

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 I waters: In-stream work shall not be conducted during the period March 1 through June 15 inclusive, during any year.
 - Use III waters: In-stream work shall not be conducted during the period October 1 through April 30, inclusive, during any year.
 - Use IV waters: In-stream work shall not be conducted during the period March 1 through May 31, inclusive, during any year.
- 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.

HARFORD COUNTY SEDIMENT CONTROL NOTES

- The contractor/owner is responsible for obtaining all necessary permits. Further, no construction activity shall take place until all required permits have been obtained.
- The limits of disturbance shall be clearly delineated in the field prior to grading of the site to ensure compliance with approved plans. All Forest Retention areas will be delineated with Blaze Orange Fence as well as any SWM infiltration practice prior to any clearing. Work beyond the limits of disturbance and in any area inside the Forest Retention and SWM infiltration area is considered to be a violation of this plan.
- All sediment control practices must be installed prior to any construction activity. Upon completion of the installation of perimeter sediment control practices the site must be inspected by the Department of Public Works (DPW). No additional construction activity will be authorized without the approval from DPW.
- All points of ingress and egress shall be protected to prevent tracking of mud into public ways. During construction, every means will be taken to control soil erosion and siltation. If necessary a wash rack may need to be established.
- Earth dikes, sediment traps, etc. will be located as shown on these drawings. Field changes and minor adjustments are permissible as long as the installation functions and conforms to specifications. The site inspector prior to installation must approve all such changes. Major changes to the approved plan will require re-approval by the Harford Soil Conservation District.
- Following initial soil disturbance or re-disturbance permanent or temporary stabilization shall be completed within:
 - Three calendar days on slopes greater than 3:1, all waterways and to the surface of all perimeter controls.
 - Seven calendar days as to all other disturbed or graded areas of the project site.
- Dust control must be managed as part of all Sediment Control plans. Failure to do so is a violation of this plan.
- Sediment basins must be built to design specifications shown on the plan. If the basin is to be used as a future SWM facility, the basin will be built in accordance with the latest MD-378 standards and specifications. Specified materials must be used. No changes or modifications will be made without written authorization of the Harford Soil Conservation District.
- Temporary fencing shall be placed around all sediment basins, traps, and ponds during construction and site grading.
- At the end of each working day all sediment control practices will be inspected and left operational. A weekly log will be kept in accordance with NOI/NPDES regulations. A copy of the approved sediment control plans shall be available at the site at all times.
- Ensure positive drainage to all road inlets during all phases of road construction to ensure positive flow to traps and basins.
- Cut and/or fill shall be done in conformance with 2011 Erosion and Sediment Control Standards and Specifications for land grading.
- Surface flows over cut and fill slopes shall be controlled by either redirecting flows from traversing the slopes or by installing mechanical devices to safely convey water down slopes without causing erosion.
- Off-site waste or borrow areas shall have an approved erosion and sediment control plan prior to the import or export of material to/from the project site.
- All material originating from the development of the property and deposited on the public right-of-way shall be immediately removed.
- Storm drain inlets and outlets shall be protected per 2011 Erosion and Sediment Control standards and specifications.
- Topsoil, liming, fertilizing, seeding, mulching, sod, etc. are all essential parts of the sediment control plan and must be completed along with all other practices.
- Traps to be removed shall be dewatered as per the 2011 Erosion and Sediment Control standards and specifications.
- Prior removal of traps or conversion of sediment basins to SWM facilities, the storm drains will be flushed.
- Sediment control practices will be maintained until all disturbed areas for which the practices were installed have been stabilized. Sediment control practices may be removed only with the authorization of the DPW inspector. All disturbed areas resulting from the removal of sediment control devices shall be stabilized immediately. Removal prior to inspector's approval constitutes a violation.

GENERAL NOTES

- This plan has been prepared to provide approximately 3,610 linear feet of stream restoration on the Edgely Grove Farm Property, located on Smith Lane in Harford County, Maryland.
- Contours were obtained from C.F. Kreutter & Associates, Inc. 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 Smith Lane as indicated hereon.
- 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 downstream end of the project.

SEQUENCE OF CONSTRUCTION

- Contractor shall notify owner and the Harford County Department of Public Works (DPW) sediment control inspector at least 48 hours prior to beginning any work and the Maryland Department of the Environment 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 and contractor, and Harford County DPW sediment control inspector prior to construction starting.
- All necessary approvals and permits must be obtained prior to start of construction.
- Clear and grub for the installation of sediment and erosion control measures or devices.
- Install stabilized construction entrances and all sediment control devices.
- Notify the Harford County DPW sediment control inspector upon completion of said installation.
- With the approval of the Harford County DPW sediment control inspector, clear and grub for in-stream work. The stream is in the Winters Run watershed, designated as Use IV-P by the Maryland Department of the Environment. No in-stream work shall be conducted during the period March 1 through May 31.
- Install pump around practices as noted on Sheets 2-4. 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.
- Begin stream work starting at the upstream end of the project 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. Pump around practices shown on this plan are shortened to "daily" pump around practices to reflect that amount of work that can be completed in one work day.
- Stabilize all disturbed areas at the end of each working day or within a 3-day dry weather forecast.
- Once stream restoration is complete, seed and stabilize any remaining work areas.
- Upon stabilization of site with established vegetation and with permission of the Harford County DPW sediment control inspector, remove sediment control measures and stabilize those areas disturbed by this process, including any spoils areas.
- Install plant material during appropriate planting dates.

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

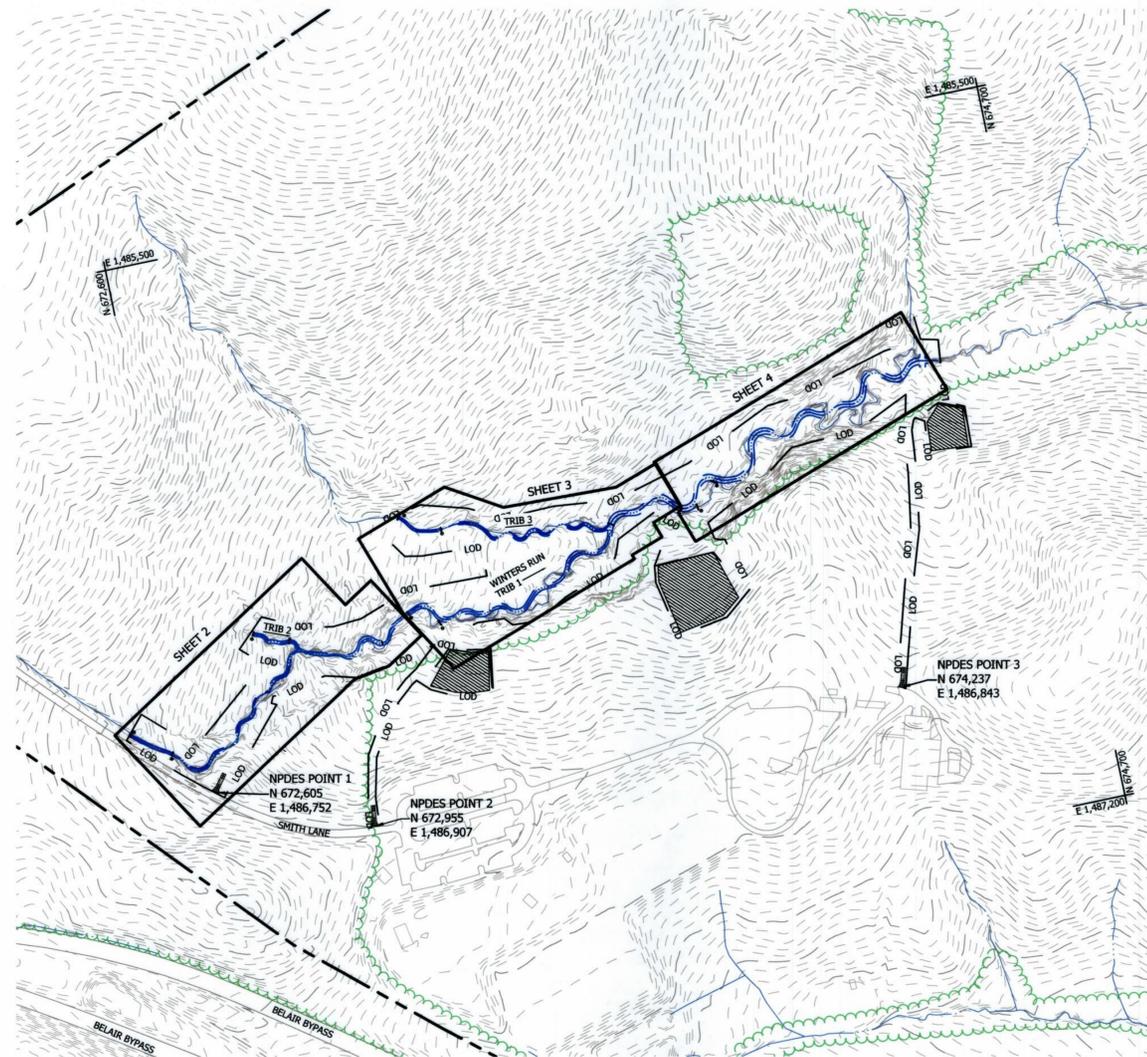
Pump around shows the maximum extents of stream to be diverted. Actual pump around length will be the length which can be completed in a working day.

100-YEAR FLOODPLAIN NOTE

FEMA mapped floodplain is not present on site according to FEMA mapping and County GIS data. FIRM panel #24025C0144E

ANNIE'S PLAYGROUND STREAM RESTORATION

864 SMITH LANE, FALLSTON, MD 21047



LEGEND

---	PROPERTY BOUNDARY
---	EX. CONTOURS
---	EX. STREAM CENTERLINE
---	EX. ROADS
---	EX. TREELINE
---	PROPOSED STREAM CENTERLINE
---	PROPOSED TOP OF BANK
---	LOD
---	LIMIT OF DISTURBANCE
---	STOCKPILE & STAGING



SHEET NOTE
NO INSTREAM WORK SHALL START UNTIL ALL NEEDED RESOURCES ARE ON SITE.

INDEX OF SHEETS

TITLE	GRADING SHEET NO.	S/C SHEET NO.
TITLE SHEET	1	1
PLAN VIEW DESIGN	2-4	2-4
PROFILES	5-7	-
DESIGN INFORMATION & STOCKPILE INSET MAPS	8	5
NOTES & DETAILS	9-10	6-7
S/C NOTES & DETAILS	11-12	8-9
PLANTING PLAN	1 & 2 ADDITIONAL SHEETS	-

TEMPORARY BENCHMARKS

TBM	ELEVATION	REMARKS
TBM 102	328.24'	REBAR & CAP
TBM 103	307.19'	REBAR & CAP
TBM 150	245.78'	REBAR & CAP

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."

PROPERTY OWNER INFORMATION

HARFORD COUNTY GOVERNMENT
212 BOND STREET, 3RD FLOOR
BEL AIR, MD 21014
HARFORD COUNTY

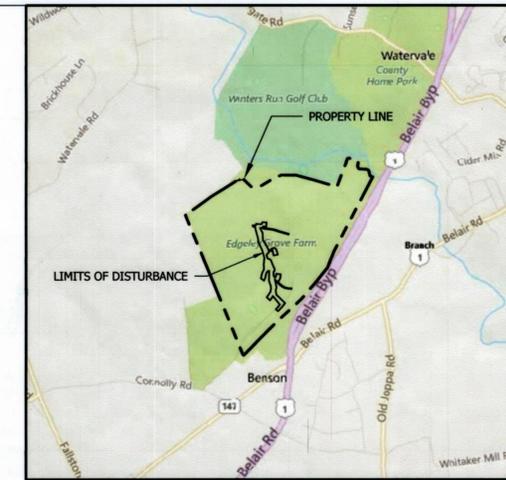
SITE DATA

DEED REF: 03456/000634
MAP 0048, GRID 0004E, PARCEL 0105
ELECTION DISTRICT 3
SITE ACREAGE: ± 237.67 AC.
8 DIGIT HUC: 02060003
MD 8 DIGIT BASIN: 02130703 (Atkisson Reservoir)

SITE ANALYSIS

LIMIT OF DISTURBANCE: ±405,190 SF. / 9.30 AC.
NEW IMPERVIOUS AREA: NONE
TOTAL AREA TO BE STABILIZED: 9.30 AC.
APPROXIMATE CUT: 3,560 CY.
APPROXIMATE FILL: 2,676 CY.
APPROXIMATE NET: 884 CY. (CUT)

NPDES ID POINT 1: N 672,605, E 1,486,752
NPDES ID POINT 2: N 672,955, E 1,486,907
NPDES ID POINT 3: N 674,237, E 1,486,843



VICINITY MAP
SCALE: 1" = 2000'

RESTORATION PLAN

The Winters Run Tributaries shown on this plan traverse through Edgely Grove Farm also known as Annie's Playground. This is a Use IV-P stream combined of perennial and intermittent channels. Winters Run Tributary 1 is a perennial stream that traverses the property from south to north. Winters Run Tributaries 2 & 3 are intermittent streams that flow into Tributary 1 on the property. The watershed is composed of moderately sloped mature forest land as well as agricultural fields. The existing stream is experiencing bed and bank scour in conjunction with lateral migration and tributary head-cutting. Potential causes of the degradation originate from runoff off of Smith Lane and agricultural practices in the drainage area.

