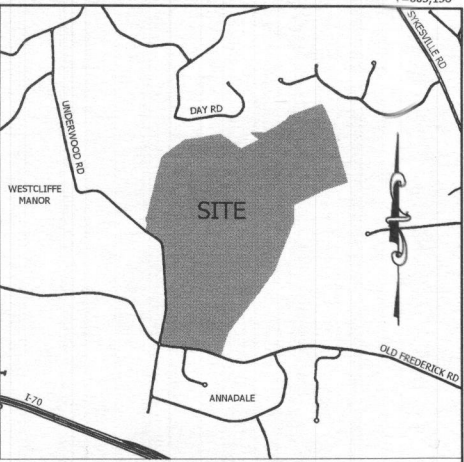








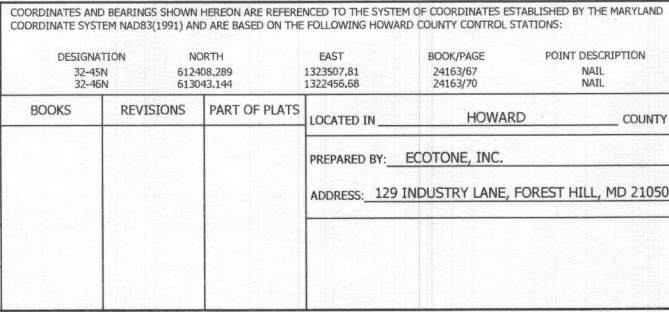


**EXHIBIT I**  
**PROPOSED CONSERVATION**  
**EASEMENT**



INDIAN CAVE FARM LLC PARCEL E					
REC'D		FOLIO			
LIBER					
1	S 69°04'51" W	186.82'	8	N 10°11'09" E	708.06'
2	S 65°08'30" W	97.19'	9	N 22°22'49" W	345.59'
3	N 87°54'36" W	170.67'	10	N 67°47'08" E	167.19'
4	S 66°29'15" W	349.49'	11	S 25°16'52" E	311.28'
5	S 63°49'24" W	319.69'	12	S 07°04'44" E	473.57'
6	N 02°12'21" W	179.72'	13	S 66°48'55" E	544.50'
7	N 66°55'15" E	225.34'			
PERPETUAL EASEMENT AREA 410,475 SQ. FT. OR 9,423 ACRES+ SHOWN THUS: 					

LEGEND	
	REVERTIBLE EASEMENT FOR SUPPORTING SLOPES.
	TEMPORARY CONSTRUCTION EASEMENT FOR SPECIAL PURPOSE AS INDICATED BY NOTATION ON THIS PLAT.
	PERPETUAL EASEMENT FOR SPECIAL PURPOSE AS INDICATED ON THIS PLAT.
	PERPETUAL EASEMENT FOR DRAINAGE FACILITY AS INDICATED BY NOTATION ON THIS PLAT.
	PERPETUAL EASEMENT TO DISCHARGE FLOW OF WATER FROM OR INTO AN EXISTING WATERWAY OR NATURAL DRAINAGE COURSE.
	PERPETUAL EASEMENT TO DISCHARGE FLOW OF WATER UPON EXISTING GROUND.



**ecotone**  
ecological restoration

129 Industry Lane • Forest Hill, Maryland 21050  
(410) 420 2600 • [www.ecotoneinc.com](http://www.ecotoneinc.com)

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TRIBUTARY TO SOUTH BRANCH  
PATAPSCO RIVER STREAM RESTORATION

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SUED \_\_\_\_\_ 20 \_\_\_\_\_ SCALE: 1" = 100'

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PLAT No. XXXX-XX



X=1,323,082  
Y=607,614


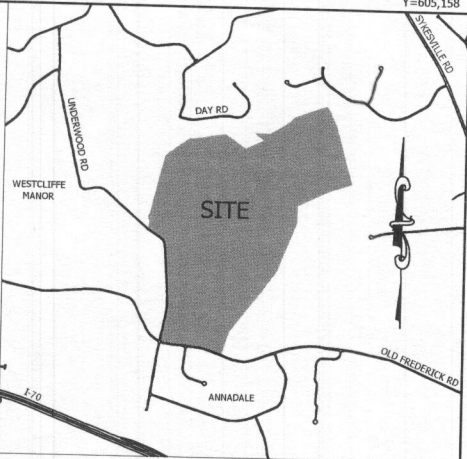
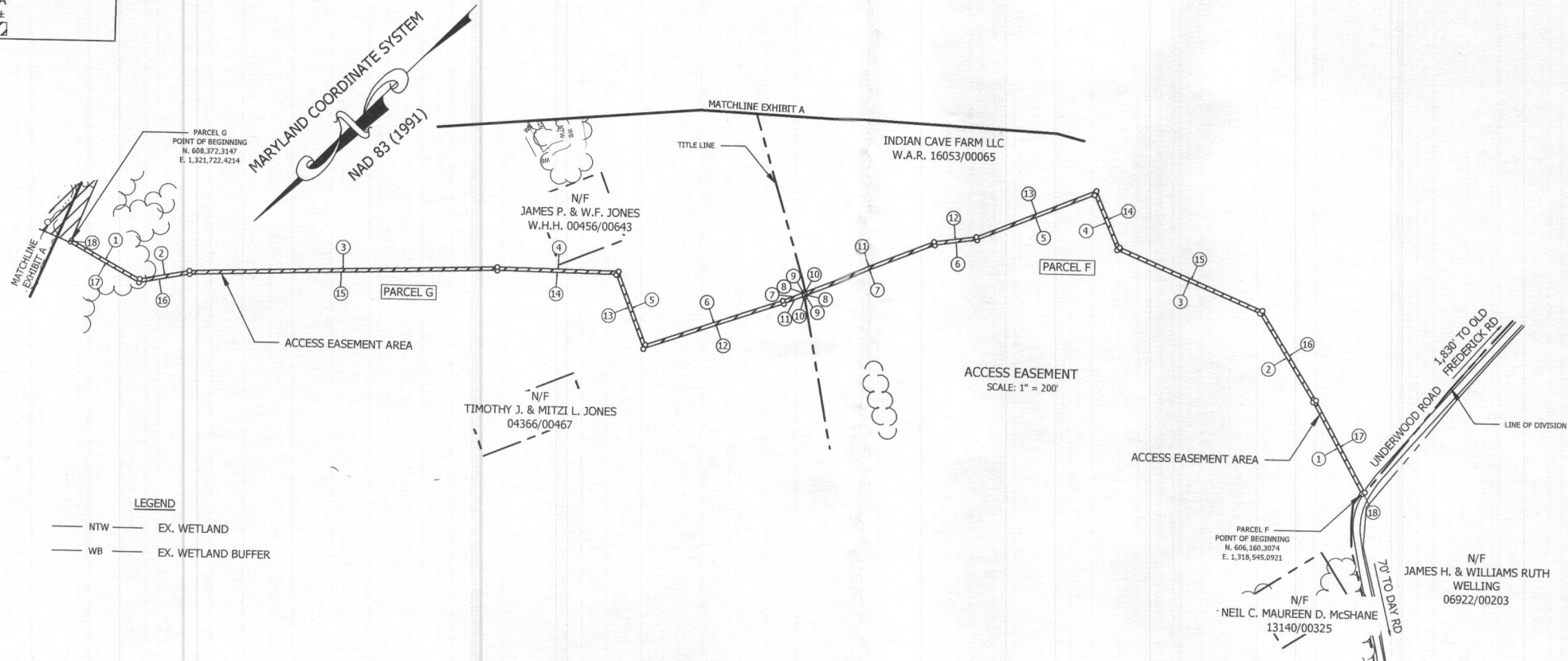
INDIAN CAVE FARM LLC PARCEL G				
REC'D LIBER	FOLIO			
1	S 73°50'03" W	231.30'	10	N 44°41'00" W 5.04'
2	S 34°37'44" W	148.55'	11	N 23°23'06" E 65.34'
3	S 43°19'59" W	905.06'	12	N 26°18'50" E 434.57'
4	S 46°02'14" W	358.57'	13	S 65°58'30" E 231.82'
5	N 65°58'30" W	228.96'	14	N 46°02'14" E 351.59'
6	S 26°18'50" W	424.70'	15	N 43°19'59" E 904.07'
7	S 23°23'06" W	67.30'	16	N 34°37'44" E 151.35'
8	N 48°54'01" W	5.51'	17	N 73°50'56" E 233.78'
9	S 26°33'55" W	1.34'	18	S 22°18'19" E 10.00'
PERPETUAL EASEMENT AREA 23,679 SQ. FT. OR 0.544 ACRES± SHOWN THUS: 				


EXHIBIT B



X=1,320,625  
Y=605,158









LEGEND  
— NTW — EX. WETLAND  
— WB — EX. WETLAND BUFFER

INDIAN CAVE FARM LLC PARCEL F				
REC'D LIBER	FOLIO			
1	S 73°59'24" E	305.61'	10	S 48°54'01" E 5.51'
2	S 76°56'39" E	302.56'	11	S 23°23'06" W 409.99'
3	N 67°45'45" E	459.55'	12	S 37°12'54" W 125.44'
4	S 68°07'16" E	174.11'	13	S 22°58'45" W 379.39'
5	N 22°58'45" E	370.83'	14	N 68°07'16" W 179.86'
6	N 37°12'54" E	125.47'	15	S 67°45'45" W 458.68'
7	N 23°23'06" E	411.00'	16	N 76°56'39" W 306.00'
8	S 44°41'00" E	5.04'	17	N 73°59'24" W 305.87'
9	N 26°33'55" E	1.34'	18	N 16°00'36" E 10.00'
PERPETUAL EASEMENT AREA 21,571 SQ. FT. OR 0.495 ACRES± SHOWN THUS: 				

THE RIGHT OF WAY LINES AND LINES OF DIVISION SHOWN HEREON ARE AN INTERPRETATION OF: (i) DEEDS AND PLATS OF RECORD; (ii) STATE HIGHWAY ADMINISTRATION PLATS; AND (iii) FIELD SURVEYS. THE UNDERSIGNED WAS IN RESPONSIBLE CHARGE OF THE PREPARATION OF THIS PLAT AND THE SURVEYING WORK REFLECTED IN IT. THIS PLAT WAS DEVELOPED IN COMPLIANCE WITH THE REQUIREMENTS SET FORTH IN COMAR REGULATION 09.13.06.

CARL F. KREUTTER  
PROFESSIONAL LAND SURVEYOR  
MD REG. NO. 21333  
EXP. DATE 01/07/2021

DATE

- LEGEND
-  REVERTIBLE EASEMENT FOR SUPPORTING SLOPES.
  -  TEMPORARY CONSTRUCTION EASEMENT FOR SPECIAL PURPOSE AS INDICATED BY NOTATION ON THIS PLAT.
  -  PERPETUAL EASEMENT FOR SPECIAL PURPOSE AS INDICATED ON THIS PLAT.
  -  PERPETUAL EASEMENT FOR DRAINAGE FACILITY AS INDICATED BY NOTATION ON THIS PLAT.
  -  PERPETUAL EASEMENT TO DISCHARGE FLOW OF WATER FROM OR INTO AN EXISTING WATERWAY OR NATURAL DRAINAGE COURSE.
  -  PERPETUAL EASEMENT TO DISCHARGE FLOW OF WATER UPON EXISTING GROUND.

0 100 200 Feet  
SCALE: 1" = 100'

COORDINATES AND BEARINGS SHOWN HEREON ARE REFERENCED TO THE SYSTEM OF COORDINATES ESTABLISHED BY THE MARYLAND COORDINATE SYSTEM NAD83(1991) AND ARE BASED ON THE FOLLOWING HOWARD COUNTY CONTROL STATIONS:

DESIGNATION	NORTH	EAST	BOOK/PAGE	POINT DESCRIPTION
32-45N 32-46N	612408.289 613043.144	1323507.81 1322456.68	24163/67 24163/70	NAIL NAIL
BOOKS	REVISIONS	PART OF PLATS	LOCATED IN HOWARD COUNTY	
			PREPARED BY: ECOTONE, INC.	
			ADDRESS: 129 INDUSTRY LANE, FOREST HILL, MD 21050	



TRIBUTARY TO SOUTH BRANCH  
PATAPSCO RIVER STREAM RESTORATION

ISSUED 20 SCALE: 1" = 100'

PLAT No. XXXX-XX

X=1,319,044  
Y=606,738



BEST MANAGEMENT PRACTICES FOR WORKING IN NONTIDAL WETLANDS, WETLAND BUFFERS, WATERWAYS, AND 100-YEAR FLOODPLAINS

- No excess fill, construction material, or debris shall be stockpiled or stored in nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Place materials in a location and manner which does not adversely impact surface or subsurface water flow into or out of nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Do not use the excavated material as backfill if it contains waste metal products, unsightly debris, toxic material, or any other deleterious substance. If additional backfill is required, use clean material free of waste metal products, unsightly debris, toxic material, or any other deleterious substance.
- Place heavy equipment on mats or suitably operate the equipment to prevent damage to nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Repair and maintain any serviceable structure or fill so there is no permanent loss of nontidal wetlands, nontidal wetland buffers, or waterways, or permanent modification of the 100-year floodplain in excess of that lost under the originally authorized structure or fill.
- Rectify any nontidal wetlands, wetland buffers, waterways, or 100-year floodplain temporarily impacted by any construction.
- All stabilization in the nontidal wetland and nontidal wetland buffer shall consist of the following species: Annual Ryegrass (*Lolium multiflorum*), Millet (*Setaria Italica*), Barley (*Hordeum* sp.), Oats (*Uniola* sp.), and/or Rye (*Secale cereale*). These species will allow for the stabilization of the site while also allowing for the voluntary revegetation of natural wetland species. Other non-persistent vegetation may be acceptable, but must be approved by the Nontidal Wetlands and Waterways Division. **Kentucky 31 fescue shall not be utilized in wetland or buffer areas.** The area should be seeded and mulched to reduce erosion after construction activities have been completed.
- After installation has been completed, make post-construction grades and elevations the same as the original grades and elevations in temporarily impacted areas.
- To protect aquatic species, in-stream work is prohibited as determined by the classification of the stream:

Use 1 waters: In-stream work shall not be conducted during the period  
March 1 through June 15 inclusive, during any year.

- Stormwater runoff from impervious surfaces shall be controlled to prevent the washing of debris into the waterway.
- Culverts shall be constructed and any riprap placed so as not to obstruct the movement of aquatic species, unless the purpose of the activity is to impound water.
- A dewatering pump will be utilized in conjunction with a dirt bag (see detail this sheet) to remove standing water in the project area during construction. The dirt bag will be placed on a vegetated area a sufficient distance from subject reach so that any sediment leaving the dirt bag has time/distance to settle out before reaching the waterway.

SEDIMENT CONTROL NOTES

- Refer to "2011 Maryland Standards and Specifications for Soil Erosion and Sediment control" for standard details and detailed specifications of each practice specified herein.
- With the approval of the sediment control inspector, minor field adjustments can and will be made to insure the control of any sediment. Changes in sediment control practices require prior approval of the sediment control inspector and the Howard Soil Conservation District.
- At the end of each working day, all sediment control practices will be inspected and left in operational condition.
- Following initial soil disturbance or redistribution, permanent or temporary stabilization shall be completed within:
  - Three calendar days as to the surface of all perimeter controls, dikes, swales, ditches, perimeter slopes, and all slopes greater than three horizontal to one vertical (3:1); and
  - Seven days as to all other disturbed or graded areas on the project site which will remain idle over fourteen days.
- Any change to the grading proposed on this plan requires resubmission to Howard Soil Conservation District for approval.
- Dust control will be provided for all disturbed areas. Refer to "2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control", pg. H-30-1, for acceptable methods and specifications for dust control.
- Any variations from the sequence of operations stated on this plan require the approval of the sediment control inspector and the Howard Soil Conservation District prior to the initiation of the change.
- Excess cut or borrow material shall go to, or come from, respectively, a site with an open grading permit or approved agricultural ground.
- The following item may be used as applicable: refer to "Maryland's Guidelines to Waterway Construction" by the Water Management Administration of the Maryland Department of the Environment, revised November, 2000, for standard details and detailed specifications of each practice specified herein for waterway construction.
- All work is to be completed "to the dry", see sequence of operations. After rainfall events during construction, the site is to be fully dewatered prior to proceeding with grading.
- Ingress and egress to the site shall be from the existing private driveway off Underwood Road and Underwood Road.
- The contractor must adhere to "Best Management Practices for Working in Nontidal Wetlands, Wetland Buffers, Waterways, and the 100-year Floodplain".

SEQUENCE OF CONSTRUCTION

- Contractor shall notify owner and Howard County CIS inspector at least 48 hours prior to beginning any work and the Maryland Department of the Environment's Inspection and Compliance Program (410 537-3510) at least 5 days prior to beginning any work. Miss Utility must be contacted at least 72 hours prior to beginning work. A pre-construction meeting is required with the landowner, contractor, and Howard County CID inspector prior to construction starting.
- County grading permit, and other necessary approvals and permits must be obtained prior to start of construction. MDE permit tracking No. 18-NT-3254.
- Clear and grub for the installation of sediment and erosion control measures or devices (1 Day).
- Install stabilized construction entrances and all sediment control devices (2 Days).
- Notify Howard County CID inspector upon completion of said installation.
- With the approval of Howard County CID inspector, clear and grub for in-stream work. The streams are in the South Branch Patapsco River watershed, designated as Use I by the Maryland Department of the Environment. No in-stream work shall be conducted during the period March 1 through June 15 (15 Days).
- Install pump around practices in the unnamed tributaries. All pump around diversions shall be set up and running before in-stream work will be permitted to start. See Pump-Around Note, this Sheet (1 Day) (adjusted daily as needed).
- Begin stream work starting at the upstream end of the project working downstream until the first tributary is reached. Complete work on tributary 2 and continue working downstream until you reach tributary 3. Continue work on tributary 3 and continue downstream to end of main reach and work downstream. Complete installation of all in-stream structures. Remove any accumulated sediment in the stream channel at the end of each working day and prior to the removal of the pump around practice. (Approximately 100 days)
- Stabilize all disturbed areas at the end of each working day.
- Once stream restoration is complete, seed and stabilize any remaining work areas (7 Days).
- Install plant material during appropriate planting dates (10 Days).
- Upon stabilization of site with established vegetation and with permission of the Howard County CID inspector, remove sediment control measures and stabilize those areas disturbed by this process, including any spoils areas (1 Day).

GENERAL NOTES

- This plan has been prepared to provide approximately 5,497 linear feet of stream restoration on the Jones property, located on Underwood Road in Howard County, Maryland.
- Contours were obtained from C.F. Kreutter & Associates, Inc. in February 2018 and depict field run 1-ft topo merged with 2-ft County GIS topo.
- The Contractor shall notify Ecotone, Inc. and the landowner's representative at least two (2) weeks prior to start of grading operations within the project areas.
- The Contractor is responsible for the location of all underground utilities prior to the start of construction. Any damages to utilities as a result of grading or other activities will be the sole responsibility of the Contractor and shall be repaired at the Contractor's expense.
- Access to the restoration area shall be from the existing private driveway off Underwood Road as indicated herein.
- The Contractor will be responsible for any damage to private property, including but not limited to fences and private roads resulting from the execution of this contract. Repairs for any such damage will be made at the Contractor's expense to the satisfaction of the private property owner and Ecotone, Inc.
- All machinery, equipment and supplies for the project shall be stored in an upland location, preferably the staging area shown on this plan, so as not to disturb any environmentally sensitive areas or agricultural uses on the site.
- All rough and finish grading work will be started at the upstream end of the project.
- Impairment status: Category 3. Project area is located in the Tier II, S. Branch Patapsco River UT 1 catchment area. Branch has the following impairments: E. coli, chlordane, nitrogen, phosphorus, and total suspended solids.

TEMPORARY STOCKPILE NOTE

If necessary, a temporary stockpile shall be provided within the limits of disturbance. The stockpile shall be located such that any runoff will drain to an existing sediment control device (i.e., super silt fence). The stockpile may not protrude upon nor alter drainage divides to the sediment control device at any time.

MAINTENANCE NOTE

Contractor shall inspect and maintain all sediment control measures and devices after every storm event. Maintenance shall include, but not be limited to the removal of all accumulated sediment. Geotextile fabric shall be replaced as needed to ensure proper function.

