

HOWARD COUNTY

DEPARTMENT OF PUBLIC WORKS

ELLCOTT CITY, MARYLAND 21043

POINT	NORTHING	EASTING	ELEV.	DESCRIPTION
100	554698.1524	1389109.5643	72.93	REBAR & CAP
101	554375.0888	1389127.6581	88.72	MAG NAIL
102	554565.6764	1388896.4914	54.56	REBAR & CAP
103	554573.3548	1388679.6323	54.04	REBAR & CAP
104	554641.2696	1388489.6959	56.03	REBAR & CAP
105	554691.3044	1388304.0859	61.97	REBAR & CAP
106	554604.4207	1388083.0542	66.97	REBAR & CAP
107	554546.8687	1387860.5866	66.35	REBAR & CAP
108	554493.6287	1387658.6814	67.16	REBAR & CAP
109	554436.7011	1387494.4671	66.18	REBAR & CAP
110	554343.5730	1387392.7225	66.64	REBAR & CAP
200	554427.3393	1387279.1086	80.81	OPUS-RS H&T
201	554313.5633	1387011.5304	81.63	OPUS-RS H&T
203	554720.2155	1388556.7484	57.22	REBAR & CAP
204	554854.4447	1388575.4453	59.49	REBAR & CAP
205	554871.7045	1388405.7881	54.96	REBAR & CAP
206	554783.3500	1388287.5916	60.40	REBAR & CAP
209	554736.5407	1388133.3874	56.39	REBAR & CAP

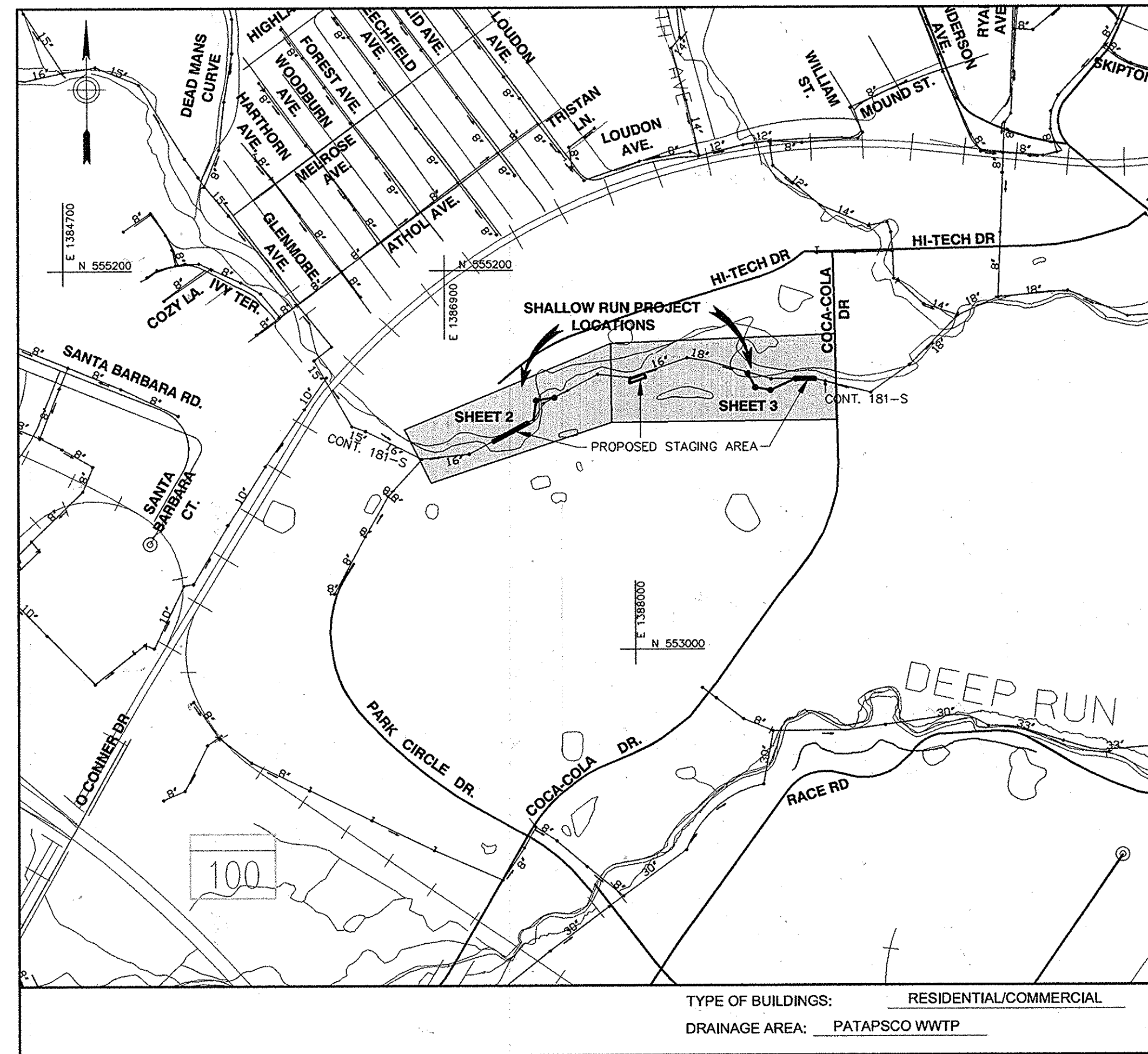
SURVEY CONTROL

B.M. #1
HOWARD CO. CONTROL PT. 38GA
CONCRETE MONUMENT
NAD 83 (Adj 1991): N 556,897.3157 E
1,390,132.1323
NAVD 88: EL. 24.6366

B.M. #2
HOWARD CO. CONTROL PT. 38DA
CONCRETE MONUMENT
NAD 83 (Adj 1991): N 556,796.2929 E
1,390,221.4861
NAVD 88: EL. 38.4419

ITEM	NORTHING	EASTING	NORTHING	EASTING
MANHOLE #2589A (HO. CO. STD. G-5.12)	554,461.32	1,387,535.00	554,461.08	1,387,536.46
MANHOLE #2590 (HO. CO. STD. G-5.12)	554,445.85	1,387,428.07	554,447.54	1,387,428.12
MANHOLE #2586C (HO. CO. STD. G-5.12)	554,600.12	1,388,649.84	554,602.31	1,388,649.96
MANHOLE #2586B (HO. CO. STD. G-5.12)	554,516.88	1,388,694.37	554,515.48	1,388,694.80
MANHOLE #2586A (HO. CO. STD. G-5.12)	554,501.15	1,388,701.35	554,500.19	1,388,702.43
MANHOLE #2586 (HO. CO. STD. G-5.12)	554,567.18	1,388,927.68	554,567.63	1,388,925.45
MANHOLE #1A	554,340.54	1,387,401.99	554,340.54	1,387,401.99
MANHOLE #2590A	554,340.51	1,387,420.25	554,340.51	1,387,420.25

ITEM	UNIT	ESTIMATE	AS-BUILT	SUPPLIER
20" DIP SEWER MAIN	L.F.	104	110'	US PIPE
21" PVC SEWER MAIN	L.F.	440	461'	NATIONAL PIPE & PLASTICS
STD. PRECAST MANHOLE WT (HO. CO. STD. G-5.12) 5'-0" DIA.	EA.	3	8	CP & P
STD. PRECAST DOGHOUSE WT MANHOLE (HO. CO. STD. G-5.14) 5'-0" DIA.	EA.	3	2	CP & P
ADDITIONAL MANHOLE DEPTH	V.F.	31	39.5	
8" PVC SEWER	L.F.	—	14'	NATIONAL PIPE & PLASTICS



VICINITY MAP
SCALE: 1" = 600'

SHALLOW RUN SEWER RELOCATION & STREAM RESTORATIONS

CAPITAL PROJECT S-6268
CONTRACT NO. 10-4830

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
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5	SEDIMENT AND EROSION CONTROL SPECIFICATIONS
6	SEDIMENT AND EROSION CONTROL DETAILS AND NOTES
7	SEDIMENT AND EROSION CONTROL DETAILS
8	MISCELLANEOUS DETAILS
9	STREAM RESTORATION SEDIMENT AND EROSION CONTROL DETAILS & SPECIFICATIONS

LEGEND

- ▲— TRAVERSE
- PROPERTY LINE
- ☀ DECIDUOUS TREE
- ☀ EVERGREEN TREE
- EX. CONTOUR
- ☉ EX. SAN. MANHOLE
- EX. SAN. SEWER MAIN
- PROP. SAN. MANHOLE
- PROP. SAN. SEWER MAIN
- PROP. CLAY DAM
- TREELINE
- TREE PROTECTION
- SUPER SILT FENCE
- SILT FENCE
- RIPRAP
- LIMITS OF DISTURBANCE
- PROPOSED ACCESS EASEMENT
- 100 YEAR FLOODPLAIN
- 25 FT WETLAND BUFFER
- NON-TIDAL WETLAND LIMITS
- WATERS OF THE STATE

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. 10966
EXPIRATION DATE: MAY 12, 2014
Thomas N. Dalletto 4/8/2014
Signature of Engineer Date

- ### GENERAL NOTES
- Approximate locations of existing sanitary sewer are shown. The Contractor shall take all necessary precautions to protect existing mains and services and maintain uninterrupted service. Any damage incurred shall be repaired immediately to the satisfaction of the Engineer by the Contractor at the Contractor's expense.
 - Topographic field surveys were performed in October 2008 for Shallow Run & redone in 2011 by Dewberry Consultants LLC.
 - Horizontal and Vertical Survey Controls: The coordinates shown on the drawings are based on Maryland State Reference System NAD 83/91 and NAVD 88 as projected by Howard County Geodetic Control Stations Howard Co. B.M. 371M3 and B.M. 38GM1.
 - All pipe elevations shown are invert elevations unless otherwise noted on the plans.
 - Clear all utilities by a minimum of 12".
 - For details not shown on the drawings or described in the contract documents, and for materials and construction methods, use Howard County Design Manual, Volume IV, Standard Specifications and Details for Construction (Latest Edition), The Contractor shall have a copy of Volume IV on the job.
 - All existing utilities shall be test pitted/located as necessary and in advance of the proposed construction, in order to properly make all required utility crossings and/or connections. Any discrepancies or utility conflicts shall be immediately reported to the Engineer. Where test pits have been made on existing utilities, they are noted by the symbol ☒ at the location of the test pit. A note or notes containing the results of the test pit or pits is included on the drawings or specifications. Existing utilities in the vicinity of the proposed work for which test pits have not been dug shall be located by the Contractor two (2) weeks in advance of construction operations at his own expense.
 - Contractor shall notify the following utility companies or agencies at least five (5) working days before starting work shown on these plans:
 - AT&T 1-800-252-1133
 - BGE - Contractor Services 410-637-8713
 - BGE - Emergency 800-685-0123
 - Bureau of Highways 410-313-7450
 - Bureau of Utilities (DPW) 410-313-4900
 - Colonial Pipeline Co. 410-795-1390
 - Miss Utility 1-800-257-7777
 - State Highway Administration 410-531-5533
 - Verizon 1-800-743-0033 / 410-224-9210
 - Trees and shrubs are to be protected from damage to the maximum extent. Trees and shrubs located within the construction strip noted by the symbol ☉ are to be protected in accordance with Howard County Volume IV Design Manual Standard Detail L-9.02.
 - Contractor shall remove trees, stumps and roots along the line of excavation. Payment for such removal shall be included in the unit price bid for construction of the sanitary sewer.
 - The approval of these drawings will constitute compliance with DPW requirements per Section 18.114(a) of the Howard County Code.
 - The Contractor shall provide all necessary lines, grades and elevations. Cut sheets shall be prepared based on the lines and grades shown on the Contract drawings.
 - Backfill all low spots over existing sewer to provide positive drainage as noted on the drawing. Approximate locations are shown. Contractor is to confirm all low spots and use approved backfill.
 - Remove all existing concrete bank protection to an approved location off-site.

SEWER MAIN NOTES

- Sewer main sizes and types are indicated on the drawings and Quantities Table.
- Distances shown for the sewer main are along the centerline of the pipe from manhole to manhole.
- All manholes shall be 4'-0" inside diameter unless otherwise noted.
- Manholes designated as W.T. in Plan and Profile shall have water tight frames and covers, Standard Detail G-5.52. Where water tight frame and cover is used, set top of frame 1'-6" above existing ground unless otherwise noted on drawings.

SEWER BY-PASS NOTES FOR EXISTING MANHOLES 2591

- Contractor to submit the following prior to execution:
 - a. Submit method for maintaining sewage flows to include:
 - 1) Intake manhole.
 - 2) Receiving manhole.
 - 3) Expected flows. (Contractor to field verify)
 - a) Design Q MH 2591 = 2.83 M.G.D.
 - 4) Pump size.
 - 5) Pipe layout.
 - 6) Backup equipment.
- Maintain existing sewage flows during connection to existing sewer.
- Take precautions and employ methods required to prevent sewage backup.
- Return diverted sewage to sanitary system and do not discharge on surfaces or into streams or storm drains.
- Use enclosed bypass flumes equivalent in size to existing sewer being diverted, when required.
- Immediately clean and disinfect raw sewage spills and overflows, and notify Howard County Bureau of Utilities at 410-313-4900.

EP14-020

I/WE CERTIFY THAT ALL DEVELOPMENT AND CONSTRUCTION WILL BE DONE ACCORDING TO THIS PLAN, AND THAT ANY RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I ALSO AUTHORIZE PERIODIC ON-SITE INSPECTIONS BY THE HOWARD SOIL CONSERVATION DISTRICT.

Joshua Glipitis 4/11/14
Signature of Developer Date

JOSHUA GLIPITIS
Print Name

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

Thomas N. Dalletto 4/8/2014
Signature of Engineer Date

Thomas N. Dalletto
Print Name

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

John L. Robertson 4/10/14
Howard Soil Conservation District Date

03-01-2016
AS-BUILTS

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

Thomas N. Dalletto 4/8/14
DIRECTOR OF PUBLIC WORKS DATE

Thomas N. Dalletto 4/11/14
CHIEF, BUREAU OF ENGINEERING DATE

Thomas N. Dalletto 4/11/14
CHIEF, BUREAU OF UTILITIES DATE

Thomas N. Dalletto 4/11/14
CHIEF, UTILITY DESIGN DIVISION DATE

Dewberry
Dewberry Consultants LLC
3106 LORD BALTIMORE DRIVE
SUITE 110
BALTIMORE, MD 21244-2662
410.285.8500
FAX: 410.285.8875



