

**DESIGN LEGEND**

	Ex. Sewer
	Ex. Electric line
	Ex. Gas line
	Ex. 100 yr Flood Plain/HEC-RAS Model
	Proposed 100 yr Flood Plain/HEC-RAS Model
	Property Line
	Ex. Stream Center line
	Prop. Stream Center line/ Design Station
	Proposed Bank-Full
	Limits of Disturbance
	Tree Line
	Existing Contours
	Ex. Tree
	Survey Limit
	Step Pool
	Erosion Control Mat (ECM)
	Design Cross Sections
	STONE PLACED (AS-BUILT)

**General Notes**

- Due to shallow nature of stream, design contours are not shown. For assistance in construction grading and stationing, see the Design Cross Sections on Sheet 5 and the Design Profile on Sheet 6. For typical pool dimensions, see Design Cross Section 5 at Design Station 0+67.5. For typical step dimensions, see Cross Sections 2, 4, 6, or 8 at Design Stations 0+30, 0+60, 0+90 and 1+20, respectively.
- The Limit of Disturbance is based on an offset of 10 (horizontal) feet from the bankfull location at each cross section or the extent of the Design Cross Sections to the existing grade tie-in (see Sheet 5), whichever distance is greater.
- For typical step-pool construction, rip rap extends from the base of the pool up to bankfull elevation. ECM is utilized from bankfull elevation to existing grade tie-in. The location of the bankfull and ECM extents on this sheet are only approximate; for exact distances, see Sheet 5. Elevations indicated on cross sections and profile are top of stone elevations. Approximate stone base height is one foot (for example, difference in elevation from top of fill beneath pool to lowest pool elevation is one foot). Plan and profile graphic presentations and additional dimensions of step-pool construction are shown on Sheet 6.

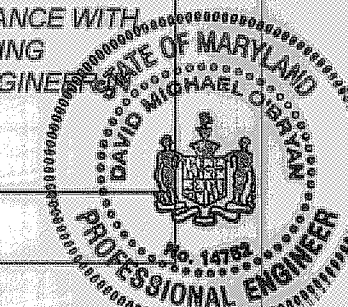


I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF, AND AS OF THE LATEST DATE SHOWN, THAT THE AS-BUILT SURVEY SHOWN HEREON IS CORRECT, AND THAT IT THE RESULTS OF A FIELD SURVEY PERFORMED BY KUNDRICK & ASSOCIATES, INC. IN JANUARY 2009.

*Robert A. Kundrick* 05/12/2010  
 ROBERT A. KUNDRICK DATE  
 PROFESSIONAL LAND SURVEYOR  
 MARYLAND REGISTRATION NO. 11046

I HEREBY CERTIFY THAT THESE AS-BUILT PLANS ARE IN CONFORMANCE WITH OR WITHIN TOLERANCE OF, THE APPROVED DESIGN PLANS, INCLUDING ADJUSTMENTS TO FIELD CONDITIONS AS APPROVED BY DESIGN ENGINEER THE FIELD.

*David O'Bryan* 5/14/10  
 ENGINEER: DAVID O'BRYAN, MD PE NO. 14752 DATE  
 CHARLES P. JOHNSON & ASSOCIATES, INC. EXP. 1/14/12



"AS-BUILT"

Prepared for:  
 Howard County Department of Public Works  
 Bureau of Environmental Services  
 6751 Columbia Gateway Drive, #514  
 Columbia, MD 21046  
 Phone: (410) 313-6417  
 Attn: Mr. Richard Powell

HOWARD COUNTY, MD  
 100 yr. Flood Plain & R/W for Sewer  
 Parcel 650 L 5236 F 207  
 Park and Recreation  
 Parcel 648 Lot 9 L 1726 F 100  
 Tax Map 17 Grid 10

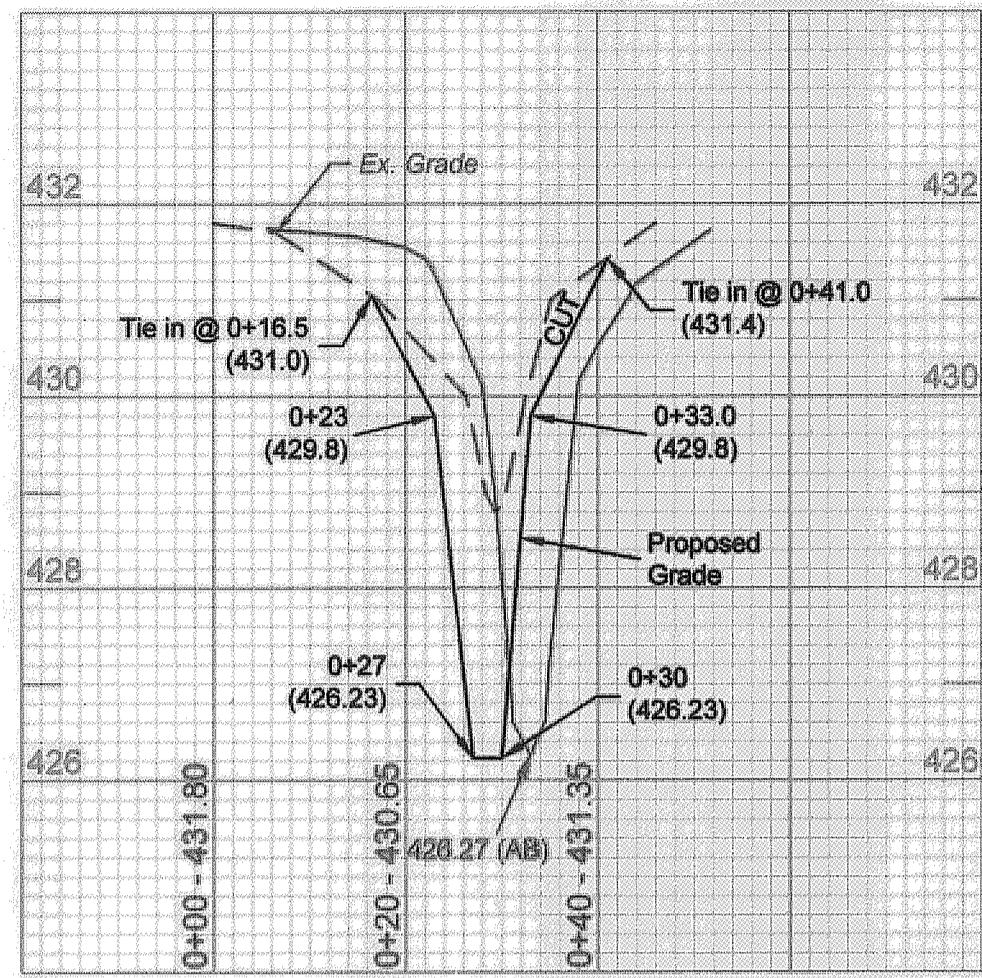
**Tiller Drive Stream Stabilization**  
 PLAN VIEW

DATE: 09/08	1	FINAL FIELD AS-BUILT	RAK	2/9/09
DESIGNED: RP				
DRAFTED: HT				
CHECKED: DO				
BASE DATA: J.A. Rice	NO.	REVISIONS	BY	DATE

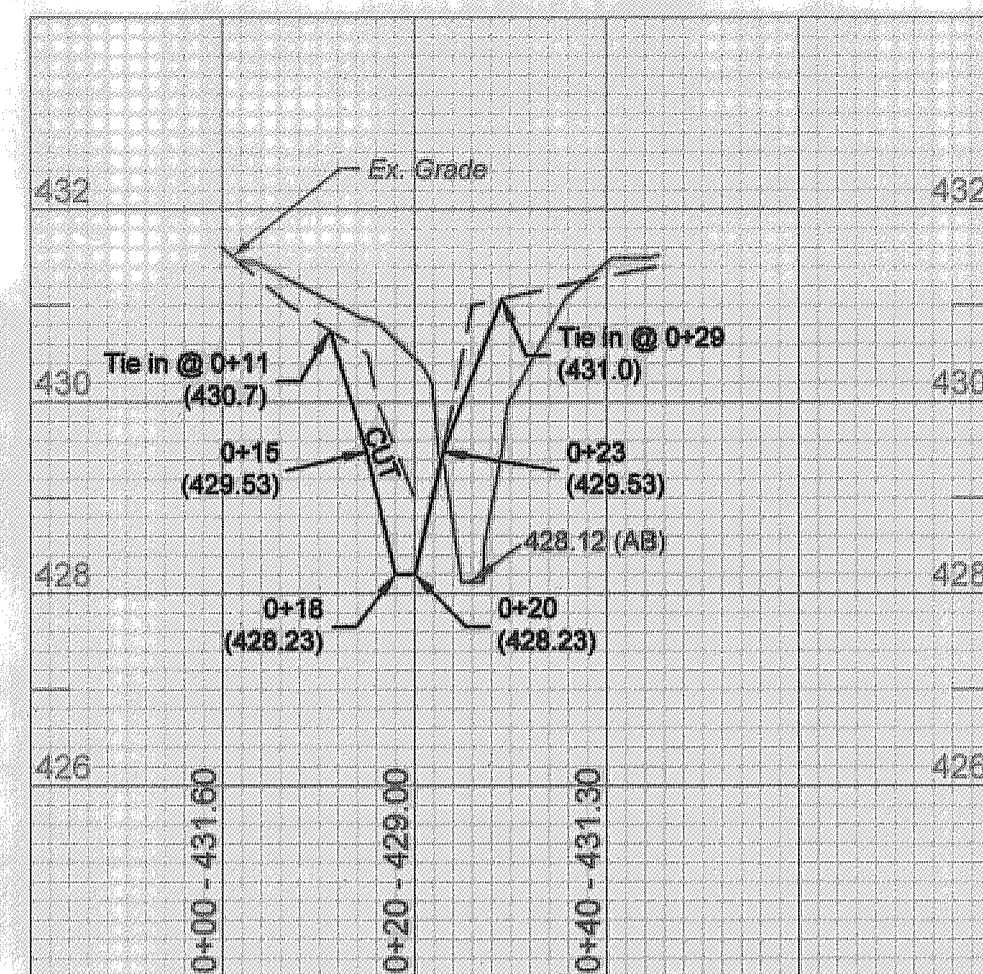
**CPI Associates**  
**Environmental Services Division**  
 STREAM RESTORATION • STORMWATER MANAGEMENT • INSPECTION  
 910 CLOPPER ROAD, STE 215N GAITHERSBURG MARYLAND 20878  
 Phone: (201) 208-9573 E-mail: envcpj@a.com Fax: (201) 926-4551  
 SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE AS SHOWN
SHEET
2-1
OF 7 SHEETS
JOB NO.
37-553

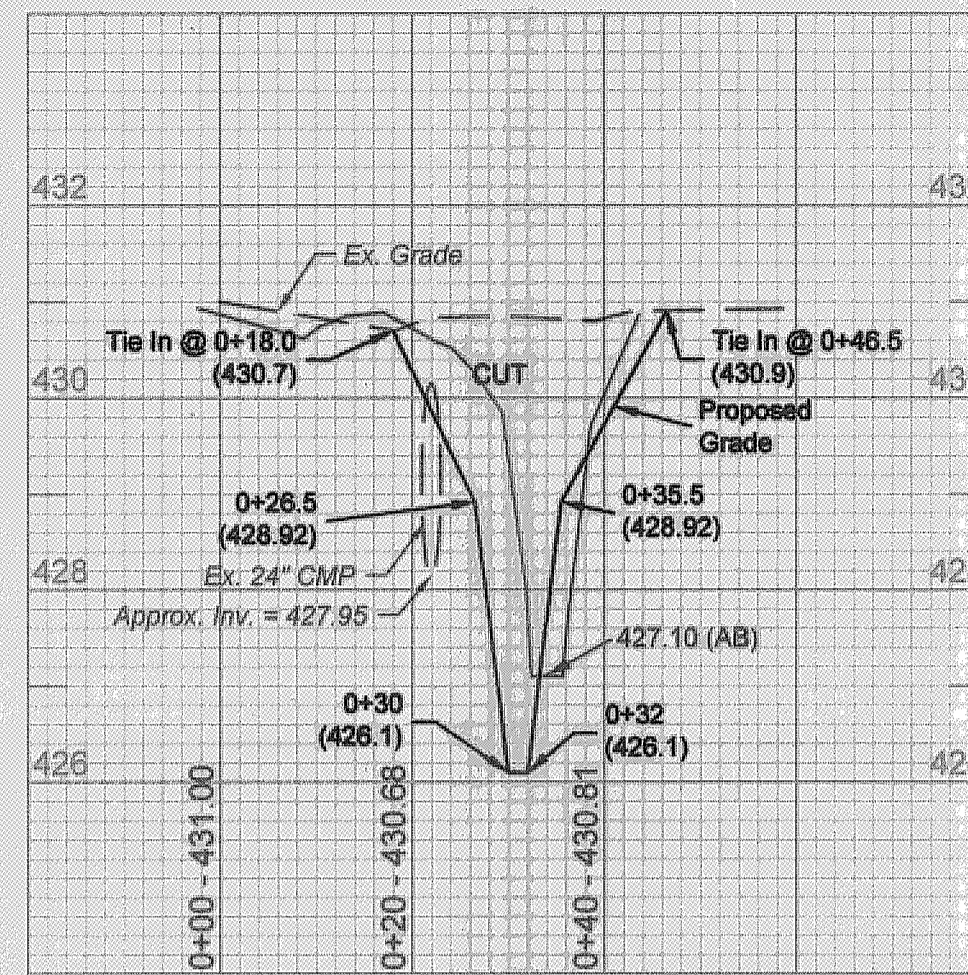
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 Plot: 1050.dwg  
 Plot Path: D:\Projects\2010\1050\1050.dwg



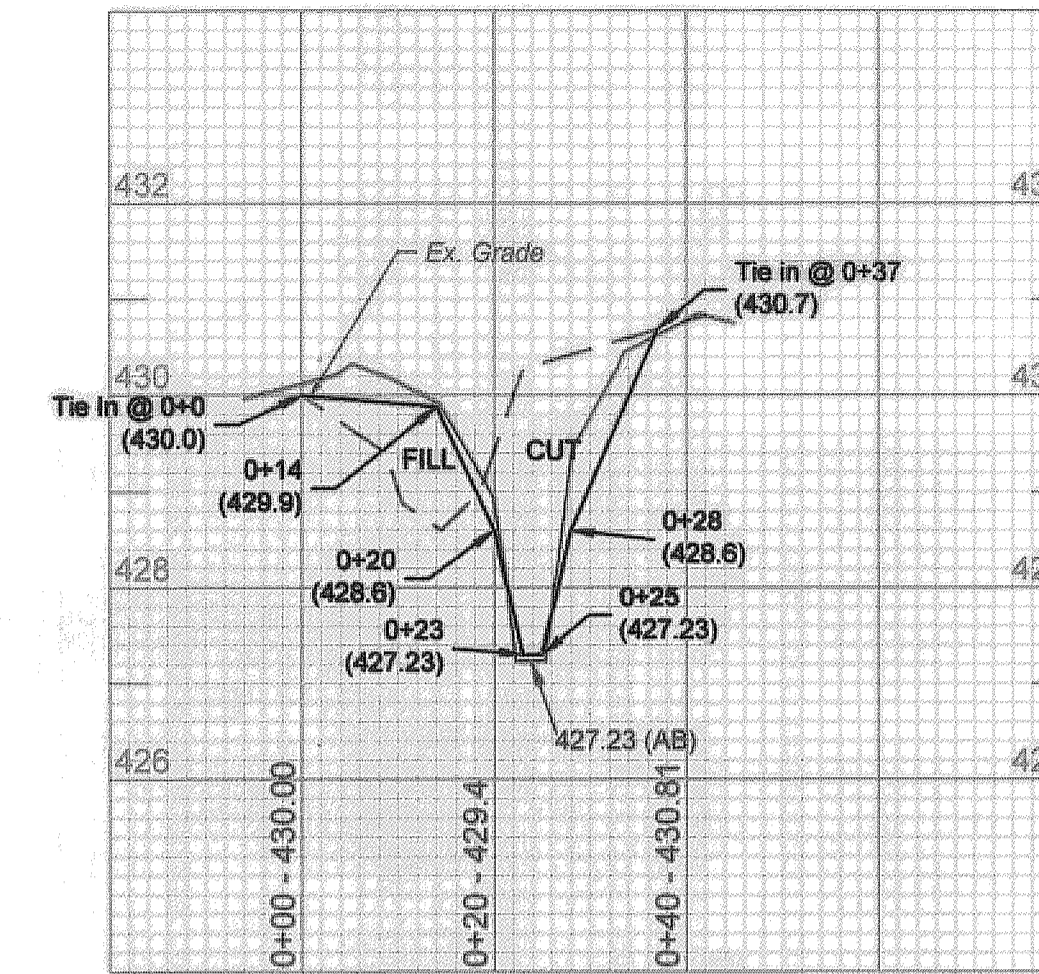
1 Cross Section 1 @ Station 0+22  
Scale: V-1"=2'  
H-1"=20'



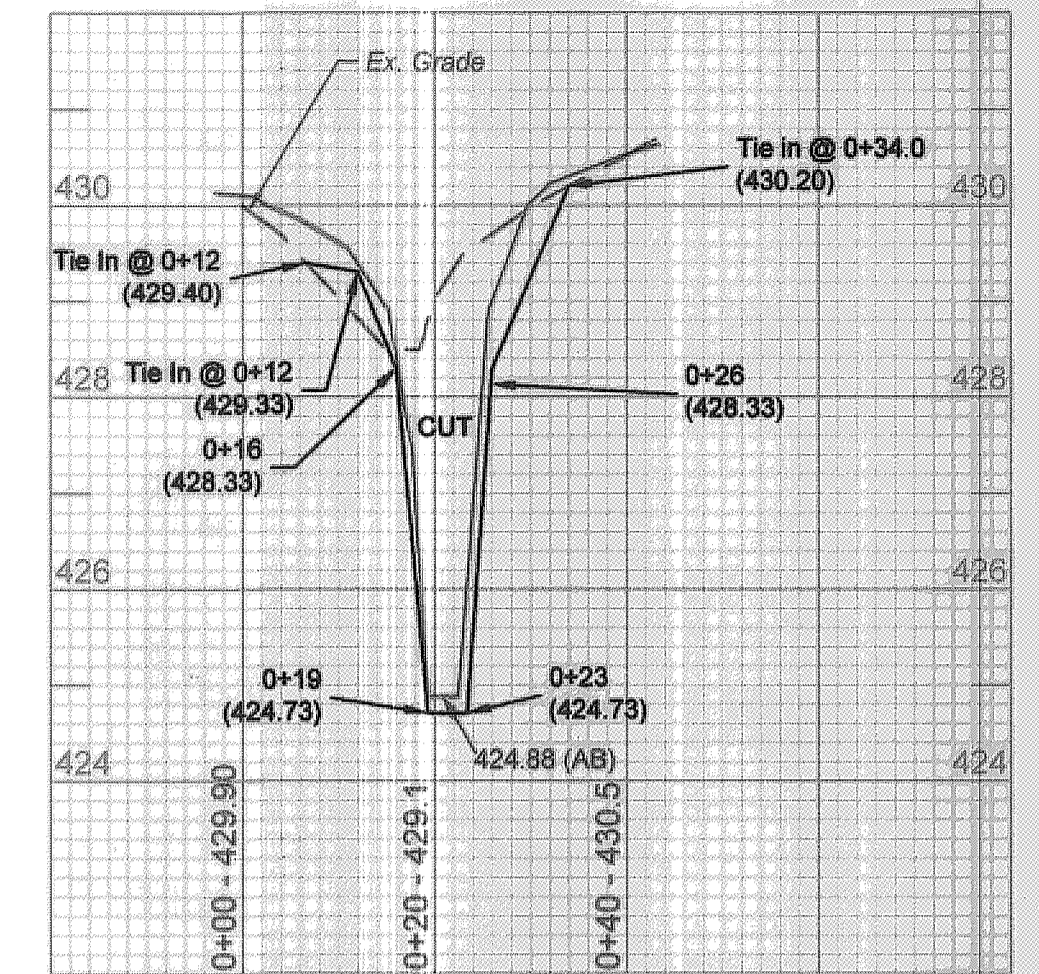
2 Cross Section 2 @ Station 0+30  
Scale: V-1"=2'  
H-1"=20'



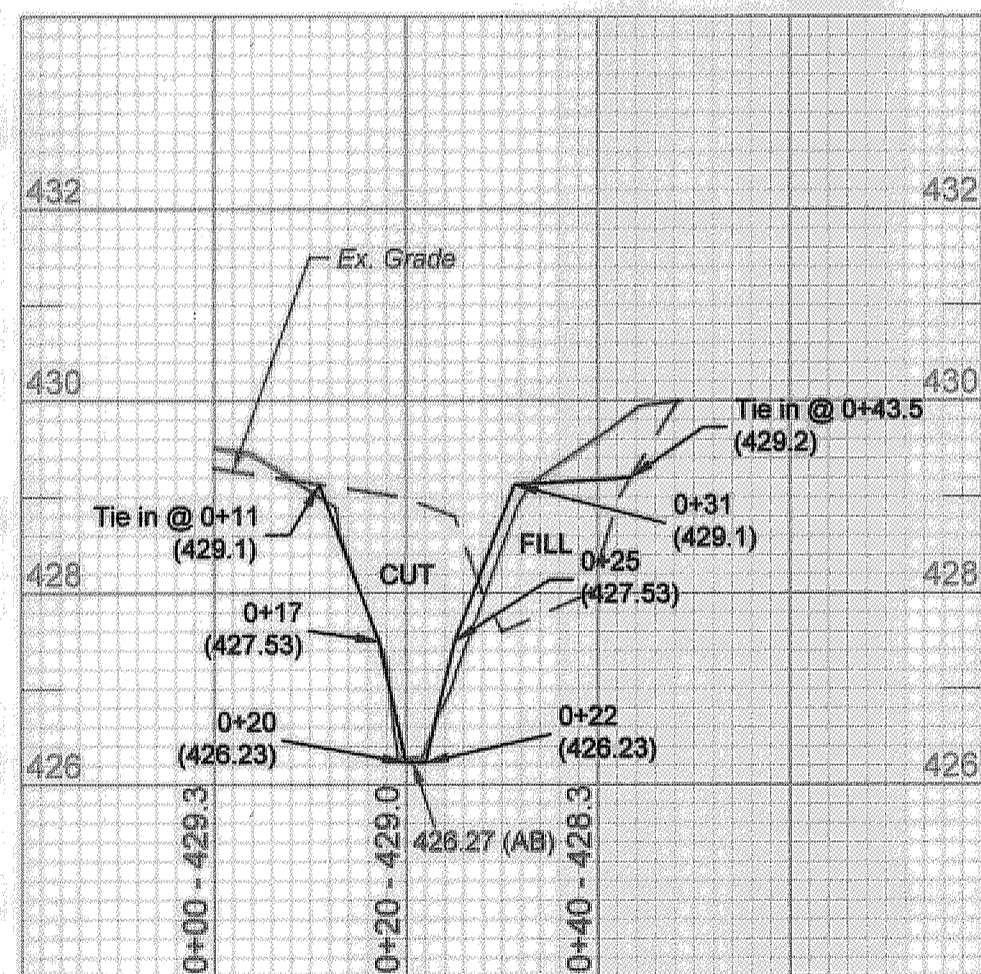
3 Cross Section 3 @ Station 0+49  
Scale: V-1"=2'  
H-1"=20'