3,610 linear feet of the Tributaries to Winters Run will be realigned to a more stable platform according to natural channel design concepts. Tributary 1 will be designed into a naturally sinuous stream which will reduce shear stresses along meanders while adding diversity to the system and improving aquatic habitat. To achieve this the existing entrenched G4 stream type will be converted into a B4 stream type. The stream invert elevation will be raised while additionally adding bankfull benches to provide floodplain connectivity. In addition to the stream work, wetlands will be created in the floodplain and in locations where the existing channel will be abandoned. Trees removed during construction will be added to the floodplain to increase floodplain roughness and reduce deer traffic through the valley. Created wetlands and woody material will serve as a natural defense against invasive species growth in the floodplain. A minimum 35 foot vegetated buffer on each side of the stream will provide additional stability and ecological uplift.

Tributary 2 will be restored to arrest a head cut. Tributary 3 will be a low flow meandering channel to that will experience frequent out of bank flows onto the floodplain.

The proposed structural stabilization measures include installing toe wood on the meander bends to add roughness and provide bank protection. Step-pools created using salvaged rock on site will be utilized in intermittent sections of the reach. Log vanes will control grade along steeper slopes. Bioengineering practices including sod matting, warm season grass plantings, reforestation, and live stake installation will accompany structural stabilization methods to provide additional stability, shade and improved aquatic habitat.

20 years from now, the surrounding area to the Winters Run Tributary will be fully forested in previously constructed areas with herbaceous wetland vegetation present along the established floodplain. Live stakes will provide shade and bank protection to the stream channel. The stream channel's width to depth ratio will reduce. Toe wood and log vane structures will be barely visible while still providing continued stabilization. Tributary 3 will transform into a swamp run with multi threaded shallow channels including dense wetland vegetation throughout.

EROSION & SEDIMENT CONTROL SITE SUMMARY

Work completed on the Tributaries to Winters Run will remain inside the staked-out limit of disturbance area that is 9.3 acres. Access to the work area will be from three stabilized construction entrances. A total of three stockpile and staging areas will be added where noted on the cover sheet. Each stockpile and staging area will have appropriate super 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. Refer to sheet 11 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.

RECOMMENDED FOR APPROVAL:

HARFORD COUNTY, DPW

TECHNICAL CONCURRENCE:

HARFORD SOIL CONSERVATION DISTRICT

APPROVED:

HARFORD SOIL CONSERVATION DISTRICT

OWNER'S CERTIFICATION

I/we certify that all development and construction will be done according to this plan of development and plan from erosion and sediment control and that any responsible personnel involved in the construction project will have a certification of attendance at a Department of Natural Resources Approved Training Program for the control of sediment and erosion before beginning the project. I also authorize periodic onsite inspection by the Harford Soil Conservation District or their authorized agents, or as deemed necessary.

Owner: *[Signature]* Date: 11/9/18

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: 4/17/19.

ENGINEER'S CERTIFICATION

I certify that this plan for erosion and sediment control and stormwater management represents a practical and workable plan based on my personal knowledge of the site conditions and that it was prepared in accordance with the 2011 Maryland Standard and Specifications for Soil Erosion and Sediment Control.

Engineer: *[Signature]* Date: 11/8/18



S/C PLAN #: 59840 GRADING PERMIT #: GRA 16333-2018

ANNIE'S PLAYGROUND STREAM RESTORATION
TITLE SHEET

864 SMITH LANE, FALLSTON, MARYLAND, 21047



ecotone
ecological restoration
129 Industry Lane - Forest Hill, Maryland 21050
(410) 420 2800 - www.ecotoneinc.com

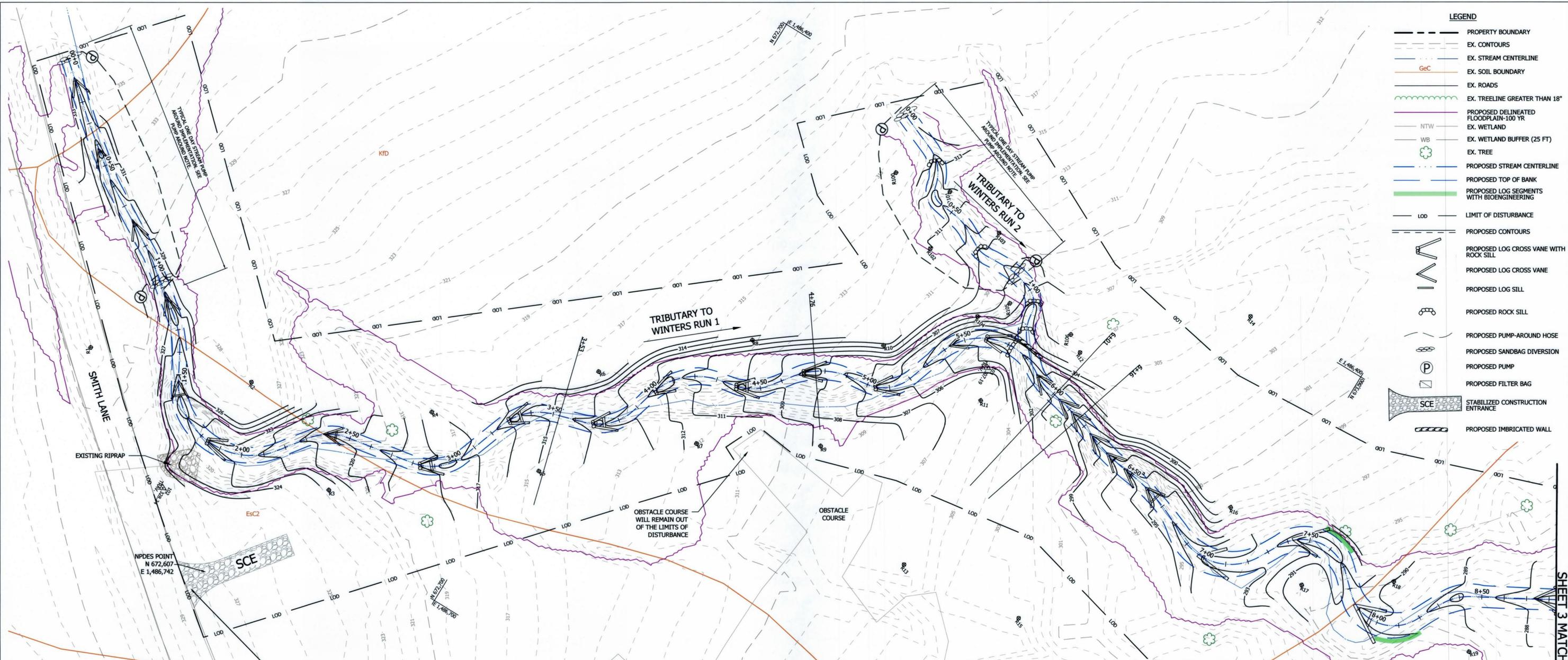
REVISIONS

No.	DATE	DESCRIPTION	REV. BY
1	11-20	30% Design	CRH

CHECKED BY: CRH
DESIGNED: JES
DRAWN: JES
PROJECT No.: 17-15-028
DATE: 11/1/2018

SHEET: 1 of 12

S/C SHEET 1 OF 9

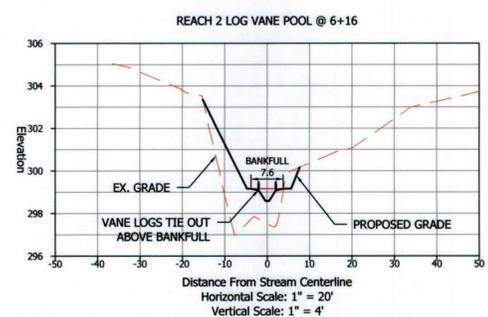
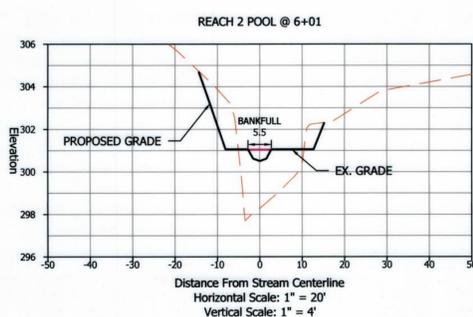
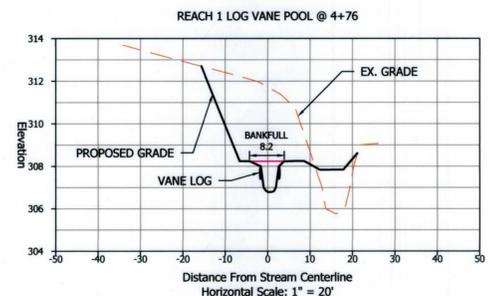
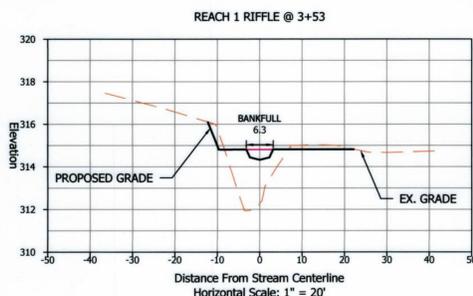


LEGEND

- PROPERTY BOUNDARY
- EX. CONTOURS
- EX. STREAM CENTERLINE
- EX. SOIL BOUNDARY
- EX. ROADS
- EX. TREELINE GREATER THAN 18"
- PROPOSED DELINEATED FLOODPLAIN-100 YR
- EX. WETLAND
- EX. WETLAND BUFFER (25 FT)
- EX. TREE
- PROPOSED STREAM CENTERLINE
- PROPOSED TOP OF BANK
- PROPOSED LOG SEGMENTS WITH BIOENGINEERING
- LOD - LIMIT OF DISTURBANCE
- PROPOSED CONTOURS
- PROPOSED LOG CROSS VANE WITH ROCK SILL
- PROPOSED LOG CROSS VANE
- PROPOSED LOG SILL
- PROPOSED ROCK SILL
- PROPOSED PUMP-AROUND HOSE
- PROPOSED SANDBAG DIVERSION
- PROPOSED PUMP
- PROPOSED FILTER BAG
- SCE - STABILIZED CONSTRUCTION ENTRANCE
- PROPOSED IMBRICATED WALL

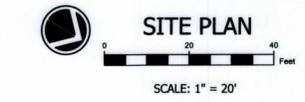
- SHEET NOTES**
- NO INSTREAM WORK SHALL START UNTIL ALL NEEDED RESOURCES ARE ON SITE.
 - AFTER STREAM AND FLOODPLAIN GRADING ARE COMPLETE, THE FLOODPLAIN SHOULD BE ROUGHED UP TO CREATE MICROTOPOGRAPHY.