DES: LAL	
DRN: RLI	
CHK: TND	
DATE: 04/2014	
BY NO.	
REVISIONS	
DATE	

TITLE SHEET

600' SCALE MAP NO. 38

BLOCK NO. 19

SHALLOW RUN SEWER RELOCATION & STREAM RESTORATION

CAPITAL PROJECT NO. S-6268
CONTRACT NO. 10-4830

ELECTION DISTRICT NO. 5

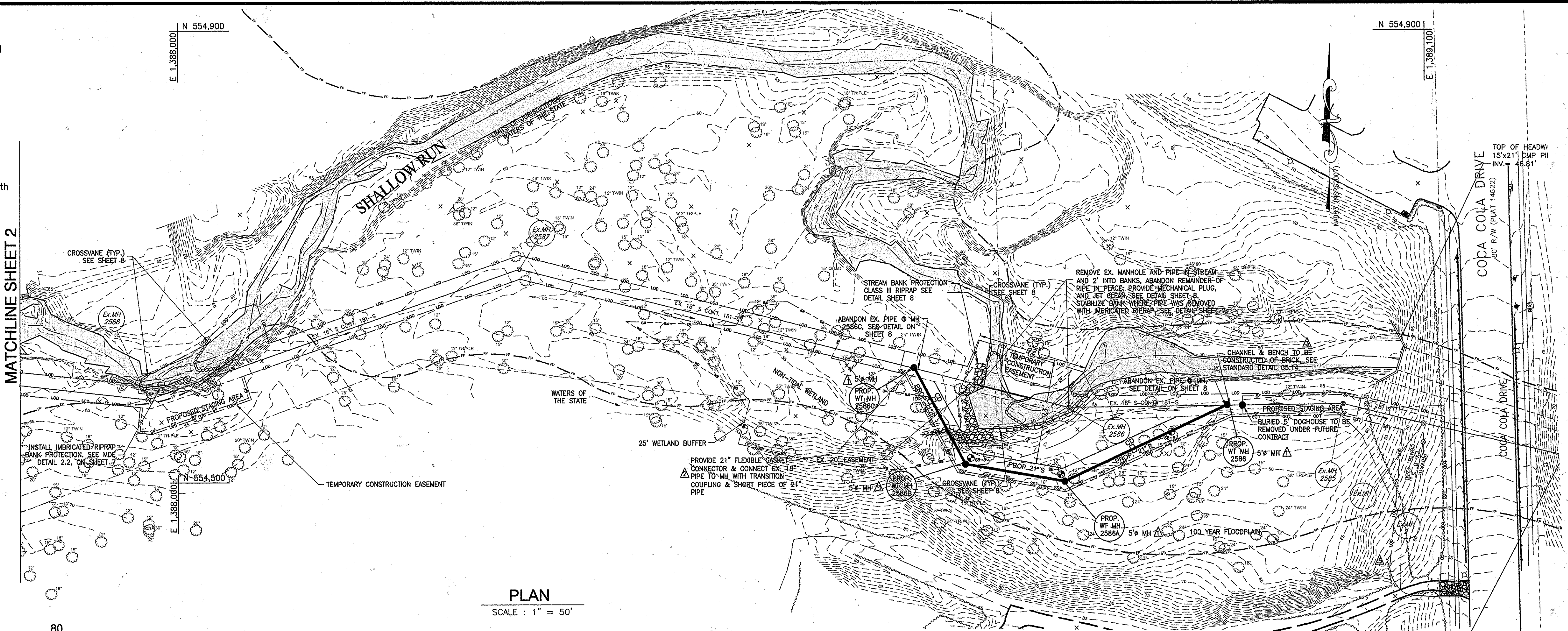
HOWARD COUNTY, MARYLAND

SCALE: AS SHOWN

SHEET 1 OF 9

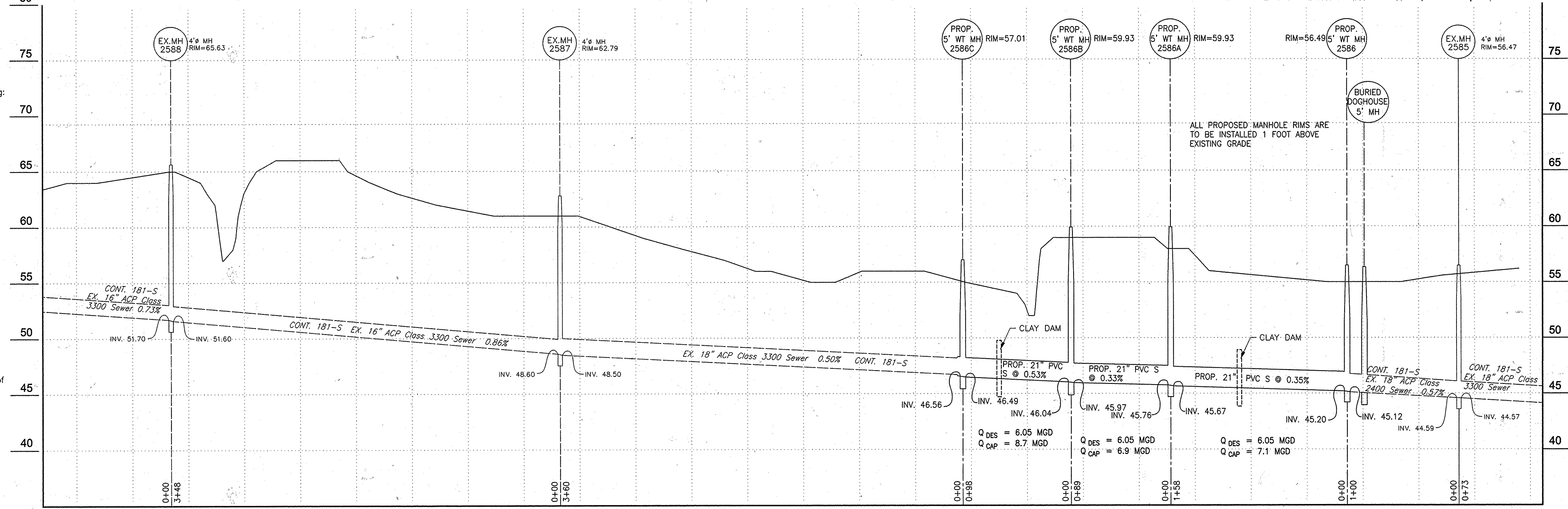
- NOTES:
1. PROVIDE ADDITIONAL SUPER SILT FENCE AT THE DIRECTION OF THE HOWARD COUNTY CONSTRUCTION INSPECTOR OR REPRESENTATIVE TO CONTROL EROSION & CONTAIN SURFACE DRAINAGE OR DISTURBED AREAS & TO MINIMIZE SEDIMENTATION OF ADJACENT WATERCOURSES & LANDS THROUGHOUT LIFE OF CONTRACT.
 2. ALL SUPER SILT FENCE IS SHOWN 2' INSIDE LOD FROM ACTUAL LOCATION FOR CLARITY. LOCATE AT LOD.
 3. SEE SHEET 4 FOR CROSS SECTIONS.

Note: All utilized staging areas are to be protected with silt fence as directed.



SHALLOW RUN SEQUENCE OF CONSTRUCTION BETWEEN MH 2587 & 2585

1. Deliver written notice to adjacent properties 48 hours prior to commencement of work being conducted to include the following:
 - a. Local telephone number for inquiries.
 - b. A summary of work to be completed.
 - c. Contract name & number.
 - d. Potential disturbance to area.
2. Provide silt fence, stabilized construction entrance, temporary access bridge and all other devices as shown on the contract drawings prior to commencement of the work.
3. Excavate at MH 2586 and install a sheeted excavation for the new MH.
4. Construct the sewer from just outside MH 2586 to just outside MH 2586C.
5. Test the new sewer.
6. Set up a by-pass system from MH 2587 to MH 2585.
7. Install new MH 2586 and MH 2586C and connect new pipe to same.
8. Installation complete - Remove by-pass pumps.
9. Perform all removals and abandonments with approved stream diversions after new sewer main and service connections have been tested, approved and placed in service and existing sewer has been jet cleaned as directed on Sheet 8 of 9. Abandon existing sewer with bulkheads at each end and on either side of Ex. MH 2586.
10. Remove Ex. MH 2586 in its entirety.



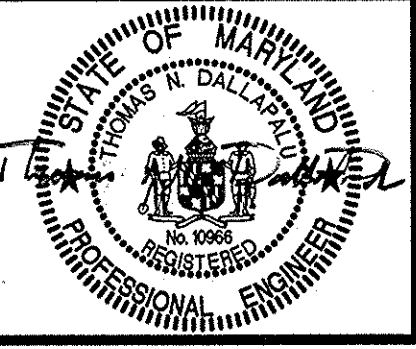
REPLACEMENT SHEET ASBUILTS 03-01-2016

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

Director of Public Works: [Signature] 3/30/16
 Chief, Bureau of Utilities: [Signature] 3/28/16

Chief, Bureau of Engineering: [Signature] 3/29/16
 Chief, Utility Design Division: [Signature] 3/28/16

Dewberry
Dewberry Consultants LLC
3106 LORD BALTIMORE DRIVE
SUITE 110
BALTIMORE, MD 21244-2662
410.265.9500
FAX: 410.265.8875



DES: LAL	LAL/RLI	5' MH replace 4' MHs & 4' Doghouse MHs	7/15
	LAL/RLI	Added flexible gasket connectors	8/15
DRN: RLI	LAL/RLI	Brick channel & bench for transition at MH 2586	9/15
	LAL/RLI	LOD Revision, Added 2nd SCE	11/15
CHK: TND			
DATE: 03/2016	BY NO.	REVISIONS	DATE

SHALLOW RUN PLAN AND PROFILE

600' SCALE MAP NO. 38
BLOCK NO. 19

SHALLOW RUN SEWER RELOCATION & STREAM RESTORATION

CAPITAL PROJECT NO. S-6268
CONTRACT NO. 10-4830

ELECTION DISTRICT NO. 5
HOWARD COUNTY, MARYLAND

SCALE: AS SHOWN
SHEET 3 OF 9

ITEM 903 SEEDING MATERIALS

903-2.1 SEED. All seed shall comply with the Maryland Seed Law (Agricultural Article of the Annotated Code of Maryland). Only MAA-approved species, mixtures, and rates of application provided in this item may be used to establish vegetation.

- corn cockle (Agrostemma githago), bentgrass (Agrostis spp), rectorp (Agrostis gigantea), wild onion (Allium canadense), wild garlic (Allium vineale), bindweed (Caltegia spp.), dodder (Cuscuta spp.), Bermuda grass (Cynodon dactylon), orchardgrass (Dactylis glomerata), tall fescue (Festuca arundinacea), meadow fescue (Festuca pratensis) velvetgrass (Holcus lanatus), annual bluegrass (Poa annua), rough bluegrass (Poa trivialis), timothy (Phleum pratense), and Johnson grass (Sorghum halepense).

Restricted noxious-weed seed may not exceed 0.5 percent by weight of any seed mixture. In addition, all seeds sold in Maryland shall be free from the following listed prohibited noxious weeds: balloonvine (Cardiospermum halicacabum), quackgrass (Elytrigia repens), sicklepod (Senna obtusifolia), sorghum (Sorghum spp.), Canada thistle (Cirsium arvense), plumeless thistle (Carduus spp.-includes much thistle and curled thistle), and serrated tussock (Nassella trichotoma).

Table with 4 columns: Certified Turf-Type Tall Fescue, Annual Ryegrass, Perennial Ryegrass, and Kentucky Bluegrass. Includes sub-sections for 'APPROVED PLANT SPECIES' and 'MAA SEED MIXTURES'.

903-2.1.2 PURITY. All seed shall be free of all state-designated noxious weeds listed in Paragraph 2.1.1 and conform to MAA specifications. To ensure compliance, MAA requires sampling and testing of seed by the Turf and Seed Section, Maryland Department of Agriculture (MDA).

Seed shall be furnished in standard containers with the seed name, lot number, net weight, percentages of purity, germination rate and hard seed, and percentage of maximum weed seed content clearly marked. All seed containers shall be tagged with a MDA supervised mix program seed tag.

903-2.1.3 MIXTURES AND APPLICATION RATES. Only seed mixtures and application rates described in this item may be used unless otherwise approved by the MAA Engineer. Seed mixtures shall meet criteria detailed in Paragraph 903-2.1.2. Seed mixtures have been formulated to minimize the attractiveness of areas to wildlife of common landscape scenarios.

- Seed Mixture No. 1 - relatively flat areas (grade less than 4:1) subject to normal conditions and regular mowing (Application rate= 234 lbs PLS/acre); Seed Mixture No. 2 - sloped areas (grade greater than 4:1) not subject to regular mowing (Application rate = 115lbs PLS/acre); Seed Mixture No. 3 - wetlands and their associated buffer zones (Application rate = 131lbs PLS/acre).

Rate of Application (lbs of PLS/acre): 85% Certified Turf-Type Tall Fescue 192, 10% Certified Kentucky Bluegrass 28, 5% Perennial Ryegrass 14.

Supplemental Seed: Annual Ryegrass 25. Seed Mixture No.2: Sloped areas not subject to regular mowing (Application rate= 115lbs PLS/acre).

Rate of Application (lbs of PLS/acre): 75% Hard Fescue 85, 20% Chewings Fescue 23, 5% Kentucky Bluegrass 7.

Supplemental Seed: Rectorp 3. Seed Mixture No. 3 - Wetland areas and their associated buffer zones (Application rate = 131 lbs PLS/acre).

Rate of Application (lbs of PLS/acre): 60% Creeping Bent Grass 83, 30% Fowl Bluegrass 34, 10% Switchgrass 14.

903-2.1.4 SEEDING SEASONS. Application of seed and seed mixtures shall occur within a Specified seeding season unless otherwise approved by the MAA Engineer. No seed or seed mixtures are to be applied on frozen ground or when the temperature is at or below 35 degrees Fahrenheit (7.2 degrees Centigrade).

Table with 2 columns: SEEDING SEASONS, Permanent Cool-Season Grasses, Temporary Cover of Annual Rye/Bluegrass, Temporary Cover of Warm-Season Grasses (Latis Blazens only).

Seeding seasons are based on typical years and can be subject to variation, which may be modified by the MAA Engineer based on seasonal trends. If the time required to complete any of the operations necessary under this item, within the specified planting season or any authorized extensions thereof, extends beyond the Contract period, then such time will be charged against the Contract time, and liquidated damages will be enforced with respect to this portion of work.

903-2.2 LIME. Lime shall consist of ground limestone and contain at least 85 percent total carbonates. Lime shall be ground to a fineness so that at least 90 percent will pass through a No. 20 mesh sieve and 50 percent will pass through a No. 100 mesh sieve.

903-2.3 FERTILIZER. Fertilizer shall be standard commercial fertilizer (supplied separately or in mixtures) and meet the requirements of applicable state and federal laws (0-F-241) as well as standards of the Association of Official Agricultural Chemists.

Nitrogen-Phosphorus- Potassium (N-P-K) concentrations shall be determined from analysis of soil samples. Methods of fertilizer application shall conform to standards described in Section 903-3.3 of this item. Fertilizer shall be furnished in standard containers that are clearly labeled with name, weight, and guaranteed analysis of the contents (percentage of total nitrogen, available phosphoric acid, and water-soluble potash).

The fertilizers may be supplied in the following forms: a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader; b. A finely ground fertilizer suitable in water, suitable for application by power sprayers; or c. A granular or pellet form suitable for application by blower equipment.

CONSTRUCTION METHODS AND EQUIPMENT

903-3.1 GENERAL. This section provides approved methods for the application of and includes standards for seedbed preparation, methods of application, and equipment to be used during the process. Lime and fertilizer shall be applied to seeded areas before the seed is spread.

903-3.2 ADVANCE PREPARATION. Areas designated for seeding shall be properly prepared in advance of seed application. The area shall be tilled and graded prior to application of lime and fertilizer, and the surface area shall be cleared of any stones larger than 1 inch in diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas.

If an area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, all grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory condition by discing or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

An area to be seeded shall be considered a satisfactory seedbed (without requiring additional treatment) if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches; the top 3 inches of soil is loose, friable, and is reasonably free from large clods, rocks, large roots, or other undesirable matter; appropriate amounts of fertilizer and lime have been added; and, if it has been shaped to the required grade immediately prior to seeding.

After completion of tilling and grading, lime and fertilizer shall be applied within 48 hours according to the specified rate (Paragraphs 903-2.2 and 2.3) and methods (Paragraphs 903-3.3.1 and 903-3.3.2) approved by MAA. The seeding mixture shall be applied within 48 hours after application of lime and fertilizer.

903-3.3 METHODS OF APPLICATION. Lime, fertilizer, and seed mixes shall be applied by either the dry or wet application methods that have been approved by MAA and are detailed below.

903-3.3.1 DRY APPLICATION METHOD

- a. Liming. If soil test results indicate that lime is needed, the following procedures will be used: following advance preparation of the seedbed, lime shall be applied prior to the application of any fertilizer or seed and only on seedbeds that have been prepared as described in paragraph 903-3.2. The lime shall be uniformly spread and worked into the top 2 inches of soil, after which the seedbed shall be properly graded again. b. Fertilizing. Following advance preparations (and liming if necessary), fertilizer shall be spread uniformly at the specified rate to provide no less than the minimum quantity stated in Paragraph 903-2.3. c. Seeding. Seed mixtures shall be sown immediately after fertilization of the seedbed. The fertilizer and seed shall be lightly raked to a depth of 1 inch for newly graded and disturbed areas. d. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted using a cultipacker or an approved lawnmower.

903-3.3.2 WET APPLICATION METHOD HYDROSEEDING

- a. General. The Contractor may elect to apply seed and fertilizer as per Paragraphs c and d of this section in the form of an aqueous mixture by spraying over the previously prepared seedbed using methods and equipment approved by MAA. The rates of application shall be as specified in Paragraphs 903-2.1 through 903-2.3. b. Spraying Equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge capable of reading increments of 50 gallons or less over the entire range of the tank capacity. The liquid level gauge shall be mounted so as to be visible to the nozzle operator at all times. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used. The spraying equipment shall also include a pressure pump capable of delivering 100 gallons per minute at a pressure of 100 pounds per square inch. The pressure pump assembly shall be configured to allow the mixture to flow through the tank when not being sprayed from the nozzle. All pump passages and pipelines shall be capable of providing clearance for 5/8-inch solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. A pressure gauge shall be connected to and mounted immediately behind the nozzle. The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture to be supplied so that mixtures may be properly sprayed over a distance varying from 20 feet to 100 feet. One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For ease of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings. In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet in length shall be provided to which the nozzles may be connected. c. Mixtures. Lime shall be applied separately in the quantity specified, prior to the fertilizing and seeding operations. Lime should be added to and mixed with water at a concentration not to exceed 220 pounds of lime for every 100 gallons of water. After lime has been applied, the tank should be emptied and rinsed with fresh water. Seed and fertilizer shall be mixed together in the relative proportions specified, but the resulting concentration should not exceed 220 pounds of mixture per 100 gallons of water and should be applied within 30 minutes to prevent fertilizer burn of the seeds. All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. Brackish water shall not be used at any time. The Contractor shall identify all sources of water to the MAA Engineer at least two weeks prior to use. The Engineer may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the Engineer following such tests. All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within 30 minutes from the time they were mixed or they shall be wasted and disposed of at a location acceptable to the Engineer. d. Spraying. Lime shall be sprayed upon previously prepared seedbeds on which the lime, if required, shall have been worked in already. The mixtures shall be applied using a high-pressure spray which shall always be directed upward into the air so that the mixtures will fall to the ground in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner that might produce erosion or runoff. Particular care shall be exercised to ensure that the application is made uniformly, at the prescribed rate, and to guard against misses and overlapped areas. Predetermined quantities of the mixture shall be used in accordance with specifications to cover specified sections of known areas. To check the rate and uniformity of application, the applicator will observe the degree of wetting of the ground or distribute test sheets of paper or pans over the area at intervals and observe the quantity of material deposited thereon. On surfaces that are to be mulched as indicated by the plans or designated by the MAA Engineer, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

903-3.4 MAINTENANCE OF SEEDED AREAS. The contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the Engineer. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeded as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work. When either the dry or wet application method outlined above is used for work performed out of season, the Contractor will be required to establish a good stand of grass of uniform color and density to the satisfaction of the Engineer. If at the time when the contract has been otherwise completed it is not possible to make an adequate determination of the color, density, and uniformity of such stand of grass, payment for the unaccepted portions of the areas seeded out of season will be withheld until such time as these requirements have been met.