PUMP-AROUND NOTE

Pump around shows the maximum extents of stream to be diverted. Actual pump around length will be the length which can be completed in a working day.

100-YEAR FLOODPLAIN NOTE

FEMA mapped floodplain is not present on-site according to FEMA mapping and County GIS data. FIRM panel #24027C0055D. The 100-year floodplain was delineated using a HEC-RAS analysis.

SOIL STABILIZATION MATTING NOTE

All disturbed areas shall be stabilized with soil stabilization matting immediately after disturbance. See detail on Sheet 10.

TEMPORARY ACCESS BRIDGE NOTE

Contractor shall use only new or power washed construction mats for access. The mats must meet these requirements to eliminate the possibility of invasive species spreading or being introduced to a site. See detail on Sheet 12.

STREAM MONITORING PLAN NOTE

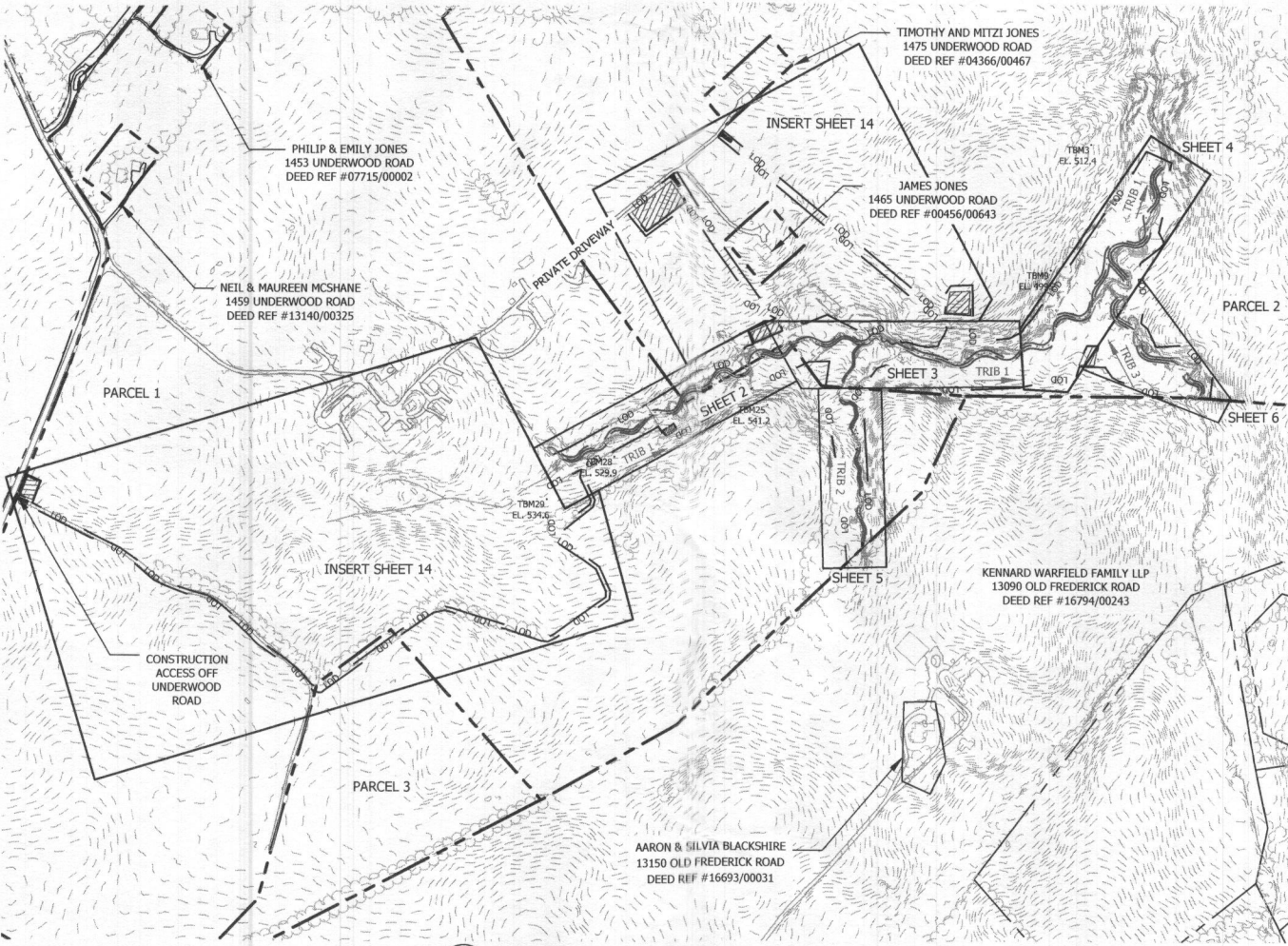
Authorized Person shall monitor the stream restoration project for three (3) out of five (5) years; on years one, three, and five following the completion of construction of the project. The monitoring shall identify and evaluate changes in 1) channel cross-section, pattern and profile; 2) bed materials; 3) channel stability; 4) structure stability and condition; and 5) vegetation viability. The monitoring effort may include topographic surveys of monumented cross-sections within the realigned channel segment, visual field observations, photographic documentation, vegetation viability measurements, and identify any necessary corrective measures. A RIBI (macroinvertebrate) survey will be completed at year 5 and included in the accompanying report.

During the year 5, if invasive plants are found to be present in quantities above baseline condition, an invasive treatment plan will be implemented. This may consist of selectively applying herbicide and physical removal, as necessary.

UNNAMED TRIBUTARIES TO SOUTH BRANCH PATAPSCO RIVER STREAM RESTORATION

AT INDIAN CAVE FARM

1485 UNDERWOOD ROAD  
SYKESVILLE, MD 21784



STREAM RESTORATION PLAN

The tributaries (3) to the South Branch Patapsco River shown on this plan, cross Indian Cave Farm, an operational cattle farm. The tributaries are Use I-P, perennial streams. The watershed is comprised predominately of grazing fields which abut a riparian stream corridor. A history of agriculture within the watershed and the current adjacent grazing fields is causing high velocity sheet flow into the stream valley. As a result the stream is displaying bed and bank scour, with limited floodplain access. An abundance of legacy sediment is present on tributaries 1 and 3 as indicated on this plan, further limiting floodplain access. The channel has become incised, leading to high shear stresses along the near bank region during high flow events. Vertical banks of approximately 3-4 feet are present throughout the reach.

Approximately 5,497 linear feet of the unnamed tributaries to South Branch Patapsco River will be restored to a highly resilient system using natural channel design guidelines. A naturally sinuous stream pattern will be designed and legacy sediment will be removed to allow access to the floodplain, add diversity to the system, and create habitat in the created riffle-pool sequence. By allowing access to the floodplain shear stresses and velocities will be greatly reduced in the channel and will be able to access the floodplain. Structures such as logjams, rootwads, etc. will serve as grade control structures. The steeper tributary, shown on this plan as tributary 2 will make use of the existing rock that is present along the reach as grade control structures as well. These structures will also add roughness to the stream channel and reduce shear stress. Bioengineering practices including soil matting, live stakes, and warm season grasses will provide vegetative stability, shade and improved aquatic habitat. Oxbow and pocket wetlands will be added where applicable to further enhance existing wetland habitat, add biodiversity to the system, slow sheet flow velocities, and reduce runoff nutrients before entering the channel.

Twenty years from now the restoration area will be vegetated with shrub and grasses. The stream will be have little meander scouring and will maintain connection with the floodplain, promoting existing and created wetlands adjacent to the stream. The restoration area will be under a conservation easement which will help to further promote vegetative growth and wetland development. Tributaries 1 and 3, as indicated on this plan, will resemble well function C-channel systems, while tributary 2 will resemble a C-channel transitioning into a B channel type.

DESIGN NARRATIVE

This project is classified as a restoration project. In the nature of a restoration project the goal is to protect and enhance natural resources related to the stream and adjacent wetlands. This project will be re-aligning and stabilizing approximately 5,497 linear feet of stream and creating over 0.5 acres of wetland both in the form of oxbow and floodplain wetlands. Special attention was given to minimizing the limit of disturbance to exclude portions of existing wetlands. Temporary bridges will be installed to protect and minimize impact to the existing stream channel and wetlands.

During construction natural stream flow will be diverted through the use of pump-around practices and sandbag diversions. Natural flow will be diverted around the current work area to allow for work in the "dry" and natural flow patterns will be present above and below the pump-around practices. Once construction is complete regular maintenance will be done on the site, and if necessary, adaptations will be made to accommodate flow patterns.

The proposed restoration project will not generate any permanent impervious areas. Stockpiles and staging areas will be temporary. The use of these stockpiles should be minimal with the majority of the materials needed being supplied on-site. All rock used for in-stream structures should be salvaged from a nearby source.

Work completed on the unnamed tributaries to South Branch Patapsco River will remain inside the staked-out limit of disturbance area that is 25.7 acres. Access to the work area will be from three stabilized construction entrances off Underwood Road (1) and the private driveway (2) that transects the property. A total of six stockpile and staging areas will be added where noted on the cover sheet. Each stockpile and staging area will have appropriate silt fencing at the downward slope to trap any sediment generated within the stockpile and staging area. All stream work will be completed in the "dry." Pump-around practices including sandbag diversions will be implemented to divert water as mentioned above. Refer to sheet 10 for pump-around detail. A filter bag will be used at each pump-around set-up to collect any groundwater from within the construction area.

TEMPORARY BENCHMARKS		
TBM 3	512.4'	REBAR & CAP
TBM 9	499.2'	REBAR & CAP
TBM 25	541.2'	REBAR & CAP
TBM 28	529.9'	REBAR & CAP
TBM 29	534.6'	REBAR & CAP

PROPERTY OWNER INFORMATION

INDIAN CAVE FARM LLC  
1485 UNDERWOOD ROAD  
SYKESVILLE, MD 21784  
HOWARD COUNTY

SITE DATA

ELECTION DISTRICT 05  
EXISTING ZONING: AGRICULTURAL  
8 DIGIT HUC: 02060003  
MD 8 DIGIT BASIN: 02130908  
(S BRANCH PATAPSCO)

PARCEL 1 DATA

DEED REF.: 16053/00065  
MAP: 0009, GRID: 0015, PARCEL: 0012  
SITE ACREAGE: ±197 AC.

PARCEL 2 DATA

DEED REF.: 16053/00070  
MAP: 0009, GRID: 0009, PARCEL: 0002  
SITE ACREAGE: ±134 AC.

PARCEL 3 DATA

DEED REF.: 16053/00076  
MAP: 0009, GRID: 0015, PARCEL: 0013  
SITE ACREAGE: ±15 AC.

SITE ANALYSIS

LIMIT OF DISTURBANCE: ±931,135 SF. / 21.3 AC.

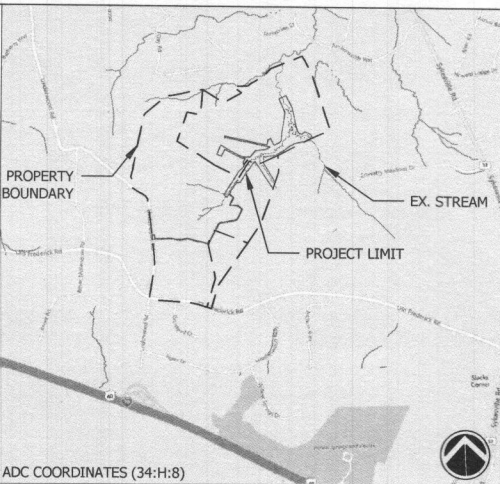
NEW IMPERVIOUS AREA: NONE

TOTAL AREA TO BE STABILIZED: 21.3 AC.

APPROXIMATE CUT: 7,264 CY.

APPROXIMATE FILL: 6,362 CY.

APPROXIMATE NET: 902 CY. (CUT)



VICINITY MAP  
SCALE: 1" = 2000'

HOWARD SOIL CONSERVATION DISTRICT (HSCD) STANDARD SEDIMENT CONTROL NOTES

- A pre-construction meeting must occur with the Howard County Department of Public Works, Construction Inspection Division (CID), 410-313-1855 after the future LOD and protected areas are marked clearly in the field. A minimum of 48 hour notice to CID must be given at the following stages:
  - Prior to the start of earth disturbance.
  - Upon completion of the installation of perimeter erosion and sediment controls, but before proceeding with any other earth disturbance or grading.
  - Prior to the start of another phase of construction or opening of another grading unit.
  - Prior to the removal or modification of sediment control practices.Other building or grading inspection approvals may not be authorized until this initial approval by the inspection agency is made. Other related state and federal permits shall be referenced, to ensure coordination and to avoid conflicts with this plan.
- All vegetative and structural practices are to be installed according to the provisions of this plan and are to be in conformance with the 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, and revisions thereto.
- Following initial soil disturbance or redistribution, permanent or temporary stabilization is required within three (3) calendar days as to the surface of all perimeter controls, dikes, swales, ditches, perimeter slopes, and all slopes steeper than 3 horizontal to 1 vertical (3:1); and seven (7) calendar days as to all other disturbed areas on the project site except for those areas under active grading.
- All disturbed areas must be stabilized within the time period specified above in accordance with the 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL for topsoil (Sec. 8-4-2), permanent seeding (Sec. 8-4-5), temporary seeding (Sec. 8-4-6) and mulching (Sec. 8-4-3). Temporary stabilization with mulch alone can only be applied between the fall and spring seeding dates if the ground is frozen. Incremental stabilization (Sec. 8-4-1) specifications shall be enforced in areas with >15' of cut and/or fill. Stockpiles (Sec. 8-4-8) in excess of 20 ft. must be benched with stable outlet. All concentrated flow, steep slope, and highly erodible areas shall receive soil stabilization matting (Sec. 8-4-6).
- 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 CID.
- Site Analysis:

Total Area of Site:	18.0	Acres
Area Disturbed:	18.0	Acres
Area to be seeded or paved:	0	Acres
Area to be vegetatively stabilized:	13.3	Acres
Total Cut:	7,364	Cu. Yds.
Total Fill:	6,362	Cu. Yds.

Off-site waste/borrow area location: None/all on-site
- 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 CID. The site and all controls shall be inspected by the contractor weekly; and the next day after each rain event. A written report by the contractor, made available upon request, is part of every inspection and should include:
  - Inspection date
  - Inspection type (routine, pre-storm event, during rain event)
  - Name and title of inspector
  - Weather information (current conditions as well as time and amount of last recorded precipitation)
  - Brief description of project's status (e.g., percent complete) and/or current activities
  - Evidence of sediment discharges
  - Identification of plan deficiencies
  - Identification of sediment controls that require maintenance
  - Identification of missing or improperly installed sediment controls
  - Compliance status regarding the sequence of construction and stabilization requirements
  - Photographs
  - Monitoring/sampling
  - Maintenance and/or corrective action performed
  - Other inspection items as required by the General Permit for Stormwater Associated with Construction Activities (NPDES, MDE).
- Trenches for the construction of utilities is limited to three pipe lengths or that which can and shall be back-filled and stabilized by the end of each workday, whichever is shorter.
- Any major changes or revisions to the plan or sequence of construction must be reviewed and approved by the HSCD prior to proceeding with construction. Minor revisions may be allowed by the CID per the list of HSCD-approved field changes.
- Disturbance shall not occur outside the L.O.D. A project is to be sequenced so that grading activities begin on one grading unit (maximum acreage of 20 ac. per grading unit) at a time. Work may proceed to a subsequent grading unit when at least 50 percent of the disturbed area in the preceding grading unit has been stabilized and approved by the CID. Unless otherwise specified and approved by the HSCD, no more than 30 acres cumulatively may be disturbed at a given time.
- Wash water from any equipment, vehicles, wheels, pavement, and other sources must be treated in a sediment basin or other approved washout structure.
- Topsoil shall be stockpiled and preserved on-site for redistribution onto final grade.
- All Silt Fence and Super Silt Fence shall be placed on-the-contour, and be imbricated at 25' minimum intervals, with lower ends curled uphill by 2' in elevation.
- Stream channels must not be disturbed during the following restricted time periods (inclusive):
  - Use I and IP March 1 - June 15
  - Use III and IIIP October 1 - April 30
  - Use IV March 1 - May 31
- A copy of this plan, the 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, and associated permits shall be on-site and available when the site is active.

Owners/Developer Certification:

"I/we hereby certify that any clearing, grading, construction, or development will be done pursuant to this approved erosion and sediment control plan, including inspecting and maintaining controls, and that the responsible personnel involved in the construction project will have a Certificate of Training at a Maryland Department of the Environment (MDE) approved training program for the control on erosion and sediment prior to beginning the project. I certify right-of-entry for periodic on-site evaluation by Howard County, the Howard Soil Conservation District and/or MDE."

Owner's/ Developer's Signature \_\_\_\_\_ Date \_\_\_\_\_

Printed Name & Title \_\_\_\_\_

Design Certification:

"I hereby certify that this plan has been designed in accordance with current Maryland erosion and sediment control laws, regulations, and standards, that it represents a practical and workable plan based on my personal knowledge of the site, and that it was prepared in accordance with the requirements of the Howard Soil Conservation District."

Designer's Signature \_\_\_\_\_ Date \_\_\_\_\_

Printed Name \_\_\_\_\_ MD Registration No. \_\_\_\_\_  
P.E., R.L.S., or R.L.A. (circle one)

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. 50819, expiration date: 04/17/21.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

STORM WATER MANAGEMENT DIVISION  
BUREAU OF ENVIRONMENTAL SERVICES  
6751 COLUMBIA GATEWAY DRIVE, SUITE 514  
COLUMBIA, MARYLAND 21046-3143  
(410) 313-6444

COORDINATE NOTE

PLAN IS IN NAD 83 MARYLAND STATE PLANE FIPS 1900 COORDINATE SYSTEM.

UTILITY NOTIFICATION

"Ecotone, Inc. makes no representation as to the existence or non-existence of any utilities at the construction site. Shown on these construction drawings are those utilities which have been identified. It is the responsibility of the landowners or operators and contractors to assure themselves that no hazard exists or damage will occur to utilities. It is suggested that Miss Utility be contacted at: 1-800-257-7777."

Howard SCD Signature Block:

This plan is approved for soil erosion and sediment control by the Howard Soil Conservation District.

Howard Soil Conservation District \_\_\_\_\_ Date \_\_\_\_\_

UNNAMED TRIBUTARIES TO SOUTH BRANCH PATAPSCO RIVER STREAM RESTORATION EROSION & SEDIMENT CONTROL PLANS COVER SHEET

1485 UNDERWOOD ROAD  
SYKESVILLE, MD 21784



ecological restoration  
129 Industry Lane • Forest Hill, Maryland 21050  
(410) 470 2600 • www.ecotoneinc.com

REVISIONS			
No.	DATE	DESCRIPTION	REV. BY

CHECKED BY: \_\_\_\_\_ ORH

DESIGNED: \_\_\_\_\_ JES/SM

DRAWN: \_\_\_\_\_ SUM

PROJECT No.: 18-15-001

DATE: 6/10/2019

SHEET: \_\_\_\_\_





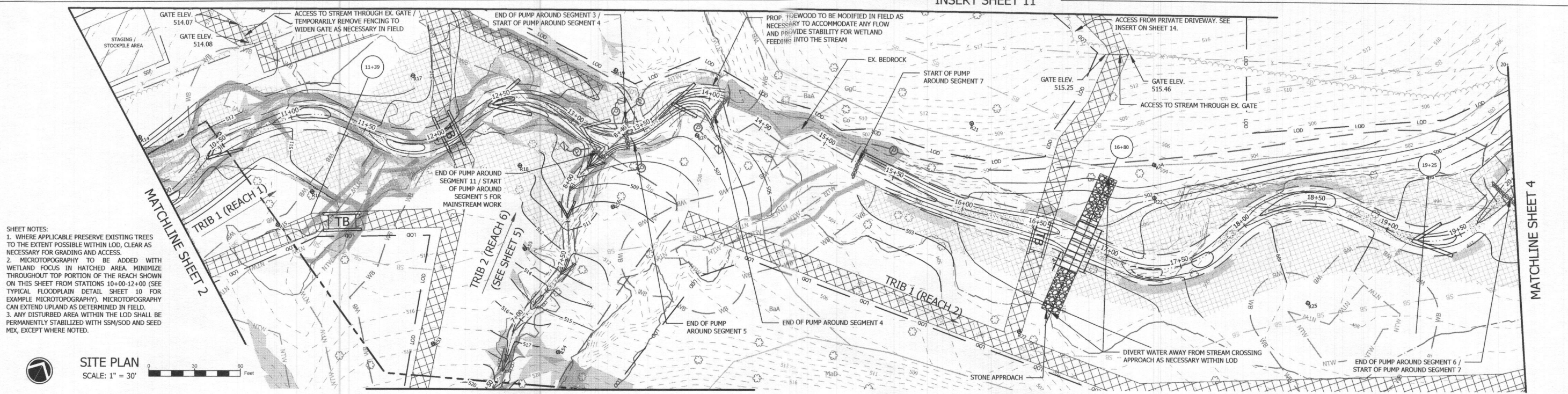
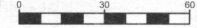


SHEET NOTES:  
1. WHERE APPLICABLE PRESERVE EXISTING TREES TO THE EXTENT POSSIBLE WITHIN LOD, CLEAR AS NECESSARY FOR GRADING AND ACCESS.  
2. MICROTOPOGRAPHY TO BE ADDED WITH WETLAND FOCUS IN HATCHED AREA. MINIMIZE THROUGHOUT TOP PORTION OF THE REACH SHOWN ON THIS SHEET FROM STATIONS 10+00-12+00 (SEE TYPICAL FLOODPLAIN DETAIL SHEET 10 FOR EXAMPLE MICROTOPOGRAPHY). MICROTOPOGRAPHY CAN EXTEND UPLAND AS DETERMINED IN FIELD.  
3. ANY DISTURBED AREA WITHIN THE LOD SHALL BE PERMANENTLY STABILIZED WITH SSM/SOD AND SEED MIX, EXCEPT WHERE NOTED.



