACING
      4.3.1. LAPS, WELDS, AND SPACING FOR PRECAST BRIDGE UNITS - TENSION SPLICES IN THE CIRCUMFERENTIAL REINFORCEMENT SHALL BE MADE BY LAPPING. LAPS MAY BE TACK WELDED TOGETHER FOR ASSEMBLY PURPOSES. FOR SMOOTH WELDED WIRE FABRIC, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 8.30.2 AND 8.32.6. FOR DEFORMED WELDED WIRE FABRIC, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 8.30.1 AND 8.32.5. THE OVERLAP OF WELDED WIRE FABRIC SHALL BE MEASURED BETWEEN THE OUTER-MOST LONGITUDINAL WIRES OF EACH FABRIC SHEET. FOR DEFORMED BILLET-STEEL BARS, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 8.25. FOR SPLICES OTHER THAN TENSION SPLICES, THE OVERLAP SHALL BE A MINIMUM OF 1'-0" FOR WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS. THE SPACING CENTER TO CENTER OF THE CIRCUMFERENTIAL WIRES IN A WIRE FABRIC SHEET SHALL BE NOT LESS THAN 2" NOR MORE THAN 4". THE SPACING CENTER TO CENTER OF THE LONGITUDINAL WIRES SHALL NOT BE MORE THAN 8". THE SPACING CENTER TO CENTER OF THE LONGITUDINAL DISTRIBUTION STEEL FOR EITHER LINE OF REINFORCING IN THE TOP SLAB SHALL BE NOT MORE THAN 1'-4".
      4.3.2. LAPS, WELDS, AND SPACING FOR PRECAST WINGWALLS AND HEADWALLS - SPLICES IN THE REINFORCEMENT SHALL BE MADE BY LAPPING. LAPS MAY BE TACK WELDED TOGETHER FOR ASSEMBLY PURPOSES. FOR SMOOTH WELDED WIRE FABRIC, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 8.30.2 AND 8.32.6. FOR DEFORMED WELDED WIRE FABRIC, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 8.30.1 AND 8.32.5. FOR DEFORMED BILLET-STEEL BARS, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 8.25. THE SPACING CENTER-TO-CENTER OF THE WIRES IN A WIRE FABRIC SHEET SHALL BE NOT LESS THAN 2" NOR MORE THAN 8".
   4.4. CURING - THE PRECAST CONCRETE ELEMENTS SHALL BE CURED FOR A SUFFICIENT LENGTH OF TIME SO THAT THE CONCRETE WILL DEVELOP THE SPECIFIED COMPRESSIVE STRENGTH IN 28 DAYS OR LESS. ANY ONE OF THE FOLLOWING METHODS OF CURING OR COMBINATIONS THERE OF SHALL BE USED:
      4.4.1. STEAM CURING - THE PRECAST ELEMENTS MAY BE LOW-PRESSURE STEAM CURED BY A SYSTEM THAT WILL MAINTAIN A MOIST ATMOSPHERE.
      4.4.2. WATER CURING - THE PRECAST ELEMENTS MAY BE WATER CURED BY ANY METHOD THAT WILL KEEP THE SECTIONS MOIST.
      4.4.3. MEMBRANE CURING - A SEALING MEMBRANE CONFORMING TO THE REQUIREMENTS OF ASTM SPECIFICATION C309 MAY BE APPLIED AND SHALL BE LEFT INTACT UNTIL THE REQUIRED CONCRETE COMPRESSIVE STRENGTH IS ATTAINED. THE CONCRETE TEMPERATURE AT THE TIME OF STRENGTH IS ATTAINED. THE CONCRETE TEMPERATURE AT THE TIME OF APPLICATION SHALL BE WITHIN +/- 10 DEGREES F OF THE ATMOSPHERIC TEMPERATURE. ALL SURFACES SHALL BE KEPT MOIST PRIOR TO THE APPLICATION OF THE COMPOUNDS AND SHALL BE DAMP WHEN THE COMPOUND IS APPLIED.
   4.5. STORAGE, HANDLING & DELIVERY
      4.5.1. STORAGE - PRECAST CONCRETE BRIDGE ELEMENTS SHALL BE LIFTED AND STORED IN "AS-CAST" POSITION. PRECAST CONCRETE HEADWALL AND WINGWALL UNITS ARE CAST, STORED AND SHIPPED IN A FLAT POSITION. THE PRECAST ELEMENTS SHALL BE STORED IN SUCH A MANNER TO PREVENT CRACKING OR DAMAGE. STORE ELEMENTS USING TIMBER SUPPORTS AS APPROPRIATE. THE UNITS SHALL NOT BE MOVED UNTIL THE CONCRETE COMPRESSIVE STRENGTH HAS REACHED A MINIMUM OF 2500 PSI, AND THEY SHALL NOT BE STORED IN AN UPRIGHT POSITION.
      4.5.2. HANDLING - HANDLING DEVICES SHALL BE PERMITTED IN EACH PRECAST ELEMENT FOR THE PURPOSE OF HANDLING AND SETTING. SPREADER BEAMS MAY BE REQUIRED FOR THE LIFTING OF PRECAST CONCRETE BRIDGE ELEMENTS TO PRECLUDE DAMAGE FROM BENDING OR TORSION FORCES.
      4.5.3. DELIVERY - PRECAST CONCRETE ELEMENTS MUST NOT BE SHIPPED UNTIL THE CONCRETE HAS ATTAINED THE SPECIFIED DESIGN COMPRESSIVE STRENGTH, OR AS DIRECTED BY THE DESIGN ENGINEER. PRECAST CONCRETE ELEMENTS MAY BE UNLOADED AND PLACED ON THE GROUND AT THE SITE UNTIL INSTALLED. STORE ELEMENTS USING TIMBER SUPPORTS AS APPROPRIATE.
   4.6. QUALITY ASSURANCE - THE PRECASTER SHALL DEMONSTRATE ADHERENCE TO THE STANDARDS SET FORTH IN THE NPCA QUALITY CONTROL MANUAL. THE PRECASTER SHALL MEET EITHER SECTION 4.7.1 OR 4.7.2
      4.6.1. CERTIFICATION - THE PRECASTER SHALL BE CERTIFIED BY THE PRECAST/PRESTRESSED CONCRETE INSTITUTE PLANT CERTIFICATION PROGRAM OR THE NATIONAL PRECAST CONCRETE ASSOCIATION'S PLANT CERTIFICATION PROGRAM PRIOR TO AND DURING PRODUCTION OF THE PRODUCTS COVERED BY THIS SPECIFICATION.
      4.6.2. QUALIFICATIONS, TESTING AND INSPECTION
         4.6.2.1. THE PRECASTER SHALL HAVE BEEN IN THE BUSINESS OF PRODUCING PRECAST CONCRETE PRODUCTS SIMILAR TO THOSE SPECIFIED FOR A MINIMUM OF THREE YEARS. HE SHALL MAINTAIN A PERMANENT QUALITY CONTROL DEPARTMENT OR RETAIN AN INDEPENDENT TESTING AGENCY ON A CONTINUING BASIS. THE AGENCY SHALL ISSUE A REPORT, CERTIFIED BY A LICENSED ENGINEER, DETAILING THE ABILITY OF THE PRECASTER TO PRODUCE QUALITY PRODUCTS CONSISTENT WITH INDUSTRY STANDARDS.
         4.6.2.2. THE PRECASTER SHALL SHOW THAT THE FOLLOWING TESTS ARE PERFORMED IN ACCORDANCE WITH THE ASTM STANDARDS INDICATED. TESTS SHALL BE PERFORMED AS INDICATED IN SECTION 6 OF THESE SPECIFICATIONS.
            4.6.2.2.1. AIR CONTENT: C231 OR C173
            4.6.2.2.2. COMPRESSIVE STRENGTH: C31,C39,C497
         4.6.2.3. THE PRECASTER SHALL PROVIDE DOCUMENTATION DEMONSTRATING COMPLIANCE WITH THIS SECTION TO CONTECH® BRIDGE SOLUTIONS AT REGULAR INTERVALS OR UPON REQUEST.
         4.6.2.4. THE OWNER MAY PLACE AN INSPECTOR IN THE PLANT WHEN THE PRODUCTS COVERED BY THIS SPECIFICATION ARE BEING MANUFACTURED.
      4.6.3. DOCUMENTATION - THE PRECASTER SHALL SUBMIT PRECAST PRODUCTION REPORTS TO CONTECH® BRIDGE SOLUTIONS AS REQUIRED.

