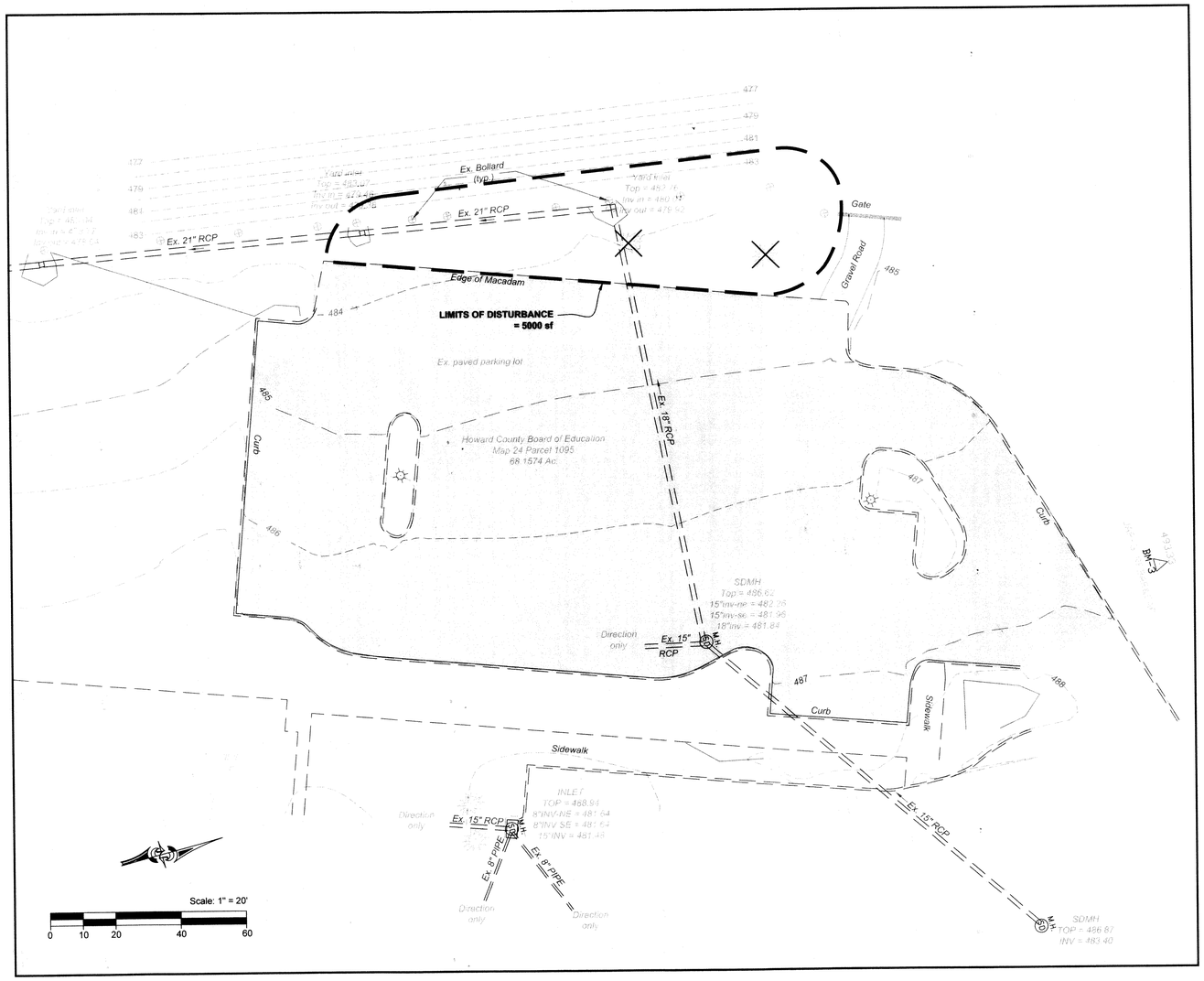
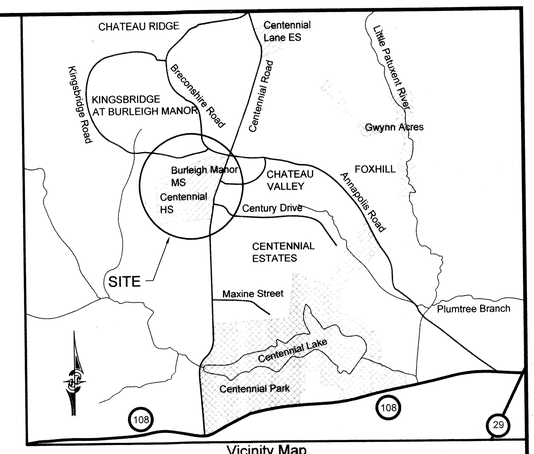
BURLEIGH MANOR MIDDLE SCHOOL
Bioretention Design



LEGEND

- Limits of Disturbance
- 426 Existing Contours
- Ex. Curb
- Light pole
- Existing Bollard

SHEET INDEX



Vicinity Map
Scale: 1" = 4000'
Howard County, MD
20th Edition Map 11 F12

Sequence of Construction

1. Obtain County grading permits. Conduct pre-construction meeting. (1 day)
2. Clear and grub in preparation to install silt fence, pedestrian fence and inlet protection. (1day).
3. Install sediment control items (1 day).
4. Install de-watering sump pit and de-water basin area if permanent pool saturated soils exist (1 day).
5. Install sand underdrain system and drainage/planting media as shown on plans (2 days).
6. Install plantings (with assistance from Middle School students) and permanent seeding (1 day).
7. With sediment control inspector's permission remove remaining sediment control devices and stabilize areas disturbed by this process. (1 day).

Total = 8 days

General Notes

1. These plans were prepared with the field information at the time of project survey. It is possible that field conditions as of the the date of construction vary from these plans and it is the contractor's responsibility to verify field conditions such as elevations, depths, etc. prior to proceeding with work. It is the contractor's responsibility to verfiy with the supplier / manufacturer of any proprietary product that their product will function per the design for the field conditions at time of construction. The design engineer should be notified immediately if any deviations from the design plan are found.
2. All specified and/or proprietary products shown hereon may be subject to substitution with other products recommended by the contractor, subject to written review and approval by the design engineer.
3. All construction shall be in accordance with the latest standards and specifications of Howard County.
4. The contractor shall notify the Department of Public Works / Bureau of Engineering / Construction Inspection Division at (410) 313-4900 at least five (5) working days prior to the start of work.
5. The contractor shall notify "Miss Utility" at 1-800-257-7777 at least 48 hours prior to any excavation work.
6. The coordinates shown hereon are based upon the Howard County Geodetic control which is based upon the Maryland State Plane Coordinate System.
7. The contractor shall field visit and familiarize themselves with the site prior to bidding and construction.
8. 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 and Erosion and Sediment Control* and any revisions thereto.
9. The appropriate federal/state and local permits must be obtained before work commences.
10. Source of existing topography is J.A. Rice Inc. field survey dated March 2006. Horizontal and Vertical Datum is based on Howard County Monuments 0023, 24GB, and 24GD.
11. Contractor shall not store any material and/ or equipment within 2 feet of private property.
12. Contractor shall take caution not to damage any existing trees, except those designated on the plan to be removed. Any damaged tree shall be replaced at contractor's expense.
13. The Board of Education will remove trees flush with the ground and contractor will remove roots as part of his work.
14. Contractor to install erosion control matting, top soil, seeding and grading so as not to affect positive drainage from parking area.
15. All quantities are estimates only. The contractor is responsible for verifying quantities through a field visit and his own quantity takeoffs.

Summary of Environmental Impacts

	Tree Removal (each)	Stream Disturbance (lf)	Wetland Disturbance (sq.ft)	Limits of Disturbance (sq.ft)	Limits of Disturbance (ac)	Cut (cy)	Fill (cy)	Net (cy)
Total	2	0	0	5,000	0.11	171	6	165

STATE OF MARYLAND — JOHN CLINTON [illegible] — No. 21237 — REGISTERED PROFESSIONAL ENGINEER

MISS Utility

Call "Miss Utility" at 1-800-257-7777, 48 hours prior to the start of work. The excavator must notify all public utility companies with underground facilities in the area of proposed excavation and have those facilities located by the utility companies prior to commencing excavation.

HOWARD COUNTY DPW - ENVIRONMENTAL SERVICES
6751 COLUMBIA GATEWAY DRIVE, SUITE 514
COLUMBIA, MD 21046
PHONE: (410) 313-6413
ATTN: MARK RICHMOND

HOWARD COUNTY, MD
BOARD OF EDUCATION
PARCEL 132 AND 280
ELECTION DISTRICT 15
MAP 29

BURLEIGH MANOR MIDDLE SCHOOL
BIORETENTION DESIGN

Title Sheet and Existing Conditions

DATE: 07/06			
DESIGNED: CW/HT			
DRAFTED: HT			
CHECKED: TCS			
BASE DATA: J.A. RICE	NO.	REVISIONS	BY DATE

CPJ Associates
CPJ Environmental Services Division
STREAM RESTORATION • STORMWATER MANAGEMENT • INSPECTION
910 CLOPPER ROAD, STE 215N GAITHERSBURG MARYLAND 20878
Phone:(301)208-9573 E-mail: envsvc@cpja.com Fax:(301)926-4551
SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE AS SHOWN
SHEET 1 OF 7 SHEETS
JOB NO. 36-506