SITE PLAN

SCALE: 1" = 30'



STREAM	REALIGNMENT	RADIUS #	REALIGNMENT STATIONING	RADIUS OF CURVATURE	RADIUS OF CURVATURE/BANKFULL WIDTH
TRIBUTARY 1	REACH 1	R14	9+69 - 10+20	43 FT	2.76
TRIBUTARY 1	REACH 1	R15	10+35 - 10+67	63 FT	4.04
TRIBUTARY 1	REACH 1	R16	10+97 - 11+34	50 FT	3.21
TRIBUTARY 1	REACH 1	R17	11+65 - 12+13	45 FT	2.88
TRIBUTARY 1	REACH 1	R18	12+33 - 12+89	44 FT	2.82
TRIBUTARY 1	REACH 1	R19	13+04 - 13+67	43 FT	2.76
TRIBUTARY 1	REACH 1	R20	13+71 - 13+98	25 FT	1.60
TRIBUTARY 1	REACH 2	R21	15+75 - 15+92	55 FT	3.06
TRIBUTARY 1	REACH 2	R22	16+55 - 16+67	68 FT	3.78
TRIBUTARY 1	REACH 2	R23	17+13 - 17+42	47 FT	2.61
TRIBUTARY 1	REACH 2	R24	17+46 - 17+79	68 FT	3.78
TRIBUTARY 1	REACH 2	R25	18+00 - 18+72	65 FT	3.61
TRIBUTARY 1	REACH 2	R26	19+09 - 19+68	48 FT	2.67

SOILS LEGEND	
SYMBOL	K-FACTOR
BaA	0.37
Co	0.37
GgB	0.24
GgC	0.24
GmB	0.43
GmC	0.43
MaA	0.28
MaD	0.28
MkF	0.32

SOIL DESCRIPTION	
BaA	Baile silt loam, 0-3% slopes
Co	Codorus and Hatboro silt loams, 0-3% slopes
GgB	Glenelg loam, 3-8% slopes
GgC	Glenelg loam, 8-15% slopes
GmB	Glenville silt loam, 0-3% slopes
GmC	Glenville silt loam, 3-8% slopes
MaA	Manor loam, 8-15% slopes
MaD	Manor loam, 15-25% slopes
MkF	Manor loam, 15-25% slopes, very rocky
MkF	Manor-Brinklow complex, 25-65% slopes, very rocky

LEGEND	
---	PROPERTY BOUNDARY
---	EX. CONTOURS
---	EX. STREAM CENTERLINE
---	EX. SOIL BOUNDARY
---	EX. TREELINE
---	EX. FLOODPLAIN - 100 YR
---	EX. WETLAND
---	EX. WETLAND BUFFER (25 FT)
---	EX. FENCELINE
---	EX. STREAM BUFFER
---	EX. TREE
---	PROPOSED CONTOURS
---	PROPOSED ODD CONTOURS
---	PROPOSED STREAM CENTERLINE
---	PROPOSED TOP OF BANK
---	LIMIT OF DISTURBANCE
---	PROPOSED SUPER SILT FENCE
---	PROPOSED LOG SEGMENT
---	PROPOSED SOIL STABILIZATION MATTING (INFLOW PROTECTION)
---	PROPOSED FLOODPLAIN WETLAND MICROTOPOGRAPHY AREA
---	PROPOSED OXBOW WETLAND
---	PROPOSED RIFFLE GRADE CONTROL
---	PROPOSED MULCH ACCESS PATH
---	PROPOSED PUMP AND HOSE
---	PROPOSED SANDBAG SEDIMENT DIKE
---	PROPOSED FILTER BAG
---	PROPOSED CONCRETE PANEL CROSSING
---	TEMPORARY ACCESS BRIDGE OR TIMBER MAT IF APPLICABLE
---	PROPOSED ROCK STEP POOL
---	PROPOSED LOG CROSS VANE
---	EX. SLOPES 15-25%
---	EX. SLOPES 25% GREATER

UNNAMED TRIBUTARIES TO SOUTH BRANCH PATAPSCO RIVER  
STREAM RESTORATION  
EROSION & SEDIMENT CONTROL PLAN  
TRIBUTARY 1 DESIGN SHEET  
1485 UNDERWOOD ROAD  
SYKESVILLE, MD 21784

ecotone  
ecological restoration  
129 Industry Lane · Forest Hill, Maryland 21050  
(410) 420 2600 · www.ecotoneinc.com

REVISIONS			
No.	DATE	DESCRIPTION	REV. BY

CHECKED BY: CRH  
DESIGNED: JEB/SJM  
DRAWN: SJM  
PROJECT No.: 18-15-001  
DATE: 6/10/2019  
SHEET: 3 of 16





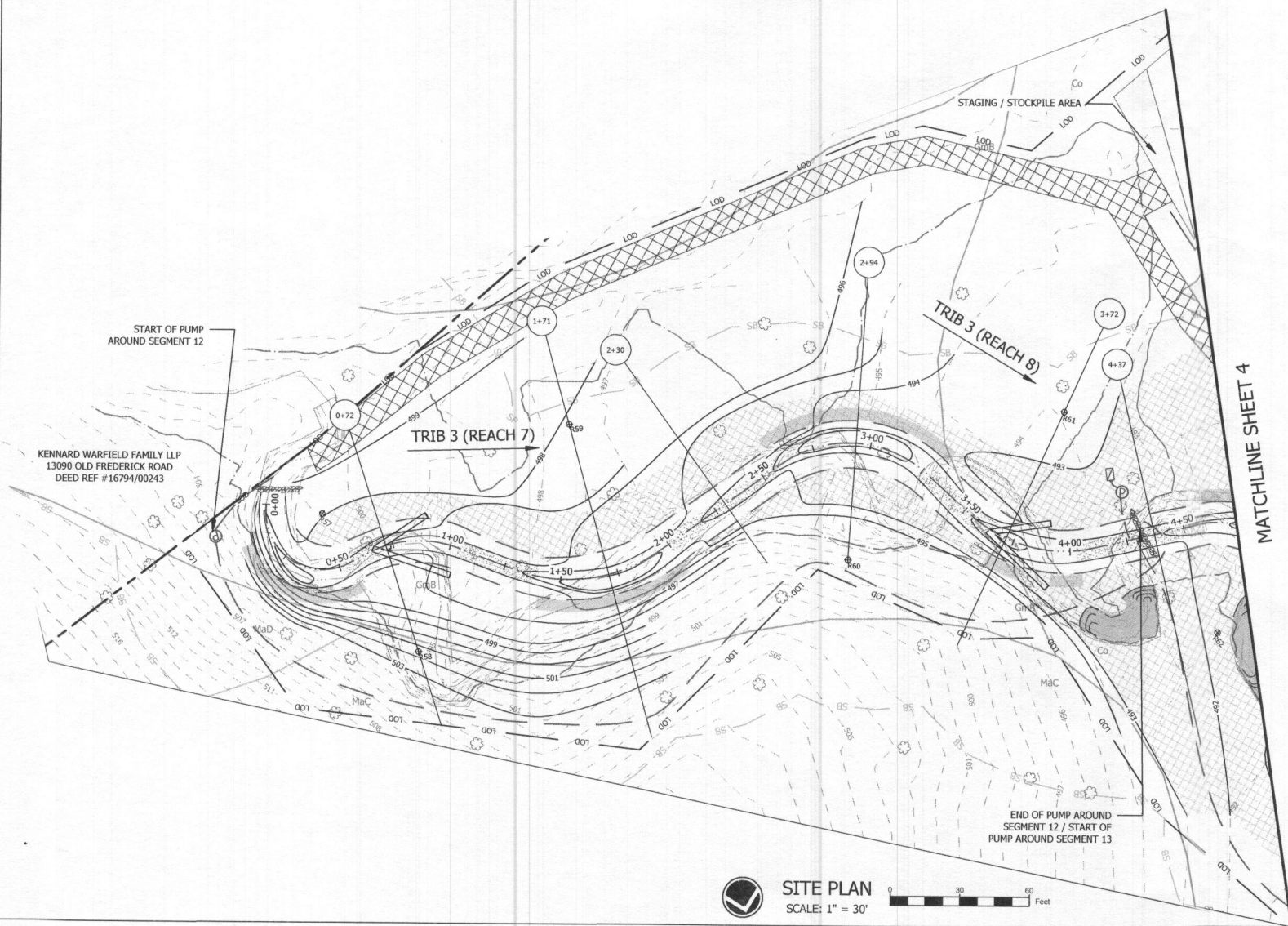
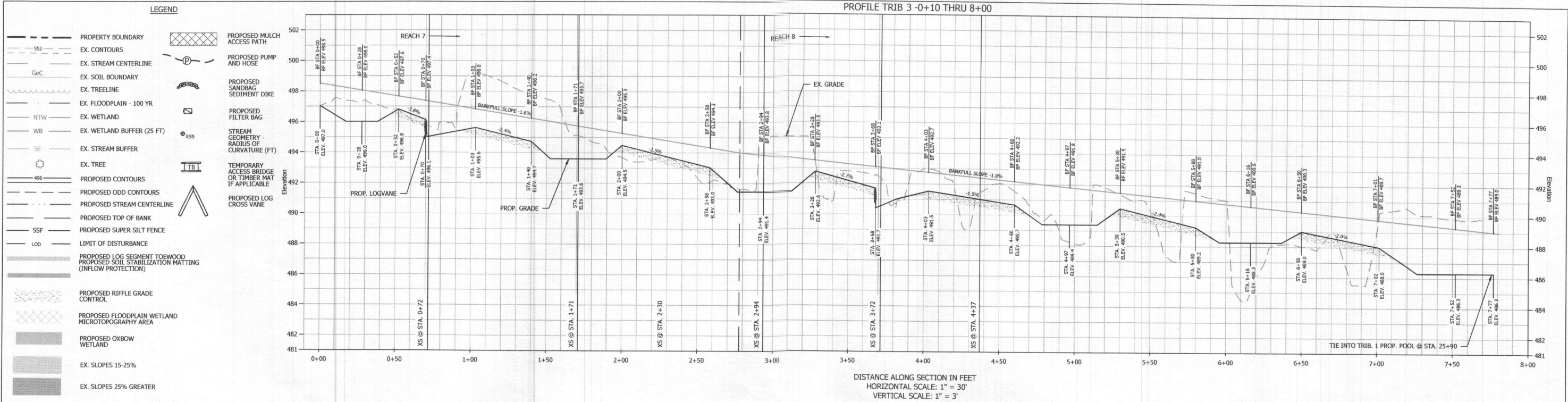












SHEET NOTES:

- WHERE APPLICABLE PRESERVE EXISTING TREES TO THE EXTENT POSSIBLE WITHIN LOD, CLEAR AS NECESSARY FOR GRADING AND ACCESS.
- MICROTOPOGRAPHY TO BE ADDED TO FLOODPLAIN WITH WETLAND FOCUS IN HATCHED AREA. SEE TYPICAL FLOODPLAIN DETAIL (SHEET 10). MICROTOPOGRAPHY CAN EXTEND UPLAND AS DETERMINED IN FIELD.
- ANY DISTURBED AREA WITHIN THE LOD SHALL BE PERMANENTLY STABILIZED WITH SSM/SOD AND SEED MIX, EXCEPT WHERE NOTED.

STREAM	REALIGNMENT	RADIUS #	REALIGNMENT STATIONING	RADIUS OF CURVATURE	RADIUS OF CURVATURE/BANKFULL WIDTH
TRIBUTARY 3	REACH 7	R58	0+03 - 0+54	24 FT	1.43
TRIBUTARY 3	REACH 7	R59	0+63 - 1+03	47 FT	2.80
TRIBUTARY 3	REACH 7	R60	1+30 - 1+95	67 FT	3.99
TRIBUTARY 3	REACH 7	R61	2+59 - 3+28	50 FT	2.98
TRIBUTARY 3	REACH 8	R62	3+53 - 4+11	60 FT	3.33
TRIBUTARY 3	REACH 8	R63	4+54 - 5+46	47 FT	2.61
TRIBUTARY 3	REACH 8	R64	5+69 - 6+49	49 FT	2.72
TRIBUTARY 3	REACH 8	R65	7+18 - 7+77	42 FT	2.33

SOILS LEGEND		
SYMBOL	K-FACTOR	SOIL DESCRIPTION
BaA	0.37	Baile silt loam, 0-3% slopes
Co	0.37	Codorus and Halboro silt loams, 0-3% slopes
GqB	0.24	Glenelg loam, 3-8% slopes
GqC	0.24	Glenelg loam, 8-15% slopes
GmA	0.43	Glenville silt loam, 0-3% slopes
GmB	0.37	Glenville silt loam, 3-8% slopes
GqB	0.43	Glenville-Codorus silt loams, 0-8% slopes
MaC	0.28	Manor loam, 8-15% slopes
MaD	0.28	Manor loam, 15-25% slopes
MkD	0.28	Manor loam, 15-25% slopes, very rocky
MkF	0.32	Manor-Brinklow complex, 25-65% slopes, very rocky

UNNAMED TRIBUTARIES TO SOUTH BRANCH PATAPSCO RIVER  
STREAM RESTORATION  
EROSION & SEDIMENT CONTROL  
TRIBUTARY 3 DESIGN SHEET  
1485 UNDERWOOD ROAD  
SYKESVILLE, MD 21784

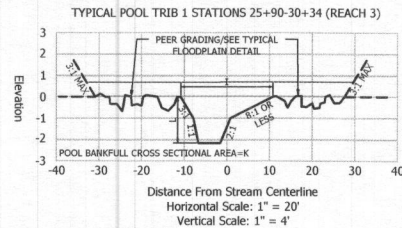
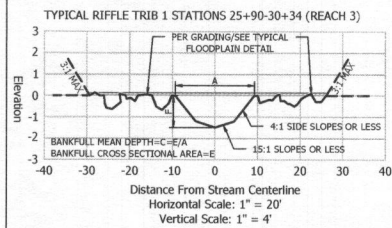
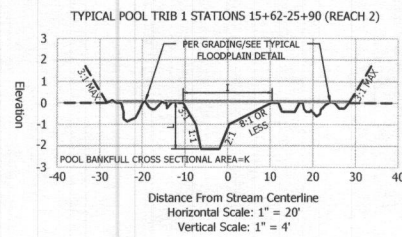
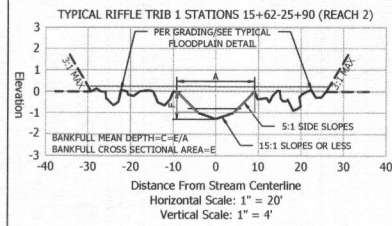
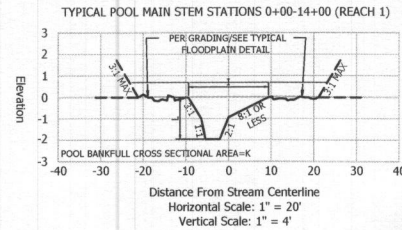
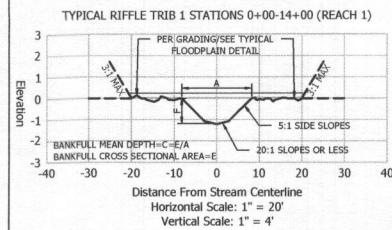


REVISIONS			
No.	DATE	DESCRIPTION	REV. BY

CHECKED BY: CRH  
DESIGNED: JESSIM  
DRAWN: SUM  
PROJECT No.: 18-15-001  
DATE: 6/10/2019  
SHEET:



## TYPICAL CROSS SECTIONS TRIBUTARY 1

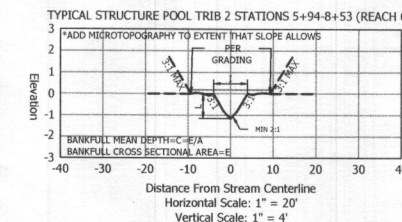
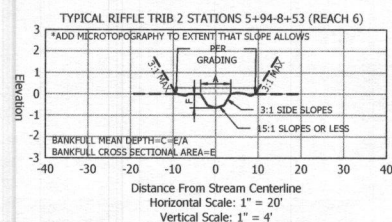
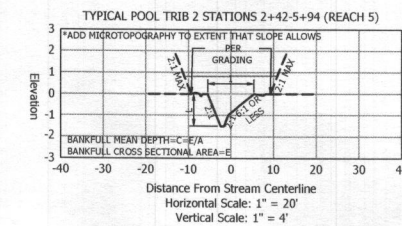
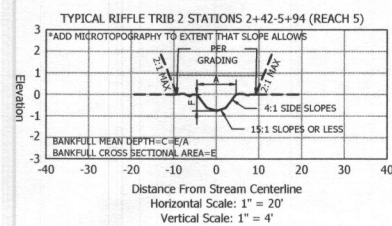
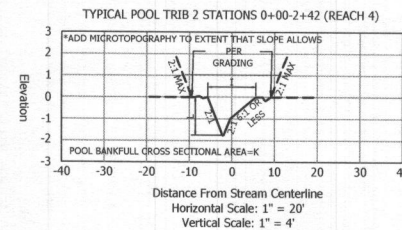
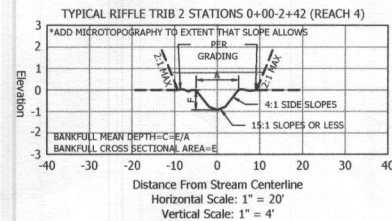


