HOWARD COUNTY, MARYLAND
DEPARTMENT OF PUBLIC WORKS

SETTLER'S LANDING STORMWATER MANAGEMENT RETROFIT

CAPITAL PROJECT NO. D-1110

INDEX OF SHEETS

POND #5 - S.W.M. SUMMARY (Ultimate Watershed Conditions)			
Storm	Inflow Peak Discharge (cfs)	Outflow Peak Discharge (cfs)	Peak Pond Elevation (ft)
1-yr	9	8	193.1
2-yr	12	11	193.2
10-yr	24	23	193.6
100-yr	37	35	194.0

POND #6 - S.W.M. SUMMARY (Ultimate Watershed Conditions)			
Storm	Inflow Peak Discharge (cfs)	Outflow Peak Discharge (cfs)	Peak Pond Elevation (ft)
1-yr	10	7	183.3
2-yr	13	9	183.4
10-yr	26	21	183.7
100-yr	40	32	184.1

THIS PROJECT HAS BEEN APPROVED BY THE MARYLAND DEPARTMENT OF THE ENVIRONMENT UNDER AUTHORIZATION NUMBER: 96-NT-0606/199664622

DEVELOPER & ENGINEER CERTIFICATES

OWNER/DEVELOPER

HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS
DIVISION OF STORMWATER MANAGEMENT
6751 COLUMBIA GATEWAY DRIVE
COLUMBIA, MARYLAND 21046

BY THE DEVELOPER:

I/We certify that all development and construction will be done according to this plan, and that any responsible personnel involved in the construction project will have a certification of attendance at a Department of the Environment Approved Training Program for the Control of Sediment and Erosion before the beginning the project. I shall engage a Registered Professional Engineer to supervise pond construction and provide the Howard County 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 County Soil Conservation District.

Howard E. Saltzman — 9/12/2000
Developer — Date

BY THE ENGINEER:

I certify that this plan for pond construction, Sediment and Erosion 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 County 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 County Soil Conservation District with an "As-Built" Plan of the Pond within 30-days of completion.

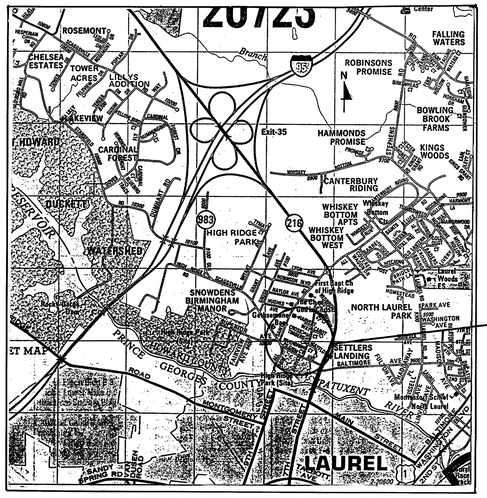
Signature of Engineer — 1-24-2000 Date
Daniel J. Maletic

( ) These plans have been reviewed for the Howard Soil Conservation District and meet the technical requirements for small pond construction, soil erosion and sediment control.

Chas. L. Sturm — Soil Conservation Service — 8/10/00 Date

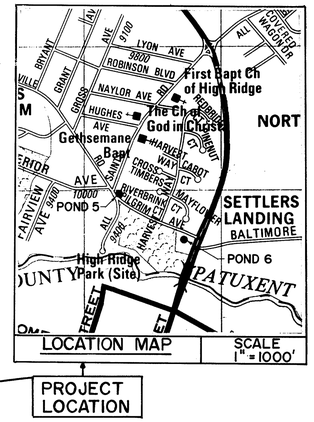
( ) These plans for small pond construction, soil erosion and sediment control meet the requirements of the Howard Soil Conservation District.

Howard Soil Conservation District — 8/10/00 Date



COPYRIGHT ADC THE MAP PEOPLE PERMITTED USE Nº 21109724

VICINITY MAP (PAGE 19 GRIDS H 11 & H 12)
SCALE: 1" = 2000'



PROJECT LOCATION

LEGEND

G.P.I.	BENCH MARK
—W—	EX. WATER
—S—	EX. SANITARY
—G—	EX. GAS
—T—T—	EX. BURIED TELEPHONE
—E—E—	EX. OVER HEAD ELECTRIC
△	G.P.I. PERMANENT SURVEY PT.
—C—	EX. CABLE TV
⊕	PROPERTY CORNER
—LOD—	LIMIT OF DISTURBANCE
BI	BORING LOCATION & Nº.
TPI	TEST PIT LOCATION & Nº.
	PROPOSED STORM DRAIN PIPE
	EXISTING STORM DRAIN PIPE
①	CONSTRUCTION NOTES
	WETLANDS
	SUMP PIT
FB	FILTER BAG
—SF—	SILT FENCE
DW	TEMPORARY DEWATERING DEVICE
	EROSION CONTROL MATTING
PSD-24	24" PIPE SLOPE DRAIN
	APPROXIMATE TREE LINE

GENERAL NOTES

1. THE ORIGINAL PONDS WERE CREATED UNDER THE SETTLER'S LANDING SUBDIVISION AS NOTED BELOW.

   POND 5- SECTION 1, AREA 2, F-81-117 ONLY ONE POND WITH NO NUMBER.
   POND 6- SECTION 1, AREA 1, F-81-18 ONLY ONE POND WITH NO NUMBER.

2. ALL TOP ELEVATIONS FOR THE PROPOSED INLETS AND MANHOLES ARE APPROXIMATE, AND ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR AND THE ENGINEER.
3. TREES ARE TO BE PROTECTED FROM DAMAGE TO MAXIMUM EXTENT. TREES LOCATED WITHIN THE CONSTRUCTION STRIP ARE NOT TO BE REMOVED OR DAMAGED BY THE CONTRACTOR UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
4. CONTRACTOR TO GRADE AROUND THE TOP OF THE PROPOSED INLETS IN ORDER TO PROVIDE POSITIVE DRAINAGE TO THE INLETS.
5. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES. ANY DAMAGE DUE TO THE CONTRACTOR'S NEGLIGENCE SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE. CLEAR ALL UTILITIES BY A MINIMUM OF 6-INCHES.
6. TEST PITS SHALL BE DUG AT ALL UTILITY CROSSINGS TO DETERMINE EXISTING HORIZONTAL AND VERTICAL ALIGNMENT OF UTILITIES. TEST PITS SHALL BE DUG A SUFFICIENT AMOUNT OF TIME IN ADVANCE OF THE CONSTRUCTION IN ORDER TO ALLOW FOR NECESSARY ADJUSTMENTS AND CONSULTATION WITH UTILITY COMPANIES.
7. WHERE TEST PITS HAVE BEEN MADE ON EXISTING UTILITIES, THEY ARE NOTED BY THE SYMBOL ■ THE RESULTS OF THE TEST PITS ARE INCLUDED IN THE PROJECT MANUAL.
8. ALL PIPE ELEVATIONS SHOWN ARE INVERT Ⓘ ELEVATIONS.
9. CONTRACTOR SHALL REMOVE TREES, STUMPS AND ROOTS ALONG LINE OF EXCAVATION. PAYMENT FOR SUCH REMOVAL SHALL BE INCLUDED IN THE UNIT PRICE BID FOR FURNISHING AND LAYING STORM DRAIN PIPE.
10. PLACE REGULATION "MEN WORKING" AND WARNING SIGNS AS REQUIRED TO COMPLY WITH MARYLAND STATE HIGHWAY ADMINISTRATION MANUAL OF TRAFFIC CONTROL FOR HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS PAYMENT FOR THIS SHALL BE INCIDENTAL TO AND INCLUDED IN OTHER BID ITEMS.
11. FOR DETAILS NOT SHOWN ON THE DRAWINGS, AND FOR MATERIALS AND CONSTRUCTION METHODS, THE CONTRACTOR SHALL ABIDE BY THE HOWARD COUNTY DESIGN MANUAL, VOLUME IV, "STANDARD SPECIFICATIONS AND DETAILS FOR CONSTRUCTION" AND THE PROJECT MANUAL. IN THE EVENT OF ANY DISCREPANCY BETWEEN THESE TWO SOURCES, THE PROJECT MANUAL SHALL GOVERN.
12. LOCATION POINTS FOR INLETS, MANHOLES AND STRUCTURES ARE IN CENTER OF GRATE/COVER.
13. SEDIMENT AND EXCAVATED MATERIAL SHALL BE HAULED OFF-SITE AND DISPOSED AT AN APPROVED SOILD DISPOSAL AREA WITH AN APPROVED SEDIMENT CONTROL PLAN.
14. CONTRACTOR SHALL PLACE 4" TOPSOIL OVER DISTURBED AREAS TO BE VEGETATED.
15. CLEAR ALL UTILITIES BY 1'. CLEAR ALL POLES BY 2' MINIMUM. THE CONTRACTOR SHALL COORDINATE WITH THE UTILITY COMPANIES TO SCHEDULE BRACING OF THE POLES.
16. WORK ZONE TRAFFIC SHALL CONFORM TO THE REQUIREMENTS IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES"

RIGHT-OF-WAY LINES SHOWN ON THESE PLANS DO NOT INCLUDE EASEMENTS, THEY ARE FOR ASSISTANCE IN INTERPRETING THE PLANS; THEY ARE NOT OFFICIAL FOR OFFICIAL FEE RIGHT-OF-WAY AND EASEMENT INFORMATION, SEE APPROPRIATE RIGHT-OF-WAY PLAT OR PLATS.

THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THE PLANS ARE FOR INFORMATION AND GUIDANCE ONLY. NO GUARANTEE IS MADE AS TO THE ACCURACY OF SAID LOCATIONS. CALL "MISS UTILITY" TELEPHONE 1-800-257-7777 FOR UTILITY LOCATIONS AT LEASE 48 HOURS BEFORE BEGINNING CONSTRUCTION.

OPERATION, MAINTENANCE AND INSPECTION

Inspection of the pond(s) shown hereon shall be 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 any 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.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

James P. Irvin — 8/4/00
DIRECTOR OF PUBLIC WORKS — DATE

John O'Hara — 8/2/00
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES — DATE

Andrew M. Daniels — 8-4-00
CHIEF, BUREAU OF HIGHWAYS — DATE

Howard E. Saltzman — 8/4/2000
CHIEF, STORMWATER MANAGEMENT DIVISION — DATE

gpi Greenman-Pedersen, Inc.
ENGINEERS/ARCHITECTS/PLANNERS
LAUREL, MARYLAND
GPI # 92130.03

STATE OF MARYLAND — DANIEL JOSEPH MALETIC — No. 13759 — REGISTERED PROFESSIONAL ENGINEER

DES: R.S. S.M.C.					
DRN: P.S.M. P.A.R.					
CHK: P.P.M.					
DATE: 7-31-00	BY	NO	REVISION	DATE	600' SCALE MAP NO. 50 BLOCK NO. 2

SETTLER'S LANDING
STORMWATER MANAGEMENT RETROFIT
TITLE
CAPITAL PROJECT NO. D-1110

SCALE AS SHOWN

SHEET 1 OF 8

SEQUENCE OF CONSTRUCTION POND #5

WORK DAYS	STEP	ACTIVITY
0	1.	NOTIFY HOWARD COUNTY INSPECTIONS AND PERMITS (410) 313-1855 AND MISS UTILITY 1-800-257-7777 48 HOURS IN ADVANCE OF ANY CONSTRUCTION.
1	2.	CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE.
1	3.	INSTALL SILT FENCE, EARTH DIKE, AND PIPE SLOPE DRAIN.
4	4.	CONSTRUCT 'K' INLET, 24" RCP TO SHALLOW MH, AND SHALLOW MH.
1	5.	REMOVE EARTH DIKE AND PIPE SLOPE DRAIN, INSTALL EROSION CONTROL MATTING.
4	6.	EXCAVATE AND REMOVE 24" CMP FROM POND OUTFALL AND REPLACE WITH 24" RCP. INSTALL CONCRETE BEDDING AND ANTI-SEEP COLLAR.
4	7.	EXCAVATE FOREBAY AND CONSTRUCT RISER AND TRASH RACKS, INSTALL TEMPORARY SEDIMENT BASIN DEWATERING DEVICE.
1	8.	STABILIZE DISTURBED AREAS WITH APPROVED SEED MIX.
1	9.	PLACE RIP RAP AT OUTFALLS INTO POND.
1	10.	WITH SEDIMENT CONTROL INSPECTOR'S PERMISSION REMOVE SEDIMENT CONTROL DEVICES AND STABILIZE ANY REMAINING DISTURBED AREAS.