Jul 13, 2006 - 1:33pm - User: rfielding
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Xrefs: 24x36-Title.dwg
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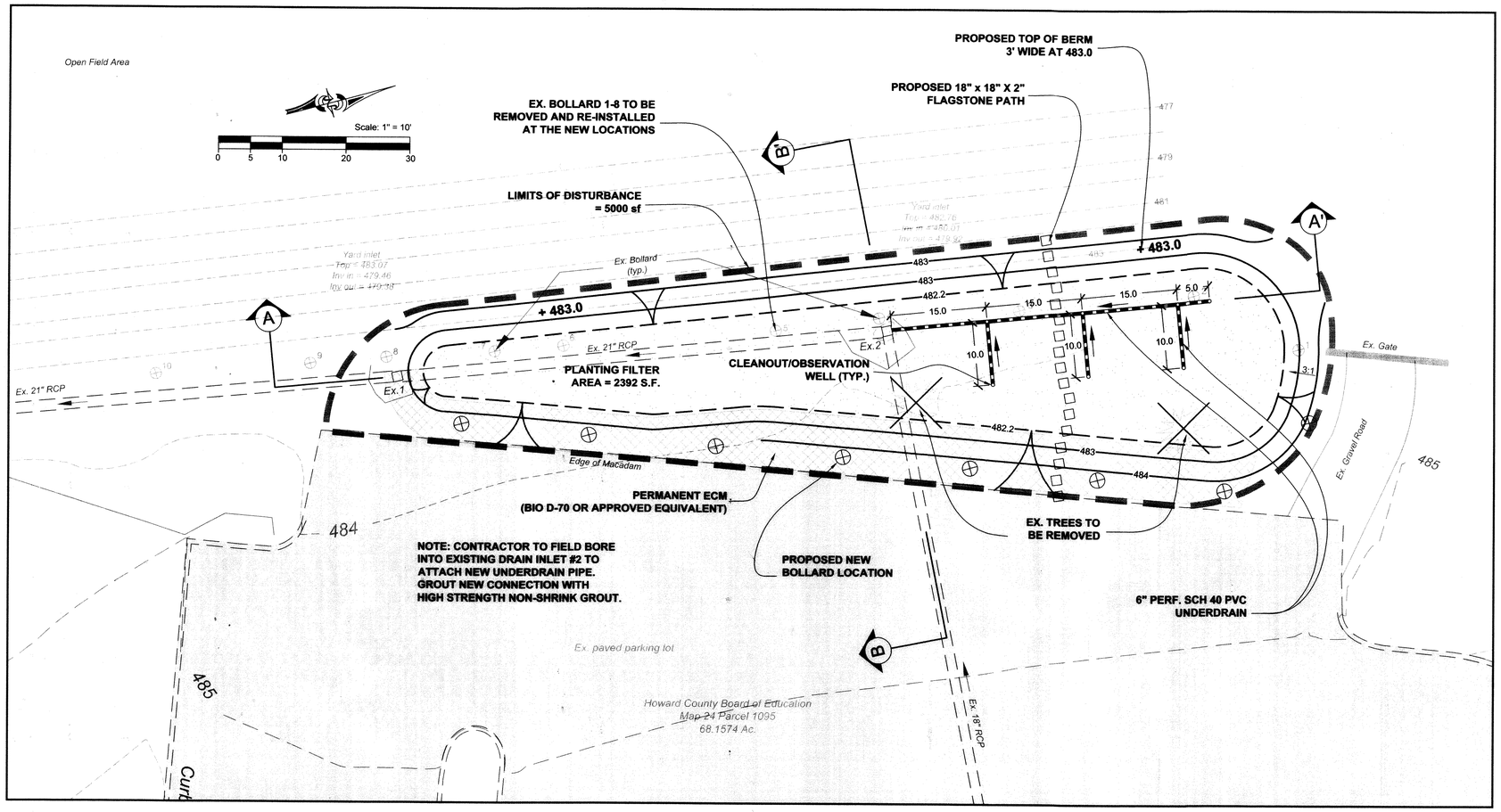

Legend

- Limits of Disturbance
- Existing Contours
- Proposed Contours
- Existing Bollard
- ECM
- Profile
- Ex. Tree to be removed

HOWARD COUNTY DPW - ENVIRONMENTAL SERVICES
6751 COLUMBIA GATEWAY DRIVE, SUITE 514
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PHONE: (410) 313-6413
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HOWARD COUNTY, MD
BOARD OF EDUCATION
PARCEL 132 AND 280
ELECTION DISTRICT 15
MAP 29

BURLEIGH MANOR MIDDLE SCHOOL BIORETENTION DESIGN

Design View

DATE:	07/06
DESIGNED:	CW/HT
DRAFTED:	HT
CHECKED:	TCS
BASE DATA:	J.A. RICE

NO.	REVISIONS	BY	DATE

CPJ Associates
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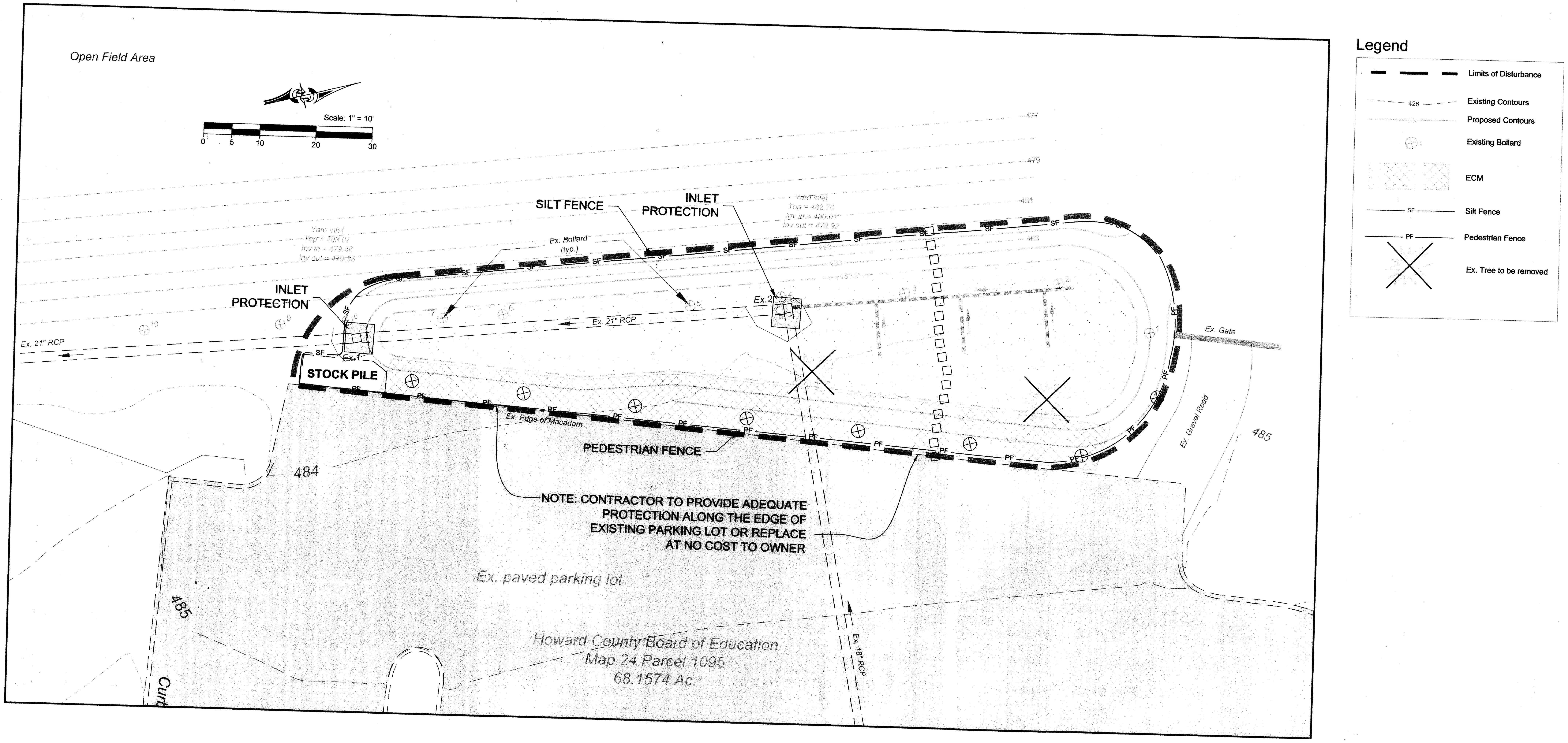
SCALE AS SHOWN
SHEET 2 OF 7 SHEETS
JOB NO. 36-506



HOWARD COUNTY DPW - ENVIRONMENTAL SERVICES 6751 COLUMBIA GATEWAY DRIVE, SUITE 514 COLUMBIA, MD 21046 PHONE: (410) 313-6413 ATTN: MARK RICHMOND	HOWARD COUNTY, MD BOARD OF EDUCATION PARCEL 132 AND 280 ELECTION DISTRICT 15 MAP 29	*BURLEIGH MANOR MIDDLE SCHOOL BIORETENTION DESIGN* **Sediment Control Plan**	DATE: 07/06 DESIGNED: CW/HT DRAFTED: HT CHECKED: TCS BASE DATA: J.A. RICE

NO.	REVISIONS	BY	DATE

CPJ Associates
CPJ Environmental Services Division
STREAM RESTORATION • STORMWATER MANAGEMENT • INSPECTION
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Phone:(301)208-9575 E-mail: env@cpja.com Fax:(301)926-4551
SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE AS SHOWN
SHEET 3 OF 7 SHEETS
JOB NO. 36-506

GENERAL BIORETENTION INSTALLATION NOTES

1. Contractor to strictly follow the approved design and construction specifications. Any substitutions are to be pre-approved by the inspector and design engineer in writing prior to placement of materials.
2. The bioretention facility may not be constructed until all contributing drainage areas to each facility are stabilized. Construction of the facility shall not proceed without prior authorization of the inspector.
3. No "rock dust" can be used for sand.
4. Unless otherwise noted, all poured in place concrete shall be 3500 psi at 28 days.
5. Contact "Miss Utility" at 1-800-257-7777 at least 48 hours prior to the start of construction.