— TYPICAL  $d_{10}$  (10-YR STORM WSE) FOR EACH STRUCTURE TYPE

## DESIGN INFORMATION - TRIB 1

HYDROLOGY		REACH STATIONING 0+00 - 14+00 (REACH 1)			REACH STATIONING 15+62 - 25+90 (REACH 2)			REACH STATIONING 25+90 - 30+34 (REACH 3)		
DRAINAGE AREA (SQ MI)		0.26			0.41			0.81		
BANKFULL DISCHARGE (CFS)		45.5			55.5			67.0		
BANKFULL SLOPE (%)		1.60%			1.30%			1.30%		
AVG BANKFULL VELOCITY (FT/S)		3.7			3.6			3.9		
AVG BANKFULL SHEAR STRESS (LBS/SF)		0.71			0.64			0.71		
AVG 10-YR VELOCITY (FT/S)		4.1			4.0			4.8		
AVG 10-YR SHEAR STRESS (LBS/SF)		0.82			0.76			0.98		
MAX D10 (FT)		2.6			4.5			3.1		
2-YR DISCHARGE (CFS)		79			96			155		
10-YR DISCHARGE (CFS)		213			269			422		
100-YR DISCHARGE (CFS)		589			766			1166		
100-YR FLOODPRONE WIDTH (FT)		76			118			206		
DIMENSIONS	KEY	REACH STATIONING 0+00 - 14+00 (REACH 1)			REACH STATIONING 15+62 - 25+90 (REACH 2)			REACH STATIONING 25+90 - 30+34 (REACH 3)		
		MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX
RIFFLE WIDTH AT BANKFULL (FT)	A	15.6	15.0	16.5	18.0	17.0	18.5	18.0	17.2	18.6
RIFFLE MEAN DEPTH (FT)	C	0.75	0.70	0.80	0.86	0.80	0.90	0.97	0.90	1.00
WIDTH/DEPTH RATIO	D	20.0	18.8	22.0	20.9	19.1	22.1	18.6	17.2	20.0
RIFFLE CROSS-SECTIONAL AREA (SF)	E	12.5	12.00	13.0	15.0	14.5	15.5	17.5	17.2	18.0
RIFFLE MAX DEPTH (FT)	F	1.0	0.9	1.2	1.2	1.0	1.3	1.4	1.2	1.5
RIFFLE LENGTH (FT)	G	31.2	15.6	46.8	36.0	18.0	54.0	36.0	18.0	54.0
RIFFLE SLOPE (%)	H	4.0	1.6	4.8	3.3	1.3	3.9	3.3	1.3	3.9
POOL WIDTH AT BANKFULL (FT)	I	18.7	17.2	20.3	21.6	19.8	23.4	21.6	19.8	23.4
POOL CROSS-SECTIONAL AREA (SF)	K	15.8	12.2	18.3	20.1	15.5	23.2	22.7	17.5	26.2
POOL MAX DEPTH (FT)	L	1.8	1.0	2.0	2.0	1.5	2.2	2.2	1.5	2.5
POOL LENGTH (FT)	M	39.0	23.4	62.4	45.0	27.0	72.0	45.0	27.0	72.0

## TYPICAL CROSS SECTIONS TRIBUTARY 2

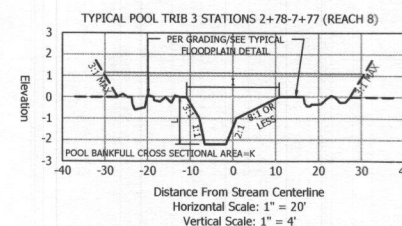
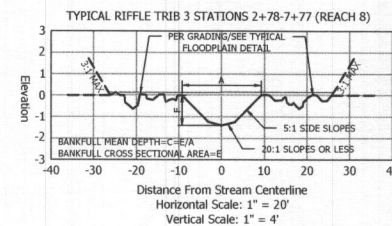
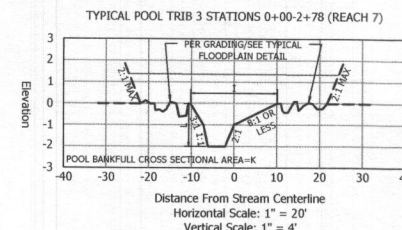
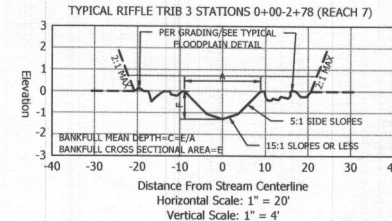


— TYPICAL  $d_{10}$  (10-YR STORM WSE) FOR EACH STRUCTURE TYPE

## DESIGN INFORMATION - TRIB 2

DESIGN INFORMATION - TRID 2										
HYDROLOGY		REACH STATIONING 0+00 - 2+42 (REACH 4)			REACH STATIONING 2+42 - 5+94 (REACH 5)			REACH STATIONING 5+94 - 8+53 (REACH 6)		
DRAINAGE AREA (SQ MI)		0.12			0.13			0.13		
BANKFULL DISCHARGE (CFS)		15.0			15.0			16.0		
BANKFULL SLOPE (%)		1.70%			2.8%			7.1%		
AVG BANKFULL VELOCITY (FT/S)		2.9			3.4			5.1		
AVG BANKFULL SHEAR STRESS (LBS/SF)		0.55			0.79			1.80		
AVG 10-YR VELOCITY (FT/S)		5.2			5.2			5.2		
AVG 10-YR SHEAR STRESS (LBS/SF)		1.1			1.2			1.2		
MAX D10 (FT)		4.1			2.2			2.0		
2-YR DISCHARGE (CFS)		51			44			43		
10-YR DISCHARGE (CFS)		136			129			126		
100-YR DISCHARGE (CFS)		373			381			379		
100-YR FLOODPRONE WIDTH (FT)		27			62			108		
DIMENSIONS	KEY	REACH STATIONING 0+00 - 2+42 (REACH 4)			REACH STATIONING 2+42 - 5+94 (REACH 5)			REACH STATIONING 5+94 - 8+53 (REACH 6)		
		MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX
RIFFLE WIDTH AT BANKFULL (FT)	A	9.5	9.0	10.3	9.0	8.4	9.5	7.0	6.2	7.7
RIFFLE MEAN DEPTH (FT)	C	0.60	0.55	0.65	0.50	0.45	0.55	0.46	0.40	0.50
WIDTH/DEPTH RATIO	D	16.3	14.5	18.4	18.0	15.9	19.8	15.2	12.4	17.9
RIFFLE CROSS-SECTIONAL AREA (SF)	E	5.6	5.0	6.0	4.5	4.0	5.0	3.2	3.0	3.5
RIFFLE MAX DEPTH (FT)	F	0.8	0.6	0.9	0.7	0.6	0.8	0.6	0.5	0.7
RIFFLE LENGTH (FT)	G	18.9	9.5	28.4	18.0	9.0	27.0	17.5	10.5	24.5
RIFFLE SLOPE (%)	H	2.2	1.7	2.6	3.6	2.8	4.2	9.2	7.1	10.7
POOL WIDTH AT BANKFULL (FT)	I	11.3	10.4	12.3	10.8	9.9	11.7	9.1	7.7	10.5
POOL CROSS-SECTIONAL AREA (SF)	K	7.3	6.1	8.4	5.9	5.0	6.8	4.8	4.2	5.8
POOL MAX DEPTH (FT)	L	1.7	1.5	2.0	1.5	1.3	1.8	1.1	0.70	1.4
POOL LENGTH (FT)	M	23.6	14.2	37.8	22.5	13.5	36.0	7.0	3.5	14.0

## TYPICAL CROSS SECTIONS TRIBUTARY 3



— TYPICAL  $d_{10}$  (10-YR STORM WSE) FOR EACH STRUCTURE TYPE

## DESIGN INFORMATION - TRIB 3

HYDROLOGY		REACH STATIONING 0+00 - 2+78 (REACH 7)			REACH STATIONING 2+78 - 7+77 (REACH 8)		
DRAINAGE AREA (SQ MI)		0.37			0.37		
BANKFULL DISCHARGE (CFS)		42.5			42.5		
BANKFULL SLOPE (%)		1.6%			1.0%		
AVG BANKFULL VELOCITY (FT/S)		3.0			2.6		
AVG BANKFULL SHEAR STRESS (LBS/SF)		0.76			0.53		
AVG 10-YR VELOCITY (FT/S)		5.3			3.8		
AVG 10-YR SHEAR STRESS (LBS/SF)		1.2			0.71		
MAX D10 (FT)		2.6			3.1		
2-YR DISCHARGE (CFS)		94			92		
10-YR DISCHARGE (CFS)		259			255		
100-YR DISCHARGE (CFS)		725			722		
100-YR FLOODPRONE WIDTH (FT)		74			128		
DIMENSIONS	KEY	REACH STATIONING 0+00 - 2+78 (REACH 7)			REACH STATIONING 2+78 - 7+77 (REACH 8)		
		MEAN	MIN	MAX	MEAN	MIN	MAX
RIFFLE WIDTH AT BANKFULL (FT)	A	16.8	16.0	17.8	18.0	17.0	18.5
RIFFLE MEAN DEPTH (FT)	C	0.84	0.80	0.90	0.93	0.90	0.96
WIDTH/DEPTH RATIO	D	20.0	18.4	22.0	19.4	17.7	20.3
RIFFLE CROSS-SECTIONAL AREA (SF)	E	13.9	13.0	14.5	16.7	15.8	16.8
RIFFLE MAX DEPTH (FT)	F	1.2	1.0	1.3	1.3	1.1	1.4
RIFFLE LENGTH (FT)	G	33.6	16.8	50.4	36.0	18.0	54.0
RIFFLE SLOPE (%)	H	4.0	1.6	4.8	2.5	1.0	3.0
POOL WIDTH AT BANKFULL (FT)	I	20.2	18.5	21.8	21.6	19.8	23.4
POOL CROSS-SECTIONAL AREA (SF)	K	18.3	14.1	21.2	21.8	16.7	25.1
POOL MAX DEPTH (FT)	L	1.9	1.3	2.1	2.1	1.4	2.3
POOL LENGTH (FT)	M	42.0	25.2	67.2	45.0	27.0	72.0

UNNAMED TRIBUTARIES TO SOUTH  
BRANCH PATAPSCO RIVER  
STREAM RESTORATION  
EROSION & SEDIMENT CONTROL PLANS  
DESIGN SHEET  
1485 UNDERWOOD ROAD  
SYKESVILLE, MD 21784

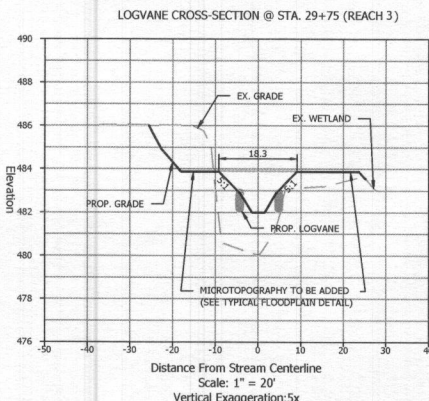
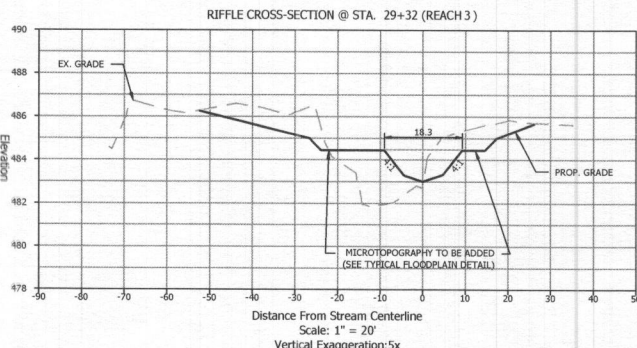
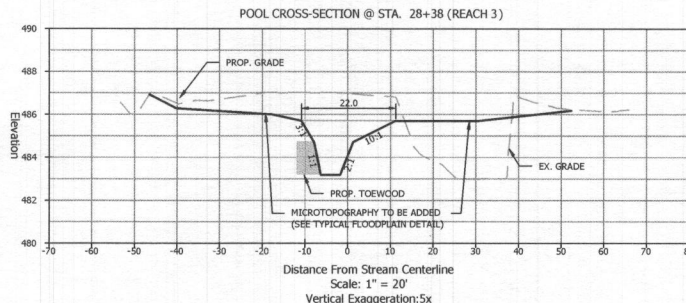
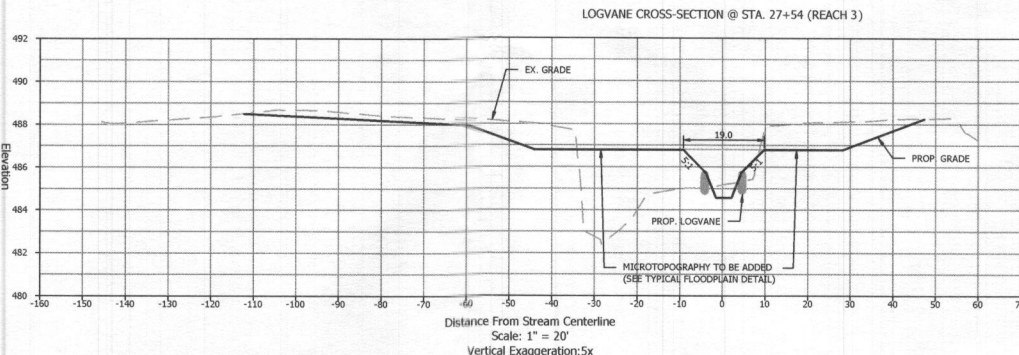
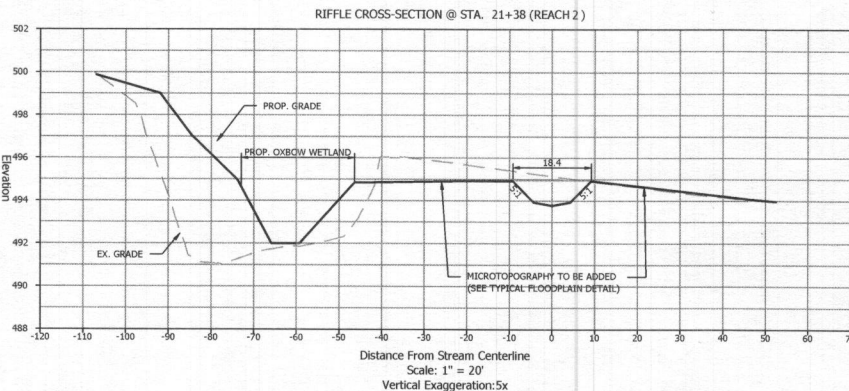
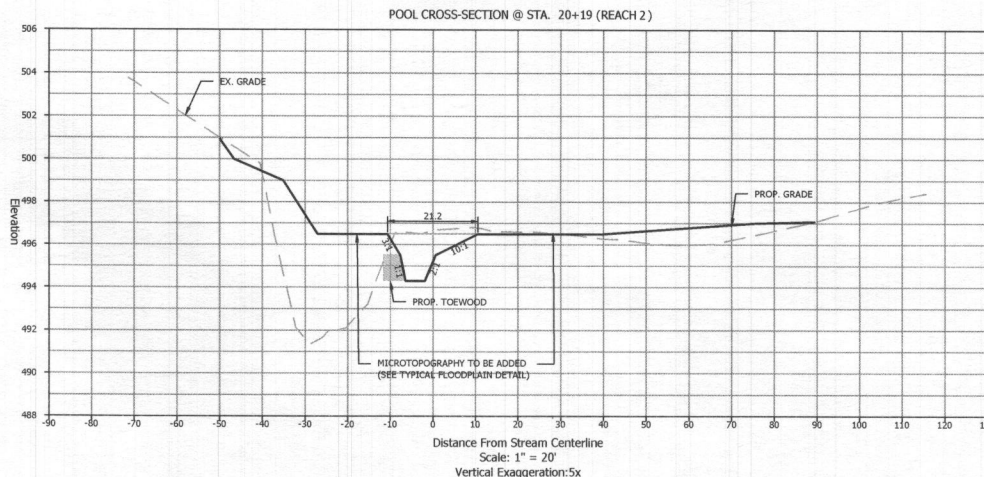
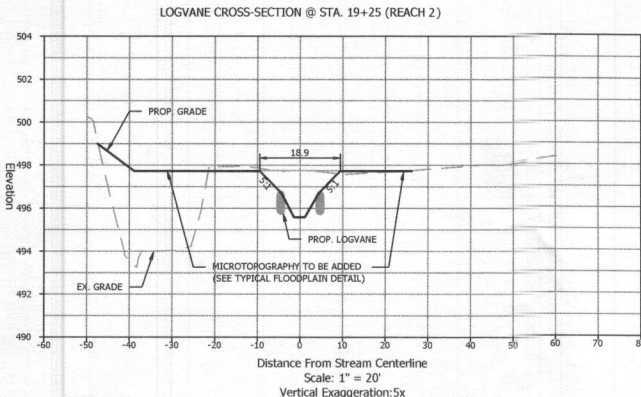
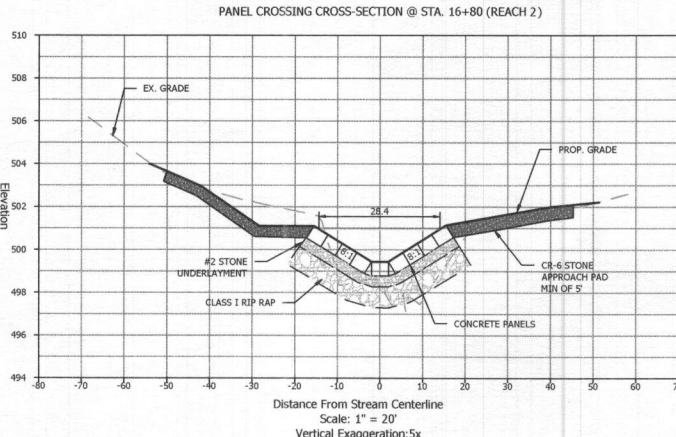
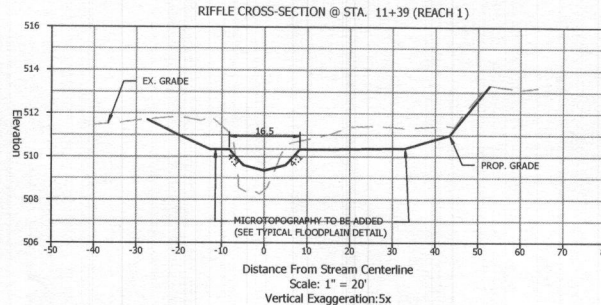
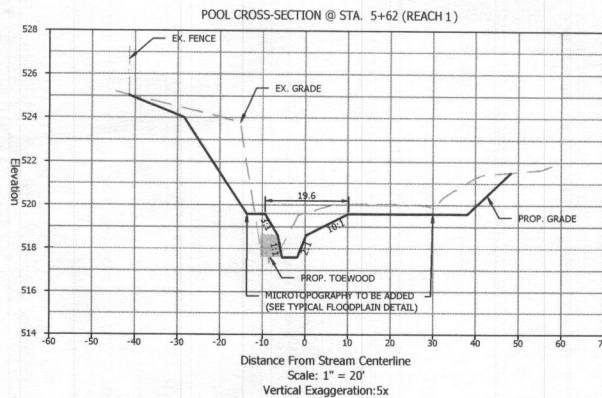
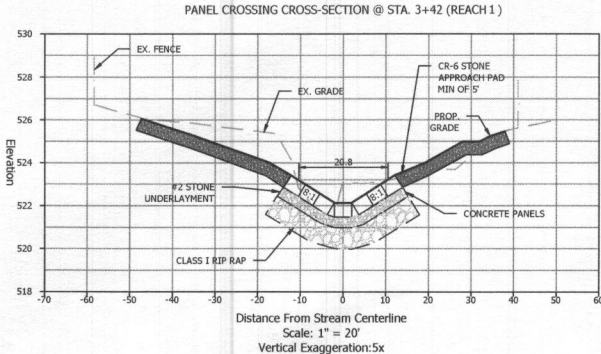
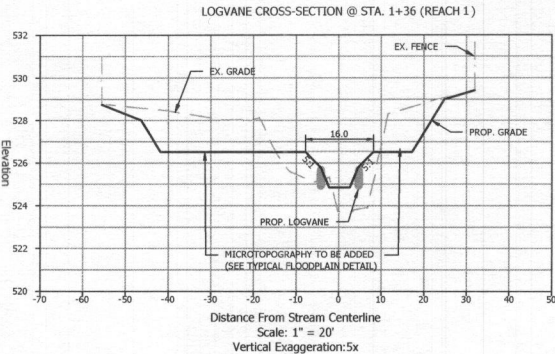


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No.	DATE	DESCRIPTION	REV BY

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DESIGNED: JES/SJM  
DRAWN: SJM  
PROJECT No.: 18-15-001  
DATE: 6/10/2019  
SHEET:



### CROSS SECTIONS TRIBUTARY :



UNNAMED TRIBUTARIES TO SOUTH  
BRANCH PATAPSCO RIVER  
STREAM RESTORATION  
EROSION & SEDIMENT CONTROL PLAN  
DESIGN SHEET  
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SYKESVILLE, MD 21784