TOTAL TIME = 18 WORK DAYS

NOTES:

A. SEE SHEET 4 FOR CROSS-SECTIONS A-A AND B-B.

B. ALL AREAS WITHIN LOD SHALL BE SEEDED WITH APPROVED SEED MIX. EXCEPT AS SHOWN OR AS DIRECTED BY THE ENGINEER.

C. RISER STRUCTURE HAS BEEN DESIGNED TO PREVENT FLOATATION, TO CHANGE ANY DIMENSION OR THICKNESS CONTRACTOR MUST PROVIDE COMPUTATIONS TO HOWARD COUNTY SOIL CONSERVATION DISTRICT FOR APPROVAL.

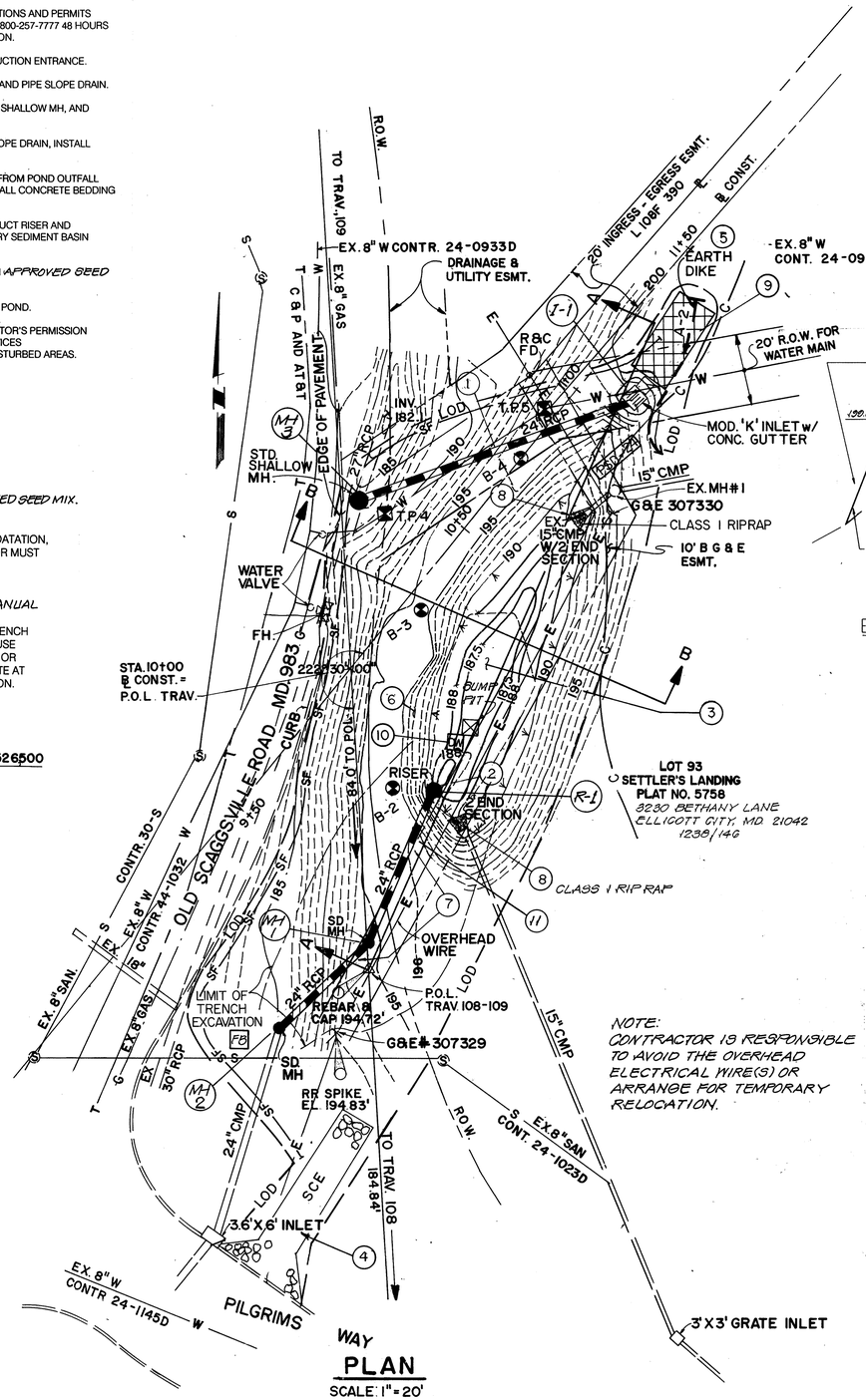
D. TEST PIT RESULTS ARE IN THE PROJECT MANUAL

E. CONTRACTOR IS RESPONSIBLE FOR REPLACING CORE TRENCH WITHIN LIMITS OF EXCAVATION. CONTRACTOR MAY NOT USE SHEETING OR TRENCH BOXES FOR REMOVAL OF 24" CMP OR INSTALLATION OF 24" RCP. CONTRACTOR SHALL EXCAVATE AT 2:1 MAXIMUM SLOPE FOR PIPE REMOVAL AND INSTALLATION.

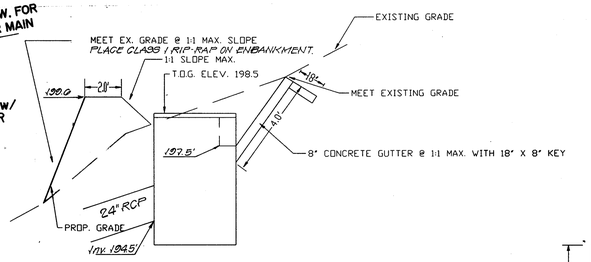
F. CONTRACTOR SHALL COORDINATE WITH BG&E CONCERNING EXCAVATION NEAR UTILITY POLES

E 1352903 N 526500

G. ALL UTILITY LOCATIONS WITHIN THE LIMITS OF GRADING MUST BE MARKED PRIOR TO CONSTRUCTION.



NOTE:
CONTRACTOR IS RESPONSIBLE TO AVOID THE OVERHEAD ELECTRICAL WIRE(S) OR ARRANGE FOR TEMPORARY RELOCATION.



EMBANKMENT & GRADING @ "K" INLET

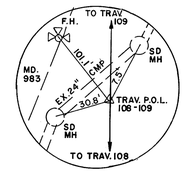
N.T.S.

NOTE: SEE INLET DETAIL THIS SHEET

E 1353200 N 526500

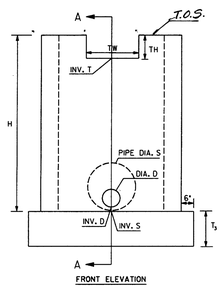
CONSTRUCTION NOTES FOR POND #5

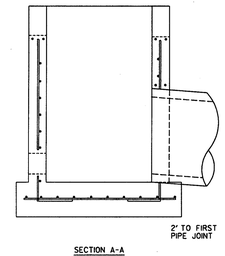
1. STA. 11+09, 14' RT. TO STA 10+38, 28' LT. CONSTRUCT MOD. 'K' INLET (SEE DETAIL THIS SHEET) WITH STD TYPE 'K' INLET GRATE 'A' (S.D. 4.13). CONSTRUCT 4' x 4' CONCRETE VALLEY GUTTER PLACE IN SUMP AS SHOWN ON DETAIL THIS SHEET. PLACE 80 L.F. 24" RCP (CL. IV) INV 194.5 TO INV. 181.5. CONSTRUCT STD. SHALLOW MANHOLE (G 5.05) WITH STD. HEAVY DUTY MANHOLE FRAME AND COVER (G5.51)
2. STA. 9+92, 40' RT. CONSTRUCT RISER AND TRASH RACK. SEE DETAILS THIS SHEET AND SHEET 5.
3. STA. 9+92, 40' RT. TO STA. 10+65, 22' RT. GRADE FOREBAY AS SHOWN. INV. 187.5, 4:1 SLOPES, 50 C.Y. EXCAVATION, WETLANDS PERMIT AUTHORIZATION # 98-NT-0606/199664622.
4. STA. 8+75, 85' RT. INSTALL STABILIZED CONSTRUCTION ENTRANCE (S.C.E.) (SEE DETAIL SHEET 6).
5. STA. 10+95, 20' RT. TO STA. 11+40, 10' RT. CONSTRUCT EARTH DIKE, A2, 50 L.F. (SEE DETAIL SHEET 6).
6. LANDSCAPE AS PROVIDED ON SHEET 6.
7. STA. 9+90,40' RT. TO 9+14, 49' RT. REMOVE EX. 24" CMP REPLACE WITH 24" RCP. EXCAVATE AT MAX. 2:1 SLOPE.
8. STA. 9+87,52' RT. AND STA. 10+73,23'RT. PLACE 1.2 CY CLASS I RIP RAP (L: 4', W: 5.25', TH: 1.6') AT EACH SITE.
9. STA. 11+15,13' RT. TO 11+40,12' RT. INSTALL EROSION MATTING (SEE DETAIL AND SPECIFICATIONS SHEET 8).
10. STA. 10+06,32' RT. INSTALL TEMPORARY SEDIMENT BASIN DEWATERING DEVICE I (SEE DETAIL SHEET 8).
11. REPLACEMENT MATERIAL FOR CORE TRENCH SHALL BE "CH" OR "CL". "GC" AND "SC" MATERIALS MAY BE UTILIZED PROVIDED THAT AT LEAST 30% PASSES THROUGH THE #200 SIEVE. ALSO EXTEND CORE TRENCH 2 FEET BEYOND LIMIT OF PIPE TRENCH EXCAVATION

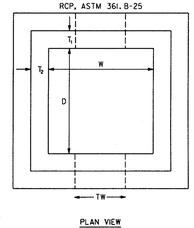


P.O.L. TRAVERSE TIE-IN

N.T.S.







CAST-IN-PLACE CONCRETE RISER DETAILS

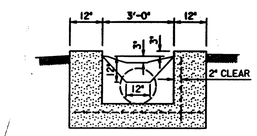
NOT TO SCALE

NOTE: TH x TW OPENING ON BOTH FRONT AND BACK OF RISER. LOW FLOW ORIFICE "D" ONLY ON FRONT OF RISER.

ALL REINFORCING STEEL TO BE ASTM-A 615 GRADE 60. REINFORCEMENT TO BE #4 DEFORMED BARS @ 6" C/C 2 WAYS, 2" COVER. PROVIDE EXTRA BARS AROUND CORNERS AND OPENINGS.

RISERS FOR PONDS #5 AND #6 DIMENSIONS

	H	W	D	T_1	T_2	T_3	T.O.S.	INV. T	INV. D	INV. S	PIPE DIA. S	DIA. D	TH	TW	2 YR WSEL	10 YR WSEL	100 YR WSEL
RISER #5	6'-6"	4'-0"	2'-0"	9"	9"	12"	193.5	192.5	187.5	187.2	24"	1.7"	1'-0"	3'-0"	193.2	193.6	194.0
RISER #6	9'-0"	5'-0"	1'-6"	9"	9"	12"	184.0	183.0	181.2	175.2	21"	2"	1'-0"	5'-0"	183.4	183.7	184.1



MODIFIED TYPE 'K' INLET DETAIL

N.T.S.

GENERAL NOTES:

1. STEEL-#4 BARS, 6"c.c.-VERTICAL
   #4 BARS, 6"c.c.-HORIZONTAL
   #4 BARS, 6"c.c.-BOTTOM
2. CONCRETE-S.H.A. MIX NO. 5 OR SIZE ONE, GRADE MS BRICK.
3. BATTER-INSIDE FACES 1/4" PER FOOT. CHAMFER-INSIDE CORNERS 3/4"x3/4".

NOTES:

1. THE CONCRETE VALLEY GUTTER TO BE USED IN CONNECTION WITH THIS INLET, WILL BE WARPED FROM THE STANDARD SECTION TO MEET THE SECTION AT THE END OF THE INLET.
2. PIPE OUTLETS AND GUTTER APPROACHES CAN BE REVISED TO MEET EXISTING CONDITIONS.
3. SIMILAR TO S.R.C. STANDARD DETAIL.
4. INLET MAY BE CONCRETE OR BRICK.
5. FOR GRATE DETAILS SEE STANDARD 4.13.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DIRECTOR OF PUBLIC WORKS — DATE 8/8/00
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES — DATE 8/2/00
CHIEF, BUREAU OF HIGHWAYS — DATE 8-4-00
CHIEF, STORMWATER MANAGEMENT DIVISION — DATE 8-2-2000

Greenman-Pedersen, Inc.
ENGINEERS/ARCHITECTS/PLANNERS
LAUREL, MARYLAND
GPI # 92130.03

STATE OF MARYLAND — DANIEL JOSEPH MALETIC — No. 13759 — REGISTERED PROFESSIONAL ENGINEER

DES: R.S., S.M.C.
DRN: P.S.M., P.A.R.
CHK: P.P.M.
1-31-00 DATE:

BY	NO	REVISION	DATE

600' SCALE MAP NO. _____ BLOCK NO. _____

SETTLER'S LANDING
STORMWATER MANAGEMENT POND #5
CONSTRUCTION PLAN
CAPITAL PROJECT NO. D-1110

SCALE AS SHOWN

SHEET 2 OF 8

CONSTRUCTION SPECIFICATIONS FOR POND LINERS

The embankment of Pond #6 shall be lined with the site soil mixed with a highly impervious bentonite in quantities sufficient to attain a maximum permeability of 1×10^{-7} cm/sec. The thickness of the liner shall be a minimum of 1.0 feet. The liner shall extend 20 feet in both directions from the center line of the riser. and from the toe of slope to the embankment crest.