ITEM 904 SODDING MATERIALS

904-2.1 SOD. Sod furnished by the Contractor shall have a good cover of living or growing grass. This includes grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas in which the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials that might be detrimental to the development of the sod or to future maintenance. Grass sod shall be Maryland-certified or approved and shall comply with the Maryland Sod Law of the Annotated Code of Maryland (Agricultural Article Sections 9-101 through 9-110). Each load of sod shall bear a Maryland State Approved or Certified label at the time of delivery on the job. Sod shall be either: (1) Bluegrass sod containing not less than 80 percent Kentucky bluegrass (Poa pratensis) and not more than 20 percent Red Fescue (Festuca rubra); or (2) certified turf type-tall fescue (Festuca arundinacea) sod containing not less than 80 percent certified turf type-tall fescue (Festuca arundinacea) grass and not more than 20 percent Kentucky Bluegrass (Poa pratensis) and Red Fescue (Festuca rubra). Any vegetation more than 6 inches in height shall be mowed to a height of 3 inches or less before sod is lifted. Sod, including the soil containing the roots and the emergent plant growth, shall be cut uniformly to a thickness not less than that specified in Section 904-3.4.

CONSTRUCTION REQUIREMENTS

904-3.1 GENERAL. Areas to be sodded shall be clearly indicated by site plans. Areas requiring special ground surface preparation, such as filling, and those areas in a satisfactory condition that are to remain undisturbed shall also be shown on the plans. Suitable equipment necessary for proper preparation of the ground surface and for the handling and placing of all required materials shall be on hand, in good condition, and shall be approved by the MAA Engineer before sodding operations begin. The Contractor shall demonstrate to the MAA Engineer, before starting the various operations, that the application of required materials, such as fertilizer and limestone, will be made at the specified rates.

904-3.2 ADVANCE PREPARATION. If the area to be sodded is sparsely vegetated, weedy, barren and unworked, or packed and hard, all existing herbaceous vegetation shall be removed. The soil shall then be scarified or otherwise loosened to a depth of at least 5 inches (125 mm). Clods shall be pulverized, and the top 3 inches (75 mm) of soil shall be worked into a satisfactory bed by discing or use of cultipackers, rollers, drags, harrows, or other equipment approved by the MAA Engineer. The area shall then be properly graded as indicated by site plans.

After grading of areas is complete and prior to the application of fertilizer and limestone, areas to be sodded shall be raked or otherwise cleared of stones larger than 1 inch in diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after grading of areas and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be sodded will be considered a satisfactory seedbed without requiring additional treatment if it recently has been thoroughly loosened and worked to a depth of at least 5 inches as a result of grading operations and, if immediately prior to sodding, the top 3 inches of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and is shaped to the required grade. For slope areas steeper than 3:1 (three horizontal to one vertical) the subsoil shall be loosened to a depth of 1 inch. Lime and fertilizer shall be applied within 48 hours after tilling as described in 903-3.3 and 3.4. The sod shall be applied immediately after the lime and fertilizer have been worked into the soil.

904-3.3 APPLICATION OF FERTILIZER AND LIME. Following ground surface preparation, fertilizer shall be uniformly spread as described in Section 903-3.3 at a rate that will provide at least the minimum quantity of fertilizer required. If the use of ground limestone is specified, it shall be spread as described in Section 903-3.3, "Methods of Application"; at a rate that will provide at least the minimum quantity of lime required. These materials shall be incorporated into the soil to a depth of at least 2 inches by discing, raking, or other methods approved by the MAA Engineer. Any stones larger than 1 inch in diameter, large clods, roots, and other litter brought to the surface by this operation shall be removed.

904-3.4 OBTAINING AND DELIVERING SOD. The sod shall be well rooted, grown in the State of Maryland, and field grown for a minimum of 12 months. After inspection and approval of the sod by the MAA Engineer, the sod shall be cut with approved sod cutters to such a thickness that after placement on the prepared bed, but before compaction, it shall have a uniform attached soil thickness of at least 0.75 inch. Sod sections or strips shall be cut in uniform widths of at least 14 inches and in lengths of at least 18 inches, but not to lengths that might inhibit placement without breaking, tearing, or loss of soil. Where strips are required, the sod shall be rolled or folded undamaged, with the grass facing inward. The Contractor may be required to mow high grass before cutting sod. Sod shall be transplanted within 24 hours from the time of harvest unless circumstances beyond the Contractor's control make storage necessary. In such cases, sod shall be stacked, kept moist, protected from exposure to the air and sun, and shall be kept from freezing. Sod shall only be harvested and moved when soil moisture conditions are such that favorable results can be expected. Where soil is too dry, permission to cut sod may be granted only after it has been sufficiently watered to moisten the soil to the depth at which the sod will be cut.

904-3.5 PLACING SOD. Sodding shall only be performed during seasons when satisfactory results can be expected. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the MAA Engineer, provided the sod bed is watered to moisten the soil to a depth of at least 4 inches immediately prior to laying the sod. The sod shall be moist and shall be placed on a bed, prepared according to Paragraphs 904-3.2 "Advance Preparation", and 904-3.3, "Application of Fertilizer and Lime" by hand. Pitchforks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be placed carefully by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, starting at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and ensure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod has been displaced during sodding operations, the workers replacing it shall work from ladders or treaded planks to prevent further displacement. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately 1.5 inches below the pavement edge. Where the flow will be over the sodded areas and onto the paved surfaces around manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges. On slopes steeper than 1:2.5 and in V-shaped or flat-bottom ditches or gutters, the sod shall be secured wooden pegs at least 18 inches long and a cross-sectional area of at least 0.75-square inch, or by other methods of securing sod approved by the MAA Engineer. The pegs shall be driven flush with the surface of the sod. The pegs shall be of sufficient number and at adequate spacing to secure sod from displacement. The use of sod staples or other means of securing the sod from displacement may be approved by the MAA Engineer provided satisfactory results are expected.

904-3.6 WATERING. Adequate water and watering equipment shall be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. In all cases, watering shall be done in a manner that will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface.

904-3.7 ESTABLISHING TURF.

904-3.7.1 GENERAL. The Contractor shall provide general care for the sodded areas as soon as the sod has been laid and shall continue to provide such care until final inspection and acceptance of the work.

904-3.7.2 PROTECTION. All sodded areas shall be protected against traffic or other use by warning signs and barricades approved by the MAA Engineer.

904-3.7.3 MOWING. The Contractor shall mow the sodded areas with approved mowing equipment, depending upon climatic and growth conditions and the needs for mowing of specific areas. In the event that weeds or other undesirable vegetation establishes to such an extent that, either cut or uncut, they threaten to smother the sodded species, the weeds shall be mowed and the clippings raked and removed from the area. Spot applications of an appropriate herbicide by a licensed applicator shall be approved by the MAA Engineer to remove invasive species. The appropriate herbicide shall be determined on a case-by-case basis, depending on the location and type of weed.

904-3.7.4 REPAIR. When the surface has become gullied or otherwise damaged during the period covered by this contract, the affected areas shall be repaired to re-establish the grade and the condition of the soil and shall then be re-sodded as specified in Paragraph 904-3.5, "Placing Sod", at the Contractor's expense.

ITEM 905 MULCHING MATERIALS

905-2.1 TYPES OF MULCH. Acceptable mulch shall be composed of the materials listed below or composed of any locally available materials that are similar to those specified and approved by the MAA Engineer. Low-grade, shaggy, soiled, partially rotted hay, straw, or other materials unfit for animal consumption will not be acceptable for use as mulch. Straw or other material that is fresh, excessively brittle, or is in such an advanced stage of decomposition as to smother or retard the planted grass, is not acceptable. Clean, weed-free straw may be used. Mulch materials containing matured seed with the potential to establish and be detrimental to the project or the surrounding area are not acceptable.

- a. Shredded Hardwood Bark. Shredded hardwood bark shall consist of hardwood tree bark that has been milled and screened to ensure a maximum 4-inch (100-mm) particle size, provide a uniform texture, and be free from sawdust, toxic substances, and other foreign materials. b. Wood Chips. Wood chips shall be produced by a chipping machine to a size specified by the MAA Engineer. Chips may not have been subjected to any conditions that would shorten their useful life or cause them to lose any of their value as mulch. Wood chips shall be free from bark, leaves, twigs, wood shavings, sawdust, toxic substances, and other foreign material. c. Wood Cellulose Fiber. Wood cellulose fiber shall consist of a processed wood product with uniform fiber characteristics. The fiber shall be capable of remaining in a uniform suspension under agitation in water and blending with seed, fertilizer, and other additives to form a homogeneous slurry. The fiber shall perform satisfactorily in hydraulic seeding equipment without clogging or damaging the system. The slurry shall contain a green dye to provide easy visual inspection for uniformity of application.

Certification showing that the fiber material conforms to the following specifications shall be provided by the manufacturer:

Table with 2 columns: Wood Cellulose Fiber Requirements, Particle Length, in. (mm), Particle Thickness, in. (mm), Net dry Weight Content, TAPPI* T 509, pH, Ash Content, TAPPI* Standard T 413, % max, Water Holding Capacity, % min.

*Technical Association of Pulp and Paper Industry. The material shall be delivered in packages of uniform net weight of 75 lbs (34 kg) or less and shall be clearly labeled with the name of the manufacturer, net weight, and a supplemental statement of the net weight content.

905-2.2 INSPECTION. Within five days after acceptance of the bid, the Contractor shall provide representative samples of mulch material to be used to the MAA Engineer and identify the source of the material and quantities of mulch materials available. The samples provided may be used as standards with the approval of the MAA Engineer and any materials brought on the site that do not meet these standards may be rejected.

CONSTRUCTION REQUIREMENTS

905-3.1 ADVANCE PREPARATION. Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding unless otherwise specified. The application and spreading of mulch may be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

905-3.2 APPLICATION OF MULCH. The Contractor shall evenly apply mulch materials to areas indicated by site plans or otherwise designated by the MAA Engineer. Cellulose-fiber or wood-pulp mulch shall be applied at the rate of 1,500 pounds (dry weight) per acre. Mulch may be blown on the slopes and use of cutters in the equipment for this purpose will be permitted to the extent that at least 95 percent of the mulch in place on the slope is 6 inches or more in length. When mulch applied by the blowing methods is cut, the loose depth in place shall be 1 to 2 inches. Cellulose fiber or wood-pulp mulch shall be applied as an aqueous mixture by spraying at the rate of 1,500 pounds (dry weight) per acre using spraying equipment approved by the MAA Engineer.

905-3.3 SECURING MULCH. Mulch shall be held in place by light discing, a thin coating of topsoil, pins, stakes, wire mesh, other methods approved by the MAA Engineer. If the "peg and string" method is used, the mulch shall be secured with stakes or wire pins driven into the ground on 5-foot centers or less. Binder twine shall be strung between adjacent stakes in straight lines and crossed diagonally over the mulch. The stakes shall be firmly driven nearly flush to the ground to draw the twine down tightly onto the mulch.

905-3.4 MAINTENANCE OF MULCHED AREAS. The Contractor shall care for mulched areas until final acceptance of the project. Care required may consist of providing protection against traffic or other disturbances by placement of warning signs and/or barricades before or immediately after mulching has been completed. The Contractor may be required to repair or replace any mulching that is defective or becomes damaged before the project is finished and deemed satisfactory by the MAA Engineer. When, in the judgment of the MAA Engineer, defects or damage result from poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement will be borne by the Contractor. However, once the Contractor has completed the mulching of an area in accordance with the provisions of the specifications and to the satisfaction of the Engineer, no additional work at his expense will be required. Any subsequent repairs and/or replacements deemed necessary by the Engineer may be made by the Contractor and will be paid for as additional or extra work.

03-01-2014



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DEPARTMENT OF PUBLIC WORKS HOWARD COUNTY, MARYLAND. Includes signatures and dates for Director of Public Works, Chief, Bureau of Engineering, and Chief, Utility Design Division.

Dewberry logo and contact information: 2106 LORD BALTIMORE DRIVE, SUITE 110, BALTIMORE, MD 21244-2662. Phone: 410.265.9500. Fax: 410.265.8075.

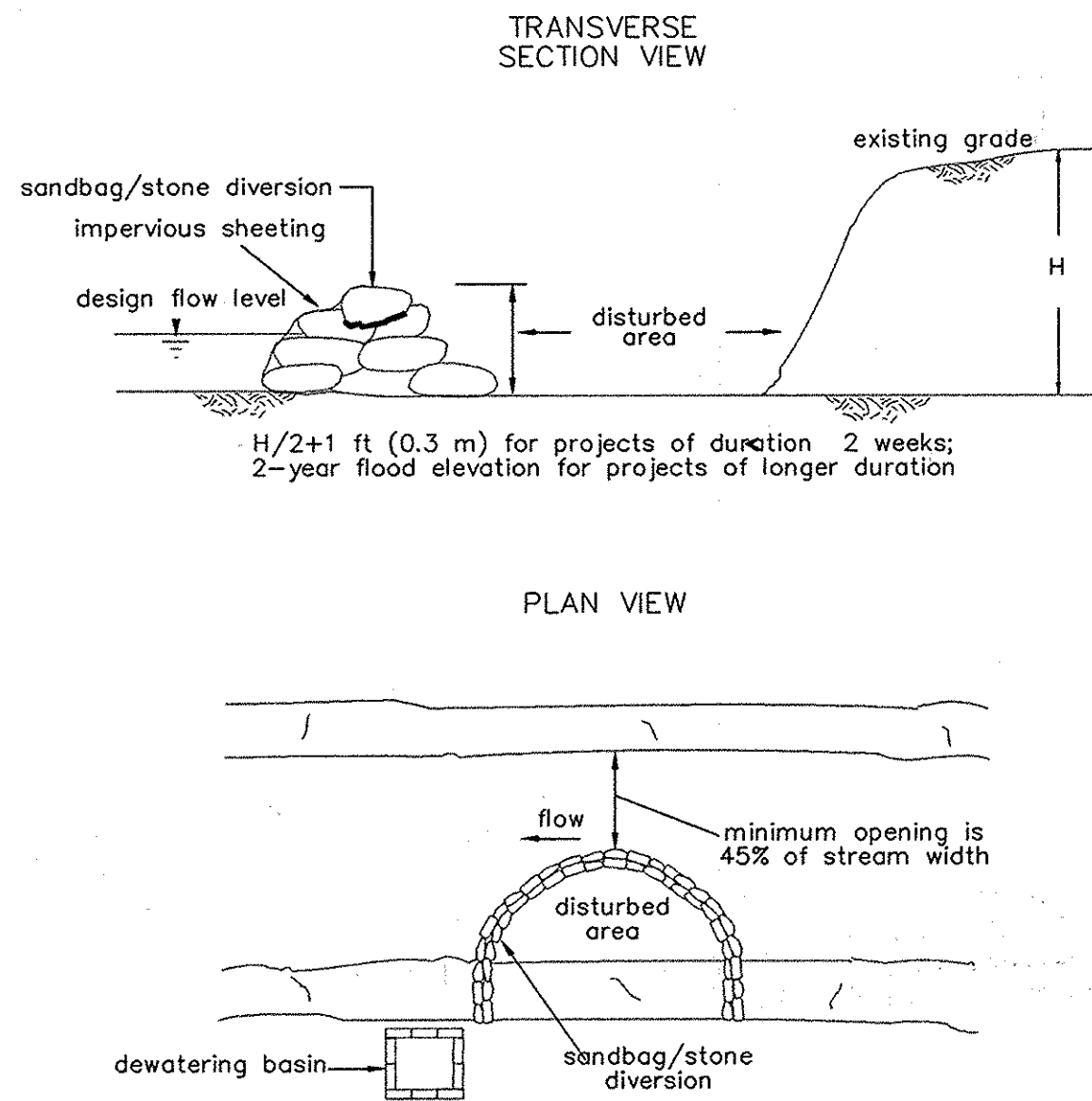


Table with columns: DES: LAL, DRN: RLI, CHK: TND, DATE: 04/2014, BY, NO, REVISIONS, DATE, 600' SCALE MAP NO. 37-38, BLOCK NO. 5.