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CHECKED BY: CRH

DESIGNED: JES/SJM

DRAWN: SJM

PROJECT No.: 18-15-001

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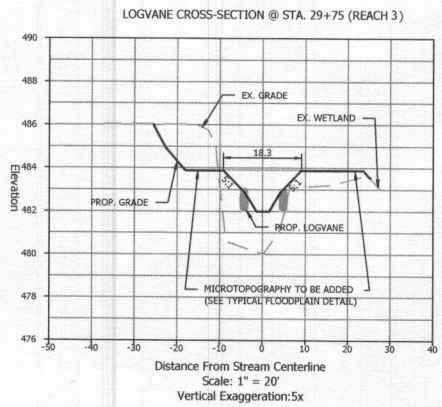
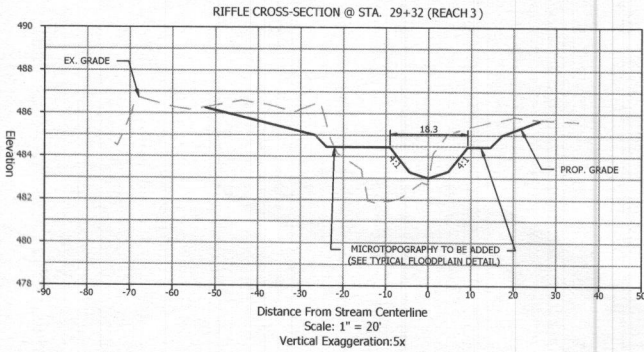
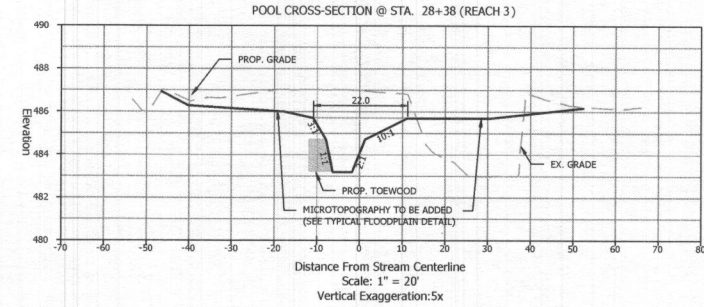
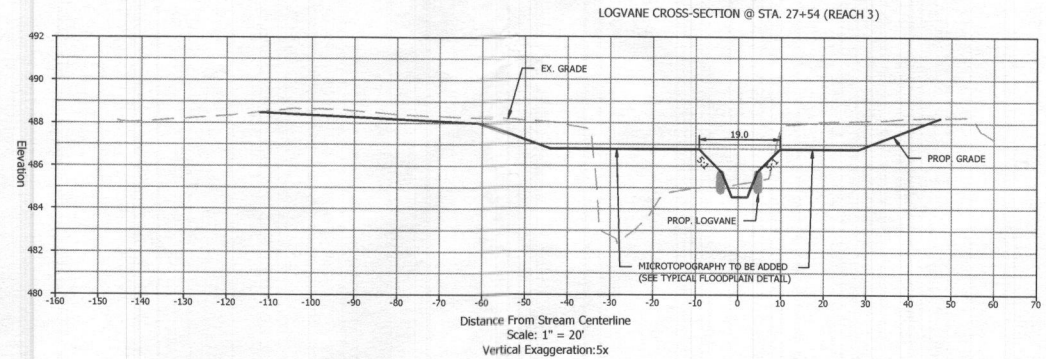
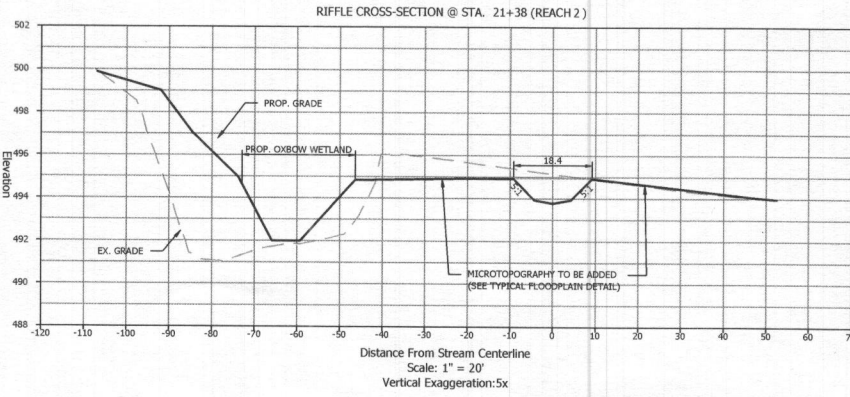
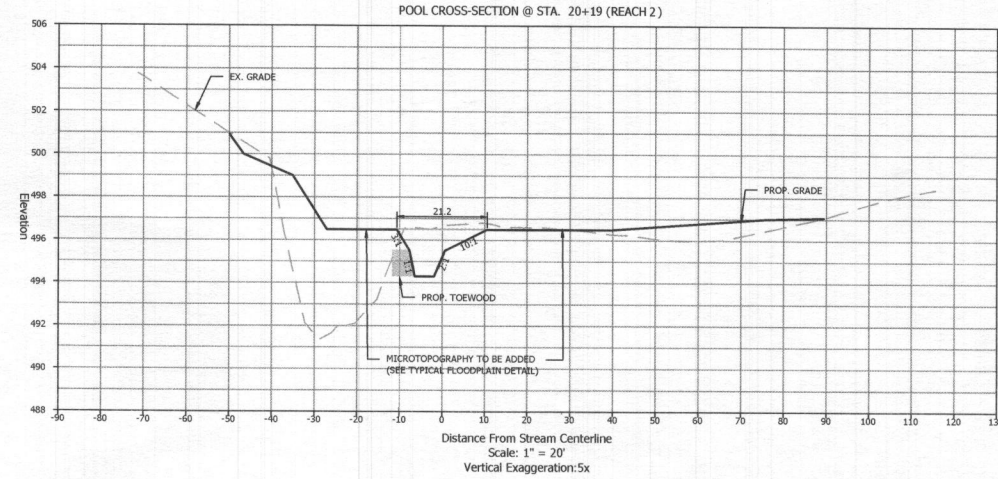
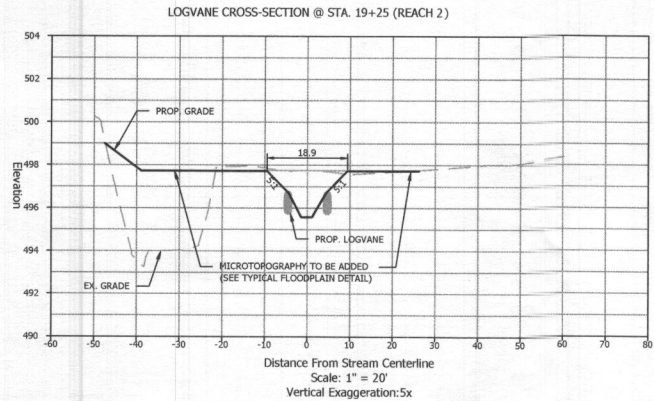
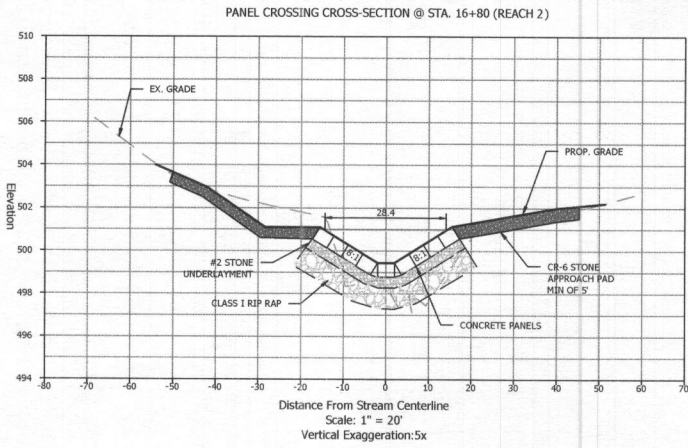
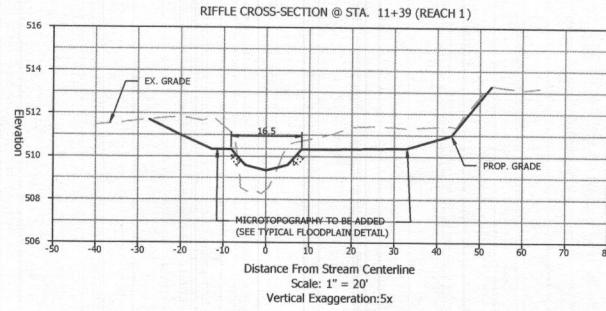
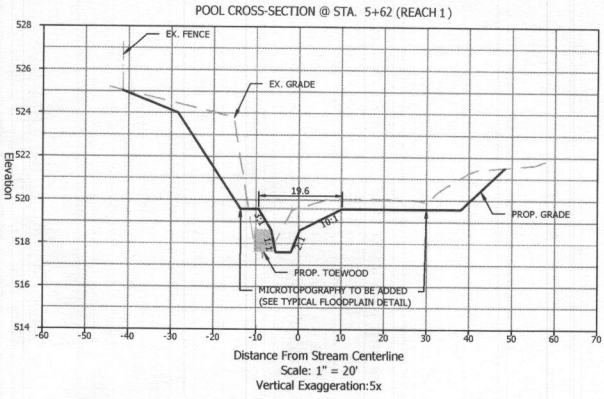
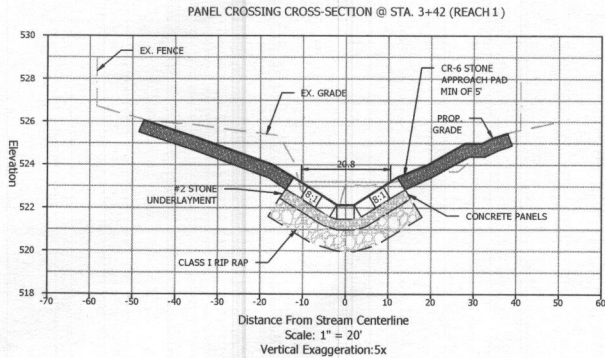
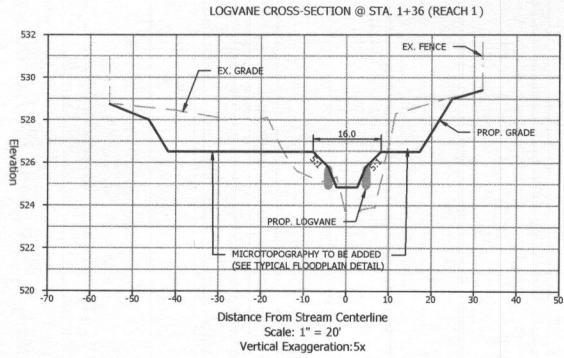
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8 of 16



CROSS SECTIONS TRIBUTARY 1



UNNAMED TRIBUTARIES TO SOUTH  
BRANCH PATAPSCO RIVER  
STREAM RESTORATION  
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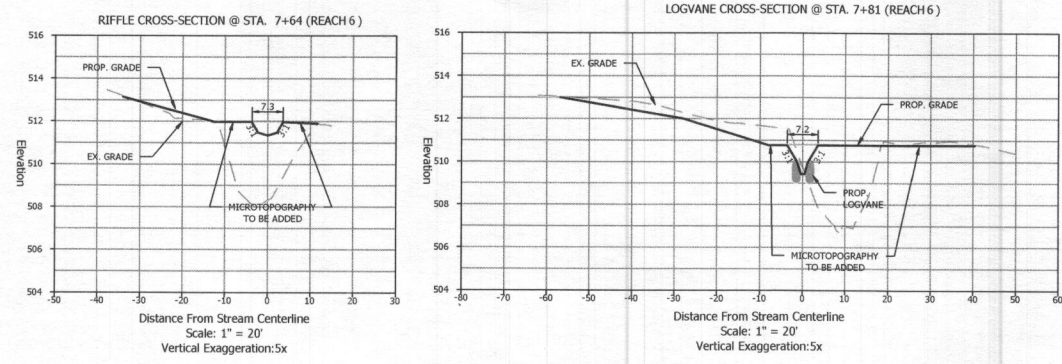
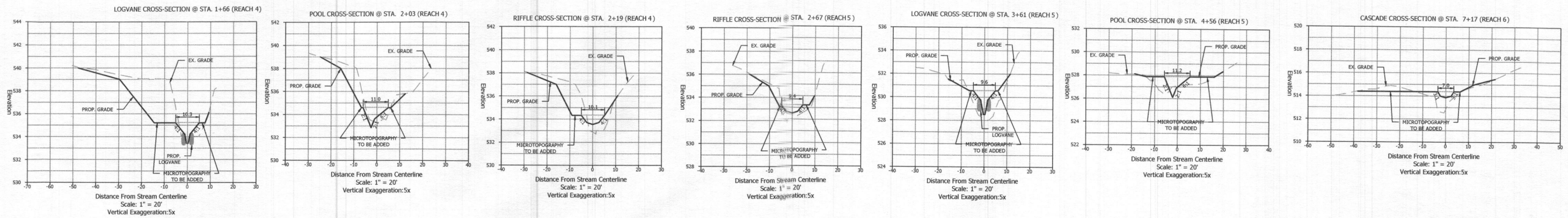


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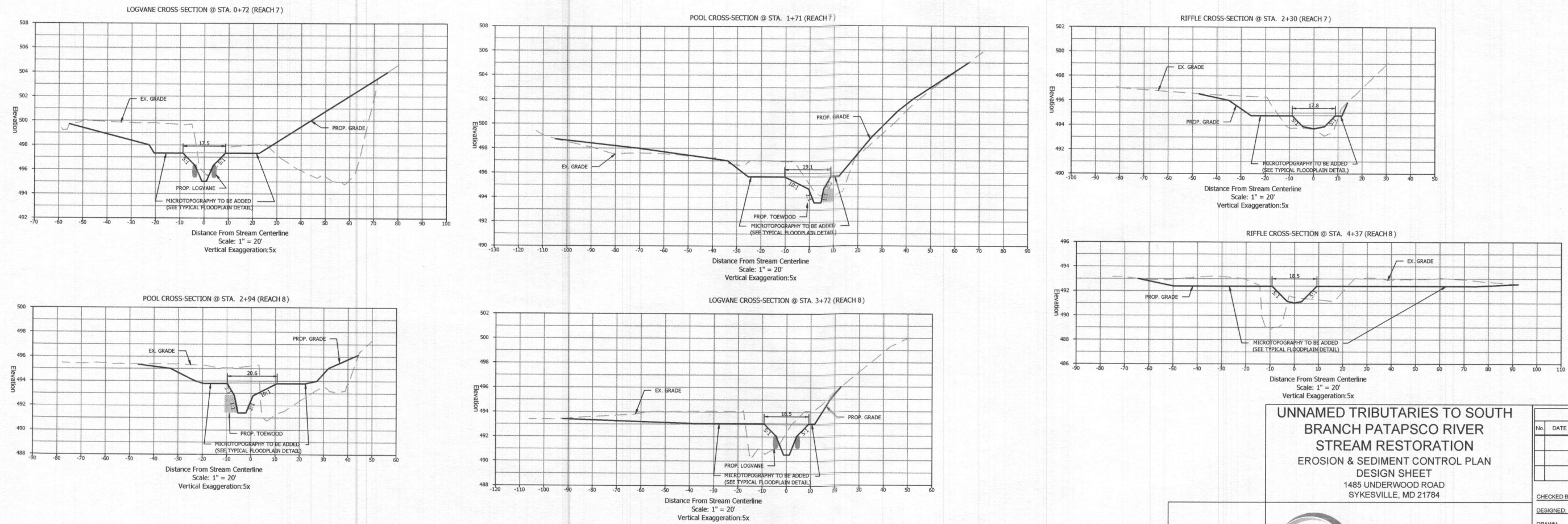
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DRAWN: SJM  
PROJECT No.: 18-15-001  
DATE: 6/10/2019  
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CROSS SECTIONS TRIBUTARY 2



CROSS SECTIONS TRIBUTARY 3



UNNAMED TRIBUTARIES TO SOUTH  
BRANCH PATAPSCO RIVER  
STREAM RESTORATION  
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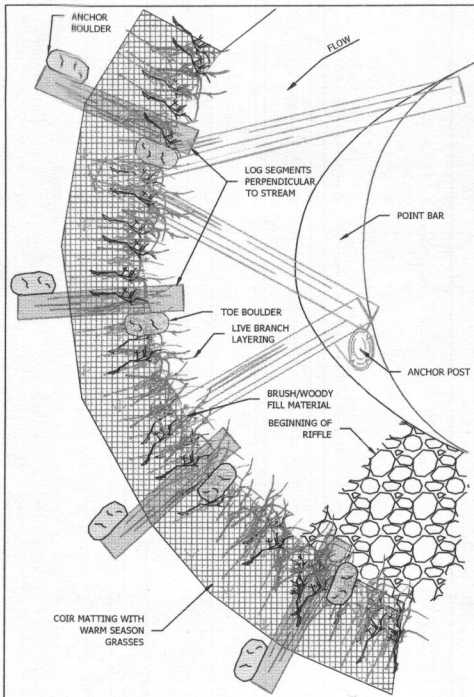


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DRAWN: SJM  
PROJECT No.: 16-15-001  
DATE: 6/10/2019  
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JRM





PLAN VIEW  
LOG SEGMENT TOEWOOD

#### LOG SEGMENT TOEWOOD INSTALLATION

**DESCRIPTION**  
This work shall consist of installing log segment structures to provide bank stability, minimize near bank stress, maintain low width/depth ratio, and enhance aquatic habitat.

#### MATERIALS

**Log Segment Material**  
Material shall consist of woody material such as large limbs, branches, brush, and logs. Logs shall be solid hardwood with minimum trunk diameter of 10 inches. Logs shall have a minimum length of 10 feet. All material shall be free of rot and evidence of pests. Estimated design log life to be 10-20 years, vegetation will have time to establish around before logs decompose.

#### Live Branch Material

- Live branch cuttings shall be approximately 1.5 inch in diameter.
  - Cuttings shall be 24-36" in length and long enough to extend a minimum of 1 foot and maximum of 18 inches from the rebuilt slope face. Side branches and bark shall remain intact prior to installation.
  - Live branch cuttings shall consist of a mix of three or more of the following species as shown on the "Live Branch Plant List" shown on Planting Plans, with at least one willow (salix) and one dogwood (cornus) species included. Each species shall comprise no more than 50% and no less than 20% of the mix.
  - Anchor/Toe Boulder: Class II riprap
- NOTE: When not in dormancy period (Dec. 1 to Apr.1), livestock shall be substituted with tubelings spaced 1 per foot.

#### Soil

Soil material shall consist of top soil salvaged from within the construction limits or supplied topsoil that meets the specifications for topsoil in the Sediment and Erosion Control Plans.

#### Soil Stabilization Matting

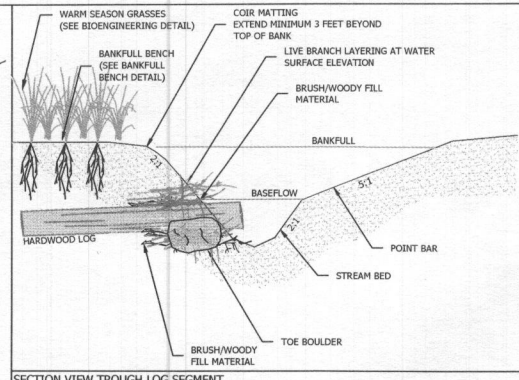
- Matting shall be woven machine spun bristle coir twine made of coir fiber obtained from fresh water cured coconut husks.
- Soil stabilization matting (Coir 700 or equivalent) shall conform to the "Soil Stabilization Chart".

#### CONSTRUCTION

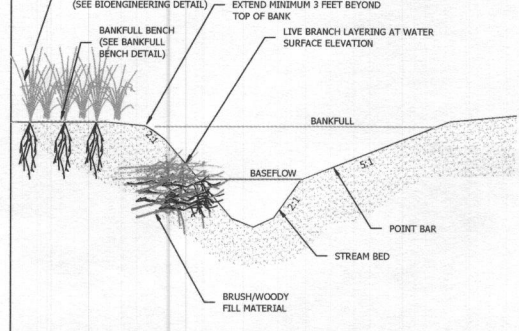
- Live Material Preparation:**
- All cuts shall be smooth and the cut surface kept small. The use of large pruning shears or power saws may be required.
  - Live materials not installed within 8 hours of harvesting shall be protected against drying out and overheating. Protection against drying out shall be accomplished by keeping the material covered, transported in unheated vehicles, moistened and/or kept in soak pits.
  - Storage of live materials shall include continuous shade by covering with evergreen branches or plastic sheeting. Proper storage shall also include sheltering live plant material from the wind and protection from drying by being heeled into moist soils and/or sprayed with anti-transpirant chemicals. Where water is available, live branch cuttings shall be sprayed or immersed.
  - Live materials shall be installed the same day that the cuttings are harvested. If installation of live materials cannot be accomplished on the same day and storage is required, live materials shall be stored for a period no longer than 2 days in cold storage.