RADIUS NUMBER	REALIGNMENT STATIONING	RADIUS OF CURVATURE	RADIUS OF CURVATURE/BANKFULL WIDTH
R1	1+23 - 1+40	40 FT	6.3
R2	1+52 - 2+17	33 FT	5.2
R3	2+31 - 2+50	25 FT	3.9
R4	2+80 - 3+05	24 FT	3.8
R5	3+26 - 3+50	26 FT	4.1
R6	3+65 - 3+88	23 FT	3.6
R7	3+98 - 4+31	30 FT	4.7
R8	4+39 - 4+55	22 FT	3.4
R9	4+65 - 4+92	33 FT	5.2
R10	5+00 - 5+21	19 FT	3.0
R11	5+38 - 5+88	28 FT	4.4
R12	5+88 - 5+96	21 FT	3.3
R13	6+04 - 6+16	101 FT	17.1
R14	6+30 - 6+49	88 FT	14.9
R15	6+50 - 6+84	81 FT	13.7
R16	6+85 - 7+25	25 FT	2.6
R17	7+36 - 7+73	20 FT	2.1
R18	7+82 - 8+19	20 FT	2.1
R19	8+31 - 8+45	25 FT	2.6
R100	0+17 - 0+35	19 FT	2.7
R101	0+35 - 0+44	7 FT	1.0
R102	0+53 - 0+60	18 FT	2.6
R103	0+69 - 0+75	12 FT	1.7
R104	0+85 - 0+94	25 FT	3.6
R105	0+99 - 1+10	11 FT	1.6
R106	1+12 - 1+25	20 FT	2.9



SOILS LEGEND

SYMBOL	SOIL DESCRIPTION
KeB	Kelly silt loam, 3 to 8 percent slopes
Esc2	Elisboro loam, 5 to 10 percent slopes, moderately eroded
LaD3	Legore silty clay loam 15 to 25 percent slopes, severely eroded
LeC2	Legore silt loam, 8 to 15 percent slopes, moderately eroded
LeB2	Legore silt loam, 3 to 8 percent slopes moderately eroded
KfD	Kelly very stony silt loam, 3 to 25 percent slopes
Hb	Hatboro silt loam
LfC	Legore very stony silt loam, 0 to 15 percent slopes



S/C PLAN #: 59840 GRADING PERMIT #: GRA 16333-2018

ANNIE'S PLAYGROUND STREAM RESTORATION
PLAN VIEW DESIGN
 864 SMITH LANE, FALLSTON, MARYLAND, 21047

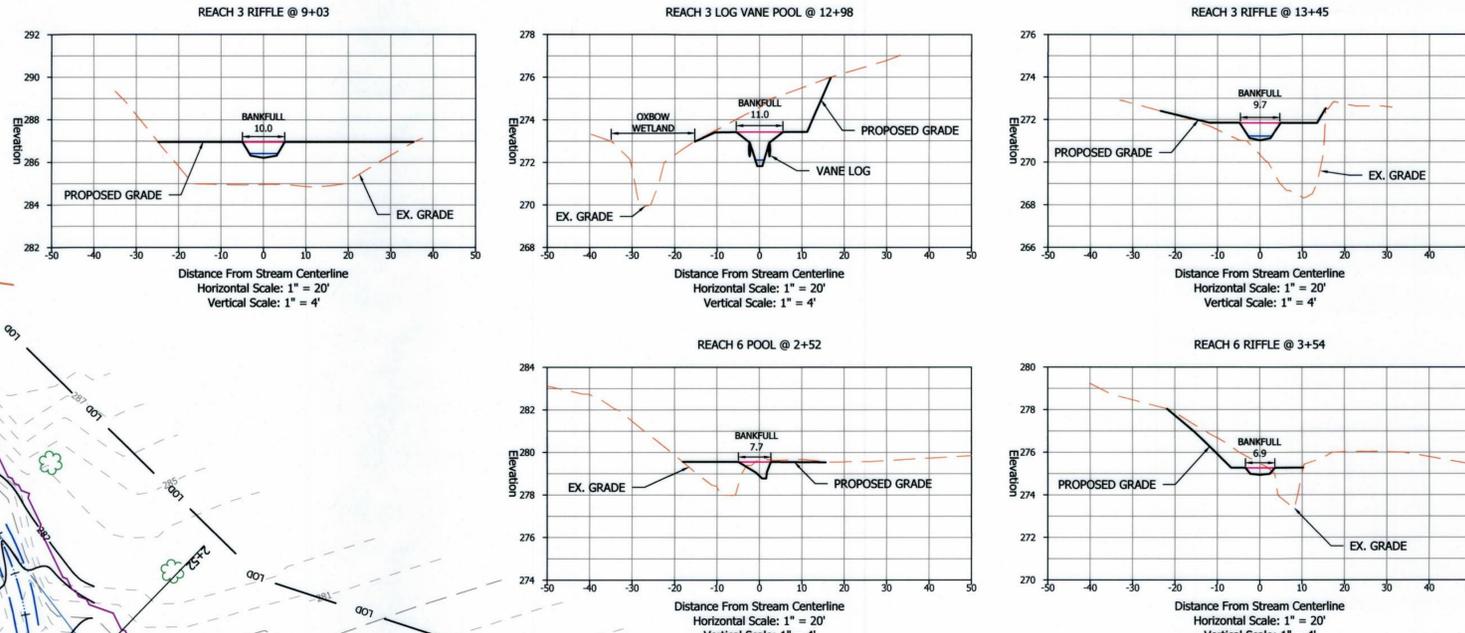
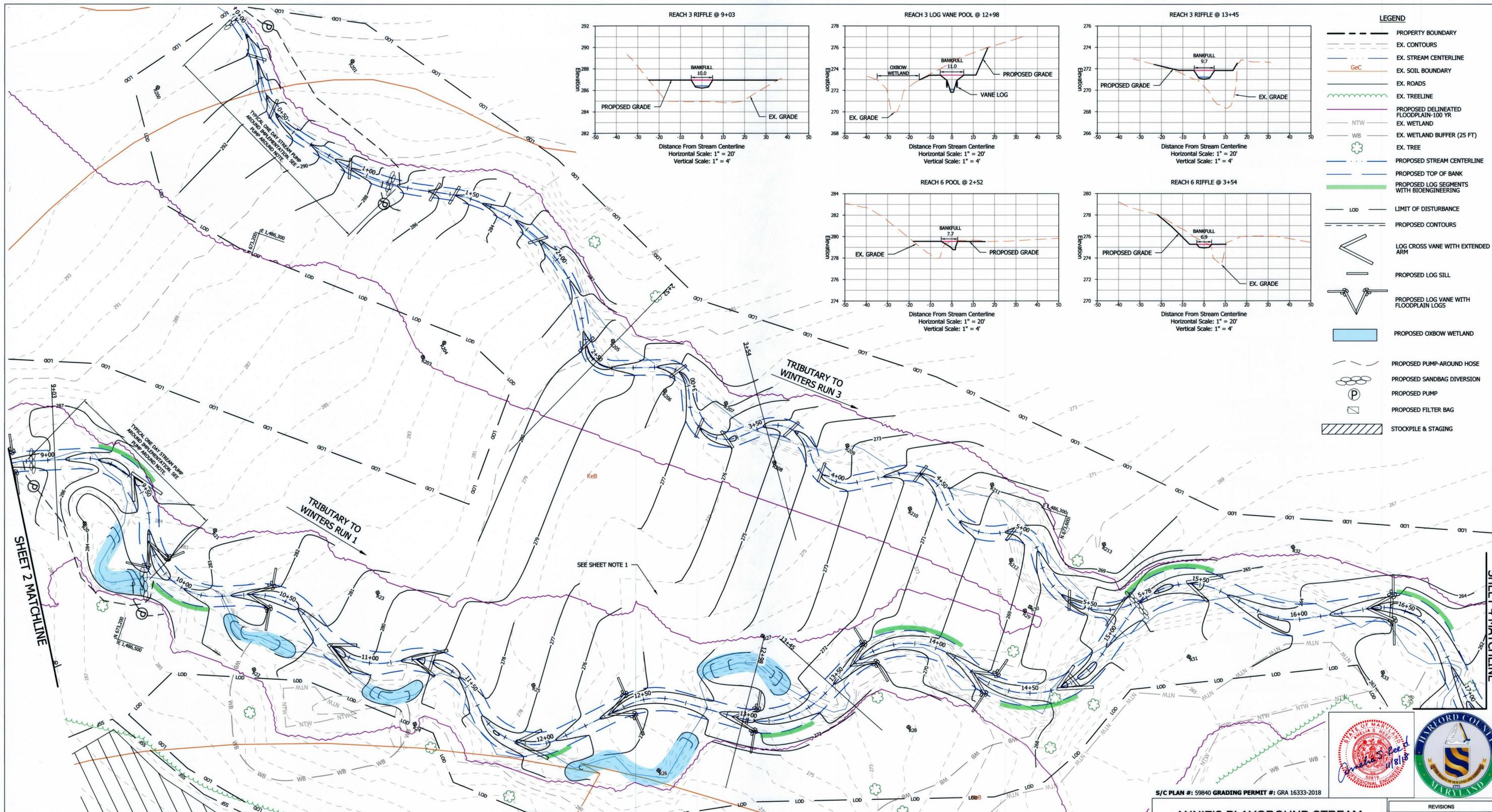
ecotone
 ecological restoration
 129 Industry Lane • Forest Hill, Maryland 21050
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REVISIONS

No.	DATE	DESCRIPTION	REV. BY

CHECKED BY: CRH
 DESIGNED: JES
 DRAWN: JES
 PROJECT No.: 17-15-028
 DATE: 11/1/2018
 SHEET: 2 of 12
 S/C SHEET 2 OF 9

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LEGEND

- PROPERTY BOUNDARY
- - - EX. CONTOURS
- - - EX. STREAM CENTERLINE
- - - EX. SOIL BOUNDARY
- - - EX. ROADS
- - - EX. TREELINE
- - - PROPOSED DELINEATED FLOODPLAIN-100 YR
- - - EX. WETLAND
- - - EX. WETLAND BUFFER (25 FT)
- NTW
- WB
- EX. TREE
- - - PROPOSED STREAM CENTERLINE
- - - PROPOSED TOP OF BANK
- - - PROPOSED LOG SEGMENTS WITH BIOENGINEERING
- LOD
- - - PROPOSED CONTOURS
- LOG CROSS VANE WITH EXTENDED ARM
- - - PROPOSED LOG SILL
- PROPOSED LOG VANE WITH FLOODPLAIN LOGS
- PROPOSED OXBOW WETLAND
- - - PROPOSED PUMP-AROUND HOSE
- PROPOSED SANDBAG DIVERSION
- (P) PROPOSED PUMP
- PROPOSED FILTER BAG
- STOCKPILE & STAGING

REALIGNMENT	REALIGNMENT STATIONING	RADIUS OF CURVATURE	RADIUS OF CURVATURE/BANKFULL WIDTH	REALIGNMENT	REALIGNMENT STATIONING	RADIUS OF CURVATURE	RADIUS OF CURVATURE/BANKFULL WIDTH
R200	0+05 - 0+23	48 FT	6.9	R20	9+14 - 9+66	30 FT	3.1
R201	0+33 - 0+67	43 FT	6.1	R21	9+67 - 10+18	31 FT	3.2
R202	0+84 - 1+28	106 FT	15.1	R22	10+33 - 10+68	35 FT	3.6
R203	1+37 - 1+80	77 FT	11.0	R23	10+73 - 11+09	33 FT	3.4
R204	1+84 - 2+31	65 FT	9.3	R24	11+17 - 11+55	30 FT	3.1
R205	2+33 - 2+61	13 FT	1.9	R25	11+63 - 12+06	28 FT	2.9
R206	2+85 - 3+01	11 FT	1.6	R26	12+42 - 12+66	34 FT	3.5
R207	3+10 - 3+41	17 FT	2.4	R27	12+96 - 13+39	40 FT	4.1
R208	3+51 - 3+81	17 FT	2.4	R28	13+55 - 14+16	39 FT	4.0
R209	3+82 - 4+09	18 FT	2.6	R29	14+20 - 14+33	38 FT	3.9
R210	4+32 - 4+55	17 FT	2.4	R30	14+34 - 14+89	40 FT	4.1
R211	4+60 - 4+90	23 FT	3.3	R31	15+12 - 15+61	34 FT	3.5
R212	4+93 - 5+14	13 FT	1.9	R32	15+81 - 16+02	34 FT	3.1
R213	5+14 - 5+69	31 FT	4.4	R33	16+35 - 16+74	30 FT	2.4

- SHEET NOTES:**
1. STREAM AND FLOODPLAIN GRADING WILL OCCUR SIMULTANEOUSLY WITH STREAM PUMP-AROUND PRACTICES IN PLACE TO PROTECT THE STREAM.
 2. R202 IS NOT VISIBLE ON PLANVIEW. SURVEYOR WILL STAKEOUT THE RADIUS FOR CONSTRUCTION.
 3. AFTER STREAM AND FLOODPLAIN GRADING ARE COMPLETE, THE FLOODPLAIN SHOULD BE ROUGHED UP TO CREATE MICROTOPOGRAPHY.
 4. NO INSTREAM WORK SHALL START UNTIL ALL NEEDED RESOURCES ARE ON SITE.