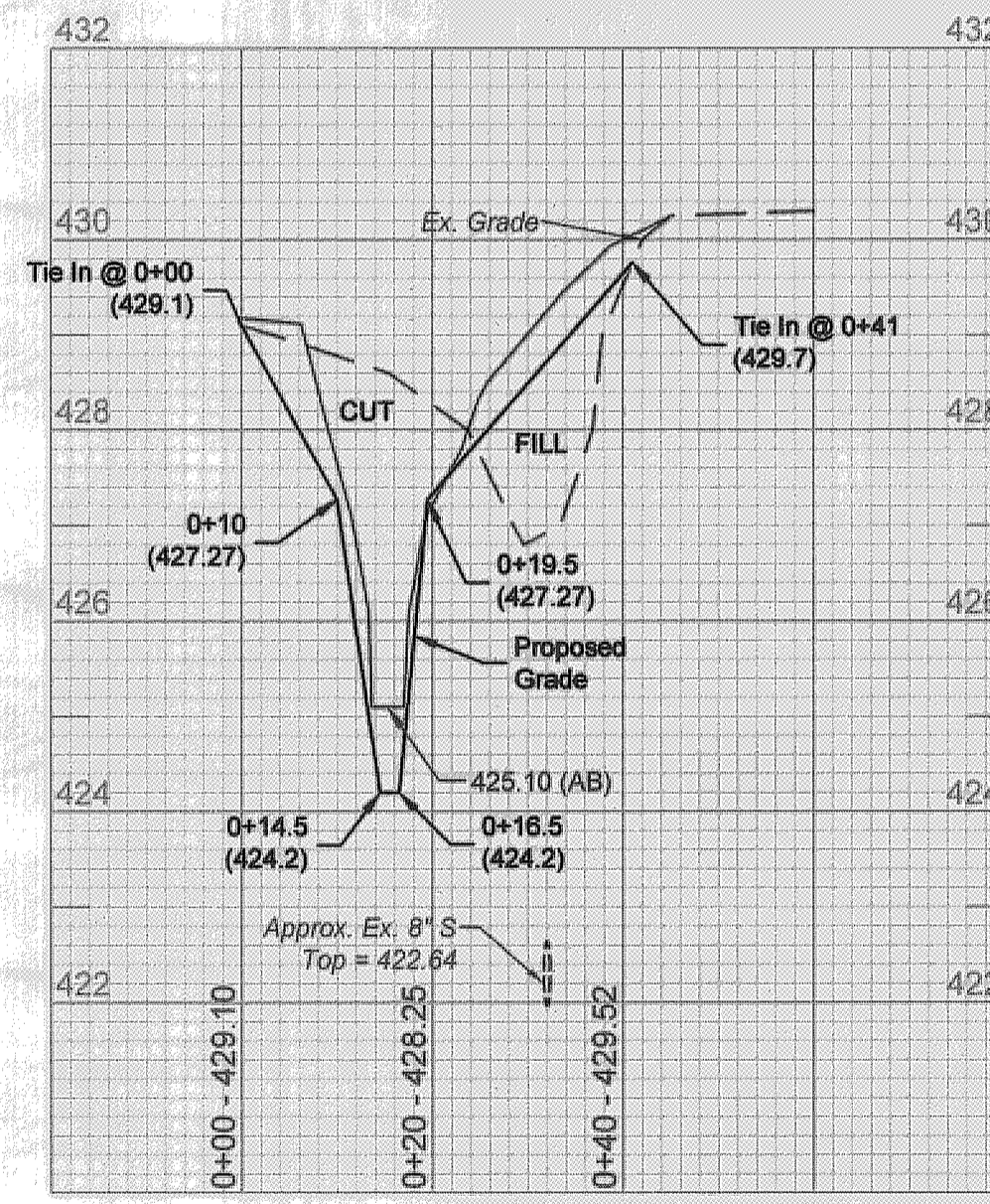
4 Cross Section 4 @ Station 0+60  
Scale: V-1"=2'  
H-1"=20'



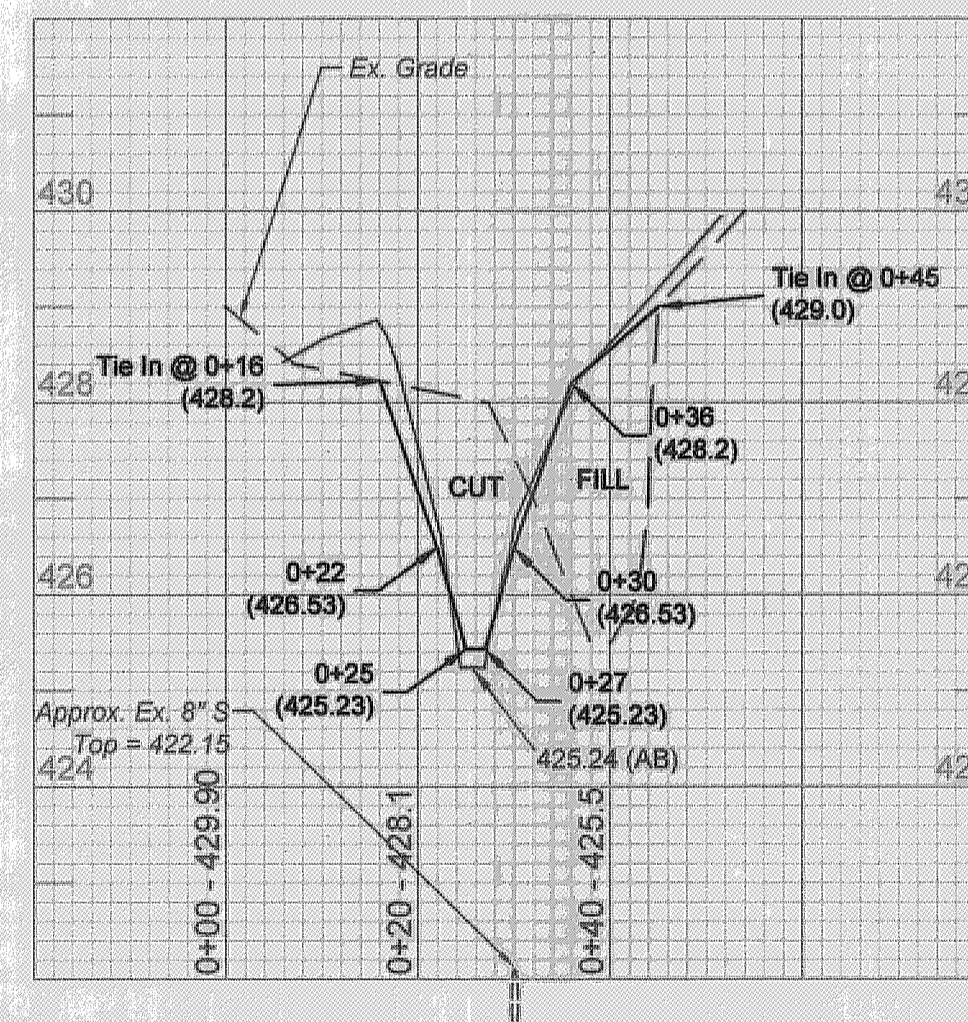
5 Cross Section 5 @ Station 0+67.5  
Scale: V-1"=2'  
H-1"=20'



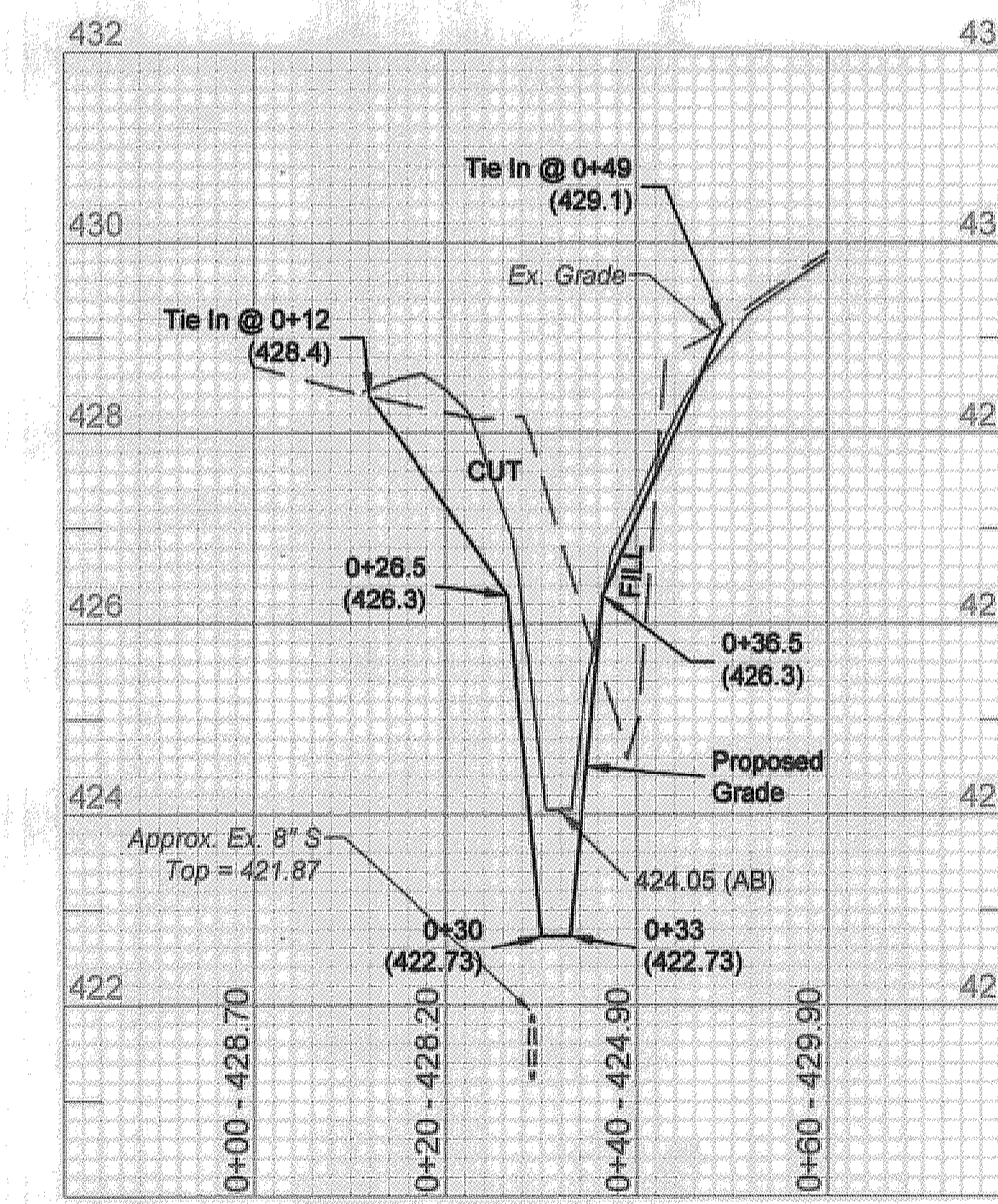
6 Cross Section 6 @ Station 0+90  
Scale: V-1"=2'  
H-1"=20'



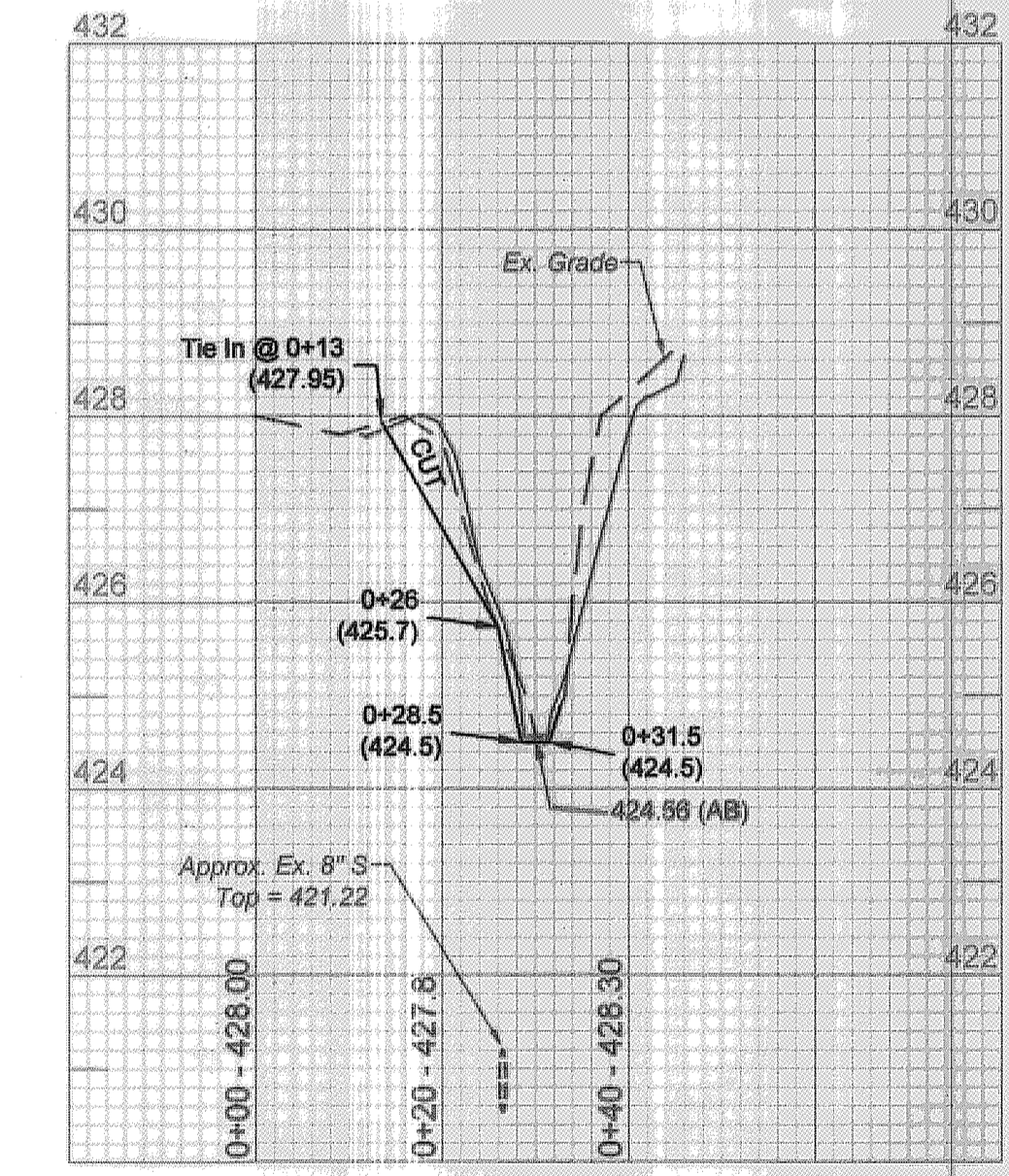
7 Cross Section 7 @ Station 1+01  
Scale: V-1"=2'  
H-1"=20'



8 Cross Section 8 @ Station 1+20  
Scale: V-1"=2'  
H-1"=20'



9 Cross Section 9 @ Station 1+29  
Scale: V-1"=2'  
H-1"=20'



10 Cross Section 10 @ Station 1+50  
Scale: V-1"=2'  
H-1"=20'

"AS-BUILT"

Date: 09/08  
 Prepared: J. Rice  
 Checked: HT  
 Project: Tiller Drive Stream Stabilization, Parcel 650 L 5236 F 207, Parcel 648 Lot 9 L 1726 F 100

Prepared for:  
Howard County Department of Public Works  
Bureau of Environmental Services  
6751 Columbia Gateway Drive, #514  
Columbia, MD 21046  
Phone: (410) 313-6417  
Attn: Mr. Richard Powell

HOWARD COUNTY, MD  
100 yr. Flood Plain & R/W for Sewer  
Parcel 650 L 5236 F 207  
Park and Recreation  
Parcel 648 Lot 9 L 1726 F 100  
Tax Map 17 Grid 10

## Tiller Drive Stream Stabilization

### CROSS SECTIONS

DATE:	09/08	1	FINAL FIELD AS-BUILT	RAK	2/9/09
DESIGNED:	RP				
DRAFTED:	HT				
CHECKED:	DO				
BASE DATA:	J.A. Rice	NO.	REVISIONS	BY	DATE

**CPJ** Environmental Services Division  
 STREAM RESTORATION - STORMWATER MANAGEMENT - INSPECTION  
 910 CLOPPER ROAD, STE 25N GAITHERSBURG, MARYLAND 20878  
 Phone: (301) 208-9575 E-mail: envcpj@a.com Fax: (301) 208-4551  
 SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE	AS SHOWN
SHEET	5-2
OF 7 SHEETS	
JOB NO.	37-553

**Tiller Road Stream Bioengineering General Specifications**  
 [These notes supplement details already shown hereon]

**1.0 Disposal of Flush Cut or other Woody Vegetation**

1.1 Unless specifically shown on plans, all trees and woody growth stated for removal shall either be removed onsite or chipped and spread onsite as directed by the Howard County DPWBES Project Manager. Under no circumstances are trunk sections to be left on the flood plain.

**2.0 Erosion Control Matting [ECM]**

2.1 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. Contact Design Engineer where "key trench" will impact primary tree root systems. Secure with 24-inch wood stakes, 2 per square yard.

2.2 Base soil shall be tilled to a three-inch depth; rake in three inches organic matter (top soil) prior to ECM placement.

2.3 Seeding for ECM areas shall be seeded with mix as described in these specifications. See Section 6.0.

**3.0 Topsoil for Fill Areas**

3.1 Immediately prior to spreading borrow topsoil, loosen the subgrade by tilling to a depth of at least three (3) inches to ensure adequate aeration of the subsoil. The subsoil shall be free of loose stones or other foreign material.

3.2 Borrow topsoil shall be uniformly placed and spread a minimum thickness of three inches (3") within the project limits as indicated on the construction drawings or as directed by the design engineer. Do not spread topsoil while it is frozen, saturated or when the subsoil is wet or frozen. Correct any irregularities in the surface that result from topsoiling or other operations to prevent the formation of depressions or water pockets.

3.3 Incorporate the topsoil into the underlying subsoil. When topsoil is to be placed on slopes 3:1 or greater, on which the subsoil is of a suitable condition to blend with topsoil, the contractor shall work the topsoil into the subsoil by tilling. Where subsoil on slopes are of such a character that they will not blend with the topsoil, the contractor shall roughen, bench or serrate the slopes so as to provide a bond for the topsoil. Avoid compaction from machinery as it increases runoff and inhibits seed germination.

**4.0 Backfill and Compaction**

4.1 Stripping: The top 6 inches of soil and organic matter shall be stripped within the designated excavations and grading lines and deposited in storage piles. All excavated materials not suitable as topsoil or for other uses at the site shall be disposed offsite.

4.2 Satisfactory Fill Materials: Fill and backfill within the limits of the design points and beneath appurtenant structures shall be those materials classified in ASTM D 2487 as GW, GP, GM, GC, SW, SM, SC, or combinations thereof. The Contractor shall maintain proper specified compaction as directed by a qualified Geotechnical Engineer.

4.3 Subgrade Preparation: Unsatisfactory subgrade material shall be removed and replaced with satisfactory material as directed by the Design Engineer. All exposed subgrades shall be scarified to a depth of 3 inches before the fill is started. Slope surface steeper than 1 vertical to 3 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by tamping (sheepfoot) rollers, pneumatic-tires rollers, steel-wheeled rollers, or other approved well suited to the soil being compacted. The contractor shall be prepared to moisten or aerate as necessary to provide an in-place moisture content within plus or minus 2 percent of optimum within the compacted lifts and/or subgrades for each material. Minimum subgrade density shall be as specified in paragraph filling and backfilling.

4.4 Filling and Backfilling: Satisfactory materials shall be used in bringing fills and backfill to the proposed contours indicated on the plan and for replacing unsatisfactory materials. Satisfactory materials will be determined by the Design Engineer. Satisfactory materials shall be placed in horizontal layers not exceeding 8 inches in uncompacted thickness, or 6 inches when hand-operated compactors are used. After placing, each layer shall be moistened or aerated as necessary to obtain plus or minus 2 percent of optimum moisture, thoroughly mixed and compacted as specified. Backfilling shall not begin until construction below finish grade has been approved, underground utilities systems have been inspected, tested approved, and forms removed.

**5.0 Invasive Species Control (Within LOD)**

5.1 Invasive species control program shall utilize appropriate Integrated Pest Management practices and the use of a professional certified pesticide applicator. The applicator shall be certified in the following categories depending upon the nature of the application area: Forest, Right of Way, or Aquatic Pest Control (for work directly adjacent to or over water).

5.2 Growth habits of invasives are rapid and site conditions may change dramatically, therefore the program may be altered at the time of implementation.

5.3 Cutting of the large plant masses followed by chemical controls is suggested at this time. Mowing of the target species may occur any time of the year. Herbicide application will follow cutting. During the growing season, the identified plants may be treated with a non-selective herbicide (glyphosate), applied according to label directions. However, care should be taken to ensure that the timing of the application is conducive to uptake and translocation of the herbicide. The applicator should ensure that the herbicide is listed for use against the selected species, and is labeled for aquatic use if the application will be made over water. During periods outside of the growing season, the woody weeds identified may be treated with systemic herbicides labeled for dormant season applications (triclopyr).

5.4 A follow up treatment of control is to be performed 1 month after the beginning of the following growing season (approximately May 1st).

5.5 It is the responsibility of the applicator to select the proper herbicide for the targeted species based on the time of year, and to use the herbicide in a manner that is consistent with the label. Additionally, it is the responsibility of the applicator to obtain Toxic Materials Permits for the use of herbicides.