5. PERMISSIBLE VARIATIONS
   5.1. WINGWALLS & HEADWALLS
      5.1.1. WALL THICKNESS - THE WALL THICKNESS SHALL NOT VARY FROM THAT SHOWN IN THE DESIGN BY MORE THAN ½".
      5.1.2. LENGTH/HEIGHT OF WALL SECTIONS - THE LENGTH AND HEIGHT OF THE WALL SHALL NOT VARY FROM THAT SHOWN IN THE DESIGN BY MORE THAN ½".
      5.1.3. POSITION OF REINFORCEMENT - THE MAXIMUM VARIATION IN THE POSITION OF THE REINFORCEMENT SHALL BE ± ½". IN NO CASE SHALL THE COVER OVER THE REINFORCEMENT BE LESS THAN 1½".
      5.1.4. SIZE OF REINFORCEMENT - THE PERMISSIBLE VARIATION IN DIAMETER OF ANY REINFORCING SHALL CONFORM TO THE TOLERANCES PRESCRIBED IN THE ASTM SPECIFICATION FOR THAT TYPE OF REINFORCING. STEEL AREA GREATER THAN THAT REQUIRED SHALL NOT BE CAUSE FOR REJECTION.

6. TESTING/ INSPECTION
   6.1. TESTING
      6.1.1. TYPE OF TEST SPECIMEN - CONCRETE COMPRESSIVE STRENGTH SHALL BE DETERMINED FROM COMPRESSION TESTS MADE ON CYLINDERS OR CORES. FOR CYLINDER TESTING, A MINIMUM OF 3 CYLINDERS SHALL BE TAKEN FOR EACH LOT OF BRIDGE ELEMENTS. (A LOT IS DEFINED AS THE PRECAST ELEMENTS MADE USING THE SAME CONCRETE MIX DURING A SINGLE DAY'S PRODUCTION.) FOR CORE TESTING, ONE CORE SHALL BE CUT FROM EACH OF 3 PRECAST ELEMENTS SELECTED AT RANDOM FROM EACH GROUP OF 15 OR FEWER ELEMENTS MADE USING A SINGLE CONCRETE MIX IN THE SAME DAY'S PRODUCTION. EACH LOT SHALL BE CONSIDERED SEPARATELY FOR THE PURPOSE OF TESTING AND ACCEPTANCE.
      6.1.2. COMPRESSION TESTING - CYLINDERS SHALL BE MADE AND TESTED AS PRESCRIBED BY THE ASTM C39 SPECIFICATION. CORES SHALL BE OBTAINED AND TESTED FOR COMPRESSIVE STRENGTH IN ACCORDANCE WITH THE PROVISIONS OF THE ASTM C42 SPECIFICATION.
      6.1.3. ACCEPTABILITY OF CYLINDER TESTS - WHEN THE AVERAGE COMPRESSIVE STRENGTH OF ALL CYLINDERS TESTED IS EQUAL TO OR GREATER THAN THE DESIGN COMPRESSIVE STRENGTH, AND NOT MORE THAN 10% OF THE CYLINDERS TESTED HAVE A COMPRESSIVE STRENGTH LESS THAN THE DESIGN CONCRETE STRENGTH, AND NO CYLINDER TESTED HAS A COMPRESSIVE STRENGTH LESS THAN 80% OF THE DESIGN COMPRESSIVE STRENGTH, THEN THE LOT SHALL BE ACCEPTED. WHEN THE COMPRESSIVE STRENGTH OF THE CYLINDERS TESTED DOES NOT CONFORM TO THESE ACCEPTANCE CRITERIA, THE ACCEPTABILITY OF THE LOT MAY BE DETERMINED AS DESCRIBED IN SECTION 6.1.4, BELOW.
      6.1.4. ACCEPTABILITY OF CORE TESTS - THE COMPRESSIVE STRENGTH OF THE CONCRETE IN A LOT IS ACCEPTABLE WHEN THE AVERAGE CORE TEST STRENGTH IS EQUAL TO OR GREATER THAN THE DESIGN CONCRETE STRENGTH. WHEN THE COMPRESSIVE STRENGTH OF A CORE TESTED IS LESS THAN THE DESIGN CONCRETE STRENGTH, THE PRECAST ELEMENT FROM WHICH THAT CORE WAS TAKEN MAY BE RE-CORED. WHEN THE COMPRESSIVE STRENGTH OF THE RE-CORE IS EQUAL TO OR GREATER THAN THE DESIGN CONCRETE STRENGTH, THE COMPRESSIVE STRENGTH OF THE CONCRETE IN THAT LOT IS ACCEPTABLE.
         6.1.4.1. WHEN THE COMPRESSIVE STRENGTH OF ANY RECORE IS LESS THAN THE DESIGN CONCRETE STRENGTH, THE PRECAST ELEMENT FROM WHICH THAT CORE WAS TAKEN SHALL BE REJECTED. TWO PRECAST ELEMENTS FROM THE REMAINDER OF THE LOT SHALL BE SELECTED AT RANDOM AND ONE CORE SHALL BE TAKEN FROM EACH. IF THE COMPRESSIVE STRENGTH OF BOTH CORES IS EQUAL TO OR GREATER THAN THE DESIGN CONCRETE STRENGTH, THE COMPRESSIVE STRENGTH OF THE REMAINDER OF THAT GROUP IS ACCEPTABLE. IF THE COMPRESSIVE STRENGTH OF EITHER OF THE TWO CORES TESTED IS LESS THAN THE DESIGN CONCRETE STRENGTH, THE REMAINDER OF THE GROUP SHALL BE REJECTED OR, AT THE OPTION OF THE MANUFACTURER, EACH PRECAST ELEMENT OF THE REMAINDER OF THE GROUP SHALL BE CORED AND ACCEPTED INDIVIDUALLY, AND ANY OF THESE ELEMENTS THAT HAVE CORES WITH LESS THAN THE DESIGN CONCRETE STRENGTH SHALL BE REJECTED. PLUGGING CORE HOLES - THE CORE HOLES SHALL BE PLUGGED AND SEALED BY THE MANUFACTURER IN A MANNER SUCH THAT THE ELEMENTS WILL MEET ALL OF THE TEST REQUIREMENTS OF THIS SPECIFICATION. PRECAST ELEMENTS SO SEALED SHALL BE CONSIDERED SATISFACTORY FOR USE.
         6.1.4.2. TEST EQUIPMENT - EVERY MANUFACTURER FURNISHING PRECAST ELEMENTS UNDER THIS SPECIFICATION SHALL FURNISH ALL FACILITIES AND PERSONNEL NECESSARY TO CARRY OUT THE TEST REQUIRED.
   6.2. INSPECTION - THE QUALITY OF MATERIALS, THE PROCESS OF MANUFACTURE, AND THE FINISHED PRECAST ELEMENTS SHALL BE SUBJECT TO INSPECTION BY THE PURCHASER.

7. JOINTS
   THE BRIDGE UNITS SHALL BE PRODUCED WITH FLAT BUTT ENDS. THE ENDS OF THE BRIDGE UNITS SHALL BE SUCH THAT WHEN THE SECTIONS ARE LAID TOGETHER THEY WILL MAKE A CONTINUOUS LINE WITH A SMOOTH INTERIOR FREE OF APPRECIABLE IRREGULARITIES, ALL COMPATIBLE WITH THE PERMISSIBLE VARIATIONS IN SECTION 5, ABOVE. THE JOINT WIDTH BETWEEN ADJACENT PRECAST UNITS SHALL NOT EXCEED ¾".

8. WORKMANSHIP/ FINISH
   THE BRIDGE UNITS, WINGWALLS, AND HEADWALLS SHALL BE SUBSTANTIALLY FREE OF FRACTURES. THE ENDS OF THE BRIDGE UNITS SHALL BE NORMAL TO THE WALLS AND CENTERLINE OF THE BRIDGE SECTION, WITHIN THE LIMITS OF THE VARIATIONS GIVEN IN SECTION 5, ABOVE, EXCEPT WHERE BEVELED ENDS ARE SPECIFIED. THE FACES OF THE WINGWALLS AND HEADWALLS SHALL BE PARALLEL TO EACH OTHER, WITHIN THE LIMITS OF VARIATIONS GIVEN IN SECTION 5, ABOVE. THE SURFACE OF THE PRECAST ELEMENTS SHALL BE A SMOOTH STEEL FORM OR TROWELED SURFACE. TRAPPED AIR POCKETS CAUSING SURFACE DEFECTS SHALL BE CONSIDERED AS PART OF A SMOOTH, STEEL FORM FINISH.

9. REPAIRS
   PRECAST ELEMENTS MAY BE REPAIRED, IF NECESSARY, BECAUSE OF IMPERFECTIONS IN MANUFACTURE OR HANDLING DAMAGE AND WILL BE ACCEPTABLE IF, IN THE OPINION OF THE PURCHASER, THE REPAIRS ARE SOUND, PROPERLY FINISHED AND CURED, AND THE REPAIRED SECTION CONFORMS TO THE REQUIREMENTS OF THIS SPECIFICATION.

