

SPECIAL CONSTRUCTION REQUIREMENTS FOR WORK PERFORMED IN THE VICINITY OF THE EXISTING 96" P.C.C.P. WATER MAIN

- Construction vehicles generating a load greater than an AASHTO H20 and vibratory compaction equipment are not permitted within 10 feet clear of the existing 96" P.C.C.P. water or sewer main(s).
- The Contractor shall submit construction vehicle specifications for all vehicles to be used closer than 10 feet clear of existing 96" P.C.C.P. water or sewer main(s) to the WSSC Relocations Unit for WSSC approval prior to commencing work over the mains.
- Stockpiling of soil or other material is not permitted within 10 feet clear of the mains.
- The contractor shall locate and stake out the existing 96" P.C.C.P. water or sewer mains and maintain the markers during construction. Unless otherwise approved by WSSC Relocations Unit, construction vehicles are not permitted within 10 feet clear of the 96" P.C.C.P. water or sewer mains at any time when less than 3'-0" of cover exists over the mains during construction. The Contractor is responsible for identifying areas where less than 3'-0" of soil cover will exist over the mains during his construction operations.
- All backfill and compaction over the 96" P.C.C.P. water or sewer mains with less than 3'-0" of soil cover must be performed manually and/or with vehicles positioned a minimum of 10 feet clear of the main(s) until 3'-0" of cover is achieved. If necessary, temporary fill shall be placed over the existing mains to allow WSSC approved vehicle traffic to cross over the pipeline.
- All exposed rocks, broken pavement, curbing and other unyielding debris having any dimension greater than three inches shall be removed from above the main(s) prior to placing and compacting fill, subgrade materials or paving over the main.
- The contractor shall notify the WSSC Construction Inspector, Mike Trail (301.206.4300), at least 5 days in advance of any grading or paving in the vicinity of the existing 96" P.C.C.P. water or sewer main(s). All grading and paving over the mains shall be coordinated and performed under the supervision of the WSSC Construction Inspector.
- The contractor shall use special care while performing work in the vicinity of the existing 96" P.C.C.P. water or sewer main where less than 3'0" of soil cover exists and strictly adhere to these special construction requirements. The Contractor is responsible for any damage and/or replacement required as result of his work over the mains.

Erosion and Sediment Control General Notes

- The developer is responsible for the acquisition of all required easement, right and/or rights-of-way pursuant to the discharge from the erosion and sediment control practices, stormwater management practices and the discharge of stormwater onto or across and grading or other work to be performed on adjacent or downstream properties affected by this plan.
- Following initial soil disturbance or redistribution, permanent or temporary stabilization shall be completed within: a) three (3) calendar days as to the surface of all perimeter controls, dikes, swales, ditches, perimeter slopes, and all slopes greater than three horizontal to one vertical (3:1) and b) seven (7) calendar days for all other disturbed or graded areas on the project site. The in-place sediment control measures will be maintained on a continuing basis until the site is permanently stabilized and all permit requirements are met.
- The owner/developer or representative shall request that the inspection authority approve work completed in accordance with the approved erosion and sediment control plan, the grading or building permit and shall obtain written inspection approvals by the Inspector at the following stages in the development of the site:
 - Prior to the start of earth disturbance.
 - Upon completion of installation of tree protection devices, followed by the installation of perimeter erosion and sediment controls, prior to proceeding with any other earth disturbance or grading. Other building or grading inspection approvals may not be authorized until initial approval by the Inspector is made;
 - Upon completion of stripping, the stockpiling of topsoil, the construction of temporary sediment and erosion control facilities, disposal of all waste material and preparation of the ground;
 - Upon completion of rough grading, but prior to placing topsoil, permanent drainage or other site development improvements and ground covers;
 - Prior to the start of another phase of construction or opening of another grading unit;
 - Prior to the removal of sediment control practices; and
 - Upon completion of final grading, reforesting, permanent drainage and erosion control facilities including established ground covers and planting, and all other work of the building permits.
- Approval shall be requested upon final stabilization of all sites with disturbed areas in excess of two acres before removal of controls.
- All permits under an erosion and sediment control plan must and can only be issued to the owner/developer that signs the certification on the plan. The owner/developer that signs the certification on an erosion and sediment control plan is the responsible party regardless of any sale of the property or work of subcontractors. Erosion and sediment control plans are approved for one owner/developer only.
- PGSCD approval of an erosion and sediment control plan, pursuant to meeting local permit requirements for grading, building or street permits, etc., is valid only when the work to be performed under the permit is the same as (no more/less than) that contained in the plan as approved by the PGSCD.
- Any changes or modifications to an approved erosion and sediment control plan, not approved by the PGSCD, shall invalidate the plan approval.
- Offsite borrow or spoil areas must have an approved and active erosion and sediment control plan.
- Temporary designed sediment basins shall be removed within 36 months after the beginning of construction of the basin.
 - The owner or engineer will notify PGSCD promptly in writing when construction is begun and when construction is completed.
 - The project shall be constructed under the supervision of the engineer-in-charge. Within 30 days of the completion of construction, the engineer-in-charge that designed the structure shall provide PGSCD with an As-Built plan and shall certify, with the engineer's seal, that the MD378 pond was constructed as shown on the As-Built plans.
 - The approval is valid only for use by the applicant and may not be transferred to another unless written approval for such transfer is obtained from PGSCD.

OWNER'S/DEVELOPER'S CERTIFICATION

"I/We hereby certify that I/we have reviewed this erosion and sediment control plan and that any clearing, grading, drainage, construction and/or development will be done pursuant to this approved plan, including inspecting and maintaining controls and that any responsible personnel involved in the construction project will have a Certificate of Training at a Maryland Department of the Environment approved training program for the control of erosion and sediment before beginning the project. Prince George's Soil Conservation District and the enforcement authority shall have the right of entry for periodic on-site evaluations."

Signature: *Terris S. Hrubc* Date: *7/31/19*

Name (printed): *Terris S. Hrubc* Title: *Director PC&D*

Ph#: *301-245-5177* Firm: *City of Greenbelt*

Completed address: *15 Cecelia Rd, Greenbelt MD 20723*

CONSULTANT'S CERTIFICATION

"I certify that this plan of erosion and sediment control represents a practicable and workable plan base on my personal knowledge of the site, and that this plan was designed and prepared in accordance with the requirements of the Prince George's Soil Conservation District and "Standards and Specifications for Soil Erosion and Sediment Control". I have reviewed this erosion and sediment control plan with the owner/developer."

Signature: *Brian K. Davila* MD License#: *19908* Date: *7/31/19*

Name (printed): *BRIAN K. DAVILA, P.E.*

(Include seal, company name, address and phone number if not included elsewhere on plan).

CHARLES P. JOHNSON & ASSOCIATES, 1751 ELTON ROAD, SILVER SPRING, MARYLAND 20903 (301) 434-7000

MISS UTILITY

Call "Miss Utility" at 1-800-257-7777, 72 hours prior to the start of work. The excavator must notify all public utility companies with underground facilities in the area of proposed excavation and have those facilities located by the utility companies prior to commencing excavation.

GREENBELT LAKE

(MD DAM No. 8) DAM REPAIRS

Sequence of Construction to Repair Greenbelt Lake Dam

Notes:

- This project involves phased work. After completing a phase of the project, the contractor is expected to leave the site in a permanently stabilized condition.
- For earthwork of any kind, the contractor must submit a cut sheet to the Engineer-in-Charge 72 hours in advance of earthwork operations.
- All concrete, earthwork, and subsurface work should be completed under supervision of a professional geotechnical engineer.
- Prior to issuing a grading permit, a pre-construction meeting must be conducted on-site with the Owner's representative (240-542-2042 48 hours' notice), the MDE Dam Safety Engineer (410-901-4042 five days' notice), the Engineer-in-Charge (301-434-7000 48 hours' notice), the WSSC Inspector (301-206-4300 five days' notice) and the Contractor.

