

NOTE: DETAILS FOR LIVE STAKING AND FIBER MATTING ARE SHOWN ON SHEET LD1 (13 OF 13).

RIFLE GRADE CONTROL CONSTRUCTION

DESCRIPTION. This work shall consist of installing riffle grade controls, which are stone structures designed to improve habitat, provide fish passage, and provide grade control, as specified in the Contract Documents or as directed by the Engineer.

MATERIALS.

Granular Filter Material	As specified below
Rifle Grade Control Material	As specified below
Existing Channel Bed Material	As specified below

The Engineer reserves the right to reject any material brought on site if the material does not meet the gradation requirements as specified in the Contract Documents. The Engineer also reserves the right to require on-site reworking of the materials to eliminate stockpile segregation.

Granular Filter Material. The granular filter material shall consist of stone ranging in size as specified below. This material shall be free of roots and debris.

% less than	U.S. Standard sieve size
100	2.5 in
85-100	1 in
60-100	0.5 in
35-70	No. 10
20-50	No. 40
3-20	No. 200

This material can be created through a composition of the following commonly available quarry products:

- 50% Fine Aggregate Sand (MSHA Standard)
- 25% AASHTO M43-8
- 25% AASHTO M43-5

#57 Stone cannot be used as a substitute.

Rifle Grade Control Material. The material for the riffle grade control structures shall consist of natural stone ranging in size as specified below. Existing channel material meeting the defined criteria must be salvaged from the channel to be relocated and utilized within the proposed riffle grade control structures. Channel bed material shall be approved by the Engineer prior to use. The channel bed layer material for the riffle grade control structures shall consist of material that conforms to the specifications presented in the following table:

% less than	Size (inches)
95	18
84	16
50	12
30	4
16	2

The Contractor shall provide a sample of the channel bed material to the Engineer for review and approval two weeks prior to its intended use. Only approved material shall be placed at the site. This material can be created through a composition of the following commonly available quarry products:

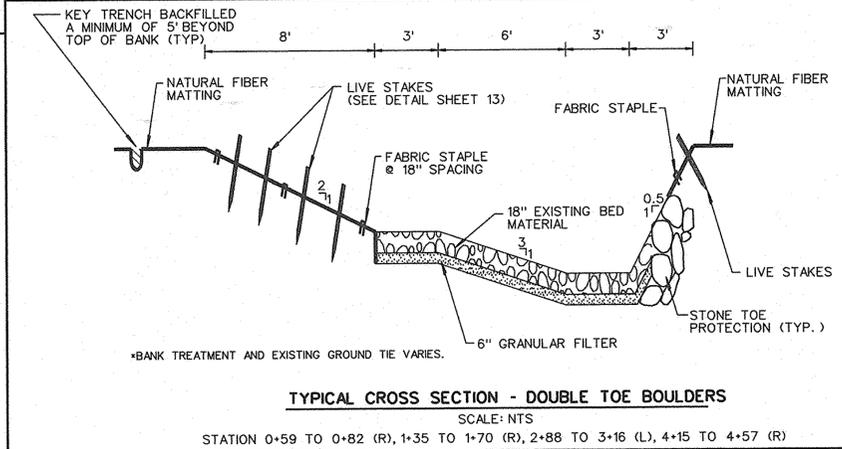
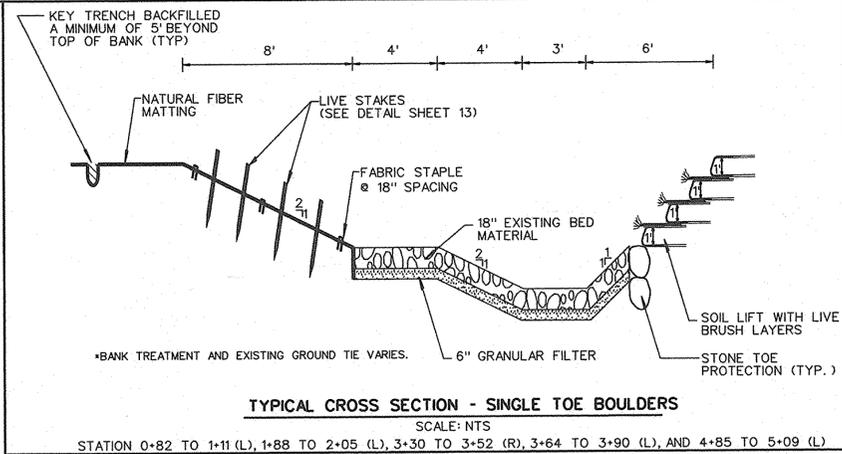
- 25% MSHA Class 0 riprap
- 50% MSHA Class 1 riprap
- 25% MSHA Class 2 riprap