SEDIMENT AND EROSION CONTROL SPECIFICATIONS. Includes scale and map information.

SHALLOW RUN SEWER RELOCATION & STREAM RESTORATION. CAPITAL PROJECT NO. S-6268. CONTRACT NO. 10-4830. SHEET 5 OF 9. ELECTION DISTRICT NO. 5. HOWARD COUNTY, MARYLAND.

DETAIL 1.5: SANDBAG/STONE DIVERSION



MGWC 1.5: SANDBAG/STONE CHANNEL DIVERSION

Temporary measure for dewatering in-channel construction sites

DESCRIPTION

The work should consist of installing sandbag or stone flow diversions for the purpose of erosion control when construction activities occur within the stream channel.

EFFECTIVE USES & LIMITATIONS

Diversions are used to isolate work areas from flow during the construction of in-stream projects. Diversions which have an insufficient flow capacity can fail and severely erode the disturbed channel section under construction. Therefore, in-channel construction activities should occur only during periods of low rainfall. This temporary measure may not be practical in large channels.

MATERIAL SPECIFICATIONS

Materials for sandbag and stone stream diversions should meet the following requirements:

- Riprap: Riprap should be washed and have a minimum diameter of 6 inches (0.15 meters).
- Sandbags: Sandbags should consist of materials which are resistant to ultra-violet radiation, tearing & puncture, and should be woven tightly enough to prevent leakage of fill material (i.e. sand, fine gravel, etc.).
- Sheeting: Sheeting should consist of polyethylene or other materials which are impervious and resistant to puncture and tearing.

MATERIAL SPECIFICATIONS

All erosion and sediment control devices, including dewatering basins, should be implemented as the first order of business according to a plan approved by the WMA or local authority. Installation should proceed from upstream to downstream during periods of low flow. If necessary, silt fence or straw bales should be installed around the perimeter of the work area.

Sandbag/stone diversions can be used independently or as components of other stream diversion techniques. Installation of this measure should be installed around the perimeter of the work area.

- The diversion structure should be installed from upstream to downstream.
- The height of the sandbag/stone diversion should be a function of the duration of the project in the stream reach. For projects with a duration of less than 2 weeks, the height of the diversion should be one half of the streambank height, measured from the channel bed, plus 1 foot (0.3 meters) or bankfull height, whichever is greater. For projects of longer duration, the top of the sandbag or stone diversion should correspond to bankfull height. For diversion structures utilizing sandbags, the stream bed should be hand prepared prior to placement of the base layer of sandbags in order to ensure a water tight fit. Additionally, it may be necessary to prepare the bank in a similar fashion.
- All accreted material should be deposited and stabilized in an approved area outside the 100-year floodplain unless authorized by the WMA.
- Sediment-laden water from the construction area should be pumped to a dewatering basin.

TEMPORARY IN STREAM CONSTRUCTION MEASURES MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES

MGWC 1.5: SANDBAG/STONE CHANNEL DIVERSION

- Sheeting on the diversion should be positioned such that the upstream portion covers the downstream portion with at least a 18-inch (0.45 meters) overlap.
- Sandbag or stone diversions should not obstruct more than 45% of the stream width. Additionally, bank stabilization measures should be placed in the constricted section if accelerated erosion and bank scour are observed during the construction time or if project time is expected to last more than 2 weeks.
- Prior to removal of these temporary structures, any accumulated sediment should be removed, deposited and stabilized in an approved area outside the 100-year floodplain unless authorized by the WMA.
- Sediment control devices are to remain in place until all disturbed areas stabilized in accordance with an approved sediment and control plan and the inspecting authority approves their removal.

TEMPORARY IN STREAM CONSTRUCTION MEASURES MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES

MGWC 2.2: IMBRICATED RIPRAP

Rigid engineering technique for bank stabilization

DESCRIPTION

Imbricated riprap is used to protect and stabilize embankment soils from the erosive forces of flowing water and piping forces resulting from groundwater seepage. A well-engineered imbricated riprap revetment should consist of the following:

- A filter layer of gravel or cloth designed to prevent soil movement into or through the riprap layer while allowing water to drain from the embankment, and
- A stone wall of appropriate size and positioning to resist the shearing forces of channelized water and the lateral earth pressure of the developed bank.

EFFECTIVE USES & LIMITATIONS

When properly designed and installed, imbricated riprap revetments resist lateral earth pressures to some extent and can be an effective method of bank armoring where soil conditions, water turbulence and velocity, exposed vegetative cover, and groundwater conditions are such that the soil may erode under the design flow conditions and threaten infrastructure or personal property.

Filter cloth should only be utilized when the bank material is a noncohesive material such as sand or gravel.

MATERIAL SPECIFICATIONS

Materials for imbricated riprap construction and installation should meet the following requirements:

- Filters: Synthetic filter fabric may be used cautiously based on the 1994 MD Standards and Specifications for Soil Erosion and Sediment Control. Wherever possible, however, granular filters with a minimum thickness of 6 inches (15 cm) should be used with a gradation as found in Table 2.2.

Table 2.2: Granular Filter Material Grading Specifications

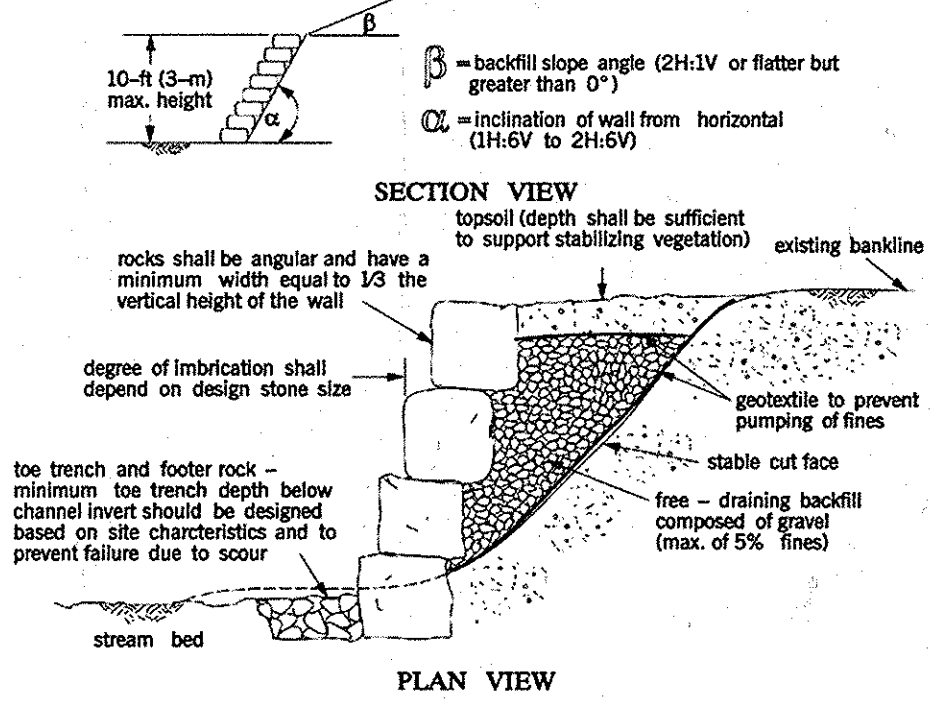
Percent Less Than	U.S. Standard Sieve Size
100	2 1/2 in (64 mm)
85 - 100	1 in (25 mm)
60 - 100	1/2 in (13 mm)
35 - 70	No. 10
20 - 50	No. 40
3 - 20	No. 200

- Toe Riprap: The maximum diameter or weight of stone for toe riprap should be based upon the bankfull stream channel velocity as detailed in the MGWC 2.1: Riprap and Figure 2.1.
- Imbricated Stones: Imbricated riprap should be angular and blocky in shape such that they are stackable and should be sufficiently large to resist displacement by both the design storm event and the site-specific lateral earth stresses. Therefore, the length of the longest axis of each stone should be the greater of 1/3 the height of the proposed wall and the size necessary to resist the design stream flow according to MGWC 2.1: Riprap. A typical minimum axis length is 24 inches (0.6 meters).

SLPOTE PROTECTION AND STABILIZATION TECHNIQUES MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2006

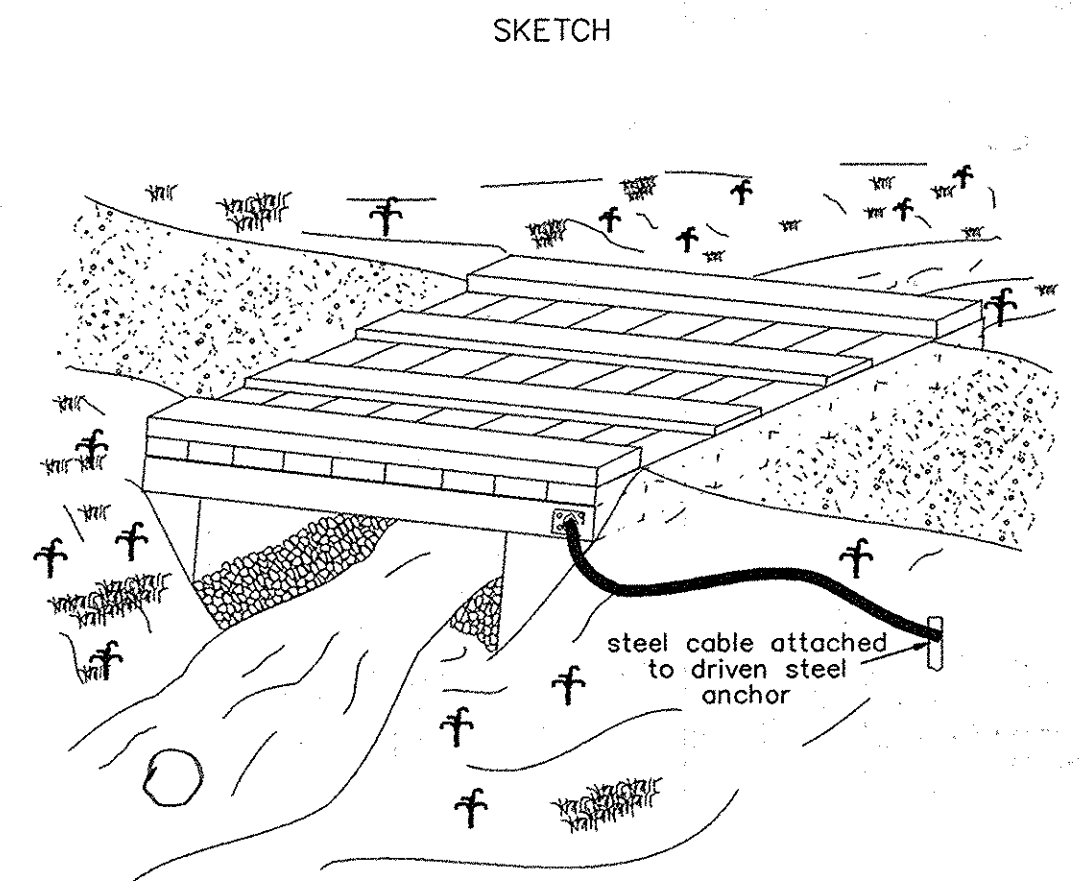
Maryland's Guidelines To Waterway Construction
DETAIL 2.2: IMBRICATED RIPRAP

DEFINITION SKETCH



SLPOTE PROTECTION AND STABILIZATION TECHNIQUES MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2006

DETAIL 4.8: TEMPORARY ACCESS BRIDGE



MGWC 4.8: TEMPORARY ACCESS BRIDGE

Temporary stream crossing intended for minimum corridor disturbance

DESCRIPTION

A temporary access bridge is a stream crossing made of wood, metal, or other materials designed to limit the amount of disturbance to the stream banks and bed.

EFFECTIVE USES & LIMITATIONS

Temporary access bridges are the preferred method of waterway crossing since they typically cause the least disturbance to the waterway bed and banks, pose the least chance for interference with fish migration, and can be quickly removed and reused.

MATERIAL SPECIFICATIONS

- Stringers: Stringers should either be logs, sawn timber, prestressed concrete beams, or other approved materials.
- Deck Materials: Deck materials should be of sufficient strength to support the anticipated load.

CONSTRUCTION SEQUENCE

All erosion and sediment control devices, including stream diversions, should be implemented as the first order of business according to plan approved by the WMA or local authority. Dewatering basins should be built as needed and swales or ditches should be used to prevent surface (See the 1994 Maryland Standards drainage from entering the stream via the bridge crossing. The proposed construction, maintenance, and specifications for Soil Erosion and Sediment Control) and removal sequence is as follows:

- Abutments should be placed parallel to, and on, stable banks such that the structure is at or above bankfull depth to prevent the entrapment of floating materials and debris.
- Temporary access bridges should be constructed to span the entire channel. If the bankfull channel width exceeds 8 feet (2.5 meters), then a footing, pier, or other bridge support may be constructed within the waterway. No support will be permitted within the channel for waterways less than 8 feet wide. One additional bridge support will be permitted for each 8-foot width of the channel.
- All deck members should be placed perpendicularly to the stringers, butted tightly, and securely fastened to the stringers. Decking materials must be butted tightly to prevent any soil material tracked onto the bridge from falling into the waterway.
- Although run planks are optional, they may be necessary to properly distribute loads. One run plank should be provided for each track of the equipment wheels and should be securely fastened to the length of the span.
- Curbs or fenders may be installed along the outer sides of the deck to provide additional safety.
- Bridges should be securely anchored at one end using steel cable or chain to prevent the bridge from floating downstream and possibly causing an obstruction to the flow. Anchoring at only one end will prevent channel obstruction in the event that flood waters float the bridge. Acceptable anchors are large trees, boulders, or driven steel anchors.

TEMPORARY IN STREAM CONSTRUCTION MEASURES MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES

MGWC 4.8: TEMPORARY ACCESS BRIDGE

- All areas disturbed during installation should be stabilized within 14 calendar days in accordance with a revegetation plan approved by the WMA.
- Periodic inspection should be performed by the user to ensure that the bridge, streambed, and stream banks are maintained and not damaged.
- Maintenance should be performed as needed to ensure that the structure complies with all the standards and specifications. This should include the removal of trapped sediment and debris which should then be disposed of and stabilized outside the floodplain.
- When the temporary bridge is no longer needed, all structures, including abutments and other bridging materials, should be removed within 14 calendar days. In all cases, the bridge materials should be removed within 1 year of installation. Removal of the bridge and clean-up of the area, including protection and stabilization of disturbed stream banks, should be accomplished without the use of construction equipment in the waterway.

TEMPORARY IN STREAM CONSTRUCTION MEASURES MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES

MGWC 2.2: IMBRICATED RIPRAP

Approximate Cost (\$1999)
\$90 per linear ft

INSTALLATION GUIDELINES

All erosion and sediment control devices, including dewatering basins, should be implemented as the first order of business according to a plan approved by the WMA or local authority. The recommended construction procedure for imbricated riprap is as follows (refer to Detail 2.2):

- The stream should be diverted according to a WMA recommended procedure (see Section 1, Temporary Instream Construction Measures, Maryland's Guidelines to Waterway Construction), and the construction area should be dewatered.
- All excavation should be made in reasonably close conformity with the existing stream slope and bed. The slope of the cut face should be in the range of 1H:5V to 2H:5V. Loose material at the toe of the embankment should be excavated until a stable foundation is reached, usually within 2 to 3 feet (0.6 to 0.9 meters) of the surface. The subgrade should be smooth, firm, and free from protruding objects or voids that would affect the proper positioning of the first layer of stones.
- A graded granular filter or filter fabric should be placed on the face of the cut slope to prevent the migration of fine materials through the revetment. If filter fabric is used, it should be carefully and loosely placed on the prepared slope and secured. Adjacent strips should overlap a minimum of 8 inches (0.20 meters). If the filter fabric is torn or damaged, it should be repaired or replaced.
- The rock layers should be neatly stacked with staggered joints so that each stone rests firmly on two stones in the tier below. Additionally, smaller stones should be used to fill voids so that each rock rests solidly on the previous rock layer with minimal opportunity for movement. Upon completion of the first layer of stones, the toe trench should be filled with Class III riprap sized according to MGWC 2.1: Riprap or additional imbricated stones. Two footer stones should be used where high potential for channel incision exists. The height of the imbricated revetment is dictated by the size of the stone used, and the height should not exceed 3 times the length of the longest axis and should not be greater than 10 feet (3 meters).
- Placement of the granular backfill should occur concurrently with the stone placement. The backfill slope angle should be 2H:1V or flatter but should be greater than 6 degrees to facilitate drainage. Once all of the backfill is in place, it should be covered with a filter layer and a layer of topsoil sufficient to support a native vegetative cover.
- The disturbed sections of the channel, including the slopes and stream bed, should be stabilized with methods approved by the WMA.

Note: The use of rock vanes (MGWC 3.1: Rock Vanes) should be considered to dissipate excessive toe velocities.