Phase 1 - Lake Drain Repair (to be completed on or before November 1, 2015 - 41 DAY DURATION PLUS RECORD DRAWING TIME) (COMPLETED)

- Clear and grub for installation of sediment control devices for access to site and staging and stockpile area (2 DAYS).
- Install stabilized construction entrance from the Greenbelt Lake Dam access road (1 DAY).
- Install perimeter sediment controls for access to site and staging and stockpile area (2 DAYS).
- Clear and grub for installation of sediment controls and install sediment controls including clean water diversion earth dike (install from downstream to upstream) with mountable berm and silt fence as shown on Phase 1 sediment control plan (5 DAYS).
- Clear and grub for excavation and replacement of the existing 24" C.M.P. lake drain pipe extension (2 DAYS).
- Excavate the existing 24" C.M.P. lake drain pipe extension from downstream to upstream to the connection with the existing 24" C.I.P. lake drain pipe. Remove and dispose of existing end wall, weep drains, and 24" C.M.P. Contractor is to take extreme care when working over and around existing 42" and 96" water mains. Coordinate work with W.S.S.C. Inspector (5 DAYS).
- Complete CCTV inspection of existing 24" C.I.P. (5 DAYS).
- Prepare existing 24" C.I.P. lake drain pipe for connection to proposed manhole (MH2) location (1 DAY).
- Install manhole MH2, 24" R.C.P. lake drain pipe stub, and (2) 6" P.V.C. toe drain pipe stubs (2 DAYS).
- Form, reinforce and pour concrete collars around all pipe connections to manhole MH2 (3 DAYS).
- Install 24" R.C.P. lake drain pipe and end wall EW2 from downstream to upstream and connect to 24" R.C.P. pipe stub at manhole MH2. Contractor is to take extreme care when working over and around existing 42" and 96" water mains. Coordinate work with W.S.S.C. Inspector (5 DAYS).
- Backfill excavation to existing grade per MD-378 specifications and stabilize (5 DAYS).
- Install riprap channel at end wall EW-2 (2 DAYS).
- Complete repair items pertaining to the existing lake drain manhole MH1 and install valve stem extension to the top of the existing manhole MH3 (3 DAYS).
- Exercise and lubricate lake drain valve in existing manhole MH1 (1 DAY).
- Install valve stem extension (2 DAYS).
- Upon completion of this phase of construction, stabilize all disturbed areas per soil stabilization notes and remove all sediment control devices with the approval of the Sediment Control Inspector (1 DAY).
- Complete record drawing survey and plan (by Engineer-in-Charge) and submit to MDE within 60 days of completion of the work (60 DAYS).

Phase 2A - Chimney Filter and Toe Drain Installation - 55 DAY DURATION PLUS RECORD DRAWING TIME (NOT STARTED)

- Clear and grub for installation of sediment controls and install sediment controls including temporary gabion outlet structure, earth dikes (install from downstream to upstream), and super silt fence, and silt fence as shown on Phase 2 sediment control plan (5 DAYS).
- Clear and grub for installation of toe drain and chimney filter (5 DAYS).
- Excavate for installation of the toe drain. Excavation must use trench boxes or provide 2H:1V layback as well as comply with all applicable OSHA regulations (3 DAYS).
- Install toe drain media and 6" P.V.C. toe drain pipes and connect to proposed manhole MH3 (7 DAYS).
- Excavate for chimney filter (10 DAYS).
- Install chimney filter on the downstream slope of the embankment. Contractor is to take extreme care not to damage existing observation wells (15 DAYS).
- Backfill and install topsoil over chimney filter and toe drain and complete finalized grading per grading plan (7 DAYS).
- Upon completion of this phase of construction, stabilize all disturbed areas per soil stabilization notes and remove all sediment control devices with the approval of the Sediment Control Inspector (3 DAYS).
- Complete record drawing survey and plan (by Engineer-in-Charge) and submit to MDE within 60 days of completion of the work (60 DAYS).
- Concurrently contractor is to slip-line and remove and replace existing 24" R.C.P., installed from Phase 1. Limits are shown on plan.

Phase 2B - Embankment Raising - 32 DAY DURATION PLUS RECORD DRAWING TIME (Contractor to submit shop drawings for design build for repairs to existing bridge in a timely fashion. (NOT STARTED)

- Clear and grub for installation of sediment controls and install sediment controls including silt fence as shown on Phase 3 sediment control plan (5 DAYS).
- Clear and grub for installation of fill to raise and level embankment (2 DAYS).
- Remove existing access road graded aggregate base material and stockpile for reuse (3 DAYS). Contractor to perform bridge repairs.
- Raise existing lake drain manhole MH1 and existing sewer manhole located in the graded aggregate base access road to their proposed grades (5 DAYS).
- Install embankment fill per MD-378 specifications to proposed grade. Contractor is to take extreme care not to damage existing observation wells (10 DAYS).
- Install access road consisting of graded aggregate base course surface to proposed grade (5 DAYS).
- Upon completion of this phase of construction, stabilize all disturbed areas per soil stabilization notes and remove all sediment control devices with the approval of the Sediment Control Inspector (2 DAYS).
- Complete record drawing survey and plan (by Engineer-in-Charge) and submit to MDE within 60 days of completion of work (60 DAYS).

Phase 3 - Spillway Repair - 59 DAY DURATION (NOT STARTED)

- Use the lake drain to lower the lake level to elevation 100.00. Lake draw-down may not exceed six inches per day. During this time, the lake drain valve is to remain open and operable in order to pass base flow through the lake and control the lake level in the during storm events (20 DAYS).
NOTE: Initial opening of valve must not occur during stream closure date of March 1 thru June 15.
- Install sediment controls including temporary stone outlet structure, clean water earth dikes (install downstream to upstream) and temporary diversion wall barrier around work area as shown on the plan. Temporary stone outlet structure to be keyed into side slopes of spillway. Contractor to monitor outlet structure to ensure that stabilization is maintained during construction (7 DAYS).
- Demolish and remove existing spillway from the upstream end in the lake to a point downstream equal to the downstream side of the existing bridge. Take care to not damage existing concrete bridge abutments which are to remain in their entirety (10 DAYS).
- Prepare subgrade for new concrete spillway. Use a mudmat if necessary. DO NOT USE GRAVEL, STONE, OR AGGREGATE UNDER THE SPILLWAY (5 DAYS).
- Form, reinforce, and pour the new concrete spillway (15 DAYS).
- Upon completion of this phase of construction, stabilize all disturbed areas per soil stabilization notes and remove all sediment control devices with the approval of the Sediment Control Inspector (2 DAYS).

Project Completion (Continuation of Phase 3 - 75 DAY DURATION)

- Once all work is completed, contact the Engineer-in-Charge and the MDE Dam Safety Engineer to hold a punch list inspection of the entire project (5 DAY WINDOW).
- Address all punch list items (10 DAYS).
- Complete record drawing survey and plan (by Engineer-in-Charge) and submit to MDE within 60 days of completion of the punch list by the contractor. Final Record Drawing and accompanying report should cover entire project and include all documentation (60 DAYS).