UNDERDRAIN INSTALLATION SPECIFICATIONS

1. Pipe shall be 6" diameter perforated SDR 35 PVC with 3/8" diameter holes, or approved equivalent.
2. Perforations are to be 3/8-inch diameter, located 90 degrees on center, every four inches on center along the underdrain pipe. More rows may be used, if desired.
3. Pipe shall be surrounded by a bed of 3/4" diameter clean gravel.
4. Under drains to be placed on a 3'-0" wide section of filter cloth (Mirafi 140 N, or approved equivalent). Pipe is placed next, followed by the gravel bedding.
5. The ends of under drain pipes not terminating in an observation well shall be capped.

BIORETENTION AREA SOIL SPECIFICATIONS

1. Soil Texture and Structure

Topsoil for bioretention shall have a sandy loam, loamy sand, or loam texture per USDA textural triangle. Maximum clay content is 5 %; soil mixture shall be 50-60% sand; 20-30% leaf mulch; and 20-30% topsoil. The soil shall be a uniform mix, free of stones, stumps, roots, or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the bioretention that may be harmsful to plant growth, or prove a hindrance to th e planting or maintenance operations. The planting soil shall be free of Bermuda Grass, Quackgrass, Johnson Grass, Mugwort, Nutsedge, Poison Ivy, Canadian Thistle, Tearthumb, or other noxious weeds.

2. Soil Testing:

Planting soil for bioretention areas must be tested prior to installation for pH and organic matter. The soil should meet the following criteria (Landscape Contractors Association, 1986).

pH Range: 5.5-6.5
Organic Matter: 1.5-3.0%

It is required that a sieve analysis, pH, and organic matter test be performed per each bioretention area.

3. Soil Placement:
Placement of the planting soil in the bioretention area should be in lifts of 12 to 18 inches and lightly compacted. Minimal compaction effort can be applied to the soil by tamping with a bucket from a dozer or backhoe. Refer also to Section 6 - Compaction.

4. Mulch Specifications:
Individual planting shall be mulched (refer to landscaping details, this sheet). Acceptable mulch shall be shredded hardwood only. Mulch must be well aged, uniform in color, and free of foreign material including plant material. Well aged mulch is defined as mulch that has been stockpiled or stored for at least twelve (12) months.

5. Sand Specifications:
Provide clean sand, free of deleterious materials. Sand shall meet AASHTP M-6 or ASTM C-33 with grain size of 0.02"-0.04".

6. Compaction:
It is very important to minimize compaction of both the base of the bioretention area and the required backfill. When possible, use excavation hoes to remove original soil. If bioretention areas is excavated using a loader, the contractor should use wide track or marsh track equipment, or light equipment with turf type tires.

Use of equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high pressure tires will cause excessive compaction resulting in reduced infiltration rates and storage volumes and is not acceptable. Compaction will significantly contribute to design failure. Compaction can be alleviated at the base of the bioretention facility by using a primary tilling operation such as a chisel plow, ripper, or subsoiler. These tilling operations are to refracture the soil profile through the 12 inch compaction zone. Substitute methods must be approved by the engineer. Rotoillers typically do not till deep enough to reduce the effects of compaction from heavy equipment.

When back filling the bioretention facility, place soil in lifts 12" or greater. Do not use heavy equipment within the bioretention basin. Heavy equipment can be used around the perimeter of the basin to supply soils and sand. Grade bioretention materials with light equipment such as a compact loader or a dozer/loader with marsh tracks.

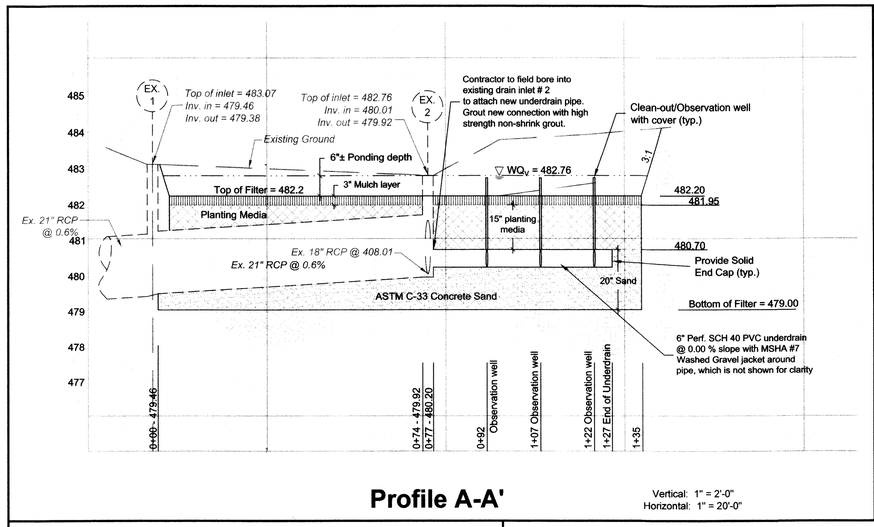
7. Geotextile Specifications:
Geotextile fabric shall meet ASTM D-751 (puncture strength - 125 lb)
ASTM D-1117 (Mullen burst strength - 400 PSI)
ASTM D-1682 (Tensile strength - 300 lb)
Fabric shall have 0.08" thick E.O.S. of #80 sieve, and maintain 125 GPM per sq. ft. flow rate.

8. Gravel Filter Specifications:
Underdrain gravel blanket shall be double washed, #57 stone, 1-½" in size. Pea Gravel shall be washed, river-run, round diameter, ¼"-½" in size.

9. Inspection Requirements:
_The contractor shall arrange a "preconstruction meeting" with the owner and architect/engineer prior to beginning work on the bioretention facility.
_At the completion of excavation to inspect subgrade preparation.
_During underdrain and filter installation
_Back fill of soil into the bioretention areas. Soil certifications for back fill are required.
_The final topsoil layers should be thoroughly wetted achieve settlement of the soil/sand backfill mix.
_Additional soil backfill should be placed as required to achieve the design top surface elevations.
_The work shall be inspected by the owner/architect prior to final stabilization and planting.
_Sediment & erosion control practices may be removed upon approval by the County inspector.

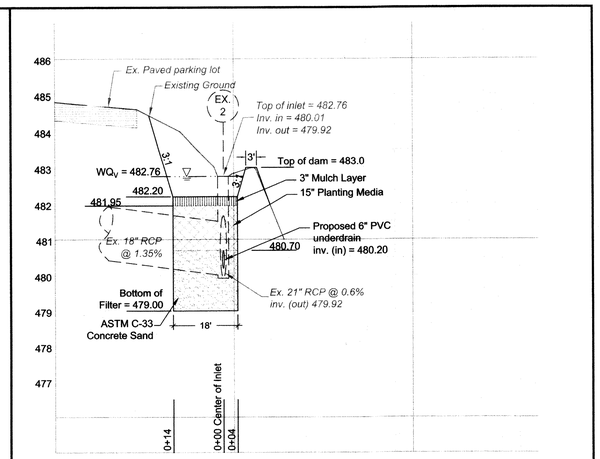
GENERAL PLANTING SPECIFICATIONS

The plant root ball should be planted so 1/8th of the ball is above final grade surface.
1. Fertilization: The topsoil specifications provide enough organic material to adequately supply nutrients from natural cycling. The primary function of the bioretention structure is to improve water quality. Adding fertilizers defeats, or at a minimum, impedes this goal. Only add fertilizer if wood chips or mulch is used to amend the soil. Rototill urea fertilizer at a rate of 2 pounds per 1000 square feet.
2. Grass Seeding (slopes adjacent to bioretention area): Seed areas according to the following schedule: Panicum virgatum (Switchgrass) 0.25 lb. per 1000 sq. ft. Poa trivialis (Rough-stalked bluegrass) 1.00 lb. per 1000 sq. ft. Festuca ovina var. duriuscula (Hard fescue) 1.00 lb. per 1000 sq. ft.



Profile A-A'

Vertical: 1" = 2'-0"
Horizontal: 1" = 20'-0"



Profile B-B'

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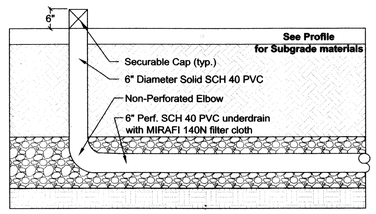
Horizontal: 1" = 20'-0"



Clean Out/Observation Well

N. T. S.

PIPE SCHEDULE

Location	Material	Length	Specification
Wells	Solid 6" PVC	12'	Schedule 40
Underdrain	Perforated 6" PVC	80'	Schedule 40

STATE OF MARYLAND
TIMOTHY CLINTON SCHAFER
No. 21037
REGISTERED
PROFESSIONAL ENGINEER

HOWARD COUNTY DPW -
ENVIRONMENTAL SERVICES
6751 COLUMBIA GATEWAY DRIVE, SUITE 514
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ATTN: MARK RICHMOND

HOWARD COUNTY, MD
BOARD OF EDUCATION
PARCEL 132 AND 280
ELECTION DISTRICT 15
MAP 29

BURLEIGH MANOR MIDDLE SCHOOL BIORETENTION DESIGN

PROFILES

DATE: 07/06
DESIGNED: CW/HT
DRAFTED: HT
CHECKED: TCS
BASE DATA: J.A. RICE

NO.	REVISIONS	BY	DATE

CPJ Associates
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SCALE AS SHOWN
SHEET 4 OF 7 SHEETS
JOB NO. 36-506