10. REJECTION
   THE PRECAST ELEMENTS SHALL BE SUBJECT TO REJECTION ON ACCOUNT OF ANY OF THE SPECIFICATION REQUIREMENTS. INDIVIDUAL PRECAST ELEMENTS MAY BE REJECTED BECAUSE OF ANY OF THE FOLLOWING:
   10.1. FRACTURES OR CRACKS PASSING THROUGH THE WALL, EXCEPT FOR A SINGLE END CRACK THAT DOES NOT EXCEED ONE HALF THE THICKNESS OF THE WALL.
   10.2. DEFECTS THAT INDICATE PROPORTIONING, MIXING, AND MOLDING NOT IN COMPLIANCE WITH SECTION 4 OF THESE SPECIFICATIONS.
   10.3. HONEYCOMBED OR OPEN TEXTURE.
   10.4. DAMAGED ENDS, WHERE SUCH DAMAGE WOULD PREVENT MAKING A SATISFACTORY JOINT.

11. MARKING
   EACH BRIDGE UNIT SHALL BE CLEARLY MARKED BY WATERPROOF PAINT. THE FOLLOWING SHALL BE SHOWN ON THE INSIDE OF THE VERTICAL LEG OF THE BRIDGE SECTION:
   BRIDGE SPAN x BRIDGE RISE
   DATE OF MANUFACTURE
   NAME OR TRADEMARK OF THE MANUFACTURER

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. 36225 , EXPIRATION DATE: 8/19/2010 .

2/9/10

STATE OF MARYLAND · PHILIP A. CREAMER · Lic. No. 36225 · PROFESSIONAL ENGINEER

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAY — DATE 6-11-10
APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

MARK	DATE	REVISION DESCRIPTION	BY
JMF	2/8/2010	NO CHANGES ON THIS SHEET	JMF

CONTECH® CONSTRUCTION PRODUCTS INC.
www.contech-cpi.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CON/SPAN® BRIDGE SYSTEMS

CONTECH CONTRACT DRAWING

BONNIE BRANCH WOODS

HOWARD COUNTY, MARYLAND

PROJECT No.: 402195	SEQ. No.: 001	DATE: 11/13/2009
DESIGNED: JMF	DRAWN: ZWM	
CHECKED: DMR	APPROVED: PAC	
SHEET NO.: 19 OF 24 — CT6 OF CT7		

F-10-042

I:\MERLIN\PROJECT\ACTIVE\402100\402195\402195-1-MULTI_PLATE\DRAWINGS\CONTRACT\PRE-402195-001-CS-CON-B.DWG 2/9/2010 11:30 AM

SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF CON/SPAN® BRIDGE SYSTEMS (CONT'D)

12. INSTALLATION PREPARATION
TO ENSURE CORRECT INSTALLATION OF THE PRECAST CONCRETE BRIDGE SYSTEM, CARE AND CAUTION MUST BE EXERCISED IN FORMING THE SUPPORT AREAS FOR BRIDGE UNITS, HEADWALL, AND WINGWALL ELEMENTS. EXERCISING SPECIAL CARE WILL FACILITATE THE RAPID INSTALLATION OF THE PRECAST COMPONENTS.

12.1. FOOTINGS
DO NOT OVER EXCAVATE FOUNDATIONS UNLESS DIRECTED BY SITE SOIL ENGINEER TO REMOVE UNSUITABLE SOIL.

THE SITE SOILS ENGINEER SHALL CERTIFY THAT THE BEARING CAPACITY MEETS OR EXCEEDS THE FOOTING DESIGN REQUIREMENTS, PRIOR TO THE CONTRACTOR POURING OF THE FOOTINGS. A COPY OF THE REPORT SHALL BE SUBMITTED TO CONTECH® BRIDGE SOLUTIONS PRIOR TO SHIPMENT OF PRECAST CONCRETE ELEMENTS.

THE BRIDGE UNITS AND WINGWALLS SHALL BE INSTALLED ON EITHER PRECAST OR CAST-IN-PLACE CONCRETE FOOTINGS. THE SIZE AND ELEVATION OF THE FOOTINGS SHALL BE AS DESIGNED BY THE ENGINEER. A KEYWAY SHALL BE FORMED IN THE TOP SURFACE OF THE BRIDGE FOOTING AS SPECIFIED ON THE PLANS. NO KEYWAY IS REQUIRED IN THE WINGWALL FOOTINGS, UNLESS OTHERWISE SPECIFIED ON THE PLANS.

THE FOOTINGS SHALL BE GIVEN A SMOOTH FLOAT FINISH AND SHALL REACH A COMPRESSIVE STRENGTH OF 2,000 PSI BEFORE PLACEMENT OF THE BRIDGE AND WINGWALL ELEMENTS. BACKFILLING SHALL NOT BEGIN UNTIL THE FOOTING HAS REACHED THE FULL DESIGN COMPRESSIVE STRENGTH WITHOUT WRITTEN APPROVAL FROM CONTECH® BRIDGE SOLUTIONS.

THE FOOTING SURFACE SHALL BE CONSTRUCTED IN ACCORDANCE WITH GRADES SHOWN ON THE PLANS. WHEN TESTED WITH A 10'-0" STRAIGHT EDGE, THE SURFACE SHALL NOT VARY MORE THAN ¼" IN 10'-0".

IF A PRECAST CONCRETE FOOTING IS USED, THE CONTRACTOR SHALL PREPARE A 4" THICK BASE LAYER OF COMPACTED GRANULAR MATERIAL THE FULL WIDTH OF THE FOOTING PRIOR TO PLACING THE PRECAST FOOTING.

THE FOUNDATIONS FOR PRECAST CONCRETE BRIDGE ELEMENTS AND WINGWALLS MUST BE CONNECTED BY REINFORCEMENT TO FORM ONE MONOLITHIC BODY. EXPANSION JOINTS SHALL NOT BE USED.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE FOUNDATIONS PER THE PLANS AND SPECIFICATIONS.

13. INSTALLATION
13.1. GENERAL - THE INSTALLATION OF THE PRECAST CONCRETE ELEMENTS SHALL BE AS EXPLAINED IN THE PUBLICATION CON/SPAN BRIDGE SYSTEMS INSTALLATION HANDBOOK.
13.1.1. LIFTING - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT A CRANE OF THE CORRECT LIFTING CAPACITY IS AVAILABLE TO HANDLE THE PRECAST CONCRETE UNITS. THIS CAN BE ACCOMPLISHED BY USING THE WEIGHTS GIVEN FOR THE PRECAST CONCRETE COMPONENTS AND BY DETERMINING THE LIFTING REACH FOR EACH CRANE UNIT. SITE CONDITIONS MUST BE CHECKED WELL IN ADVANCE OF SHIPPING TO ENSURE PROPER CRANE LOCATION AND TO AVOID ANY LIFTING RESTRICTIONS. THE LIFT ANCHORS OR HOLES PROVIDED IN EACH UNIT ARE THE ONLY MEANS TO BE USED TO LIFT THE ELEMENTS. THE PRECAST CONCRETE ELEMENTS MUST NOT BE SUPPORTED OR RAISED BY OTHER MEANS THAN THOSE GIVEN IN THE MANUALS AND DRAWINGS WITHOUT WRITTEN APPROVAL FROM CONTECH® BRIDGE SOLUTIONS.
13.1.2. CONSTRUCTION EQUIPMENT WEIGHT RESTRICTIONS - IN NO CASE SHALL EQUIPMENT OPERATING IN EXCESS OF THE DESIGN LOAD (HS20 OR HS25) BE PERMITTED OVER THE BRIDGE UNITS UNLESS APPROVED BY CONTECH® BRIDGE SOLUTIONS.
13.1.2.1. IN THE IMMEDIATE AREA OF THE BRIDGE UNITS, THE FOLLOWING RESTRICTIONS FOR THE USE OF HEAVY CONSTRUCTION MACHINERY DURING BACKFILLING OPERATIONS APPLY:
- NO CONSTRUCTION EQUIPMENT SHALL CROSS THE BARE PRECAST CONCRETE BRIDGE UNIT.
- AFTER THE COMPACTED FILL LEVEL HAS REACHED A MINIMUM OF 4" OVER THE CROWN OF THE BRIDGE, CONSTRUCTION EQUIPMENT WITH A WEIGHT OF LESS THAN 10 TONS MAY CROSS THE BRIDGE.
- AFTER THE COMPACTED FILL LEVEL HAS REACHED A MINIMUM OF 1'-0" OVER THE CROWN OF THE BRIDGE, CONSTRUCTION EQUIPMENT WITH A WEIGHT OF LESS THAN 30 TONS MAY CROSS THE BRIDGE.
- AFTER THE COMPACTED FILL LEVEL HAS REACHED THE DESIGN COVER, OR 2'-0" MINIMUM, OVER THE CROWN OF THE PRECAST CONCRETE BRIDGE, CONSTRUCTION EQUIPMENT WITHIN THE DESIGN LOAD LIMITS FOR THE ROAD MAY CROSS THE PRECAST CONCRETE BRIDGE.