#### Log Segment and Branch Layering Installation

- Excavate channel bed and outside bank to a subgrade depth that allows for thickness of proposed log segments (when complete, baseflow water height should match or be slightly higher than the height of the installed log segments). Excavation width into the bank shall be a minimum of 5 feet from proposed toe.
- At proposed log segment locations, excavate a wider trench into bank that allows for proposed length of log segments.
- Place log segments into proposed locations. Spacing of log segments shall be per spacing chart. Log segments shall not protrude more than 1 foot past proposed toe.
- Place the boulder on the downstream side of log segment and an anchor boulder on the upstream end.
- Small woody material (limbs, branches, brush) shall be placed in between previously installed log segments. Height of woody material shall match height of log segments.
- Place a thin layer of backfill (0.2' max) over woody material to form a planting bed for live branch material.
- Place live branch material over backfill such that 2/3 of the branch will be covered with soil and 1/3 of the branch is exposed, extending out beyond the face of the bank. Live branches placed minimum 3/ft with growing tops facing out.
- A layer of topsoil backfill shall be placed on top of the branches and compacted such that soil completely fills all voids between all the branches.
- Regrade stream bank above branch layering to a subgrade elevation that allows for the placement of sod matting (0.5'-0.75' typ.). Create a 2:1 slope (typ.) on the face and also a bankfull bench per the detail above and typical cross sections.
- Install sod matting beginning at the start of the woody fill material to the end of the bankfull bench.
- On the opposite side (inside of the meander) of the toe wood, grade point bar to match typical pool cross section. Seed and straw to stabilize.



SECTION VIEW TROUGH LOG SEGMENT



SECTION VIEW TROUGH BRUSH/WOODY MATERIAL

#### 11. Warm season grasses will be installed during the appropriate growing season.

**Alternatively (at the Contractor's discretion):**  
Sod matting can be wrapped in soil stabilization matting. Follow "Soil Lift Detail" and "Soil Stabilization Matting Detail".

NOTE: The spacing of log segments will vary on each meander based on the following table:

Ratio of Radius to Bankfull Width	Log Segment Spacing
<2x bankfull width	5'-8'
2-2.5x bankfull width	7'-10'
>2.5x bankfull width	9'-12'

#### LOG CROSS VANE INSTALLATION

#### DESCRIPTION

This work shall consist of installing a log cross vane structure to provide grade control, bank stability, and minimize near bank stress.

#### MATERIALS

##### LOGS

Logs shall be hardwood species, have a minimum length as indicated on the "Log Cross Vane Chart", and a minimum diameter of 12 inches. All material shall be free of rot and evidence of pests. All branches and root mass shall be removed. Estimated design log life to be 10-20 years, vegetation will have time to establish around before logs decompose.

#### Backfill Substrate Material

Backfill material shall conform to riffle substrate specifications.

#### Anchor Boulders

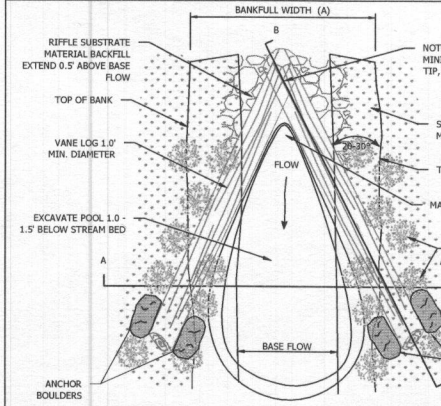
Anchor boulders shall consist of Class II Riprap or equivalent salvaged boulders found on site.

#### Soil Stabilization Matting

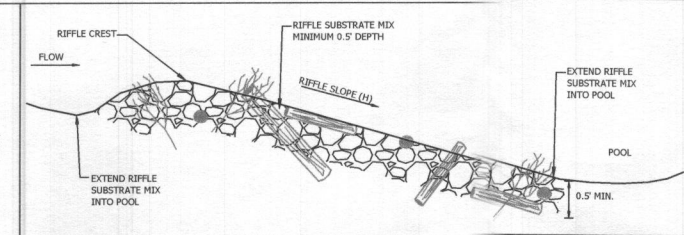
- Matting shall be woven machine spun bristle coir twine made of coir fiber obtained from fresh water cured coconut husks.
- Soil stabilization matting shall conform to the "Soil Stabilization Matting Specifications" chart.

#### CONSTRUCTION

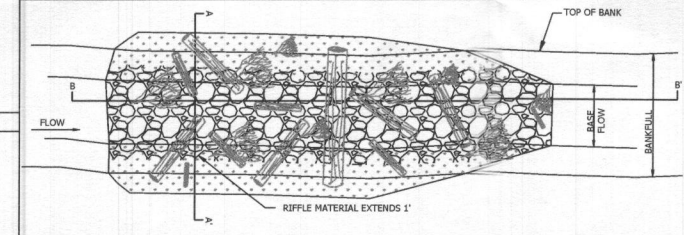
- Rough grade channel and floodplain areas prior to installing logs.
- Excavate trench for vane log so that tip of log will be flush with proposed stream bed elevation at thalweg and log ties into the bank at approximately 0.5' below bankfull elevation.
- Install vane log and backfill with riffle substrate material. Ensure that all voids have been filled on the upstream side of log and beneath.
- Excavate trench for opposing vane log.
- Install log with tip at same elevation as previously installed log and bank tie in point at same elevation as first log. Logs shall be notched so that the lowest point is at the tip where the logs meet. Secure log tips with a 3 foot section of rebar.
- Backfill remaining areas with riffle substrate material, ensuring that all voids have been filled.
- Grade banks, seed and mulch per bank treatment specifications and details.



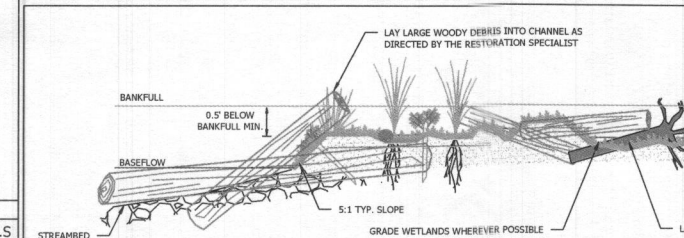
PLAN VIEW  
LOG CROSS VANE DETAIL



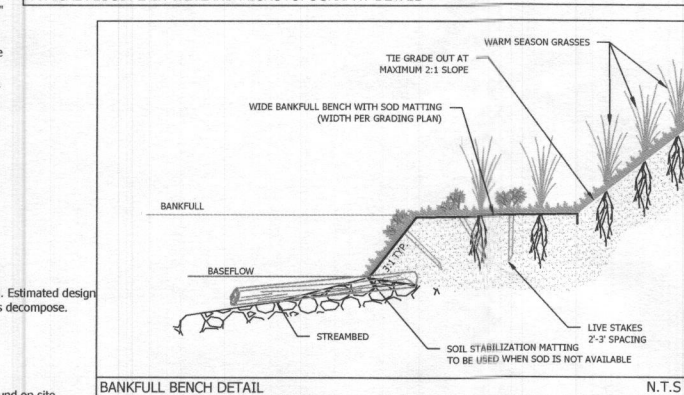
PROFILE B - B'



PLAN VIEW  
RIFFLE GRADE CONTROL STRUCTURE WITH EMBEDDED WOODY MATERIAL DETAIL



TYPICAL FLOODPLAIN WETLAND MICROTOPOGRAPHY DETAIL



BANKFULL BENCH DETAIL

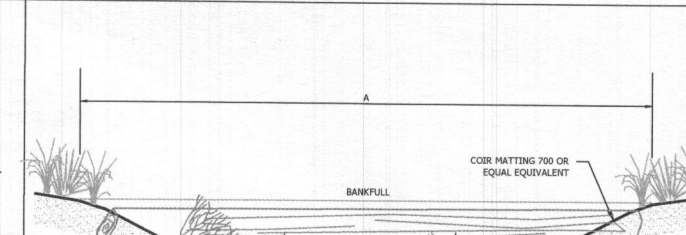
#### BANKFULL BENCH INSTALLATION

##### Bankfull Bench Installation:

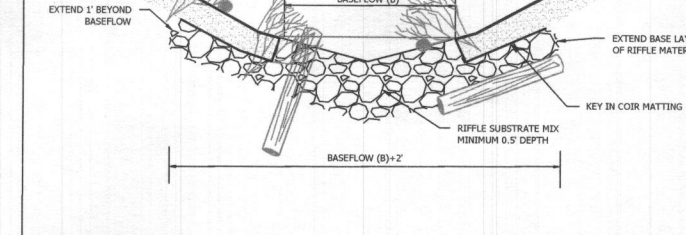
- Grade stream bank to a subgrade elevation that allows for the placement of sod matting (0.5' - 0.75' typ.). Bank face slope and bench width to match grading plan and typical cross sections.
- Install sod matting starting at edge of base flow and continue up bank and over the bankfull bench.
- If sod matting is not available, utilize soil stabilization matting making sure to key in all edges a minimum of 6".
- When using stabilization matting, subgrade elevations are not needed, however topsoil must be placed on bank and bench at a minimum of 3". Utilize salvaged topsoil whenever possible.

#### Bioengineering:

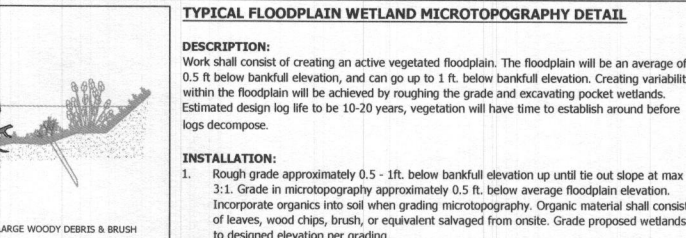
- See "Bioengineering Detail" for installation sequence.



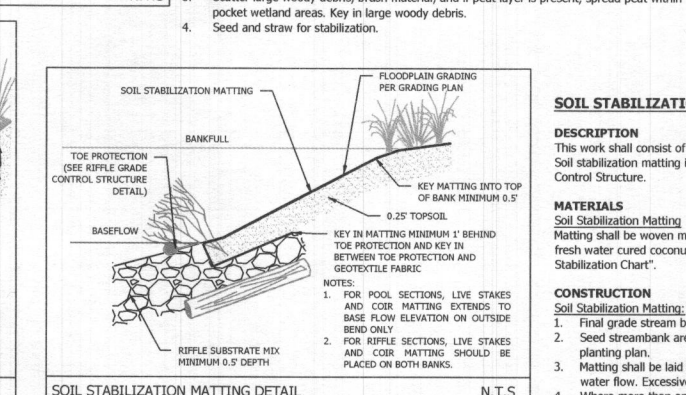
CROSS SECTION A - A'



PLAN VIEW  
RIFFLE GRADE CONTROL STRUCTURE WITH EMBEDDED WOODY MATERIAL DETAIL



TYPICAL FLOODPLAIN WETLAND MICROTOPOGRAPHY DETAIL



SOIL STABILIZATION MATTING DETAIL

#### RIFFLE GRADE CONTROL STRUCTURE WITH EMBEDDED WOODY MATERIAL INSTALLATION

#### DESCRIPTION

Work shall consist of furnishing and installing stone and woody materials for the creation of riffle grade control structures within the proposed stream bed. Riffle grade control structures are to be utilized at every riffle along the proposed stream alignment.

#### MATERIALS

##### Riffle Substrate Mix

- Riffle substrate mix material shall consist of salvaged natural field rock or furnished crushed rock from a quarry and shall be sound, tough, dense, resistant to the action of air and water, and suitable in all respects for the purpose intended.
- The Construction Manager shall review riffle material for review and approval prior to beginning construction.
- Substrate shall be a mixture conforming to the "Riffle Substrate Specifications".
- Not to exceed 50% Angular Quarry Rock.
- Incorporate with salvaged material when available. Mix material prior to placing in stream.
- All material shall meet the approval of the Construction Manager. While no specific gradation is required, the various sizes of the rock shall be equally distributed within the required size range. The size of an individual rock particle shall be determined by measuring its diameter across the intermediate axis.

##### Woody Material

- Woody material shall be 1-8" in diameter (maximum) and 18-48 inches in length.
- Woody material shall be from native trees and shrubs. No exotic or invasive species are to be used.
- No willow (Salix) or shrub dogwood (Cornus sericea, Cornus mas or Cornus racemosa) species are to be used.
- Estimated design log life to be 10-20 years, vegetation will have time to establish around before logs decompose.

#### CONSTRUCTION

- Salvageable material within any given work area shall be harvested and stockpiled for later use.
- Excavate proposed channel to form subgrade of proposed riffle sequence.
- Place a portion of woody debris in the excavated riffle. Woody material shall be placed in a manner in which it is keyed into the proposed banks, proposed riffle material, and/or driven into the substrate prior to riffle material placement.
- Place random Class II riprap habitat stones throughout riffle.
- Thoroughly mix appropriate quantities of Class I, Class 0, cobble and salvaged material.
- Add base layer of compacted Class I, Class 0, cobble and salvaged material. Extend substrate 1-ft beyond base flow width and approximately 0.4' below finished grade.
- Regrade stream banks to the proposed site and elevation, making sure to key in coir matting a full 1-ft along edge of baselaw.
- Spread proposed seed mix on newly graded banks, fold back, coir matting, and stake in place. Coir should be carry past bankfull width by 3-ft minimum. Key in edge of coir along top of bank.
- Place remaining substrate mix within baseflow and bring to final elevation, making sure to cover and protect the edge of newly installed matting.
- Any woody material that extends up from the channel more than 0.4' should be trimmed or tamped lower.

#### RIFFLE SUBSTRATE SPECIFICATION

Use existing stream bed material in riffle substrate. If adequate existing streambed material is not present, use silt as necessary to acquire appropriately sized riffle substrate from excavated material. If sifting the material is not practical, import quarry rock as needed to supplement and meet the approximately sized D50.

REACH	D50	D84
REACH 1	2.5 IN.	5.0 IN.
REACH 2	2.5 IN.	5.9 IN.
REACH 3	3.0 IN.	6.0 IN.
REACH 4	3.3 IN.	6.1 IN.
REACH 5	3.9 IN.	5.7 IN.
REACH 6	3.9 IN.	5.0 IN.
REACH 7	3.7 IN.	5.0 IN.
REACH 8	2.5 IN.	5.5 IN.

#### SOIL STABILIZATION MATTING INSTALLATION

#### DESCRIPTION

This work shall consist of installing soil stabilization matting. Soil stabilization matting is to be installed concurrently with installation of Riffle Grade Control Structure.

#### MATERIALS

**Soil Stabilization Matting**  
Matting shall be woven machine spun bristle coir twine made of coir fiber obtained from fresh water cured coconut husks. Soil stabilization matting shall conform to the "Soil Stabilization Chart".

#### CONSTRUCTION

##### Soil Stabilization Matting:

- Final grade stream banks to proposed dimension and slope per the grading plan.
- Seed streambank areas with proposed permanent and temporary seed mix per the planting plan.
- Matting shall be laid smoothly and firmly upon the seeded bed in the direction of the water flow. Excessive stretching shall be avoided.
- Where more than one width of matting is required, the ends of each strip shall overlap at least 1 foot for both vertical and horizontal overlaps. Overlapping shall be done with the up-slope matting overlapping the down-slope matting and the upstream matting overlapping the downstream matting.
- Matting shall be firmly fastened in place with stakes driven vertically into the soil and flush with the surface. Stakes shall be placed on 4-foot centers throughout the matting and along the edges of the matting.
- The contractor shall excavate a shallow trench along the up-slope, down-slope, and vertical edges of the matting at both the upstream and downstream edges of the matting. The matting shall be keyed into the trench a minimum of 6 inches. Following the installation of the stakes, the matting trenches shall be backfilled with soil (or stream bed material if keying in within the channel) and tamped firmly.

LOG CROSS VANE CHART		
REACH	LENGTH (FT)	SLOPE (%)
REACH 1	10-13	3-5
REACH 2	15-18	3-5

DESIGN NOTE: STRUCTURE ELEMENTS TO BE ADJUSTED IN THE FIELD BY THE CONTRACTOR'S DESIGNATED STREAM SPECIALIST WITH THE APPROVAL FROM COUNTY INSPECTOR IN ORDER TO MEET SITE CONDITIONS.