Existing Channel Bed Material. The material washed into the riffle grade control material shall consist of stone salvaged from the existing channel that is to be filled. The material can be found within the limits of the active channel, which is defined as the portion of the channel located between the bottom of bank breaklines in the existing channel. The salvaged stone shall range in size as specified below. Existing channel material meeting the defined criteria must be salvaged from the channel to be relocated and utilized within the proposed riffle grade control structure. Material furnished from off-site sources will not be permitted unless otherwise approved by the Engineer. Existing Channel Bed Material shall be approved by the Engineer prior to use and shall be free from roots, debris, rubble, silt, clay, and other organic material. Unsuitable material shall be removed to the extent directed by the Engineer.

% finer than	Size (in.)
95	8.0 - 10.5
84	6.0 - 8.0
50	2.5 - 6.0
35	1.5 - 2.5
16	0.5 - 1.5

CONSTRUCTION.

Working downstream to upstream, excavate a section (from opposite bank to streamflow diversion) of the existing stream channel and associated banks to obtain the necessary sub-grade. Allow room for placement of the granular filter material, the channel bed material, and any associated bank treatments. Limit the total length of work to that which can be completed and stabilized in a single work day or dry weather period. Excavation for the installation of the riffle grade control shall conform to the dimensions, grades, and details specified in the Contract Documents.



STONE TOE PROTECTION

DESCRIPTION. This work shall consist of protecting the channel toe with a covering of placed granular filter and stone as specified in the Contract Documents.

MATERIALS.

Granular Filter for Stone Toe Protection. The granular filter shall be a minimum of 6 inches thick and shall be placed prior to the stone toe protection. The Contractor shall place the material along the slope of the channel bank as illustrated on the Contract Documents and shall be compacted in a manner acceptable to the Engineer. Granular filter shall be placed and distributed so the resulting layer will contain minimal voids, and no pockets of same size material. Granular filter shall be placed to its full course thickness in one operation in a manner that the underlying material will not be displaced or worked into the course of material being placed. Granular filter for the Stone Toe Protection shall consist of material displaying the following grading criteria:

% less than	U.S. Standard sieve size
100	2.5 in
85-100	1 in
60-100	0.5 in
35-70	No. 10
20-50	No. 40
3-20	No. 200

This material shall be free of roots and debris. This material can be created through a composition of the following commonly available quarry products:

50% Fine Aggregate Sand (MSHA Standard)
25% AASHTO M43-8
25% AASHTO M43-5

#57 Stone cannot be used as a substitute.

Stone. The stone shall be naturally colored (white stone will not be approved) and shall be approved prior to installation by the Engineer and the Administration. The stone shall have an intermediate diameter that ranges from 24 to 30 inches.

CONSTRUCTION.

Excavation. Excavation for stone for Stone Toe Protection along the streambank in bank treatment areas shall conform to the lines and grades specified on the Contract Documents. The subgrade shall be smooth and firm, free from protruding objects that would damage the geotextile or soil stabilization matting, and constructed in a manner acceptable to the Engineer. The limits of streambank Stone Toe Protection shall transition smoothly and evenly between cross-sections, as indicated on the plans.

Stone Placement for Bank Treatment Areas. The ground surface upon which the slope and toe protection is to be placed shall be free of brush, trees, and stumps and shall be acceptable to the Engineer.