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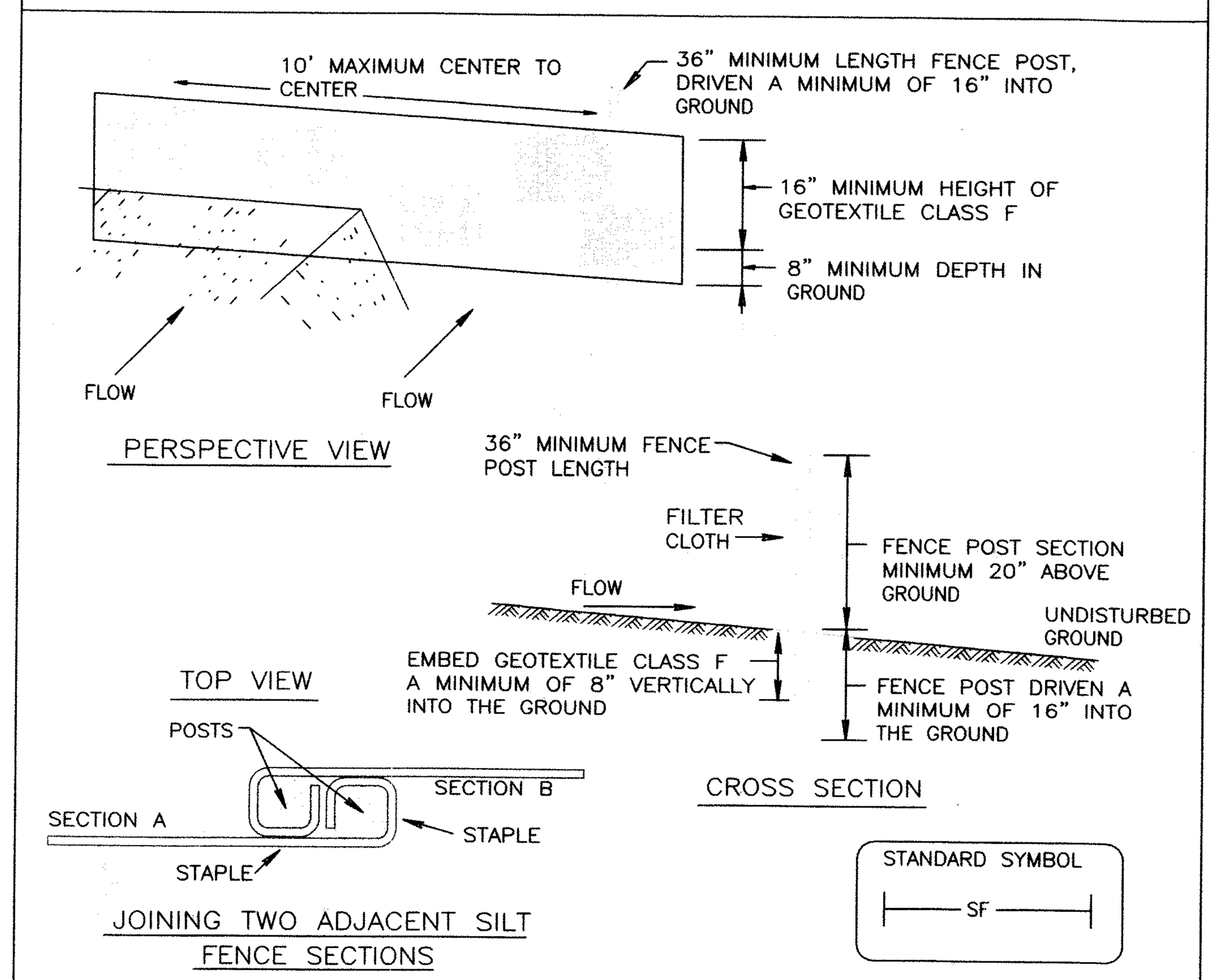
Profiles.dwg
Observation well.dwg

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.

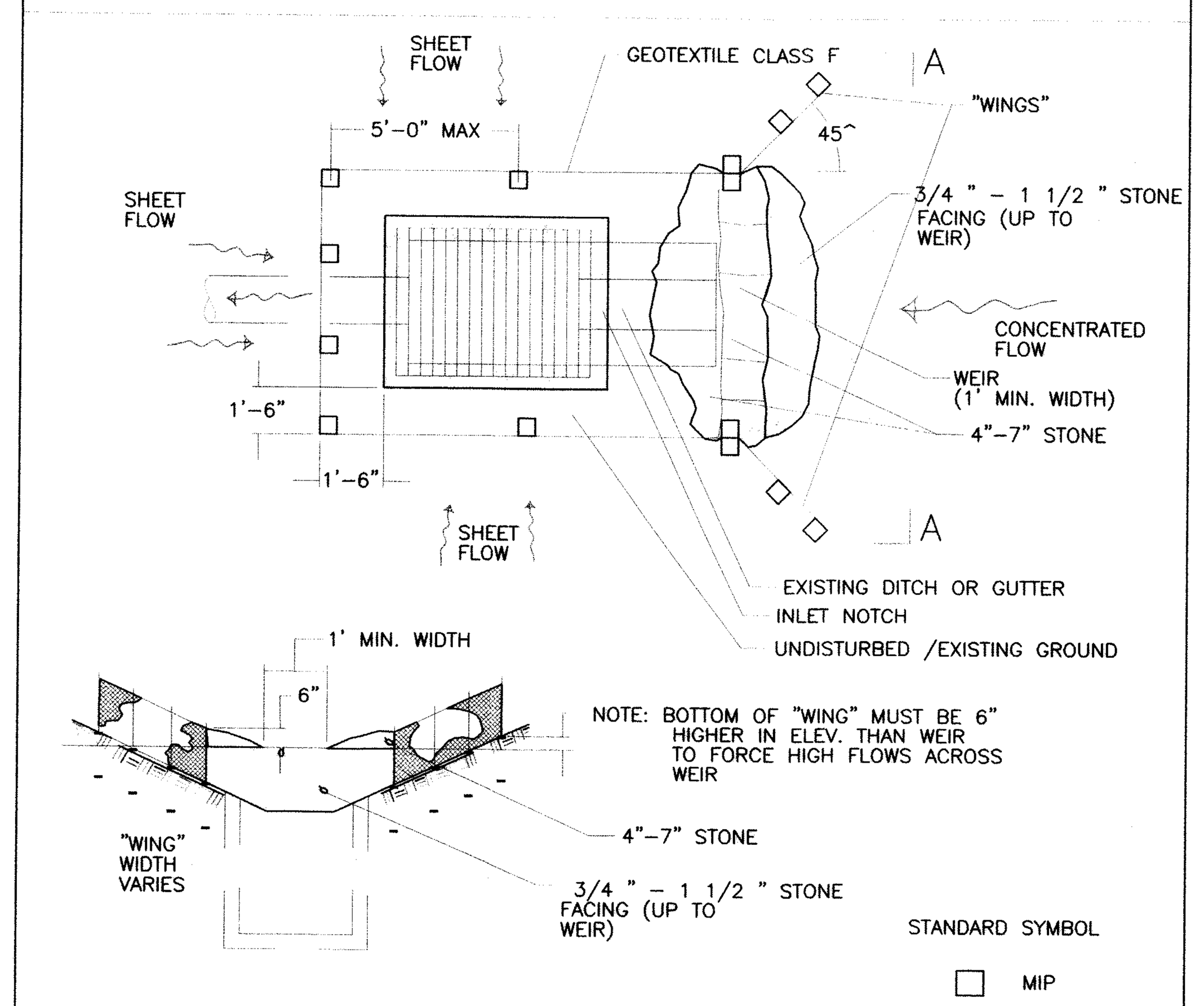
4. Silt Fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reached 50% of the fabric height.

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

(1) **SILT FENCE**

Not to scale

DETAIL 23D – MEDIAN INLET PROTECTION



Construction Specifications

1. Fence posts shall be 36" (min.) long, driven 16" into the ground and spaced 5' (max.) apart. Wood posts shall be 1 1/2 " x 1 1/2 " (min.) square cut or 1 3/4 " (min.) diameter round and shall be of sound quality hardwood. Steel posts shall be standard T or U section weighing not less than 1.0 #/linear foot.

2. Geotextile Class F shall be fastened securely to each post with wire ties or staples at top and mid–section.

3. Where ends of geotextile fabric come together they shall be overlapped, folded and stapled.

4. Median Inlet Protection shall be inspected after each rain and maintained when bulges occur in the fabric or when the stone gets clogged.