**SHEET NOTES:**  
1. USE SOD IN PLACE OF COIR MATTING WHEN AVAILABLE ADJACENT TO THE STREAM.

UNNAMED TRIBUTARIES TO SOUTH  
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E&S NOTES AND DETAILS  
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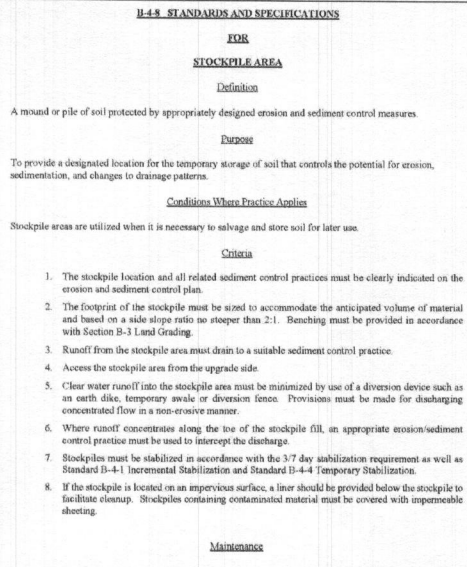
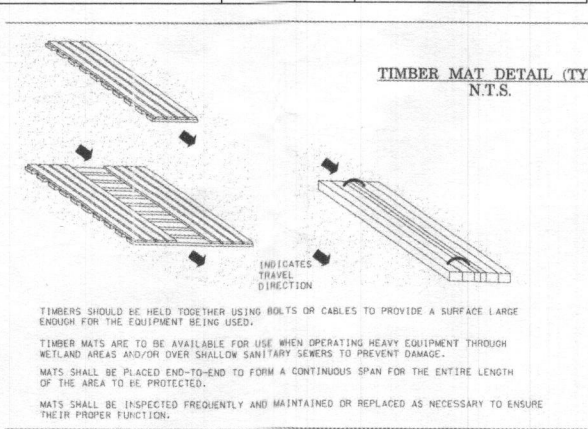
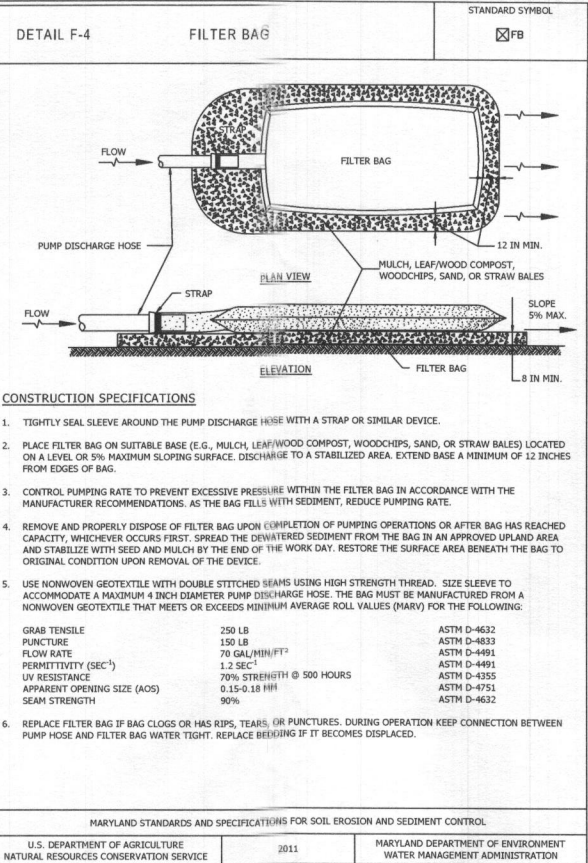
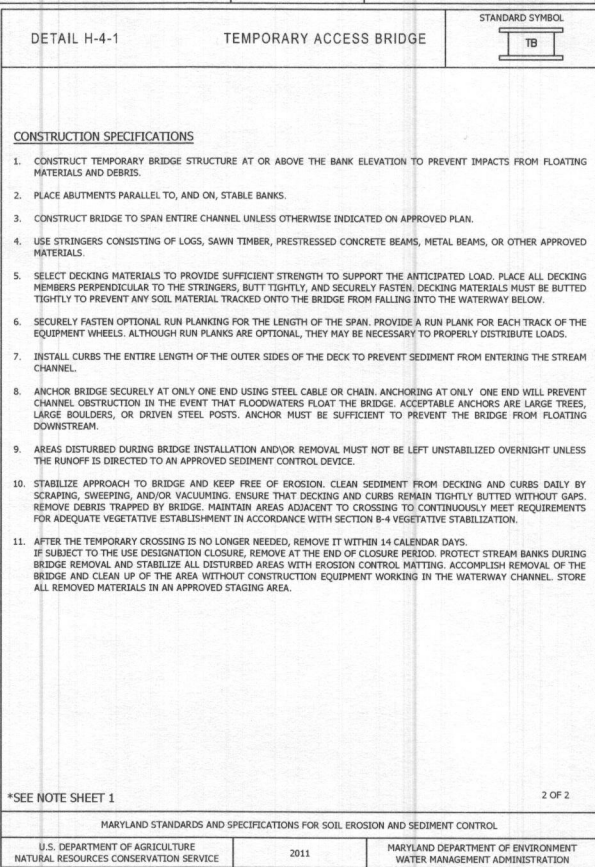
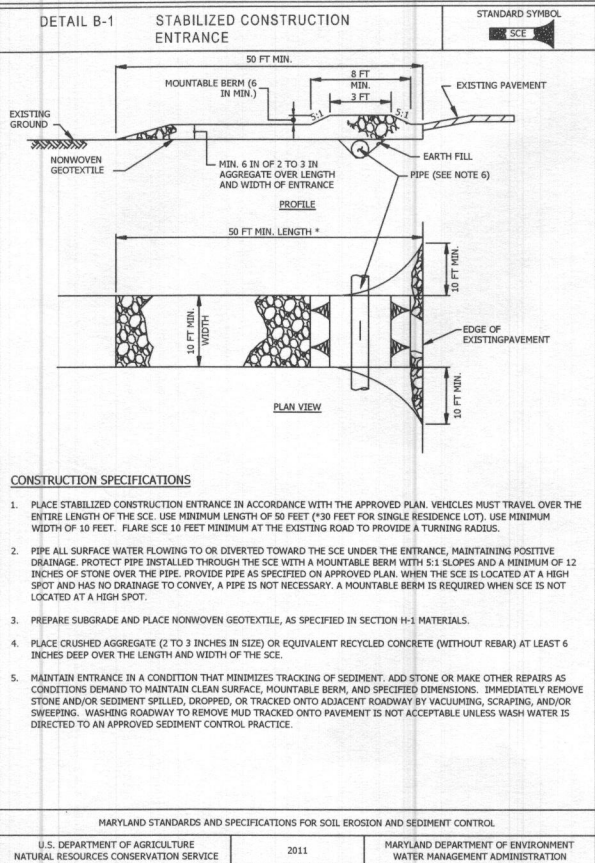
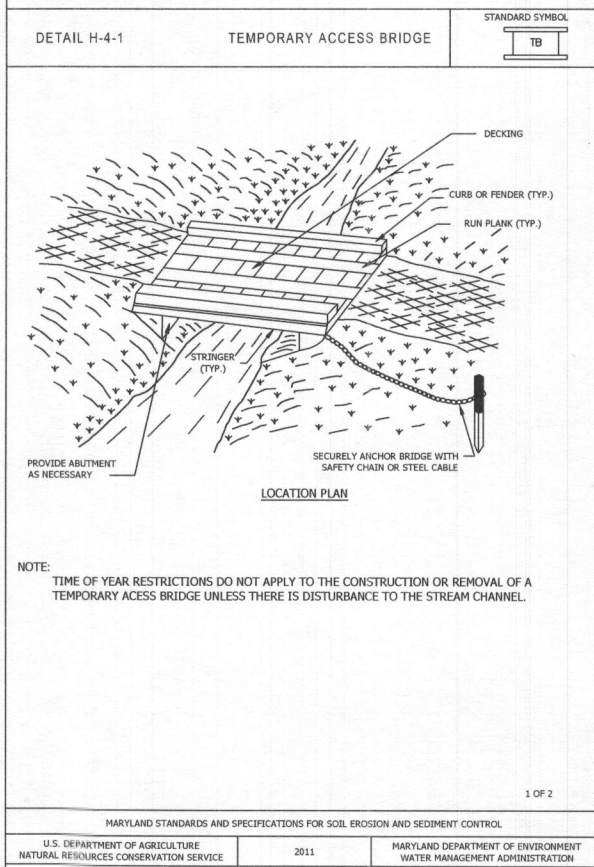
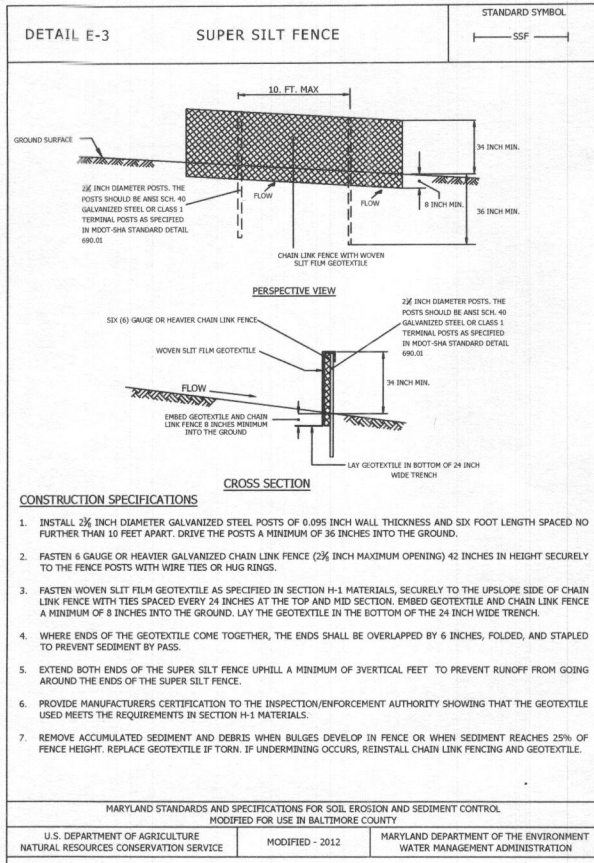
No.	DATE	DESCRIPTION	REV. BY

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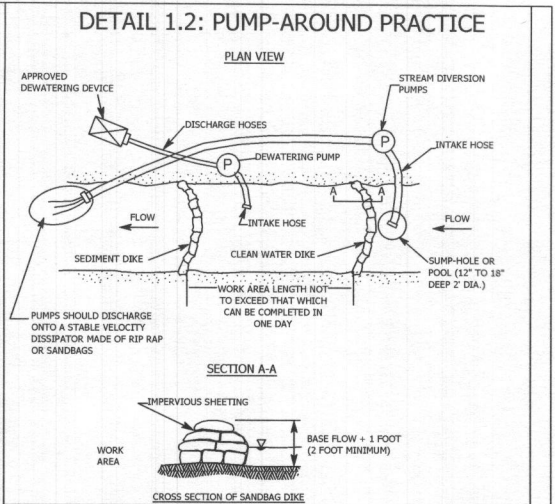








The stockpile area must continuously meet the requirements for Adequate Vegetative Establishment in accordance with Section B-4 Vegetative Stabilization. Side slopes must be maintained at no steeper than a 2:1 ratio. The stockpile area must be kept free of erosion. If the vertical height of a stockpile exceeds 20 feet for 2:1 slopes, 30 feet for 3:1 slopes, or 40 feet for 4:1 slopes, benching must be provided in accordance with Section B-3 Land Grading.



**PUMP-AROUND PRACTICE DESCRIPTION:**  
The work shall consist of installing a temporary pump and supporting measures to divert flow around instream construction sites.

**IMPLEMENTATION SEQUENCE:**  
Sediment control measures, pump-around practices, and associated channel and bank construction shall be completed in the following sequence (refer to Detail 1.2): PUMP-AROUND PRACTICE.

1. Construction activities including the installation of erosion and sediment control measures shall not begin until all necessary easements and/or right-of-ways have been acquired. All existing utilities shall be marked in the field prior to construction. The contractor will be responsible for any damage to existing utilities that may result from construction and shall repair the damage at his/her own expense to the county's or utility company's satisfaction.

2. The contractor shall notify the Maryland Department of the Environment or WMA sediment control inspector at least 5 days before beginning construction. Additionally, the contractor shall inform the local environmental protection and resource management inspection and enforcement division and the provider of local utilities a minimum of 48 hours before starting construction.

3. The contractor shall conduct a pre-construction meeting on site with the WMA sediment control inspector, the county project manager, and the engineer to review the limits of disturbance, erosion and sediment control requirements, and the sequence of construction. The contractor shall stake out all limits of disturbance prior to the pre-construction meeting so they may be reviewed. The participants will also designate the contractor's staging areas and flag all trees within the limit of disturbance which will be removed for construction access. Trees shall not be removed within the limit of disturbance without approval from the WMA or local authority.

4. Construction shall not begin until all sediment and erosion control measures have been installed and approved by the engineer and the sediment control inspector. The contractor shall stay within the limits of the disturbance as shown on the plans and minimize disturbance within the work area whenever possible.

5. Upon installation of all sediment control measures and approval by the sediment control inspector and the local environmental protection and resource management inspection and enforcement division, the contractor shall begin work at the upstream section and proceed downstream beginning with the establishment of stabilized construction entrances. 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 shall only begin work in an area which can be completed by the end of the day including grading adjacent to the channel. At the end of each work day, the work area must be stabilized and the pump-around removed from the channel. Work shall not be conducted in the channel during rain events.

6. Sandbag dikes shall be situated at the upstream and downstream ends of the work area as shown on the plans, and stream flow shall be pumped around the work area. The pump shall discharge onto a stable velocity dissipater of riprap or sandbags.

7. Water from the work area shall be pumped to a sediment filtering measure such as a dewatering basin, sediment bag, or other approved source. The measure shall be located such that the water drains back into the channel below the downstream sandbag dike.

8. Traversing a channel reach with equipment within the work area where no work is proposed shall be avoided. If equipment has to traverse such a reach for access to another area, then timber mats or similar measures shall be used to minimize disturbance to the channel. Temporary stream crossing shall 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 shall be installed as indicated by the plans and all banks graded in accordance with the grading plans and typical cross-sections.

10. After an area is completed and stabilized, the clean water dike shall be removed. After the first sediment flush, a new clean water dike shall be established upstream from the old sediment dike. Finally, upon establishment of a new sediment dike below the old one, the old sediment dike shall be removed.

11. A pump-around must be installed on any tributary or storm drain outfall which contributes baseflow to the work area. This shall 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 shall discharge onto the same velocity dissipater used for the main stem pump-around.

12. If a tributary is to be restored, construction shall take place on the tributary before work on the main stem reaches the tributary confluence. Construction in the tributary, including pump-around practices, shall follow the same sequence as for the main stem of the river or stream. When construction on the tributary is completed, work on the main stem shall resume. Water from the tributary shall continue to be pumped around the work area in the main stem.

13. The contractor is responsible for providing access to and maintaining all erosion and sediment control devices until the sediment control inspector approves their removal.

14. After construction, all disturbed areas shall be regraded and revegetated.

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BRANCH PATAPSCO RIVER  
STREAM RESTORATION  
EROSION & SEDIMENT CONTROL PLANS  
E&S NOTES AND DETAILS  
1485 UNDERWOOD ROAD  
SYKESVILLE, MD 21784



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ecological restoration  
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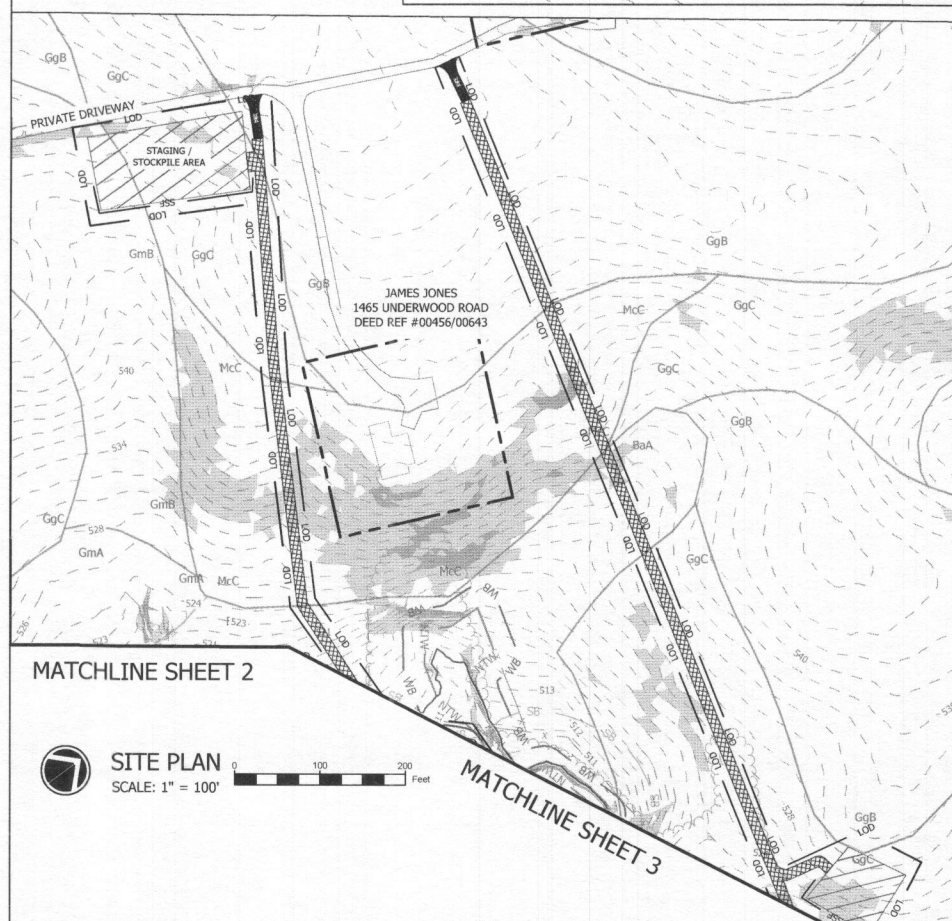
REVISIONS			
No.	DATE	DESCRIPTION	REV. BY

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DESIGNED: JES/SJM  
DRAWN: SJM  
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SHEET:



B-4.2 STANDARDS AND SPECIFICATIONS				B-4.3 STANDARDS AND SPECIFICATIONS				B-4.5 STANDARDS AND SPECIFICATIONS				B-4.4 STANDARDS AND SPECIFICATIONS						
FOR				FOR				FOR				FOR						
SOIL PREPARATION, TOPSOILING, AND SOIL AMENDMENTS				SEEDING AND MULCHING				PERMANENT STABILIZATION				TEMPORARY STABILIZATION						
Definition				Definition				Definition				Definition						
The process of preparing the soils to sustain adequate vegetative stabilization.				The application of seed and mulch to establish vegetative cover.				To stabilize disturbed soils with permanent vegetation.				To stabilize disturbed soils with vegetation for up to 6 months.						
Purpose				Purpose				Purpose				Purpose						
To provide a suitable soil medium for vegetative growth.				To protect disturbed soils from erosion during and at the end of construction.				To use long-lived perennial grasses and legumes to establish permanent ground cover on disturbed soils.				To use fast growing vegetation that provides cover on disturbed soils.						
Conditions Where Practice Applies				Conditions Where Practice Applies				Conditions Where Practice Applies				Conditions Where Practice Applies						
Where vegetative stabilization is to be established.				To the surface of all perimeter controls, slopes, and any disturbed area not under active grading.				Exposed soils where ground cover is needed for 6 months or more.				Exposed soils where ground cover is needed for a period of 6 months or less. For longer duration of time, permanent stabilization practices are required.						
Criteria				Criteria				Criteria				Criteria						
A. Soil Preparation	1. Temporary Stabilization			A. Seeding	1. Specifications			A. Seed Mixtures	1. General Use			B. Sod Maintenance	1. Sod Maintenance					
	a. Seedbed preparation consists of loosening soil to a depth of 3 to 5 inches 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 must not be rolled or dragged smooth but left in the roughened condition. Slopes 3:1 or flatter are to be tracked with ridges running parallel to the contour of the slope.				a. All seed must meet the requirements of the Maryland State Seed Law. All seed must be subject to re-testing by a recognized seed laboratory. All seed used must have been tested within the 6 months immediately preceding the date of sowing such material on any project. Refer to Table B.4 regarding the quality of seed. Seed tags must be available upon request to the inspector to verify type of seed and seeding rate.				a. Select one or more of the species or mixtures listed in Table B.3 for the appropriate Plant Hardiness Zone (from Figure B.3) and based on the site condition or purpose found on Table B.2. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The Summary is to be placed on the plan.				a. In the absence of adequate rainfall, water daily during the first week or as often and sufficiently as necessary to maintain moist soil to a depth of 4 inches. Water sod during the heat of the day to prevent wilting.					
	b. Apply fertilizer and lime as prescribed on the plans.				b. Mulch alone may be applied between the fall and spring seeding dates only if the ground is frozen. The appropriate seeding mixture must be applied when the ground thaws.				b. Additional planting specifications for exceptional sites such as shorelines, stream banks, or dunes or for special purposes such as wildlife or aesthetic treatment may be found in USDA-NRCS Technical Field Office Guide, Section 342 - Critical Area Planting.				b. After the first week, sod watering is required as necessary to maintain adequate moisture content.					
	c. Incorporate lime and fertilizer into the top 3 to 5 inches of soil by disking or other suitable means.				c. Inoculants: The inoculant for treating legume seed in the seed mixtures must be a pure culture of nitrogen fixing bacteria prepared specifically for the species. Inoculants must not be used later than the date indicated on the container. Add fresh inoculants as directed on the 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 to 80 degrees Fahrenheit can weaken bacteria and make the inoculant less effective.				c. For sites having disturbed area over 5 acres, use and show the rates recommended by the soil testing agency.				c. Do not mow until the sod is firmly rooted. No more than ⅓ of the grass leaf must be removed by the initial cutting or subsequent cuttings. Maintain a grass height of at least 3 inches unless otherwise specified.					
	2. Permanent Stabilization				d. Sod or seed must not be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed (14 days min.) to permit dissipation of phyto-toxic materials.				d. For areas receiving low maintenance, apply urea form fertilizer (46-0-0) at 3 ½ pounds per 1000 square feet (150 pounds per acre) at the time of seeding in addition to the soil amendments shown in the Permanent Seeding Summary.									
	a. A soil test is required for any earth disturbance of 5 acres or more. The minimum soil conditions required for permanent vegetative establishment are:				2. Application				2. Turfgrass Mixtures									
	i. Soil pH between 6.0 and 7.0.				a. Dry Seeding: This includes use of conventional drop or broadcast spreaders.				a. Areas where turfgrass may be desired include lawns, parks, playgrounds, and commercial sites which will receive a medium to high level of maintenance.									
	ii. Soluble salts less than 500 parts per million (ppm).				i. Incorporate seed into the subsoil at the rates prescribed on Temporary Seeding Table B.1, Permanent Seeding Table B.3, or site-specific seeding summaries.				b. Select one or more of the species or mixtures listed below based on the site conditions or purpose. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The summary is to be placed on the plan.									
	iii. Soil contains less than 40 percent clay but enough fine grained material (greater than 30 percent silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception: if lovegrass will be planted, then a sandy soil (less than 30 percent silt plus clay) would be acceptable.				ii. Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction. Roll the seeded area with a weighted roller to provide good seed to soil contact.				i. Kentucky Bluegrass: Full Sun Mixture: For use in areas that receive intensive management. Irrigation required in the areas of central Maryland and Eastern Shore. Recommended Certified Kentucky Bluegrass Cultivars Seeding Rate: 1.5 to 2.0 pounds per 1000 square feet. Choose a minimum of three Kentucky bluegrass cultivars with each ranging from 10 to 35 percent of the total mixture by weight.									
	iv. Soil contains 1.5 percent minimum organic matter by weight.				b. Drill or Cultipacker Seeding: Mechanized seeders that apply and cover seed with soil.				ii. Kentucky Bluegrass/Perennial Ryegrass Mixture: For use in full sun areas where rapid establishment is necessary and when turf will receive medium to intensive management. Certified Perennial Ryegrass Cultivars/Certified Kentucky Bluegrass Seeding Rate: 2 pounds mixture per 1000 square feet. Choose a minimum of three Kentucky bluegrass cultivars with each ranging from 10 to 35 percent of the total mixture by weight.									
	v. Soil contains sufficient pore space to permit adequate root penetration.				i. 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.				iii. Tall Fescue/Kentucky Bluegrass: Full Sun Mixture: For use in drought prone areas and/or for areas receiving low to medium management in full sun to medium shade. Recommended mixture includes: Certified Tall Fescue Cultivars 95 to 100 percent, Certified Kentucky Bluegrass Cultivars 0 to 5 percent. Seeding Rate: 5 to 8 pounds per 1000 square feet. One or more cultivars may be blended.									
B. Topsoiling	1. Topsoil is placed over prepared subsoil prior to establishment of permanent vegetation. The purpose is to provide a suitable soil medium for vegetative growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable soil gradation.			B. Mulching	c. Hydroseeding: Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer).			C. Soil Amendments (Fertilizer and Lime Specifications)	Notes: Select turfgrass varieties from those listed in the most current University of Maryland Publication, Agronomy Memo #77, "Turfgrass Cultivar Recommendations for Maryland"									
	2. Topsoil salvaged from an existing site may be used provided it meets the standards as set forth in these specifications. Typically, the depth of topsoil to be salvaged for a given soil type can be found in the representative soil profile section in the Soil Survey published by USDA-NRCS.				i. If fertilizer is being applied at the time of seeding, the application rates should not exceed the following: nitrogen, 100 pounds per acre total of soluble nitrogen; P <sub>2</sub> O <sub>5</sub> (phosphorous), 200 pounds per acre; K <sub>2</sub> O (potassium), 200 pounds per acre.				Choose certified material. Certified material is the best guarantee of cultivar purity. The certification program of the Maryland Department of Agriculture, Turf and Seed Section, provides a reliable means of consumer protection and assures a pure genetic line.									
	3. Topsoiling is limited to areas having 2:1 or flatter slopes where:				ii. Lime: Use only ground agricultural limestone (up to 3 tons per acre may be applied by hydroseeding). Normally, not more than 2 tons are applied by hydroseeding at any one time. Do not use burnt or hydrated lime when hydroseeding.				c. Ideal Times of Seeding for Turf Grass Mixtures									
	a. The texture of the exposed subsoil/parent material is not adequate to produce vegetative growth.				iii. Mix seed and fertilizer on site and seed immediately and without interruption.				Western MD: March 15 to June 1, August 1 to October 1 (Hardiness Zones: 5b, 6a)									
	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.				iv. When hydroseeding do not incorporate seed into the soil.				Central MD: March 1 to May 15, August 15 to October 15 (Hardiness Zone: 6b)									
	c. The original soil to be vegetated contains material toxic to plant growth.				1. Mulch Materials (in order of preference)				Southern MD, Eastern Shore: March 1 to May 15, August 15 to October 15 (Hardiness Zones: 7a, 7b)									
	d. The soil is so acidic that treatment with limestone is not feasible.				a. Straw consisting of thoroughly threshed wheat, rye, oat, or barley and reasonably bright in color. Straw is to be free of noxious weed seeds as specified in the Maryland Seed Law and not musty, moldy, caked, decayed, or excessively dusty. Note: Use only sterile straw mulch in areas where one species of grass is desired.				d. Till areas to receive seed by disking or other approved methods to a depth of 2 to 4 inches, level and rake the areas to prepare a proper seedbed. Remove stones and debris over 1½ inches in diameter. The resulting seedbed must be in such condition that future mowing of grasses will pose no difficulty.									
	4. Areas having slopes steeper than 2:1 require special consideration and design.				b. Wood Cellulose Fiber Mulch (WCFCM) consisting of specially prepared wood cellulose processed into a uniform fibrous physical state.				e. If soil moisture is deficient, supply new seedlings with adequate water for plant growth (¼ to 1 inch every 3 to 4 days depending on soil texture) until they are firmly established. This is especially true when seedlings are made late in the planting season, in abnormally dry or hot seasons, or on adverse sites.									
	5. Topsoil Specifications: Soil to be used as topsoil must meet the following criteria:				i. WCFCM is to 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.				f. Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.									
	a. Topsoil must be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by the appropriate approval authority. Topsoil must not be a mixture of contrasting textured subsoils and must contain less than 5 percent by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than 1½ inches in diameter.				ii. WCFCM, including dye, must contain no germination or growth inhibiting factors.				g. Sod must be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period must be approved by an agronomist or soil scientist prior to its installation.									
	b. Topsoil must be free of noxious plants or plant parts such as Bermuda grass, quack grass, Johnson grass, nut sedge, poison ivy, thistle, or others as specified.				iii. WCFCM materials are to 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 must form a blotter-like ground cover, on application, having moisture absorption and percolation properties and must cover and hold grass seed in contact with the soil without inhibiting the growth of the grass seedlings.				h. Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.									
C. Soil Amendments (Fertilizer and Lime Specifications)	c. Topsoil substitutes or amendments, as recommended by a qualified agronomist or soil scientist and approved by the appropriate approval authority, may be used in lieu of natural topsoil.				iv. WCFCM material must not contain elements or compounds at concentration levels that will be phyto-toxic.				i. Sod must be machine cut at a uniform soil thickness of ¾ inch, plus or minus ¼ inch, at the time of cutting. Measurement for thickness must exclude top growth and thatch. Broken pads and torn or uneven ends will not be acceptable.									
	6. Topsoil Application				v. WCFCM must conform to the following physical requirements: fiber length of approximately 10 millimeters, diameter approximately 1 millimeter, pH range of 4.0 to 8.5, ash content of 1.6 percent maximum and water holding capacity of 90 percent minimum.				c. Standard size sections of sod must 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.									
	a. Erosion and sediment control practices must be maintained when applying topsoil.				2. Application				d. Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.									
	b. Uniformly distribute topsoil in a 5 to 8 inch layer and lightly compact to a minimum thickness of 4 inches. Spreading is to 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 must be corrected in order to prevent the formation of depressions or water pockets.				a. Apply mulch to all seeded areas immediately after seeding.				e. Sod must be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period must be approved by an agronomist or soil scientist prior to its installation.									
	c. Topsoil must not be placed if 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.				b. When straw mulch is used, spread it over all seeded areas at the rate of 2 tons per acre to a uniform loose depth of 1 to 2 inches. Apply mulch to achieve a uniform distribution and depth so that the soil surface is not exposed. When using a mulch anchoring tool, increase the application rate to 2.5 tons per acre.				f. Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.									
					c. Wood cellulose fiber used as mulch must be applied at a net dry weight of 1500 pounds per acre. Mix the wood cellulose fiber with water to attain a mixture with a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.				g. Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.									
					3. Anchoring				2. Sod Installation									
					a. Perform mulch anchoring immediately following application of mulch to minimize loss by wind or water. This may be done by one of the following methods (listed by preference), depending upon the size of the area and erosion hazard:				a. During periods of excessively high temperature or in areas having dry subsoil, lightly irrigate the subsoil immediately prior to laying the sod.									
					i. A mulch anchoring tool is a tractor drawn implement designed to punch and anchor mulch into the soil surface a minimum of 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 follow the contour.				b. Lay the first row of sod in a straight line with subsequent rows placed parallel to it and tightly wedged against each other. Stagger lateral joints 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.									
					ii. Wood cellulose fiber may be used for anchoring straw. Apply the fiber binder at a net dry weight of 750 pounds per acre. Mix the wood cellulose fiber with water at a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.				c. Wherever possible, lay sod with the long edges parallel to the contour and with staggering joints. Roll and tamp, peg or otherwise secure the sod to prevent slippage on slopes. Ensure solid contact exists between sod roots and the underlying soil surface.									
					iii. Synthetic binders such as Acrylic DLR (Agro-Tack), DCA-70, Petrosol, Terra Tax II, Terra Tack AR or other approved equal may be used. Follow application rates as specified by the manufacturer. Application of liquid binders needs to be heavier at the edges where wind catches mulch, such as in valleys and on crests of banks. Use of asphalt binders is strictly prohibited.				d. Water the sod immediately following rolling and tamping until the underside of the new sod pad and soil surface below the sod are thoroughly wet. Complete the operations of laying, tamping and irrigating for any piece of sod within eight hours.									
					iv. Lightweight plastic netting may be stapled over the mulch according to manufacturer recommendations. Netting is usually available in rolls 4 to 15 feet wide and 300 to 3,000 feet long.													





SOILS LEGEND		
SYMBOL	K-FACTOR	SOIL DESCRIPTION
BaA	0.37	Baile silt loam, 0-3% slopes
Co	0.37	Codorus and Hatboro silt loams, 0-3% slopes
GoB	0.24	Genesly loam, 3-8% slopes
GoC	0.24	Genesly loam, 8-15% slopes
GnA	0.43	Glenville silt loam, 0-3% slopes
GnB	0.37	Glenville silt loam, 3-8% slopes
GoB	0.43	Glenville-Codorus silt loams, 0-8% slopes
MaC	0.28	Manor loam, 8-15% slopes
MaD	0.28	Manor loam, 15-25% slopes
McD	0.28	Manor loam, 15-25% slopes, very rocky
MkF	0.32	Manor-Brinklow complex, 25-65% slopes, very rocky

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REVISIONS			
No.	DATE	DESCRIPTION	BY

CHECKED BY: \_\_\_\_\_ CR

DESIGNED: \_\_\_\_\_ J.E.B./S.J.

DRAWN: \_\_\_\_\_ S.J.

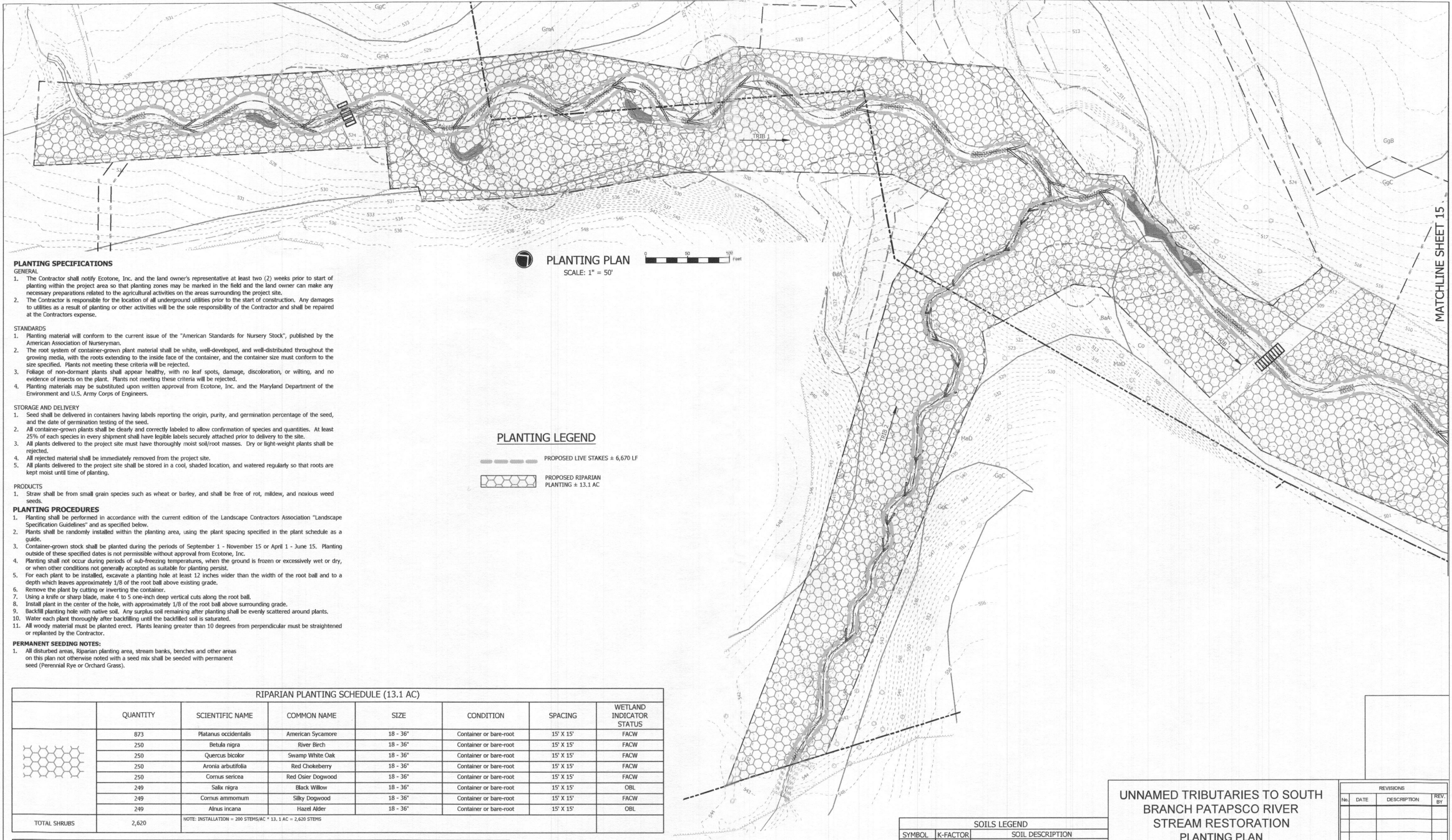
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**PLANTING SPECIFICATIONS**  
GENERAL

1. The Contractor shall notify Ecotone, Inc. and the land owner's representative at least two (2) weeks prior to start of planting within the project area so that planting zones may be marked in the field and the land owner can make any necessary preparations related to the agricultural activities on the areas surrounding the project site.
2. The Contractor is responsible for the location of all underground utilities prior to the start of construction. Any damages to utilities as a result of planting or other activities will be the sole responsibility of the Contractor and shall be repaired at the Contractor's expense.

**STANDARDS**

1. Planting material will conform to the current issue of the "American Standards for Nursery Stock", published by the American Association of Nurseryman.
2. The root system of container-grown plant material shall be white, well-developed, and well-distributed throughout the growing media, with the roots extending to the inside face of the container, and the container size must conform to the size specified. Plants not meeting these criteria will be rejected.
3. Foliage of non-dormant plants shall appear healthy, with no leaf spots, damage, discoloration, or wilting, and no evidence of insects on the plant. Plants not meeting these criteria will be rejected.
4. Planting materials may be substituted upon written approval from Ecotone, Inc. and the Maryland Department of the Environment and U.S. Army Corps of Engineers.

**STORAGE AND DELIVERY**

1. Seed shall be delivered in containers having labels reporting the origin, purity, and germination percentage of the seed, and the date of germination testing of the seed.
2. All container-grown plants shall be clearly and correctly labeled to allow confirmation of species and quantities. At least 25% of each species in every shipment shall have legible labels securely attached prior to delivery to the site.
3. All plants delivered to the project site must have thoroughly moist soil/root masses. Dry or light-weight plants shall be rejected.
4. All rejected material shall be immediately removed from the project site.
5. All plants delivered to the project site shall be stored in a cool, shaded location, and watered regularly so that roots are kept moist until time of planting.

**PRODUCTS**

1. Straw shall be from small grain species such as wheat or barley, and shall be free of rot, mildew, and noxious weed seeds.

**PLANTING PROCEDURES**

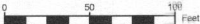
1. Planting shall be performed in accordance with the current edition of the Landscape Contractors Association "Landscape Specification Guidelines" and as specified below.
2. Plants shall be randomly installed within the planting area, using the plant spacing specified in the plant schedule as a guide.
3. Container-grown stock shall be planted during the periods of September 1 - November 15 or April 1 - June 15. Planting outside of these specified dates is not permissible without approval from Ecotone, Inc.
4. Planting shall not occur during periods of sub-freezing temperatures, when the ground is frozen or excessively wet or dry, or when other conditions not generally accepted as suitable for planting persist.
5. For each plant to be installed, excavate a planting hole at least 12 inches wider than the width of the root ball and to a depth which leaves approximately 1/8 of the root ball above existing grade.
6. Remove the plant by cutting or inverting the container.
7. Using a knife or sharp blade, make 4 to 5 one-inch deep vertical cuts along the root ball.
8. Install plant in the center of the hole, with approximately 1/8 of the root ball above surrounding grade.
9. Backfill planting hole with native soil. Any surplus soil remaining after planting shall be evenly scattered around plants.
10. Water each plant thoroughly after backfilling until the backfilled soil is saturated.
11. All woody material must be planted erect. Plants leaning greater than 10 degrees from perpendicular must be straightened or replanted by the Contractor.

**PERMANENT SEEDING NOTES:**

1. All disturbed areas, Riparian planting area, stream banks, benches and other areas on this plan not otherwise noted with a seed mix shall be seeded with permanent seed (Perennial Rye or Orchard Grass).



**PLANTING PLAN**  
SCALE: 1" = 50'



**PLANTING LEGEND**

- PROPOSED LIVE STAKES ± 6,670 LF
- PROPOSED RIPARIAN PLANTING ± 13.1 AC

**RIPARIAN PLANTING SCHEDULE (13.1 AC)**

	QUANTITY	SCIENTIFIC NAME	COMMON NAME	SIZE	CONDITION	SPACING	WETLAND INDICATOR STATUS
	873	Platanus occidentalis	American Sycamore	18 - 36"	Container or bare-root	15' X 15'	FACW
	250	Betula nigra	River Birch	18 - 36"	Container or bare-root	15' X 15'	FACW
	250	Quercus bicolor	Swamp White Oak	18 - 36"	Container or bare-root	15' X 15'	FACW
	250	Aronia arbutifolia	Red Chokeberry	18 - 36"	Container or bare-root	15' X 15'	FACW
	250	Cornus sericea	Red Osier Dogwood	18 - 36"	Container or bare-root	15' X 15'	FACW
	249	Salix nigra	Black Willow	18 - 36"	Container or bare-root	15' X 15'	OBL
	249	Cornus amomum	Silky Dogwood	18 - 36"	Container or bare-root	15' X 15'	FACW
TOTAL SHRUBS	2,620	Alnus incana	Hazel Alder	18 - 36"	Container or bare-root	15' X 15'	OBL
	NOTE: INSTALLATION = 200 STEMS/AC * 13.1 AC = 2,620 STEMS						

**BIOENGINEERING PLANTING SCHEDULE (6,670 LF)**

	QUANTITY	SCIENTIFIC NAME	COMMON NAME	CONDITION	SPACING
	1,482	Cornus amomum	Silky Dogwood	Live stake	2-3' Triangular
	1,482	Salix exigua	Sandbar Willow	Live stake	2-3' Triangular
	1,482	Salix nigra	Black Willow	Live stake	2-3' Triangular
TOTAL	4,446	NOTE: 6,670 LF of live staking divided by 3' spacing = 2,223 multiplied by (2 rows) = 4,446 divided by (3 species) = 1,482 live stakes of each species.			

SOILS LEGEND		
SYMBOL	K-FACTOR	SOIL DESCRIPTION
BaA	0.37	Baile silt loam, 0-3% slopes
Co	0.37	Codorus and Hatboro silt loams, 0-3% slopes
GgB	0.24	Glenelg loam, 3-8% slopes
GgC	0.24	Glenelg loam, 8-15% slopes
GmA	0.43	Glenville silt loam, 0-3% slopes
GmB	0.37	Glenville silt loam, 3-8% slopes
GgB	0.43	Glenville-Codorus silt loams, 0-8% slopes
MaC	0.28	Manor loam, 8-15% slopes
MaD	0.28	Manor loam, 15-25% slopes
McD	0.28	Manor loam, 15-25% slopes, very rocky
MkF	0.32	Manor-Brinklow complex, 25-65% slopes, very rocky

UNNAMED TRIBUTARIES TO SOUTH  
BRANCH PATAPSCO RIVER  
STREAM RESTORATION  
PLANTING PLAN  
1485 UNDERWOOD ROAD  
SYKESVILLE, MD 21784



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REVISIONS			
No.	DATE	DESCRIPTION	REV. BY
CHECKED BY:			CRH
DESIGNED:			SJM
DRAWN:			SJM
PROJECT No.:			18-15-001
DATE:			6/10/2019
SHEET:			15 of 16