13.2. LEVELING PAD/SHIMS - THE BRIDGE UNITS AND WINGWALLS SHALL BE SET ON MASONITE OR STEEL SHIMS MEASURING 6" x 6", MINIMUM, UNLESS SHOWN OTHERWISE ON THE PLANS. A MINIMUM GAP OF ½" SHALL BE PROVIDED BETWEEN THE FOOTING AND THE BOTTOM OF THE BRIDGE'S VERTICAL LEGS OR THE BOTTOM OF THE WINGWALL.
13.3. WATERPROOFING/JOINT PROTECTION AND SUBSURFACE DRAINAGE
13.3.1. EXTERNAL PROTECTION OF JOINTS - THE BUTT JOINT MADE BY TWO ADJOINING BRIDGE UNITS SHALL BE COVERED WITH A ⅞" x 12" PREFORMED BITUMINOUS JOINT SEALANT AND A MINIMUM OF A 9" WIDE JOINT WRAP. THE SURFACE SHALL BE FREE OF DIRT BEFORE APPLYING THE JOINT MATERIAL. A PRIMER COMPATIBLE WITH THE JOINT WRAP TO BE USED SHALL BE APPLIED FOR A MINIMUM WIDTH OF 9" ON EACH SIDE OF THE JOINT. THE EXTERNAL WRAP SHALL BE EITHER EZ-WRAP RUBBER BY PRESS-SEAL GASKET CORPORATION, SEAL WRAP BY MAR MAC MANUFACTURING CO. INC. OR APPROVED EQUAL. THE JOINT SHALL BE COVERED CONTINUOUSLY FROM THE BOTTOM OF ONE BRIDGE SECTION LEG, ACROSS THE TOP OF THE BRIDGE AND TO THE OPPOSITE BRIDGE SECTION LEG. ANY LAPS THAT RESULT IN THE JOINT WRAP SHALL BE A MINIMUM OF 6" LONG WITH THE OVERLAP RUNNING DOWNHILL.
13.3.2. IN ADDITION TO THE JOINTS BETWEEN BRIDGE UNITS, THE JOINT BETWEEN THE END BRIDGE UNIT AND THE HEADWALL SHALL ALSO BE SEALED AS DESCRIBED ABOVE. IF PRECAST WINGWALLS ARE USED, THE JOINT BETWEEN THE END BRIDGE UNIT AND THE WINGWALL SHALL BE SEALED WITH A 2'-0" STRIP OF FILTER FABRIC. ALSO, IF LIFT HOLES ARE FORMED IN THE BRIDGE UNITS, THEY SHALL BE PRIMED AND COVERED WITH A 9" x 9" SQUARE OF JOINT WRAP.
13.3.3. DURING THE BACKFILLING OPERATION, CARE SHALL BE TAKEN TO KEEP THE JOINT WRAP IN ITS PROPER LOCATION OVER THE JOINT.
13.3.4. SUBSOIL DRAINAGE SHALL BE AS DIRECTED BY THE ENGINEER.

13.4. GROUTING
13.4.1. GROUTING SHALL NOT BE PERFORMED WHEN TEMPERATURES ARE EXPECTED TO GO BELOW 35° FOR A PERIOD OF 72 HOURS. FILL THE BRIDGE-FOUNDATION KEYWAY WITH CEMENT GROUT (PORTLAND CEMENT AND WATER OR CEMENT MORTAR COMPOSED OF PORTLAND CEMENT, SAND AND WATER) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI. VIBRATE AS REQUIRED TO ENSURE THAT THE ENTIRE KEY AROUND THE BRIDGE ELEMENT IS COMPLETELY FILLED. IF BRIDGE ELEMENTS HAVE BEEN SET WITH TEMPORARY TIES (CABLES, BARS, ETC.) GROUT MUST ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI BEFORE TIES MAY BE REMOVED.
13.4.2. ALL GROUT SHALL HAVE A MAXIMUM AGGREGATE SIZE OF ¼".
13.4.3. LIFTING AND ERECTION ANCHOR RECESSES SHALL BE FILLED WITH GROUT.

13.5. BACKFILL
13.5.1. DO NOT PERFORM BACKFILLING DURING WET OR FREEZING WEATHER.
13.5.2. NO BACKFILL SHALL BE PLACED AGAINST ANY STRUCTURAL ELEMENTS UNTIL THEY HAVE BEEN APPROVED BY THE ENGINEER.
13.5.3. BACKFILL SHALL BE CONSIDERED AS ALL REPLACED EXCAVATION AND NEW EMBANKMENT ADJACENT TO THE PRECAST CONCRETE ELEMENTS. THE PROJECT CONSTRUCTION AND MATERIAL SPECIFICATIONS, WHICH INCLUDE THE SPECIFICATIONS FOR EXCAVATION FOR STRUCTURES AND ROADWAY EXCAVATION AND EMBANKMENT CONSTRUCTION, SHALL APPLY EXCEPT AS MODIFIED IN THIS SECTION.
13.5.4. BACKFILL ZONES:
IN-SITU SOIL
ZONE A: CONSTRUCTED EMBANKMENT OR OVERFILL.
ZONE B: FILL THAT IS DIRECTLY ASSOCIATED WITH PRECAST CONCRETE BRIDGE INSTALLATION.
ZONE C: ROAD STRUCTURE.
13.5.5. REQUIRED BACKFILL PROPERTIES
13.5.5.1. IN-SITU SOIL - NATURAL GROUND IS TO BE SUFFICIENTLY STABLE TO ALLOW EFFECTIVE SUPPORT TO THE PRECAST CONCRETE BRIDGE UNITS. AS A GUIDE, THE EXISTING NATURAL GROUND SHOULD BE OF SIMILAR QUALITY AND DENSITY TO ZONE B MATERIAL FOR MINIMUM LATERAL DIMENSION OF ONE BRIDGE SPAN OUTSIDE OF THE BRIDGE FOOTING.
13.5.5.2. ZONE A - ZONE A REQUIRES FILL MATERIAL WITH SPECIFICATIONS AND COMPACTING PROCEDURES EQUAL TO THAT FOR NORMAL ROAD EMBANKMENTS.
13.5.5.3. ZONE B - GENERALLY, SOILS SHALL BE REASONABLY FREE OF ORGANIC MATTER, AND, NEAR CONCRETE SURFACES, FREE OF STONES LARGER THAN 3" IN DIAMETER SEE CHARTS FOR DETAILED DESCRIPTIONS OF ACCEPTABLE SOILS.
13.5.5.4. ZONE C - ZONE C IS THE ROAD SECTION OF GRAVEL, ASPHALT OR CONCRETE BUILT IN COMPLIANCE WITH LOCAL ENGINEERING PRACTICES.
-
-
-
13.5.6. PLACING AND COMPACTING BACKFILL
- DUMPING FOR BACKFILLING IS NOT ALLOWED ANY NEARER THAN 3'-0" FROM THE BRIDGE LEG.

THE FILL MUST BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING 8". THE MAXIMUM DIFFERENCE IN THE SURFACE LEVELS OF THE FILL ON OPPOSITE SIDES OF THE BRIDGE MUST NOT EXCEED 2'-0".

THE FILL BEHIND WINGWALLS MUST BE PLACED AT THE SAME TIME AS THAT OF THE BRIDGE FILL. IT MUST BE PLACED IN PROGRESSIVELY PLACED HORIZONTAL LAYERS NOT EXCEEDING 8" PER LAYER.

THE BACKFILL OF ZONE B SHALL BE COMPACTED TO A MINIMUM DENSITY OF 95% OF THE STANDARD PROCTOR, AS REQUIRED BY AASHTO T-99.

SOIL WITHIN 1'-0" OF CONCRETE SURFACES SHOULD BE HAND-COMPACTED. ELSEWHERE, USE OF ROLLERS IS ACCEPTABLE. IF VIBRATING ROLLER-COMPACTORS ARE USED, THEY SHOULD NOT BE STARTED OR STOPPED WITHIN ZONE B AND THE VIBRATION FREQUENCY SHOULD BE AT LEAST 30 REVOLUTIONS PER SECOND.

THE BACKFILL MATERIAL AND COMPACTING BEHIND WINGWALLS SHOULD SATISFY THE CRITERIA FOR THE BRIDGE BACKFILL, ZONE B.