SLPOTE PROTECTION AND STABILIZATION TECHNIQUES MARYLAND DEPARTMENT OF THE ENVIRONMENT WATERWAY CONSTRUCTION GUIDELINES REVISED NOVEMBER 2006

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

Director of Public Works: [Signature] DATE: 4/11/14
 Chief, Bureau of Engineering: [Signature] DATE: 4/11/14
 Chief, Bureau of Utilities: [Signature] DATE: 4/11/14
 Chief, Utility Design Division: [Signature] DATE: 4/11/14

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DES: LAL					
DRN: RLI					
CHK: TND					
DATE: 04/2014	BY	NO.	REVISIONS	DATE	

SHALLOW RUN SEWER RELOCATION
& STREAM RESTORATION
CONTROL DETAILS

600' SCALE MAP NO. 37-38 BLOCK NO. 19

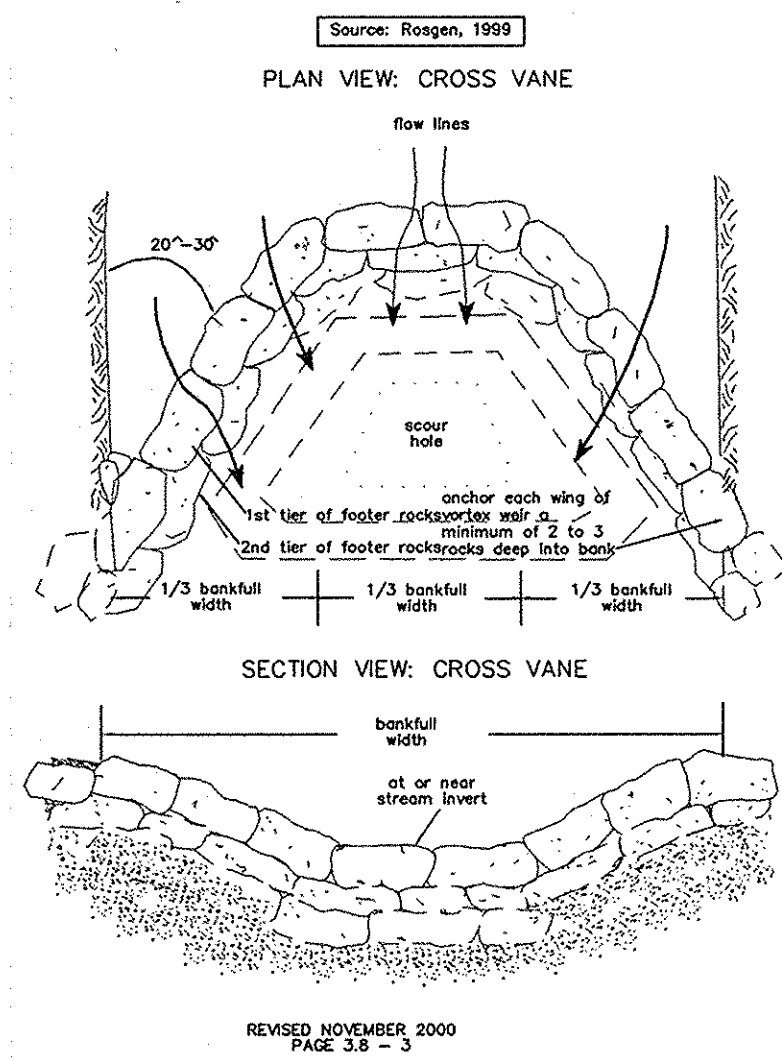
SHALLOW RUN SEWER RELOCATION
& STREAM RESTORATION

CAPITAL PROJECT NO. S-6268
CONTRACT NO. 10-4830
ELECTION DISTRICT NO. 5 HOWARD COUNTY, MARYLAND

SCALE: AS SHOWN
SHEET 7 OF 9

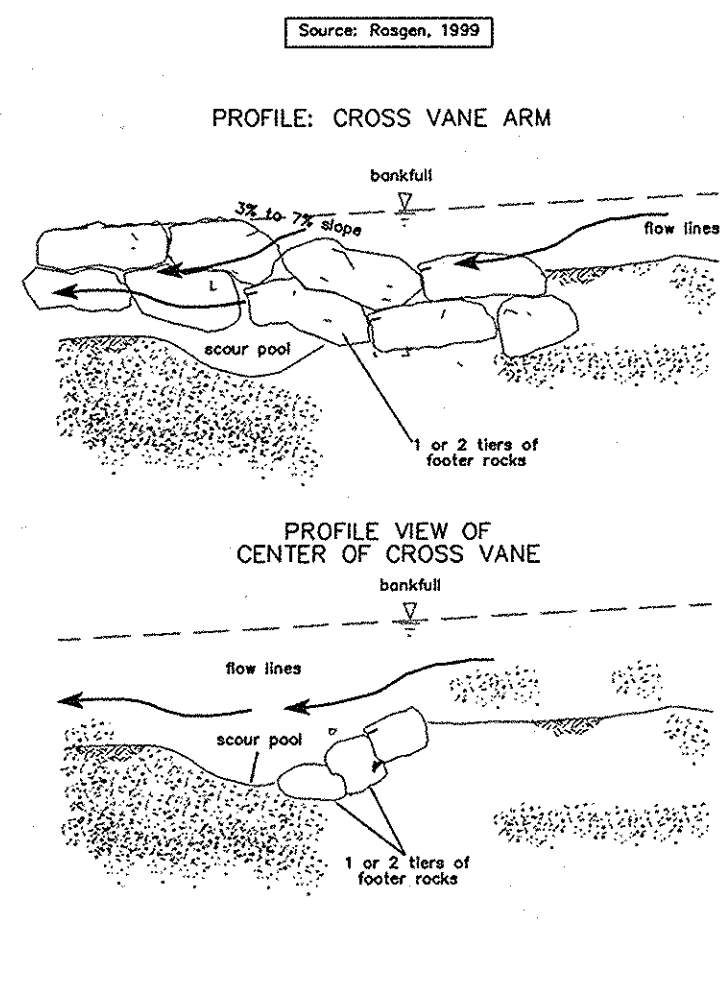
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DETAIL 3.8(a): CROSS VANES



CROSS VANE
NOT TO SCALE

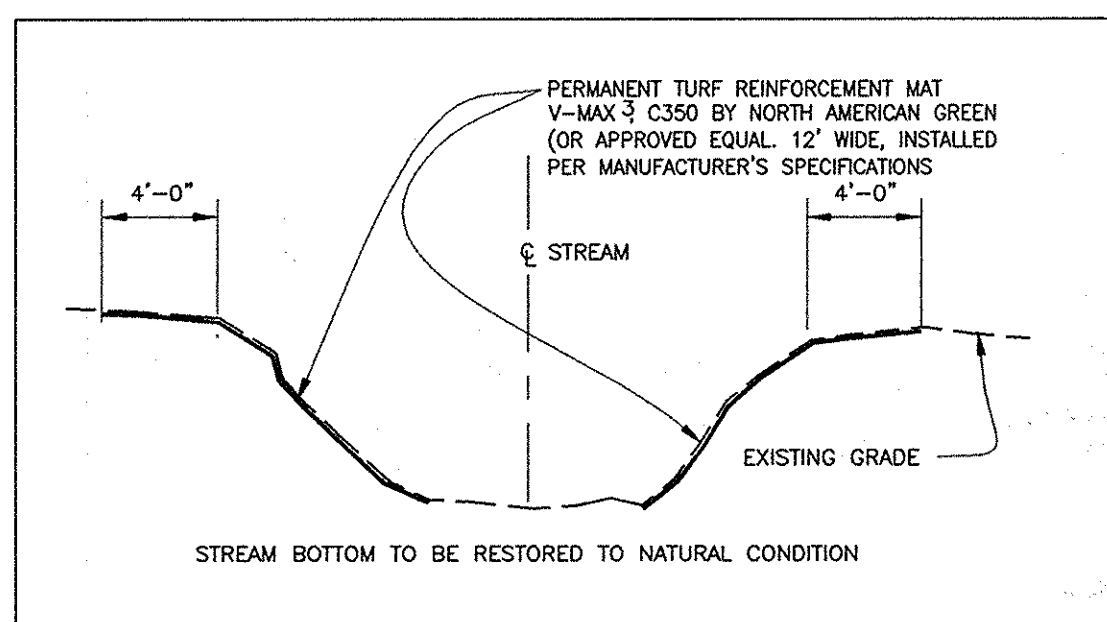
DETAIL 3.8(b): CROSS VANES



CROSS VANE
NOT TO SCALE

CROSS VANES INSTALLATION & MATERIALS

- Divert stream and dewater work area per design plans.
- Rocks to be a minimum of 3' in diameter and a minimum of 200 pounds. Footer rocks should be long and flat.
- Cross Vanes shall be installed per approved plans.
- Vane rocks to be placed on top of footer rocks so that each rock touches an adjacent rock and rests upon 2 halves of each footer rock below it and so that the vane rock is offset in the upstream direction.
- Cross Vanes to be firmly anchored a minimum of 2-3 rocks into the bank.
- Armor excavated bank with Class III rip rap.
- All disturbed area should be permanently stabilized in accordance with approved design plans.
- Adjust crossvanes to match current stream width.
- Assume Bankfull Height to be 2' above normal water surface elevation.



PERMANENT TURF REINFORCEMENT MAT DETAIL
NOT TO SCALE

MGCW 1.1: DEWATERING BASINS

Temporary measure for filtering sediment-laden water

DESCRIPTION

The work should consist of installing dewatering basins jointly with channel diversion measures to filter sediment-laden water from in-stream construction sites before the water re-enters the downstream reach.

EFFECTIVE USES & LIMITATIONS

Undersized dewatering basins will not adequately filter sediment-laden water from the construction site.

MATERIAL SPECIFICATIONS

Materials for dewatering basins should meet the following requirements:

- Riprap:** Riprap should be washed and have a diameter ranging from 4 to 6 inches (10 to 15 centimeters).
- Filter Cloth:** Filter cloth should be a woven or non-woven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric should be inert to commonly encountered chemicals, hydro-carbons, ultraviolet light, and mildew and should be rot resistant.
- Straw Bales/Silt Fence:** Straw bales should meet the criteria as specified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control.

INSTALLATION GUIDELINES

Due to the danger of overtopping by events greater than the design flow, dewatering basins require a vegetative buffer strip to filter sediment-laden overflow. A 50-foot (15-meter) minimum grass-covered buffer width is required for slopes less than 20 degrees (1:2.7) when right-of-way is not limited. For slopes greater than 20 degrees, basins should have a 100-foot (30-meter) minimum buffer width when practical.

All erosion and sediment control devices should be installed as the first order of business according to a plan approved by the Water Management Administration (WMA) or local authority. Dewatering basins should be constructed as follows (refer to Detail 1.1):

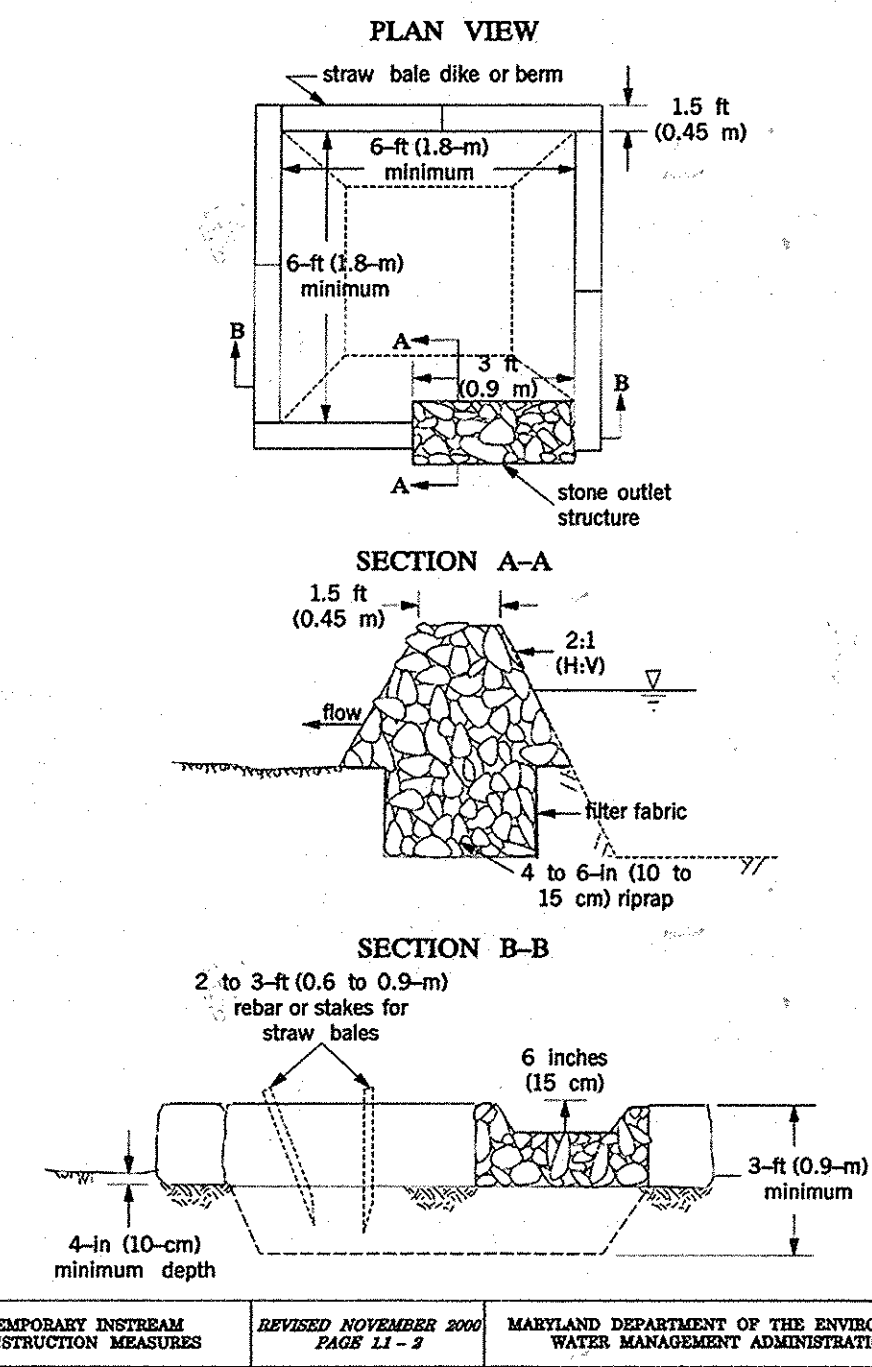
- Excavated subsoil and topsoil should be stored separately and replaced in their natural order. Additionally, the excavated sediments should be prevented from entering the waterway by using sediment perimeter controls or other measures.
- The dewatering basin should have a minimum depth of 3 feet (1 meter) where basin depth is measured from the top of the straw bales to the bottom of the excavation.
- Once the dewatering basin becomes filled to one-half of the excavated depth, accumulated sediment should be removed and disposed of in an approved area outside the 100-year floodplain unless otherwise authorized by the WMA.
- Sediment control devices should remain in place until all disturbed areas are stabilized and the inspecting authority approves their removal. All disturbed ground contours should be returned to their original condition unless otherwise approved by the WMA or local authority.