1. Site preparation

Areas within the existing embankment to be covered with the liner shall be cleared of all trees. brush. logs. fences. rubbish. and other objectionable material. The base soil shall be uniform and free of roots. sticks. cobbles. or other miscellaneous debris that would preclude a homogenous blend for the specified barrier layer thickness. The subgrade must be sloped in such a way as to provide drainage characteristics and preclude ponding of precipitations.

2. Soil-bentonite mixing

Highly impervious bentonite shall be added to the existing soils to achieve the maximum permeability rate of 1.0×10^{-7} cm/sec. The soil-bentonite liner should be at least 1.0 feet thick. The geotechnical engineer of record should determine:

- Application rate of admixing bentonite into the existing soils
- Loose lift thickness
- Compaction rate

The base soil must have water content and material characteristics that will not impede the uniform blending of the processed clay throughout the soil matrix. The moisture content should be near optimum for the soil-bentonite mixture to aid in the subsequent compaction. the bentonite should be applied by hand or trucks- spreading the material in pre marked grid squares. The material should be raked to a uniform thickness across the grid by mechanical equipment.

After application of the bentonite. the materials should be thoroughly mixed with the subgrade. Adjustable rotary tillers are recommended for controlling liner thickness and homogeneity. Tillers can blend the soils and processed clay with depth control devices and can result in a fairly uniform layer thickness. Agricultural disks. graders. and other equipment may be used for blending if quality control is assured. Immediately after blending. the soil-bentonite liner should be compacted to the density recommended by the geotechnical engineer of record. Compaction should be performed with the smooth-drummed. pneumatic roller. or equal rollers.

3. Liner Testing

Random samples of liner material shall be collected. Permeability tests shall be performed on at least two (2) samples. (one on each side of the center line of the riser). to ensure that the design permeability has been achieved. Failing tests with more than the design permeability will require additional work until the soil-bentonite liner will achieve the design permeability rate and thickness.

SEQUENCE OF CONSTRUCTION POND #6

WORK DAYS	STEP	ACTIVITY
0	1.	NOTIFY HOWARD COUNTY INSPECTIONS AND PERMITS (410) 313-1855 AND MISS UTILITY 1-800-257-7777 48 HOURS IN ADVANCE OF ANY CONSTRUCTION.
1	2.	CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE.
1	3.	REMOVE CONCRETE DIVERSION WALL IN EXISTING MANHOLE AND TEMPORARILY BLOCK FLOW INTO POND.
2	4.	EXCAVATE FOREBAYS, PLACE RIP RAP AT OUTFALL INTO POND AND PLANT NEW VEGETATION.
1	5.	EXCAVATE TO EXPOSE 24" RCP AT PROPOSED RISER SITE.
1	6.	REMOVE TEMPORARY PLUG IN EXISTING MANHOLE, SAW CUT 24" RCP AT PROPOSED RISER SITE, REMOVE 24" RCP AT RISER SITE AND ABANDON 24" RCP BETWEEN MANHOLE AND RISER. PLUG WITH BRICK MASONRY
2	7.	INSTALL 21" PVC SLIPLINE PIPE INTO 24" RCP FROM PROPOSED RISER SITE TO POND OUTFALL.
3	8.	INSTALL RISER, TRASH RACKS, AND TEMPORARY SEDIMENT BASIN DEWATERING DEVICE.
1	9.	CONSTRUCT BRICK CHANNEL AND BRICK MASONRY PLUG IN EXISTING MANHOLE.
2	10.	PLACE GABION AT POND OUTFALL.
2	11.	MIX SOIL-BENTONITE AND APPLY TO EMBANKMENT.
1	12.	INSTALL SILT FENCE AND EXCAVATE FOR EMERGENCY SPILLWAY.
1	13.	WITH SEDIMENT CONTROL INSPECTOR'S PERMISSION REMOVE SEDIMENT CONTROL DEVICES AND STABILIZE ANY REMAINING DISTURBED AREAS.

TOTAL TIME = 18 WORK DAYS

NOTES:

A. SEE SHEET 4 FOR CROSS-SECTIONS A-A AND B-B.

B. ALL AREAS WITHIN LOD SHALL BE SEEDED WITH APPROVED SEED MIX. EXCEPT AS SHOWN OR AS DIRECTED BY THE ENGINEER.

C. RISER STRUCTURE HAS BEEN DESIGNED TO PREVENT FLOATATION, TO CHANGE ANY DIMENSION OR THICKNESS CONTRACTOR MUST PROVIDE COMPUTATIONS TO HOWARD COUNTY SOIL CONSERVATION DISTRICT FOR APPROVAL.

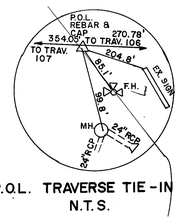
D. TEST PIT RESULTS ARE IN THE PROJECT MANUAL

E. CONTRACTOR SHALL PROVIDE GEOTECHNICAL ENGINEER TO DETERMINE AMOUNT OF BENTONITE TO BE APPLIED TO SOIL-BENTONITE MIXTURE AND TO OVERSEE APPLICATION OF MIXTURE TO EMBANKMENT. CONTRACTOR SHALL PROVIDE REPORT OF PERMEABILITY TESTS TO HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS.

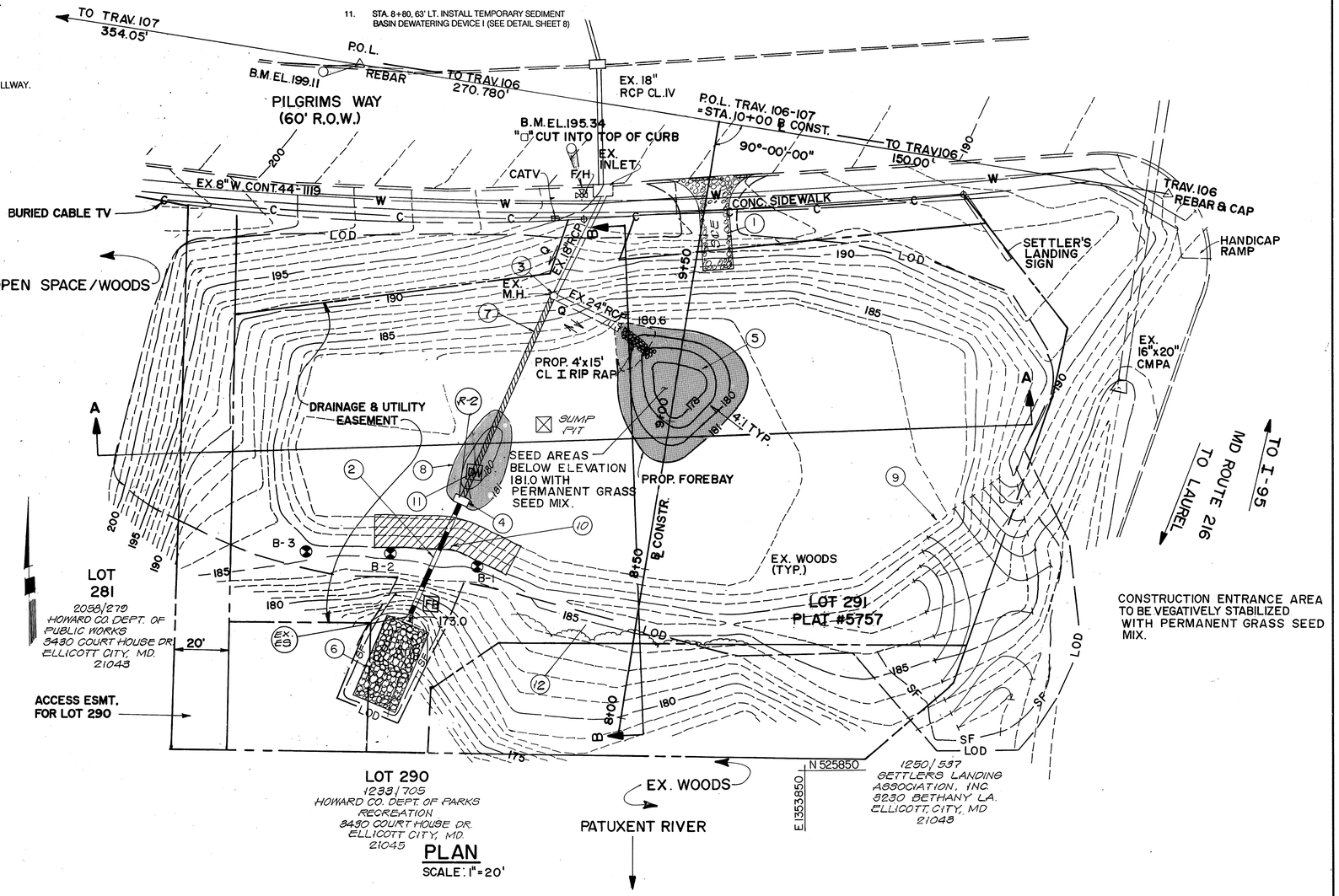
CONSTRUCTION NOTES FOR POND #6

1. WITH ENGINEERS APPROVAL, (APPROX. STA 9+50, 25' RT.), INSTALL STABILIZED CONSTRUCTION ENTRANCE, (S.C.E.)
2. STA. 8+59, 25' LT. TO 8+22, 75' LT. INSTALL 21" CONTECH PVC A-2 SLIPLINE PIPE OR APPROVED EQUIVALENT INTO EX. 24" RCP AS SPECIFIED BY MANUFACTURER.
3. STA. 9+35, 45' LT. MODIFY EX. MANHOLE SEE DETAIL THIS SHEET.
4. STA. 8+60, 64' LT. CONSTRUCT RISER AND TRASH RACK. SEE DETAILS SHEETS 2 AND 5.
5. STA. 8+84 TO 9+34, LT. & RT. CONSTRUCT FOREBAY AS SHOWN, (120 C.Y. EXCAVATION). STRIP EXISTING TOPSOIL AND RIP RAP AND REPLACE AT FINAL GRADE, PLACE 3.5 C.Y. CLASS I RIP RAP (L: 12', W: 5', TH: 1.6').
6. STA. 8+10, 75' LT. REPAIR ERODED OUTFALL. PLACE 30 L.F. GABION (L: 30', W: 12', TH: 1') DOWN TO BEDROCK. (SEE PROFILE ON SHEET 4)
7. STA. 8+62, 64' LT. TO 9+33, 45' LT. ABANDON EXISTING 24" RCP PER SEQUENCE OF CONSTRUCTION.
8. STA. 8+59, 65' LT. TO STA. 8+94, 56' LT. CONSTRUCT FOREBAY AS SHOWN (30 C.Y. EXCAVATION).
9. STA. 8+00, 110' RT. TO STA 8+88, 112' RT. CONSTRUCT EMGERGENCY SPILLWAY.
10. STA. 8+56, 89' LT. TO STA. 8+56, 47' LT. APPLY SOIL-BENTONITE MIXTURE TO EMBANKMENT. COVER WITH MINIMUM 6" TOP SOIL.
11. STA. 8+80, 63' LT. INSTALL TEMPORARY SEDIMENT BASIN DEWATERING DEVICE I (SEE DETAIL SHEET 8)
12. AFTER NEW BARREL IS INSTALLED, REMOVE TREES FROM EMANKMENT AS DIRECTED BY THE ENGINEER. STUMPS SHALL BE REMOVED TO A DEPTH OF 18" AS FOLLOWS: A UNIFORM CUT WILL BE MADE WITH APPROPRIATE EQUIPMENT. THE UNDERLYING ROOT MASS THAT REMAINS WILL BE DISTRIBUTED AS LITTLE AS POSSIBLE BY USING SHARP CUTTING TOOLS. EXPOSED TAP ROOTS WILL BE TREATED WITH AN APPROPRIATE SILVICIDE TO PREVENT REEMERGENCE. THE HOLES LEFT BY THE STUMP REMOVAL STALL BE FILLED WITH APPROVED SOILD AND COMPACTED IN 6" LIFTS AS PER MD-378 SPECIFICATIONS. PLEASE REFER TO SCS TECHNICAL NOTE SERIES 705 "OPERATION AND MAINTENANCE ALTERNATIVES FOR REMOVING TREES FROM DAMS".