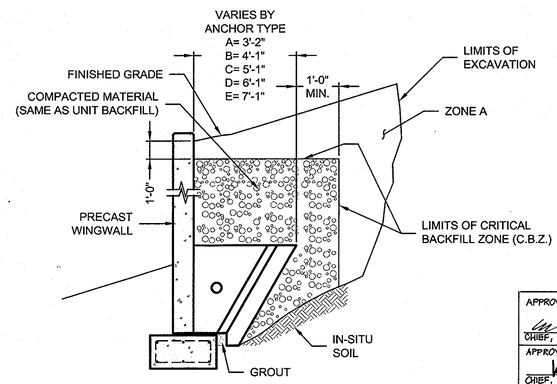
BACKFILL AGAINST A WATERPROOFED SURFACE SHALL BE PLACED CAREFULLY TO AVOID DAMAGE TO THE WATERPROOFING MATERIAL.
13.5.7. BRIDGE UNITS
FOR FILL HEIGHTS OVER 12'-0", NO BACKFILLING MAY BEGIN UNTIL A BACKFILL COMPACTION TESTING PLAN HAS BEEN COORDINATED WITH AND APPROVED BY CONTECH® BRIDGE SOLUTIONS. COST OF THE BACKFILL COMPACTION TESTING SHALL BE INCLUDED IN THE COST OF THE PRECAST UNITS. THIS INCLUDED COST APPLIES ONLY TO PROJECTS WITH FILL HEIGHTS OVER 12'-0" (AS MEASURED FROM TOP CROWN OF BRIDGE TO FINISHED GRADE).
13.5.8. WINGWALLS
BACKFILL IN FRONT OF WINGWALLS SHALL BE CARRIED TO GROUND LINES SHOWN IN THE PLANS.
13.5.9. MONITORING
THE CONTRACTOR SHALL CHECK SETTLEMENTS AND HORIZONTAL DISPLACEMENT OF FOUNDATION TO ENSURE THAT THEY ARE WITHIN THE ALLOWABLE LIMIT PROVIDED BY THE ENGINEER. THESE MEASUREMENTS SHOULD GIVE AN INDICATION OF THE SETTLEMENTS AND DEFORMATIONS ALONG THE LENGTH OF THE FOUNDATIONS.

THE FIRST MEASUREMENT ROW SHOULD TAKE PLACE AFTER THE ERECTION OF ALL PRECAST BRIDGE SYSTEM ELEMENTS, A SECOND AFTER COMPLETION OF BACKFILLING, AND A THIRD BEFORE OPENING OF THE BRIDGE TO TRAFFIC. FURTHER MEASUREMENTS MAY BE MADE ACCORDING TO LOCAL CONDITIONS.

THE MAXIMUM DIFFERENCE IN VERTICAL DISPLACEMENTS 'V' SHOULD NOT EXCEED 1" ALONG THE LENGTH OF ONE FOUNDATION.

ACCEPTABLE SOILS FOR USE IN ZONE B BACKFILL

TYPICAL USCS MATERIALS	AASHTO GROUP	AASHTO SUBGROUP	PERCENT PASSING US SIEVE NO.			CHARACTER OF FRACTION PASSING NO. 40 SIEVE		SOIL DESRIPTION
			#10	#40	#200	LIQUID LIMIT	PLASTICITY INDEX	
GW, GP, SP	A1	A-1a	50 MAX	30 MAX	15 MAX		6 MAX	LARGELY GRAVEL BUT CAN INCLUDE SAND AND FINES
GM, SW, SP, SM		A-1b		50 MAX	25 MAX		6 MAX	GRAVELLY SAND OR GRADED SAND, MAY INCLUDE FINES
GM, SM, ML, SP, GP	A2	A-2-4			35 MAX	40 MAX	10 MAX	SANDS, GRAVELS WITH LOW-PLASTICITY SILT FINES
SC, GC, GM		A-2-5			35 MAX	41 MAX	10 MAX	SANDS, GRAVELS WITH PLASTIC SILT FINES
SP, SM, SW	A3			51 MIN	10 MAX		NON-PLASTIC	FINE SANDS
ML, SM, SC	A4				36 MIN	40 MAX	10 MAX	LOW-COMPRESSIBILTY SILTS



WALL BACKFILL REQUIREMENTS

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. 36225, EXPIRATION DATE: 8/19/2010.

STATE OF MARYLAND — PHILIP A. CRAMSIE — No. 36225 — PROFESSIONAL ENGINEER — 2/4/10

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/27/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/8/10

MARK	DATE	REVISION DESCRIPTION	BY
JMF	2/8/2010	NO CHANGES ON THIS SHEET	JMF

CONTECH® CONSTRUCTION PRODUCTS INC.
www.contech-cpi.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CON/SPAN® BRIDGE SYSTEMS
CONTECH CONTRACT DRAWING

BONNIE BRANCH WOODS

HOWARD COUNTY, MARYLAND

PROJECT No.:	SEQ. No.:	DATE:
402195	001	11/13/2009
DESIGNED: JMF		DRAWN: ZWM
CHECKED: DMR		APPROVED: PAC
SHEET NO.: 20 OF 24		CT7 OF CT7

F-10-042

I:\MERLIN\PROJECTACTIVE\402100\402195\402195-1-MULTI_PLATE\DRAWINGS\CONTRACT\PRE-402195-001-CS-CON-B.DWG 2/9/2010 11:30 AM

CONTECH CONSTRUCTION PRODUCTS, INC.
DESIGN OF FOOTINGS, BACKFILL SPECIFICATIONS AND SCOUR ANALYSIS
FOR A 19' x 6'-4" MULTI-PLATE ARCH;
BONNIE BRANCH WOODS
HOWARD COUNTY, MARYLAND

INDEX

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 6-1-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