5. Stone used to construct the weir shall be 4" – 7" with a 1' thick layer of 3/4 " – 1 1/2 " stone on the upstream face.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PAGE E – 16 – 5C	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

(2) **MEDIAN INLET PROTECTION**

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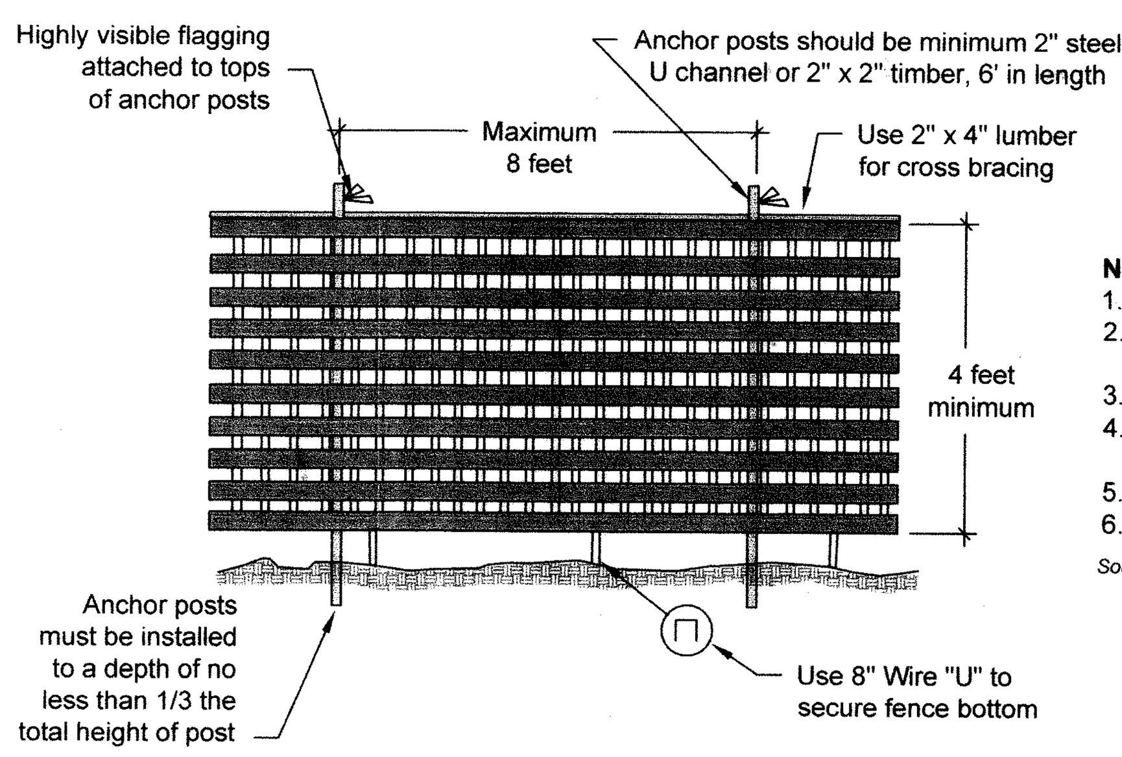

Notes:
1. Blaze orange or blue plastic mesh fence for forest protection device only.
2. Boundaries of Retention Area will be established as part of the conservation plan review process.
3. Boundaries of Retention Area should be staked and flagged prior to installing device.
4. Avoid damage to critical root zone. Do not damage or sever large roots when installing posts.
5. Protection signs are required.
6. Device should be maintained throughout construction.

Source: Adapted from Prince George's County Maryland; Woodland Conservation Manual and Forest Conservation Manual, 1991.

(3) **PEDESTRIAN FENCE**

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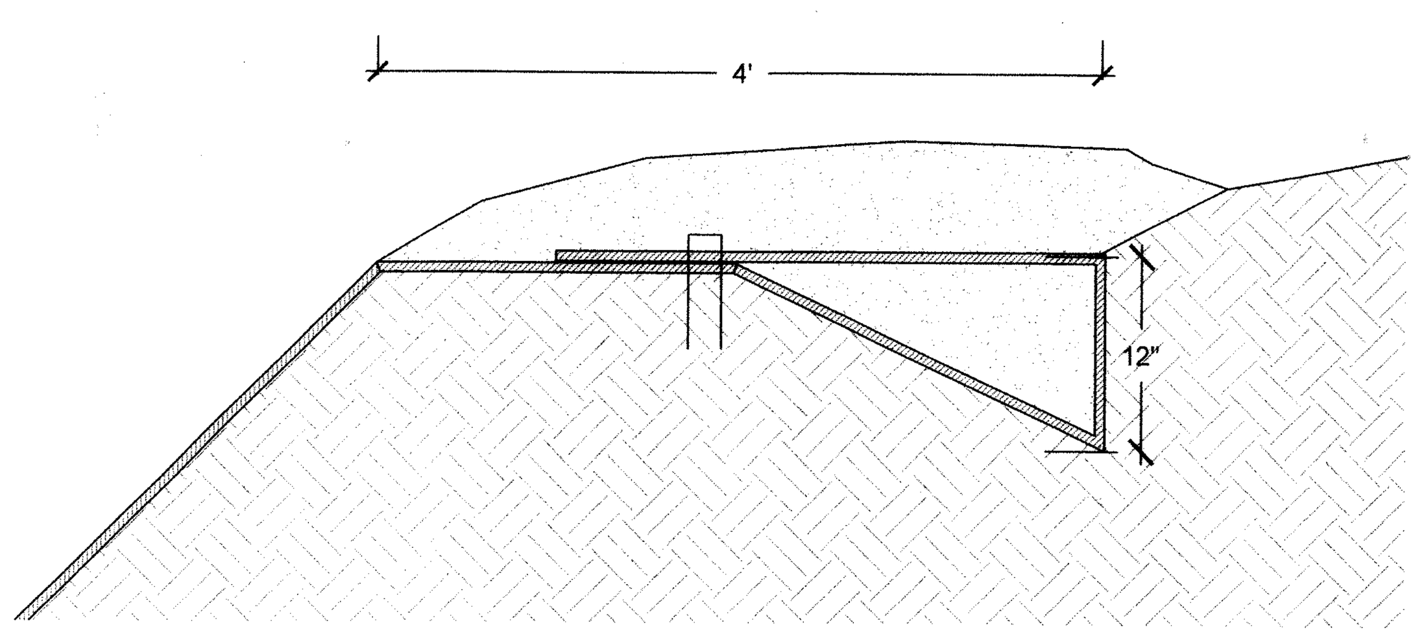


Notes: 1. Begin at the top of the slope and anchor fiber matting in a 12" deep initial anchor trench. Backfill trench and tamp earth firmly.
2. Unroll fiber matting downslope in the direction of water flow.
3. Overlap edges of adjacent parallel rolls 6" and anchor at 12" centers.
4. When fiber mat must be spliced, place end over end (shingle style) with 12" overlap and anchor using two staggered rows of staples at 6" centers.
5. Lay fiber mat loosely and anchor sufficiently to maintain direct contact with the soil - Do Not Stretch.
6. For slopes 2:1 and steeper use a minimum of 3 staples per square yard and for slopes flatter than 2:1 use a minimum of 2 staples per square yard.
7. Anchor, fill, and compact end of fiber matting in 12"x6" terminal anchor trench (mirror image of initial trench).

(4) **(ECM) FIBER MATTING KEY-IN**

Not to scale

Sediment Control Notes

1. A minimum of 48 hours notice must be given to the Howard County Department of Inspections and Permits prior to the start of any construction (410-313-1855).

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 Maryland Standards and Specifications for Soil and Erosion Control, 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 other disturbed or graded areas on the project site.

4. All sediment traps/ basins shown must be fenced and warning signs posted around the 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 and Erosion Control for permanent seedings (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:	**68.15 acres**
Area disturbed:	**0.11 acres**
Area that is roofed or paved:	**0.0 acres**
Area to be vegetatively stabilized:	**0.11 acres**
Drainage area:	**1.1 acres**
Total cut:	**171.0 cu. Yds.**
Total fill:	**6.0 cu. Yds.**

8. Any sediment control practice which is disturbed by grading activity for placement of utilities must be repaired on the same day of disturbance.

9. Additional sediment controls must be provided if deemed necessary by the Howard County Sediment Control Inspector.

10. On all sites with disturbed areas in excess of 2 acres, approval of the inspection agency shall be requested upon completion of installation of perimeter erosion and sediment controls, but before proceeding with any other earth disturbance or grading. Other building or grading inspection approvals may not be authorized until this initial approval by the inspection agency is made.

11. Trenches for the construction of utilities is limited to three pipe lengths or that which can be backfilled and stabilized within one working day, whichever is shorter.

12. Site grading will begin only after all perimeter sediment control measures have been installed and are in a functioning condition.

13. Sediment will be removed from traps when its depth reaches clean out elevation shown on plans.

14. Cut and fill quantities provided under site analysis do not represent bid quantities. These quantities do not distinguish between topsoil, structural fill or embankment material, nor do they reflect consideration of undercutting or removal of unsuitable material. The contractor shall familiarize himself/herself with site conditions which may affect the work.

Standard and Specifications For Topsoil

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

Purpose: To provide a suitable soil medium for vegetation growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable soil gradation.

Condition 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 mot 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 Standard and Specifications, areas having slopes steeper that 2:1 require special consideration and design for adequate stabilization. Areas having slopes steeper that 2:1 shall have the appropriate stabilization shown on the plans.

Construction and Material Specification

I. Topsoil salvaged from the existing site may be used provided that it meets the standard as set forth in these specifications. Typically, the depth of topsoil to be salvaged for a given soil type can be found in the representative soil profile section in the soil survey published be USDA-SCS in cooperation with Maryland Agricultural Experimentation 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, and 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" in diameter.

ii. Topsoil must be free of plants or plant parts such as Bermuda grass, quackgrass, Johnson grass, nutsedge, poison ivy, thistle, or other as specified.

iii. Where 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 operation as described in the following procedures.

III. For site having disturbed areas under 5 acres:
i. Place topsoil (if required) and apply soil amendments as specified in 20.0 vegetation Stabilization - b Section I - Vegetation Stabilization Method and Materials.

IV. For site having disturbed areas over 5 acres:
i. On soil meeting Topsoil Specifications, obtain test results dictating fertilizer and lime amendments required to bring the soil into compliance with the following:
a. pH for topsoil shall be between 6.0 and 7.5. If the tested soil demonstrates a pH less than 6.0, sufficient lime shall be prescribed 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 steri□lants or chemicals used for weed control until sufficient time has elapsed (14days min.) to permit dissipation of phyto-toxic materials.

* Note: Topsoil substitutes to amendments, as recommended by a qualified agronomist or soil scientist and approved by the appropriated approval authority may be used in lieu of natural topsoil.