SOILS LEGEND

SYMBOL	SOIL DESCRIPTION
KeB	Kelly silt loam, 3 to 8 percent slopes
ExC2	Elsinboro loam, 5 to 10 percent slopes, moderately eroded
LoD3	Legore silty clay loam 15 to 25 percent slopes, severely eroded
LoC2	Legore silt loam, 8 to 15 percent slopes, moderately eroded
LoB2	Legore silt loam, 3 to 8 percent slopes moderately eroded
KtD	Kelly very stony silt loam, 3 to 25 percent slopes
Hb	Hatboro silt loam
LtC	Legore very stony silt loam, 0 to 15 percent slopes

S/C PLAN #: 59840 GRADING PERMIT #: GRA 16333-2018

ANNIE'S PLAYGROUND STREAM RESTORATION

PLAN VIEW DESIGN

864 SMITH LANE, FALLSTON, MARYLAND, 21047



129 Industry Lane - Forest Hill, Maryland 21050
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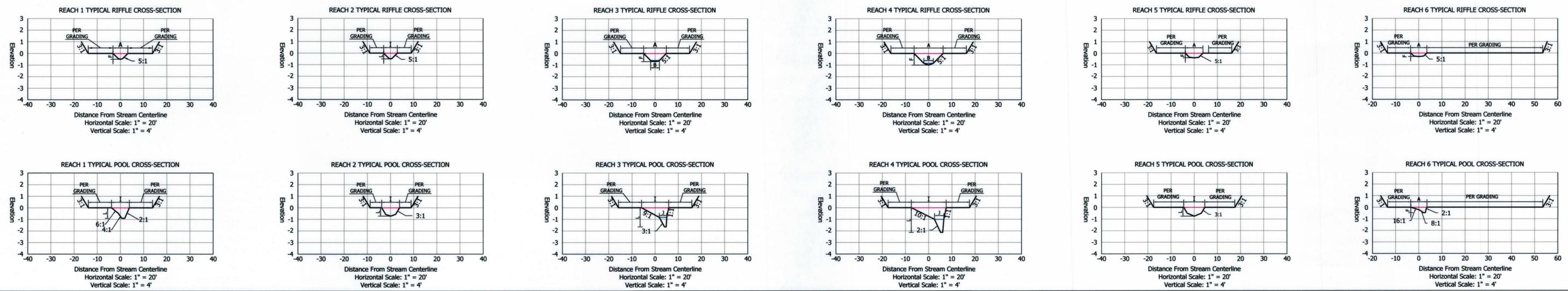
REVISIONS			
No.	DATE	DESCRIPTION	REV BY

CHECKED BY: CRH
DESIGNED: JES
DRAWN: JES
PROJECT No.: 17-15-028
DATE: 11/11/2018
SHEET: 3 of 12
S/C SHEET 3 OF 9

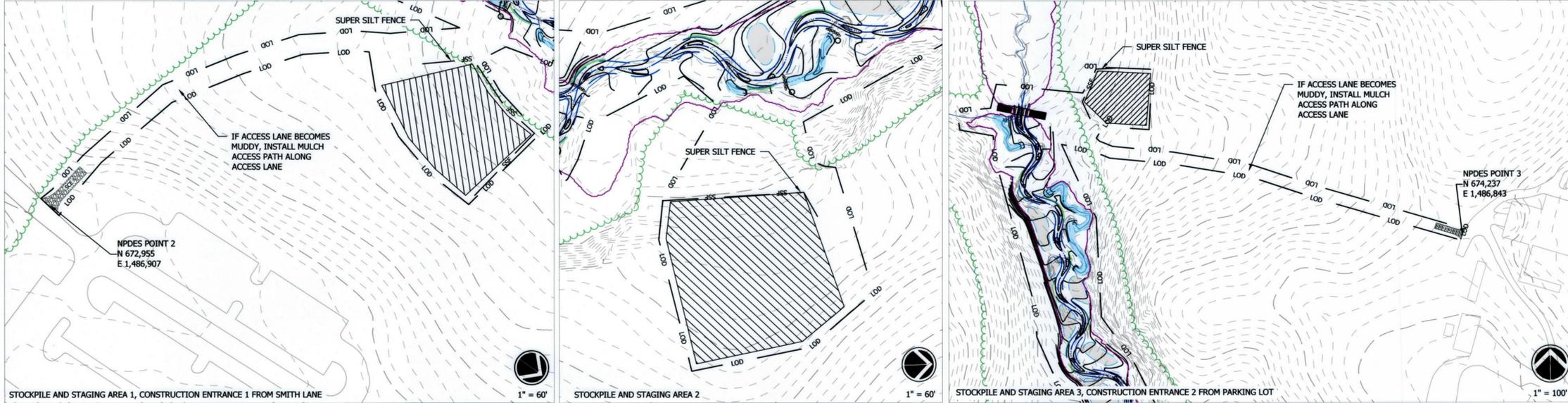
DESIGN INFORMATION

HYDROLOGY	TRIBUTARY 1 REACH 1 0+00 - 5+90			HYDROLOGY	TRIBUTARY 1 REACH 2 5+90 - 6+67			HYDROLOGY	TRIBUTARY 1 REACH 3 6+68 - 15+23			HYDROLOGY	TRIBUTARY 1 REACH 4 15+24 - 25+52			HYDROLOGY	TRIBUTARY 2 REACH 5 0+00 - 1+28			HYDROLOGY	TRIBUTARY 3 REACH 6 0+00 - 5+78		
	DRAINAGE AREA (SQ MI)	BANKFULL DISCHARGE (CFS)	BANKFULL SLOPE (%)		DRAINAGE AREA (SQ MI)	BANKFULL DISCHARGE (CFS)	BANKFULL SLOPE (%)		DRAINAGE AREA (SQ MI)	BANKFULL DISCHARGE (CFS)	BANKFULL SLOPE (%)		DRAINAGE AREA (SQ MI)	BANKFULL DISCHARGE (CFS)	BANKFULL SLOPE (%)		DRAINAGE AREA (SQ MI)	BANKFULL DISCHARGE (CFS)	BANKFULL SLOPE (%)		DRAINAGE AREA (SQ MI)	BANKFULL DISCHARGE (CFS)	BANKFULL SLOPE (%)
DRAINAGE AREA (SQ MI)	0.04			0.05			0.15			0.24			0.02			0.06							
BANKFULL DISCHARGE (CFS)	9.5			9.5			19.5			30			10			10							
BANKFULL SLOPE (%)	5.3%			9.1%			3.4%			2.2%			7.9%			4.2%							
AVG VELOCITY (FT/S)	4.7			5.0			3.7			3.3			3.4			3.4							
AVG SHEAR STRESS (LBS/SF)	1.08			1.6			1.05			0.86			0.61			0.61							
BASEFLOW DISCHARGE (CFS)	N/A			N/A			4.1			0.2			N/A			N/A							
2-YR DISCHARGE (CFS)	15			15			30			40			12			12							
10-YR DISCHARGE (CFS)	38			38			91			128			50			50							
100-YR FLOODPRONE WIDTH (FT)	14 - 75			15 - 41			32 - 86			52 - 106			10 - 30			42 - 95							

DIMENSIONS	KEY	REACH 1 0+00 - 5+90			DIMENSIONS	KEY	REACH 2 5+90 - 6+67			DIMENSIONS	KEY	REACH 3 6+68 - 15+23			DIMENSIONS	KEY	REACH 4 15+24 - 25+52			DIMENSIONS	KEY	REACH 5 0+00 - 1+28			DIMENSIONS	KEY	REACH 6 0+00 - 5+78		
		MEAN	MIN	MAX			MEAN	MIN	MAX			MEAN	MIN	MAX			MEAN	MIN	MAX			MEAN	MIN	MAX			MEAN	MIN	MAX
RIFFLE WIDTH AT BANKFULL (FT)	A	6.4	6.0	6.7	RIFFLE WIDTH AT BANKFULL (FT)	A	5.9	5.4	6.1	RIFFLE WIDTH AT BANKFULL (FT)	A	9.8	9.3	10.0	RIFFLE WIDTH AT BANKFULL (FT)	A	12.6	12.0	13.2	RIFFLE WIDTH AT BANKFULL (FT)	A	7.6	6.7	8.0	RIFFLE WIDTH AT BANKFULL (FT)	A	7.0	6.5	7.5
RIFFLE BASEFLOW WIDTH (FT)	B	2.1	1.5	4.2	RIFFLE BASEFLOW WIDTH (FT)	B	2.0	1.0	4.0	RIFFLE BASEFLOW WIDTH (FT)	B	3.3	2.0	5.8	RIFFLE BASEFLOW WIDTH (FT)	B	4.2	3.0	5.0	RIFFLE BASEFLOW WIDTH (FT)	B	-	-	-	RIFFLE BASEFLOW WIDTH (FT)	B	-	-	-
RIFFLE MEAN DEPTH (FT)	C	0.4	0.3	0.5	RIFFLE MEAN DEPTH (FT)	C	0.3	0.2	0.5	RIFFLE MEAN DEPTH (FT)	C	0.6	0.5	0.7	RIFFLE MEAN DEPTH (FT)	C	0.7	0.6	0.9	RIFFLE MEAN DEPTH (FT)	C	0.3	-	-	RIFFLE MEAN DEPTH (FT)	C	0.25	-	-
WIDTH/DEPTH RATIO	D	17.5	15.5	19.0	WIDTH/DEPTH RATIO	D	18.2	15.7	19.1	WIDTH/DEPTH RATIO	D	17.7	16.2	18.5	WIDTH/DEPTH RATIO	D	17.8	16.2	19.1	WIDTH/DEPTH RATIO	D	26.0	22.0	28.0	WIDTH/DEPTH RATIO	D	28.0	26.0	29.0
RIFFLE CROSS-SECTIONAL AREA (SF)	E	2.3	2.2	2.5	RIFFLE CROSS-SECTIONAL AREA (SF)	E	1.9	1.7	2.1	RIFFLE CROSS-SECTIONAL AREA (SF)	E	5.4	5.3	5.5	RIFFLE CROSS-SECTIONAL AREA (SF)	E	9.0	8.9	9.1	RIFFLE CROSS-SECTIONAL AREA (SF)	E	2.2	2.1	2.4	RIFFLE CROSS-SECTIONAL AREA (SF)	E	1.8	1.6	1.9
RIFFLE MAX DEPTH (FT)	F	0.5	0.4	0.6	RIFFLE MAX DEPTH (FT)	F	0.5	0.4	0.6	RIFFLE MAX DEPTH (FT)	F	0.7	0.6	0.8	RIFFLE MAX DEPTH (FT)	F	0.9	0.8	1.1	RIFFLE MAX DEPTH (FT)	F	0.4	0.3	0.5	RIFFLE MAX DEPTH (FT)	F	0.3	0.2	0.5
RIFFLE LENGTH (FT)	G	9.6	6.4	16.0	RIFFLE LENGTH (FT)	G	-	-	-	RIFFLE LENGTH (FT)	G	19.5	9.8	29.3	RIFFLE LENGTH (FT)	G	25.2	12.6	37.8	RIFFLE LENGTH (FT)	G	19.0	11.0	27.0	RIFFLE LENGTH (FT)	G	14.0	7.0	21.0
RIFFLE SLOPE (%)	H	6.3	5.3	8.0	RIFFLE SLOPE (%)	H	11.8	10.5	13.7	RIFFLE SLOPE (%)	H	3.7	3.4	4.8	RIFFLE SLOPE (%)	H	2.6	2.4	3.4	RIFFLE SLOPE (%)	H	9.5	7.5	10.1	RIFFLE SLOPE (%)	H	5.0	4.0	6.0
POOL WIDTH AT BANKFULL (FT)	I	7.7	7.0	9.6	POOL WIDTH AT BANKFULL (FT)	I	7.7	5.9	8.9	POOL WIDTH AT BANKFULL (FT)	I	11.7	10.7	12.7	POOL WIDTH AT BANKFULL (FT)	I	15.1	13.9	16.4	POOL WIDTH AT BANKFULL (FT)	I	9.1	8.4	11.4	POOL WIDTH AT BANKFULL (FT)	I	9.1	7.7	10.0
POOL BASEFLOW WIDTH (FT)	J	2.6	2	5.2	POOL BASEFLOW WIDTH (FT)	J	2.6	1.5	5.2	POOL BASEFLOW WIDTH (FT)	J	3.9	2.0	4.5	POOL BASEFLOW WIDTH (FT)	J	5.0	3.5	6.5	POOL BASEFLOW WIDTH (FT)	J	-	-	-	POOL BASEFLOW WIDTH (FT)	J	-	-	-
POOL CROSS-SECTIONAL AREA (SF)	K	3.5	2.3	4.0	POOL CROSS-SECTIONAL AREA (SF)	K	3.0	2.1	3.5	POOL CROSS-SECTIONAL AREA (SF)	K	5.9	5.4	7.0	POOL CROSS-SECTIONAL AREA (SF)	K	9.8	8.9	11.6	POOL CROSS-SECTIONAL AREA (SF)	K	3.3	2.2	3.7	POOL CROSS-SECTIONAL AREA (SF)	K	2.6	2.3	2.8
POOL MAX DEPTH (FT)	L	0.9	0.6	1.1	POOL MAX DEPTH (FT)	L	0.7	0.5	0.9	POOL MAX DEPTH (FT)	L	1.7	1.4	2.0	POOL MAX DEPTH (FT)	L	2.1	1.8	2.5	POOL MAX DEPTH (FT)	L	0.8	0.5	0.9	POOL MAX DEPTH (FT)	L	0.7	0.6	0.9
POOL LENGTH (FT)	M	9.6	6.4	16.0	POOL LENGTH (FT)	M	6.0	3.0	11.8	POOL LENGTH (FT)	M	24.4	14.6	39.0	POOL LENGTH (FT)	M	31.5	18.9	50.4	POOL LENGTH (FT)	M	11.4	7.6	15.2	POOL LENGTH (FT)	M	10.5	6.3	17.5