PROFESSIONAL ENGINEER 22779 REGISTERED STATE OF MARYLAND

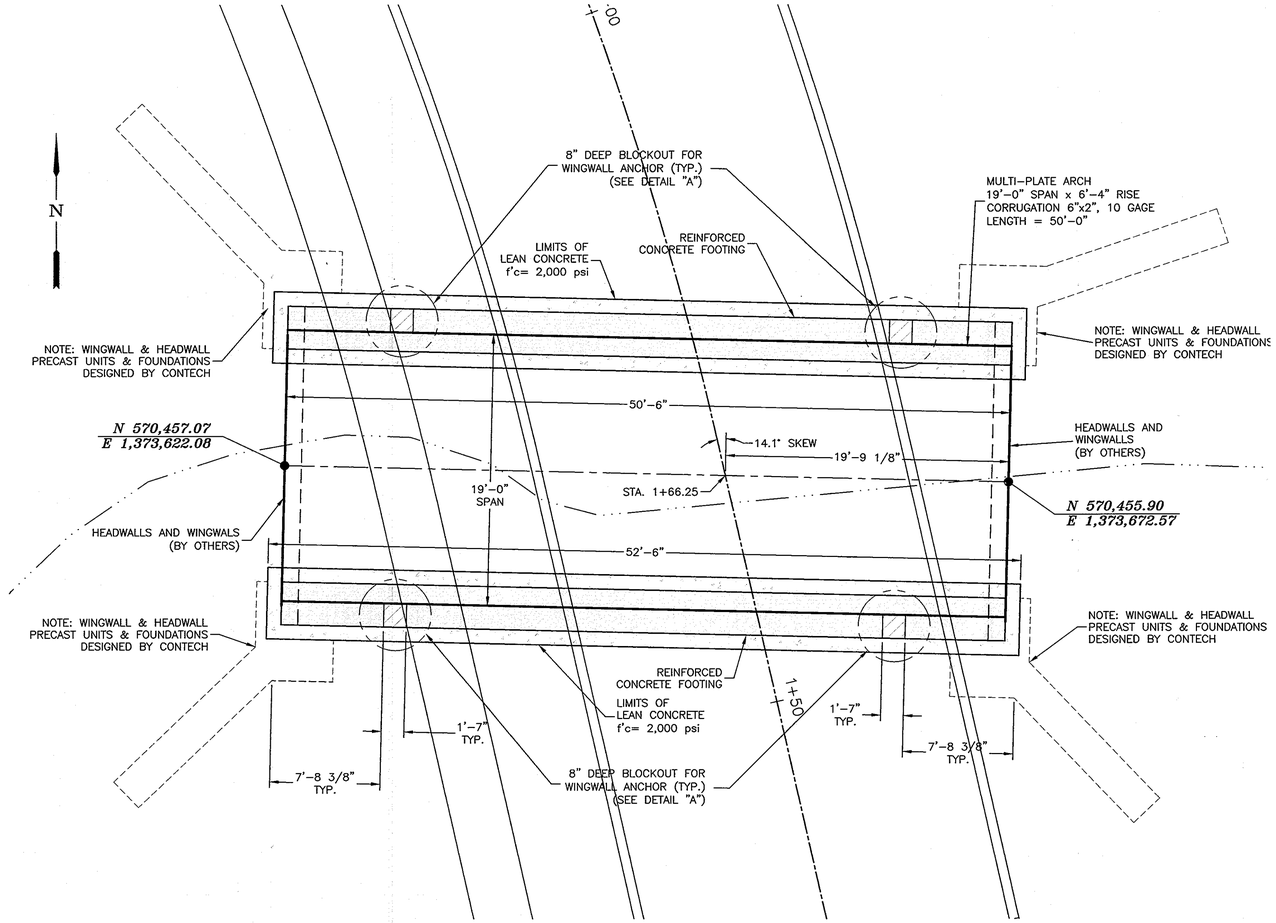
1	2/17/10	DJH	REVISION 1

CBC ENGINEERS
DAYTON, OHIO

TITLE SHEET / INDEX

Drawn By: JBE	Date: 11/17/09	CONTECH CONSTRUCTION PRODUCTS, INC. DESIGN OF FOOTINGS, BACKFILL SPECIFICATIONS AND SCOUR ANALYSIS FOR A 19' x 6'-4" MULTI-PLATE ARCH; BONNIE BRANCH WOODS HOWARD COUNTY, MARYLAND	
Approved By:	Date:		
Scale: GRAPHIC	Project No.: CBC-11035	Rev.: 1	Sheet: 21 OF 24 / 1 OF 4

F-10-042

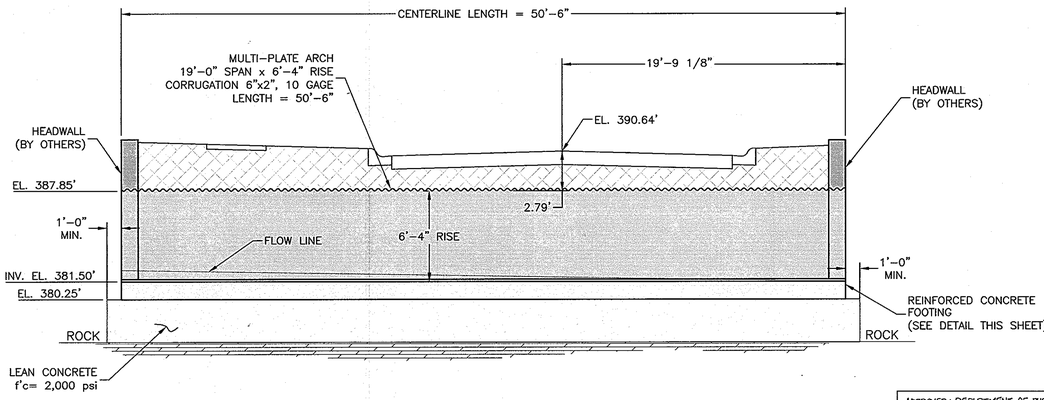


PLAN VIEW

GRAPHIC SCALE

5' 2.5' 0 5' 10'

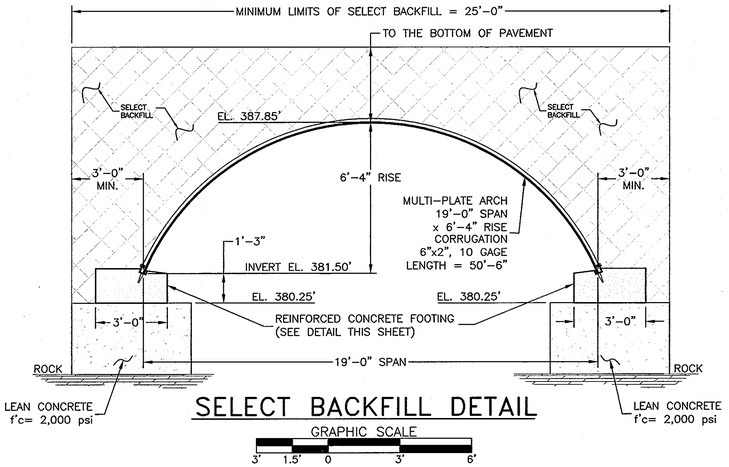
NOTE:
LENGTH AND SKEWS BASED ON INFORMATION PROVIDED IN MILDENBERG BOENDER & ASSOC., INC. PLAN & PROFILE



PROFILE THROUGH CENTERLINE OF STRUCTURE

GRAPHIC SCALE

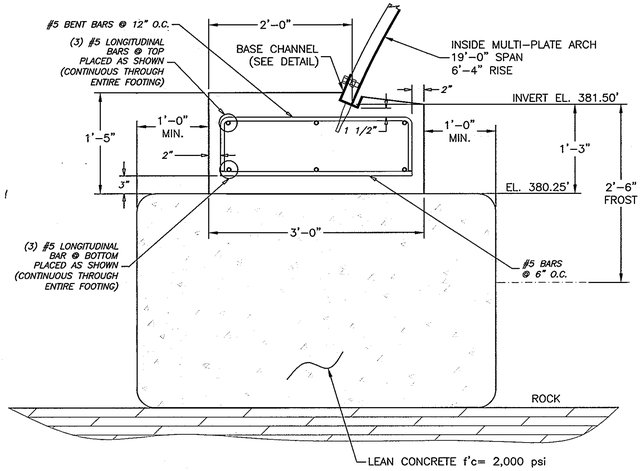
5' 2.5' 0 5' 10'



SELECT BACKFILL DETAIL

GRAPHIC SCALE

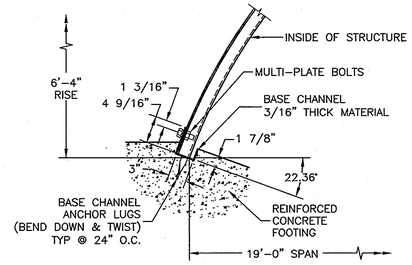
3' 1.5' 0 3' 6'



FOOTING DETAIL

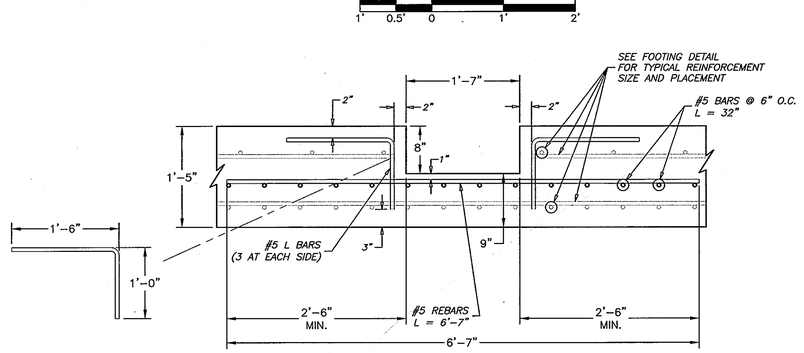
GRAPHIC SCALE

1' 0.5' 0 1' 2'



BASE CHANNEL DETAIL

NOT TO SCALE



8" DEEP BLOCKOUT (FOR WINGWALL ANCHOR TYP.) DETAIL "A"

GRAPHIC SCALE

1' 0.5' 0 1' 2'

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 6-1-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

NOTE:
1.) CONCRETE SHALL BE f'c = 4,000 psi
2.) ALL REINFORCEMENT SHALL BE ASTM A-615, GRADE 60
3.) FOUNDATION EXCAVATION DOWN TO THE ROCK ALL BACKFILLED WITH LEAN CONCRETE.

1	2/17/10	DJH	REVISION 1

CBC ENGINEERS
DAYTON, OHIO

PLAN, PROFILE AND DETAILS

Drawn By	Date	CONTECH CONSTRUCTION PRODUCTS, INC. DESIGN OF FOOTINGS, BACKFILL SPECIFICATIONS AND SCOUR ANALYSIS FOR A 19' x 6'-4" MULTI-PLATE ARCH; BONNIE BRANCH WOODS HOWARD COUNTY, MARYLAND		
JBE	11/17/09			
Approved By	Date			
Scale	Project No.	Rev.	Sheet	
GRAPHIC	CBC-11035	1	22 OF 24 2 OF 4	

F-10-042

I – GENERAL

1.0 STANDARDS AND DEFINITIONS

1.1 STANDARDS - All standards refer to latest edition unless otherwise noted.

1.1.1 ASTM D-698-70 (Method C) "Standard Test Methods for Moisture. Density Relations of Soils and Soil Aggregate Mixtures Using 5.5-lb (2.5 kg.) Rammer and 12-inch (305-mm) Drop".