V. Topsoil application

i. When topsoiling, maintain needed erosion and sediment control practices such as diversions, grade Stabilization Structures, Earth Dikes, Slope Silt Fence and sediment Traps and Basins.

ii. Grade on the areas to be topsoiled, which have been previously established, shall be maintained, albeit 4"-8" higher in elevation.

iii. Topsoil shall be uniformly distributed in a 4" - 8" layer and lightly compacted to a minimum thickness of 4". Spreading shall be performed in such a manner that sodding or 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 applies as specified below:

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

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

b. Composted sludge shall contain at least 1 percent nitrogen, 1.5 percent phosphorus, and 0.2 percent potassium and have a pH of 7.0 to 8.0.

If composted does not meet these requirements, the appropriated constituents must be added to meet the requirement prior to use.

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

d. 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.

** Reference: Guideline Specifications, Soil Preparation and Sodding. MD - VA, Pub. #1, Cooperative Extension Service, University of Maryland and Virginia Polytechnic Institutes. Revised 1973.*

Bioretention Maintenance Schedule

Soil

1. Visually inspect and repair erosion monthly. Use erosion control mat to stabilize erosion along drainage paths.
2. Check the pH once or twice a year. Apply an alkaline product, such as limestone, if needed.

Mulch (Around Trees)

1. Re-mulch any void areas by hand as needed.
2. Every 6 months, in the spring and fall, add a fresh mulch layer.
3. Once every 2 to 3 years, in the spring, remove old mulch layer before applying new one.

Plants

1. Immediately after the completion of cell construction, water plant material for 14 consecutive days unless there is sufficient natural rainfall.
2. When trees have taken root, or at least by 6 months, remove stakes and wires.
3. Once a month (more frequently in the summer), visually inspect vegetation for disease or pest problems.
4. If treatment is warranted, use the least toxic approach.
5. Twice a year, from March 15th to April 30th and October 1st to November 30th, remove and replace all dead and diseased vegetation considered beyond treatment.
6. During times of extended drought, look for physical features of stress (unrevived wilting, yellow, spotted or brown leaves, loss of leaves, etc.). Water in the early morning as needed.
7. Weed regularly, if needed.
8. Prune excess growth annually or more often, if desired. Trimmed materials may be recycled back in with replenished mulch or land filled if there is a concern of heavy metals accumulation.

General

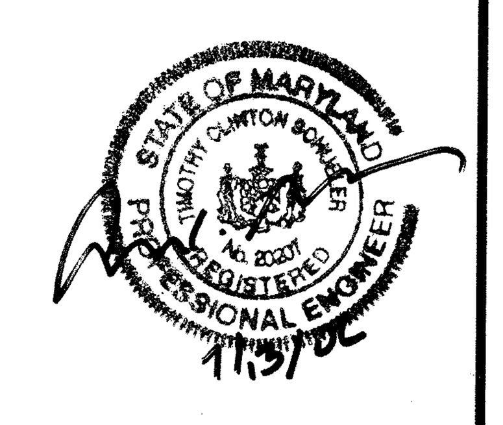
1. After rainstorms, inspect the cell and make sure that drainage paths are clear and that ponding water dissipates over 4-6 hours. (Water may pond for longer times during the winter and early spring.)
2. Keep in mind, the bioretention cell is not a pond. It should not provide a breeding ground for mosquitoes. Mosquitoes need at least 4 days of standing water to develop as larva.

Erosion Control Matting (ECM)

1.1 Unless specified otherwise, all erosion control matting (ECM) shall be BIO D-70, or approved equal. Matting shall be "keyed" into ground 12 inches on the top and bottom of slopes. Secure with 24"x2"x2" wooden stakes, 2 per square yard.

1.2 Base soil shall be tilled to a three-inch depth; rake in three inches of organic matter or top soil prior to ECM placement.

1.3 Seeding for ECM areas shall be seeded with mix as described in these specifications.



HOWARD COUNTY DPW - ENVIRONMENTAL SERVICES 6751 COLUMBIA GATEWAY DRIVE, SUITE 514 COLUMBIA, MD 21046 PHONE: (410) 313-6413 ATTN: MARK RICHMOND	HOWARD COUNTY, MD BOARD OF EDUCATION PARCEL 132 AND 280 ELECTION DISTRICT 15 MAP 29	*BURLEIGH MANOR MIDDLE SCHOOL BIORETENTION DESIGN* **Sediment Control Notes and Details**

DATE:	07/06
DESIGNED:	CW/HT
DRAFTED:	HT
CHECKED:	TCS
BASE DATA:	J.A. RICE

NO.	REVISIONS	BY	DATE

CPJ Associates

CPJ Environmental Services Division
STREAM RESTORATION • STORMWATER MANAGEMENT • INSPECTION
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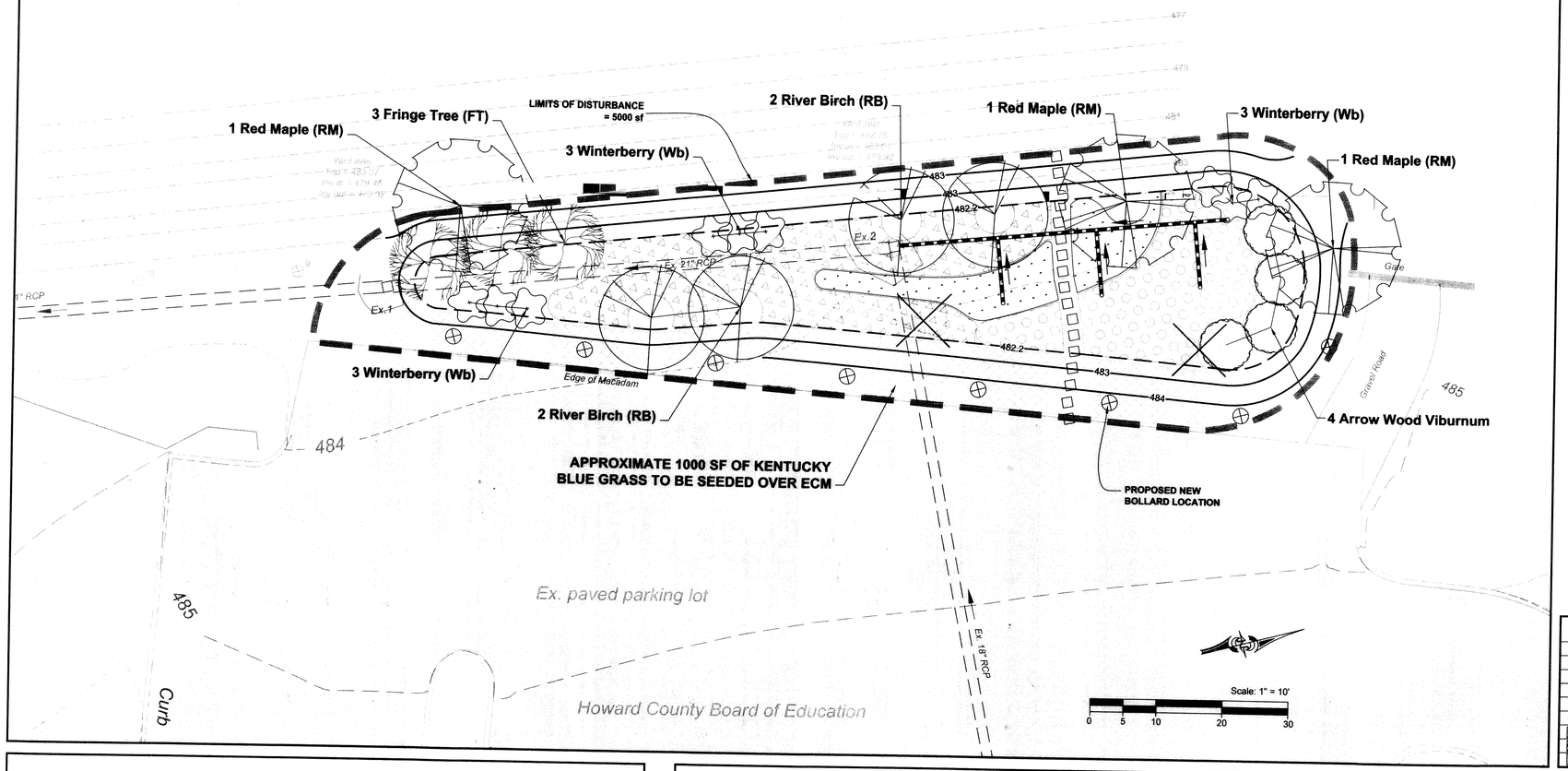
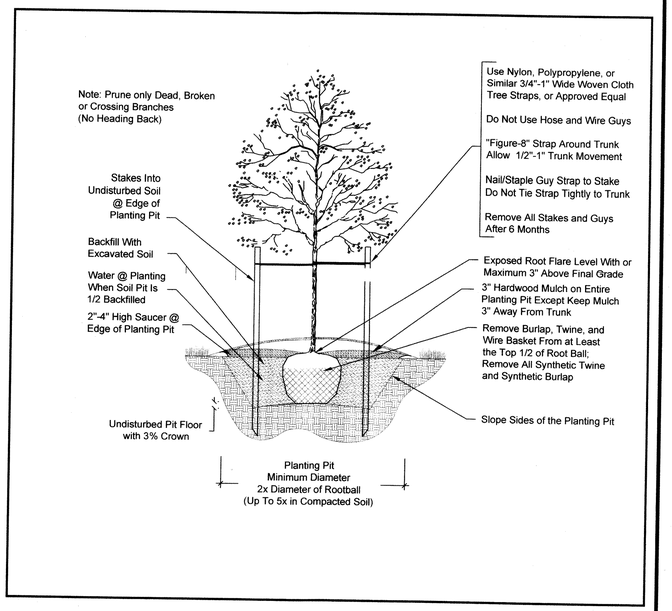
SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE	AS SHOWN
SHEET	5 OF 7 SHEETS
JOB NO.	36-506





③ **TREE PLANTING DETAIL**
Not to Scale

BIORETENTION PLANTING SCHEDULE

ID	Common Name	Scientific Name	Size	QTY	Spacing	Notes
	Red Maple	*Acer rubrum*	2.5" Cal.	3	As Shown	
	River Birch	*Betula nigra*	2" Cal.	4	As Shown	
	Fringe Tree	*Chionanthus virginicus*	2" Cal.	3	As Shown	
	Arrow Wood Viburnum	*Viburnum dentatum*	1 Gal.	4	As Shown	
	Winterberry	*Ilex verticillata*	1 Gal.	9	As Shown	
	Black-eyed Susan	*Rudbeckia hirta*	Quart Pot	320	1.5' O.C.	
	Blue Flag Iris	*Iris versicolor*	Quart Pot	210	1.5' O.C.	
	Switch Grass	*Panicum virgatum*	Quart Pot	76	2' O.C.	