VICINITY MAP

SCALE: 1"=2000'

Map Copyright © Koppa Map Group, INC.
(800) 829-6277 Used with Permission
Prince George's County Map# 5288 Grid H10

SITE ADDRESS:
BUDDY ATTKICK PARK
555 CRESCENT ROAD
GREENBELT, MD 20770

General Notes:

- Only approved plans that have been signed by the appropriate regulatory authority shall be used for the construction of the improvements shown on these drawings. CAD or other electronic files are not to be used for construction purposes.
- These plans do not include the necessary precautions for construction safety. The contractor shall perform work in accordance and compliance with Health and Safety Acts of 1970 and all rules and regulations thereto appurtenant.
- The existing utilities shown hereon have been located using information available at the time this plan was prepared. Prior to digging, the contractor shall locate all existing utilities via hand-dug test pit within the limits of construction shown on this plan and confirm that no conflicts exist. Conflicts must be brought to the attention of the Owner and CPJ prior to starting construction.
- Prior to grading, installation of structures or treatments, or any work that involves earthwork of any kind, the contractor shall provide cut sheets to the Owner and CPJ a minimum of 72 hours in advance of work for review.
- The contractor is responsible for repairing, replacing, or reconstruction all site features (e.g. pavement, sidewalk, curb, gutter, trees, landscaping, benches, mailboxes, utilities, etc.) damaged as a result of project work.
- Prior to vegetative stabilization, all disturbed areas must be topsoil per the Maryland Department of the Environment Standards and Specifications for Topsoil.

Project Notes:

- The survey datum for this project is horizontally: Maryland State Plane 1983 NRSR 2007 and vertically: NAVD 1988. The contractor shall use the marked survey traverse points shown on the plan to complete the work.
- There is no Federal Emergency Management Agency (FEMA) 100 year floodplain located on the project site per FEMA Flood Insurance Rate Map (FIRM) 2452080015D Effective December 15, 1989.
- This dam is a Class 'C' (High) hazard structure based on a dam breach analysis completed by Charles P. Johnson & Associates, Inc. and accepted by the Maryland Department of the Environment.

Stabilization Note:

Stabilization practices on all projects must be in compliance with the requirements of COMAR 26.17.1.08 g regulations by January 9, 2013, regardless of when an erosion and sediment control plan was approved.

Following initial soil disturbance or re-disturbance, permanent or temporary stabilization must be completed within:

- Three (3) calendar days as to the surface of all perimeter dikes, swales, ditches, perimeter slopes, and all slopes steeper than 3 horizontal to 1 vertical (3:1); and
- Seven (7) calendar days as to all other disturbed or graded areas on the project site not under active grading.

GREENBELT LAKE DAM REPAIRS - Sediment Control Narrative

Site Analysis

The project is located in Greenbelt, Maryland east of the intersection of Kenilworth Avenue and the Capital Beltway and just south of Crescent Rd. The dam is located on a 91.59 acre property owned by the City of Greenbelt. The property consists of a lake, dam and recreational paths. Existing topography shows that the top of dam is at an elevation of 113.30 +/- and the existing outfall is approximately at an elevation of 86.00 +/-, it has been determined that seepage is occurring through the base of the berm between the lake and the lower embankment.

The drainage area to Greenbelt Lake is approximately 0.8 square miles. Wetlands and forested areas exist on the site, mainly to the west and south. Wetlands were located near the downstream toe of the dam and appear to be caused by poor drainage. Impacts from an adjacent water main, or both. Several large trees were located on the downstream embankment of the dam and will have to be removed as part of the retrofit. A Natural Resource Inventory and Forest Stand Delineation (NRI/FSD) have been completed is being reviewed and approved by the Maryland-National Capital Park and Planning Commission. All natural resources have been identified and integrated with the proposed design.

Proposed Project Design and Environmental Site Development

The project will be completed over a four year phased plan. Overall, the pond retrofit includes the replacement of the corrugated metal pipe (C.M.P.) portion of the existing pond drain, installation of a chimney filter, raising the top of dam, replacing the concrete flume spillway, and re-grading the downstream embankment to improve drainage. The top of dam embankment will be raised to elevation 114.50. While there are impacts to the existing wetlands downstream of the dam they are considered minor in nature and authorization is being obtained from the Maryland Department of the Environment's Non-Tidal Wetlands Division.

Soils were mapped by use of United States Department of Agriculture Natural Resource Conservation Service Wed Soil Survey. An area of interest was delineated around the site and the following results were obtained. The area is made up of a mixture of type B and D soils. The B soil contained within the site are Udorthents, loamy, 5 to 15 percent slopes and the D soils are Zekiah and Issue soils, flooded frequently. All construction within the limit of disturbance (LOD) and any portion of highly erodible soils shall be immediately and permanently stabilized upon completion of construction. This shall control any erosion which may occur during the construction process.

The Greenbelt Lake Retrofit site is located in the Tier II watershed of the Anacostia River. The Maryland Department of the Environment identified this watershed as biologically impaired in 2006. Greenbelt Lake flows to Indian Creek, a tributary of the Anacostia River. Accelerated stabilization will also be implemented to protect the watershed against added sediment runoff. Super silt fence will be placed around portions of the LOD that are next to the stream and lake and silt fence will be placed around all other portions of the LOD. Where possible, clean water earth dikes will be used to divert clean water around open grading work areas. In addition, all runoff from the site will be filter using gabion or stone outlet structures or silt/super silt fencing. During replacement of the concrete spillway, the lake will be lowered and the lake drain valve opened to allow discharge from the lake without impacting the work area.

The site has been designed to avoid sensitive and natural resource areas to the maximum extent practicable. However, small portions of forests will need to be removed to maintain the integrity of the dam and complete the retrofit design. Forest surrounds the downstream channel and portions of the downstream embankment. Several large trees from the downstream embankment and small areas of forest near the downstream toe of the dam will be removed (approx. 0.192 acres).

TRAVERSE TABLE

POINT #	NORTHING	EASTING	ELEVATION	TYPE
19501	N 486,509.45	E 1,343,336.21	113.44	REBAR & CAP
19502	N 486,811.11	E 1,343,360.46	112.74	REBAR & CAP

PRINCE GEORGE'S SOIL CONSERVATION DISTRICT
FINAL APPROVAL
GRADING, EROSION AND SEDIMENT CONTROL
08/07/2019
FSC# 23-15-01
EXPIRATION DATE: 08/07/2019

POND (P#) MDE
DISTRICT SIGNATURE: *[Signature]* APPROVAL DATE: 08/07/2019
CSC/SSC # 23-15
update # 01 08/07/2019 KAJ

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 # 19908
EXPIRATION DATE: 10/20/21

WETLAND NOTE:

IT IS THE APPLICANT'S RESPONSIBILITY TO OBTAIN ANY STATE PERMITS, IF REQUIRED, FOR ANY CONSTRUCTION ACTIVITY COVERED BY THIS PLAN WHICH IMPACTS A STATE REGULATED WETLAND. ANY CHANGES TO PLANS FOR THIS DEVELOPMENT WHETHER REQUIRED BY THE STATE OR INITIATED BY THE APPLICANT TO MEET STATE REQUIREMENTS, MUST BE APPROVED BY PGSCD.

"I hereby certify that this plan conforms to Subtitle 32, Division 2 of the Grading, Drainage, and Erosion & Sediment Control Code of Prince George's County, Maryland".

Signature: *[Signature]* Date: *7/31/19*

"I certify that I have inspected this site and that drainage onto this site from other properties and from this site to other properties, has been addressed in substantial accordance with applicable codes."