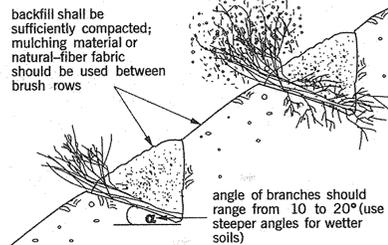
The placement of stone for toe protection shall begin 24 inches below the proposed surface of the final grades depicted on the cross-sections. The stone shall be placed with suitable equipment to produce a uniformly graded mass of stones with an even surface.

The surface elevation of completed stone installations shall be flush with adjacent channel bed or bank slope elevations and shall not create an obstacle to flow. The cross-sections in the Contract Drawings represent the desired channel shape after rock has been installed. The outer stone surfaces shall be even and present a generally neat appearance. The plus or minus tolerance of the surface of the finished stone installation shall be 6 inches at any one point with median surface within 3 inches from the lines and grades shown on the Contract Documents when measured perpendicular to the exterior surface of the stonework.

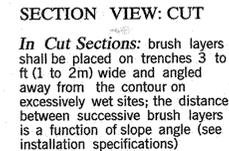
Placed material not conforming to the specified limits shall be removed and replaced as directed by the Engineer.

The stone shall be placed and distributed so the resulting layer will contain a minimum of voids and there will be no pockets of undersized material. The soil stabilization matting shall be placed and pinned within the excavated area for toe and slope protection prior to installation of stone.

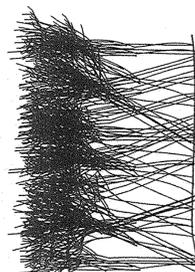
DETAIL 2.7(a): BRUSH LAYERING



SECTION VIEW: CUT



PLAN VIEW: CUT & FILL



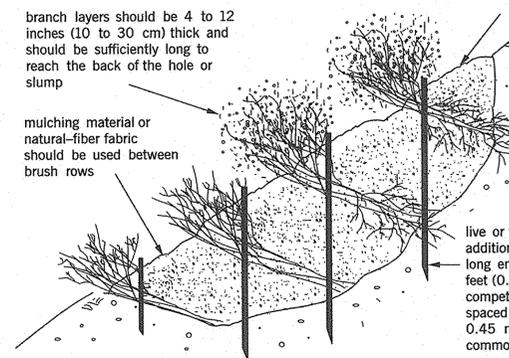
Construction Notes: installation should occur during periods of low flow and should proceed up the slope; a stable rock toe should be constructed below the normal baseflow level (see riprap guidelines)

Adapted From Gray & Sotir (1996)

DETAIL 2.7(b): BRUSH LAYERING

Adapted From Gray & Sotir (1996)

SECTION VIEW



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. 31201 EXPIRATION DATE: JANUARY 24, 2009

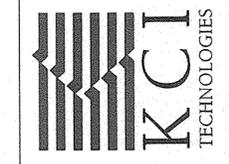
APPROVED: HOWARD COUNTY DEPT. OF PLANNING AND ZONING

Chief, Development Engineering Division
Chief, Division of Land Development
Director