TEMPORARY INSTREAM CONSTRUCTION MEASURES

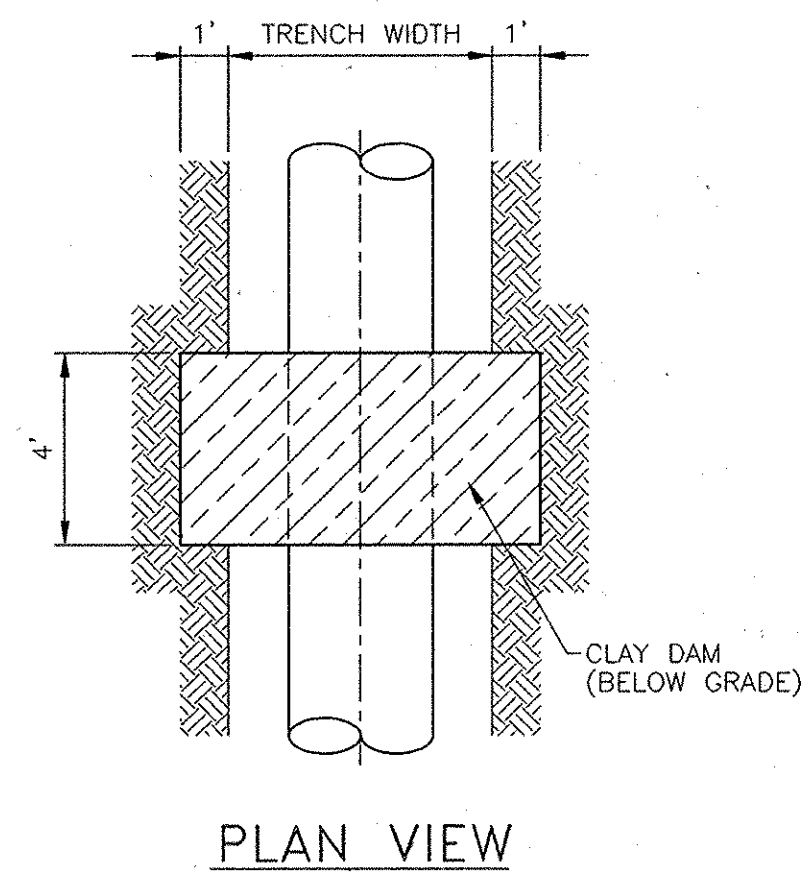
MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATERWAY CONSTRUCTION GUIDELINES
REVISED NOVEMBER 2000

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Maryland's Guidelines To Waterway Construction
DETAIL 1.1: DEWATERING BASINS



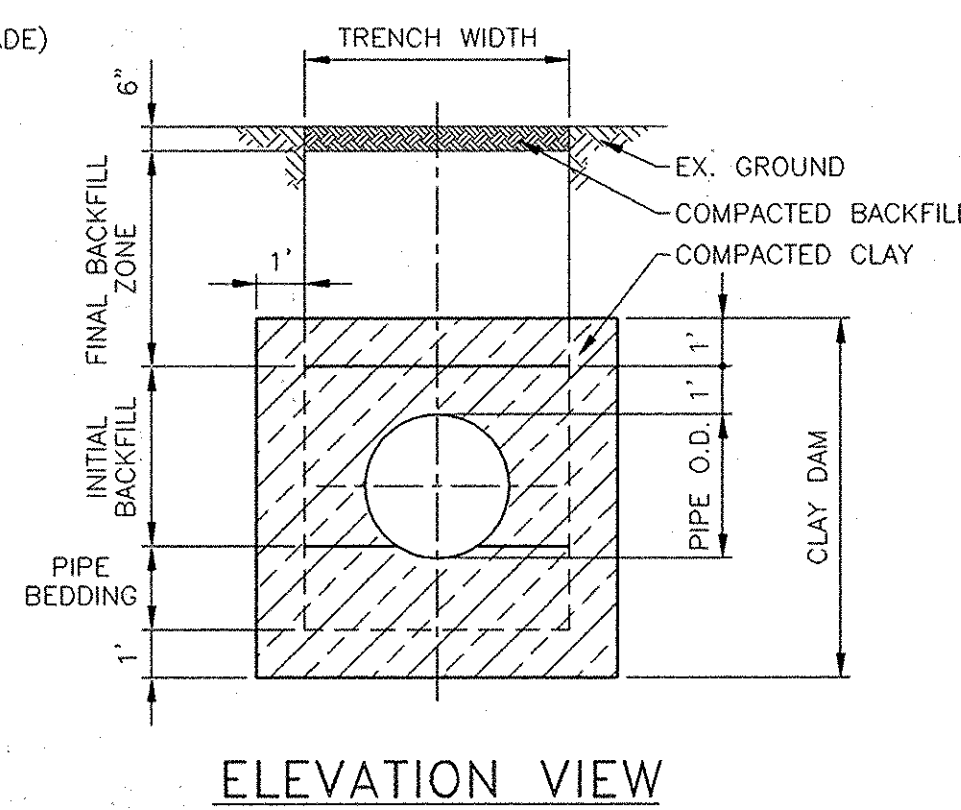
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WATERWAY CONSTRUCTION GUIDELINES



PLAN VIEW

CLAY DAM NOTES:

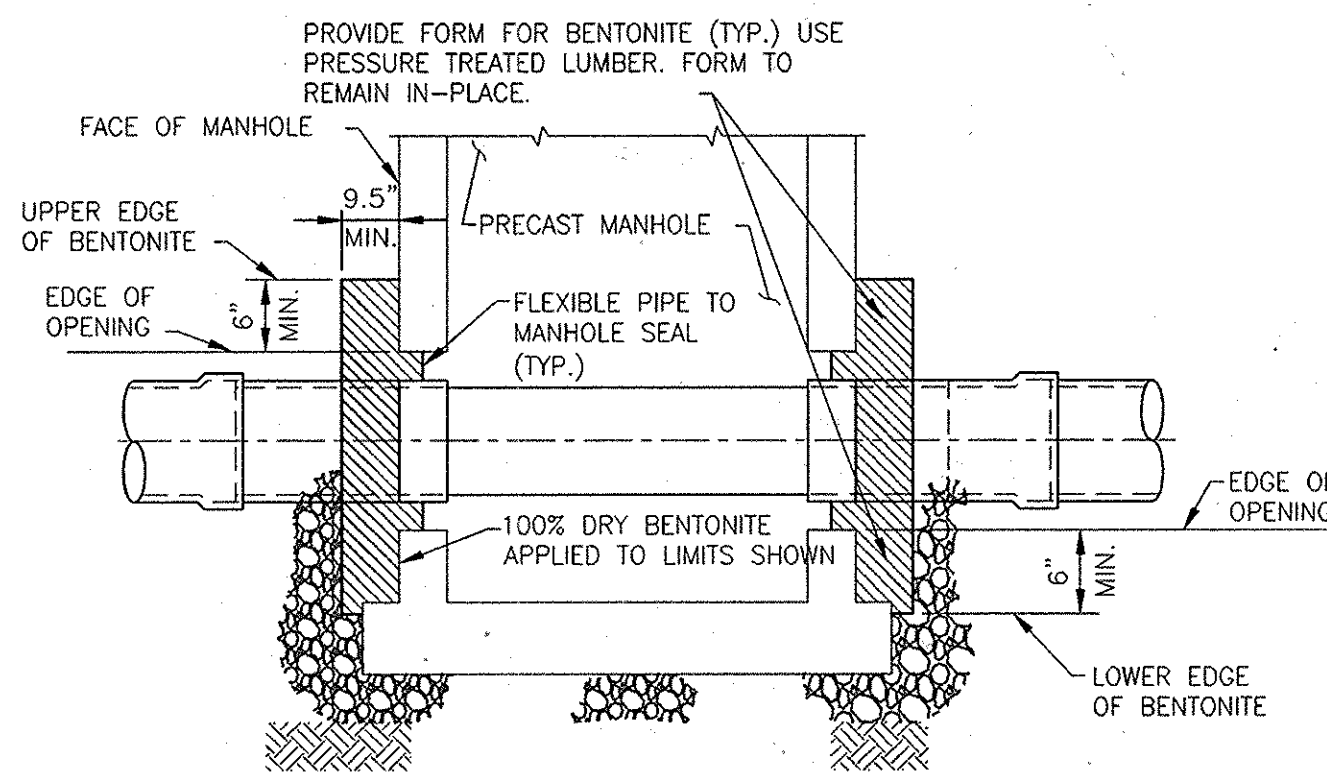
- CLAY DAM SHALL BE INSTALLED AT INTERVALS NO GREATER THAN 500 FEET AND AS SHOWN ON THE PLANS.
- CLAY DAM LENGTH SHALL BE 4 FEET ALONG THE PIPE AXIS, AND SHALL BE PLACED FROM UNDERCUT SUBGRADE OR TRENCH SUBGRADE UP TO 1 FOOT OVER THE INITIAL BACKFILL.
- PLACE CLAY DAM IN 6" LIFTS, USING CLAY MEETING THE REQUIREMENTS OF AASHTO M145 SOIL GROUPS A-6 OR A-7 AND COMPACT TO MIN. 92%.
- NO STONE SHALL BE USED IN THE BOTTOM OF THE TRENCH OR IN THE FINAL BACKFILL ZONE ALONG THE LENGTH OF THE DAM.



ELEVATION VIEW

CLAY DAM TYPICAL PIPE BEDDING DETAIL

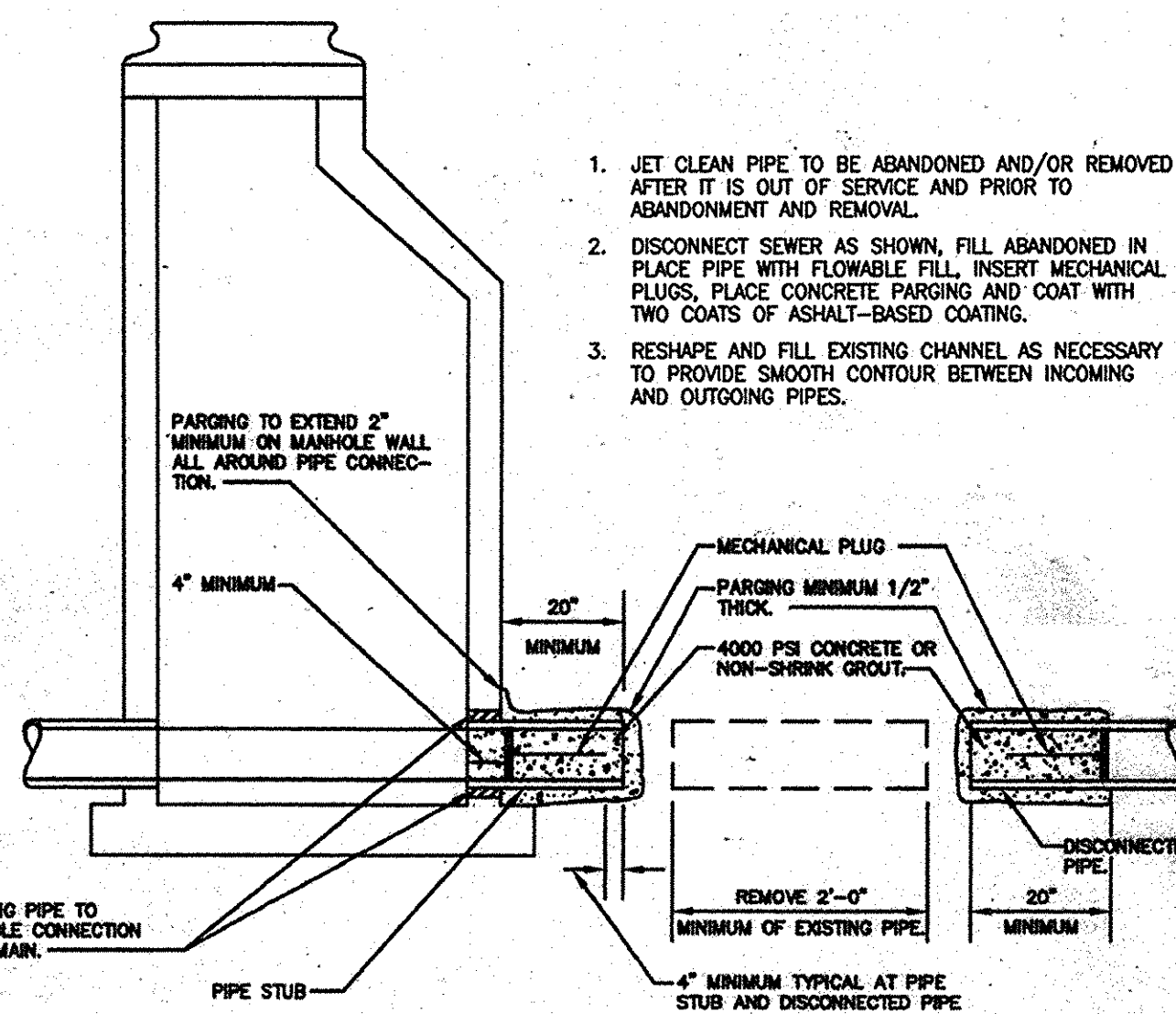
NO SCALE



PIPE TO MANHOLE CONNECTIONS

NOT TO SCALE

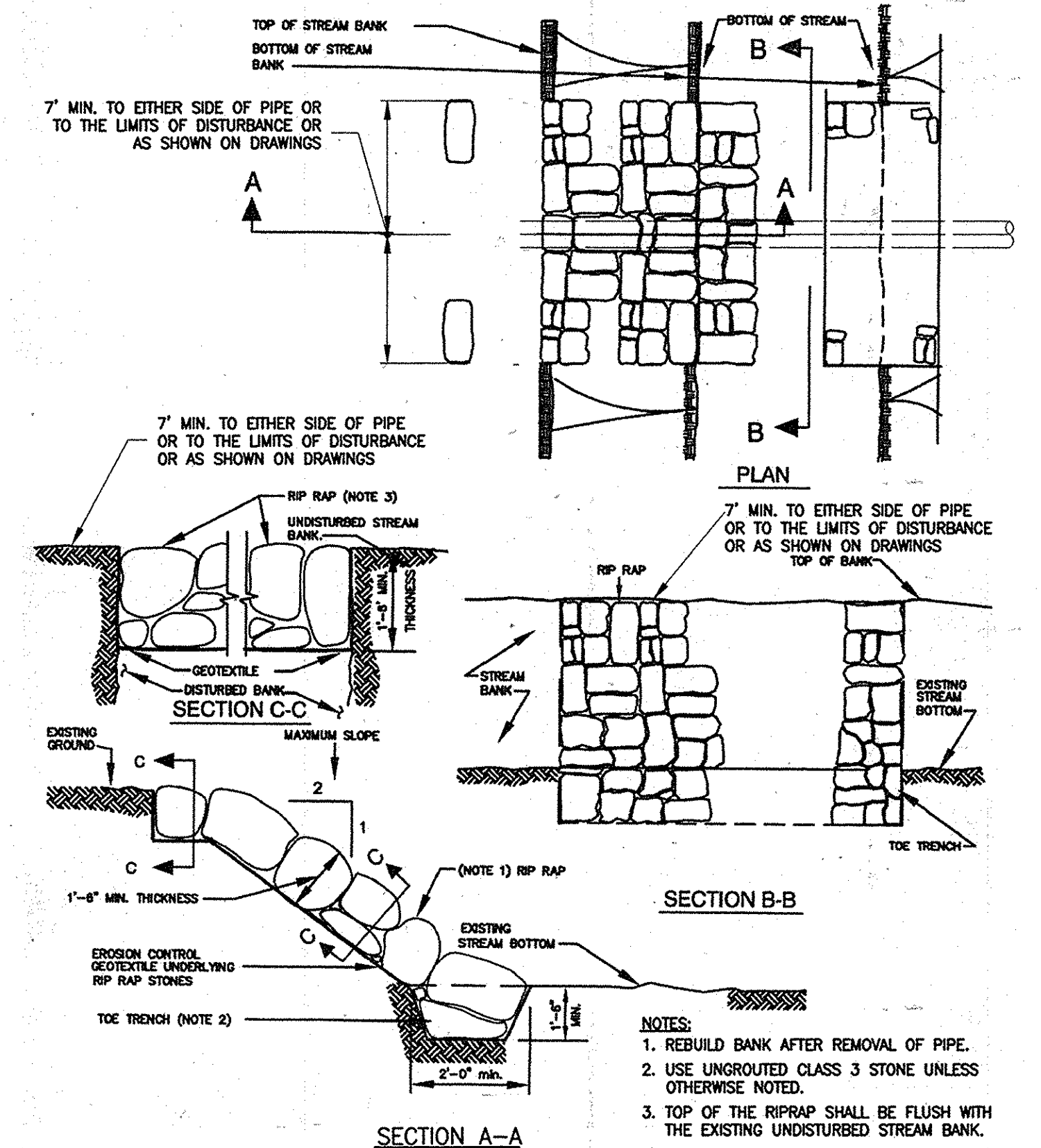
NOTES:



ABANDONMENT OF PIPE AT MANHOLE
AND LEFT IN PLACE

NOT TO SCALE

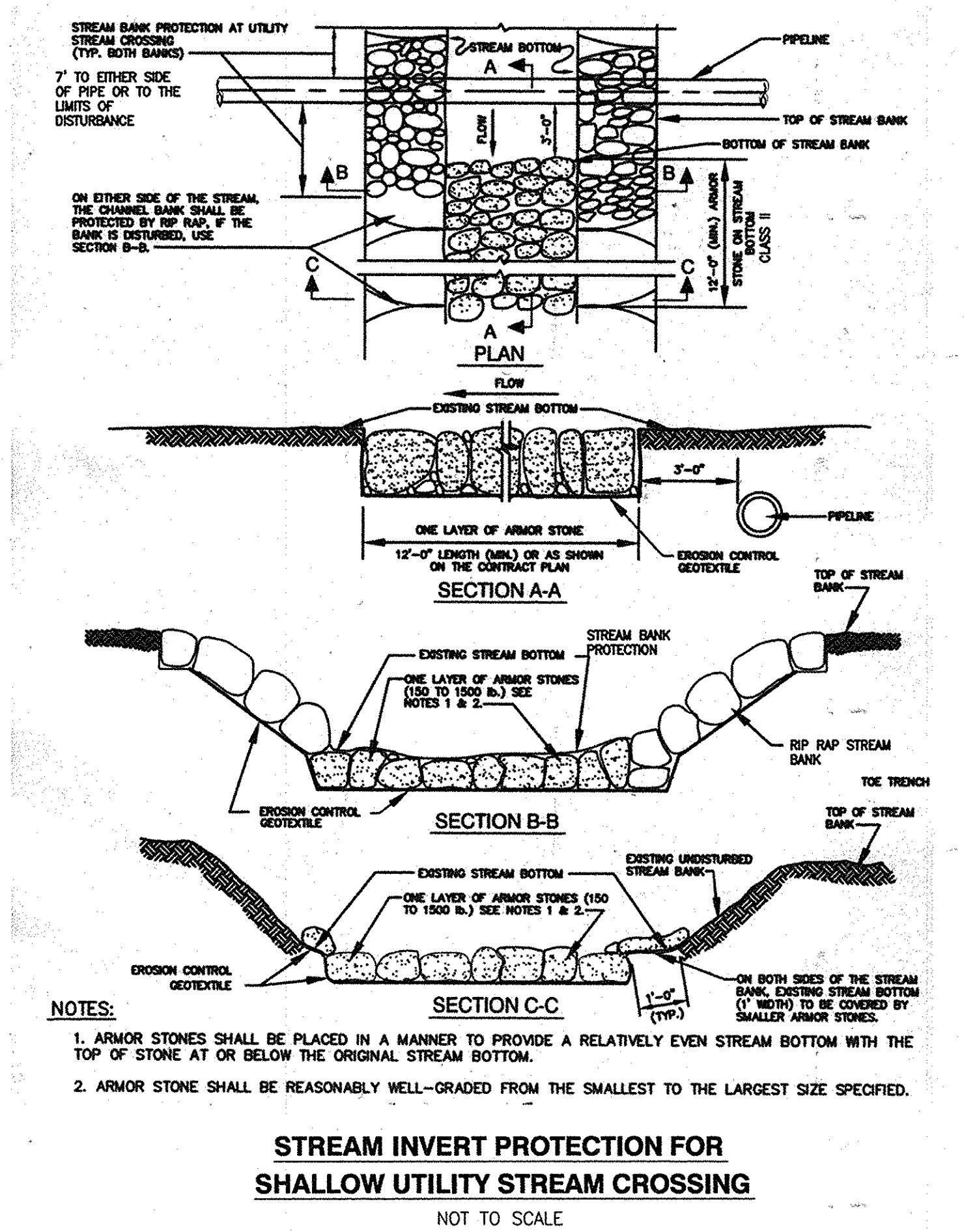
- JET CLEAN PIPE TO BE ABANDONED AND/OR REMOVED AFTER IT IS OUT OF SERVICE AND PRIOR TO ABANDONMENT AND REMOVAL.
- DISCONNECT SEWER AS SHOWN, FILL ABANDONED IN PLACE PIPE WITH FLOWABLE FILL, INSERT MECHANICAL PLUGS, PLACE CONCRETE PARGING AND COAT WITH TWO COATS OF ASHALT-BASED COATING.
- RESHAPE AND FILL EXISTING CHANNEL AS NECESSARY TO PROVIDE SMOOTH CONTOUR BETWEEN INCOMING AND OUTGOING PIPES.



STREAM BANK PROTECTION

NOT TO SCALE

- NOTES:
- REBUILD BANK AFTER REMOVAL OF PIPE.
 - USE UNGRADED CLASS 3 STONE UNLESS OTHERWISE NOTED.
 - TOP OF THE RIPRAP SHALL BE FLUSH WITH THE EXISTING UNDISTURBED STREAM BANK.



STREAM INVERT PROTECTION FOR
SHALLOW UTILITY STREAM CROSSING

NOT TO SCALE

- NOTES:
- ARMOR STONES SHALL BE PLACED IN A MANNER TO PROVIDE A RELATIVELY EVEN STREAM BOTTOM WITH THE TOP OF STONE AT OR BELOW THE ORIGINAL STREAM BOTTOM.
 - ARMOR STONE SHALL BE REASONABLY WELL-GRADED FROM THE SMALLEST TO THE LARGEST SIZE SPECIFIED.

03-01-2016

AS-BUILTS

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

Director of Public Works: *[Signature]* 4/15/14
Chief, Bureau of Utilities: *[Signature]* 4/15/14
Chief, Bureau of Engineering: *[Signature]* 4/15/14
Chief, Utility Design Division: *[Signature]* 4/15/14

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DES:	LAL				
DRN:	RLI				
CHK:	TND				
DATE:	04/2014	BY	NO.	REVISIONS	DATE

MISCELLANEOUS DETAILS

600' SCALE MAP NO. 37 38

BLOCK NO. 5

SHALLOW RUN SEWER RELOCATION
& STREAM RESTORATION

CAPITAL PROJECT NO. S-6268
CONTRACT NO. 10-4830
ELECTION DISTRICT NO. 5
HOWARD COUNTY, MARYLAND

SCALE:
AS
SHOWN

SHEET
8 OF 9

MGWC 2.1: RIPRAP

Rigid engineering technique for bank stabilization

DESCRIPTION

Riprap is used to protect and stabilize embankment soils from the erosive forces of flowing water and piping forces resulting from groundwater seepage. A well-engineered riprap system should consist of the following:

- a filter layer of gravel or cloth designed to prevent soil movement into or through the riprap layer while allowing water to drain from the embankment, and
- a stone layer of appropriate gradation and thickness to resist the shearing forces of channelized water.

EFFECTIVE USES & LIMITATIONS

When properly designed and installed, riprap is an effective method where soil conditions, water turbulence and velocity, expected vegetative cover, and groundwater conditions are such that the soil may erode under the design flow conditions. Some common areas of riprap applicability are:

- diversion channel banks and/or bottoms,
- roadside ditches,
- drop structure outlets, and
- laterally expanding banks threatening infrastructure or personal property.

Additionally, properly graded riprap forms a flexible, self-healing cover which can be easily repaired in localized areas by the timely replacement of stone. Uniform-grade riprap can also be used with a geotextile filter cloth.

Filter cloth should only be utilized when the bank material is noncohesive such as sand or gravel.

MATERIAL SPECIFICATIONS

- **Filters:** Material and design specifications for granular filters are found in Table 3.1a.

Table 3.1a: Granular Filter Material Gradation Specifications

% less than	U.S. Standard sieve size
100	2 1/4 in (64 mm)
85-100	1 in (25 mm)
60-100	1/2 in (13 mm)
35-70	No. 10
20-50	No. 40
3-20	No. 200

The thickness of the filter should not be less than 6 inches (15 cm). Generally, filters that are one-half the thickness of the riprap layer are satisfactory.

Synthetic filter cloth may be used cautiously based on the 1994 MD Standards and Specifications for Soil Erosion and Sediment Control.

- **Riprap:** The maximum diameter or weight of stone for riprap should be based upon the design flow velocity using Figure 3.1. This chart is based on a maximum slope of 2H:1V. The stone gradations for Classes I-III are found in Table 3.1b.

TEMPORARY INSTREAM CONSTRUCTION MEASURES

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MGWC 1.3: CULVERT PIPE WITH ACCESS ROAD

Temporary measure for providing access to stream enhancement sites

DESCRIPTION

The work should consist of installing a culvert pipe and associated access road for the purpose of erosion control when construction activities occur within the stream channel.

EFFECTIVE USES & LIMITATIONS

Culvert pipes with access roads can be used effectively for installation of utility lines at stream crossings.

Diversion which have an insufficient flow capacity can fail and severely erode the disturbed channel section under construction. Therefore, in-channel construction activities should occur only during periods of low rainfall.

MATERIAL SPECIFICATIONS

Materials for culverts with temporary access roads should meet the following requirements:

- **Riprap:** Riprap should be sized to resist a stream's baseflow if the duration of the project is less than one month. Otherwise, the riprap should be designed to resist bankfull discharge.
- **Sandbags:** Sandbags should consist of materials which are resistant to ultra-violet radiation, tearing, and puncture and should be woven tightly enough to prevent leakage of fill material (i.e., sand, fine gravel, etc.).
- **Sheeting:** Sheeting should consist of polyethylene or other material which is impervious and resistant to puncture and tearing.

INSTALLATION GUIDELINES

All erosion and sediment control devices including mandatory dewatering basins should be installed as the first order of business according to a plan approved by the WMA or local authority. Installation should proceed from upstream to downstream during low flow conditions. Additionally, all excavated material should be deposited and stabilized in an approved area outside the 100-year floodplain unless otherwise authorized by the WMA or local authority.

A culvert pipe with a temporary access road should be constructed as follows (refer to Detail 1.3):

1. Culverts should have a minimum capacity sufficient to convey the stream's base flow for projects with duration of 2 weeks or less. For projects of longer duration, culverts should have a capacity sufficient to convey the 2-year flow.
2. Sandbag or stone flow barriers should be sized and installed as detailed in MGWC 1.5: Sandbag/Stone Channel Diversion. The materials should be sized to withstand normal streamflow velocities.
3. All sediment laden flow from the construction site should be pumped to a dewatering basin built according to MGWC 1.1: Dewatering Basins prior to re-entering the stream.
4. Temporary culvert crossings should be constructed in accordance with the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control (refer to Section 4, Stream Crossings, Maryland Guidelines to Waterway Construction).

TEMPORARY INSTREAM CONSTRUCTION MEASURES

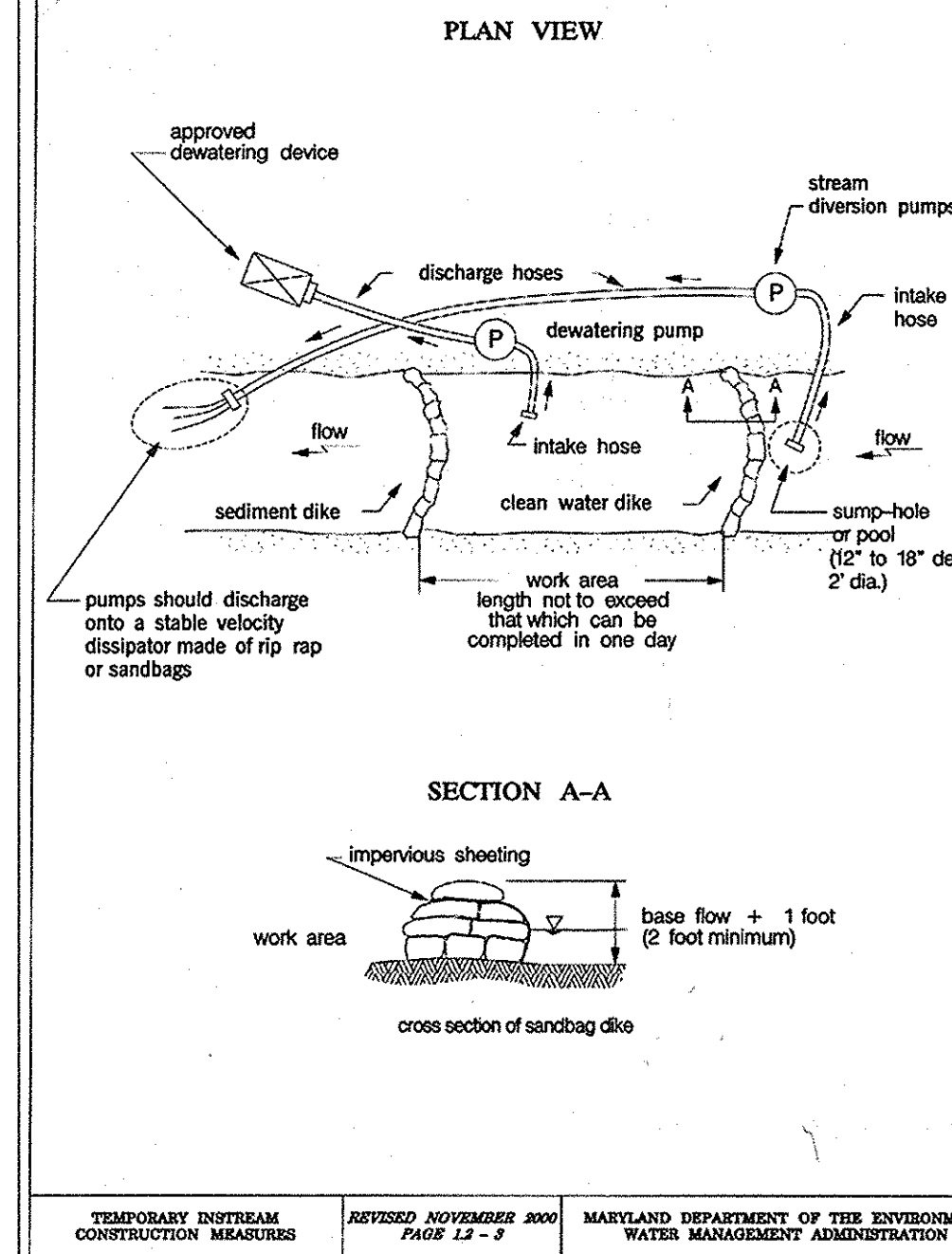
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MGWC 1.3: CULVERT PIPE WITH ACCESS ROAD

5. Velocity dissipation measures should be provided at the outfall to prevent aggravated erosion of the stream channel. If riprap is utilized, it should be sized according to MGWC 2.1: Riprap.
6. Sediment control devices should remain in place until all disturbed areas have been stabilized in accordance with an approved sediment and erosion control plan and the inspecting authority approves their removal.

**Maryland's Guidelines To Waterway Construction
DETAIL 1.2: PUMP-AROUND PRACTICE**



TEMPORARY INSTREAM CONSTRUCTION MEASURES
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MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATER MANAGEMENT ADMINISTRATION

MGWC 1.2: PUMP-AROUND PRACTICE

Temporary measure for dewatering in-channel construction sites

DESCRIPTION

The work should consist of installing a temporary pump around and supporting measures to divert flow around in-stream construction sites.

IMPLEMENTATION SEQUENCE

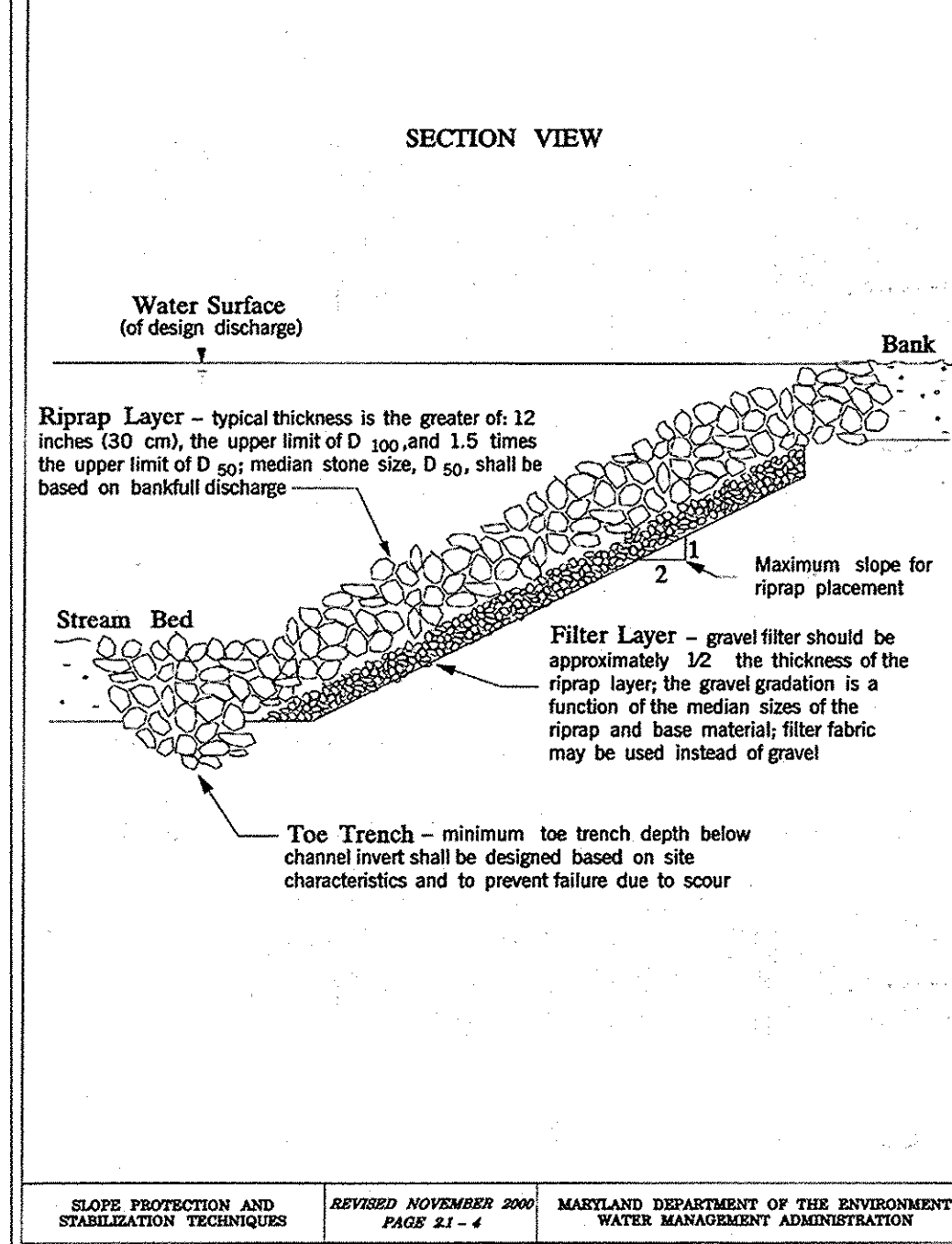
Sediment control measures, pump-around practices, and associated channel and bank construction should be completed in the following sequence (refer to Detail 1.2):

1. Construction activities including the installation of erosion and sediment control measures should not begin until all necessary easements and/or right-of-ways have been acquired. All existing utilities should be marked in the field prior to construction. The contractor should stake out all limits of disturbance prior to the pre-construction meeting so they may be reviewed. The participants will also designate the contractor's staging areas and flag all trees within the limit of disturbance which will be removed for construction access. Trees should not be removed within the limit of disturbance without approval from the WMA or local authority.
2. The contractor should notify the Maryland Department of the Environment or WMA sediment control inspector at least 5 days before beginning construction. Additionally, the contractor should inform the local environmental protection and resource management inspection and enforcement division and the provider of local utilities a minimum of 48 hours before starting construction.
3. The contractor should conduct a pre-construction meeting on site with the WMA sediment control inspector, the county project manager, and the engineer to review limits of disturbance, erosion and sediment control requirements, and the sequence of construction. The contractor should stake out all limits of disturbance prior to the pre-construction meeting so they may be reviewed. The participants will also designate the contractor's staging areas and flag all trees within the limit of disturbance which will be removed for construction access. Trees should not be removed within the limit of disturbance without approval from the WMA or local authority.
4. Construction should not begin until all sediment and erosion control measures have been installed and approved by the engineer and the sediment control inspector. The contractor should stay within the limits of the disturbance as shown on the plans and minimize disturbance within the work area whenever possible.
5. Upon installation of all sediment control measures and approval by the sediment control inspector and the local environmental protection and resource management inspection and enforcement division, the contractor should begin work at the upstream section and proceed downstream beginning with the establishment of stabilized construction entrances. In some cases, work may begin downstream if appropriate. The sequence of construction must be followed unless the contractor gets written approval for deviations from the WMA or local authority. The contractor should only begin work in an area which can be completed by the end of the day including grading adjacent to the channel. At the end of each work day, the work area must be stabilized and the pump around removed from the channel. Work should not be conducted in the channel during rain events.
6. Sandbag dikes should be situated at the upstream and downstream ends of the work area as shown on the plans, and stream flow should be pumped around the work area. The pump should discharge onto a stable velocity dissipater made of riprap or sandbags.