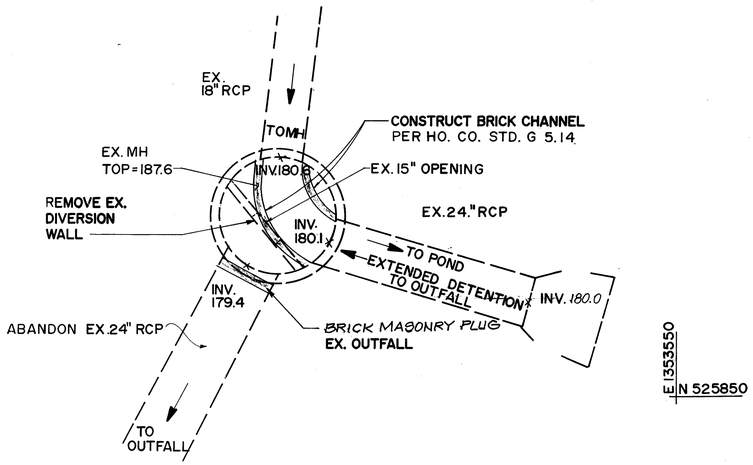
E 1353850
N 526,150



P.O.L. TRAVERSE TIE-IN
N.T.S.



PLAN
SCALE: 1"=20'



× INV. 173.0

EXIST. DIVERSION STRUCTURE
NOT TO SCALE

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DIRECTOR OF PUBLIC WORKS — DATE 8/15/00
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES — DATE 8/2/00
CHIEF, BUREAU OF HIGHWAYS — DATE 8-4-00
CHIEF, STORMWATER MANAGEMENT DIVISION — DATE 8/2/2000

Greenman-Pedersen, Inc.
ENGINEERS/ARCHITECTS/PLANNERS
LAUREL, MARYLAND
GPI # 92130.03

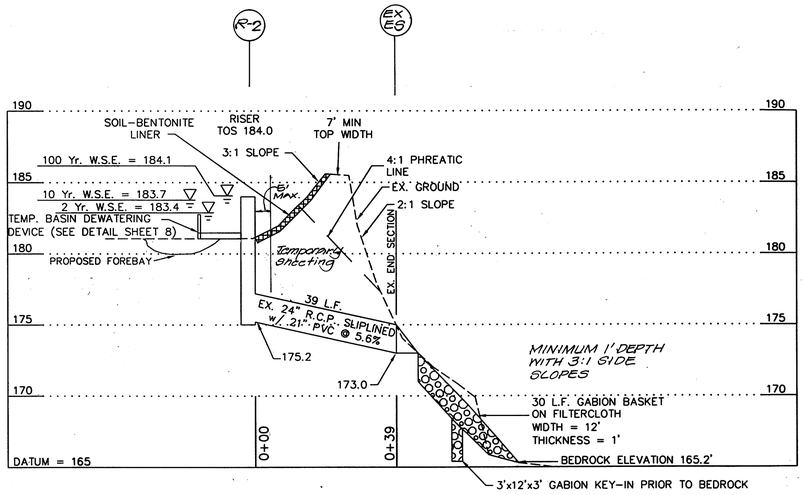
STATE OF MARYLAND
DANIEL JOSEPH MALETIC
No. 13759
REGISTERED PROFESSIONAL ENGINEER

DES: R.S. S.M.C	BY	NO	REVISION	DATE
DRN: P.S.M. P.A.R.				
CHK: P.P.M.				
1-31-00 DATE:				

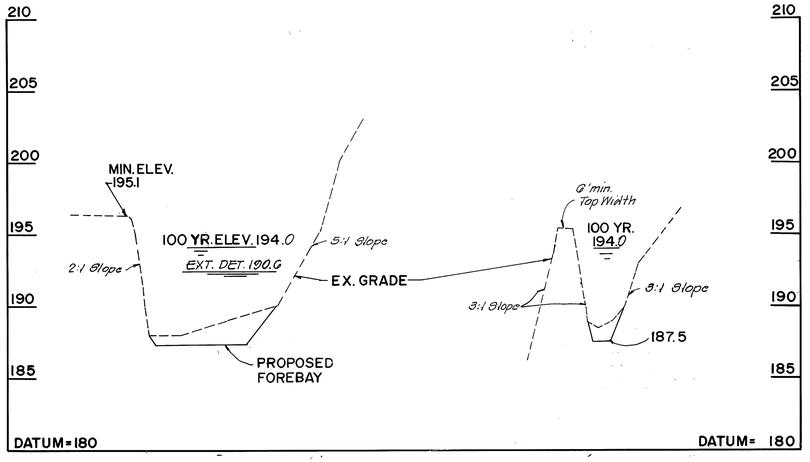
600' SCALE MAP NO. 50 BLOCK NO. 2

SETTLER'S LANDING
STORMWATER MANAGEMENT POND # 6
CONSTRUCTION PLAN
CAPITAL PROJECT NO. D-1110

SCALE AS SHOWN
SHEET 3 OF 8

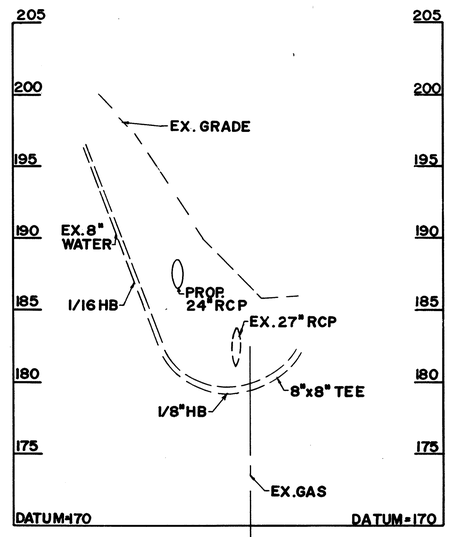


PROFILE POND #6
SCALE: 1"=20' HORIZ.
1"=5' VERT.

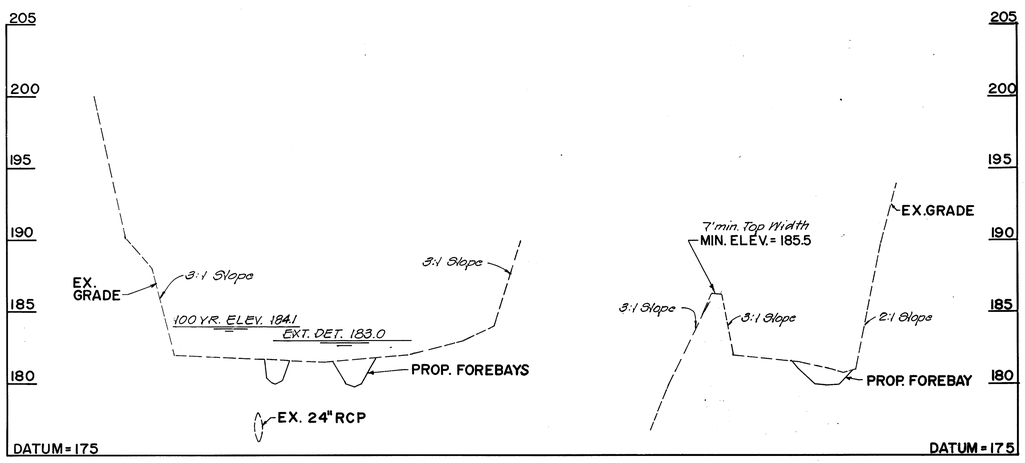


CROSS SECTION A-A
POND # 5

CROSS SECTION B-B
POND # 5

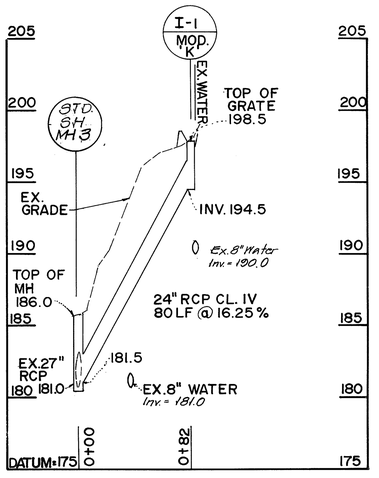


PROFILE EX. 8" WATER
POND # 5

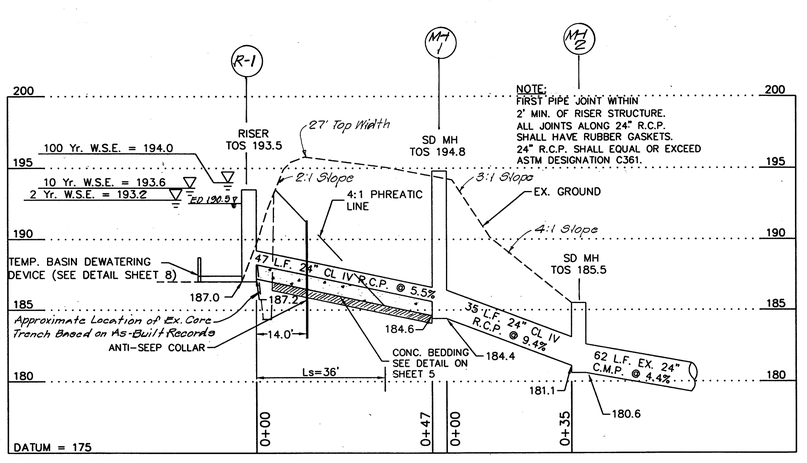


CROSS SECTION A-A
POND # 6

CROSS SECTION B-B
POND # 6



PROFILE PROPOSED DIVERSON
POND # 5
Scale 1"=50' Horiz.
1"=5' Vert.



PROFILE POND #5
SCALE: 1"=20' HORIZ.
1"=5' VERT.

SCALE
ALL CROSS SECTIONS & PROFILES: HORIZ. 1"=50'; VERT. 1"=5' OR AS SHOWN

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DIRECTOR OF PUBLIC WORKS — DATE 8/8/00
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES — DATE 8/2/00
CHIEF, BUREAU OF HIGHWAYS — DATE 8-4-00
CHIEF, STORMWATER MANAGEMENT DIVISION — DATE 8/2/2000

Greenman-Pedersen, Inc.
ENGINEERS/ARCHITECTS/PLANNERS
LAUREL, MARYLAND
GPI # 92130.03

DES: R.S. S.M.C.
DRN: P.S.M. P.A.R.
CHK: P.F.M.
1-31-00
DATE:

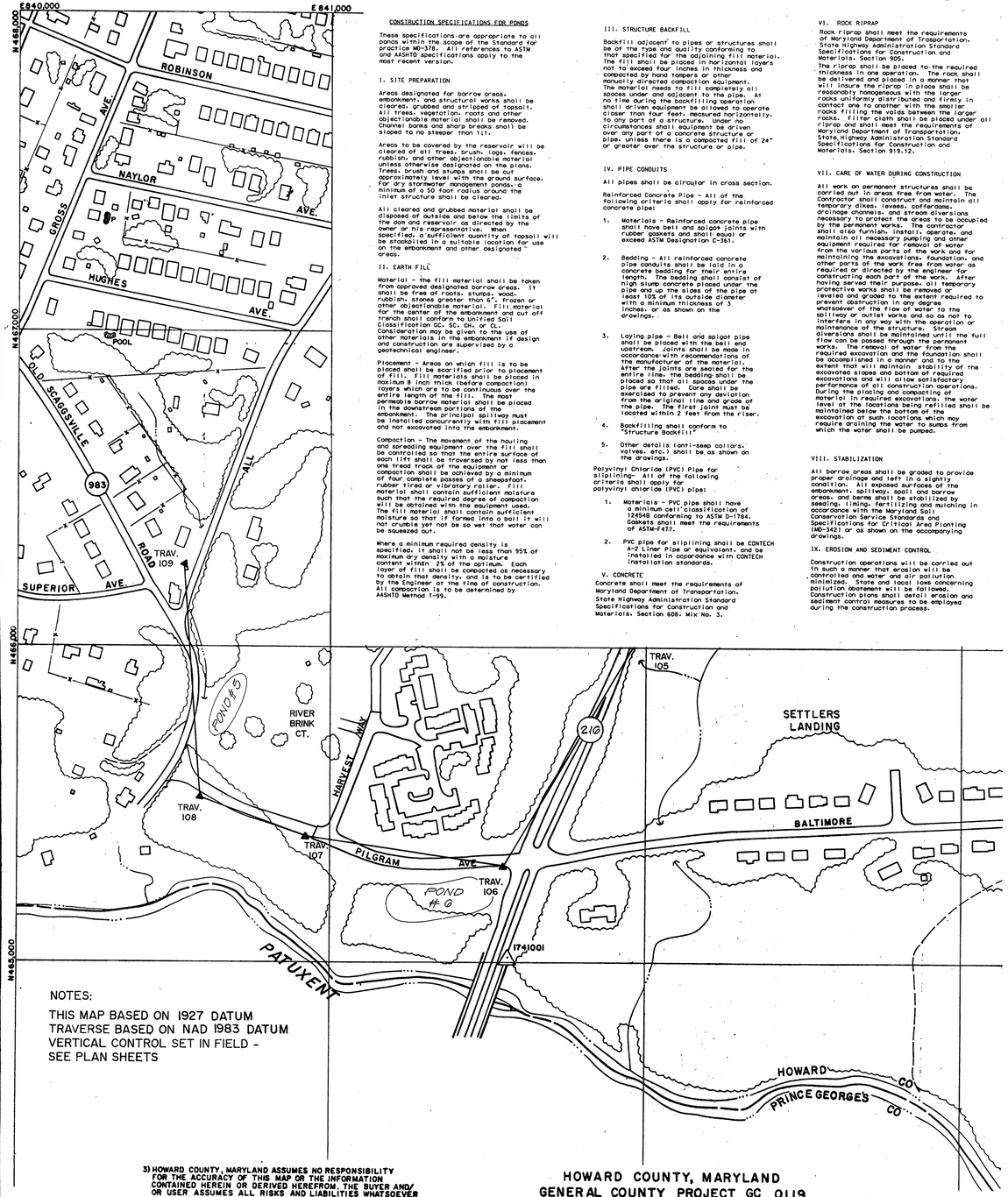
BY	NO	REVISION	DATE

600' SCALE MAP NO. _____ BLOCK NO. _____

SETTLER'S LANDING
STORMWATER MANAGEMENT RETROFIT
CROSS SECTIONS AND PROFILES
CAPITAL PROJECT NO. D-1110

SCALE AS SHOWN

SHEET 4 OF 8



NOTES:

THIS MAP BASED ON 1927 DATUM
TRAVERSE BASED ON NAD 1983 DATUM
VERTICAL CONTROL SET IN FIELD - SEE PLAN SHEETS

3) HOWARD COUNTY, MARYLAND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THIS MAP OR THE INFORMATION CONTAINED HEREIN OR DERIVED HEREFROM. THE BUYER AND/OR USER ASSUMES ALL RISKS AND LIABILITIES WHATSOEVER RESULTING FROM OR ARISING OUT OF THE USE OF THIS MAP. THERE ARE NO ORAL AGREEMENTS OR WARRANTIES RELATING TO THE SALE AND/OR USE OF THIS MAP.

200' 0 200' 400' 600'
SCALE 1"=200'

HOWARD COUNTY, MARYLAND
GENERAL COUNTY PROJECT GC 0119
GEODETIC CONTROL SURVEY AND TOPOGRAPHIC MAPPING

PLANIMETRIC MAP OF HOWARD COUNTY, MARYLAND

SHEET NO. GC-0119-P- 17-41

CONSTRUCTION SPECIFICATIONS FOR PONDS

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.

I. 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.

Areas to be covered by the reservoir will be cleared of all trees, brush, logs, fences, rubbish, and other objectionable material unless otherwise designated on the plans. Trees, brush and stumps shall be cut approximately level with the ground surface. For dry stormwater management ponds, a minimum of a 50 foot radius around the inlet structure shall be cleared.

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

II. 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 material. Fill material for the center of the embankment and cut off trench shall conform to Unified Soil Classification GC, SC, OH, or CL. Consideration may be given to the use of other materials in the embankment if design and construction are supervised by a geotechnical engineer.

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 the equipment or compaction shall be achieved by a minimum of four complete passes of a sheepsfoot, rubber tired or vibratory roller. The 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.

Where a minimum required density is specified, it 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.

III. STRUCTURE BACKFILL

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

IV. PIPE CONDUITS

All pipes shall be circular in cross section.

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

1. Materials - Reinforced concrete pipe shall have bell and spigot joints with rubber gaskets and shall equal or exceed ASTM Designation C-361.
2. Bedding - All reinforced concrete pipe conduits shall be laid in a concrete bedding for their entire length. The bedding shall consist of high slump concrete placed under the pipe and up the sides of the pipe at least 10% of its outside diameter with a minimum thickness of 3 inches, or as shown on the drawings.
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, and shall be exercised to prevent any deviation from the original line and grade of the pipe. The first joint must be located within 2 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.

Polyvinyl Chloride (PVC) Pipe for slipliningAll of the following criteria shall apply for polyvinyl chloride (PVC) pipe:

1. Materials - PVC pipe shall have a minimum cell classification of 12454B conforming to ASTM D-1784. Gaskets shall meet the requirements of ASTM-F477.
2. PVC pipe for slipliningshall be CONTECH A-2 Liner Pipe or equivalent, and be installed in accordance with CONTECH installation standards.

V. CONCRETE

Concrete shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 608, Mix No. 3.

VI. ROCK RIPRAP

Rock riprap shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 905.

The riprap shall be placed to the required thickness in one operation. The rock shall be delivered and placed in a manner that will insure the riprap in place shall be reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks filling the voids between the larger rocks. Filter cloth 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 919.12.

VII. 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 the 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 of 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 to sumps from which the water shall be pumped.

VIII. 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 Maryland Soil Conservation Service Standards and Specifications for Critical Area Planting (MD-342) or as shown on the accompanying drawings.

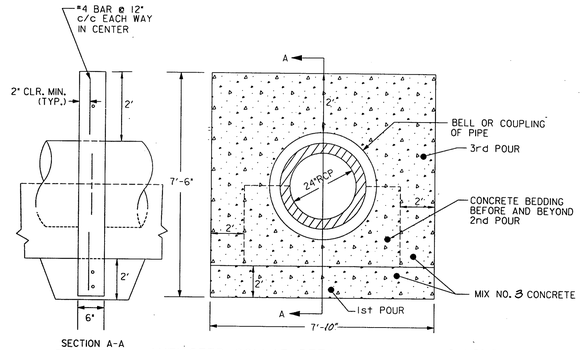
IX. EROSION AND SEDIMENT CONTROL

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 to be employed during the construction process.

HORIZONTAL CONTROL

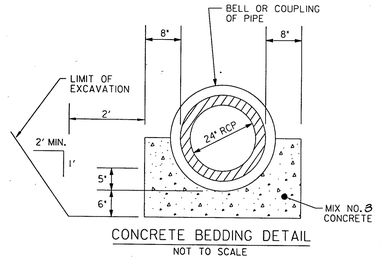
TRAV. PT.	AZIMUTH NORTH	DISTANCE	NORTH COORDINATE	EAST COORDINATE
104	188° 21' 16.373"	1005.0303	527769.6470	1354538.4862
105	209° 47' 13.947"	846.2185	526775.2821	1354392.4571
106	279° 10' 41.373"	624.4021	526040.8691	1353972.0725
107	289° 57' 42.494"	350.6663	526140.4643	1353355.6646
108	355° 57' 10.696"	738.2449	526996.5936	1352973.9644
109				

COORDINATES ARE BASED UPON MARYLAND GRID SYSTEM



SECTION A-A

ANTI-SEEP COLLAR DETAIL
NOT TO SCALE

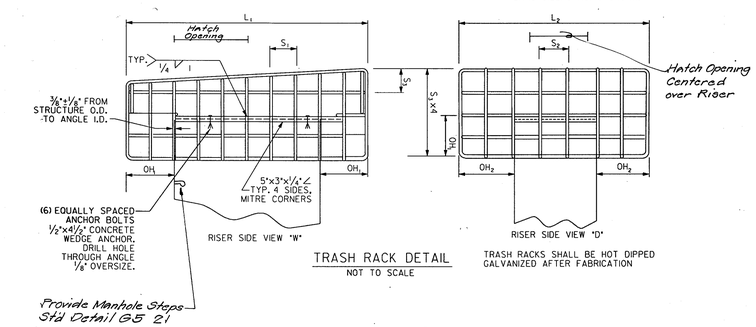


CONCRETE BEDDING DETAIL
NOT TO SCALE

TRASH RACK FOR PONDS #5 AND #6 RISERS

	L_1	L_2	S_1	S_2	S_3	OH_1	OH_2	BAR SIZE	NO. VERT. BARS (L_1)	NO. VERT. BARS (L_2)
RISER #5	7.5'	5.5'	6"	6"	6"	12"	12"	#6	16	12
RISER #6	8.5'	5'	6"	6"	6"	12"	12"	#6	18	11

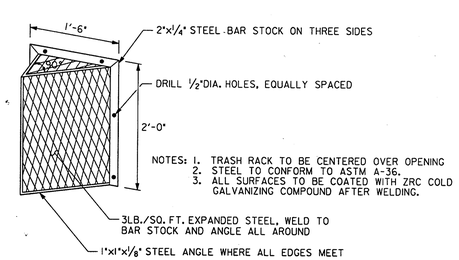
NOTE: NUMBER OF HORIZONTAL BARS SHOWN IS CORRECT FOR BOTH TRASH RACKS. NUMBER OF VERTICAL BARS IS DEPENDENT ON INDIVIDUAL TRASH RACK. TRASH RACK EXTENDS 12" PAST EDGE OF RISER ON EACH SIDE OF RISER. TRASH RACK ALSO EXTENDS 12" BELOW CREST OF RISER ON ALL SIDES. TRASH RACK SHALL EXTEND ACROSS TOP OF RISER WITH BARS SIZE/SPACING SHOWN.



TRASH RACK DETAIL
NOT TO SCALE

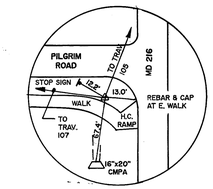
TRASH RACKS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION

NOTE: THE CONTRACTOR SHALL PROVIDE A HINGED, LOCKABLE ACCESS HATCH IN THE TOP OF THE TRASH RACK. TWO HEAVY DUTY GALVANIZED HINGES ARE REQUIRED. THE HATCH SHALL PROVIDE A CLEAR OPENING OF 36"x 36" WITH A PERIMETER STEEL FRAME ON THE HATCH AND THE OPENING.

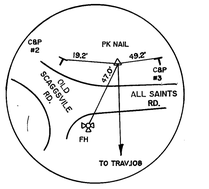


NOTES: 1. TRASH RACK TO BE CENTERED OVER OPENING
2. STEEL TO CONFORM TO ASTM A-36.
3. ALL SURFACES TO BE COATED WITH ZRC COLD GALVANIZING COMPOUND AFTER WELDING.

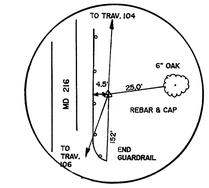
LOW FLOW ORIFICE TRASH RACK DETAIL
NOT TO SCALE



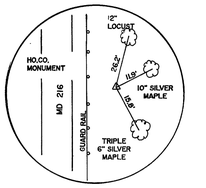
TRAV. 106



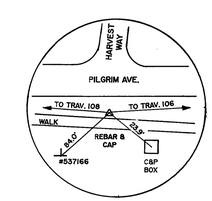
TRAV. 109



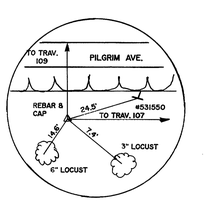
TRAV. 105



TRAV. 104



TRAV. 107



TRAV. 108

TRAVERSE TIES
NOT TO SCALE

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

James M. Irvin 8/2/00
DIRECTOR OF PUBLIC WORKS — DATE

Chief, Bureau of Highways 8-4-00
CHIEF, BUREAU OF HIGHWAYS — DATE

John L. O'Hare 8/2/00
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES — DATE

Howard E. Saltzman 8/2/2000
CHIEF, STORMWATER MANAGEMENT DIVISION — DATE

gpi Greenman-Pedersen, Inc.
ENGINEERS/ARCHITECTS/PLANNERS
LAUREL, MARYLAND
GPI # 92130.03

DES: R.S. S.M.C.
DRN: D.J.B P.A.R
CHK: P.P.M.
1-31-00 DATE:

BY	NO	REVISION	DATE

600' SCALE MAP NO. _____ BLOCK NO. _____

SETTLER'S LANDING
STORMWATER MANAGEMENT RETROFIT
GEOMETRIC LAYOUT AND MISC. DETAILS
CAPITAL PROJECT NO. D-1110

SCALE AS SHOWN

SHEET 5 OF 8

19.0 STANDARDS AND SPECIFICATIONS FOR LAND GRADING

Design Criteria

The grading plan should be based upon the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surroundings to avoid extreme grade modifications. Information submitted must provide sufficient topographic surveys and soil investigations to determine limitations that must be imposed on the grading operation related to slope stability, effect on adjacent properties and drainage patterns, measures for drainage and water removal and vegetative treatment, etc.