3/2/08
4/15/08
4/17/08

NO.	REVISIONS DESCRIPTION	DATE

10 NORTH PARK DRIVE
HUNT VALLEY, MD 21030
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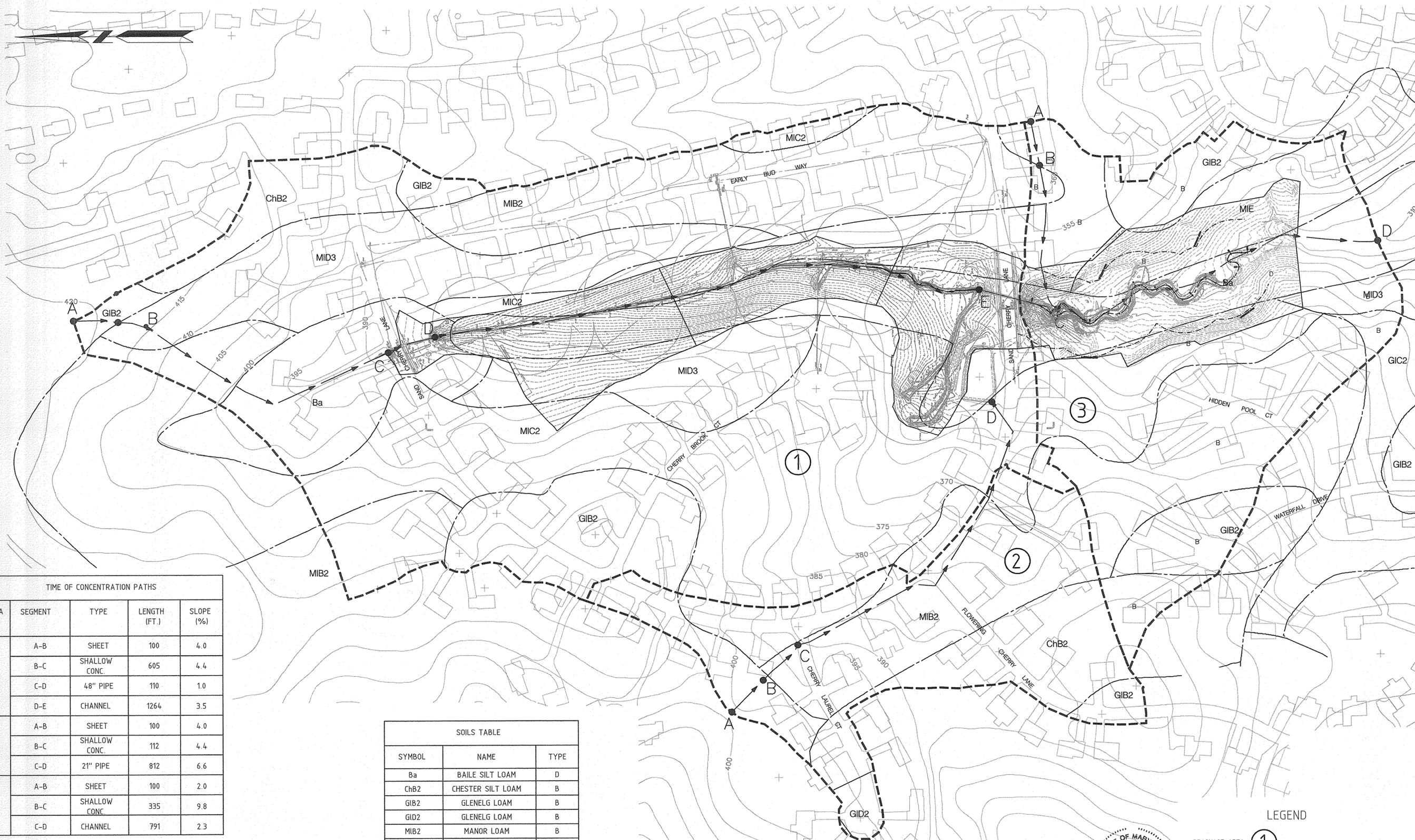


CHERRYTREE FARM SECTION 1, LOT 80, CHERRY CREEK LOT AREA 1, LOT 80, CHERRY CREEK OVERLOOK 45, SECTION 1, AREA 2, LOT 13
STREAM RESTORATION PUBLIC WORKS
STORMWATER MANAGEMENT DIVISION
9 COLUMBIA MARYLAND 2046
(410) 313-6417
PLAT 1998-0039-019-0471-05 PARCEL DISTRICT.

STREAM RESTORATION DETAILS

SCALE:	AS NOTED
DATE:	NOVEMBER 2007
KCIJOB NO.:	01-043223.09
CAPITAL PROJECT NO.:	SWMEDB1
PERMIT ISSUE:	
CONSTRUCTION ISSUE:	

DE1
SHEET NO. 7 OF 13



TIME OF CONCENTRATION PATHS				
AREA	SEGMENT	TYPE	LENGTH (FT.)	SLOPE (%)
1	A-B	SHEET	100	4.0
	B-C	SHALLOW CONC.	605	4.4
	C-D	48" PIPE	110	1.0
	D-E	CHANNEL	1264	3.5
2	A-B	SHEET	100	4.0
	B-C	SHALLOW CONC.	112	4.4
	C-D	21" PIPE	812	6.6
3	A-B	SHEET	100	2.0
	B-C	SHALLOW CONC.	335	9.8
	C-D	CHANNEL	791	2.3