Signature: *[Signature]* Date: *7/31/19*

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

- No excess fill, construction material, or debris shall be stockpiled or stored in nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Place materials in a location and manner which does not adversely impact surface or subsurface water flow into or out of nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Do not use the excavated material as backfill if it contains waste metal products, unsightly debris, toxic material, or any other deleterious substance. If additional backfill is required, use clean material free of waste metal products, unsightly debris, toxic material, or any other deleterious substance.
- Place heavy equipment on mats or suitably operate the equipment to prevent damage to nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Repair and maintain any serviceable structure or fill so there is no permanent loss of nontidal wetlands, nontidal wetland buffers, or waterways, or permanent modification of the 100-year floodplain in excess of that lost under the originally authorized structure or fill.
- Rectify any nontidal wetlands, wetland buffers, waterways, or 100-year floodplain temporarily impacted by any construction.
- All stabilization in the nontidal wetland and nontidal wetland buffer shall consist of the following species: Annual Ryegrass (*Lolium multiflorum*), Millet (*Setaria italica*), Barley (*Hordeum sp.*), Oats (*Avena sp.*), and/or Rye (*Secale cereale*). These species will allow for the stabilization of the site while also allowing for the voluntary revegetation of natural wetland species. Other non-persistent vegetation may be acceptable, but must be approved by the Nontidal Wetlands and Waterways Division. Kentucky 31 fescue shall not be utilized in wetland or buffer areas. The area should be seeded and mulched to reduce erosion after construction activities have been completed.
- After installation has been completed, make post-construction grades and elevations the same as the original grades and elevations in temporarily impacted areas.
- To protect aquatic species, in-stream work is prohibited as determined by the classification of the stream:
 - Use I waters: In-stream work shall not be conducted during the period March 1 through June 15, inclusive, during any year.
 - Use III waters: In-stream work shall not be conducted during the period October 1 through April 30, inclusive, during any year.
 - Use IV waters: In-stream work shall not be conducted during the period March 1 through May 31, inclusive, during any year.
- Stormwater runoff from impervious surfaces shall be controlled to prevent the washing of debris into the waterway.
- Culverts shall be constructed and any riprap placed so as not to obstruct the movement of aquatic species, unless the purpose of the activity is to impound water.

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COVER SHEET

MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND

CPJ Associates
Charles P. Johnson & Associates, Inc.
Civil and Environmental Engineers • Planners • Landscape Architects • Surveyors
1751 Elton Rd., Ste. 300 Silver Spring, MD 20903 301-434-7000 Fax: 301-434-9394
www.cpja.com • Silver Spring, MD • Gaithersburg, MD • Annapolis, MD • Greenbelt, MD • Frederick, MD • Fairfax, VA

CLIENT:	CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MRS. CELIA CRAZE	PRELIMINARY PLAN NO:	N/A	SHEET	OF	DATE	FEB, 2015	FILE NO.:	
DESIGN	IMV			1	22				
SCALE	AS-SHOWN								38-146-241

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MASTER LEGEND

EXISTING CONTOURS	----- 452 -----
EXISTING INDEX CONTOURS	----- 450 -----
PROPOSED CONTOURS	===== 452 =====
PROPOSED INDEX CONTOURS	===== 450 =====
EXISTING STORM DRAIN PIPE	----- EX. 36" C.M.P. -----
PROPOSED STORM DRAIN PIPE	===== 36" C.M.P. =====
OVERALL PROPOSED LIMITS OF DISTURBANCE	----- LOS -----
PROPOSED LIMITS OF DISTURBANCE (BY PHASE)	----- LOD -----
DRAINAGE DIVIDE	-----
DRAINAGE FLOWPATH POINT	(A)
FLOWPATH	-----
NORMAL POOL WATER SURFACE ELEV.	-----
EXISTING STREAM	-----
100 YEAR WATER SURFACE ELEV.	-----
PROPOSED/EXISTING RIPRAP	-----
EXISTING PROPERTY LINE	-----
EXISTING WSSC RIGHT-OF-WAY	-----
SILT FENCE	----- SF -----
SUPER SILT FENCE	----- SSF -----
TREE PROTECTION FENCE	----- TPF -----
BLAZE ORANGE FENCE	----- BOF -----
LIMITS OF EXCAVATION	-----
EXISTING TREE LINE	-----
PROPOSED TREE LINE	-----
EXISTING ACCESS PATH	-----
REPLACEMENT ACCESS PATH	-----
LIMITS OF EXCAVATION	CcD UdbD

EX. SEWER LINE	----- S -----
EX. WATER LINE	----- W -----
EXISTING WETLAND	----- WL -----
EXISTING 25' WETLAND BUFFER	----- WB -----
EX. SEWER MANHOLE	(S)
EX. STORMDRAIN MANHOLE	(D)
EX. WATER VALVE	(W)
EX. TREE TO BE REMOVED	(X)
EX. TREE TO REMAIN	(T)
STAGING/STOCKPILE AREA	(Hatched)
STRUCTURAL LABEL	(HW)
TRAVERSE POINT	(642)
STABILIZED CONSTRUCTION ENTRANCE	(SCE)
DRAINAGE SLOPE	(XXX)
SOIL BORING	(SB-3)
CHIMNEY DRAIN	(G.O.S.)
PROPOSED STORMDRAIN MANHOLE	(O)
TEMPORARY GABION OUTLET STRUCTURE	(T.G.O.S.)
EARTH DIKE	(ED/AZ)
PROPOSED CHIMNEY FILTER	(Filter)

MASTER LIST OF ABBREVIATIONS

⊙	- AT	L	- LENGTH OF CURVE (CURVE DATA)
Ac.	- ACRE(S)	L.F.	- LINEAR FEET
ACI	- AMERICAN CONCRETE INSTITUTE	L. / F.	- LIBER / FOLIO
ASTM	- AMERICAN SOCIETY FOR TESTING AND MATERIALS	MAX	- MAXIMUM
¢	- CENTERLINE	MD378	- NATURAL RESOURCES CONSERVATION PRACTICE - MARYLAND No. 378 (POND)
CAD	- COMPUTER AIDED DRAFTING	MDE	- MARYLAND DEPARTMENT OF THE ENVIRONMENT
C/C	- CENTER-TO-CENTER	MH	- MANHOLE
CF	- CUBIC FEET	MIN	- MINIMUM
cfs	- CUBIC FEET PER SECOND	MSHA	- MARYLAND STATE HIGHWAY ADMINISTRATION
C.I.P.	- CAST IRON PIPE	NAD83	- NORTH AMERICAN DATUM OF 1983
CL	- CLASS	NAV88	- NORTH AMERICAN VERTICAL DATUM OF 1988
C.M.P.	- CORRUGATED METAL PIPE	NIC	- NOT IN CONTRACT
COMAR	- CODE OF MARYLAND REGULATIONS	N/F	- NOW OR FORMERLY
CPv	- CHANNEL PROTECTION VOLUME	No.	- NUMBER
CR	- CRUSHER RUN	NTS	- NOT TO SCALE
CS	- CONTROL STRUCTURE	O/C	- ON-CENTER
CY	- CUBIC YARDS	O.D.	- OUTSIDE DIAMETER
D	- DEPTH	PGDER	- PRINCE GEORGE'S COUNTY DEPARTMENT OF ENVIRONMENTAL RESOURCES
D50	- 50TH PERCENTILE OF DIAMETER	PGSCD	- PRINCE GEORGE'S COUNTY SOIL CONSERVATION DISTRICT
DA	- DRAINAGE AREA	PSI	- POUNDS PER SQUARE INCH
DBC	- DIRECT BURIED CABLE	P.V.C.	- POLYVINYL CHLORIDE PIPE
D.I.P.	- DUCTILE IRON PIPE	RCN	- RUNOFF CURVE NUMBER
DPW	- DEPARTMENT OF PUBLIC WORKS	R.C.P.	- REINFORCED CONCRETE PIPE
EA	- EACH	R/W	- RIGHT-OF-WAY
ELEC	- ELECTRIC	S	- SEWER
ELEV	- ELEVATION	SB	- SOIL BORING
EW	- END WALL	SCH.	- SCHEDULE
ES	- END SECTION	S.S.	- SIDE SLOPE
EX.	- EXISTING	STA.	- STATION
f'c	- COMPRESSIVE STRENGTH	S.W.M.	- STORMWATER MANAGEMENT
FEMA	- FEDERAL EMERGENCY MANAGEMENT AGENCY	t	- THICKNESS
FIRM	- FLOOD RATE INSURANCE MAP	T	- TANGENT (CURVE DATA)
FO	- FIBER OPTIC	T.B.R.	- TO BE REMOVED
f.p.s.	- FEET PER SECOND	Tc	- TIME OF CONCENTRATION
FT	- FEET	TELE	- TELECOMMUNICATION
GAB	- GRADED AGGREGATE BASE	T.O.W.	- TOP OF WALL
GALV.	- GALVANIZED	TYP.	- TYPICAL
H	- HEIGHT	V	- VELOCITY
HRS.	- HOURS	W	- WATER / WIDTH
HW	- HEADWALL	WQv	- WATER QUALITY VOLUME
H.D.P.E.	- HIGH DENSITY POLYETHYLENE	WSEL	- WATER SURFACE ELEVATION
HGL	- HYDRAULIC GRADE LINE	YR	- YEAR
HSG	- HYDROLOGIC SOIL GROUP	∅	- DIAMETER
I	- INLET		
I.D.	- INSIDE DIAMETER		
INV.	- INVERT		