MGWC 1.2: PUMP-AROUND PRACTICE

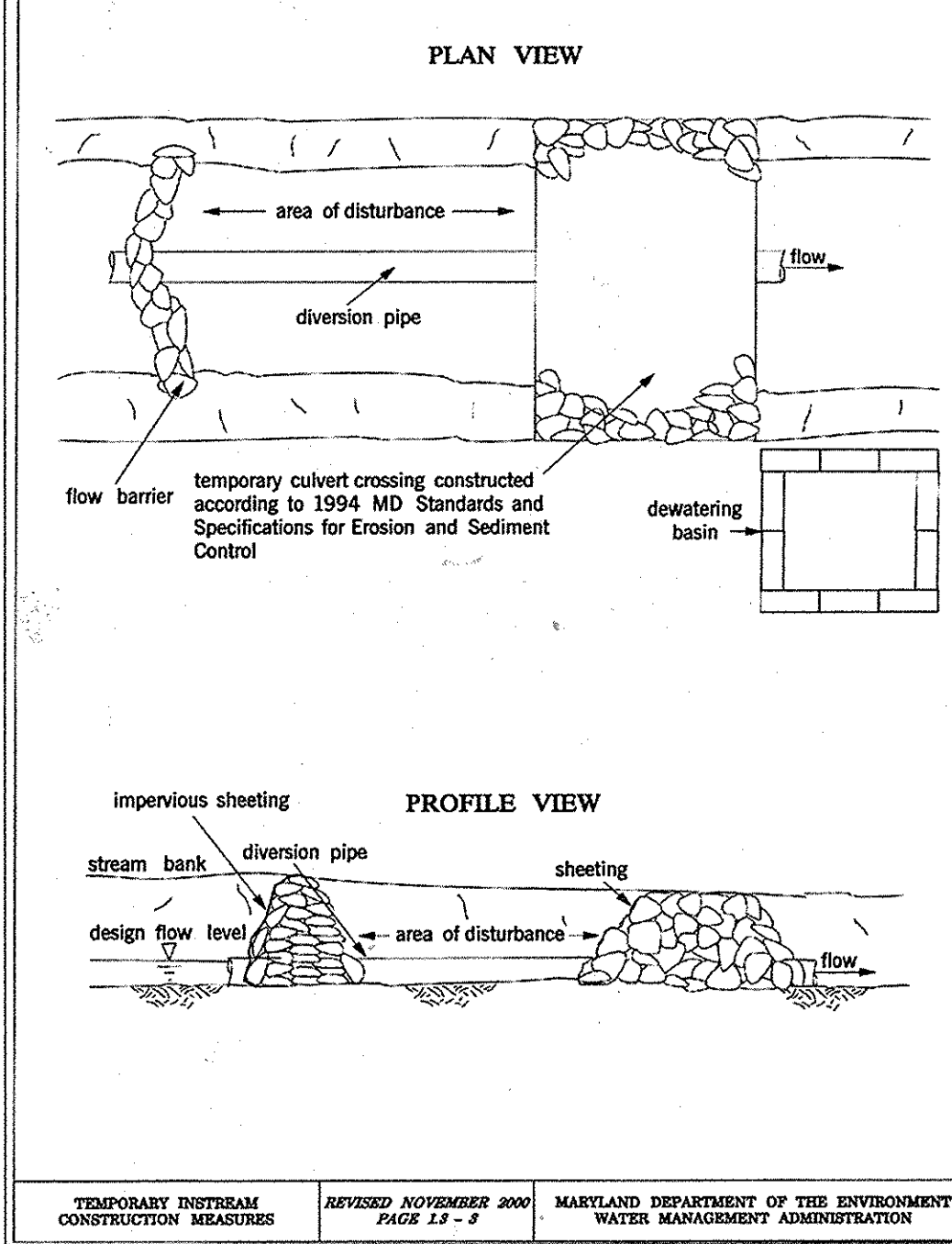
7. Water from the work area should be pumped to a sediment filtering measure such as a dewatering basin, sediment bag, or other approved source. The measure should be located such that the water drains back into the channel below the downstream sandbag dike.
8. Traversing a channel reach with equipment within the work area where no work is proposed should be avoided. If equipment has to traverse such a reach for access to another area, then timber mats or similar measures should be used to minimize disturbance to the channel. Temporary stream crossings should be used only when necessary and only where noted on the plans or specified. (See Section 4, Stream Crossings, Maryland Guidelines to Waterway Construction).
9. All stream restoration measures should be installed as indicated by the plans and all banks graded in accordance with the grading plans and typical cross-sections. All grading must be stabilized at the end of each day with seed and mulch or seed and matting as specified on the plans.
10. After an area is completed and stabilized, the clean water dike should be removed. After the first sediment flush, a new clean water dike should be established upstream from the old sediment dike. Finally, upon establishment of a new sediment dike below the old one, the old sediment dike should be removed.
11. A pump around must be installed on any tributary or storm drain outfall which contributes baseflow to the work area. This should be accomplished by locating a sandbag dike at the downstream end of the tributary or storm drain outfall and pumping the stream flow around the work area. This water should discharge onto the same velocity dissipater used for the main stem pump around.
12. If a tributary is to be restored, construction should take place on the tributary before work on the main stem reaches the tributary confluence. Construction in the tributary, including pump around practices, should follow the same sequence as for the main stem of the river or stream. When construction on the tributary is completed, work on the main stem should resume. Water from the tributary should continue to be pumped around the work area in the main stem.
13. The contractor is responsible for providing access to and maintaining all erosion and sediment control devices until the sediment control inspector approves their removal.
14. After construction, all disturbed areas should be regraded and revegetated as per the planting plan.

**Maryland's Guidelines To Waterway Construction
DETAIL 2.1: RIPRAP**



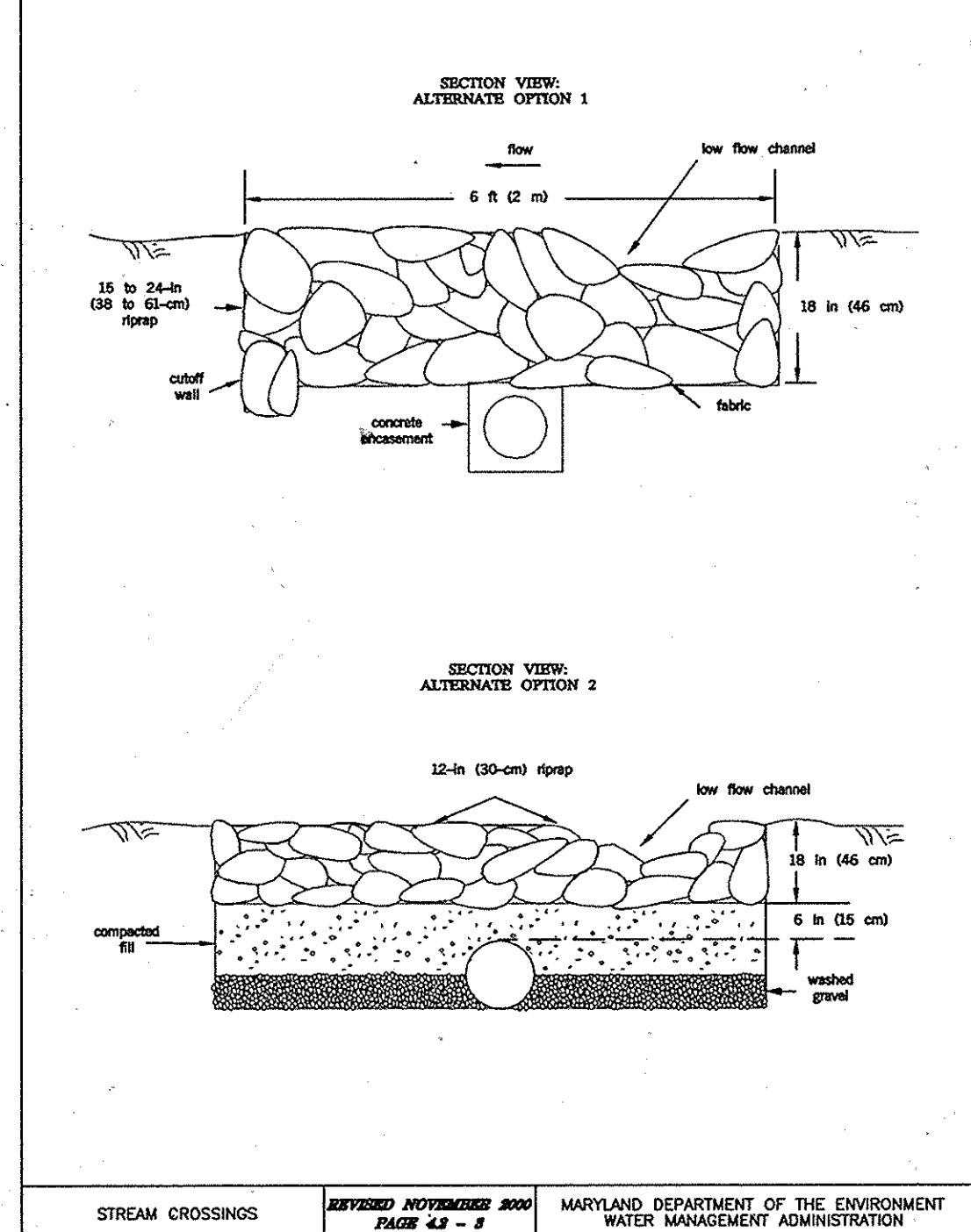
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**Maryland's Guidelines To Waterway Construction
DETAIL 1.3: CULVERT PIPE W/ACCESS ROAD**



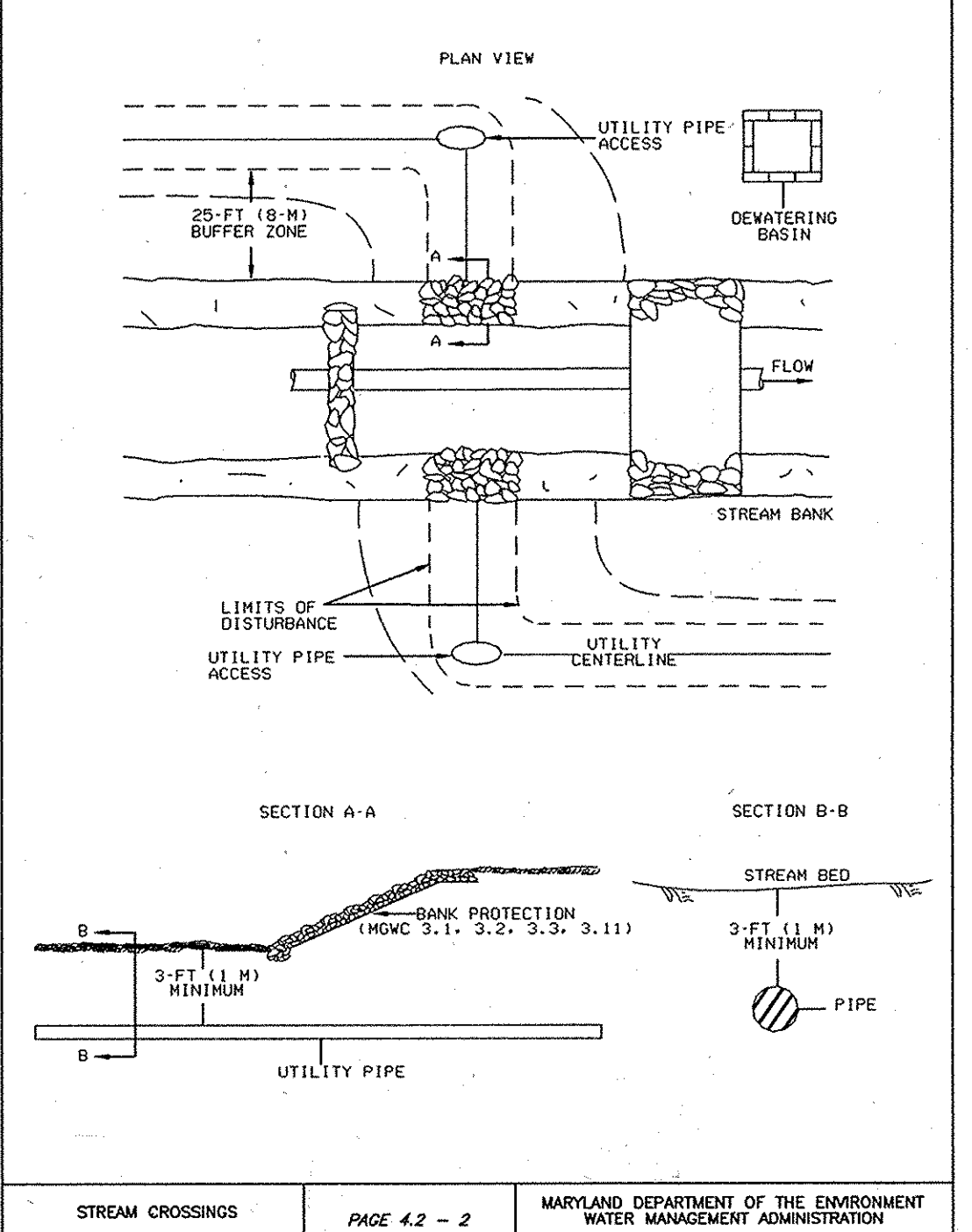
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**Maryland's Guidelines To Waterway Construction
DETAIL 4.2(b): UTILITY CROSSING**



STREAM CROSSINGS
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WATER MANAGEMENT ADMINISTRATION

**Maryland's Guidelines To Waterway Construction
DETAIL 4.2(a): UTILITY CROSSING**



STREAM CROSSINGS
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WATER MANAGEMENT ADMINISTRATION

**DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND**

Director of Public Works: [Signature] DATE: 4/12/14
 Chief, Bureau of Engineering: [Signature] DATE: 4/12/14
 Chief, Bureau of Utilities: [Signature] DATE: 4/12/14
 Chief, Utility Design Division: [Signature] DATE: 4/12/14

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DES: LAL					
DRN: RLI					
CHK: TND					
DATE: 04/2014					
BY NO.					
REVISIONS					
DATE					

**STREAM RESTORATION
SEDIMENT AND EROSION
CONTROL DETAILS & SPECIFICATIONS**

600' SCALE MAP NO. 37-38
BLOCK NO. 5

**SHALLOW RUN SEWER RELOCATION
& STREAM RESTORATION**

CAPITAL PROJECT NO. S-6268
CONTRACT NO. 10-4830
ELECTION DISTRICT NO. 5
HOWARD COUNTY, MARYLAND

SCALE: AS SHOWN
SHEET 9 OF 9

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