Many counties have regulations and design procedures already established for land grading and cut and fill slopes. Where these requirements exist, they shall be followed. The plan must show existing and proposed contours of the area(s) to be graded. The plan shall also include practices for erosion control, slope stabilization, safe disposal of runoff water and drainage, such as waterways, lined ditches, reverse slope benches (include grade and cross section), grade stabilization structures, retaining walls, and surface and subsurface drains. The plan shall also include phasing of these practices. The following shall be incorporated into the plan:

I. Provisions shall be made to safely conduct surface runoff to storm drains, protected outlets or to stable water courses to insure that surface runoff will not damage slopes or other graded

II. Cut and fill slopes that are to be stabilized with grasses shall not be steeper than 2:1. (Where the slope is to be mowed the slope should be no steeper than 3:1; 4:1 is preferred because of safety factors related to mowing steep slopes.) Slopes exceeding 2:1 shall require special design and stabilization considerations that shall be adequately shown on the plans.

III. Reverse benches shall be provided whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slope it shall be increased to 30 feet and for 4:1 to 40 feet. Benches shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designing benches.

A. Benches shall be a minimum of six-feet wide to provide for ease of maintenance.

B. Benches shall be designed with a reverse slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. Bench gradient to the outlet shall be between 2 percent and 3 percent, unless accompanied by appropriate design and computations.

C. The flow length within a bench shall not exceed 800' unless accompanied by appropriate design and computations. For flow channel stabilization see temporary

IV. Surface water shall be diverted from the face of all cut and/or fill slopes by the use of earth dikes, ditches and swales or conveyed downslope by the use of a designed structure, except

A. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.

B. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainageways, graded swales, downspouts, etc.

C. The face of the slope will be protected by special erosion control materials, to include, but not limited to: approved vegetative stabilization practices (see section G), rip-rap or other approved stabilization methods.

V. Cut slopes occurring in ripable rock shall be serrated as shown on the following diagram. These serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. The nominal slope line is 1:1. These steps will weather and act to hold moisture, lime, fertilizer and seed thus producing a much quicker and longer lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carries to a suitable outlet.

VI. Subsurface drainage shall be provided where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.

VII. Slopes shall not be created so close to property lines as to endanger adjoining properties without adequately protecting such properties against sedimentation, erosion, slippage, settlement, subsidence or other related damages.

VIII. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two (2) inches in diameter where compacted by hand or mechanical tampers or over eight (8) inches in diameter where compacted by rollers or other equipment. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.

IX. Stockpiles, borrow areas and spoil shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

X. All disturbed areas shall be stabilized structurally or vegetatively in compliance with 20.0 Standards and Specifications for Vegetative Stabilization.

21.0 STANDARDS 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 specifications. Typically, the depth of topsoil to be salvaged for a given soil type ran 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:

A. 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.

B. Topsoil must be free of plants or plant parts such as bermuda grass, quackgrass, Johnsongrass, nutsedge, poison ivy, thistle, or others as specified.

C. 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 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:

A. On soil meeting Topsoil specifications, obtain test results dictating fertilizer and lime amendments required to bring the soil into compliance with the following:

1. pH for topsoil shall be between 6.0 and 7.5. If the tested soil demonstrates a pH of less than 6.0, sufficient lime shall be prescribed to raise the pH to 6.5 or higher.

2. Organic content of topsoil shall be not less than 1.5 percent by weight.

3. Topsoil having soluble salt content greater than 500 parts per million shall not be used.

4. 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.

B. Place topsoil (if required) and apply soil amendments as specified in 20.0 Vegetative Stabilization – Section I – Vegetative Stabilization Methods and Materials.

V. Topsoil Application

A. 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.

1. Grades on the areas to be topsoiled, which have been previously established, shall be maintained, albeit 4" – 8" higher in elevation.

2. Topsoil shall be uniformly distributed in a 4" – 8" layer and lightly compacted to a minimum thickness of 4". Spreading shall be performed in such a manner that sodding or 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.

3. 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:

A. Composted Sludge Material for use as a soil conditioner for sites having disturbed areas over 5 acres shall be tested to prescribe amendments and for sites having disturbed areas under 5 acres shall conform to the following, requirements:

1. Composted sludge shall be supplied by, or originate from, a person or persons that are permitted (at the time of acquisition of the compost) by the Maryland Department of the Environment under COMAR 26.04.06.

2. Composted sludge shall contain at least 1 percent nitrogen, 1.5 percent phosphorus, and 0.2 percent potassium and have a Ph of 7.0 to 8.0. If compost does not meet these requirements, the appropriate constituents must be added to meet the requirements prior to use.

3. Composted sludge shall be applied at a rate of 1 ton/1,000 square feet.

B. Composted sludge shall be amended with a potassium fertilizer 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.

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/acres dolomitic limestone (92 lbs/1000 sq. ft.) And 600 lbs/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/acre 30-0-0 ureaform fertilizer (9 lbs/1000 sq. ft.)
2. Acceptable – Apply 2 tons/acres dolomitic limestone (92 lbs/1000 sq. ft.)and 1000 lbs/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 – April 30, and August 1 – October 15, seed with 60 lbs/acres (1.4 lbs/1000 sq. ft.) Of Kentucky 31 Tall Fescue per acres and 2 lbs/acre (0.05 lbs/1000 sq. ft.) Of weeping lovegrass. During the period of October 16 – February 28, protect site by:
Option 1 – Two tons per acres of well anchored straw mulch and seed as soon as possible in the spring.
Option 2 – use sod.
Option 3 – seed with 60 lbs/acres Kentucky 30 tall fescue and mulch with 2 tons/acre well anchored straw.

Mulching: Apply 1-1/2 to 2 tons per acre (70 – 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 slope 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 re-disturbed 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, if not previously loosened.

Soil Amendments: Apply 600 lbs/acre 10-10-10 fertilizer (14 lbs/1000 sq. ft.)

Seeding: For periods March 1 – April 30 and from August 15 – October 15, seed with 2-1/2 bushel per acre of annual rye (3.2 lbs/1000 sq. ft.). For the period May 1 – August 14, seed with 3 lbs/acre of weeping lovegrass (0.07 lbs/1000 lbs/sq. ft.). For the period November 16 – February 28, protect site by applying 2 tons/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 – 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 slope 8 feet or higher, use 348 gallons per acre (8 gal/1000 sq. ft.) for anchoring.

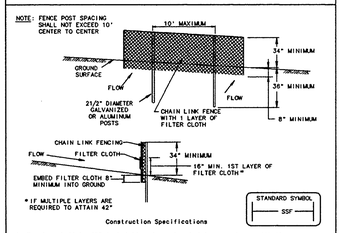
HOWARD SOIL CONSERVATION DISTRICT

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 start of any construction (313-1855).
2. All vegetative and structural practices are to be installed according to the provisions of this plan and are to be in conformance with the 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL and revisions thereto.
3. Following initial soil disturbance or re-disturbance, permanent or temporary stabilization shall be completed within:
   A) 7 calender days for all perimeter sediment control structures, dikes, perimeter slopes and all slopes steeper than 3:1.
   B) 14 calender 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 7 of the HOWARD COUNTY DESIGN MANUAL, Storm drainage.
5. All disturbed areas must be stabilized within the time period specified above in accordance with the 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL for permanent seeding, sod, temporary seeding and mulching (section g). Temporary stabilization with mulch alone shall 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 there removal has been obtained from the Howard County Sediment Control Inspector.
7. Site Analysis: *
   Total Area of Site = 2.0 Acres
   Area Disturbed = 1.16 Acres
   Area to be Roofed or Paved = 0 Acres
   Area to be Vegetatively Stabilized = 1.16 Acres
   Total Cut = 800 Cu. Yds.
   Total Fill = 0 Cu. Yds.
   Offsite waste/borrow area location ——— SPOIL/EXCESS MUST BE DISPOSED OFFSITE TO AN AREA WITH AN ACTIVE AND APPROVED SEDIMENT CONTROL PLAN.

   * QUANTITIES NOT INTENDED FOR BIDDING
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 shall be back-filled and stabilized within one working day, whichever is shorter.

DETAIL 33 – SUPER SILT FENCE



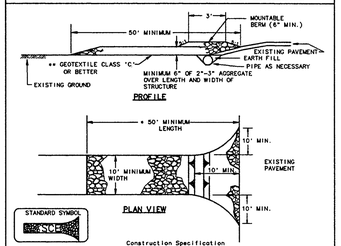
Construction Specifications

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

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal/ft²/minute (max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PAGE M – 88 – 8	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL 24 – STABILIZED CONSTRUCTION ENTRANCE

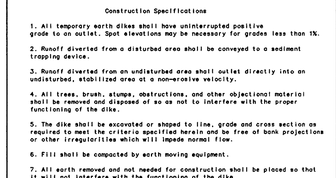


Construction Specification

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

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PAGE F – 17 – 3	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL 1 – EARTH DIKE



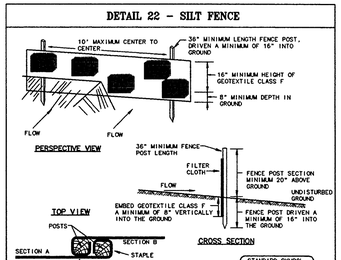
1. Seed and cover with straw mulch.
2. Seed and cover with Erosion Control Matting or line with sod.
3. 4" – 7" stone or recycled concrete equivalent pressed into the soil 7" minimum

Construction Specifications

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

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PAGE A – 1 – 6	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL 22 – SILT FENCE



Construction Specifications

1. Fence posts shall be a minimum of 36" long driven 16" minimum into the ground. Wood posts shall be 11/2" x 11/2" square (minimum) cut, or 13/4" diameter (minimum) round and shall be of sound quality hardwood. Steel posts will be standard T or U section weighting not less than 1.00 pond per linear foot.
2. Geotextile shall be fastened securely to each fence post with wire ties or staples at top and mid-section and shall meet the following requirements for Geotextile Class F:

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal ft²/ minute (max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322

3. Where ends of geotextile fabric come together, they shall be overlapped, folded and stapled to prevent sediment bypass.
4. Silt fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reached 50% of the fabric height.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PAGE M – 55 – 8	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

Permanent Seed Mix Table For Turf Establishment

Botanical Name	Common Name	Percent of Seed Mix	Purity Percent Min.	Weedseed Percent Max.	Germanation Percent Min.
Poa Trivialis L.	Rough Stalk Bluegrass	10	90	1	80
Agrostis Albo L.	Red Top	30	90	1	80
Lolium Species	Annual Ryegrass	30	90	1	80
Panicum Virgatum L.	Switch Grass	30	90	1	80

Note: * Application rate shall be 20 lbs/Acre.
* Seed mix percentages are based upon weight.
* This seed mix will supersede any other permanent seed mixture listed in the Contract Documents unless otherwise allowed by the engineer.
* Seeds shall be mixed offsite and delivered throughly mixed.
* This mix is to be used for temporary seeding when directed by the engineer.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DIRECTOR OF PUBLIC WORKS — DATE 8/8/00
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES — DATE 8/2/00
CHIEF, BUREAU OF HIGHWAYS — DATE 8-4-00
CHIEF, STORMWATER MANAGEMENT DIVISION — DATE 8/2/2000

GPI
GREENMAN-PEDERSEN INC.
ENGINEERS/ARCHITECTS/PLANNERS
14502 GREENVIEW DRIVE, SUITE 100
LAUREL, MD. 20708
WASH. (301) 470-2772 BALT. (410) 880-3055
GPI No. 92130.03

STATE OF MARYLAND — DANIEL JOSEPH MALETIC No. 13758 — REGISTERED PROFESSIONAL ENGINEER

DES: R.S.
DRN: W.R.F.
CHK: P.P.M.
DATE: 1-31-00

BY	NO	REVISION	DATE

SEDIMENT & EROSION CONTROL DETAILS & NOTES

600' SCALE MAP NO. _____ BLOCK NO. _____

SETTLER'S LANDING
STORMWATER MANAGEMENT RETROFIT

SCALE AS SHOWN

SHEET 6 OF 8

HILLIS – CARNES
E. .INEERING ASSOCIATES, INC.