SOILS TABLE		
SYMBOL	NAME	TYPE
Ba	BAILE SILT LOAM	D
ChB2	CHESTER SILT LOAM	B
GIB2	GLENELG LOAM	B
GID2	GLENELG LOAM	B
MIB2	MANOR LOAM	B
MIC2	MANOR LOAM	B
MID3	MANOR LOAM	B
MIE	MANOR LOAM	B

SUBAREA	AREA	RCN	Tc	% IMP.
1	39.70 AC	73	0.22 HRS	24.8%
2	8.50 AC	70	0.15 HRS	34.8%
3	14.58 AC	73	0.25 HRS	7.1%

- LEGEND
- DRAINAGE AREA ①
 - DRAINAGE AREA BOUNDARY - - - - -
 - T.C. PATH A → → → B
 - EXISTING MAJOR CONTOUR (GIS) ——— 380
 - SOIL BOUNDARY ———
 - SOIL TYPE MIC2
 - EXISTING MAJOR CONTOUR (SURVEY) ———
 - EXISTING MINOR CONTOUR (SURVEY) - - - - -

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. 31201 EXPIRATION DATE: JANUARY 24, 2009

2/5/08

APPROVED: HOWARD COUNTY DEPT. OF PLANNING AND ZONING

[Signature] 3/2/08
 CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

[Signature] 4/15/08
 CHIEF, DIVISION OF LAND DEVELOPMENT DATE

[Signature] 4/15/08
 DIRECTOR DATE

THIS DEVELOPMENT IS APPROVED FOR SOIL EROSION AND SEDIMENT CONTROL BY THE HOWARD SOIL CONSERVATION DISTRICT.

[Signature]
 HOWARD SCD DATE

NO. REVISIONS DESCRIPTION DATE

10 NORTH PARK DRIVE
 HUNT VALLEY, MD 21030
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 WWW.KCI.COM

KCI
 TECHNOLOGIES

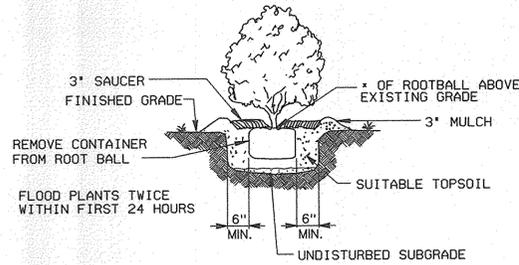
CHERRYTREE FARM SECTION 1, LOT 1, LOT 80, CHERRY CREEK LOOK AREA & CHERRY CREEK OVERLOOK SECTION 1, AREA 2, LOT 13

STREAM RESTORATION DIVISION
 HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS
 STORMWATER MANAGEMENT DIVISION
 67 COLUMBIA WAPLELAND 21046
 (410) 316-6417
 PLAT 8929/8930/8931/8932/8933/8934/8935/8936/8937/8938/8939/8940/8941/8942/8943/8944/8945/8946/8947/8948/8949/8950

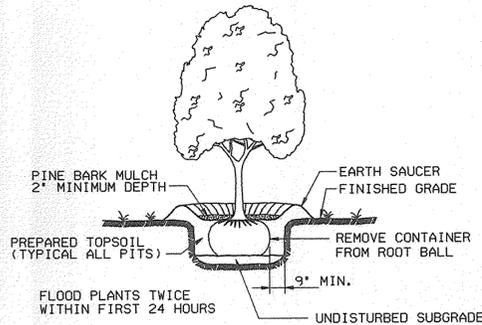
EROSION & SEDIMENT CONTROL DRAINAGE AREA MAP

SCALE: 1" = 100'
 DATE: NOVEMBER 2007
 KCI JOB NO.: 01-043223.09
 CAPITAL PROJECT NO.: SWMEDB*1
 PERMIT ISSUE:
 CONSTRUCTION ISSUE:

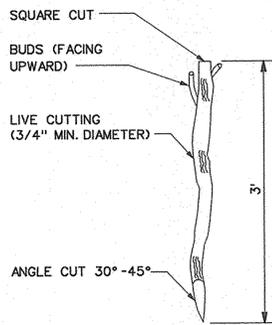
ES1
 SHEET NO.: 8 OF 13
 SDP-08-020



SHRUB PLANTING DETAIL
NOT TO SCALE



TREE PLANTING DETAIL
NOT TO SCALE



LIVE STAKE DETAIL

APPROVED: HOWARD COUNTY DEPT. OF PLANNING AND ZONING

William D. ... 3/27/08
CHIEF, DEVELOPMENT ENGINEERING DIVISION DATE

Cindy ... 4/15/08
CHIEF, DIVISION OF LAND DEVELOPMENT DATE

Derek ... 4/17/08
DIRECTOR DATE

SOIL STABILIZATION MATTING

DESCRIPTION. This work shall consist of furnishing, placing and securing soil stabilization matting along bank treatment areas and other areas of the site, as specified in the Contract Documents or as directed by the Engineer.

MATERIALS.

Soil Stabilization Matting. Soil stabilization matting for the bank treatment areas shall consist of a machine produced mat of degradable natural fibers and shall meet the following *minimum* specifications:

- Material: Woven coir fiber yarn or twine
- Thickness: .25 in.
- Elongation (Dry/Wet): 29%/35%
- Weight: 20 oz/SY
- Open Area: 50%
- Size: 6 ft. wide X 150 ft in length (100 SY per roll)
- Flow Velocity: 8 ft./sec.
- Life Expectancy: 3 years

CONSTRUCTION.

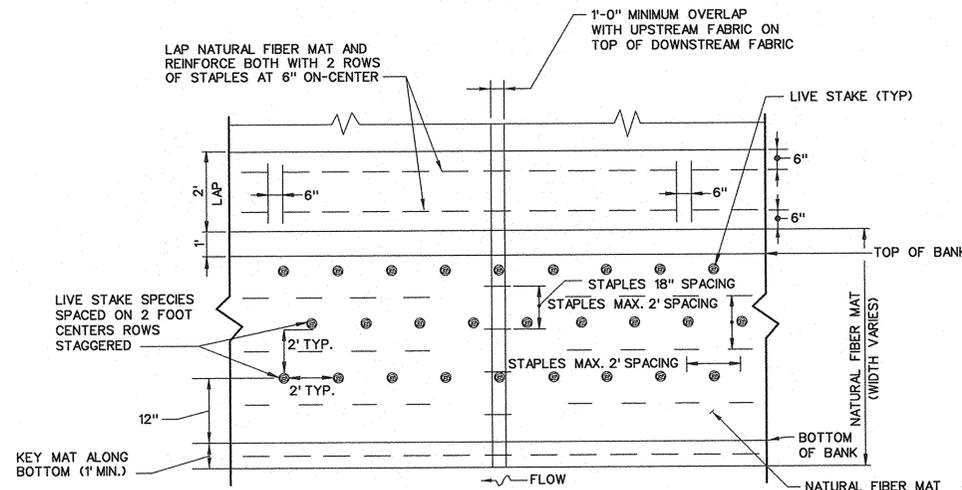
Placing. The matting shall be placed within 48 hours after seeding operations have been completed. Matting shall be laid smoothly and firmly upon the seeded surface in the direction of water flow. Stretching shall be avoided.

Where more than one width of matting is required and in areas where matting join, as depicted on the cross-sections, the ends of each strip shall overlap at least 12 inches for vertical and 24 inches for horizontal overlaps. Overlapping shall be done with both the upslope and upstream ends of the matting overlapping the downslope and downstream ends. Soil stabilization matting shall be installed as depicted on the typical details to the limits shown on the cross-sections. Soil stabilization matting shall extend beyond the top of the slope a minimum of five feet.