1.1.2 ASTM D-2922 "Standard Test Method for Density of Soil and Soil Aggregate in Place by Nuclear methods (Shallow Depth)".

1.1.3 ASTM D-1556 "Standard Test Method for Density of Soil in place by the Sand-Cone Method".

1.1.4 ASTM D-1557 "Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort."

1.1.5 All construction and materials shall be in accordance with the latest AASHTO and Maryland DOT standards.

1.2 DEFINITIONS

1.2.1 Owner - In these specifications the word "Owner" shall mean Ducketis Ridge, LLC, Columbia, Maryland.

1.2.2 Engineer - In these specifications the word "Engineer" shall mean the Owner designated engineer.

1.2.3 Design Engineer - In these specifications the words "Design Engineer" shall mean CBC Engineers and Associates, Ltd.

1.2.4 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any work under the terms of these specifications.

1.2.5 Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.

1.2.6 As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.

2.0 GENERAL CONDITIONS

2.1 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein.
This work shall consist of all mobilization clearing and grading, grubbing, stripping, removal of existing material unless otherwise stated, 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 lines, grades, slopes, and specifications.

This work is to be accomplished under the observation of the Owner or his designated representative.

2.2 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 the general and local conditions at the construction site, including, without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site; and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.

If conditions other than those indicated are discovered by the Contractor, the Owner should be notified immediately. The material which the Contractor believes to be a changed condition should not be disturbed so that the owner can investigate the condition.

2.3 The construction shall be performed under the direction of an experienced engineer who is familiar with the design plan.

II - FOOTINGS

1.0 EXCAVATION FOR FOOTINGS

1.1 Footing excavation shall consist of the removal of all material, of whatever nature, necessary for the construction of foundations.

1.2 It shall be the responsibility of the Contractor to identify and relocate all existing utilities which conflict with the proposed footing locations shown on the plan. The Contractor must call the appropriate utility company at least 48 hours before any excavation to request exact field location of utilities, and coordinate removal and installation of all utilities with the respective utility company.

1.3 The side of all excavations shall be cut to prevent sliding or caving of the material above the footings.

1.4 Excavated material shall be disposed in accordance with the plan established by the Engineer.

1.5 The footings are designed for an allowable bearing capacity of 4,000 psf on lean concrete (f'c = 2,000 psi) placed directly on competent rock with an allowable bearing capacity of 5,000 psf. These values and the presence of rock shall be verified in the field before construction. The dimensions of the lean concrete shall be as shown on the drawings.

2.0 CONCRETE FOOTING DIMENSIONS

The footings shall be reinforced in accordance with the construction drawings.

APPROVED: DEPARTMENT OF PUBLIC WORKS
CHIEF, BUREAU OF HIGHWAYS — DATE 6-11-10
APPROVED: DEPARTMENT OF PLANNING AND ZONING
CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10
CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

III – MULTI-PLATE ARCH

1.0 GENERAL

1.1 This work shall consist of furnishing, fabricating, and installation of a Multi-Plate arch culvert in conformance with these specifications, the manufacturer provisions, and the details shown on the plans.

1.2 The contractor shall verify the actual location of all utilities in the field before beginning any work that could be impacted by these utilities.

1.3 Contractor must notify/contact all utility companies to determine exact locations of existing utilities prior to commending any work on this contract.

1.4 Contractor shall coordinate construction with work done by others adjacent to or within the contract limits.

2.0 DIMENSIONS

2.1 The proposed structure shall be a MULTI-PLATE arch with the following dimensions:

Span: 19'-0"
Rise: 6'-4"
Gage: 10 (0.140")

2.2 All plan dimensions on the contract drawings are measured in a true horizontal plan unless otherwise noted.

2.3 All dimensions, locations, and elevations of existing structures shown on the contract drawings shall be verified by the contractor in the field.

3.0 DESIGN CRITERIA

All design, except where noted, conforms to the applicable sections of the current AASHTO Standard Specifications for Highway Bridges.

4.0 WORKMANSHIP AND INSPECTIONS

All metal piping materials shall conform to the workmanship and inspection requirements of AASHTO M36 and M167.

5.0 MATERIALS AND DIMENSIONS

5.1 Steel structural plate arches shall conform to the requirements of AASHTO M167.
5.2 Bolts and nuts shall meet the provisions of ASTM A-449 and ASTM A-563, Grade C, respectively, and shall be galvanized in accordance with the requirements of ASTM A-153, Class C.

6.0 INSTALLATION

ASSEMBLY. The Structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloading and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.

The Structure shall be placed in the footing starting at the downstream end. Structures with circumferential seams shall be installed with their inside circumferential sheet laps pointing downstream.

IV - CONCRETE

1.0 CODES AND STANDARDS

1.1 Reinforced concrete for the structural footings shall conform to the requirements of AASHTO Standard Specifications for Highway Bridges, Division II - Construction, Section 8, "Concrete Structures", for Class A concrete, having a minimum compressive strength of 4,000 psi.

2.0 STANDARDS FOR MATERIALS

2.1 Portland Cement - Conforming to ASTM Specification C-150, Type I or II.

2.2 Water - The water shall be drinkable, clean free from injurious amounts of oils, acids, alkalis, organic materials, or deleterious substances.

2.3 Aggregates - Fine and coarse aggregates shall conform to current ASTM Specification C-33 "Specification for Concrete Aggregates" except that local aggregates which have been shown by tests and by actual service to produce satisfactory qualities may be used when approved by the Engineer.

2.4 Submittals - Test data and/or certifications to the Owner shall be furnished upon request.

3.0 PROPORTIONING OF CONCRETE

3.1 COMPOSITION

3.1.1 The concrete shall be composed of cement, fine aggregate, coarse aggregate and water.

3.1.2 The concrete shall be homogeneous, readily placeable and uniformly workable and shall be proportioned in accordance with ACI-211.1.

3.1.3 Proportions shall be established on the basis of field experience with the materials to be employed. The amount of water used shall not exceed the maximum 0.49 water/cement ratio, and shall be reduced as necessary to produce concrete of the specified consistency at the time of placement.

3.1.4 An air-entraining admixture, conforming to the requirements of ASTM C260, shall be used in all concrete furnished under this contract. The quantity of admixture shall be such as to produce an air content in the freshly mixed concrete of 6 percent plus or minus 1 percent as determined in accordance with ASTM C231 or C173.

3.2 Qualities Required - As indicated in the table below:

TABLE IV-1
QUALITIES REQUIRED

ITEM	QUALITY REQUIRED
AASHTO Class	A
Type of Cement	I or II
Compressive Strength fc @ 28 days	4,000 psi
Slump, inches	2 - 4 in.

3.3 Maximum Size of Coarse Aggregates - Maximum size of coarse aggregates shall not be larger than 38 mm (1 ½ inches).

3.4 Rate of Hardening of Concrete - Concrete mix shall be adjusted to produce the required rate of hardening for varied climatic conditions:

Under 40°F Ambient Temperature - Accelerate calcium chloride at 2% is acceptable when used within the recommendations of ACI-306R "Cold Weather Concreting." Admixtures containing chloride ion in excess of 1% by weight of admixture shall not be used in reinforced concrete.

4.0 MIXING AND PLACING

4.1 Equipment - Ready Mix Concrete shall be used and shall conform to the "Specifications for Ready-Mix Concrete," ASTM C-94. Approval is required prior to using job mixed concrete.

4.2 Preparation - All work shall be in accordance with ACI-304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete." All construction debris and extraneous matter shall be removed from within the forms. Concrete shall be placed on clean surfaces, free from water. Concrete that has to be dropped four (4) feet or more shall be placed through a tremie.

4.3 All concrete shall be consolidated by internal mechanical vibration immediately after placement. Vibrators shall be of a size appropriate for the work, capable of transmitting vibration to concrete at frequencies of not less than 4,500 impulses per minute.

5.0 FORM WORK

5.1 Forms shall be of wood, steel or other approved material and shall be set and held true to the dimensions, lines and grades of the structure prior to and during the placement of concrete.