**6.0 Seeding**

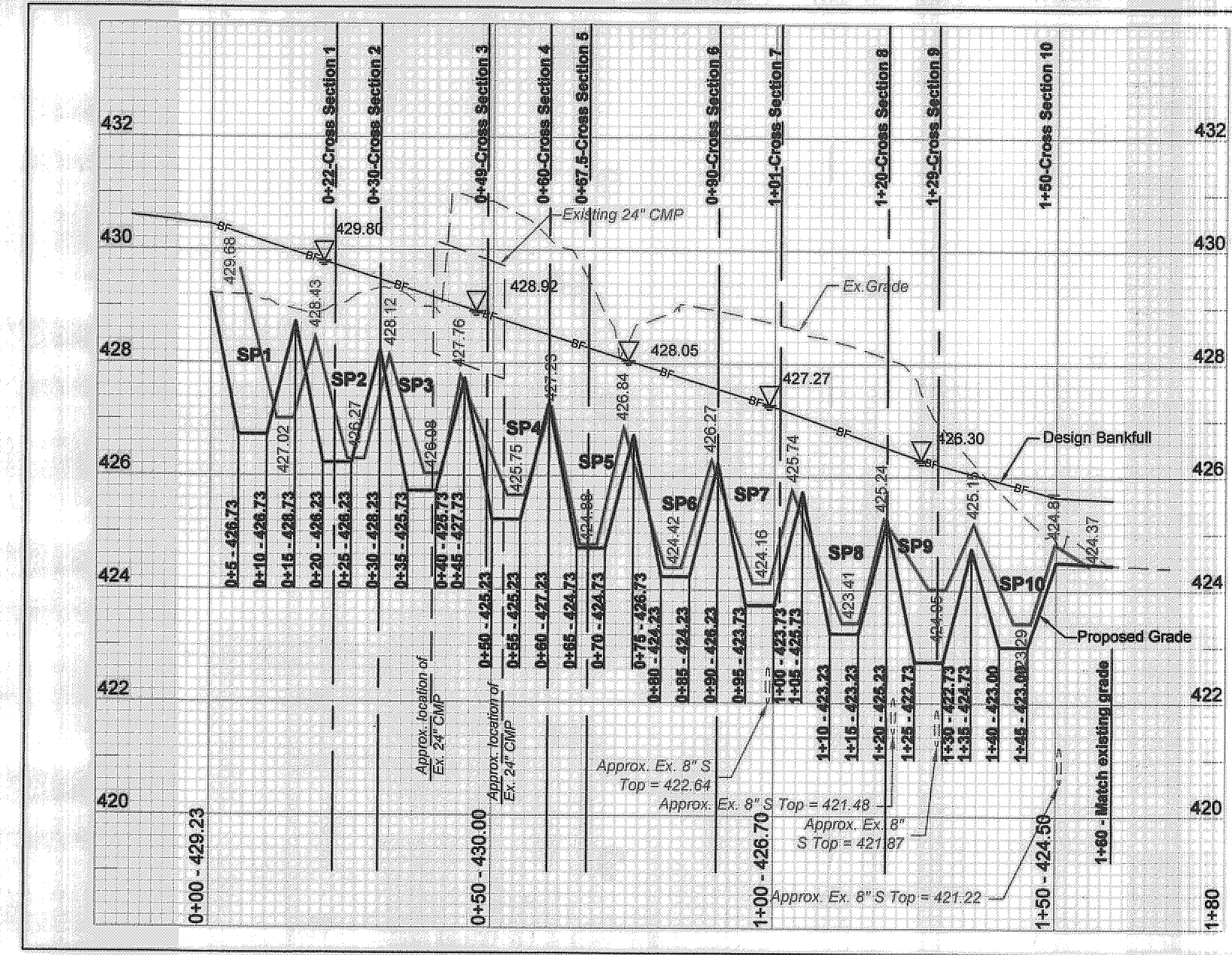
GRASS SEED: Shall be Maryland Certified. It shall be fresh, clean, new crop seed mixed in the proportion shown and tested to the following minimum percentages of purity and germination. Approved varieties shall be selected "Recommended Turfgrass cultivars for Professional Seed Mixtures," University of Maryland Turfgrass Technical Update TT-77, most recent edition (See Section 705.3) A copy of this publication can be obtained by visiting the Maryland Turfgrass Council website <<http://www.md turf council.org>> or by calling them at 410-836-2876. A minimum application rate shall be approximately 300 pounds per acre (7 lbs/1000 ft<sup>2</sup>) unless specific rates are dictated to the Contractor.

**Minimum Percentages of Grass Seed:**

SEED MIXTURE TO BE: % BY WEIGHT % PURITY % GERMINATION

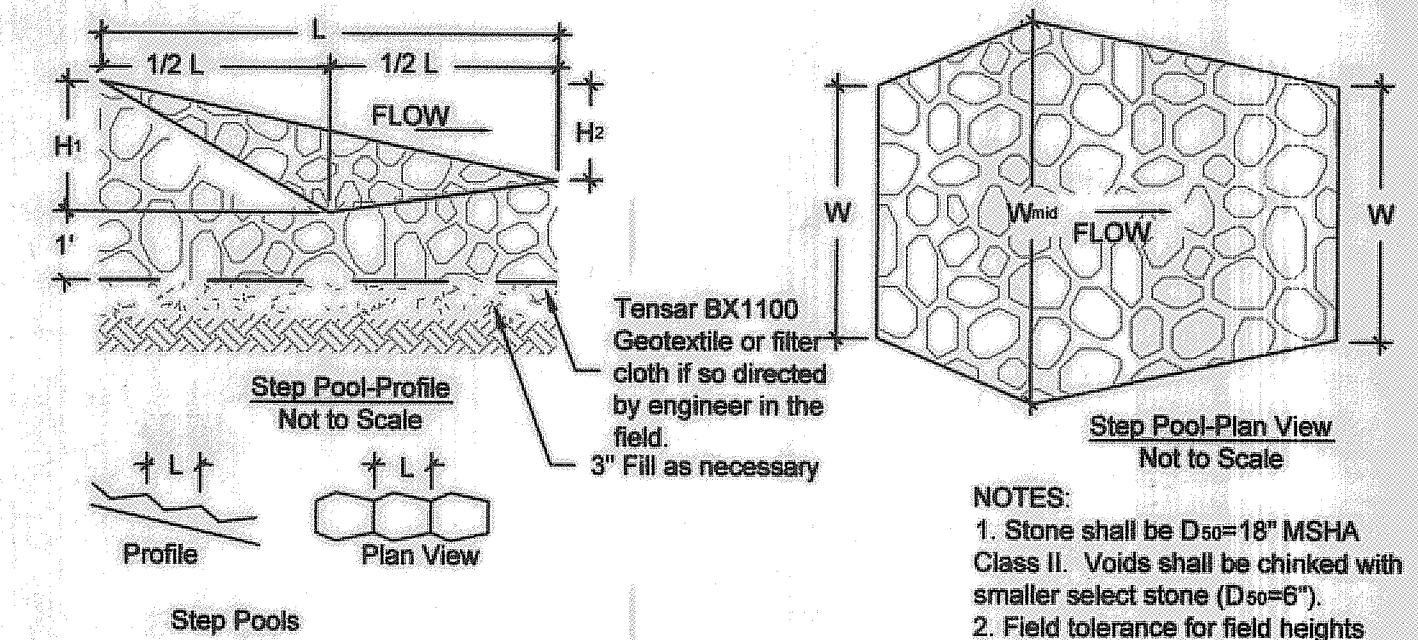
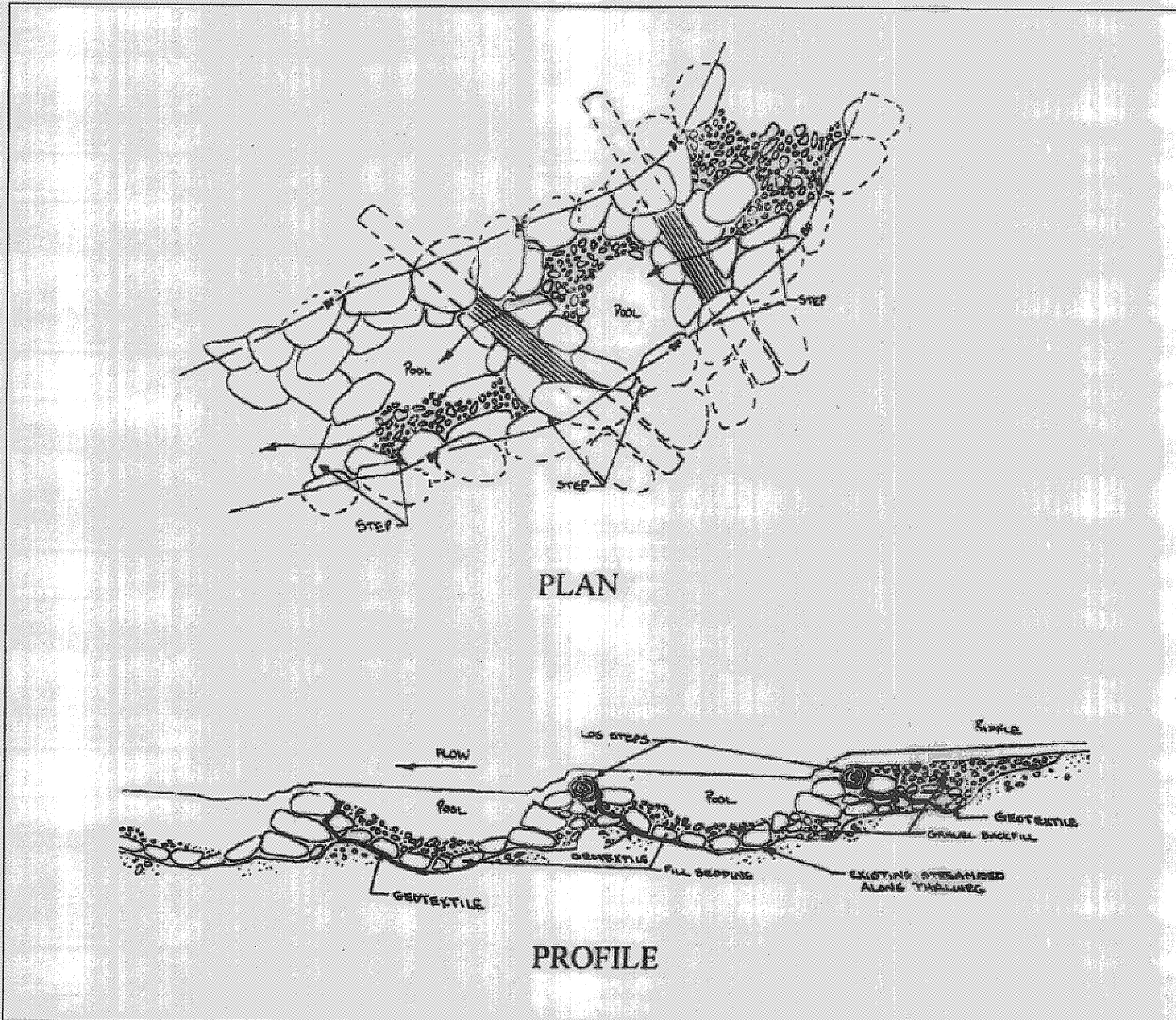
Kentucky Bluegrass	10%	98%	85%
Turf-type Tall Fescue*	70%	98%	90%
Perennial Rye Grass	20%	98%	85%

\*Use a single cultivar or seed in blends



**1 PROFILE**  
 Scale: V-1"=2'  
 H-1"=20'

NOTE: The as-built profile shown hereon is based on matching as-built and plan station 0+93.38 to accurately show the horizontal stationing and vertical alignment from station 0+00 to 0+60. This adjustment was made due to the stream geometry field revision. RAK



NOTES:  
 1. Stone shall be D<sub>50</sub>=18" MSHA Class II. Voids shall be chinked with smaller select stone (D<sub>50</sub>=6").  
 2. Field tolerance for field heights (H<sub>1</sub>, H<sub>2</sub>) to be 3%.

REFERENCED TO PLAN BASELINE AT Station	L	W	W <sub>mid</sub>	H <sub>1</sub>	H <sub>2</sub>
0+15.40+15	15.95.0	2.7.2	11.8.10	AB(2.6)	1.1.0.5
0+29.90+30	11.95.0	2.7.2	10.1.10	2.2.2.5	0.3.0.5
0+47.20+45	14.25.0	AB(2)	10.1.10	2.0.2.5	0.4.0.5
0+61.4.0+50	14.45.0	2.7.2	11.1.10	2.0.2.5	AB(0.5)
0+75.1.0+75	14.45.0	2.7.2	10.3.10	2.4.2.5	0.4.0.5
0+80.4.0+90	15.95.0	2.7.2	9.2.10	2.4.2.5	0.8.0.5
1+04.31+05	14.05.0	2.7.2	9.8.10	2.1.2.5	AB(0.5)
1+20.11+20	14.95.0	1.5.2	10.7.10	2.3.2.5	AB(0.5)
1+35.41+35	15.95.0	AB(2)	1.0.10	1.2.2.5	0.1.0.2
1+49.21+50	14.45.0	3.0.2	9.0.10	1.9.2.5	0.3.0.5

"AS-BUILT"

Prepared for:  
 Howard County Department of Public Works  
 Bureau of Environmental Services  
 6751 Columbia Gateway Drive, #514  
 Columbia, MD 21046  
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 Attn: Mr. Richard Powell

HOWARD COUNTY, MD  
 100 yr. Flood Plain & R/W for Sewer  
 Parcel 650 L 5236 F 207  
 Park and Recreation  
 Parcel 648 Lot 9 L 1726 F 100  
 Tax Map 17 Grid 10

**Tiller Drive Stream Stabilization**

GRADING TYPICAL AND SPECIFICATIONS  
 AND PROFILE

DATE: 09/08	1	FINAL FIELD AS-BUILT	RAK	2/9/09
DESIGNED: RP				
DRAFTED: HT				
CHECKED: DO				
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: [cpj@cpj.com](mailto:cpj@cpj.com) Fax: (301) 926-4551  
 SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE AS SHOWN  
 SHEET 6-3  
 OF 7 SHEETS  
 JOB NO. 37-553

May 12, 2010, 9:33am User: cwhalen  
 Profile Revised.dwg  
 Step Pool.dwg  
 Profile Revised\_AE-KJA.dwg  
 Step Pool\_AR.dwg

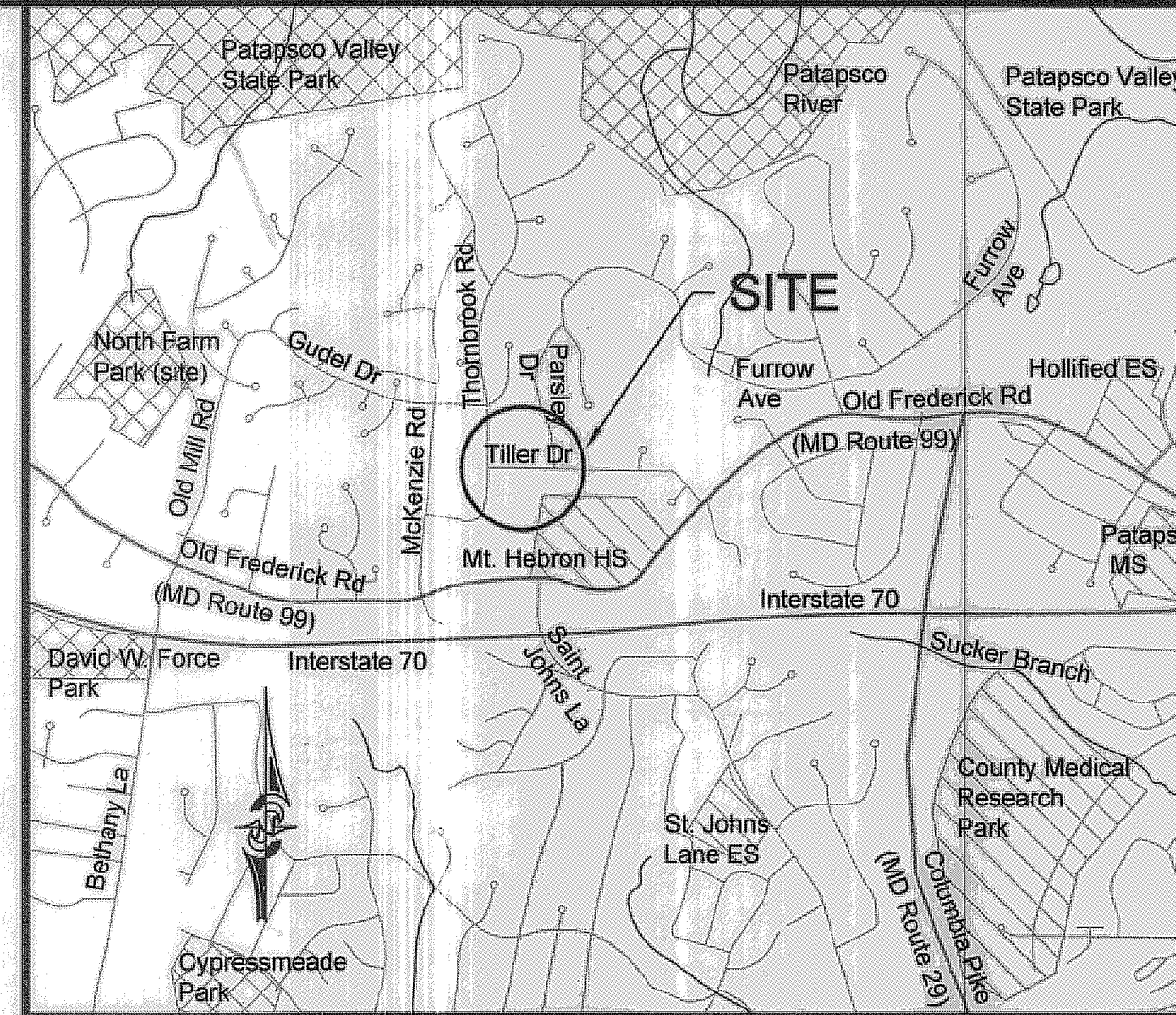


SHEET 2

**LEGEND**

- S — S — Ex. Sewer
- — — — — Ex. Electric line
- GAS — — — — — Ex. Gas line
- 100 YR — — — — — Ex. 100 yr Flood Plain/Asbuilt
- Ex 100 YR — — — — — Ex. 100 yr Flood Plain/HEC-RAS Model
- — — — — Property Line
- — — — — Ex. Stream Center Line
- — — — — Limits of Disturbance
- — — — — Tree Line
- — — — — Existing Contours
- — — — — Ex. Tree
- — — — — Survey Limit

- SHEET INDEX**
1. TITLE SHEET AND EXISTING CONDITIONS
  2. PLAN VIEW
  3. SEDIMENT CONTROL PLAN VIEW
  4. SEDIMENT CONTROL NOTES AND DETAILS
  5. PROPOSED CROSS SECTIONS
  6. GRADING TYPICAL AND SPECIFICATIONS/ PROFILE
  7. PLANTING PLAN



**ADC Vicinity Map**  
Howard County, MD  
21st edition Map 11 K4  
Approximate Scale: 1" = 2000'

- 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 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 verify 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. Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 14752, Expiration Date: 01/14/10.
  4. Existing Topography and existing features shown hereon are provided by the professional field survey from J.A. Rice, Inc. on July 31 of 2007. Per J.A. Rice documentation, "Horizontal is based on property corners found and referenced to the Maryland State Grid System (NAD27) as per Plat 7408 Recorded in the land records of Ho. County, MD. Vertical is based on 'as-built' elevations of the [72"x44"] pipe invert and headwall as shown on the plan and profile of the Tiller Drive provided by CPJ and drafted by Purdum & Jeschke on 5-12-78".
  5. All construction shall be in accordance with the latest standards and specifications of Howard County plus MSHA Standards and specifications if applicable.
  6. The contractor shall notify the Department of Public Works/Bureau of Engineering/Construction Inspection Division at (410) 313-1880 at least five (5) working days prior to the start of work.
  7. The contractor shall notify "MISS Utility" at 1-800-257-7777 at least 48 hours prior to any excavation work being done.
  8. Traffic control devices, markings and signing shall be in accordance with the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD).
  9. There are no wetlands within the LOD as found on August, 2007 field visit by CPJ.
  10. This unnamed tributary to the Patapsco River is a Maryland Use Class I Waters. Therefore, in-stream work shall not be conducted during the period of March 1 through June 15, inclusive, during any year.
  11. All material removed from this site shall be taken to a site with an active grading permit.
  12. Location of existing utilities are based on existing drawings from BG&E (electric and gas) and Howard County (sewer) and are approximate. It is the contractor's responsibility to contact MISS Utility to determine exact locations of utilities. The contractor shall take all necessary precautions to protect the existing utilities and maintain uninterrupted service. Any damage incurred due to contractor's operation shall be repaired immediately at the contractor's expense.
  13. All vegetative and structural practices are to be installed according to the provisions of this plan and are to be in conformance with the most current MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, and revisions hereto.
  14. This design was prepared using best management practices to stabilize the banks of the perennial stream within the confines of existing easement. This drainage way is a part of a natural system subject to uncontrollable natural forces. There is no warranty / guarantee that the stream will not move from its designed location in the future.

**SUMMARY OF ENVIRONMENTAL IMPACTS**

Restoration Design Area	Tree Removal (Each)	Stream Disturbance (lf)	Wetland Disturbance (sq ft)	LOD (sq ft)	LOD (acres)
Water of US Only	0	150	0	630	0.014
Land/ Stabilization Only	2	0	0	4,150	0.095
Total	0	0	0	4,780	0.109
Temp. Access Only	0	0	0	2,000	0.046

**Tree To Be Removed**

ID	Species	DBH	Stem	Condition
877	Green Ash	19	Triple	Fair
878	Black Walnut	9	Single	Fair
882*	Black Willow	32	Single	Fair

Note: Root Prune Tree # 882; only removed per County's Forester Request

**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.

BY THE OWNER/DEVELOPER:  
I/WE CERTIFY THAT ALL DEVELOPMENT AND/OR CONSTRUCTION WILL BE DONE ACCORDING TO THESE PLANS, AND THAT ANY RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I ALSO AUTHORIZE PERIODIC ON-SITE INSPECTIONS BY THE HOWARD COUNTY CONSTRUCTION INSPECTION DIVISION.