Page 1 of 1

RECORD OF SOIL EXPLORATION

Project Name Settler's Landing (Pond 5) — Boring # B-2
Location Laurel, Maryland — Job # 95127K

SAMPLER

Datum — Hammer Wt. 140 Lbs. — Hole Diameter 8" — Foreman W. Massey
Surf. Elev. — Hammer Drop 30 Inches — Rock Core Dia. — Inspector
Date Started 11-16-95 — Pipe Size 2.0 Inches OD — Boring Method HSA — Date Completed 11-16-95

ELEV.	SOIL DESCRIPTION Color,Moisture,Density,Size,Proportion	STRA. DEPTH	DEPTH SCALE	CON	SAMPLE BLOWS 6"	NO.	REC.	BORING & SAMPLING NOTES
	SURFACE		0.0					
Poss. Fill	Brown to brown and red, damp, stiff to very stiff, silt with some mica, trace of fine to coarse gravel and roots and clay layers			I	2-5-7-8	1	19"	2" Topsoil No groundwater encountered while drilling
				I	4-4-5-7	2	16"	Bag sample from 0.0' to 14.0'
			5	I	2-5-14-12	3	16"	Caved at 6.0'
				I	7-9-11-14	4	22"	Backfilled at completion
			10	I	5-10-9-11	5	23"	
		14.0		I	4-7-8-11	7	22"	
	Brown, damp, very dense micaceous silty fine to coarse sand		15	I	6-16-31-45	8	21"	
		16.0						
	Bottom of Hole at 16.0'							
			20					

SAMPLER TYPE: DRIVEN SPLIT SPOON UNLESS OTHERWISE NOTED. T-PRESSED SHELBY TUBE A-CONTINUOUS FLIGHT AUGER C-ROCK CORE
SAMPLE CONDITIONS: D-DISINTEGRATED I-INTACT U-UNDISTURBED L-LOST
GROUND WATER DEPTH: AT COMPLETION Dry FT. AFTER ____ FT. AFTER ____ FT.
BORING METHOD: HSA-HOLLOW STEM AUGERS CFA-CONT. FLIGHT AUGERS DC-DRIVING CASING MD-MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30":COUNT MADE AT 6" INTERVALS

HILLIS – CARNES
E. .INEERING ASSOCIATES, INC.

Page 1 of 1

RECORD OF SOIL EXPLORATION

Project Name Settler's Landing (Pond 5) — Boring # B-3
Location Laurel, Maryland — Job # 95127K

SAMPLER

Datum — Hammer Wt. 140 Lbs. — Hole Diameter 8" — Foreman W. Massey
Surf. Elev. — Hammer Drop 30 Inches — Rock Core Dia. — Inspector
Date Started 11-16-95 — Pipe Size 2.0 Inches OD — Boring Method HSA — Date Completed 11-16-95

ELEV.	SOIL DESCRIPTION Color,Moisture,Density,Size,Proportion	STRA. DEPTH	DEPTH SCALE	CON	SAMPLE BLOWS 6"	NO.	REC.	BORING & SAMPLING NOTES
	SURFACE		0.0					
	Brown and yellow, damp, very stiff to medium stiff, micaceous sandy silt with some clay layers and trace of fine to medium gravel			I	2-5-5-8	1	20"	2" Topsoil No groundwater encountered while drilling
				I	6-10-11-17	2	24"	
			5	I	7-10-11-16	3	21"	Caved at 7.5'
				I	7-7-9-12	4	24"	Backfilled at completion
				I	5-8-11-16	5	23"	
			10	I	6-9-12-13	6	20"	
		14.0		I	3-6-9-11	7	19"	
	Brown, damp, very dense micaceous silty fine to coarse sand		15	I	5-18-30-44	8	22"	
		16.0						
	Bottom of Hole at 16.0'							
			20					

SAMPLER TYPE: DRIVEN SPLIT SPOON UNLESS OTHERWISE NOTED. PT-PRESSED SHELBY TUBE CA-CONTINUOUS FLIGHT AUGER RC-ROCK CORE
SAMPLE CONDITIONS: D-DISINTEGRATED I-INTACT U-UNDISTURBED L-LOST
GROUND WATER DEPTH: AT COMPLETION ____ FT. AFTER ____ FT. AFTER ____ FT.
BORING METHOD: HSA-HOLLOW STEM AUGERS CFA-CONT. FLIGHT AUGERS DC-DRIVING CASING MD-MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30":COUNT MADE AT 6" INTERVALS

HILLIS – CARNES
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RECORD OF SOIL EXPLORATION

Project Name Settler's Landing (Pond 5) — Boring # B-4
Location Laurel, Maryland — Job # 95127K

SAMPLER

Datum — Hammer Wt. 140 Lbs. — Hole Diameter 8" — Foreman W. Massey
Surf. Elev. — Hammer Drop 30 Inches — Rock Core Dia. — Inspector
Date Started 11-16-95 — Pipe Size 2.0 Inches OD — Boring Method HSA — Date Completed 11-16-95

ELEV.	SOIL DESCRIPTION Color,Moisture,Density,Size,Proportion	STRA. DEPTH	DEPTH SCALE	CON	SAMPLE BLOWS 6"	NO.	REC.	BORING & SAMPLING NOTES
	SURFACE		0.0					
Poss. Fill	Brown and tan, damp, very soft, micaceous sandy silt with little clay and fine gravel with trace of root			I	1-1-2-2	1	20"	2" Topsoil No groundwater encountered while drilling
				I	3-7-8-8	2	21"	Bag samples from 6.0' to 12.0'
			5	I	4-7-9-11	3	24"	Caved at 8.0'
		6.0						Backfilled at completion
Poss. Fill	Green and brown to green, brown and red damp, medium dense to very dense micaceous silty sand with some wood and roots			D	5-8-16-19	4	16"	
				D	5-8-11-8	5	18"	
			10					
		12.0		D	6-22-36-51/5"	6	22"	
	Green, brown and red, damp very dense micaceous silty fine to medium sand	13.0		D	7-51/6"	7	12"	
	Bottom of Hole at 13.0'							
			15					
			20					

SAMPLER TYPE: DRIVEN SPLIT SPOON UNLESS OTHERWISE NOTED. PT-PRESSED SHELBY TUBE CA-CONTINUOUS FLIGHT AUGER RC-ROCK CORE
SAMPLE CONDITIONS: D-DISINTEGRATED I-INTACT U-UNDISTURBED L-LOST
GROUND WATER DEPTH: AT COMPLETION Dry FT. AFTER ____ FT. AFTER ____ FT.
BORING METHOD: HSA-HOLLOW STEM AUGERS CFA-CONT. FLIGHT AUGERS DC-DRIVING CASING MD-MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30":COUNT MADE AT 6" INTERVALS

HILLIS – CARNES
E .NEERING ASSOCIATES, INC.

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RECORD OF SOIL EXPLORATION

Project Name Settler's Landing (Pond 6) — Boring # B-1
Location Laurel, Maryland — Job # 95127K

SAMPLER

Datum — Hammer Wt. 140 Lbs. — Hole Diameter 8" — Foreman W. Massey
Surf. Elev. — Hammer Drop 30 Inches — Rock Core Dia. — Inspector
Date Started 11-16-95 — Pipe Size 2.0 Inches OD — Boring Method HSA — Date Completed 11-16-95

ELEV.	SOIL DESCRIPTION Color,Moisture,Density,Size,Proportion	STRA. DEPTH	DEPTH SCALE	CON	SAMPLE BLOWS 6"	NO.	REC.	BORING & SAMPLING NOTES
	SURFACE		0.0					
Poss. Fill	Brown and red, damp, medium stiff to hard, clay with some mica and fine to coarse gravel			I	2-3-4-8	1	19"	1" Topsoil No groundwater encountered while drilling
				I	5-5-10-20	2	18"	Bag samples from 0.1' to 7.0' 7.0' to 8.0'
			5	I	34-51/5"	3	6"	Caved at 5.5'
		7.0		D	45-51/6"	4	6"	Backfilled at completion
	Brown, damp, very dense fine to coarse sand and fine to coarse gravel							
		10.0	10	D	14-27-46-51/5"	5	19"	
	Bottom of Hole at 10.0'							
			15					
			20					

SAMPLER TYPE: DRIVEN SPLIT SPOON UNLESS OTHERWISE NOTED. T-PRESSED SHELBY TUBE A-CONTINUOUS FLIGHT AUGER C-ROCK CORE
SAMPLE CONDITIONS: D-DISINTEGRATED I-INTACT U-UNDISTURBED L-LOST
GROUND WATER DEPTH: AT COMPLETION Dry FT. AFTER ____ FT. AFTER ____ FT.
BORING METHOD: HSA-HOLLOW STEM AUGERS CFA-CONT. FLIGHT AUGERS DC-DRIVING CASING MD-MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30":COUNT MADE AT 6" INTERVALS

HILLIS – CARNES
EI .INEERING ASSOCIATES, INC.

Page 1 of 1

RECORD OF SOIL EXPLORATION

Project Name Settler's Landing (Pond 6) — Boring # B-2
Location Laurel, Maryland — Job # 95127K

SAMPLER

Datum — Hammer Wt. 140 Lbs. — Hole Diameter 8" — Foreman W. Massey
Surf. Elev. — Hammer Drop 30 Inches — Rock Core Dia. — Inspector
Date Started 11-16-95 — Pipe Size 2.0 Inches OD — Boring Method HSA — Date Completed 11-16-95

ELEV.	SOIL DESCRIPTION Color,Moisture,Density,Size,Proportion	STRA. DEPTH	DEPTH SCALE	CON	SAMPLE BLOWS 6"	NO.	REC.	BORING & SAMPLING NOTES
	SURFACE		0.0					
Poss. Fill	Brown and red, damp, soft to medium stiff, silty clay with some mica and trace of fine to medium gravel and roots			I	2-2-3-3	1	20"	1" Topsoil No groundwater encountered while drilling
		4.0		I	3-3-4-4	2	16"	Bag samples from 0.0' to 4.0' 4.0' to 10.0'
	Brown, damp, medium stiff to stiff to soft micaceous silt with some roots and fine to medium gravel		5	I	3-3-3-7	3	21"	Caved at 8.0'
				I	4-7-7-6	4	20"	Backfilled at completion
		10.0	10	I	1-1-1-1	5	8"	
	Brown and green, damp, very stiff to hard micaceous silt and weathered rock with some rock fragments			I	4-8-8-10	6	3"	
		12.4		D	51/4"	7	2"	
	Bottom of Hole at 12.4' Auger Refusal at 12.4'		15					
			20					

SAMPLER TYPE: DRIVEN SPLIT SPOON UNLESS OTHERWISE NOTED. T-PRESSED SHELBY TUBE A-CONTINUOUS FLIGHT AUGER C-ROCK CORE
SAMPLE CONDITIONS: D-DISINTEGRATED I-INTACT U-UNDISTURBED L-LOST
GROUND WATER DEPTH: AT COMPLETION Dry FT. AFTER ____ FT. AFTER ____ FT.
BORING METHOD: HSA-HOLLOW STEM AUGERS CFA-CONT. FLIGHT AUGERS DC-DRIVING CASING MD-MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30":COUNT MADE AT 6" INTERVALS

HILLIS – CARNES
E. .NEERING ASSOCIATES, INC.

Page 1 of 1

RECORD OF SOIL EXPLORATION

Project Name Settler's Landing (Pond 6) — Boring # B-3
Location Laurel, Maryland — Job # 95127K

SAMPLER

Datum — Hammer Wt. 140 Lbs. — Hole Diameter 8" — Foreman W. Massey
Surf. Elev. — Hammer Drop 30 Inches — Rock Core Dia. — Inspector
Date Started 11-16-95 — Pipe Size 2.0 Inches OD — Boring Method HSA — Date Completed 11-16-95

ELEV.	SOIL DESCRIPTION Color,Moisture,Density,Size,Proportion	STRA. DEPTH	DEPTH SCALE	CON	SAMPLE BLOWS 6"	NO.	REC.	BORING & SAMPLING NOTES
	SURFACE		0.0					
Poss. Fill	Brown, damp, medium stiff micaceous silty clay with some roots			I	2-2-4-4	1	20"	1" Topsoil No groundwater encountered while drilling
		4.0		I	2-4-6-5	2	19"	
	Brown, damp, very dense micaceous silty fine to coarse sand and fine to coarse gravel		5	D	4-42-26-30	3	16"	Caved at 4.0'
		8.0		D	30-22-46-51/4"	4	22"	Backfilled at completion
	Brown and green, damp, hard micaceous silt Refusal at 8.8'	8.8		I	23-51/3"	5	9"	
			10					
			15					
			20					

SAMPLER TYPE: DRIVEN SPLIT SPOON UNLESS OTHERWISE NOTED. PT-PRESSED SHELBY TUBE CA-CONTINUOUS FLIGHT AUGER RC-ROCK CORE
SAMPLE CONDITIONS: D-DISINTEGRATED I-INTACT U-UNDISTURBED L-LOST
GROUND WATER DEPTH: AT COMPLETION Dry FT. AFTER ____ FT. AFTER ____ FT.
BORING METHOD: HSA-HOLLOW STEM AUGERS CFA-CONT. FLIGHT AUGERS DC-DRIVING CASING MD-MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30":COUNT MADE AT 6" INTERVALS