PLANS APPROVED BY
Harold W. Van Aller, P.E.
Harold W. Van Aller
November 5, 2018
14-MR-0062R
Dam Safety Division
Maryland Dept. of the Environment

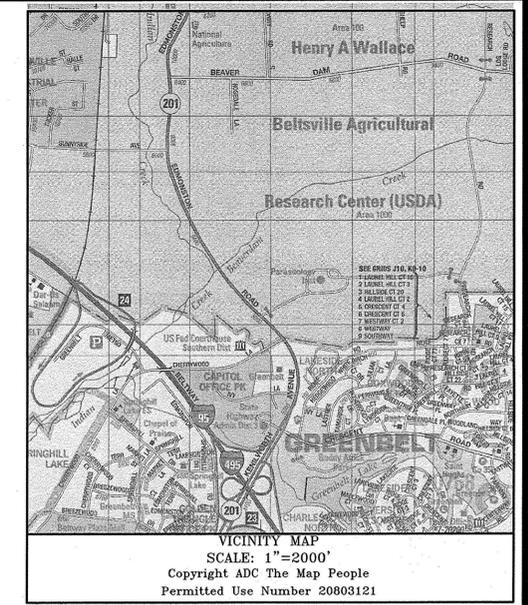
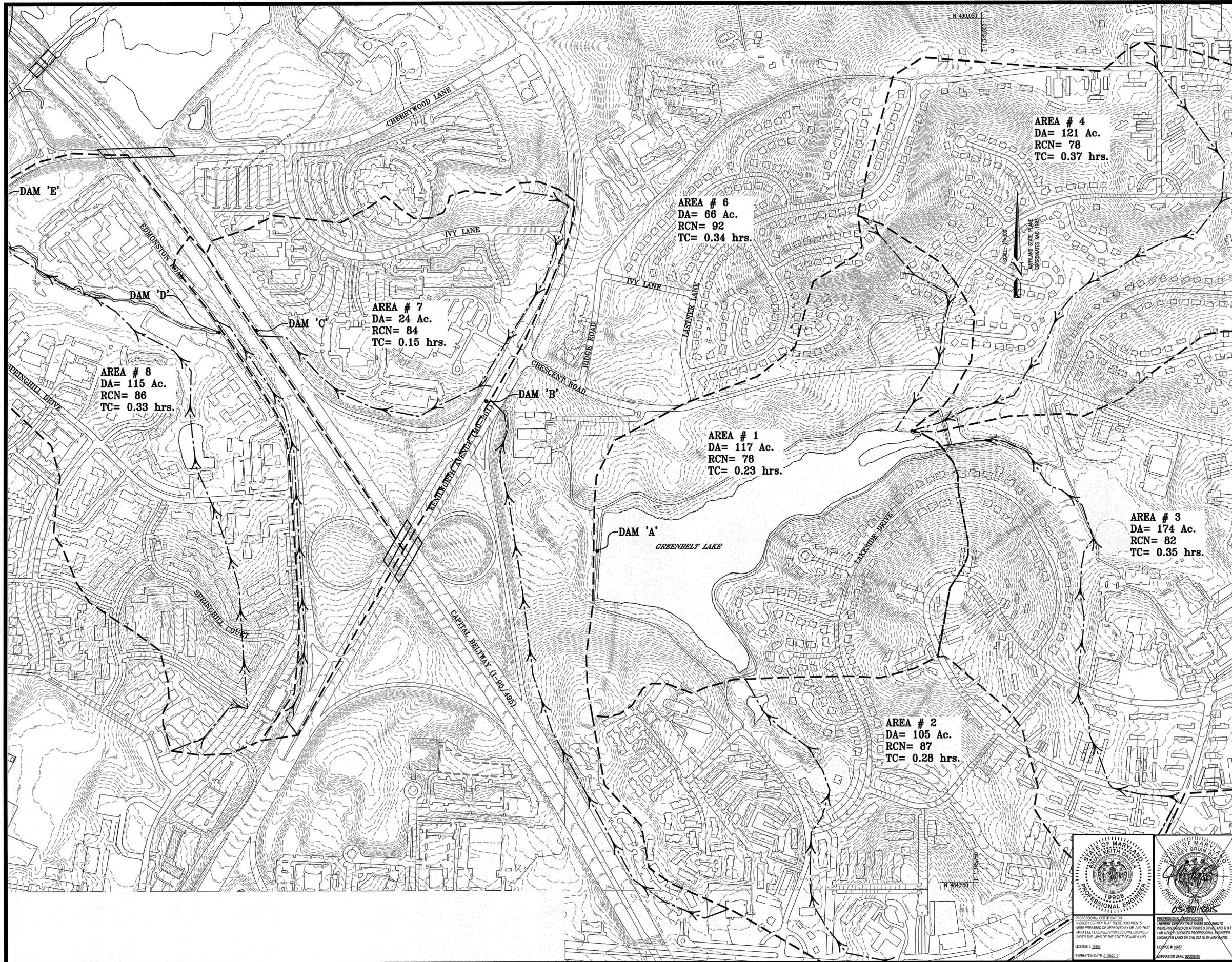
LEGEND AND ABBREVIATIONS
MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND



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CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 2	OF: 22
DRAFT: JMV	DATE: FEB. 2015	FILE NO: G-2/ES-10
SCALE: AS-SHOWN		38-146-24.1

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Area	DA (Ac.)	RCN	Tc (hrs.)
1	117	78	0.23
2	105	87	0.28
3	174	82	0.35
4	121	78	0.37
5	137	78	0.24
6	66	92	0.34
7	24	84	0.15
8	115	86	0.33