*GARY S. ARTHUR* 10-16-08  
OWNER/DEVELOPER: HC DEPT. OF RECREATION AND PARKS DIRECTOR DATE  
GARY S. ARTHUR  
OWNER/DEVELOPER: PRINTED NAME

APPROVED: DEPARTMENT OF PUBLIC WORKS

*[Signature]* 10/16/08  
DIRECTOR OF PUBLIC WORKS DATE

*[Signature]* 10/10/08  
CHIEF, BUREAU OF ENVIRONMENTAL SERVICES DATE

*[Signature]* 10/10/08  
CHIEF, STORMWATER MANAGEMENT DIVISION DATE

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

*[Signature]* 10/30/08  
DAVID O'BRYAN PE # 14752 No. 1072 DATE  
ENGINEER: PRINTED NAME

Prepared for:  
Howard County Department of Public Works  
Bureau of Environmental Services  
6751 Columbia Gateway Drive, #514  
Columbia, MD 21046  
Phone: (410) 313-6417  
Attn: Mr. Richard Powell

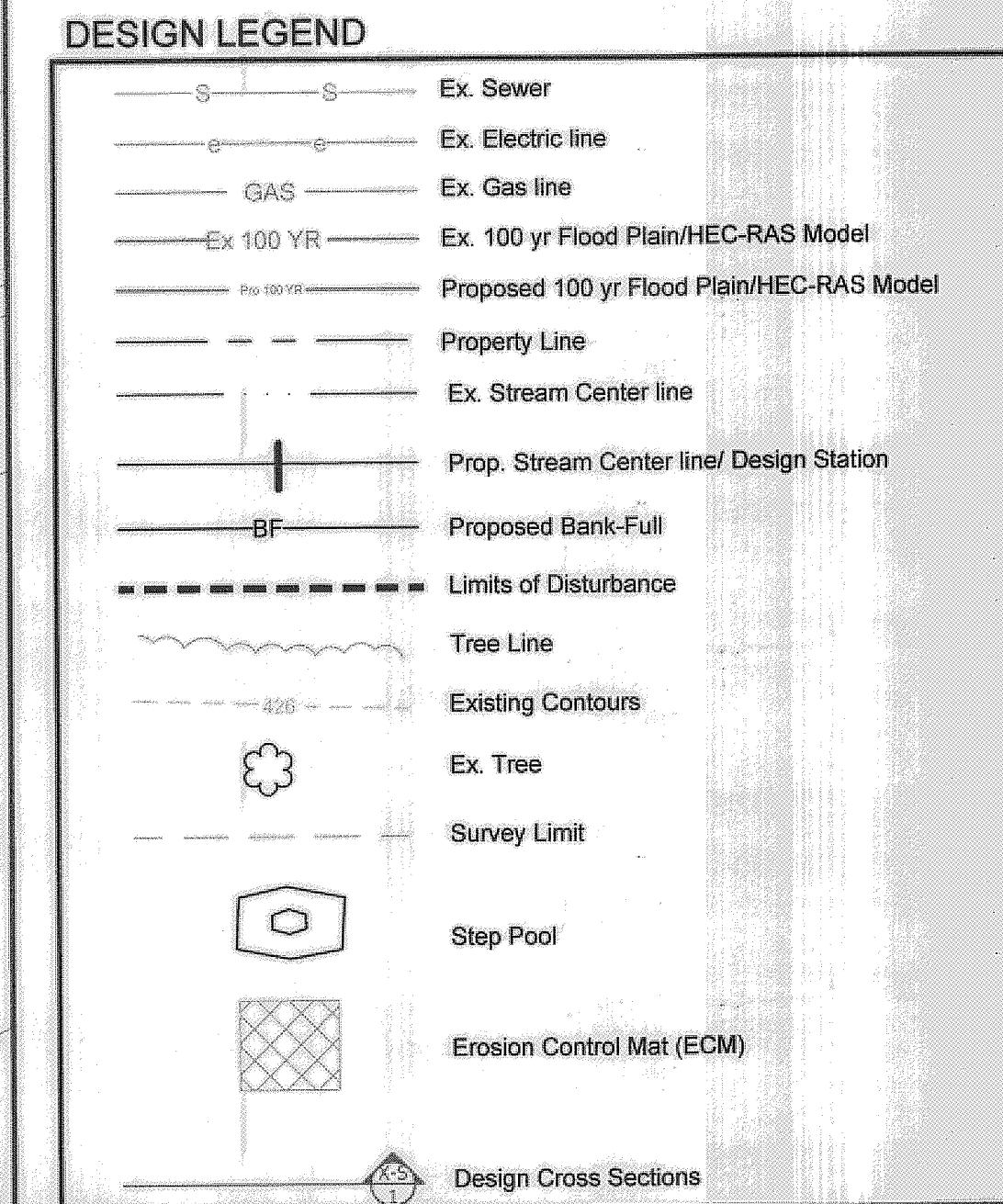
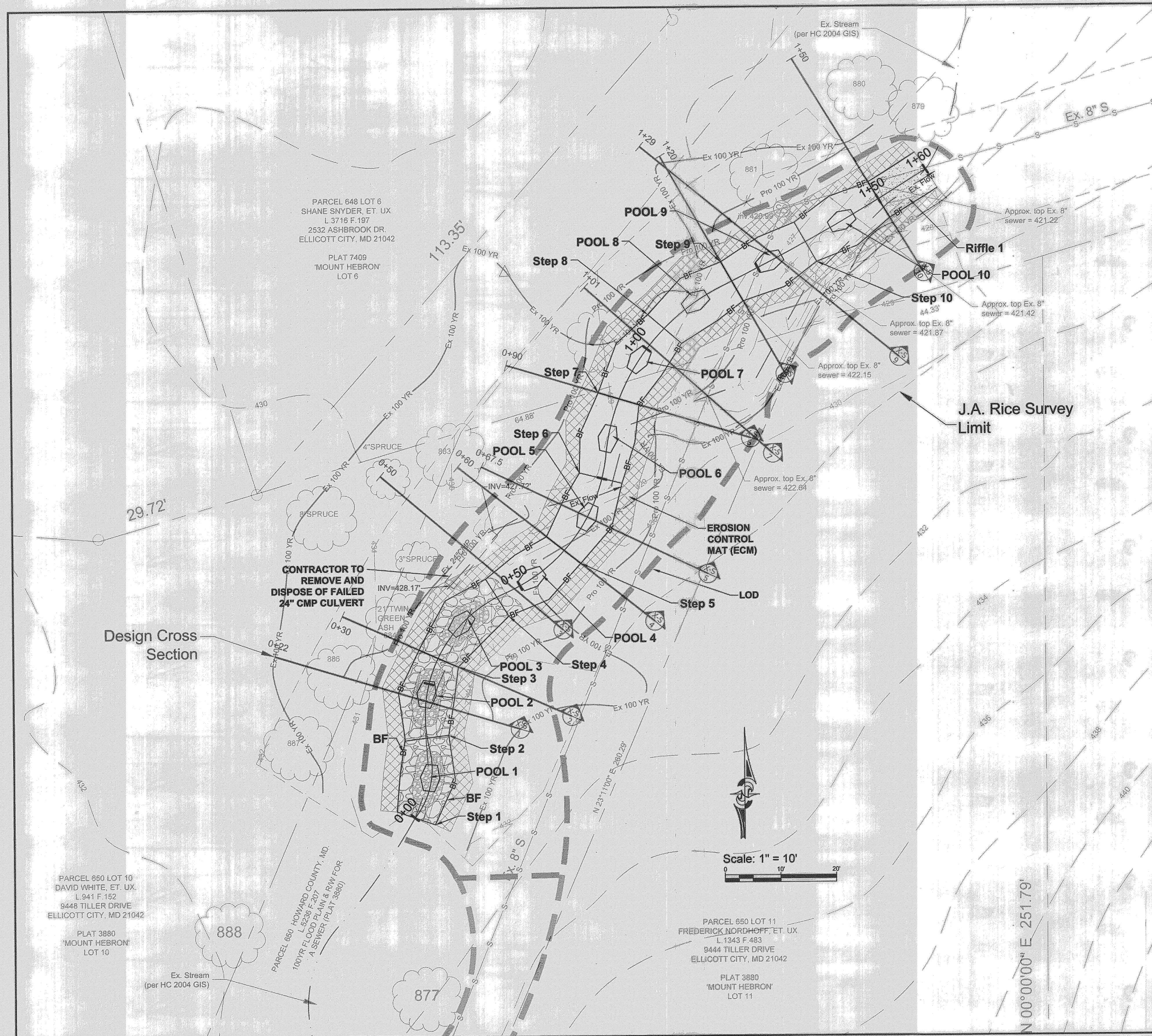
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100 yr. Flood Plain & R/W for Sewer  
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Park and Recreation  
Parcel 648 Lot 9 L 1726 F 100  
Tax Map 17 Grid 10

**Tiller Drive Stream Stabilization**  
TITLE SHEET AND EXISTING CONDITIONS

DATE:	NO.	REVISIONS	BY	DATE
09/08				
DESIGNED: RP				
DRAFTED: HT				
CHECKED: DO				
BASE DATA: J.A. Rice				

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SCALE AS SHOWN  
SHEET 1  
OF 7 SHEETS  
JOB NO. 37-553



**General Notes**

1. Due to shallow nature of stream, design contours are not shown. For assistance in construction grading and stationing, see the Design Cross Sections on Sheet 5 and the Design Profile on Sheet 6. For typical pool dimensions, see Design Cross Section 5 at Design Station 0+67.5. For typical step dimensions, see Cross Sections 2, 4, 6, or 8 at Design Stations 0+30, 0+60, 0+90 and 1+20, respectively.
2. The Limit of Disturbance is based on an offset of 10 (horizontal) feet from the bankfull location at each cross section or the extent of the Design Cross Sections to the existing grade tie-in (see Sheet 5), whichever distance is greater.
3. For typical step-pool construction, rip rap extends from the base of the pool up to bankfull elevation. ECM is utilized from bankfull elevation to existing grade tie-in. The location of the bankfull and ECM extents on this sheet are only approximate; for exact distances, see Sheet 5. Elevations indicated on cross sections and profile are top of stone elevations. Approximate stone base height is one foot (for example, difference in elevation from top of fill beneath pool to lowest pool elevation is one foot). Plan and profile graphic presentations and additional dimensions of step-pool construction are shown on Sheet 6.

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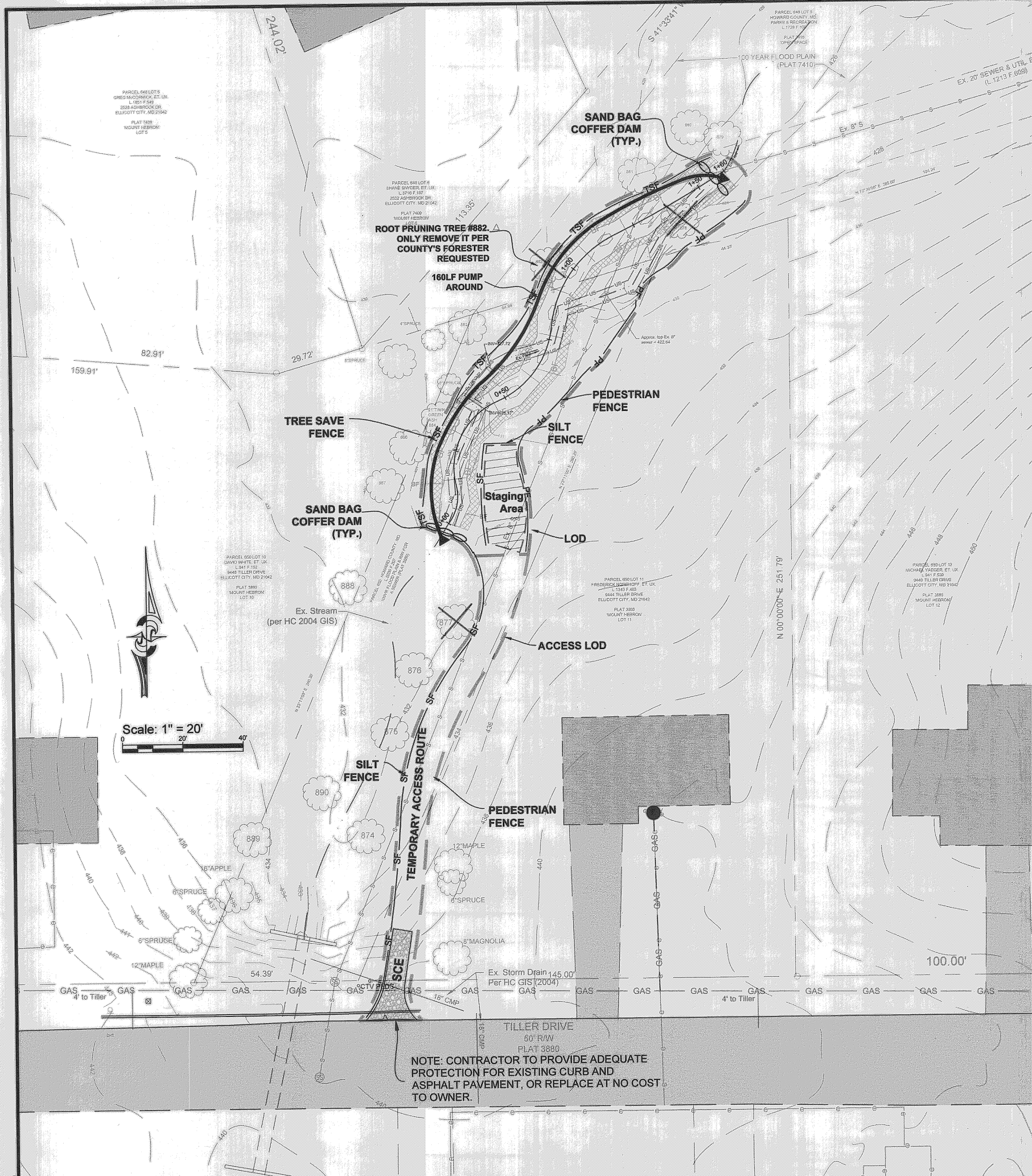
HOWARD COUNTY, MD  
100 yr. Flood Plain & R/W for Sewer  
Parcel 650 L 5236 F 207  
Park and Recreation  
Parcel 648 Lot 9 L 1726 F 100  
Tax Map 17 Grid 10

**Tiller Drive Stream Stabilization**  
PLAN VIEW

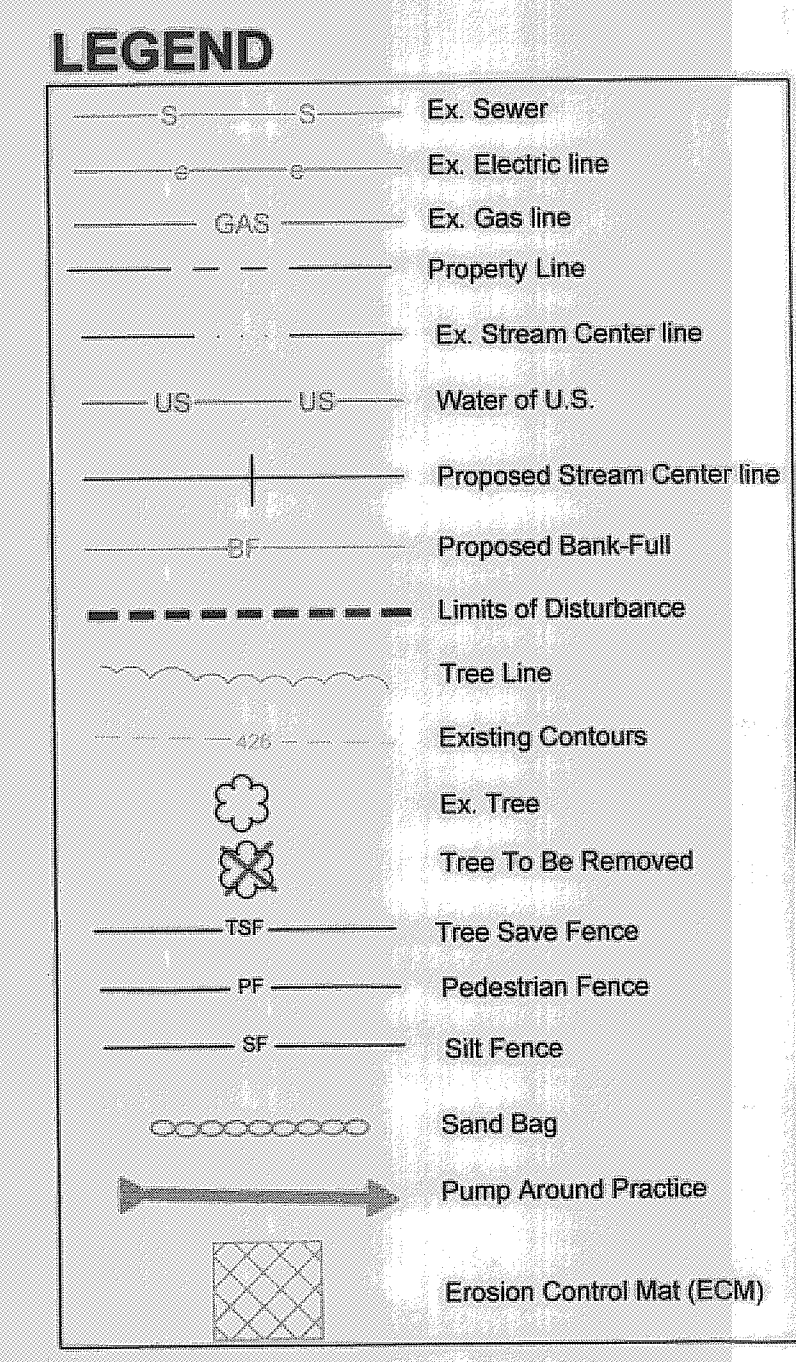
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SCALE AS SHOWN  
SHEET 2  
OF 7 SHEETS  
JOB NO. 37-553



PLAN VIEW



SEQUENCE OF CONSTRUCTION

- Contractor to conduct a pre-construction meeting with Designer (CPJ), Owner, MDE Inspector and HC DPWBES at least 48 hours prior to the start of construction. MISS Utility is to have been contacted by this time and is to have had an opportunity to mark all utilities within the limits of disturbance. Work areas and limits of disturbance to be marked in the field prior to this meeting. 1 day
  - Construction Access Staging and Stockpile Areas (4 days)**
    - Clear and grub for stabilized construction entrance, construction access points, and associated sediment and erosion control devices except for the in-stream sandbag stone dikes and pumped diversions.
    - Install stabilized construction entrances, construction access points, staging and stockpile areas, and associated sediment and erosion control devices as shown in construction drawings and outlined in the Construction Specifications.
    - Install sandbag dike around perimeter of pool upstream of construction area as shown in plans.
    - Install pump and hose system with intake hose in upstream clean water diversion pool and discharge hose placed to outfall downstream of construction area as shown in plans.
  - Construction Area (10 days)**
    - Clear and grub streambanks and remove debris from existing channel.
    - Starting at upstream end of project area and working downstream, excavate new channel and grade both stream banks (Station 0+00 - 1+60) as shown in construction drawings.
    - Starting at upstream end of project area, working in a downstream direction, install log boulder step pools (Station 0+00 - 1+50) as shown in construction drawings and outlined in the Construction Specifications.
    - Starting at upstream end, and working downstream, install constructed riffle (Station 1+50 to 1+80) as shown in construction drawings and outlined in the Construction Specifications.
    - Rake all disturbed areas on streambanks and floodplain/terrace.
    - Apply permanent seed mix and mulch over all disturbed streambank floodplain/terrace areas.
    - Install coir fiber blankets along exposed banks as outlined in the Construction Specifications.
    - Shut down pump diversion and remove pump, hoses, and sandbag/stone dikes.
    - Once work is complete, conduct a "punchlist" walk with Owner, HC DPWBES, Contractor, MDE Inspector, and Designer (CPJ).
  - Clean-Up (3 days)**
    - Remove construction access road and silt fence.
    - Haul debris, excess materials, etc.
    - Fill and rake smooth any ruts outside of immediate project area.
    - Seed all disturbed areas outside of immediate project area and mulch with straw.
    - Plant shrubs in area of reconstructed streambank.
- Total duration of construction: 18 days**

STANDARD SEDIMENT CONTROL NOTES

- A minimum of 48 hours notice must be given to the Howard County Department of Inspections, Licenses and Permits, Sediment Control Division prior to the start of any construction (410-313-1855).
- All vegetative and structural practices are to be installed according to the provisions of this plan and are to be in conformance with the most current MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL and revisions thereto.
- Following initial soil disturbance or re-disturbance, permanent or temporary stabilization shall be completed within: a) 7 calendar days for all perimeter sediment control structures, dikes, perimeter slopes and all slopes greater than 3:1, b) 14 days as to all other disturbed or graded areas on the project site.
- All sediment traps/basins shown must be fenced and warning signs posted around their perimeter in accordance with Vol 1, Chapter 12 of the HOWARD COUNTY DESIGN MANUAL, Storm Drainage.
- All disturbed areas must be stabilized within the time period specified above in accordance with the 1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL for permanent seeding (Sec. 51), sod (Sec. 54), temporary seeding (Sec. 50) and mulching (Sec. 52). Temporary stabilization and mulch alone can only be done when recommended seeding dates do not allow for proper germination and establishment of grasses.
- 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.
- Site Analysis:
 

Total Area of site	7.79 acres.
Area Disturbed	0.109 acres.
Area to be roofed or paved	0 acres.
Area to be vegetatively stabilized	0 acres.
Total Cut	100.0 Cu. Yds.
Total Fill	0 Cu. Yds.
Offsite waste/borrow area location	To be Provided by the Contractor for Approval by the Project Manager
- Any sediment control practice which is disturbed by grading activity for placement of utilities must be repaired on the same day of disturbance.
- Additional sediment control must be provided, if deemed necessary by the Howard County Sediment Control Inspector.
- 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.
- Trenches for the construction of utilities is limited to three pipe lengths or that which shall be back-filled and stabilized by the end of each work day, whichever is shorter.