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

James M. Irvin 8/4/00
DIRECTOR OF PUBLIC WORKS — DATE

Chief, Bureau of Environmental Services 5/2/00
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES — DATE

Richard M. Rinaldi 8-4-00
CHIEF, BUREAU OF HIGHWAYS — DATE

Howard E. Sattyan 8/2/2000
CHIEF, STORMWATER MANAGEMENT DIVISION — DATE

GREENMAN–PEDERSEN INC.
GPI
ENGINEERS/ARCHITECTS/PLANNERS
14502 GREENVIEW DRIVE, SUITE 100
LAUREL, MD. 20708
WASH. (301) 470-2772 BALT. (410) 880-3055
GPI No. 92130.03

STATE OF MARYLAND
DANIEL JOSEPH MALETIC
No. 13068
REGISTERED PROFESSIONAL ENGINEER

DES: R.S.
DRN: W.R.F.
CHK: P.P.M.
DATE: 10-9-99

BY	NO	REVISION	DATE

SOIL BORING PROFILES

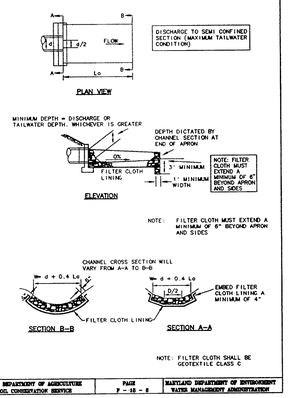
600' SCALE MAP NO. _____ BLOCK NO. _____

SETTLER'S LANDING
STORMWATER MANAGEMENT RETROFIT

SCALE AS SHOWN

SHEET 7 OF 8

DETAIL 25 - ROCK OUTLET PROTECTION I



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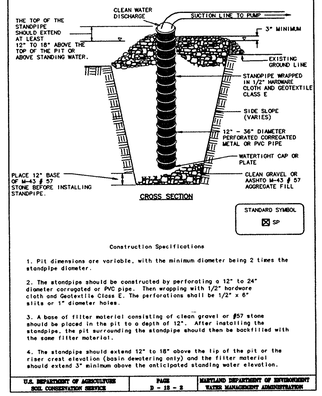
DETAIL 20B - SUMP PIT



Construction Specifications

1. Pit dimensions are variable, with the minimum diameter being 2 times the standpipe diameter.

2. The standpipe should be constructed by perforating a 12" to 24" diameter corrugated or PVC pipe. Then wrapping with 1/2" hardware cloth and Geotextile Class E. The perforations shall be 1/3" x 6" slits or 1" diameter holes.

3. A base of filter material consisting of clean gravel or #57 stone should be placed in the pit to a depth of 12". After installing the standpipe, the pit surrounding the standpipe should then be backfilled with the same filter material.

4. The standpipe should extend 12" to 18" above the lip of the pit or the riser crest elevation (basin dewatering only) and the filter material should extend 3" minimum above the anticipated standing water elevation.

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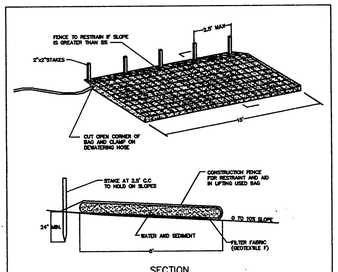
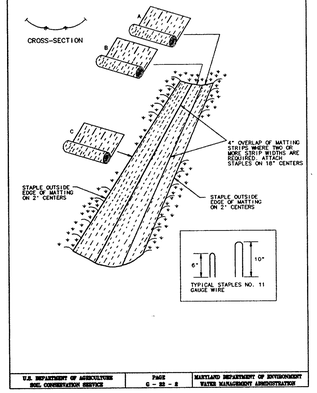


NOTES:
1. FILTER BAG SHALL BE PLACED ON A SLOPING OR LEVEL, WELL GRADED VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM DEVICE AND ANY WORK AREAS.
2. WIDTH AND LENGTH SHALL BE AS SHOWN.
3. THE FILTER BAG MUST BE STAKED IN PLACE AND SECURE TO THE PUMP DISCHARGE LINE.
4. FILTER BAG SHALL NOT BE USED FOR DISCHARGE FLOWS GREATER THAN 300 GPM.
5. DEVICE SHALL BE REMOVED AND DISPOSED OF AFTER BAG IS FILLED WITH SEDIMENT. SEDIMENT FROM BAG SHALL BE SPREAD IN AN UPLAND AREA.
6. FILTER FABRIC SHALL MEET THE FOLLOWING REQUIREMENTS FOR GEOTEXTILE CLASS 'F'.

TENSILE STRENGTH	50 lbs./in. (min)	TEST: MSMT 509
TENSILE MODULUS	20 lbs./in. (min.)	TEST: MSMT 509
FLOW RATE	0.3 gal./ft2/minute (max)	TEST: MSMT 322
FILTERING EFFICIENCY	75% (min.)	TEST: MSMT 322

WATER RESOURCES ADMINISTRATION	FILTER BAG TEMPORARY EROSION CONTROL MEASURE	Approved On 1/6/00 Chief, Waterway Permits	WPD FB

EROSION CONTROL MATTING



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EROSION CONTROL MATTING

Construction Specifications

1. Key-in the matting by placing the top ends of the matting in a narrow trench, 6" in depth. Backfill the trench and tamp firmly to conform to the channel cross-section. Secure with a row of staples about 4" down slope from the trench. Spacing between staples is 6".

2. Staple the 4" overlap in the channel center using an 18" spacing between staples.

3. Before stapling the outer edges of the matting, make sure the matting is smooth and in firm contact with the soil.

4. Staples shall be placed 2' apart with 4 rows for each strip, 2 outer rows, and 2 alternating rows down the center.

5. Where one roll of matting ends and another begins, the end of the top strip shall overlap the upper end of the lower strip by 4", shingle fashion. Reinforce the overlap with a double row of staples spaced 6" apart in a staggered pattern on either side.

6. The downslope end of the matting liner should be similarly secured with 2 double rows of staples.

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

EROSION CONTROL MATTING AND STAPLES SHALL MEET THE REQUIREMENTS OF SECTION 6102.09, EROSION CONTROL MATTING, OF THE MARYLAND DEPARTMENT OF TRANSPORTATION, STATE HIGHWAY ADMINISTRATION, STANDARD SPECIFICATIONS FOR CONSTRUCTION MATERIALS, OCTOBER 1993.

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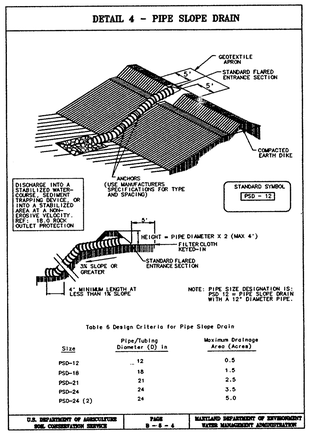
DETAIL 4 - PIPE SLOPE DRAIN



NOTE: PIPE SIZE DESIGNATION IS: PSD 12 = PIPE SLOPE DRAIN WITH A 12" DIAMETER PIPE.

Table 6 Design Criteria for Pipe Slope Drain

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

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ROCK OUTLET PROTECTION

Construction Specifications

1. The subgrade for the filter, rip-rap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.

2. The rock or gravel shall conform to the specified grading limits when installed respectively in the rip-rap or filter.

3. Geotextile shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of geotextile over the damaged part or by completely replacing the geotextile. All overlaps whether for repairs or for joining two pieces of geotextile shall be a minimum of one foot.

4. Stone for the rip-rap or gabion outlets may be placed by equipment. They shall be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The stone for rip-rap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogeneous with the smaller stones and spalls filling the voids between the larger stones. Rip-rap shall be placed in a manner to prevent damage to the filter blanket or geotextile. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

5. The stone shall be placed so that it blends in with the existing ground. If the stone is placed too high then the flow will be forced out of the channel and scour adjacent to the stone will occur.

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OPTIONAL SEDIMENT BASIN DEWATERING DEVICE I WITH 6" PERFORATED RISER

OPTIONAL SEDIMENT BASIN DEWATERING DEVICE II

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE COLLEGE PARK, MARYLAND	OPTIONAL SEDIMENT BASIN DEWATERING DEVICES	STANDARD DRAWING SB

PIPE SLOPE DRAIN

Construction Specifications - Pipe Slope Drain

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

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

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

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

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

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

7. All pipe connections shall be watertight.

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

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

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

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

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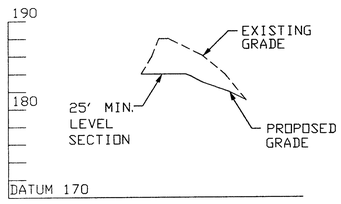
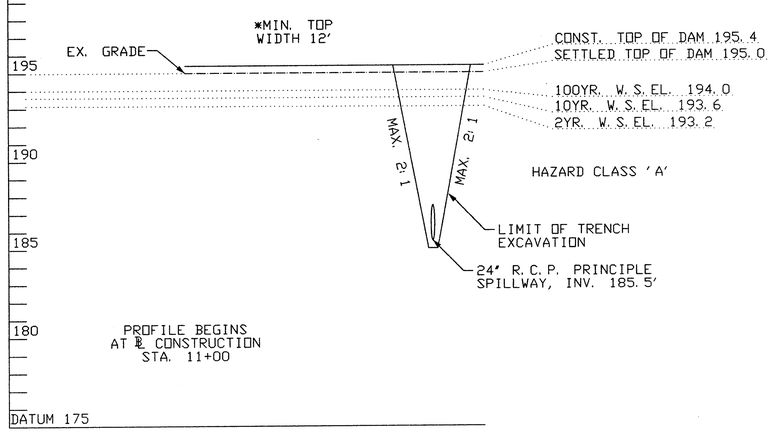


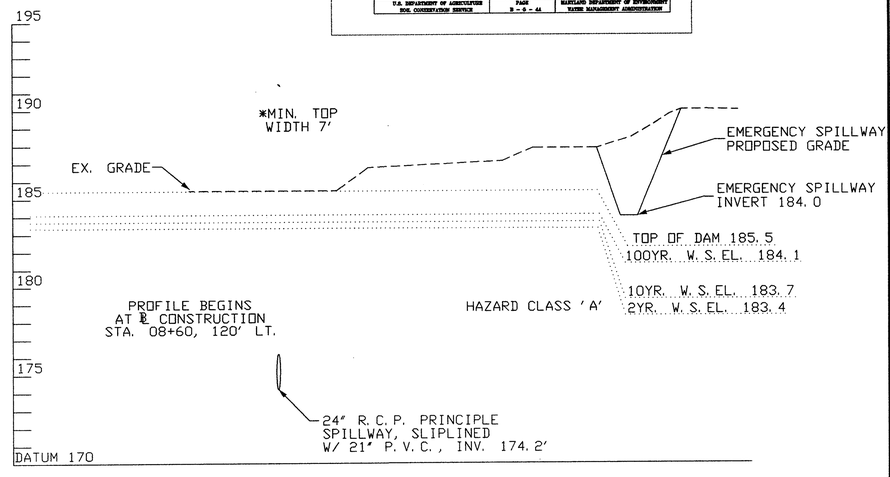
POND 6 EMERGENCY SPILLWAY PROFILE

SCALE: VERT. 1" = 8'
HOR. 1" = 40'



POND 5 - PROFILE ALONG CENTERLINE OF DAM

SCALE: VERT. 1" = 4'
HOR. 1" = 40'



POND 6 - PROFILE ALONG CENTERLINE OF DAM

SCALE: VERT. 1" = 4'
HOR. 1" = 40'

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

DIRECTOR OF PUBLIC WORKS — DATE 8/2/00
CHIEF, BUREAU OF HIGHWAYS — DATE 8-4-00
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES — DATE 8/2/00
CHIEF, STORMWATER MANAGEMENT DIVISION — DATE 8/2/00

GPI
GREENMAN-PEDERSEN INC.
ENGINEERS/ARCHITECTS/PLANNERS
14502 GREENVIEW DRIVE, SUITE 100
LAUREL, MD. 20708
WASH. (301) 470-2772 BALT. (410) 880-3055
GPI No. 92130.03

STATE OF MARYLAND — DANIEL JOSEPH MALETIC — No. 13759 — REGISTERED PROFESSIONAL ENGINEER

DES: R.S.
DRN: S.M.C.
CHK: P.P.M.
DATE: 1-31-00

BY	NO	REVISION	DATE

PROFILES AND DETAILS

600' SCALE MAP NO. _____ BLOCK NO. _____

SETTLER'S LANDING

STORMWATER MANAGEMENT RETROFIT

SCALE AS SHOWN

SHEET 8 OF 8