STOCKPILE INSET MAPS



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ANNIE'S PLAYGROUND STREAM RESTORATION
DESIGN INFORMATION & STOCKPILE INSET MAPS

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REVISIONS			
No.	DATE	DESCRIPTION	REV. BY

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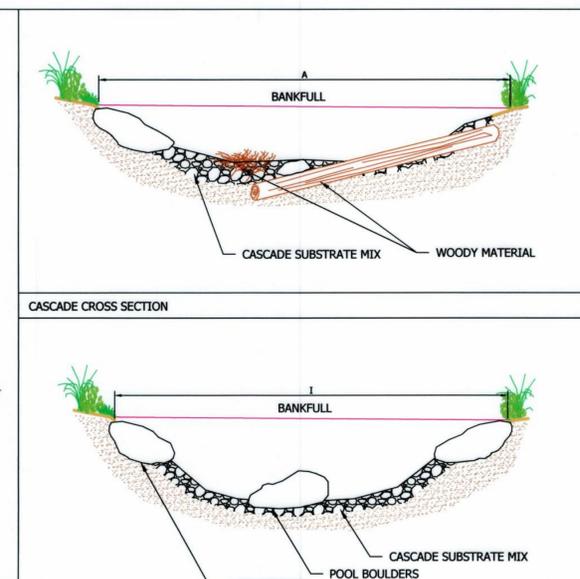
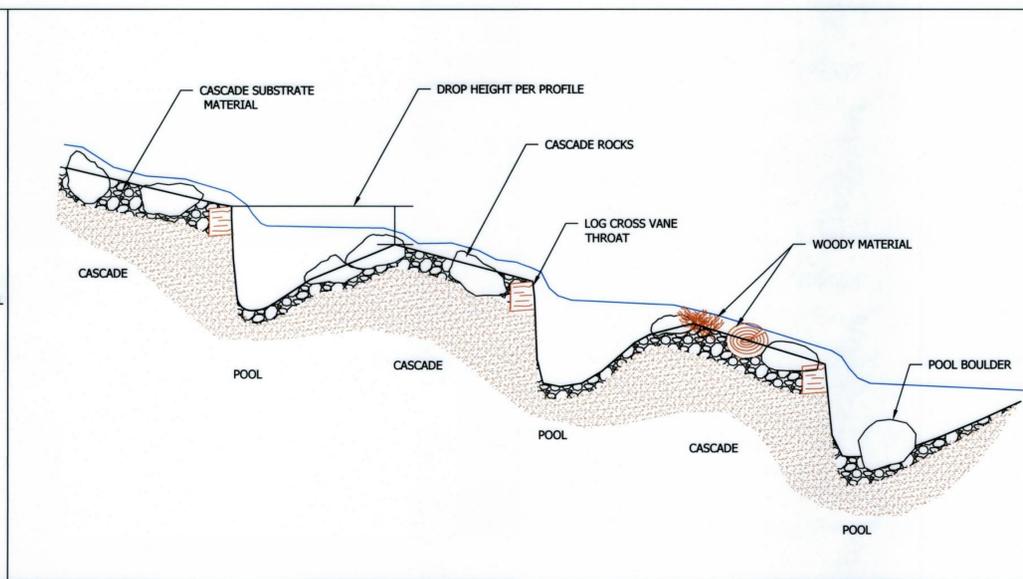
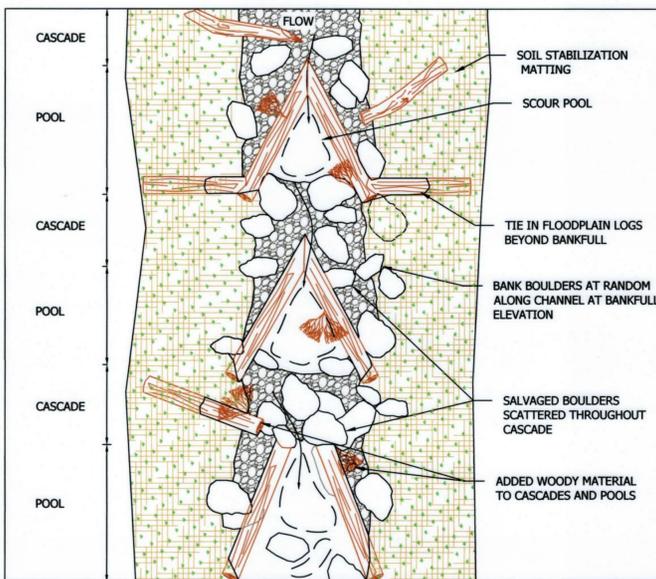
DRAWN: JES

PROJECT No.: 17-15-028

DATE: 11/1/2018

SHEET: 8 of 12

S/C SHEET 5 OF 9



LOG CROSS VANE-CASCADE SEQUENCE INSTALLATION

DESCRIPTION
This work shall consist of installing stone and woody materials for the creation of cascade grade control structures within the proposed stream bed. Log cross vanes will be installed in the cascade mix to serve as control grade structures.

MATERIALS

Logs
Logs shall be of hardwood species, have a minimum length as indicated on the "Log Cross Vane Chart," and a minimum diameter of 18 inches. All material shall be free of rot and evidence of pests. All branches and root mass shall be removed.

Cascade Rock
Boulders naturally scattered through the cascade mix should be salvaged on site with a similar size to Class III imbricated stone.

Woody Material

1. Woody material shall be 1-8" in diameter (maximum) and 18-36 inches in length.
2. 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.

Soil Stabilization Matting

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

CONSTRUCTION

1. Excavate existing channel to form subgrade of proposed log cross vane cascade sequence (Reach 2).
2. First construct log cross vanes before continuing work on cascade portion of the structure.
3. Place footer logs at the base of each drop. Set footer boulders in cascade sections, filling interstitial gaps with riffle/cascade mix as boulders are set.
4. Ensure that the elevation of the log vanes match the proposed elevation on the profile.
5. Fill pools with salvaged channel existing substrate.
6. Grade sides to meet existing topography. Seed and mulch all graded areas with Permanent Seed Mix. No disturbed areas are to be graded at a slope greater than 2:1.
7. Once log cross vanes are complete work can be directed towards the cascade portion of the structure.
8. Distribute branches and woody material throughout proposed riffle area.
9. Install substrate mixture, ensuring that branch tips are not buried.
10. Place Micro Pool Habitat Rocks within bankfull channel and grade pilot pool downstream of rock.
11. Create low flow channel at stream centerline by grading riffle/cascade substrate mix at 10-15% slope from banks toward center of channel.
12. Woody branches that extend more than 3" above the riffle substrate shall be trimmed.
13. Grade banks to bankfull elevation and grade floodplain as shown on grading plan.
14. Install soil stabilization matting.

LOG CROSS VANE-CASCADE SEQUENCE PLAN VIEW

LOG CROSS VANE-CASCADE SEQUENCE PROFILE VIEW

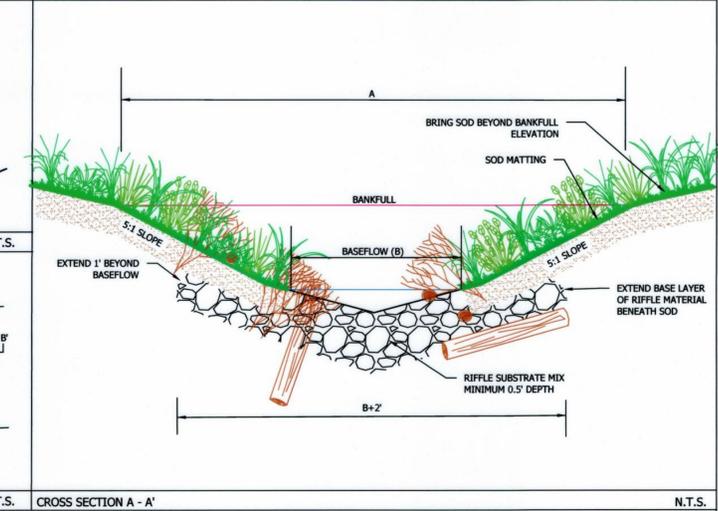
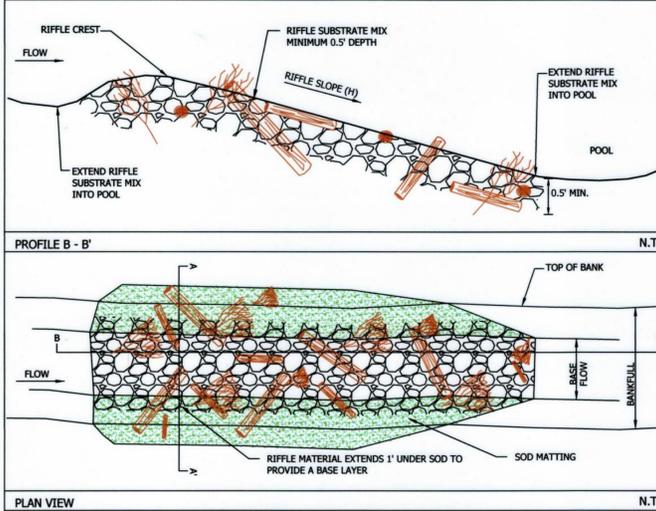
POOL CROSS SECTION

LOG CROSS VANE-CASCADE SEQUENCE

NTS

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* LOG CROSS VANE CASCADE IS TO BE IMPLEMENTED FOR REACH 2 ONLY



PLAN VIEW

CROSS SECTION A - A'

RIFLE GRADE CONTROL STRUCTURE WITH SOD INSTALLATION

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RIFLE GRADE CONTROL STRUCTURE WITH SOD 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

Sod Matting

1. Sod matting shall be harvested from native material available on-site, within the limits of disturbance when available. See "Sod Matting Detail" for specifications.