LEGEND

DRAINAGE DIVIDE

FLOW PATH

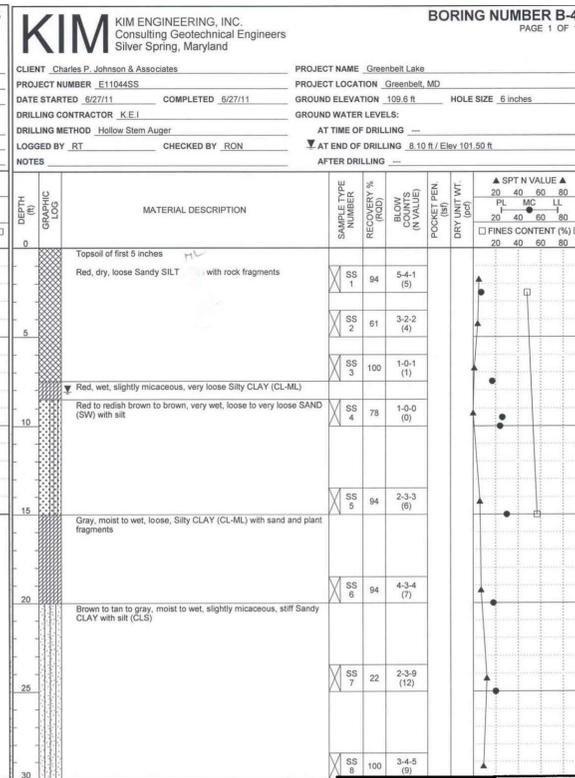
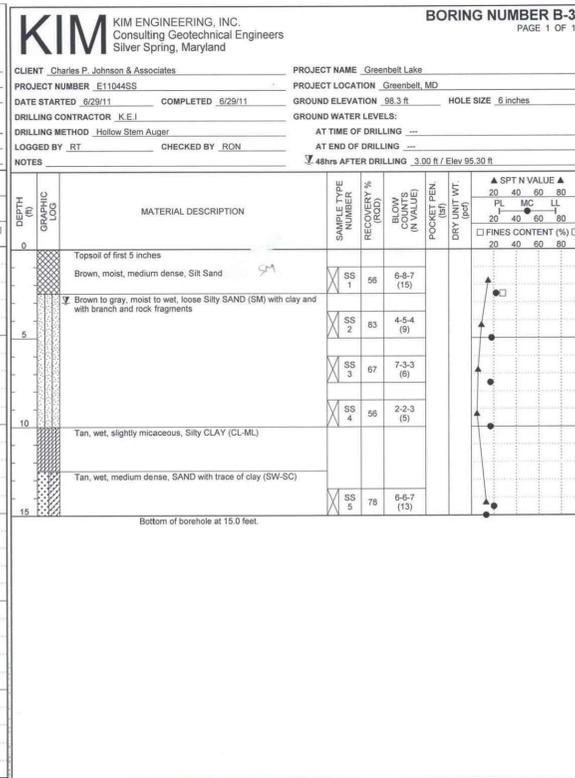
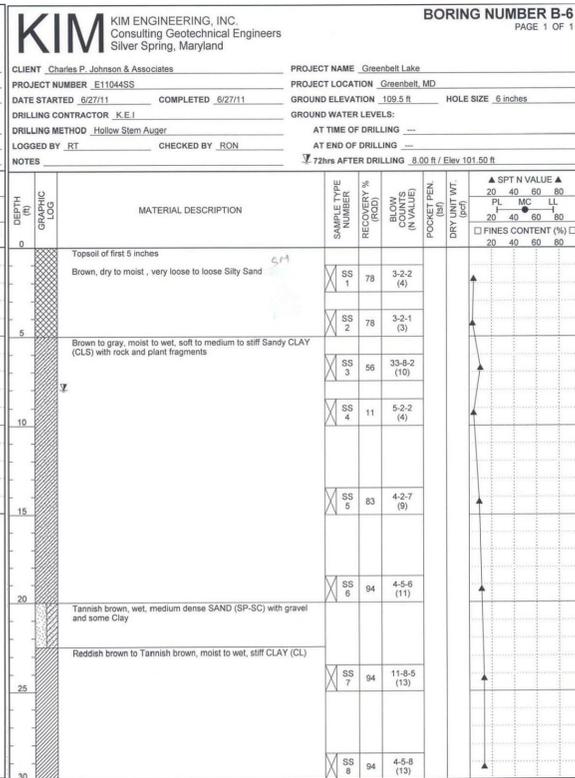
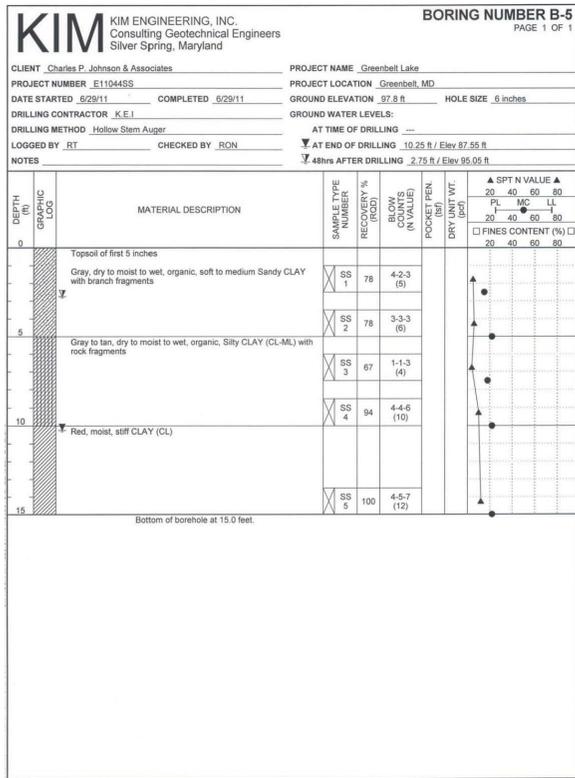
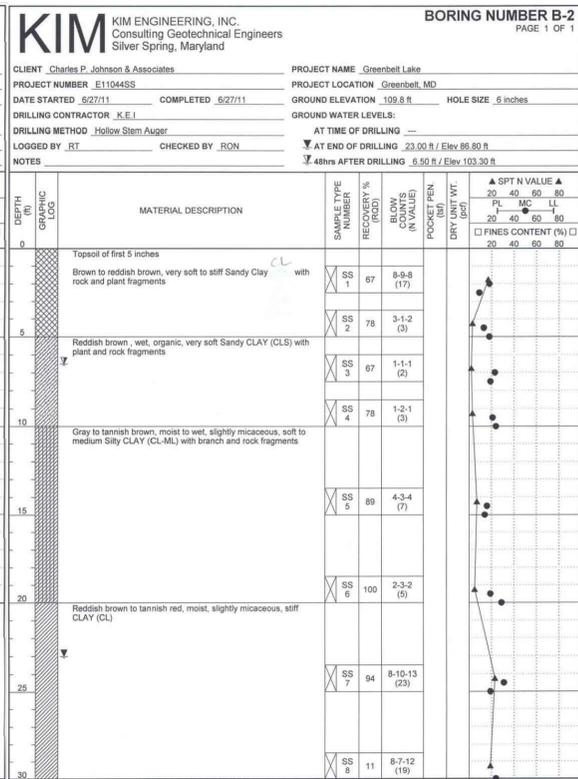
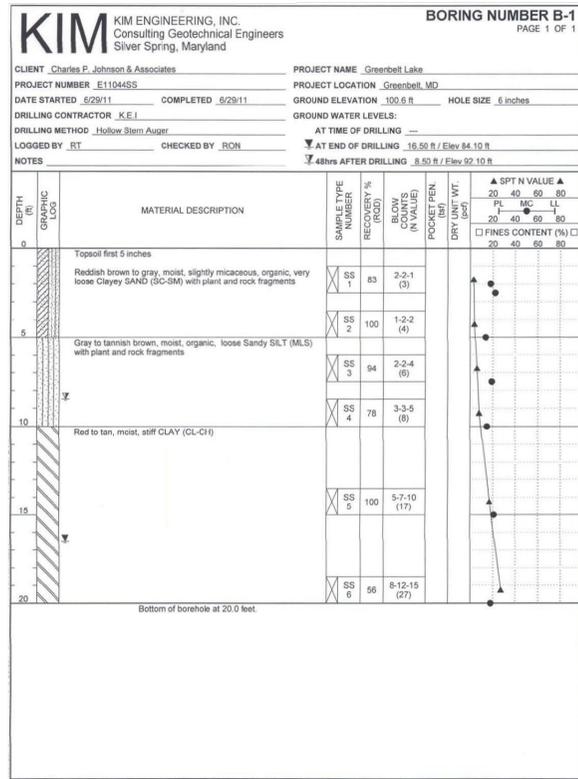
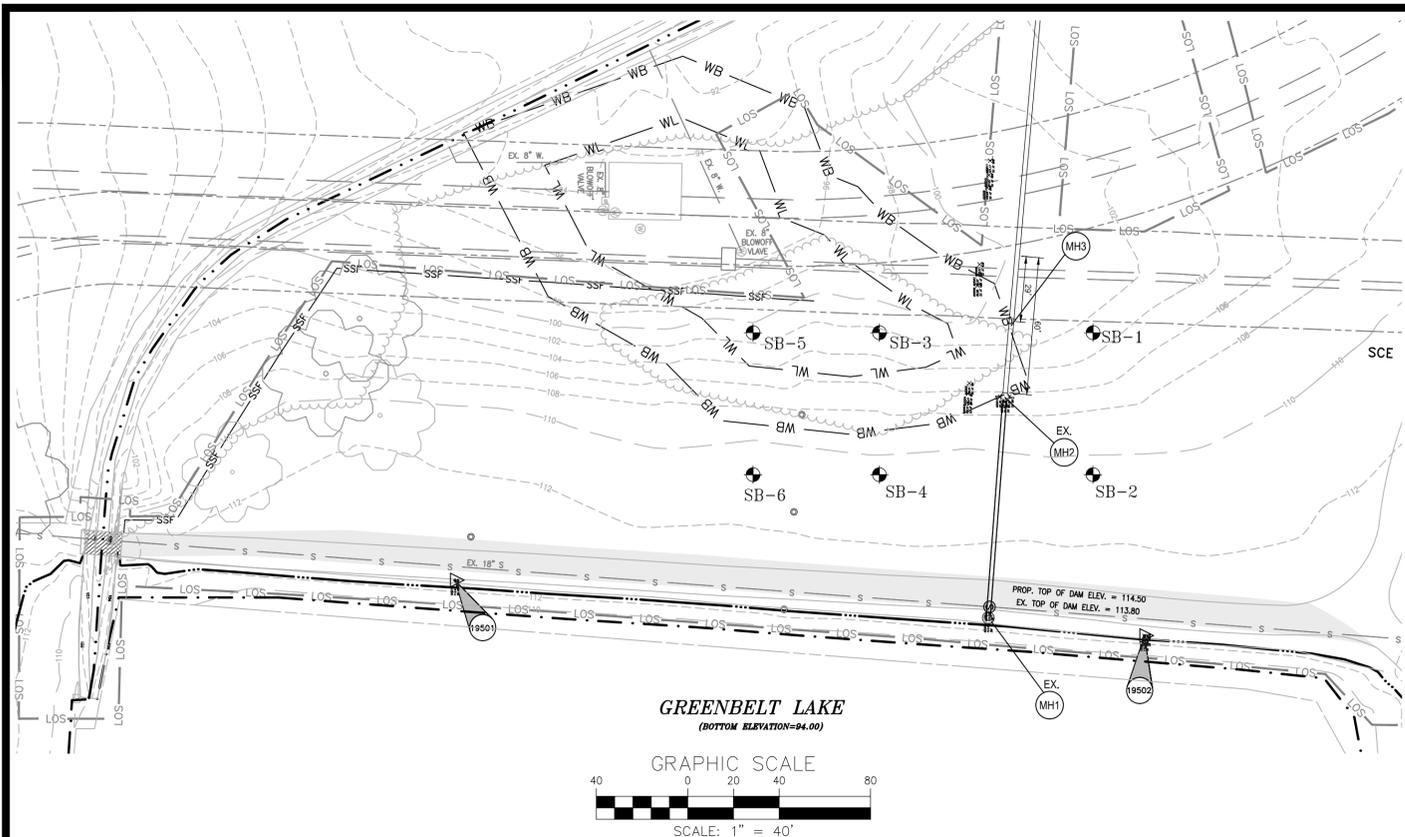
DRAINAGE AREA MAP
MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND

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DESIGN: JBB	SHEET: 3	OF: 22
DRAFT: JMV	DA-1	DA-1
DATE: FEB, 2015	FILE NO:	
SCALE: 1" = 300'		38-146-241

PROFESSIONAL CERTIFICATION
STATE OF MARYLAND
19908
PROFESSIONAL ENGINEER
LICENSE # 19908
EXPIRATION DATE: 11/02/2018

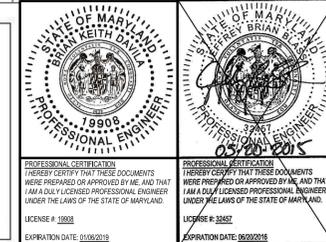
PROFESSIONAL CERTIFICATION
STATE OF MARYLAND
05101015
PROFESSIONAL ENGINEER
LICENSE # 19908
EXPIRATION DATE: 02/20/2018



GENERAL NOTES:
 1. THIS PLAN SHALL ONLY BE USED FOR THE CONSTRUCTION OF STORM DRAIN AND ASSOCIATED STORM DRAIN IMPROVEMENTS WITHIN THE PUBLIC RIGHT-OF-WAY AND/OR EASEMENT AS SHOWN. THIS PLAN IS NOT TO BE USED FOR ANY OTHER CONSTRUCTION PURPOSE.

MISS UTILITY
 Call "Miss Utility" at 1-800-257-7777, 72 hours prior to the start of work. The excavator must notify all public utility companies with underground facilities in the area of proposed excavation and have those facilities located by the utility companies prior to commencing excavation.