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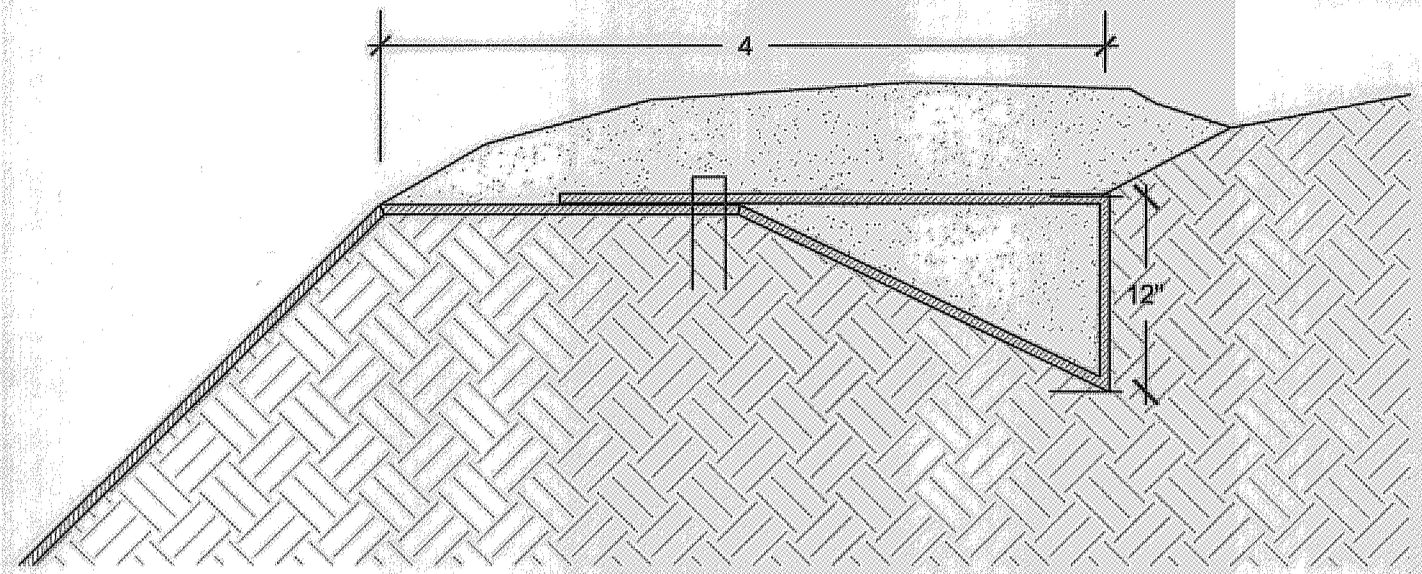
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Tiller Drive Stream Stabilization  
SEDIMENT CONTROL PLAN

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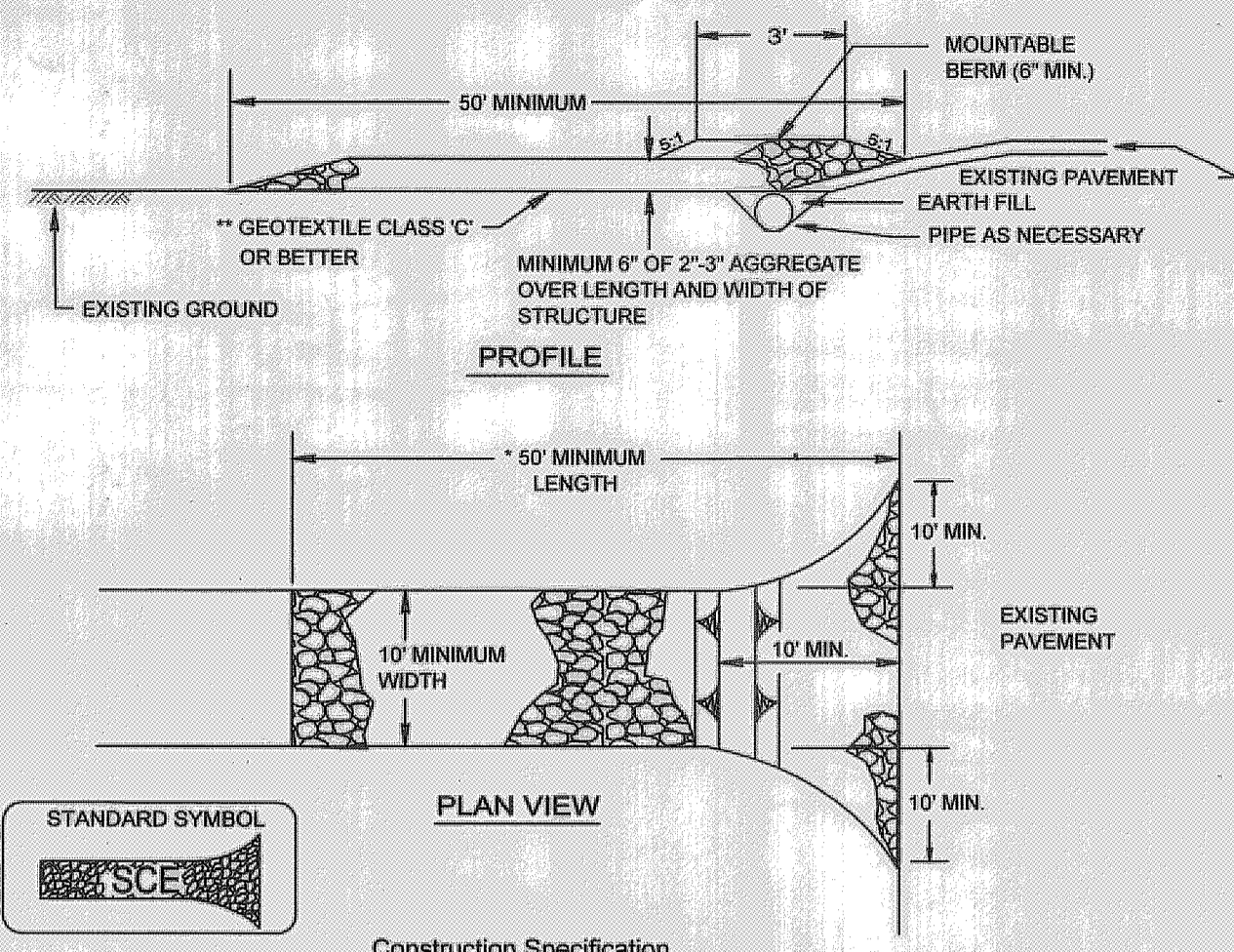
SCALE AS SHOWN  
SHEET 3  
OF 7 SHEETS  
JOB NO. 37-553



- 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).

**(ECM) FIBER MATTING KEY-IN**  
Scale: N.T.S.

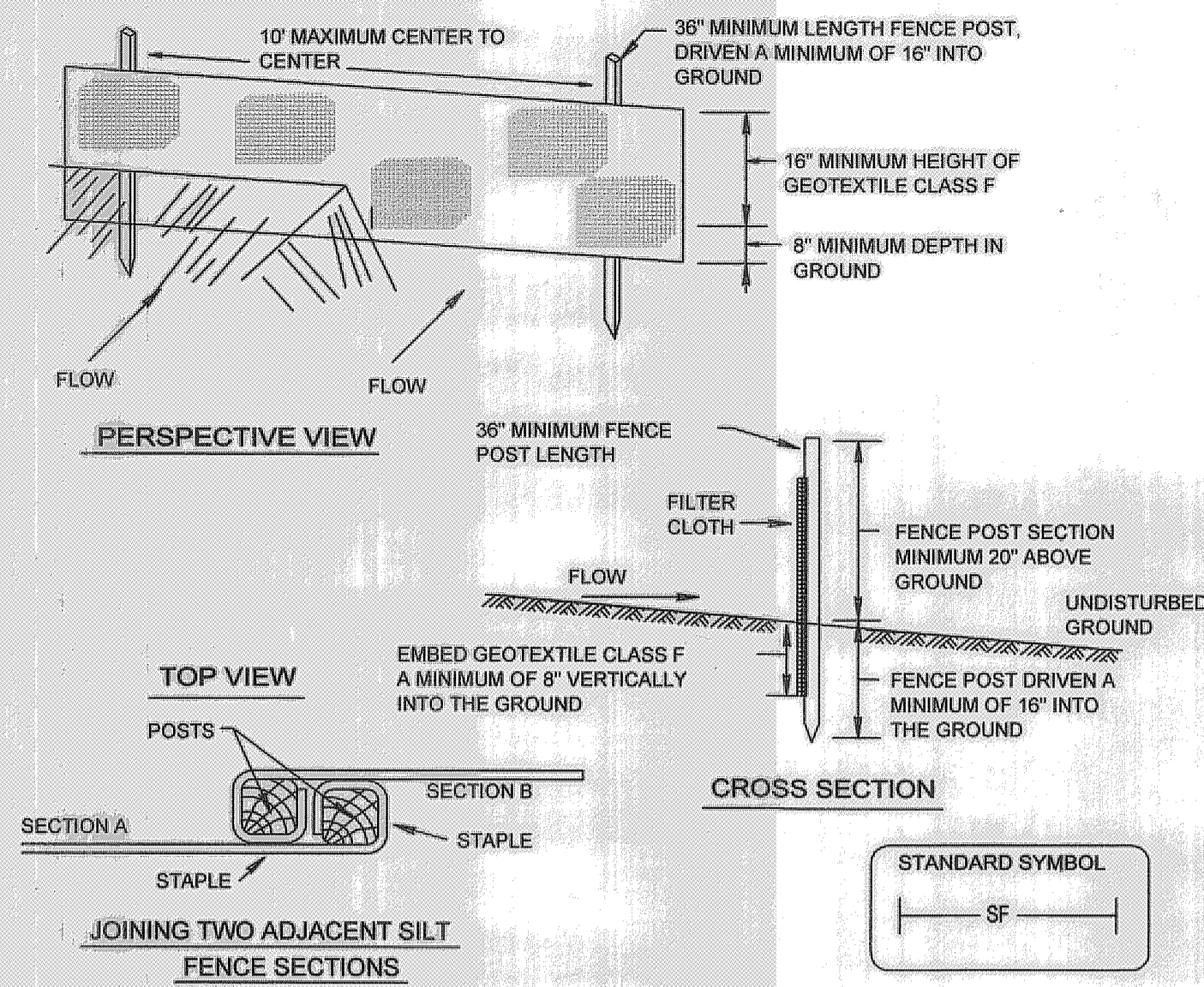
**DETAIL 24 - STABILIZED CONSTRUCTION ENTRANCE**



- 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 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 1 1/2" x 1 1/2" square (minimum) cut, or 1 3/4" 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 pound 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 ft / 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.

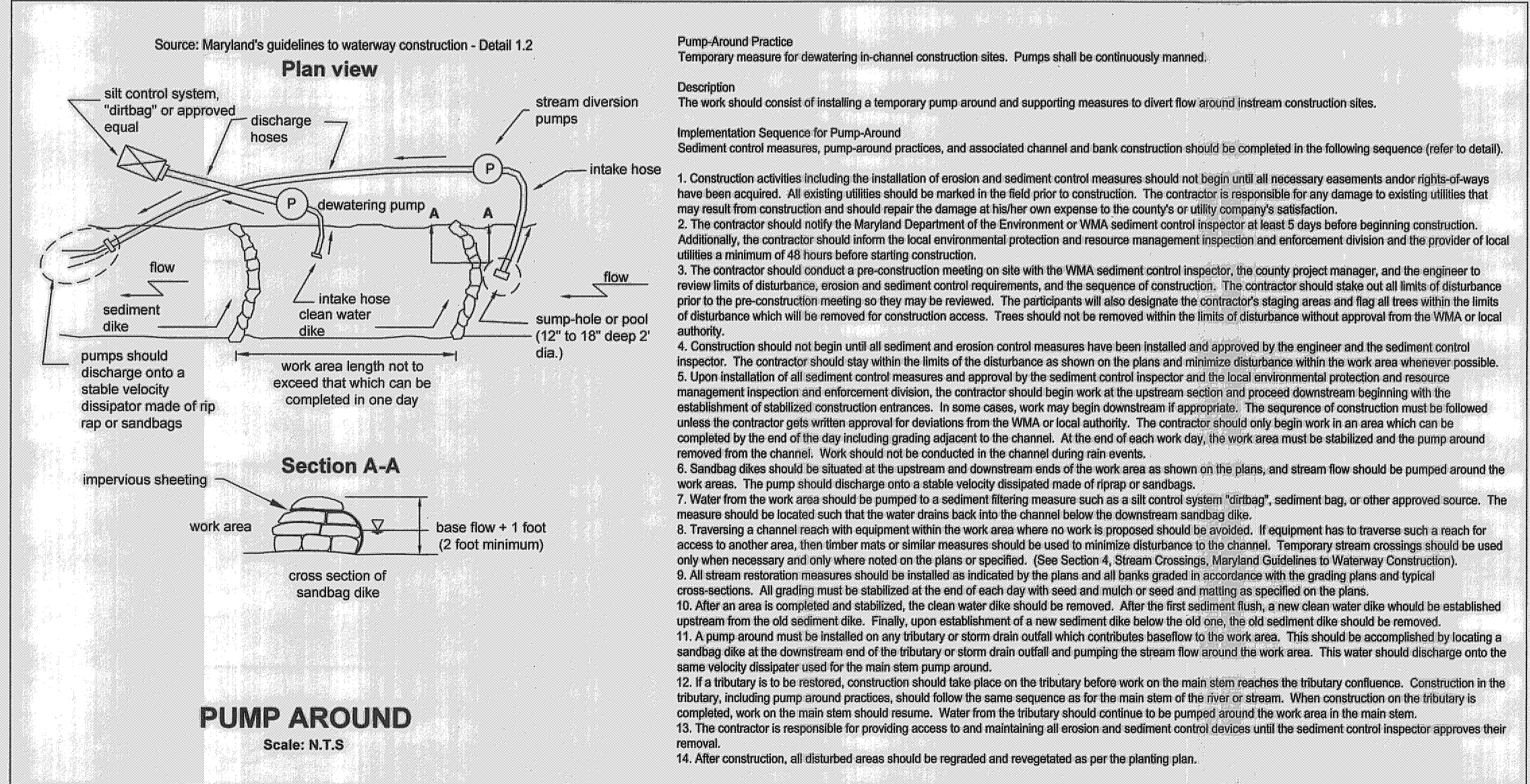
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE PAGE E - 15 - 3 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

**Silt Fence Design Criteria**

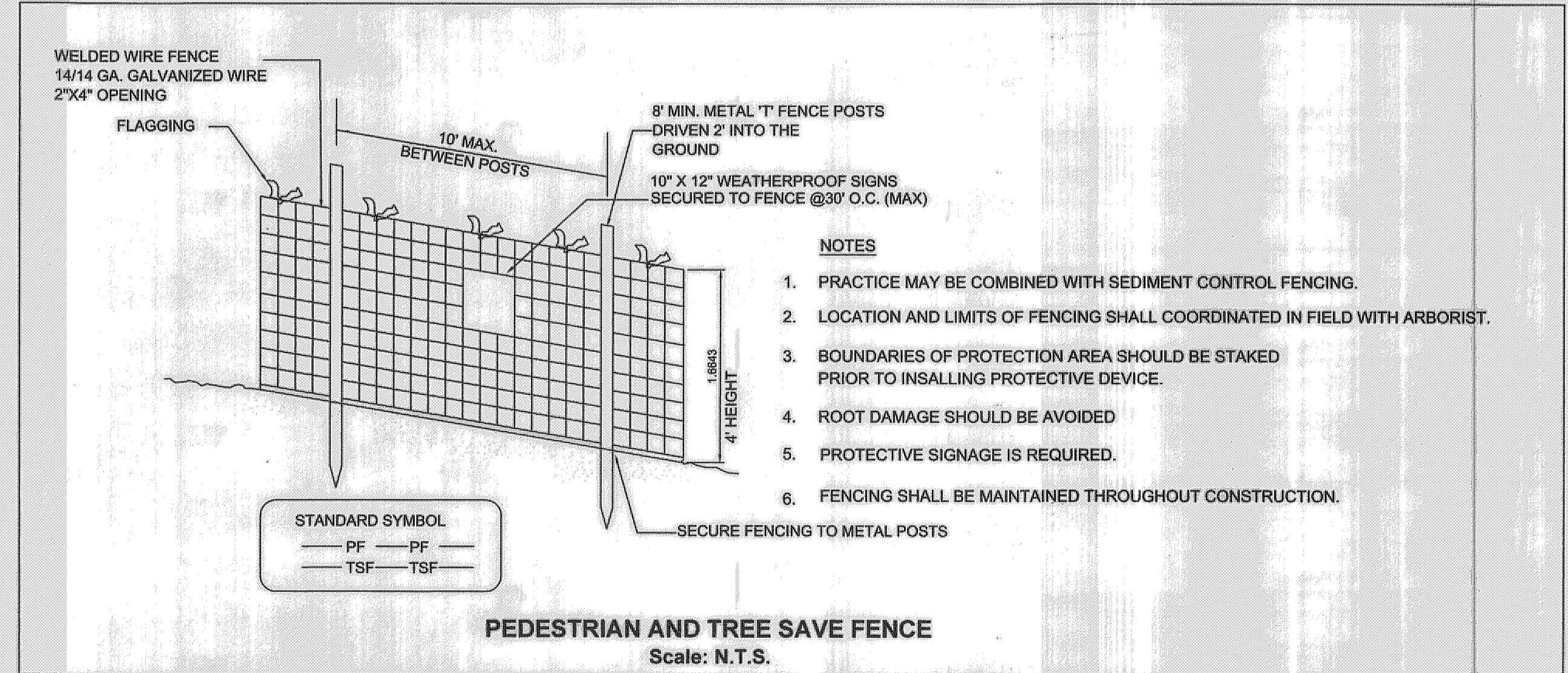
Slope Steepness	(Maximum) Slope Length	(Maximum) Silt Fence Length
Flatter than 50:1	unlimited	unlimited
50:1 to 10:1	125 feet	1,000 feet
10:1 to 5:1	100 feet	750 feet
5:1 to 3:1	80 feet	500 feet
3:1 to 2:1	40 feet	250 feet
2:1 and steeper	20 feet	125 feet

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

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



- Pump-Around Practice**  
Temporary measure for dewatering in-channel construction sites. Pumps shall be continuously manned.
- Description**  
The work should consist of installing a temporary pump around and supporting measures to divert flow around in-stream construction sites.
- Implementation Sequence for Pump-Around**  
Sediment control measures, pump-around practices, and associated channel and bank construction should be completed in the following sequence (refer to detail).
1. Construction activities including the installation of erosion and sediment control measures should not begin until all necessary easements and/or rights-of-way have been acquired. All existing utilities should be marked in the field prior to construction. The contractor is responsible for any damage to existing utilities that may result from construction and should repair the damage at his/her own expense to the county's or utility company's satisfaction.
  2. The contractor should notify the Maryland Department of the Environment or WMA sediment control inspector at least 5 days before beginning construction. Additionally, the contractor should inform the local environmental protection and resource management inspection and enforcement division and the provider of local utilities a minimum of 48 hours before starting construction.
  3. The contractor should conduct a pre-construction meeting on site with the WMA sediment control inspector, the county project manager, and the engineer to review limits of disturbance, erosion and sediment control requirements, and the sequence of construction. The contractor should stake out all limits of disturbance prior to the pre-construction meeting so they may be reviewed. The participants will also designate the contractor's staging areas and flag all trees within the limits of disturbance which will be removed for construction access. Trees should not be removed within the limits of disturbance without approval from the WMA or local authority.
  4. Construction should not begin until all sediment and erosion control measures have been installed and approved by the engineer and the sediment control inspector. The contractor should stay within the limits of the disturbance as shown on the plans and minimize disturbance within the work area whenever possible.
  5. Upon installation of all sediment control measures and approval by the sediment control inspector and the local environmental protection and resource management inspection and enforcement division, the contractor should begin work at the upstream section and proceed downstream beginning with the establishment of stabilized construction entrances. In some cases, work may begin downstream if appropriate. The sequence of construction must be followed unless the contractor gets written approval for deviations from the WMA or local authority. The contractor should only begin work in an area which can be completed by the end of the day including grading adjacent to the channel. At the end of each work day, the work area must be stabilized and the pump around removed from the channel. Work should not be conducted in the channel during rain events.
  6. Sandbag dikes should be situated at the upstream and downstream ends of the work area as shown on the plans, and stream flow should be pumped around the work areas. The pump should discharge onto a stable velocity dissipater made of riprap or sandbags.
  7. Water from the work area should be pumped to a sediment filtering measure such as a silt control system "dirtbag", sediment bag, or other approved source. The measure should be located such that the water drains back into the channel below the downstream sandbag dike.
  8. Traversing a channel reach with equipment within the work area where no work is proposed should be avoided. If equipment has to traverse such a reach for access to another area, then timber mats or similar measures should be used to minimize disturbance to the channel. Temporary stream crossings should be used only when necessary and only where noted on the plans or specified. (See Section 4, Stream Crossings, Maryland Guidelines to Waterway Construction).
  9. All stream restoration measures should be installed as indicated by the plans and all banks graded in accordance with the grading plans and typical cross-sections. All grading must be stabilized at the end of each day with seed and mulch or seed and matting as specified on the plans.
  10. After an area is completed and stabilized, the clean water dike should be removed. After the first sediment flush, a new clean water dike should be established upstream from the old sediment dike. Finally, upon establishment of a new sediment dike below the old one, the old sediment dike should be removed.
  11. A pump around must be installed on any tributary or storm drain outfall which contributes baseflow to the work area. This should be accomplished by locating a sandbag dike at the downstream end of the tributary or storm drain outfall and pumping the stream flow around the work area. This water should discharge onto the same velocity dissipater used for the main stem pump around.
  12. If a tributary is to be restored, construction should take place on the tributary before work on the main stem reaches the tributary confluence. Construction in the tributary, including pump around practices, should follow the same sequence as for the main stem of the river or stream. When construction on the tributary is completed, work on the main stem should resume. Water from the tributary should continue to be pumped around the work area in the main stem.
  13. The contractor is responsible for providing access to and maintaining all erosion and sediment control devices until the sediment control inspector approves their removal.
  14. After construction, all disturbed areas should be regraded and revegetated as per the planting plan.



- NOTES**
1. PRACTICE MAY BE COMBINED WITH SEDIMENT CONTROL FENCING.
  2. LOCATION AND LIMITS OF FENCING SHALL COORDINATED IN FIELD WITH ARBORIST.
  3. BOUNDARIES OF PROTECTION AREA SHOULD BE STAKED PRIOR TO INSTALLING PROTECTIVE DEVICE.
  4. ROOT DAMAGE SHOULD BE AVOIDED.
  5. PROTECTIVE SIGNAGE IS REQUIRED.
  6. FENCING SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.