Riffle Substrate Mix

1. 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.
2. The Construction Manager shall review riffle material for review and approval prior to beginning construction.
3. Substrate shall be a mixture conforming to the "Riffle Substrate Specifications".
4. Not to exceed 50% Angular Quarry Rock
5. Incorporate with salvaged material when available. Mix material prior to placing in stream.
6. 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

1. Woody material shall be 1-8" in diameter (maximum) and 18-48 inches in length.
2. Woody material shall be from native trees and shrubs. No exotic or invasive species are to be used.
3. No willow (*Salix*) or shrub dogwood (*Cornus sericea*, *Cornus mas* or *Cornus racemosa*) species are to be used.

CONSTRUCTION

1. Salvageable material within any given work area shall be harvested and stockpiled for later use.
2. Excavate proposed channel to form subgrade of proposed riffle sequence.
3. 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.
4. Place random Class II riprap habitat stones throughout riffle. Not to exceed 0.3' from Invert.
5. Thoroughly mix appropriate quantities of Class I, Class 0, cobble and salvaged material.
6. Add base layer of compacted Class 1, Class 0, cobble and salvaged material. Extend substrate mix 1-ft beyond base flow width and a minimum of 0.4' below finished grade.
7. Regrade stream banks to the proposed slope and at a subgrade elevation that allows for the placement of sod.
8. Place sod matting along stream banks, starting at the edge of baseflow and carry up past the edge of bankfull. Sod should be a minimum of 0.75" thick.
9. Tamp sod down with bottom edge of excavator bucket.
10. Place the remaining substrate mix within base flow and bring to final elevation, making sure to cover and protect the edge of newly installed sod.
11. Any woody material that extends up from the channel more than 0.4' should be trimmed or tamped lower.

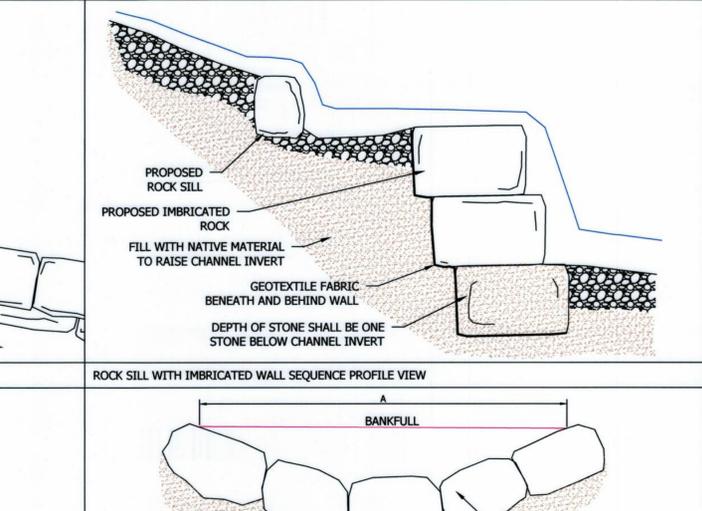
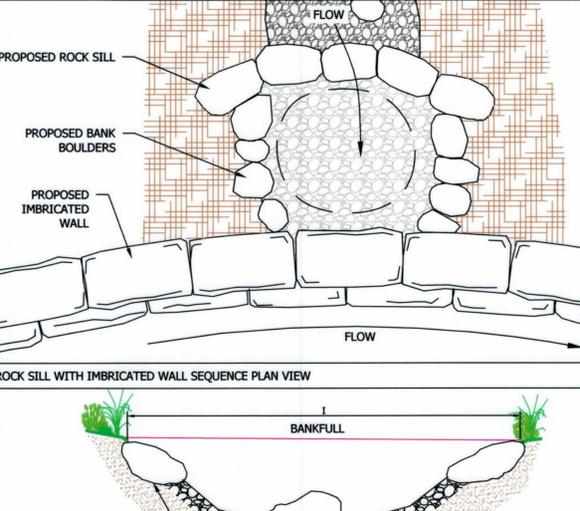
RIFLE SUBSTRATE SPECIFICATION

Use existing stream bed material where existing material meets the following size specifications. Where existing material does not meet the following size specifications, supplement with angular quarry rock so that the D50 is made to meet the following size:

REACH	D50	COMMENTS
1	1.2 - 3.0 IN.	Use high end of range on slopes 6% and greater.
2	1.5 IN.	Salvaged Class III boulders should be scattered into mix
3	1.7 IN.	Incorporate larger existing cobble into mix
4	1.9 IN.	Incorporate larger existing cobble into mix
5	1.5 IN.	Salvaged Class III boulders should be scattered into mix
6	1.2 IN.	Riffle mix should not include larger cobble in this reach

Soil Stabilization Matting Specifications

Property	Test Method	CoirMat 700
Weight	ASTM D 3776	20.6 oz/SY
Thickness	ASTM D 1777	0.3 inch
Dry Tensile Strength		
Machine Direction		1512 lbs/sf
Cross Direction	ASTM D 4595	1032 lbs/sf
Wet Tensile Strength		
Machine Direction		924 lbs/sf
Cross Direction	ASTM D 4595	684 lbs/sf
Open Area	Calculated	50%



PLAN VIEW

PROFILE VIEW

ROCK SILL WITH IMBRICATED WALL SEQUENCE

NTS

ROCK SILL WITH IMBRICATED WALL INSTALLATION

1. DESCRIPTION

Work shall consist of furnishing and installing boulders to minimize near bank stress and stabilize the confluence of Tributary 1 & 2. The elevation drop from Tributary 2 into Tributary 1 is 1.1 feet.

2. MATERIALS

Imbricated Riprap
Material Stone shall consist of angular flat rock with a blocky shape so that it is easily stacked. Dimensions of all rock shall be a minimum 2' x 2' x 3'.

Geotextile
Geotextile material shall consist of Class E geotextile fabric.

Select Topsoil Material
Subgrade fill material shall consist of native soil available onsite. If additional material is required to meet proposed grade, common borrow consisting of no more than 2% organic material will be brought in and utilized.

Sill Rock
Rocks used for sills should be salvaged from onsite with a similar size to Class III imbricated stone.

Cascade Rock
Boulders naturally scattered through the cascade mix should be salvaged on site with a similar size to Class III imbricated stone.

3. CONSTRUCTION

1. Grade streambank to the desired slope then excavate trench along the toe of the bank for the placement of footer stones. A layer of geotextile material shall be placed and secured from the top of bank down into the footer trench.
2. Place footer stones on top of the geotextile in the trench.
3. Once a layer of footer stone is in place, place each stone overlapping the one underneath by half. The stones that are placed above footer stones but below base level should be set so as to create a void space between the adjacent stones.
4. Continue placement of stone until desired wall height is achieved.
5. The top of the wall will be transitioned into the tributary. Refer to profile and plan view for rock sill and pool locations.
6. Excavate channel to desired elevation for rock sill placement. Install geotextile material behind rock.

POOL CROSS SECTION

ROCK SILL CROSS SECTION

ROCK SILL WITH IMBRICATED WALL SEQUENCE

NTS

S/C PLAN #: 59840 GRADING PERMIT #: GRA 16333-2018

ANNIE'S PLAYGROUND STREAM RESTORATION

NOTES AND DETAILS

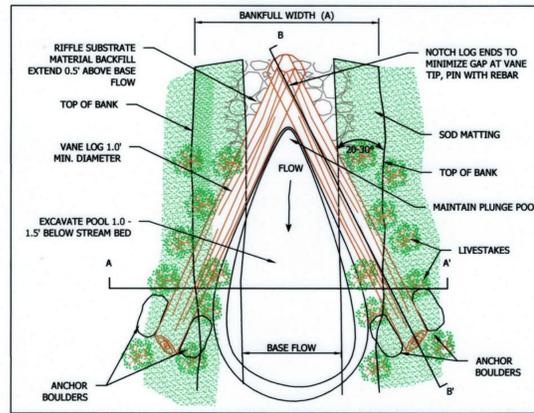
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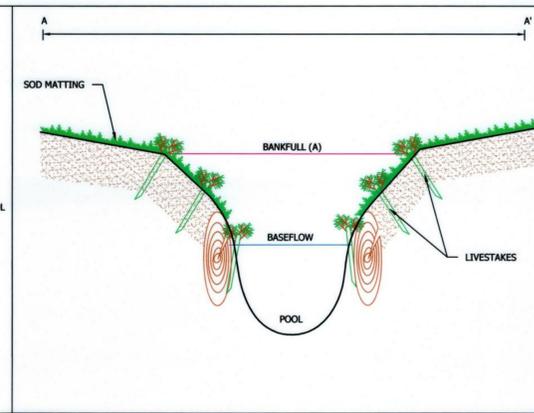
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SHEET: 9 of 12
S/C SHEET 6 OF 9

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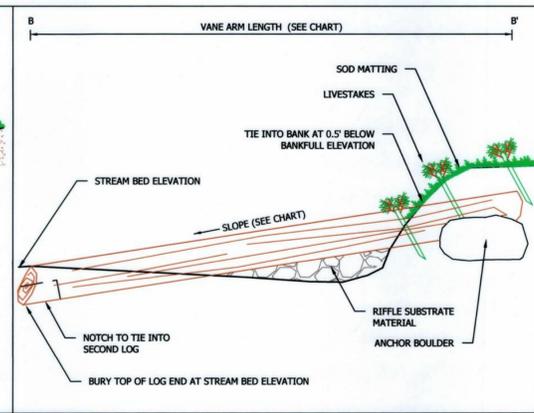
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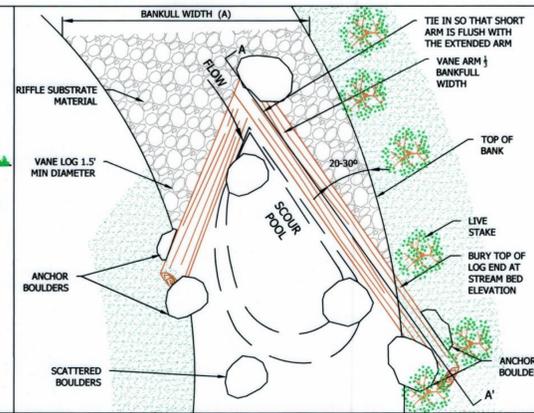
PLAN VIEW
LOG CROSS VANE WITH SOD MATTING DETAIL



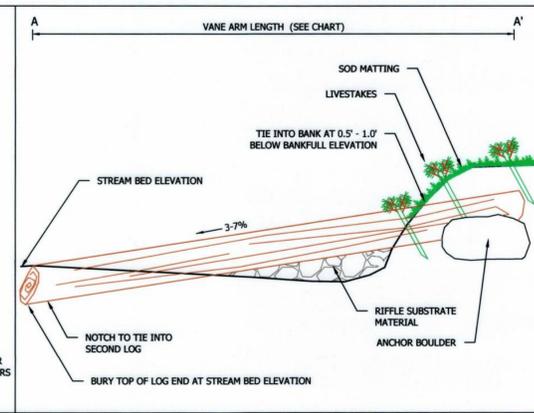
SECTION A-A'



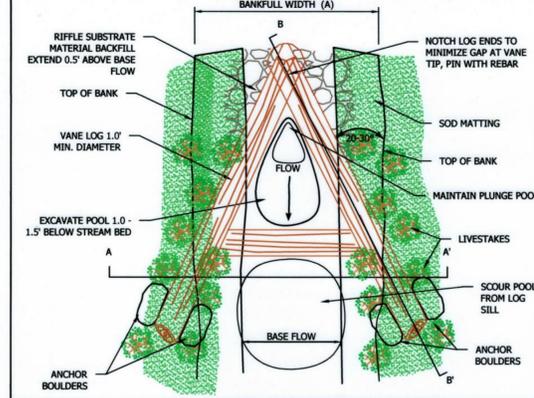
ARM PROFILE B-B'