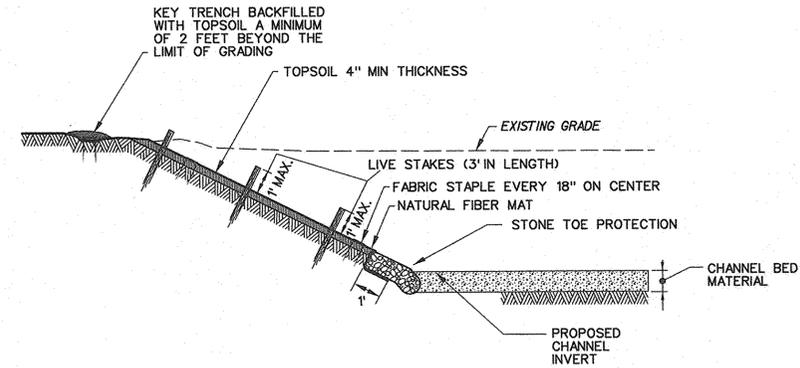
Keying-In. The Contractor shall excavate a shallow trench at the top of the slope and key-in the top edge of the soil stabilization matting a minimum of 6-inches. Vertical ends of the matting at both the upstream and downstream ends of the bank treatment areas shall also be keyed-in to a trench excavated into the slope a minimum of 6-inches. Following installation of staples, the trenches shall be backfilled with topsoil and tamped firmly.

The bottom edge of the soil stabilization matting shall extend to the full depth of toe protection and shall be stapled in-place, prior to installation of Toe Protection measures.

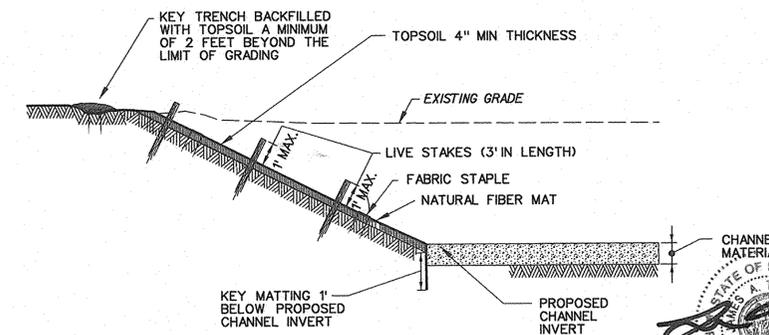
Securing Matting with Staples. Matting shall be securely fastened in place with staples driven vertically into the soil and flush with the surface. Staples shall be placed 12-inches apart along the edges and on 18-inch centers in alternating rows throughout. On all overlapping edges, staples shall be placed 18-inches apart. At all ends of the matting, staples shall be placed 6-inches apart. At upstream and downstream ends of the matting, staples shall be placed 6-inches apart within the key trench.