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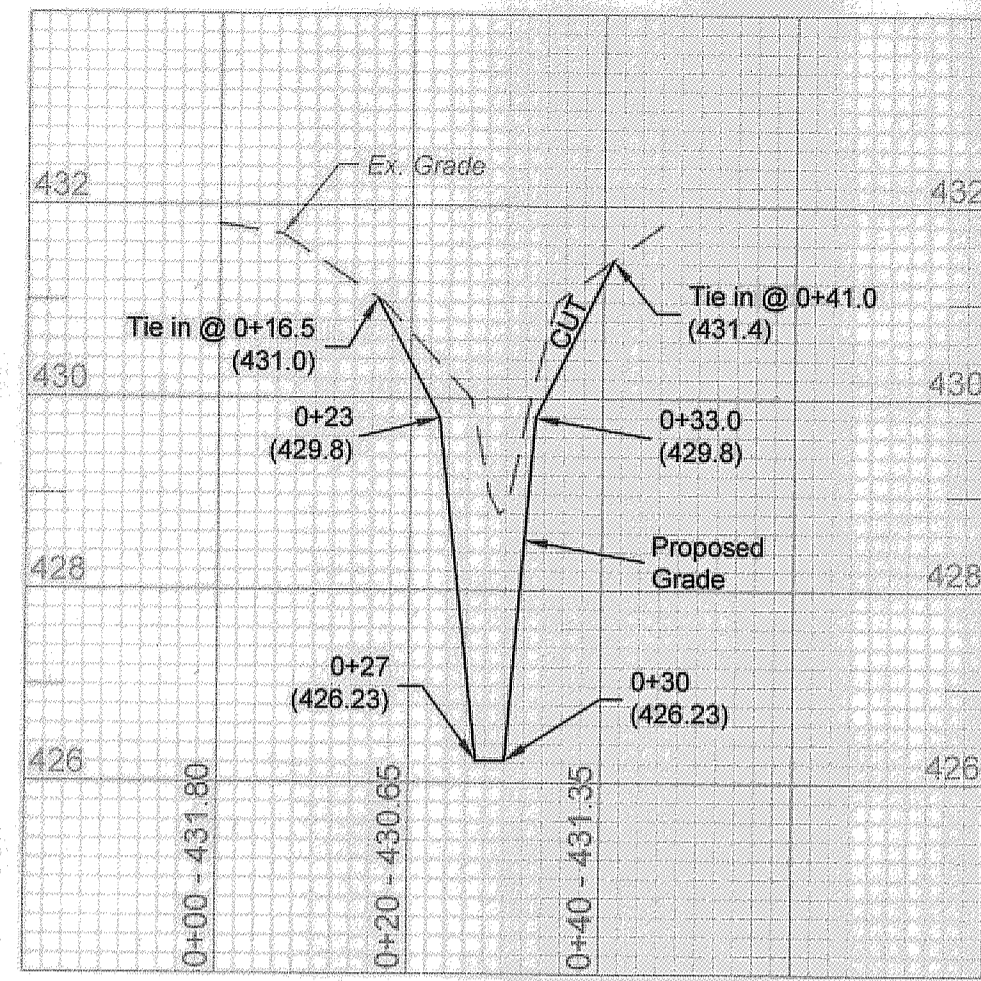
**Tiller Drive Stream Stabilization**  
SEDIMENT CONTROL NOTES AND DETAILS

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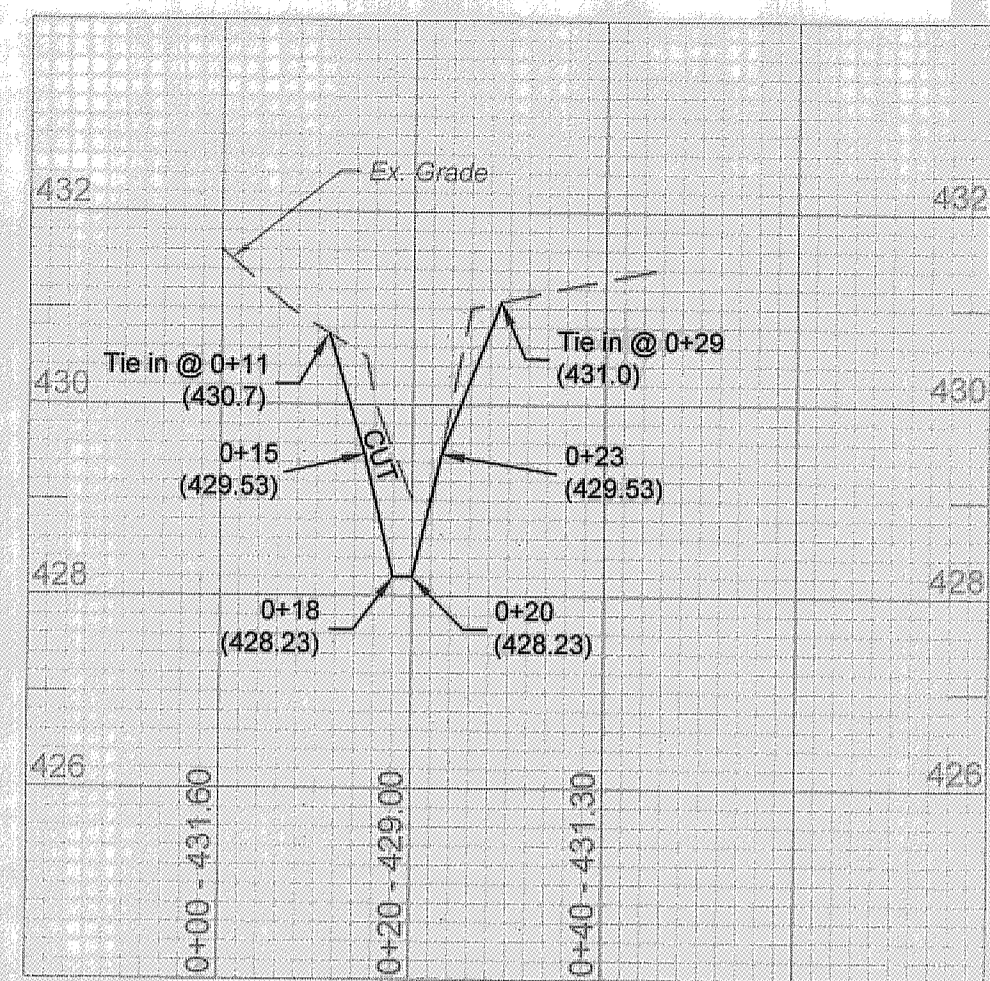
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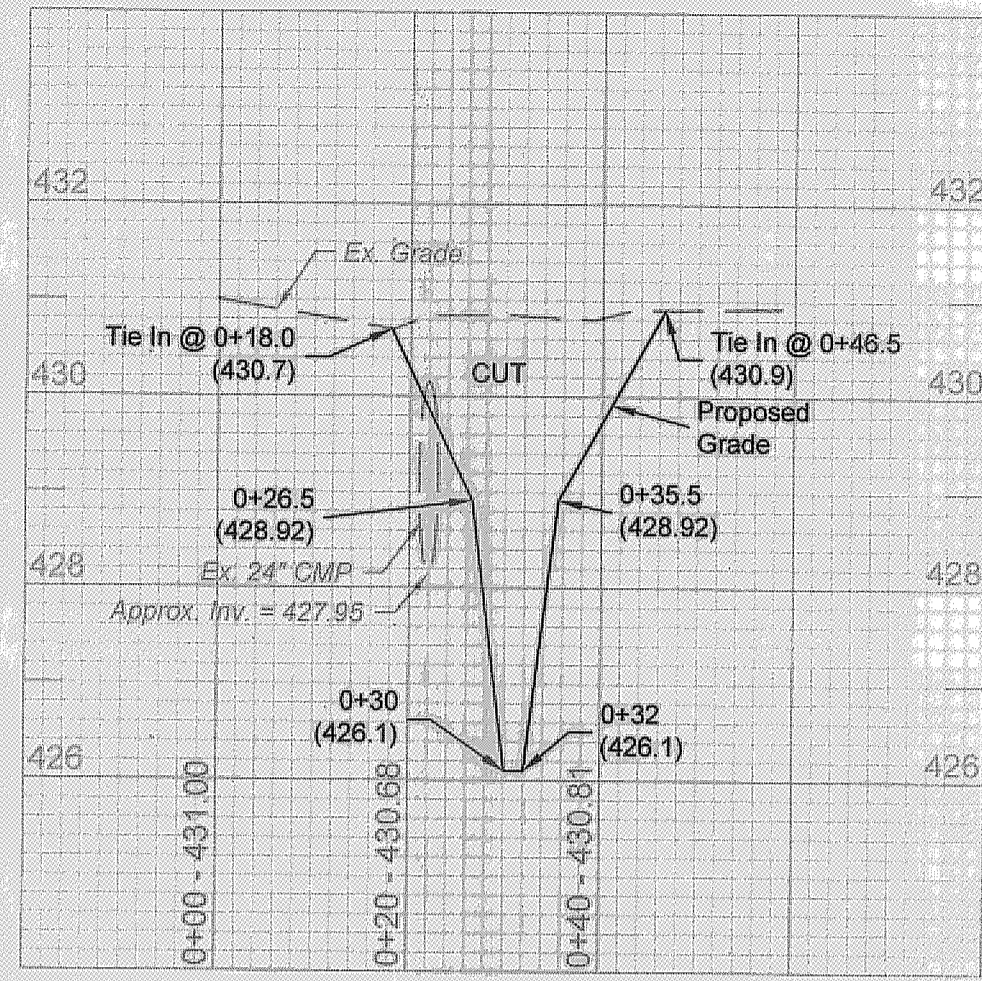
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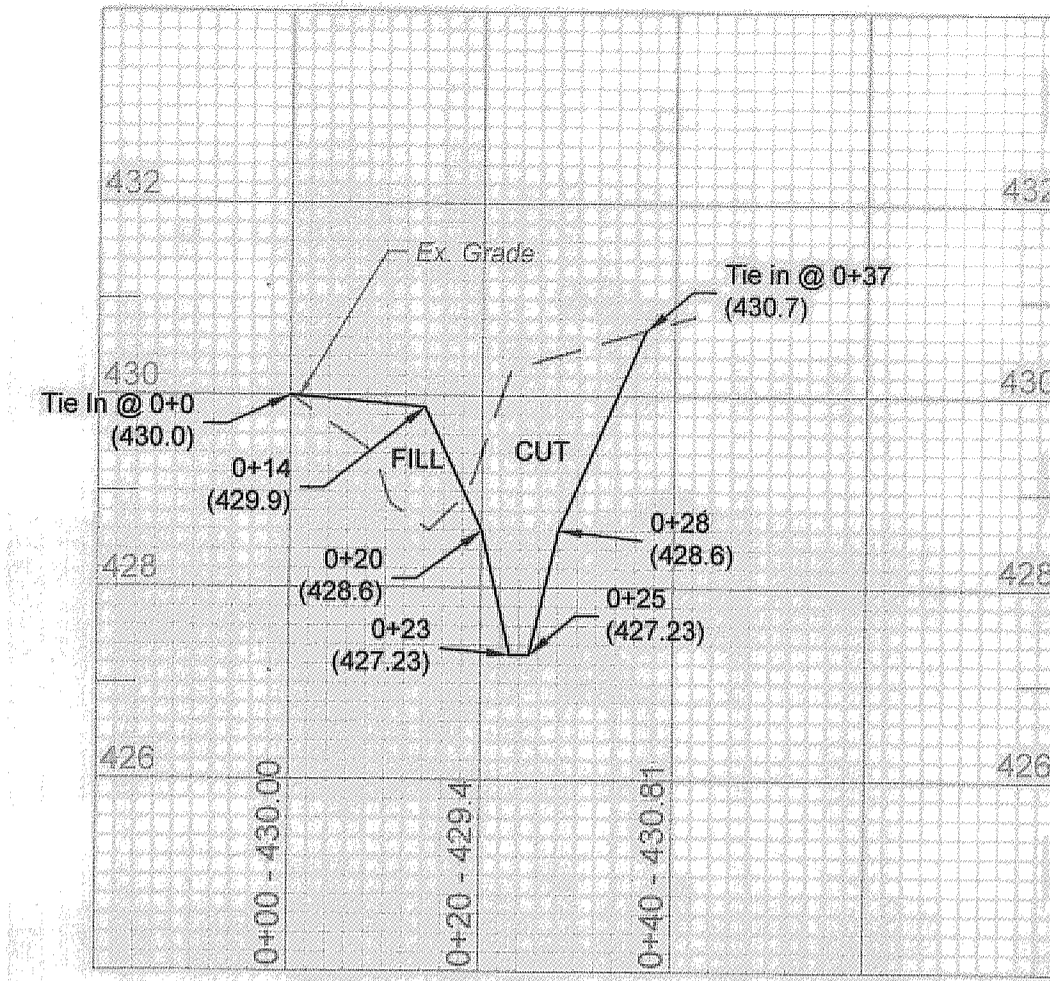
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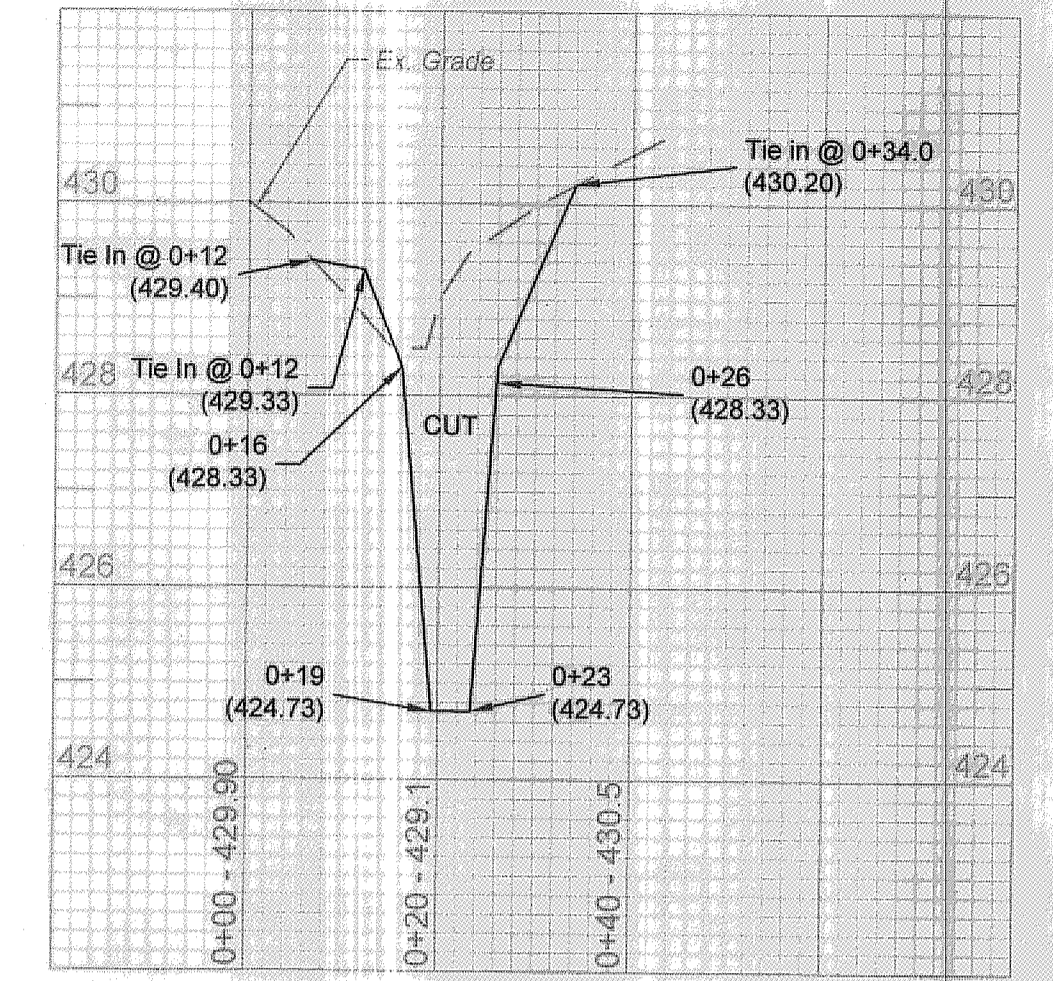
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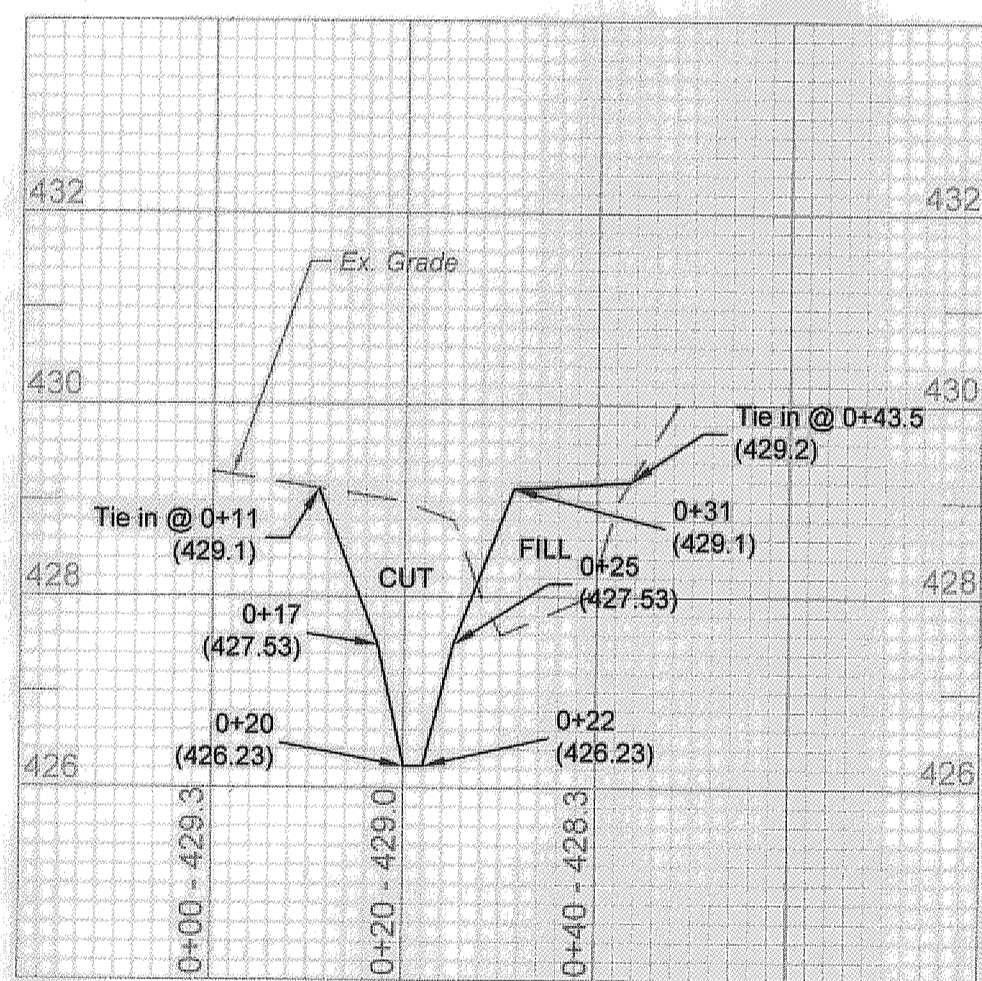
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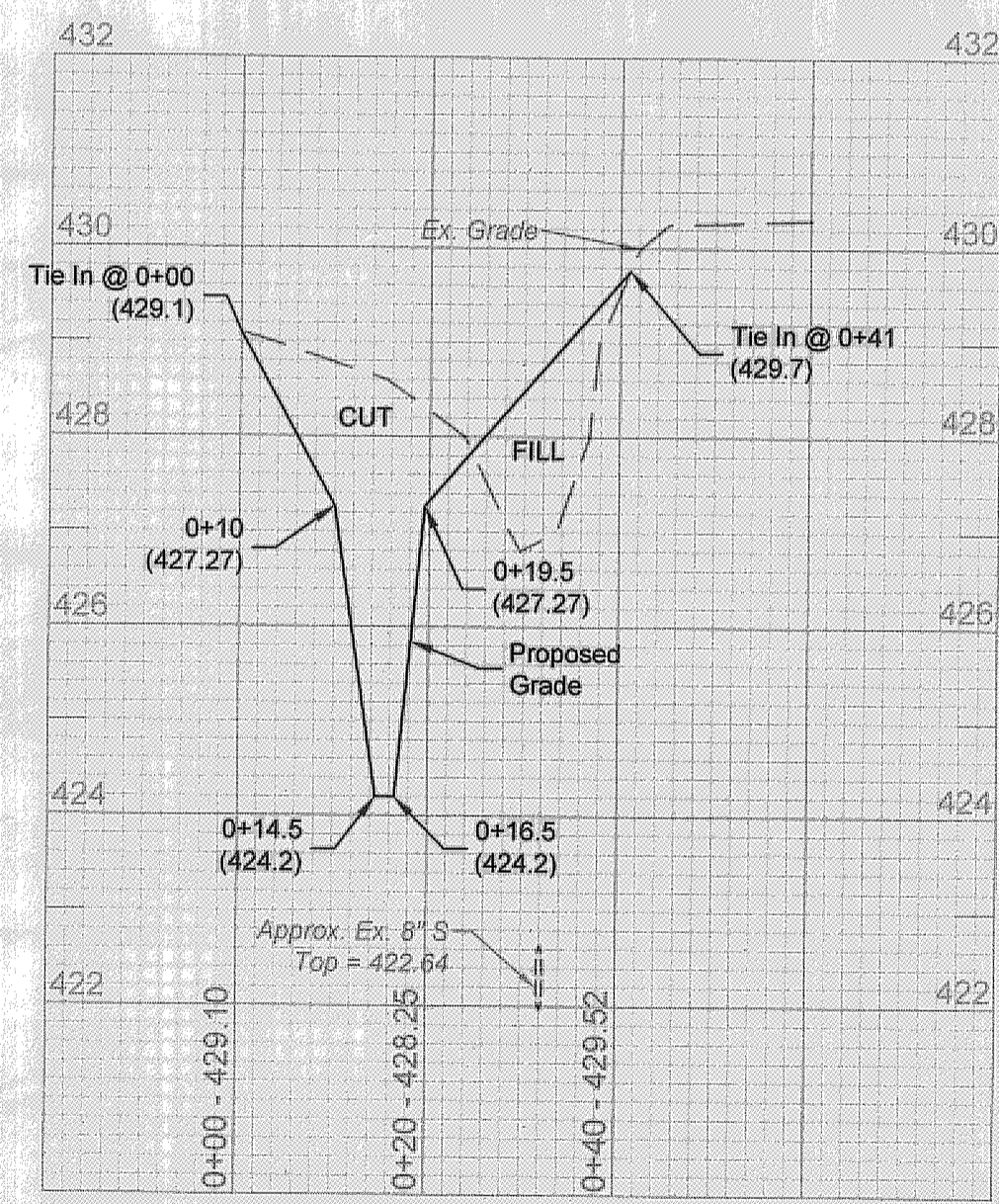
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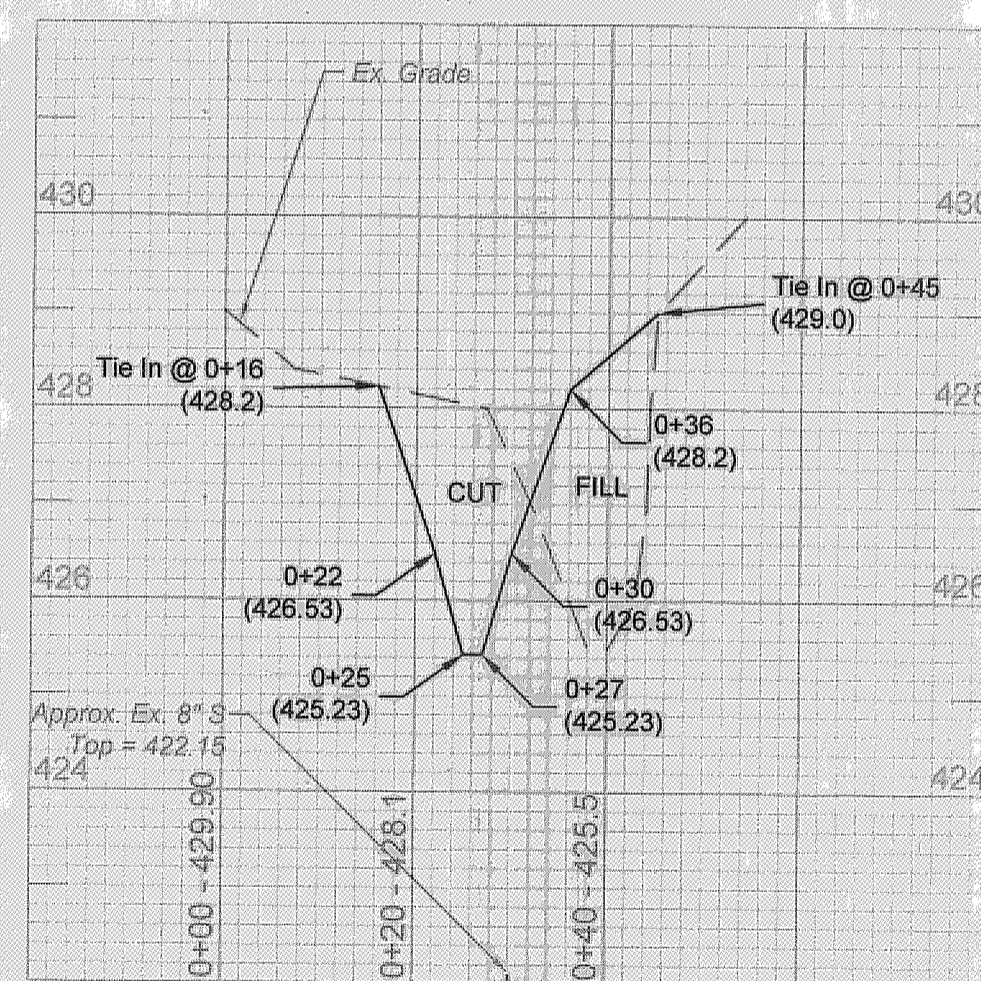
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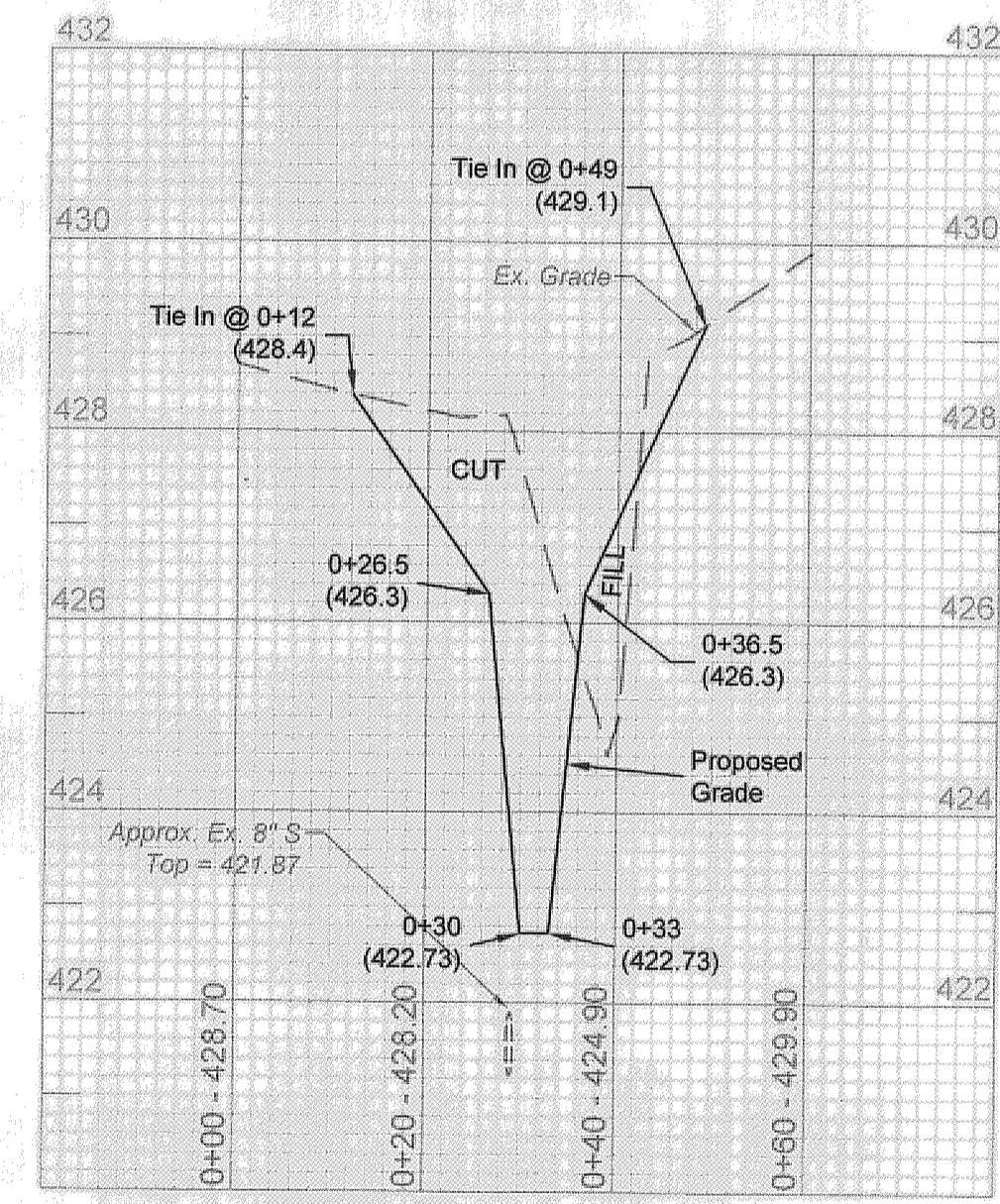
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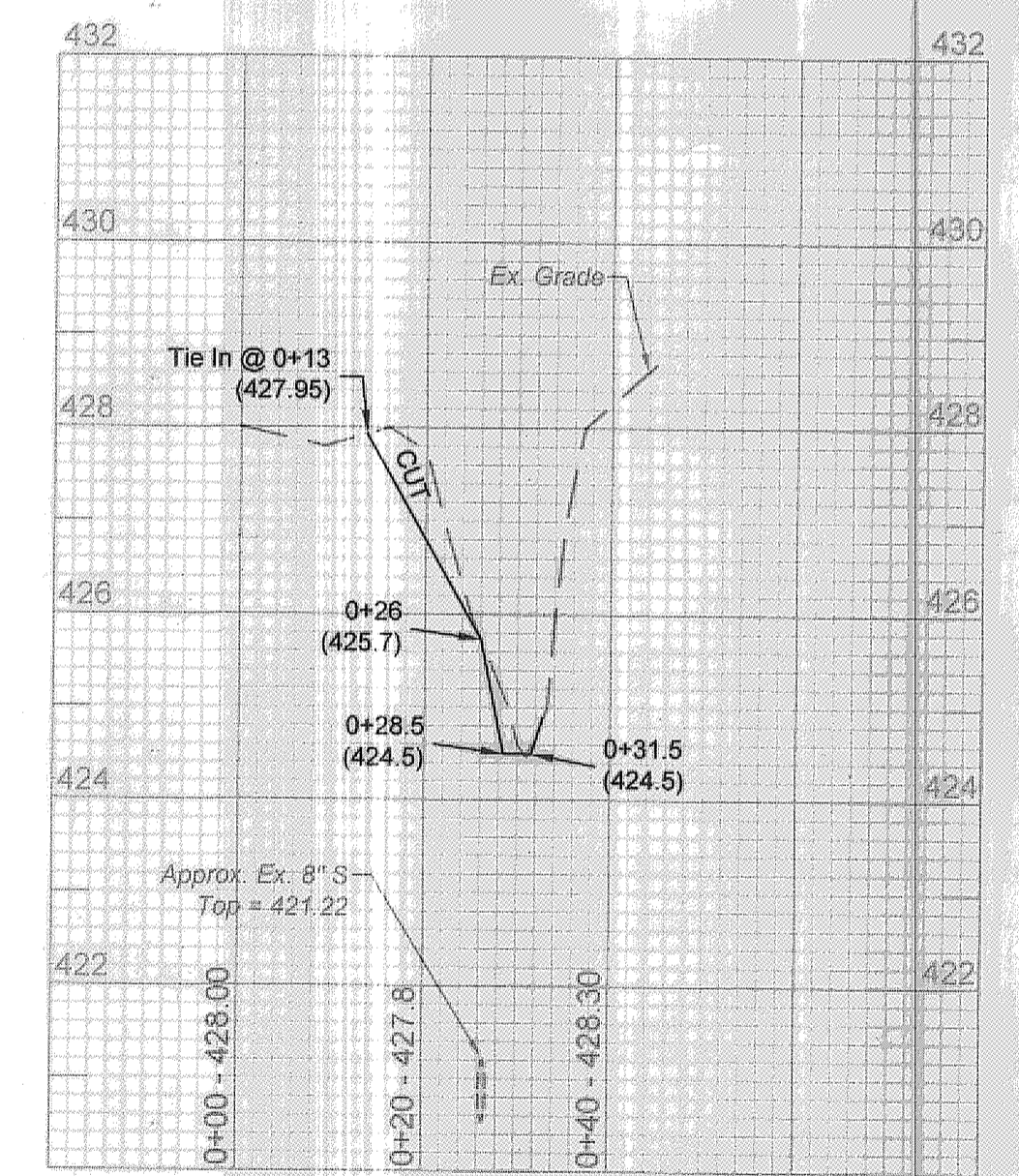
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8 Cross Section 8 @ Station 1+20  
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9 Cross Section 9 @ Station 1+29  
Scale: V-1"=2'  
H-1"=20'