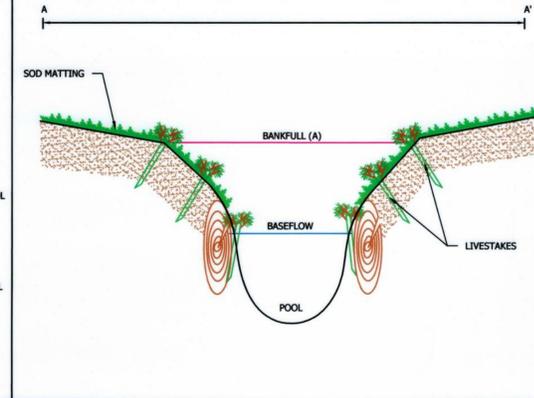
PLAN VIEW
LOG CROSS VANE WITH EXTENDED ARM DETAIL



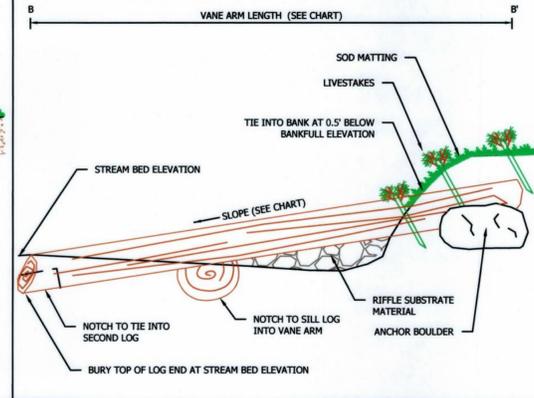
ARM PROFILE A-A'



PLAN VIEW
LOG CROSS VANE WITH LOG SILL AND SOD MATTING DETAIL



SECTION A-A'



ARM PROFILE B-B'

LOG CROSS VANE WITH EXTENDED ARM INSTALLATION

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

MATERIALS
Logs
Logs shall be hardwood species, have a minimum length of 13 feet and a minimum diameter of 18 inches. All material shall be free of rot and evidence of pests. All branches and root mass shall be removed.
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.
Cascade Rock
Boulders naturally scattered through the cascade mix should be salvaged on site with a similar size to Class III imbricated stone.
Soil Stabilization Matting
1. Matting shall be woven machine spun bristle coir twine made of coir fiber obtained from fresh water cured coconut husks.
2. Soil stabilization matting shall conform to the "Soil Stabilization Chart".
Sod Matting
1. Sod matting shall be harvested from native material available on-site, within the limits of disturbance when available.
2. Sod matting shall not be stockpiled, but installed immediately after harvest (See "Sod Matting Detail" for specifications).
CONSTRUCTION
1. Cut a trench for the Log Vane, from the starting point in the stream, extending up to 0.5' - 1.0' below bankfull elevation at a twenty to thirty (20-30) degree angle upstream from the proposed bank. The dimensions of the trench (width and depth) shall accommodate the footer logs and vane logs.
2. Excavation of the trench and placement of logs shall be conducted from the most streamward point and work toward the streambank. An optional footer log may be necessary and should be installed at the discretion of the Designated Specialist in the field. The positioning of the vane log shall be angled toward the streambank, with the top of the vane log being placed just below the proposed bankfull elevation so that the end of the log is buried in the bank. The extended log should be placed at a higher slope than the shortened vane log.
3. The shortened log will be placed at the channel invert such that the log invert elevation is matching the elevation indicated on the profile. The shortened log will tie out 0.5 - 1.0' feet below bankfull elevation into the point bar.

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.

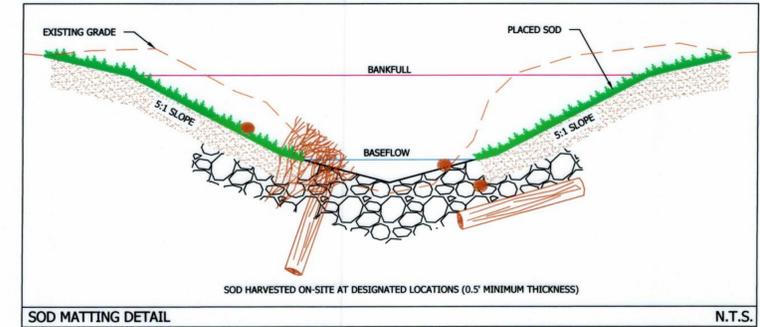
MATERIALS
Logs
Logs shall be hardwood species, have a minimum length as indicated on the "Log Cross Vane Chart", and a minimum diameter of 12 inches. All material shall be free of rot and evidence of pests. All branches and root mass shall be removed.
Backfill Substrate Material
Backfill material shall conform to riffle substrate specifications.
Anchor Boulders
Anchor boulders shall be salvaged from onsite material.
Soil Stabilization Matting
1. Matting shall be woven machine spun bristle coir twine made of coir fiber obtained from fresh water cured coconut husks.
2. Soil stabilization matting shall conform to the "Soil Stabilization Matting Specifications" chart.

CONSTRUCTION

1. Rough grade channel and floodplain areas prior to installing logs.
2. Excavate trench for vane log so that tip of log will be flush with proposed stream bed elevation at thalweg and tie into the bank at approximately 0.5' below bankfull elevation.
* For log cross vane with a log sill, excavate trench for sill and notch both vane arms for sill to tie into.
3. Install vane log and backfill with riffle substrate material. Ensure that all voids have been filled on the upstream side of log and beneath.
4. Excavate trench for opposing vane log.
5. 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.
6. Backfill remaining areas with riffle substrate material, ensuring that all voids have been filled.
7. Grade banks, seed and mulch per bank treatment specifications and details.

LOG CROSS VANE CHART		
REACH	LENGTH (FT)	SLOPE (%)
REACH 1	5-10	3-7
REACH 2	6-11	3-7
REACH 3	7-15	3-7
REACH 4	10-20	3-7
REACH 5	4-7	3-7

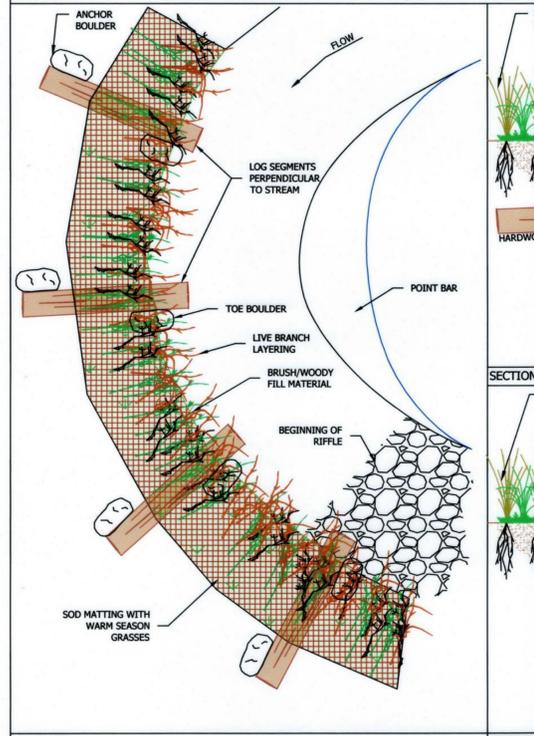
DESIGN NOTE: STRUCTURE ELEMENTS TO BE ADJUSTED IN THE FIELD BY THE CONTRACTOR'S DESIGNATED STREAM SPECIALIST WITH THE APPROVAL FROM COUNTY INSPECTOR IN ORDER TO MEET SITE CONDITIONS.



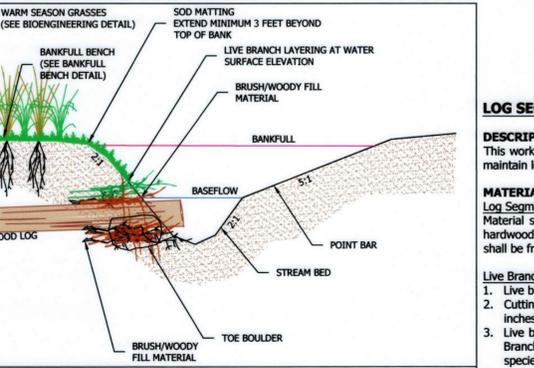
SOD MATTING DETAIL

SOD MATTING INSTALLATION

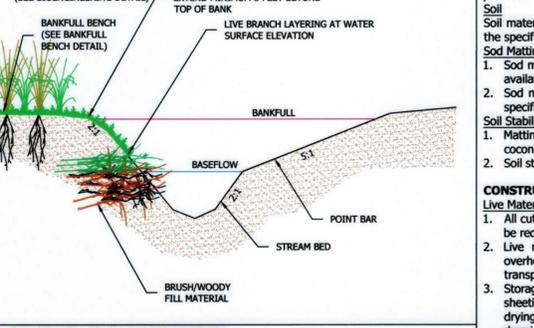
1. All sod shall be harvested on-site. On-site sod harvesting areas are available in areas where new grading or wetland enhancement is proposed. It is the responsibility of the Contractor to avoid impacting these areas prior to salvaging sod. Specialized harvesting equipment can be used. The use of an excavator or skid loader at a minimum is necessary to accomplish the sod transplanting. Equipment used, harvesting locations, and placement of sod will be accomplished under the direct supervision of the Designated Specialist. On-site borrow areas for sod will be identified and flagged by the Designated Specialist in the field. All sod materials to be placed along the streambank must be approved by the Designated Specialist prior to placement.
2. Sod should be harvested in pieces no less than 2' wide by 2' long by 0.5' - 0.75' deep with an excavator. Smaller sod pieces shall not be allowed.
3. Transport the sod to the proposed installation location and immediately place the sod along the bank. Setting the sod down temporarily, or stockpiling the sod shall not be allowed.
4. Place the sod carefully along the bank at a 5 to 1 slope, and compact the sod immediately after placement with three tamps of the bottom of the excavator bucket, being careful not to damage the sod.
5. Adjacent sod pieces shall butt together with no gaps and sod pieces shall not overlap.
6. Sod placement is required on all streambanks indicated on the plans from the toe of slope to the top of slope at the elevation of the floodplain. Seeding and mulching may be used at the top of bank back into the floodplain, but not on sloped streambanks.
7. Sod should be watered immediately.



PLAN VIEW
LOG SEGMENTS WITH SOD MATTING



SECTION VIEW THROUGH LOG SEGMENT



SECTION VIEW THROUGH BRUSH/WOODY MATERIAL

LOG SEGMENTS WITH SOD MATTING 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.
Live Branch Material
1. Live branch cuttings shall be approximately 1.5 inch in diameter.
2. 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.
3. 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.
4. 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.
Sod Matting
1. Sod matting shall be harvested from native material available on-site, within the limits of disturbance when available.
2. Sod matting shall not be stockpiled, but installed immediately after harvest (See "Sod Matting Detail" for specifications).
Soil Stabilization Matting
1. Matting shall be woven machine spun bristle coir twine made of coir fiber obtained from fresh water cured coconut husks.
2. Soil stabilization matting shall conform to the "Soil Stabilization Chart".

CONSTRUCTION
Live Material Preparation:
1. All cuts shall be smooth and the cut surface kept small. The use of large pruning shears or power saws may be required.
2. Live materials not installed within 8 hours of harvesting shall be protected against drying out and over-heating. Protection against drying out shall be accomplished by keeping the material covered, transported in unheated vehicles, moistened and/or kept in soak pits.
3. 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.

4. 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

1. 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.
2. At proposed log segment locations, excavate a wider trench into bank that allows for proposed length of log segments.
3. 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.
4. Place the boulder on the downstream side of log segment and an anchor boulder on the upstream end.
5. 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.
6. Place a thin layer of backfill (0.2' max) over woody material to form a planting bed for live branch material.
7. Place live branch material over backfill such that 2/3 of the brush will be covered with soil and 1/3 of the brush is exposed, extending out beyond the face of the bank. Live branches placed minimum 3/8" with growing tops facing out.
8. 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.
9. 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.
10. Install sod matting beginning at the start of the woody fill material to the end of the bankfull bench.
11. 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.
12. Warm season grasses will be installed during the appropriate growing season.

Alternately (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'



S/C PLAN #: 59840 GRADING PERMIT #: GRA 16333-2018

ANNIE'S PLAYGROUND STREAM RESTORATION
NOTES AND DETAILS
864 SMITH LANE, FALLSTON, MARYLAND, 21047

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

REVISIONS		
No.	DATE	DESCRIPTION

CHECKED BY: CRH
DESIGNED: JES
DRAWN: JES
PROJECT No.: 17-15-028
DATE: 11/1/2018
SHEET: 10 of 12
S/C SHEET 7 OF 9

B-4 STANDARDS AND SPECIFICATIONS

**FOR
VEGETATIVE STABILIZATION**

Definition

Using vegetation as cover to protect exposed soil from erosion.