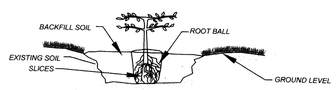
Note: Kentucky Blue Grass application rate at 2.0 - 3.0 lb/1,000 sf.

Hand Planting Method for Reforestation
(1-3 gal. container to 1 1/2" B&B stock)

1. Begin planting upon the completion of site preparation (see planting specifications for site specific preparation information).

2. Dig hole twice the width (36" min.) and no deeper than the actual size of the root mass. Scarify the sides of the hole to prevent glazing and to encourage root penetration.

3. Slice sides of the root ball if pot bound, and place onto the bottom of the hole. Hole should be the same depth as the root ball. Do not butterfly root ball, as the method causes air pockets. Backfill with the existing native soil. A polymer gel soil moisture enhancer mixed into backfill soil is optional depending on site conditions.



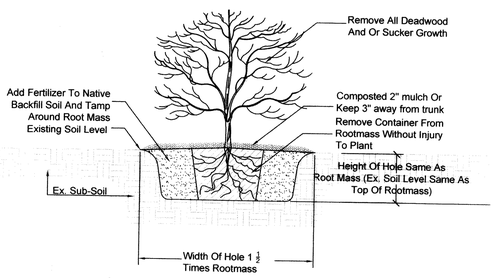
4. Tamp existing back fill soil around root ball. Avoid excessive tamping and other soil compacting activities.

5. No fertilizer is necessary at the time of planting because site specific fertilizer determines by soil test results was applied during site preparation.

6. Mulch with 3" of shredded hardwood mulch, shredded pinebark mulch or composted woodchips in a 36" diameter ring.

7. Water all plants at the time of initial planting.

① **HAND-PLANTING DETAIL**
Not to Scale



Shrub Planting Detail - Container Stock
Not To Scale

② **SHRUB PLANTING DETAIL**
Not to Scale

LANDSCAPE ARCHITECT 0003241 JAMES M. FEICHT MARYLAND

HOWARD COUNTY DPW -
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HOWARD COUNTY, MD
BOARD OF EDUCATION
PACEL 132 AND 280
ELECTION DISTRICT 15
MAP 29

BURLEIGH MANOR MIDDLE SCHOOL
BIORETENTION DESIGN

Planting Plan

DATE: 07/06
DESIGNED: CW/HT
DRAFTED: HT
CHECKED: TCS
BASE DATA: J.A. RICE

NO.	REVISIONS	BY	DATE

CPJ Associates

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SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE
AS SHOWN

SHEET
6
OF 7 SHEETS

JOB NO.
36-506

Jul 13, 2006 - 2:11pm - User: rfleming
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Xrefs:

SECTION I - VEGETATIVE STABILIZATION METHODS AND MATERIALS

A. Site Preparation

i) Install erosion and sediment control structures (either temporary or permanent) such as diversions, grade stabilization structures, berms, waterways, or sediment control basins.

ii) Perform all grading operations at right angles to the slope. Final grading and shaping is not usually necessary for temporary seeding.

iii) Schedule required soil tests to determine soil amendment composition and application rates for sites having disturbed area over 5 acres.

B. Soil Amendments (Fertilizer and Lime Specifications per Howard County Public Schools System Grounds Dept. Spec. Sect.#02490))

i) Lime shall be agricultural grade lime material (ground limestone, hydrated or burnt lime) which contains total carbonates of 85 % with a minimum of 30 % magnesium carbonate and which contains at least 50 % total oxides (calcium oxide plus magnesium oxide). Limestone shall be ground so that not less than 50% passes a 100-mesh sieve and 90-100 % passes a 20-mesh sieve.

ii) Lawn fertilizer. Complete fertilizer of neutral character and uniform composition that is suitable for applications with approved equipment. Lawn fertilizer shall be the only used after seeding operations

a. Fertilizer shall contain some elements derived from organic sources and provide nitrogen in a form that will be available to the lawn during its initial period of growth.

b. Fertilizer shall be delivered to the site fully labeled according to applicable state fertilizer laws and shall bear the name, trade name or trademark and warranty or the producer.

c. Fertilizer shall, at a minimum contain the following percentages of available plant nutrients: 18 % N, 24% P. 12% K, 50% SCU applied at a rate of 1 lb. Per 1,000 square feet lawn area.

C. Seedbed Preparation

i) Temporary Seeding

a. Seedbed preparation shall consist of loosening soil to a depth of 3" to 5" by means of suitable agricultural or construction equipment, such as disc harrows or chisel plows or rippers mounted on construction equipment. After the soil is loosened it should not be rolled or dragged smooth but left in the roughened condition. Sloped areas (greater than 3: l) should be tracked leaving the surface in an irregular condition with ridges running parallel to the contour of the slope.

b. Apply fertilizer and lime as prescribed on the plans.

c. Incorporate lime and fertilizer into the top 3 -5" of soil by disking or other suitable means.

ii) Permanent Seeding

a. Minimum soil conditions required for permanent vegetative establishment:

1. Soil pH shall be between 6.0 and 7.0.
2. Soluble salts shall be less than 500 parts per million (ppm).
3. The soil shall contain less than 40 % clay but enough fine grained material (> 30 % silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception is if lovegrass or *serecia lespedeza* is to be planted, then a sandy soil (< 30 % silt plus clay) would be acceptable.
4. Soil shall contain 1.5% minimum organic matter by weight.
5. Soil must contain sufficient pore space to permit adequate root penetration.
6. If these conditions cannot be met by soils on site, adding topsoil is required in accordance with Section 21 Standard and Specification for Topsoil.

b. Areas previously graded in conformance with the drawings shall be maintained in a true and even grade, then scarified or otherwise loosened to a depth of 3 -5" to permit bonding of the topsoil to the surface area and to create horizontafective. 7□□□l erosion check slots to prevent topsoil from sliding down a slope.

c. Apply soil amendments as per soil test or as included on the plans.

d. Mix soil amendments into the top 3- 5" of topsoil by disking or other suitable means. Lawn areas should be raked to smooth the surface, remove large objects like stones and branches, and ready the area for seed application. Where site conditions will not permit normal seedbed preparation, loosen surface soil by dragging with a heavy chain or other equipment to roughen the surface. Steep slopes (steeper than 3:l should be tracked by a dozer leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. The top 1 -3" of soil should be loose and friable. Seedbed loosening may not be necessary on newly disturbed areas.

D. Seed Specifications

i) All seed must meet the requirements of the Maryland State Seed Law. All seed shall be subject to re-testing by a recognized seed laboratory. All seed used shall have been tested within the 6 months immediately preceding the date of sowing such material on this job.

Note: Seed tags shall be made available to the inspector to verify type and rate of seed used.

ii) Inoculant -The inoculant for treating legume seed in the seed mixtures shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container. Add fresh inoculant as directed on package. Use four times the recommended rate when hydroseeding. Note: It is very important to keep inoculant as cool as possible until used. Temperatures above 75-80 F. can weaken bacteria and make the inoculant less effective.

E. Methods of Seeding

i. **Hydroseeding**: Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer), broadcast or drop seeder, or a cultipacker seeder.

a. If fertilizer is being applied at the time of seeding, the application rates amounts will not exceed the following: nitrogen; maximum of 100 lbs. per acre total of soluble nitrogen; P20S (phosphorous): 200 lbs/ac; K20 (potassium): 200 lbs/ac.

b. Lime -use only ground agricultural limestone, (Up to 3 tons per acre may be applied by hydroseeding). Normally, not more than 2 tons are applied by hydroseeding at anyone time. Do not use burnt or hydrated lime when hydroseeding.

c. Seed and fertilizer shall be mixed on site and seeding shall be done immediately and without interruption.

ii) **Dry Seeding**: This includes use of conventional drop or broadcast spreaders.

a. Seed spread dry shall be incorporated into the subsoil at the rates prescribed on the Temporary or Permanent Seeding Summaries or Tables 25 or 26. The seeded area shall then be rolled with a weighted roller to provide good seed to soil contact.

b. Where practical, seed should be applied in two directions perpendicular to each other. Apply half the seeding rate in each direction.

iii) **Drill or Cultipacker Seeding**: Mechanized seeders that apply and cover seed with soil.

a. Cultipacking seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of soil covering. Seedbed must be firm after planting.

b. Where practical, seed should be applied in two directions perpendicular to each other. Apply half the seeding rate in each direction.

ii) Wood Cellulose Fiber Mulch (WCFM)

a. WCFM shall consist of specially prepared wood cellulose processed into a uniform fibrous physical state. down a sl

b. WCFM shall be dyed green or contain a green dye in the package that will provide an appropriate color to facilitate visual inspection of the uniformly spread slurry.

c. WCFM, including dye, shall contain no germination or growth inhibiting factors.

d. WCFM materials shall be manufactured and processed in such a manner that the wood cellulose fiber mulch will remain in uniform suspension in water under agitation and will blend with seed, fertilizer and other additives to form a homogeneous slurry .The mulch material shall form a blotter-like ground cover, on application, having moisture absorption and percolation properties and shall cover and hold grass seed in contact with the soil without inhibiting the growth of the grass seedlings.

e. WCFM material shall contain no elements or compounds at concentration levels that will be phyto-toxic.

f. WCFM must conform to the following physical requirements: fiber length to approximately 10 mm, diameter approximately 1 mm, pH range of 4.0 to 8.5, ash content of 1.6 % maximum and water holding capacity of 90 % minimum.