5.2 Forms shall not be removed until the concrete has sufficient strength to prevent concrete damage and/or drainage.

6.0 CURING

6.1 Fresh concrete shall be protected from rains, flowing water and mechanical injury for a period of four (4) days.

PROFESSIONAL ENGINEER 22779 DJ HARLTON CONTECH STATE OF MARYLAND

1	2/17/10	DJH	REVISION 1

CBC ENGINEERS
DAYTON, OHIO

SPECIFICATIONS

Drawn By: JBE	Date: 11/17/09	CONTECH CONSTRUCTION PRODUCTS, INC. DESIGN OF FOOTINGS, BACKFILL SPECIFICATIONS AND SCOUR ANALYSIS FOR A 19' x 6'-4" MULTI-PLATE ARCH; BONNIE BRANCH WOODS HOWARD COUNTY, MARYLAND
Approved By:	Date:	
Scale: GRAPHIC	Project No.: CBC-11035	Rev.: 1
		Sheet: 23 OF 24 3 OF 4

F-10-042

7.0 REINFORCING STEEL

7.1 MATERIAL

7.1.1 All reinforcing bars shall be deformed bars (ASTM-A615) Grade 60.

7.2 BENDING AND SPLICING

7.2.1 Bar reinforcement shall be cut and bent to the shapes shown on the plans. Fabrication tolerances shall be in accordance with ACI 315. All bars shall be bent cold, unless otherwise permitted.

7.2.2 All reinforcement shall be furnished in the full lengths indicated on the plans unless otherwise permitted. Except for splices shown on the plans and splices for No. 5 or smaller bars, splicing of bars will not be permitted without written approval. Splices shall be staggered as far as possible.

7.2.3 In lapped splices, the bars shall be placed and wired in such a manner as to maintain the minimum distance to the surface of the concrete shown on the plans.

7.2.4 Substitution of different size bars will be permitted only when authorized by the engineer. The substituted bars shall have an area equivalent to the design area, or larger.

7.3 PLACING AND FASTENING

7.3.1 Steel reinforcement shall be accurately placed as shown on the plans and firmly held in position during the placing and setting of concrete. Bars shall be tied at all intersections around the perimeter of each mat and at not less than 2 foot centers or at every intersection, whichever is greater, elsewhere. Welding of cross bars (tack welding) will not be permitted for assembly of reinforcement.

7.3.2 Reinforcing steel shall be supported in its proper position by use of mortar blocks, wire bar supports, supplementary bars or other approved devices. Such devices shall be of such height and placed at sufficiently frequent intervals so as to maintain the distance between the reinforcing and the formed surface or the top surface within 1/4 inch of that indicated on the plans.

V - SELECT BACKFILL SPECIFICATIONS

1.0 GENERAL CONDITIONS

1.1 The contractor shall furnish all labor, materials, and equipment, and perform all work and services necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction and grading as shown on the plans and as described therein.

1.2 This work shall consist of all clearing and grading, removal of existing structures unless otherwise stated, preparation of the land to be filled, 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 lines, grades, slopes, and specifications.

1.3 This work is to be accomplished under the constant and continuous supervision of the Owner or his designated representative.

2.0 SUBSURFACE CONDITIONS

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

2.2 If conditions other than those indicated are discovered by the Contractor, the Owner should be notified immediately. The material which the Contractor believes to be a changed condition should not be disturbed so that the Owner can investigate the condition.

3.0 SITE PREPARATION

3.1 Within the specified areas, all debris, existing stockpile material, and structures scheduled for demolition shall be removed and disposed of.

3.2 Any rubbish, organic and other objectionable soils, and other deleterious material, shall be disposed of off the site, or as directed by the Owner or his designated representative if on site disposal is provided. In no case shall such objectionable material be allowed in, or under the fill.

3.3 Prior to the addition of fill, any required undercuts shall be made and the original ground shall be compacted to the project specifications as outlined below. Special attention shall be given to the proposed fill area at this time. If wet spots, spongy conditions, or ground water seepage is found, corrective measures must be taken before the placement of fill.

4.0 FORMATION OF FILL AREAS

4.1 SELECT BACKFILL

4.1.1 Select backfill shall be placed to a minimum distance of 3 feet horizontally, as measured from the springline of the structure, and to the bottom of the flexible pavement above the crown of the structure as shown on the construction drawings.

5.0 MINIMUM BACKFILL REQUIREMENTS

5.1 MATERIAL

A granular type of material shall be used around and over the structure. This select structural backfill material shall conform to AASHTO Specification AASHTO M-145 A-1 or A-2 and the following requirements. Maximum particle size shall not exceed 3 inches.

TABLE V-1

BACKFILL REQUIREMENTS

AASHTO M-145 - TABLE 2 (MODIFIED)*				
GROUP CLASSIFICATION	A-1		A-2 (Modified)	
	A-1-a	A-1-b	A-2-4	A-2-5
Sieve Analysis, Percent Passing				
No. 10 (2.00 mm)	50 max.	--	--	--
No. 40 (0.425 mm)	30 max.	50 max.	--	--
No. 100 (.150 mm)	--	--	50 max.	50 max.
No. 200 (0.075 mm)	15 max.	25 max.	20 max.	20 max.
CHARACTERISTICS OF FRACTION PASSING NO. 40 (0.425 mm)				
Liquid Limit	--	--	40 max.	41 min.
Plasticity Index	6 max.		10 max.	10 max.
USUAL TYPES OF SIGNIFICANT CONSTITUENT MATERIALS	Stone Fragments, Gravel and Sand		Silty or Clayey Gravel and Sand	

*Modified to be more select than M-145.

Additional Backfill Material Requirements:

1. Backfill must be well-graded material. Open-graded or gap-graded materials are not allowed.
2. Fine beach sands, windblown sands, stream deposited sands exhibiting fine, rounded particles and typically classified by AASHTO M-145 as A-3 materials are not allowed.
3. On-site mixing or blending to achieve specified gradation is not allowed.
4. The maximum particle size shall not exceed 3 inches.
5. The stone particles shall be angular and not rounded.
6. The backfill should have a Los Angeles Abrasion Test loss no greater than 50%. Other backfill materials which provide equivalent long term structural properties in the environmental conditions expected (saturation, freeze-thaw, etc.) may be used. Such materials shall be approved only after thorough investigation and testing by a soils engineer.

5.2 BACKFILL LIMITS

The required width of the structural backfill shall be 3 feet minimum outside the springline and to the bottom of the flexible pavement over the top of the structure.

5.3 BACKFILL PLACEMENT

Approved backfill material shall be placed in horizontal, uniform layers not exceeding 8" in thickness, before compaction, and shall be brought up uniformly on both sides of the structure. Each layer of backfill shall be compacted to a relative density of not less than 90%, modified Proctor per AASHTO Test Method No. T-180. Field density tests of compacted backfill shall be made at regular intervals during backfill.

Contractors should plan to have a D4 (approximately 20,000 lbs.) or similar weight tracked dozer to place and grade backfill immediately alongside and above the structure until minimum cover level is reached. Lightweight vibratory plate or roller type compaction equipment must be used to compact the backfill in these zones. Use of heavier equipment and/or rubber tired equipment such as scrapers, graders and front end loaders are prohibited inside the select fill envelope zone until appropriate minimum cover height has been obtained.

6.0 SLOPE RATIO AND STORM WATER RUN-OFF

Protected slopes shall not be greater than 3.0 (horizontal) to one (1) (vertical) in both cut and fill, and storm water shall not be drained over the slopes.

7.0 GRADING

The Contractor shall furnish, operate, and maintain such equipment as is necessary to construct uniform layers, and control smoothness of grade for maximum compaction and drainage.

8.0 COMPACTING

8.1 The compaction equipment shall be approved equipment of such design, weight, and quantity to obtain the required density in accordance with these specifications, without distorting the structure.

8.2 During backfill, only small tracked vehicles (D-4 or smaller) shall be near the structure as fill progresses above the crown and to finished grade. The contractor is cautioned that the minimum cover may need to be increased to handle temporary construction vehicle loads (larger than a D-4).

8.3 The Owner shall be responsible for providing all necessary field testing to verify that the provisions of these specifications are met.

APPROVED: DEPARTMENT OF PUBLIC WORKS

CHIEF, BUREAU OF HIGHWAYS — DATE 6-11-10

APPROVED: DEPARTMENT OF PLANNING AND ZONING

CHIEF, DIVISION OF LAND DEVELOPMENT — DATE 6/22/10

CHIEF, DEVELOPMENT ENGINEERING DIVISION — DATE 6/18/10

PROFESSIONAL ENGINEER 22779 DANIEL J. CONNERS STATE OF MARYLAND

1	2/17/10	DJH	REVISION 1

CBC ENGINEERS
DAYTON, OHIO

SPECIFICATIONS CONTINUED

Drawn By: JBE	Date: 11/17/09	CONTECH CONSTRUCTION PRODUCTS, INC. DESIGN OF FOOTINGS, BACKFILL SPECIFICATIONS AND SCOUR ANALYSIS FOR A 19' x 6'-4" MULTI-PLATE ARCH; BONNIE BRANCH WOODS HOWARD COUNTY, MARYLAND	
Approved By:	Date:		
Scale: GRAPHIC	Project No.: CBC-11035	Rev.: 1	Sheet: 24 OF 24 / 4 OF 4

F-10-042