TYPICAL PLAN VIEW NATURAL FIBER MAT WITH LIVE STAKES
NOT TO SCALE



NATURAL FIBER MAT (W/ STONE TOE PROTECTION)
NOT TO SCALE



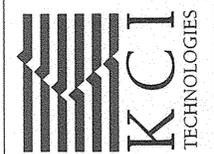
NATURAL FIBER MAT (W/OUT STONE TOE PROTECTION)
NOT TO SCALE

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		MASTER PLANTING SCHEDULE			
PLANTING ZONE	QUANTITY	COMMON NAME	SCIENTIFIC NAME	SIZE	SPACING
LIVE STAKES / STREAM BANK SEED MIX & NATURAL FIBER MAT 5,353 S.F. / 0.12 AC.	STAKES				
	335	SILKY DOGWOOD	Cornus amomum	36" Live Stake	2' O.C.
	335	GRAY TWIG DOGWOOD	Cornus racemosa	36" Live Stake	2' O.C.
	335	SHINING WILLOW	Salix lucida	36" Live Stake	2' O.C.
	334	BLACK WILLOW	Salix nigra	36" Live Stake	2' O.C.
	SEED - (44 LBS/AC - 4.4 LBS TOTAL)				
	65Z	ANNUAL RYE	Lolium multiflorum	SEED	Seed Entire Area
	13Z	VIRGINIA WILD RYE	Elymus virginicus	SEED	Seed Entire Area
	15Z	EASTERN GAMMAGRASS	Tripsacum dactyloides	SEED	Seed Entire Area
	7Z	LURID SEDGE	Carex lurida	SEED	Seed Entire Area
TREES / SHRUBS / FLOODPLAIN WILDLIFE SEED MIX 13,994 S.F. / 0.32 AC.	TREES				
	28	RED BUD	Ceris canadensis	CONT. 5 GAL	10' O.C.
	28	TULIP POPLAR	Liriodendron tulipifera	CONT. 5 GAL	10' O.C.
	28	SYCAMORE	Plantanus occidentalis	CONT. 5 GAL	10' O.C.
	27	AMERICAN HOLLY	Ilex opaca	CONT. 5 GAL	10' O.C.
	SHRUBS				
	28	RIVER BIRCH	Betula nigra	CONT. 2-3' HT.	10' O.C.
	28	ARROWWOOD VIBURNUM	Viburnum dentatum	CONT. 2-3' HT.	10' O.C.
	27	WITCH HAZEL	Hamamelis virginiana	CONT. 2-3' HT.	10' O.C.
	FLOODPLAIN WILDLIFE SEED MIX 13,994 S.F. / 0.32 AC.	SEED - (15 LBS/AC - 6.6 LBS TOTAL)			
15Z		BIG BLUESTEM	Andropogon gerardii	SEED	-
9Z		VIRGINIA WILD RYE	Elymus virginicus	SEED	-
8Z		CANADA WILD RYE	Elymus canadensis	SEED	-
8Z		SILKY WILD RYE	Elymus villosus	SEED	-
8Z		CUPPLANT	Silphium perfoliatum	SEED	-
8Z		DEER TONGUE	Dichouhelium clandestinum	SEED	-
5Z		COMMON MILKWEED	Asclepias syriaca	SEED	-
5Z		FLAT-TOP ASTER	Aster umbellatus	SEED	-
5Z		BEARD TONGUE	Penstemon digitalis	SEED	-
4Z		WINGSTEM	Verbesina alternifolia	SEED	-
3Z		NODDING BUR-MARIGOLD	Bidens cernua	SEED	-
3Z		SPOTTED JOE PYE WEED	Eupatorium maculatum	SEED	-
3Z		BLACK-EYED SUSAN	Rudbeckia hirta	SEED	-
2Z		SWAMP MILKWEED	Asclepias incarnata	SEED	-
2Z		SWITCHGRASS	Panicum virgatum	SEED	-
2Z		NODDING BEGGARS TICK	Bidens cenera	SEED	-
2Z		MARYLAND SENNA	Senna marilandica	SEED	-
2Z		NEW YORK IRONWEED	Veronia noveboracensis	SEED	-
1Z		NEW ENGLAND ASTER	Aster novae-angliae	SEED	-
1Z	SHOWY TICK-TREFOIL	Desmodium canadensis	SEED	-	
1Z	WRINKLE-LEAF GOLDENROD	Solidago rugosa	SEED	-	
1Z	GOLDEN ALEXANDERS	Zizia aurea	SEED	-	
SEED	Annual Rye - Lolium multiflorum	(10 LBS/AC - 4.4 LBS TOTAL)	SEED	Seed Entire Area	

NO.	REVISIONS DESCRIPTION	DATE

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CHERRYTREE FARM SECTION 1,
AREA 1, LOT 80, CHERRY CREEK LOT
45, & CHERRY CREEK OVERLOOK
SECTION 1, AREA 2, LOT 13
STREAM RESTORATION
HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS
STORMWATER MANAGEMENT DIVISION
9700 COLUMBIA GATEWAY DRIVE
COLUMBIA, MARYLAND 21046
(410) 313-4417
PLAT # 0929/0055/00, SHEET 16 OF 18 (SECTION 13)

LANDSCAPE DETAILS

SCALE: AS SHOWN
DATE: NOVEMBER 2007
KCI JOB NO.: 01-043223.09
CAPITAL PROJECT NO.: SWMEDB*1
PERMIT ISSUE:
CONSTRUCTION ISSUE:

LD1
SHEET NO.: 13 OF 13