10 Cross Section 10 @ Station 1+50  
Scale: V-1"=2'  
H-1"=20'

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37-553



**Tiller Road Stream Bioengineering General Specifications**  
 [These notes supplement details already shown hereon]

**1.0 Disposal of Flush Cut or other Woody Vegetation**

1.1 Unless specifically shown on plans, all trees and woody growth slated for removal shall either be removed offsite or chipped and spread onsite as directed by the Howard County DPWBES Project Manager. Under no circumstances are trunk sections to be left on the flood plain.

**2.0 Erosion Control Matting [ECM]**

2.1 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. Contact Design Engineer where "key trench" will impact primary tree root systems. Secure with 24 -inch wood stakes, 2 per square yard.

2.2 Base soil shall be tilled to a three-inch depth; rake in three inches organic matter [top soil] prior to ECM placement.

2.3 Seeding for ECM areas shall be seeded with mix as described in these specifications. See Section 6.0.

**3.0 Topsoil for Fill Areas**

3.1 Immediately prior to spreading borrow topsoil, loosen the subgrade by tilling to a depth of at least three (3) inches to ensure adequate aeration of the subsoil. The subsoil shall be free of loose stones or other foreign material.

3.2 Borrow topsoil shall be uniformly placed and spread a minimum thickness of three inches (3") within the project limits as indicated on the construction drawings or as directed by the design engineer. Do not spread topsoil while it is frozen, saturated or when the subsoil is wet or frozen. Correct any irregularities in the surface that result from topsoiling or other operations to prevent the formation of depressions or water pockets.

3.3 Incorporate the topsoil into the underlying subsoil. When topsoil is to be placed on slopes 3:1 or greater, on which the subsoil is of a suitable condition to blend with topsoil, the contractor shall work the topsoil into the subsoil by tilling. Where subsoil on slopes are of such a character that they will not blend with the topsoil, the contractor shall roughen, bench or serrat the slopes so as to provide a bond for the topsoil. Avoid compaction from machinery as it increases runoff and inhibits seed germination.

**4.0 Backfill and Compaction**

4.1 Stripping: The top 6 inches of soil and organic matter shall be stripped within the designated excavations and grading lines and deposited in storage piles. All excavated materials not suitable as topsoil or for other uses at the site shall be disposed offsite.

4.2 Satisfactory Fill Materials: Fill and backfill within the limits of the design points and beneath appurtenant structures shall be those materials classified in ASTM D 2487 as GW, GP, GM, GC, SW, SM, SC, or combinations thereof. The Contractor shall maintain proper specified compaction as directed by a qualified Geotechnical Engineer.

4.3 Subgrade Preparation: Unsatisfactory subgrade material shall be removed and replaced with satisfactory material as directed by the Design Engineer. All exposed subgrades shall be scarified to a depth of 3 inches before the fill is started. Slope surface steeper than 1 vertical to 3 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by tamping (sheepfoot) rollers, pneumatic-tires rollers, steel-wheeled rollers, or other approved well suited to the soil being compacted. The contractor shall be prepared to moisten or aerate as necessary to provide an in-place moisture content within plus or minus 2 percent of optimum within the compacted lifts and/or subgrades for each material. Minimum subgrade density shall be as specified in paragraph filling and backfilling.

4.4 Filling and Backfilling: Satisfactory materials shall be used in bringing fills and backfill to the proposed contours indicated on the plan and for replacing unsatisfactory materials. Satisfactory materials will be determined by the Design Engineer. Satisfactory materials shall be placed in horizontal layers not exceeding 8 inches in uncompacted thickness, or 6 inches when hand-operated compactors are used. After placing, each layer shall be moistened or aerated as necessary to obtain plus or minus 2 percent of optimum moisture, thoroughly mixed and compacted as specified. Backfilling shall not begin until construction below finish grade has been approved, underground utilities systems have been inspected, tested approved, and forms removed.

**5.0 Invasive Species Control (Within LOD)**

5.1 Invasive species control program shall utilize appropriate Integrated Pest Management practices and the use of a professional certified pesticide applicator. The applicator shall be certified in the following categories depending upon the nature of the application area: Forest, Right of Way, or Aquatic Pest Control (for work directly adjacent to or over water).

5.2 Growth habits of invasives are rapid and site conditions may change dramatically, therefore the program may be altered at the time of implementation.

5.3 Cutting of the large plant masses followed by chemical controls is suggested at this time. Mowing of the target species may occur any time of the year. Herbicide application will follow cutting. During the growing season, the identified plants may be treated with a non-selective herbicide (glyphosate), applied according to label directions. However, care should be taken to ensure that the timing of the application is conducive to uptake and translocation of the herbicide. The applicator should ensure that the herbicide is listed for use against the selected species, and is labeled for aquatic use if the application will be made over water. During periods outside of the growing season, the woody weeds identified may be treated with systemic herbicides labeled for dormant season applications (triclopyr).

5.4 A follow up treatment of control is to be performed 1 month after the beginning of the following growing season (approximately May 1st).

5.5 It is the responsibility of the applicator to select the proper herbicide for the targeted species based on the time of year, and to use the herbicide in a manner that is consistent with the label. Additionally, it is the responsibility of the applicator to obtain Toxic Materials Permits for the use of herbicides.

**6.0 Seeding**

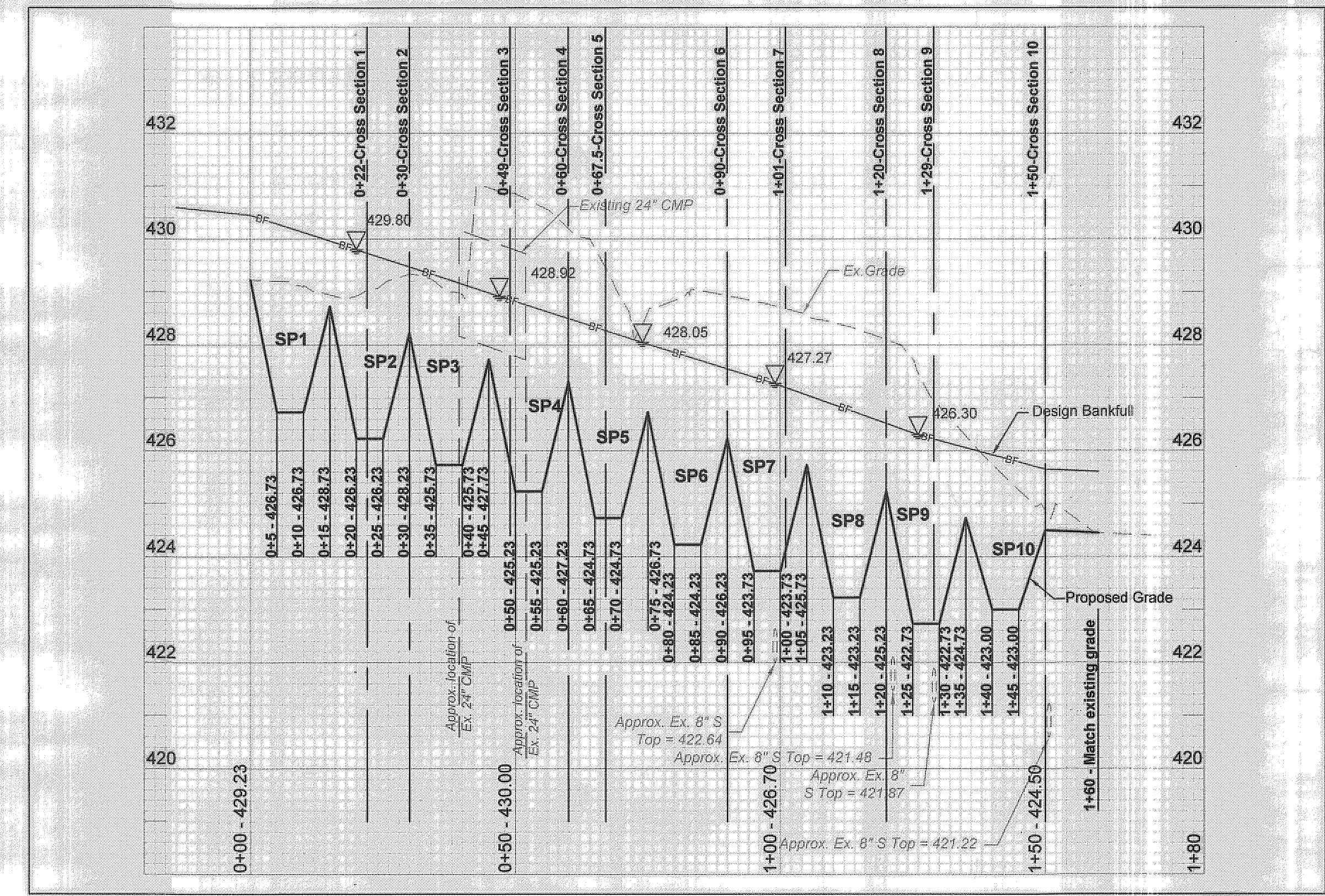
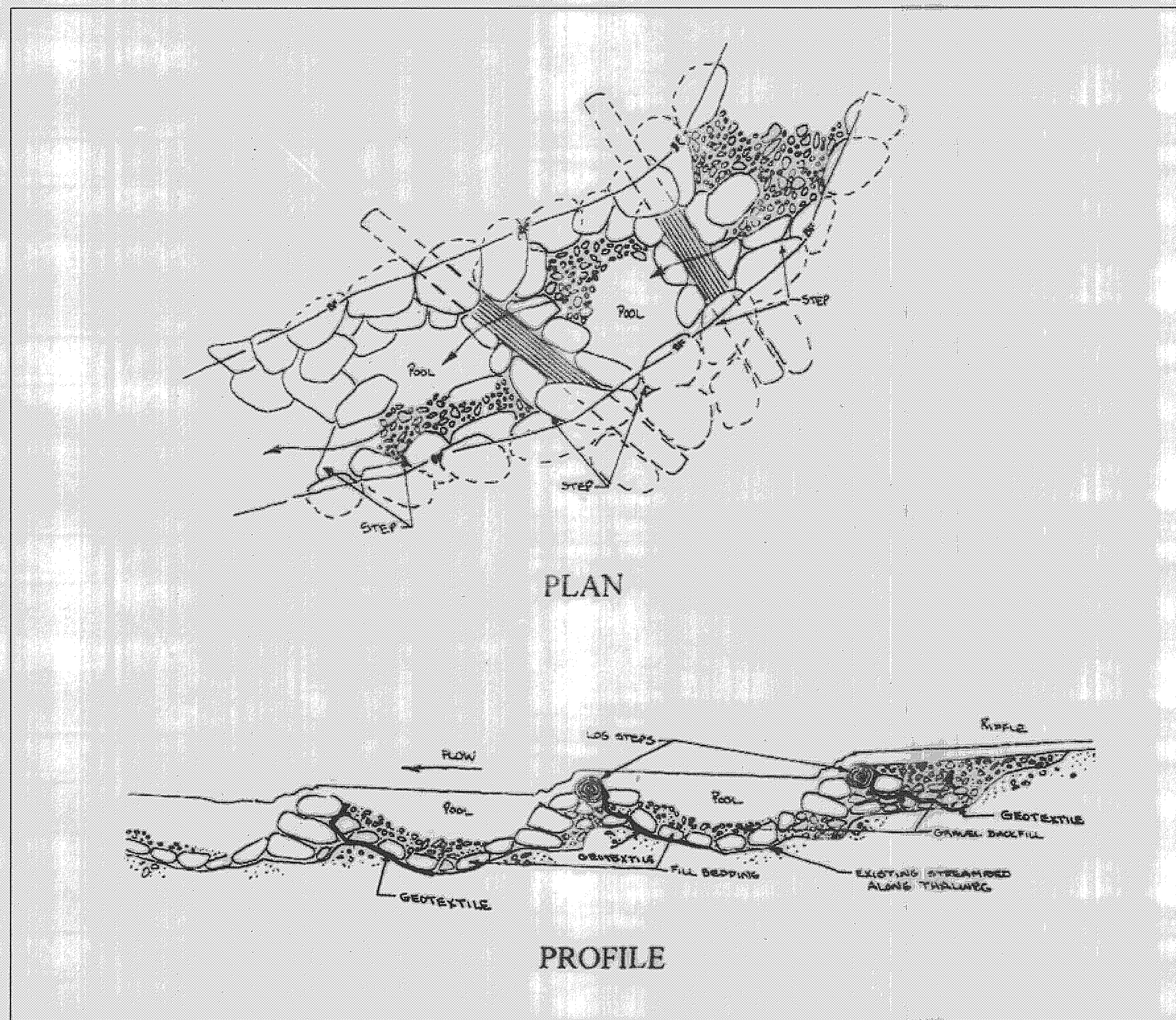
GRASS SEED: Shall be Maryland Certified. It shall be fresh, clean, new crop seed mixed in the proportion shown and tested to the following minimum percentages of purity and germination. Approved varieties shall be selected "Recommended Turfgrass cultivars for Professional Seed Mixtures," University of Maryland Turfgrass Technical Update TT-77, most recent edition (See Section 705.3) A copy of this publication can be obtained by visiting the Maryland Turfgrass Council website <<http://www.mdturfgrass.org>> or by calling them at 410-836-2876. A minimum application rate shall be approximately 300 pounds per acre (7 lbs/1000 ft<sup>2</sup>) unless specific rates are dictated to the Contractor.