Purpose

To promote the establishment of vegetation on exposed soil.

Conditions Where Practice Applies

On all disturbed areas not stabilized by other methods. This specification is divided into sections on incremental stabilization; soil preparation, soil amendments and topsoiling; seeding and mulching; temporary stabilization; and permanent stabilization.

Effects on Water Quality and Quantity

Stabilization practices are used to promote the establishment of vegetation on exposed soil. When soil is stabilized with vegetation, the soil is less likely to erode and more likely to allow infiltration of rainfall, thereby reducing sediment loads and runoff to downstream areas.

Planting vegetation in disturbed areas will have an effect on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, percolation, and groundwater recharge. Over time, vegetation will increase organic matter content and improve the water holding capacity of the soil and subsequent plant growth.

Vegetation will help reduce the movement of sediment, nutrients, and other chemicals carried by runoff to receiving waters. Plants will also help protect groundwater supplies by assimilating those substances present within the root zone.

Sediment control practices must remain in place during grading, seedbed preparation, seeding, mulching, and vegetative establishment.

Adequate Vegetative Establishment

Inspect seeded areas for vegetative establishment and make necessary repairs, replacements, and reseedings within the planting season.

1. Adequate vegetative stabilization requires 95 percent groundcover.
2. If an area has less than 40 percent groundcover, restabilize following the original recommendations for lime, fertilizer, seedbed preparation, and seeding.
3. If an area has between 40 and 94 percent groundcover, over-seed and fertilize using half of the rates originally specified.
4. Maintenance fertilizer rates for permanent seeding are shown in Table B.6.

B.9

B-4-1 STANDARDS AND SPECIFICATIONS

**FOR
INCREMENTAL STABILIZATION**

Definition

Establishment of vegetative cover on cut and fill slopes.

Purpose

To provide timely vegetative cover on cut and fill slopes as work progresses.

Conditions Where Practice Applies

Any cut or fill slope greater than 15 feet in height. This practice also applies to stockpiles.

Criteria

A. Incremental Stabilization - Cut Slopes

1. Excavate and stabilize cut slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all cut slopes as the work progresses.
2. Construction sequence example (Refer to Figure B.1):
 - a. Construct and stabilize all temporary swales or dikes that will be used to convey runoff around the excavation.
 - b. Perform Phase 1 excavation, prepare seedbed, and stabilize.
 - c. Perform Phase 2 excavation, prepare seedbed, and stabilize. Overseed Phase 1 areas as necessary.
 - d. Perform final phase excavation, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.

Note: Once excavation has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.

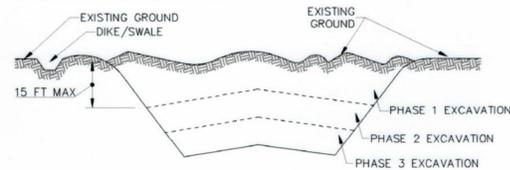


Figure B.1: Incremental Stabilization - Cut

B.10

B. Incremental Stabilization - Fill Slopes

1. Construct and stabilize fill slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all slopes as the work progresses.
2. Stabilize slopes immediately when the vertical height of a lift reaches 15 feet, or when the grading operation ceases as prescribed in the plans.
3. At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.
4. Construction sequence example (Refer to Figure B.2):
 - a. Construct and stabilize all temporary swales or dikes that will be used to divert runoff around the fill. Construct silt fence on low side of fill unless other methods shown on the plans address this area.
 - b. At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.
 - c. Place Phase 1 fill, prepare seedbed, and stabilize.
 - d. Place Phase 2 fill, prepare seedbed, and stabilize.
 - e. Place final phase fill, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.

Note: Once the placement of fill has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.

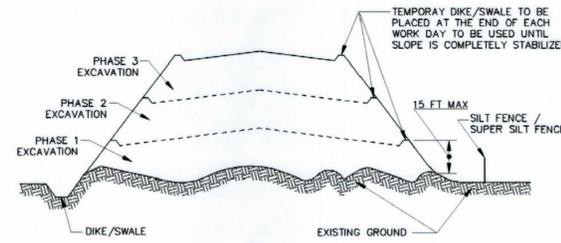


Figure B.2: Incremental Stabilization - Fill

B.11

B-4-2 STANDARDS AND SPECIFICATIONS

**FOR
SOIL PREPARATION, TOPSOILING, AND SOIL AMENDMENTS**

Definition

The process of preparing the soils to sustain adequate vegetative stabilization.

Purpose

To provide a suitable soil medium for vegetative growth.

Conditions Where Practice Applies

Where vegetative stabilization is to be established.

Criteria

A. Soil Preparation

1. Temporary Stabilization

- 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.
- b. Apply fertilizer and lime as prescribed on the plans.
- c. Incorporate lime and fertilizer into the top 3 to 5 inches of soil by disking or other suitable means.

2. Permanent Stabilization

- 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:
 - i. Soil pH between 6.0 and 7.0.
 - ii. Soluble salts less than 500 parts per million (ppm).
 - 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.
 - iv. Soil contains 1.5 percent minimum organic matter by weight.
- b. Application of amendments or topsoil is required if on-site soils do not meet the above conditions.
- c. Graded areas must be maintained in a true and even grade as specified on the approved plan, then scarified or otherwise loosened to a depth of 3 to 5 inches.

B.12

d. Apply soil amendments as specified on the approved plan or as indicated by the results of a soil test.

e. Mix soil amendments into the top 3 to 5 inches of soil by disking or other suitable means. Rake lawn areas to smooth the surface, remove large objects like stones and branches, and ready the area for seed application. Loosen surface soil by dragging with a heavy chain or other equipment to roughen the surface where site conditions will not permit normal seedbed preparation. Track slopes 3:1 or flatter with tracked equipment leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. Leave the top 1 to 3 inches of soil loose and friable. Seedbed loosening may be unnecessary on newly disturbed areas.

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.
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.
3. Topsoiling is limited to areas having 2:1 or flatter slopes where:
 - a. The texture of the exposed subsoil/parent material is not adequate to produce vegetative growth.
 - b. The soil material is so shallow that the rooting zone is not deep enough to support plants or furnish continuing supplies of moisture and plant nutrients.
 - c. The original soil to be vegetated contains material toxic to plant growth.
 - d. The soil is so acidic that treatment with limestone is not feasible.
4. Areas having slopes steeper than 2:1 require special consideration and design.
5. Topsoil Specifications: Soil to be used as topsoil must meet the following criteria:
 - 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 1 1/2 inches in diameter.
 - 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.
 - 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.
6. Topsoil Application
 - a. Erosion and sediment control practices must be maintained when applying topsoil.
 - 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.
 - 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.

B.13

Temporary Seeding Summary

Hardiness Zone (from Figure B.3): 7a						Fertilizer Rate (10-20-20)	
Seed Mixture (from Table B.1):						Lime Rate	
No.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths (inches)			
2	Annual Rye (<i>Lolium perenne</i> spp. <i>multiflorum</i>)	40	02/15 - 04/30, 08/15 - 11/30	0.5	436 lb/ac (10 lb/1000 sf)	2 tons/ac (90 lb/1000 sf)	
	Foxtail Millet (<i>Setaria italica</i>)	30	05/1 - 08/14	0.5	436 lb/ac (10 lb/1000 sf)	2 tons/ac (90 lb/1000 sf)	

Permanent Seeding Summary Mix

Hardiness Zone (from Figure B.3): 7a						Fertilizer Rate 10-20-20			Lime Rate
Seed Mixture (from Table B.3): 8, 4						N	P2O5	K2O	
No.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths					
4	Deertongue (<i>Dichanthelium dandestinum</i>)	15	02/15 - 04/30, 05/01 - 05/31	25 - 5 in	45 lb/ac (1 lb/1000 sf)	90 lb/ac (2 lb/1000 sf)	90 lb/ac (2 lb/1000 sf)	2 tons per acre	
	Creeping Red Fescue (<i>Festuca rubra</i> var. <i>rubra</i>)	20	02/15 - 04/30, 05/01 - 05/31	25 - 5 in	45 lb/ac (1 lb/1000 sf)	90 lb/ac (2 lb/1000 sf)	90 lb/ac (2 lb/1000 sf)	2 tons per acre	
	Virginia Wild Rye (<i>Elymus virginicus</i>)	5	02/15 - 04/30, 05/01 - 05/31	25 - 5 in	45 lb/ac (1 lb/1000 sf)	90 lb/ac (2 lb/1000 sf)	90 lb/ac (2 lb/1000 sf)	2 tons per acre	
	Foxtail Millet (<i>Setaria italica</i>)	5	02/15 - 04/30, 05/01 - 05/31	0.5 in	45 lb/ac (1 lb/1000 sf)	90 lb/ac (2 lb/1000 sf)	90 lb/ac (2 lb/1000 sf)	2 tons per acre	



S/C PLAN #: 59840 GRADING PERMIT #: GRA 16333-2018

ANNIE'S PLAYGROUND STREAM RESTORATION

E&S NOTES AND DETAILS

864 SMITH LANE, FALLSTON, MARYLAND, 21047

REVISIONS			
No.	DATE	DESCRIPTION	REV. BY

CHECKED BY: CRH
 DESIGNED: JES
 DRAWN: JES
 PROJECT No.: 17-15-028
 DATE: 11/1/2018
 SHEET: 12 of 12
 S/C SHEET 9 OF 9



C. Soil Amendments (Fertilizer and Lime Specifications)

1. Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas of 5 acres or more. Soil analysis may be performed by a recognized private or commercial laboratory. Soil samples taken for engineering purposes may also be used for chemical analyses.
2. Fertilizers must be uniform in composition, free flowing and suitable for accurate application by appropriate equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers must all be delivered to the site fully labeled according to the applicable laws and must bear the name, trade name or trademark and warranty of the producer.
3. Lime materials must be ground limestone (hydrated or burnt lime may be substituted except when hydroseeding) which contains at least 50 percent total oxides (calcium oxide plus magnesium oxide). Limestone must be ground to such fineness that at least 50 percent will pass through a #100 mesh sieve and 98 to 100 percent will pass through a #20 mesh sieve.
4. Lime and fertilizer are to be evenly distributed and incorporated into the top 3 to 5 inches of soil by disking or other suitable means.
5. Where the subsoil is either highly acidic or composed of heavy clays, spread ground limestone at the rate of 4 to 8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of topsoil.

B-4-3 STANDARDS AND SPECIFICATIONS

**FOR
SEEDING AND MULCHING**

Definition

The application of seed and mulch to establish vegetative cover.

Purpose

To protect disturbed soils from erosion during and at the end of construction.

Conditions Where Practice Applies

To the surface of all perimeter controls, slopes, and any disturbed area not under active grading.

Criteria

A. Seeding

1. Specifications

- 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.
- 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.
- 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.
- 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.

2. Application

- a. Dry Seeding: This includes use of conventional drop or broadcast spreaders.
 - 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.
 - 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.

B. Drill or Cultipacker Seeding: Mechanized seeders that apply and cover seed with soil.

- i. Cultipacker seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of soil covering. Seedbed must be firm after planting.
 - ii. Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction.
- c. Hydroseeding: Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer).**
- 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; P2O5 (phosphorus), 200 pounds per acre; K2O (potassium), 200 pounds per acre.
 - 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.
 - iii. Mix seed and fertilizer on site and seed immediately and without interruption.
 - iv. When hydroseeding do not incorporate seed into the soil.

2. Application

- a. Apply mulch to all seeded areas immediately after seeding.
 - 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.
 - 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.
- 3. Anchoring**
- 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:
 - 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.
 - 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.
 - iii. Synthetic binders such as Acrylic DLR (Agro-Tack), DCA-70, Petroset, 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.
 - 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.

B. Mulching

1. Mulch Materials (in order of preference)

- 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.**
- b. Wood Cellulose Fiber Mulch (WCFM) consisting of specially prepared wood cellulose processed into a uniform fibrous physical state.
 - i. WCFM 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.
 - ii. WCFM, including dye, must contain no germination or growth inhibiting factors.
 - iii. WCFM 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.
 - iv. WCFM material must not contain elements or compounds at concentration levels that will be phyto-toxic.
 - v. WCFM 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.

B.14

B.15

B.16

B.17