Note: Only sterile straw mulch should be used in areas where one species of grass is desired.

G. Mulching Seeded Areas - Mulch shall be applied to all seeded areas immediately after seeding.

i) (per Howard County Public School Spec. Sect.#02490) Mulch shall be thrashed barley, wheat or oat straw. It shall be clean and free of noxious weeds, weed seeds, and other foreign materials. Mulch all seeded areas as follows:

a. Mulch shall be applied at a rate of 2,000 pounds per acre in a uniform manner. The material shall be anchored immediately after application.

i) If grading is completed outside of the seeding season, mulch alone shall be applied as prescribed in this section and maintained until the seeding season returns and seeding can be performed in accordance with these specifications.

ii) When straw mulch is used, it shall be spread over all seeded areas at the rate of 2 tons/acre. Mulch shall be applied to a uniform loose depth of between 1" and 2". Mulch applied shall achieve a uniform distribution and depth so that the soil surface is not exposed. If a mulch anchoring tool is to be used, the rate should be increased to 2.5 tons/acre.

H. Securing Straw Mulch (Mulch Anchoring): Mulch anchoring shall be performed immediately following mulch application to minimize loss by wind or water. This may be done by one of the following methods (listed by preference), depending upon size of area and erosion hazard:

i) A mulch anchoring tool is a tractor drawn implement designed to punch and anchor mulch into the soil surface a minimum of two (2) inches. This practice is most effective on large areas, but is limited to flatter slopes where equipment can operate safely. If used on sloping land, this practice should be used on the contour if possible.

ii) Wood cellulose fiber may be used for anchoring straw. The fiber binder shall be applied at a net dry weight of 750 pounds/acre. The wood cellulose fiber shall be mixed with water and the mixture shall contain a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.

iii) Application of liquid binders should be heavier at the edges where wind catches mulch, such as in valleys and on crests of banks. The remainder of area should be appear uniform after binder application. Synthetic binders -such as Acrylic DLR {Agro-Tack), DCA-70, Petroset, Terra Tax II, Terra Tack AR or other approved equal may be used at rates recommended by the manufacturer to anchor mulch.

iv) Lightweight plastic netting may be stapled over the mulch according to manufacturer's recommendations. Netting is usually available □□□□in roll 4' to 15' wide and 300 to 3,000 feet long.

SECTION II -TEMPORARY SEEDING

Temporary Seed Mixture (For Hardiness Zone 7a) (From Table 26, MDE 1994)					Fertilizer Rate (10-10-10)	Lime Rate
No.	Species	Aplication Rate (lb/ac)	Seeding Dates	Seeding Depths		
2	Rye plus Foxtail Millet	150	2/1-11/30	1/4-1/2 in.	600 lb/ac (15 lb/1000sf)	2 tons/ac (100 lb/1000 sf)

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

A. Seed Mixtures - Temporary Seeding

i) Select one or more of the species or mixtures listed in Table 26 for the appropriate Plant Hardiness Zone (from Figure 5) and enter them in the Temporary Seeding Summary below, along with application rates, seeding dates and seeding depths. If this Summary is not put on the plans and completed, then Table 26 must be put on the plans.

ii) For sites having soil tests performed, the rates shown on this table shall be deleted and the rates recommended by the testing agency shall be written in. Soil tests are not required for Temporary Seeding.

SECTION III: PERMANENT SEEDING (per Howard County Public School System Grounds Dept. Sect.#02490)

A. GENERAL

i)Description

a. The extent of seeding work is as shown on drawings and as specified. Contractor shall produce a dense, well-established turf.

b. Furnish, install, and remove temporary seeding as shown and specified.

c. Seed all disturbed site areas.

d. Seeding notes appearing on Sediment Control drawings shall pertain only to temporary stabilization seeding and shall apply only to work covered on those drawings. Permanent seeding of all areas of the project to be seeded shall be performed in accordance with this specification.

ii) Job Conditions

a. Seed shall be sown from August 15 to October 15 inclusive as soon as the soil is dry enough to allow proper penetration of a seedbed. Extensions beyond these time periods may be granted by the Contract Manager, depending upon weather conditions for the period in question. Any planting outside of these seasons shall be solely at the Contractor's risk and shall not be subject to compensation until stabilization has been accomplished in accordance with these Specifications.

1. No seeding shall be done in frozen ground or when the temperature is 32 degrees F or lower.
2. No seeding shall be done during windy weather or when ground is wet or otherwise untellable.
3. Seed all areas within the project limits that are not paved or designated on the drawings to receive special treatment. Seed disturbed areas in the public right-or-way.
4. Complete seeding of all playfields. Playfields shall be over seeded and refertilized in the spring of 2003, as directed by the Contract Manager. Contractor shall maintain, water, and mow all seeded areas until date of substantial completion.

iii) Workmanship

a. During seeding, all areas shall be kept neat and clean, and precautions shall be taken to avoid damage to existing plants, turf, and structures.

b. Upon completion, all debris and waste material resulting from seeding operations shall be removed from the project and the area cleaned up.

c. Any areas damaged by the seeding contractor shall be restored to the original condition.

B. PRODUCTS

i)Materials

a. Grass Seeds

1. Seed lots must be state certified and blended under the supervision of the Maryland Department of Agriculture (MDA) Turf and Seed Section.
2. All seed and labeling must fully comply with the Maryland Seed Law and these Specifications.
3. Seed shall be packed 50 lbs. net weight and packed in new, clean, poly-woven bags, tightly woven to prevent leaking and contamination.
4. Each container shall have permanently affixed to it an accurate analysis tag and a certification tag.
5. All seed lots to be used in this mixture shall have been previously tested by the Maryland Seed Laboratory to insure compliance with Specification.
6. A quality control sample of the delivered mixture shall be submitted to the Maryland Seed Laboratory for testing prior to payment and any lots found not to comply with the Specification shall be returned at the Contractors expense.
7. The Contractor shall submit seed certification tags to Contractor Manager's representative prior to the beginning of any seed work.
8. Application rate: Grass seed mixture shall be applied at the rate of eight (8) pounds per 1,000 square feed immediately after fertilizing rake and/or drag mat fertilizer is applied.

b. Seed Mixture: Irrigated Athletic Fields

1. The turfgrass seed mixture shall conform to the following requirements.
2. Improved varieties of each species are required. Acceptable varieties of Tall Fescue mix is to contain any two (2) certified varieties from the latest issue of the University of Maryland Memo No. 77.
3. Acceptable varieties of certified Kentucky Bluegrass include Baron, Cheeri, Columbia, Monopoly, Nassau, Ram I, Vantage, and Victa.
4. Acceptable varieties of certified Perennial Rye Grass include Birdie II, Citation II, Cowboy, Derby, Manhattan II, Palmer, Pennant, Pennfine, Prelude, Regal, and Repell.
5. Seed mixtures must be free of all prohibited and restricted noxious weeds in accordance with the Maryland Seed Law.
6. Seed lots must be blended and certified as per the general certification specifications of the Maryland Department of Agriculture.
7. Seed filling must comply with the MARYLAND SEED AND REGULATIONS LAW.
8. All seed shall be certified with complete and accurate analysis tags attached to each container. The Contractor shall have all seed tags and submit them to the Contract Manager.

SECTION IV - FILTER CLOTH

CLASS	APPARENT OPENING SIZE MM. MAX	GRAB TENSILE STRENGTH LB. MIN	BURST STRENGTH P.S.I. MIN	
A	0.30**	250	500	
B	0.60	200	320	
C	0.30	200	320	← USE CLASS "C"
D	0.60	90	145	
E	0.30	90	145	
F	0.40-0.80*	90	190	

*US Std Sieve CW - 02215 ** 0.50 mm. max. for Super Silt Fence

The properties shall be determined in accordance with the following procedures:

-Apparent opening size MSMT 323

-Grab tensile strength ASTM D 1682: 4x8" specimen, 1x2" clamps, 12"/min. strain rate in both principal directions of geotextile fabric.

-Burst strength ASTM D 3786

The fabric shall be inert to commonly encountered chemicals and hydrocarbons, and will be rot and mildew resistant. It shall be manufactured from fibers consisting of long chain synthetic polymers, and composed of a minimum of 85 % by weight of polyolephins, polyesters, or polyamides. The geotextile fabric shall resist deterioration from ultraviolet exposure.

In addition, Classes A through E shall have a 0.01 cm./sec. minimum permeability when tested in accordance with MSMT 507, and an apparent minimum elongation of 20 percent (20%) when tested in accordance with the grab tensile strength requirements listed above.

SECTION V - SILT FENCE MATERIALS:

Class F geotextile fabrics for silt fence shall have a 50 lb./in. minimum tensile strength and a 20 lb./in. minimum tensile modules when tested in accordance with MSMT 509. The material shall also have a 0.3 gal./ft.2/min. flow rate and seventy-five percent (75 %) minimum filtering efficiency when tested in accordance with MSMT 322.

Geotextile fabrics used in the construction of silt fence shall resist deterioration from ultraviolet exposure. The fabric shall contain sufficient amounts of ultraviolet ray inhibitors and stabilizers to provide a minimum of 12 months of expected usable construction life at a temperature of 0 to 120 degrees F.

STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER 7/13/06