Minimum Percentages of Grass Seed:

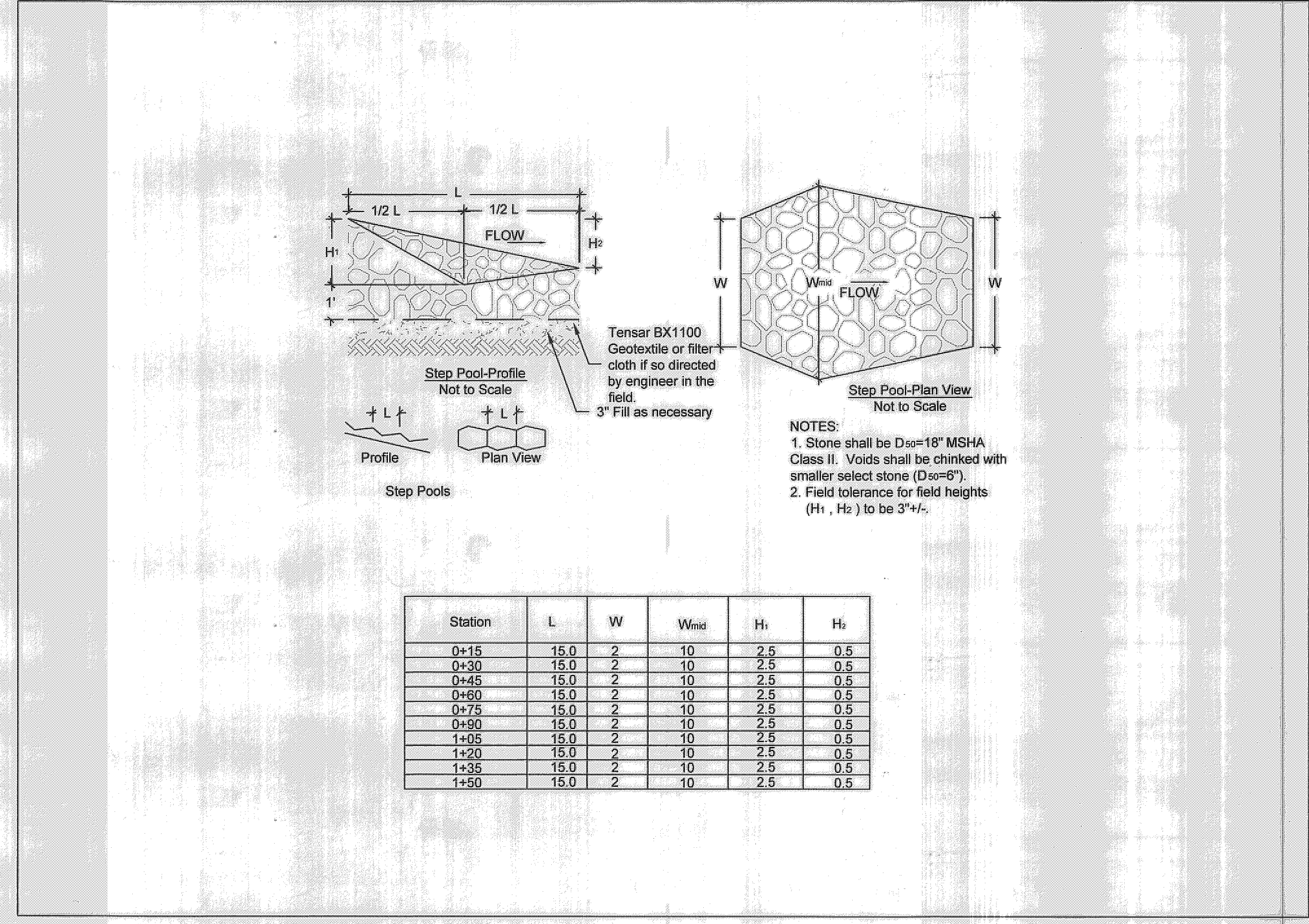
SEED MIXTURE TO BE: % BY WEIGHT % PURITY % GERMINATION

Kentucky Bluegrass	10%	98%	85%
Turf-type Tall Fescue*	70%	98%	90%
Perennial Rye Grass	20%	98%	85%

\*Use a single cultivar or seed in blends



**1 PROFILE**  
 Scale: V-1"=2'  
 H-1"=20'



Station	L	W	W <sub>min</sub>	H <sub>1</sub>	H <sub>2</sub>
0+15	15.0	2	10	2.5	0.5
0+30	15.0	2	10	2.5	0.5
0+45	15.0	2	10	2.5	0.5
0+60	15.0	2	10	2.5	0.5
0+75	15.0	2	10	2.5	0.5
0+90	15.0	2	10	2.5	0.5
1+05	15.0	2	10	2.5	0.5
1+20	15.0	2	10	2.5	0.5
1+35	15.0	2	10	2.5	0.5
1+50	15.0	2	10	2.5	0.5

Prepared for:  
 Howard County Department of Public Works  
 Bureau of Environmental Services  
 6751 Columbia Gateway Drive, #514  
 Columbia, MD 21046  
 Phone: (410) 313-6417  
 Attn: Mr. Richard Powell

HOWARD COUNTY, MD  
 100 yr. Flood Plain & R/W for Sewer  
 Parcel 650 L 5236 F 207  
 Park and Recreation  
 Parcel 648 Lot 9 L 1726 F 100  
 Tax Map 17 Grid 10

**Tiller Drive Stream Stabilization**  
 GRADING TYPICAL AND SPECIFICATIONS  
 AND PROFILE

DATE:	09/08			
DESIGNED:	RP			
DRAFTED:	HT			
CHECKED:	DO			
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: [envcpj@cpj.com](mailto:envcpj@cpja.com) Fax: (301) 926-4551  
 SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE AS SHOWN  
 SHEET 6 OF 7 SHEETS  
 JOB NO. 37-553

**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)**

- i) Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas over 5 acres. Soil analysis may be performed by the University of Maryland or a recognized commercial laboratory. Soil samples taken for engineering purposes may also be used for chemical analyses.
- ii) Fertilizers shall be uniform in composition, free flowing and suitable for accurate application by approved equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers shall all be delivered to the site fully labeled according to the applicable state fertilizer laws and shall bear the name, trade name or trademark and warrantee of the producer.
- iii) Lime materials shall be ground limestone (hydrated or burnt lime may be substituted) which contains at least 50% total oxides (calcium oxide plus magnesium oxide). Limestone shall be ground to such fineness that at least 50% will pass through a #100 mesh sieve and 98-100% will pass through a #20 mesh sieve.
- iv) Incorporate lime and fertilizer into the top 3'-5" of soil by disking or other suitable means.

**C. Seedbed Preparation**

- i) Temporary Seeding
  - a. Seedbed preparation shall consist of loosening soil to a depth of 3" to 5" by means of suitable agricultural or construction equipment, such as disc harrows or chisel plows or rippers mounted on construction equipment. After the soil is loosened it should not be rolled or dragged smooth but left in the roughened condition. Sloped areas (greater than 3:1) should be tracked leaving the surface in an irregular condition with ridges running parallel to the contour of the slope.
  - b. Apply fertilizer and lime as prescribed on the plans.
  - c. Incorporate lime and fertilizer into the top 3'-5" of soil by disking or other suitable means.
- ii) Permanent Seeding
  - a. Minimum soil conditions required for permanent vegetative establishment:
    1. Soil pH shall be between 6.0 and 7.0.
    2. Soluble salts shall be less than 500 parts per million (ppm).
    3. The soil shall contain less than 40% clay but enough fine grained material (> 30% silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception is if lovegrass or *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 horizontal erosion check slots to prevent topsoil from sliding down a slope.
  - c. Apply soil amendments as per soil test or as included on the plans.
  - d. Mix soil amendments into the top 3'-5" of topsoil by disking or other suitable means. Lawn areas should be raked to smooth the surface, remove large objects like stones and branches, and ready the area for seed application. Where site conditions will not permit normal seedbed preparation, loosen surface soil by dragging with a heavy chain or other equipment to roughen the surface. Steep slopes (steeper than 3:1) should be tracked by a dozer leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. The top 1'-3" of soil should be loose and friable. Seedbed loosening may not be necessary on newly disturbed areas.

**D. Seed Specifications**

- i) All seed must meet the requirements of the Maryland State Seed Law. All seed shall be subject to re-testing by a recognized seed laboratory. All seed used shall have been tested within the 6 months immediately preceding the date of sowing such material on this job.
- Note: Seed tags shall be made available to the inspector to verify type and rate of seed used.
- ii) Inoculant-The inoculant for treating legume seed in the seed mixtures shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container. Add fresh inoculant as directed on package. Use four times the recommended rate when 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; P2O5 (phosphorus): 200 lbs/ac; K2O (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. Cultipacker 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.

**F. Mulch Specifications (In order of preference)**

- i) Straw shall consist of thoroughly threshed wheat, rye or oat straw, reasonably bright in color, and shall not be musty, moldy, caked, decayed, or excessively dusty and shall be free of noxious weed seeds as specified in the Maryland Seed Law.
- ii) Wood Cellulose Fiber Mulch (WCFM)
  - a. WCFM shall consist of specially prepared wood cellulose processed into a uniform fibrous physical state, down a 1/4" diameter.
  - 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 phytotoxic.
  - f. WCFM must conform to the following physical requirements: fiber length to approximately 10 mm, diameter approximately 1/16 mm, pH range of 4.0 to 8.5, ash content of 1.6% maximum and water holding capacity of 90% minimum.

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

- i) If grading is completed outside of the seeding season, mulch 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.
- iii) Wood cellulose fiber used as a mulch shall be applied at a net dry weight of 1,500 lbs. per acre. The wood cellulose fiber shall be mixed with water, and the mixture shall contain a maximum of 50 lbs. of wood cellulose fiber per 100 gallons of water.

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

- i) A mulch anchoring tool is a tractor drawn implement designed to punch and anchor mulch into the soil surface a minimum of two (2) inches. This practice is most effective on large areas, but is limited to flatter slopes where equipment can operate safely. If used on sloping land, this practice should be used on the contour if possible.
- ii) Wood cellulose fiber may be used for anchoring straw. The fiber binder shall be applied at a net dry weight of 750 pounds/acre. The wood cellulose fiber shall be mixed with water and the mixture shall contain a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.
- iii) Application of liquid binders should be heavier at the edges where wind catches mulch, such as in valleys and 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, Petrosel, 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**

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**

Temporary Seeding	
Quantity	Common Name
20 lbs./ac.	Annual Rye

**SECTION III: PERMANENT SEEDING**

GRASS SEED: Shall be Maryland Certified. It shall be fresh, clean, new crop seed mixed in the proportion shown and testing to the following minimum percentages of purity and germination. Approved varieties shall be selected "Recommended Turfgrass cultivars for Professional Seed Mixtures," University of Maryland Turfgrass Technical Update TT-77, most recent edition (See Section 705.3) A copy of this publication can be obtained by visiting the Maryland Turfgrass Council website <<http://www.md turf council.org>> or by calling them at 410-836-2876. A minimum application rate shall be approximately 300 pounds per acre (7 lbs/1000 ft<sup>2</sup>) unless specific rates are dictated to the Contractor.

**Minimum Percentages of Grass Seed:**

SEED MIXTURE TO BE: % BY WEIGHT % PURITY % GERMINATION

Kentucky Bluegrass	10%	98%	85%
Turf-type Tall Fescue*	70%	98%	90%
Perennial Rye Grass	20%	98%	85%

\*Use a single cultivar or seed in blends

**Partial Shaded Woodland - For use with Coir Fiber Matting areas.**

Application Rate - 30 pounds per acre  
Ernst Conservation Seeds (ERNMX-181)

Percent	Scientific Name	Common Name
20.0%	<i>Elymus multiflorum</i>	Annual Ryegrass
20.0%	<i>Andropogon scoparius</i>	Little Bluestem, Camper
20.0%	<i>Elymus canadensis</i>	Canada Wild Rye
10.0%	<i>Sporobolus asper</i>	Rough Dropseed
10.0%	<i>Bromus ciliatus</i>	Fringed Brome
10.0%	<i>Agrostis perennans</i>	Autumn Bentgrass
5.0%	<i>Rudbeckia hirta</i>	Black Eyed Susan
3.0%	<i>Aster prenanthoides</i>	Zigzag Aster Mix
2.0%	<i>Solidago nemoralis</i>	Gray Goldenrod

**SECTION IV -SOD: TO PROVIDE QUICK COVER ON DISTURBED AREAS (2:1 GRADE OR FLATTER) - ALTERNATE**

**A. General specifications**

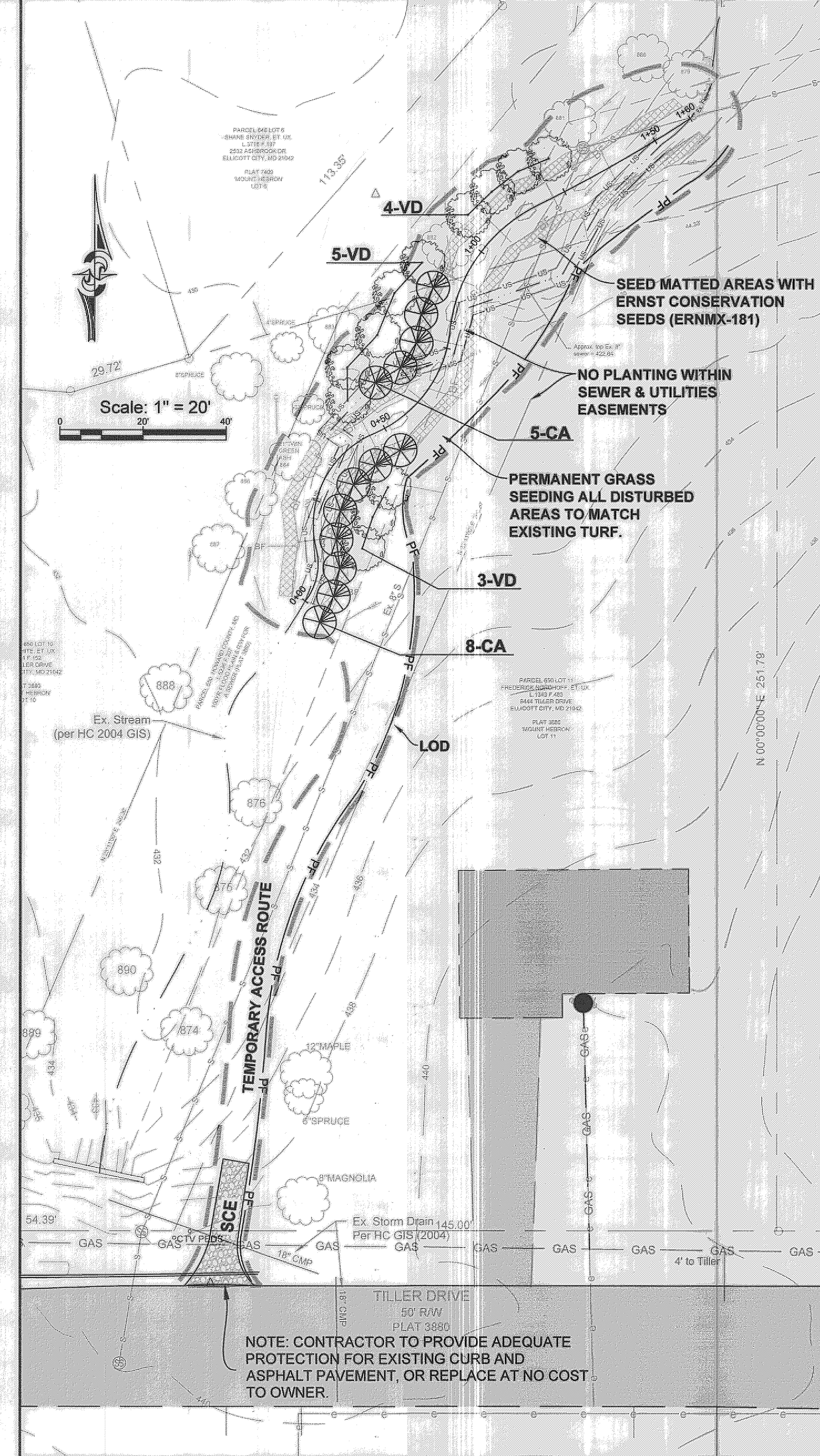
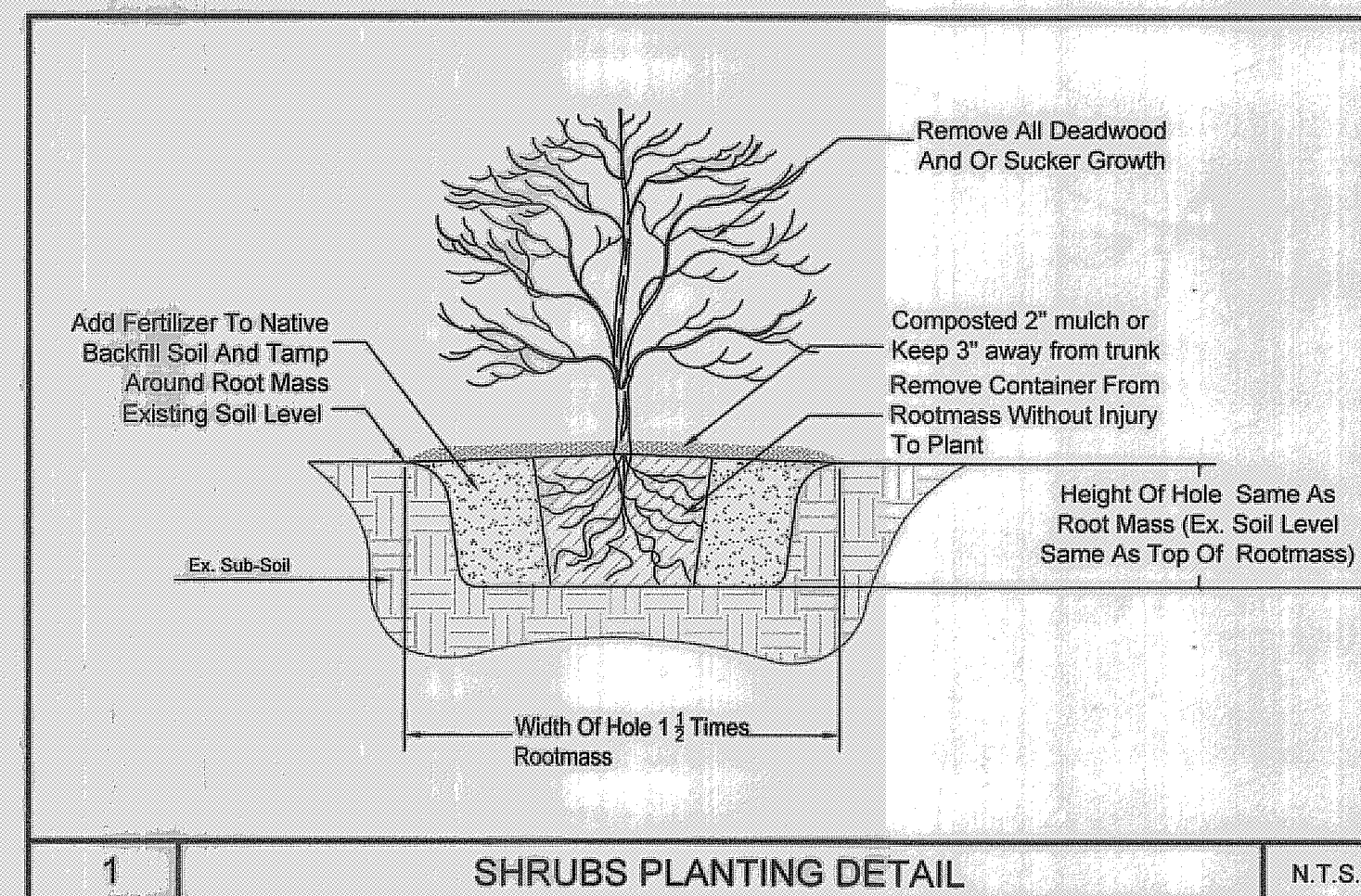
- i) Class of turf grass sod shall be Maryland or Virginia State Certified or Approved. Sod labels shall be made available to the job foreman and inspector.
- ii) Sod shall be machine cut at a uniform soil thickness of 3/4", plus or minus 1/4", at the time of cutting. Measurement for thickness shall exclude top growth and thatch. Individual pieces of sod shall be cut to the suppliers width and length. Maximum allowable deviation from standard widths and lengths shall be 5 percent. Broken pads and torn or uneven ends will not be acceptable.
- iii) Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10 percent of the section.
- iv) Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.
- v) Sod shall be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period shall be approved by an agronomist or soil scientist prior to its installation.

**B. Sod Installation**

- i) During periods of excessively high temperature or in areas having dry subsoil, the subsoil shall be lightly irrigated immediately prior to laying the sod.
- ii) The first row of sod shall be laid in a straight line with subsequent rows placed parallel to and tightly wedged against each other. Lateral joints shall be staggered to promote more uniform growth and strength. Ensure that sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would cause air drying of the roots.
- iii) Wherever possible, sod shall be laid with the long edges parallel to the contour and with staggering joints. Sod shall be rolled and tamped, pegged or otherwise secured to prevent slippage on slopes and to ensure solid contact between sod roots and the underlying soil surface.
- iv) Sod shall be watered immediately following rolling or tamping until the underside of the new sod pad and soil surface below the sod are thoroughly wet. The operations of laying, tamping and irrigating for any piece of sod shall be completed within eight hours.

**C. Sod Maintenance**

- i) In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of 4". Watering should be done during the heat of the day to prevent wilting.
- ii) After the first week, sod watering is required as necessary to maintain adequate moisture content.
- iii) The first mowing of sod should not be attempted until the sod is firmly rooted. No more than 1/3 of the grass leaf shall be removed by the initial cutting or subsequent cuttings. Grass height shall be maintained between 2" and 3" unless otherwise specified.



**PLANTING SCHEDULE FOR PARTIAL SHADED CONDITION**

ID	Common Name	Scientific Name	Size	Quantity	Spacing	Sun Exposure
4-VD	Arrowwood	<i>Viburnum dentatum</i>	2 Gallon	12	8'	Partial - Full
5-VD	Silky Dogwood	<i>Cornus amomum</i>	2 Gallon	13	7'	Partial - Full

Note: \* Trees to be field located per plan with pin flags and approved by County's Forester at pre-planting meeting.

Prepared for:  
Howard County Department of Public Works  
Bureau of Environmental Services  
6751 Columbia Gateway Drive, #514  
Columbia, MD 21046  
Phone: (410) 313-6417  
Attn: Mr. Richard Powell

HOWARD COUNTY, MD  
100 yr. Flood Plain & R/W for Sewer  
Parcel 650 L 5236 F 207  
Park and Recreation  
Parcel 648 Lot 9 L 1726 F 100  
Tax Map 17 Grid 10

**Tiller Drive Stream Stabilization  
PLANTING PLAN**

DATE:	09/08				
DESIGNED:	HT				
DRAFTED:	HT				
CHECKED:	JF				
BASE DATA:	J.A. Rice	NO.	REVISIONS	BY	DATE

**CPI** Environmental Services Division  
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SILVER SPRING, MD FREDERICK, MD FAIRFAX, VA

SCALE  
AS SHOWN  
SHEET  
7  
OF 7 SHEETS  
JOB NO.  
37-553

LANDSCAPE ARCHITECT CERTIFICATE  
I hereby certify that this plan is prepared in accordance with  
Howard County Forest Conservation Regulations.  
9/15/2008  
Date  
James M. Fetchu, R.L.A.  
Registered Landscape Architect  
MD #3241