PLANS APPROVED BY
 Harald W. Van Aller, P.E.
 November 5, 2018
 14-MR-0062R
 Dam Safety Division
 Maryland Dept. of the Environment

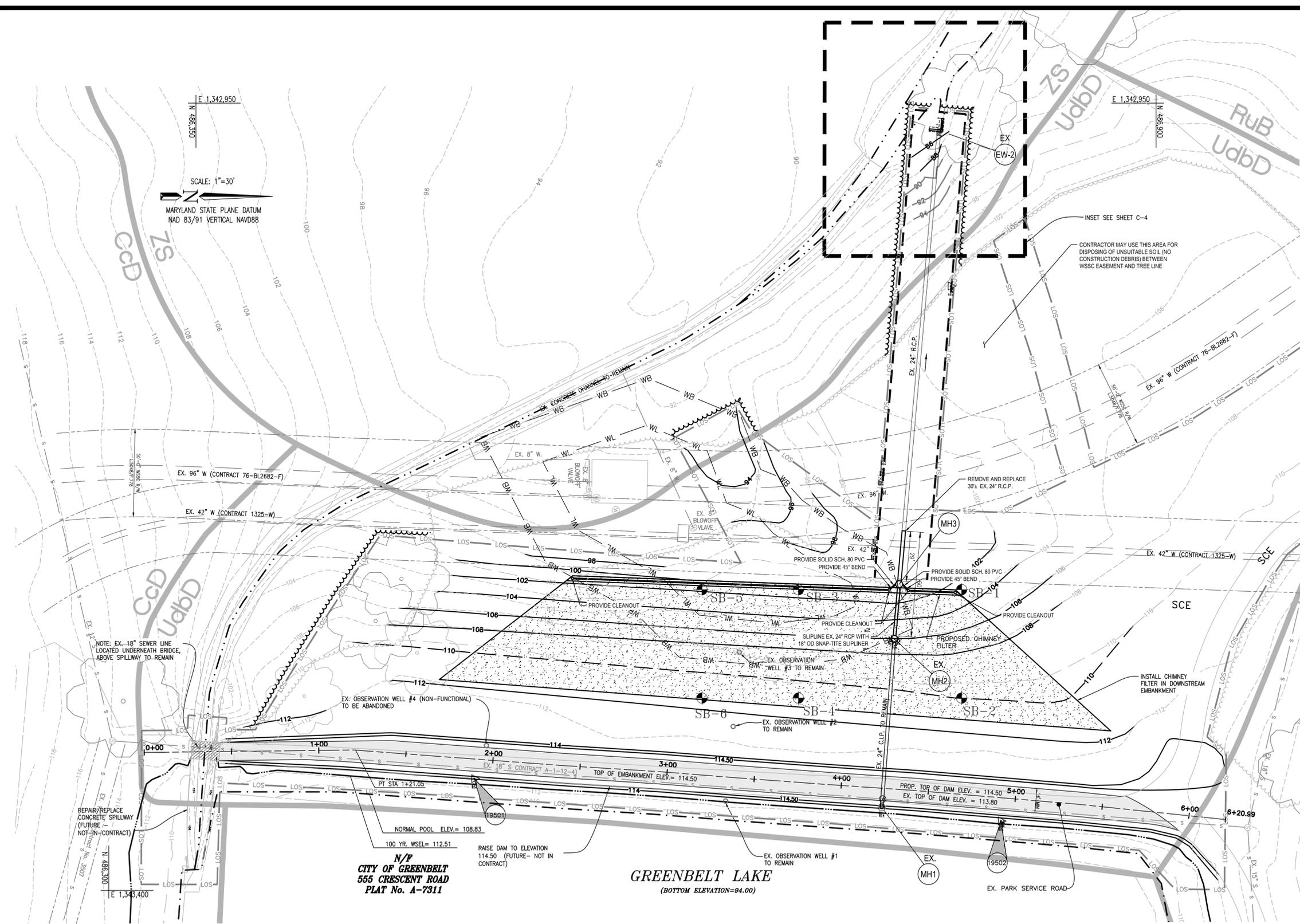


GEOTECHNICAL EXPLORATION LOGS
 MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
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DESIGN: JBB	SHEET: 4	OF: 22
DRAFT: JMV	B-1	B-1
DATE: FEB. 2015	FILE NO:	
SCALE: 1" = 40'	38-146-24.1	

SCALE: 1"=30'
 MARYLAND STATE PLANE DATUM
 NAD 83/91 VERTICAL NAVD88



- GENERAL NOTES:**
1. THIS PLAN SHALL NOT BE USED FOR THE CONSTRUCTION OF DAM REPAIR AND ASSOCIATED DAM REPAIR IMPROVEMENTS AS SHOWN. THIS PLAN SHALL NOT BE USED FOR ANY OTHER CONSTRUCTION PURPOSE. THIS PLAN SHALL NOT BE USED FOR GRADING OF THE SITE OTHER THAN AREAS WITHIN THE LOD.
 2. THE EXISTING UTILITIES SHOWN HEREON HAVE BEEN LOCATED USING INFORMATION AVAILABLE AT THE TIME THIS PLAN WAS PREPARED. PRIOR TO DIGGING, THE CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES VIA TEST PIT WITHIN THE LIMITS OF CONSTRUCTION SHOWN ON THIS PLAN AND CONFIRM THAT NO CONFLICTS EXIST. ANY CONFLICTS MUST BE BROUGHT TO THE ATTENTION OF CPJ AND THE OWNER PRIOR TO STARTING CONSTRUCTION.
 3. THE EXISTING SURVEY TRAVERSE POINTS SHALL BE PRESERVED THROUGH EACH PHASE BY THE CONTRACTOR OR RESET IN ANOTHER LOCATION AND NEW TRAVERSE POINT INFORMATION PROVIDED TO THE OWNER AND ENGINEER-IN-CHARGE.

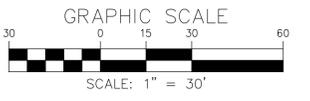
DAM PLAN VIEW

MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
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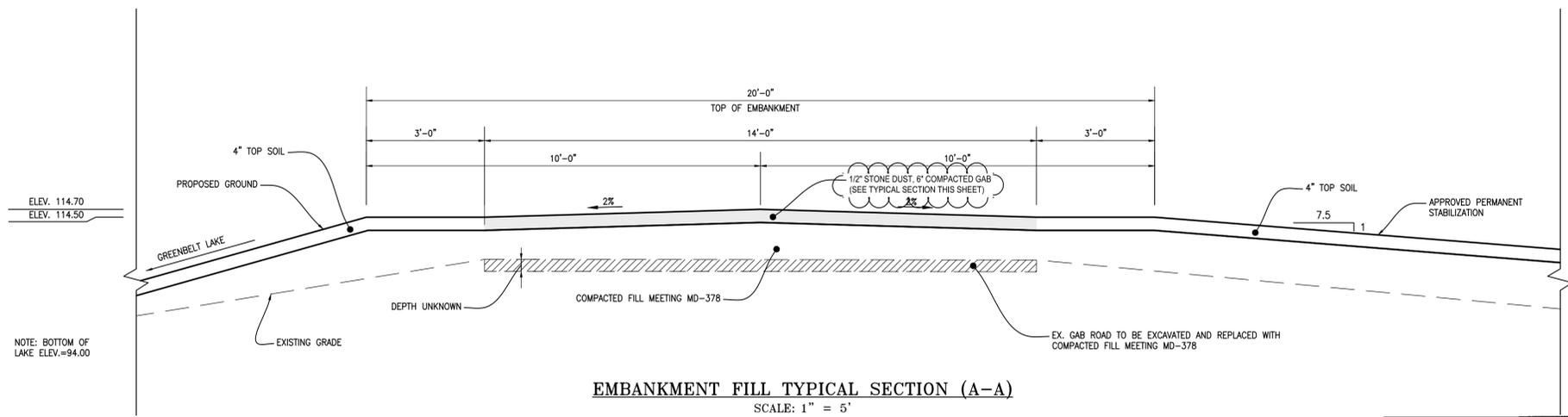
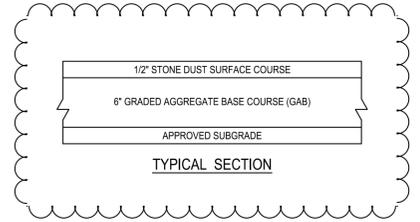
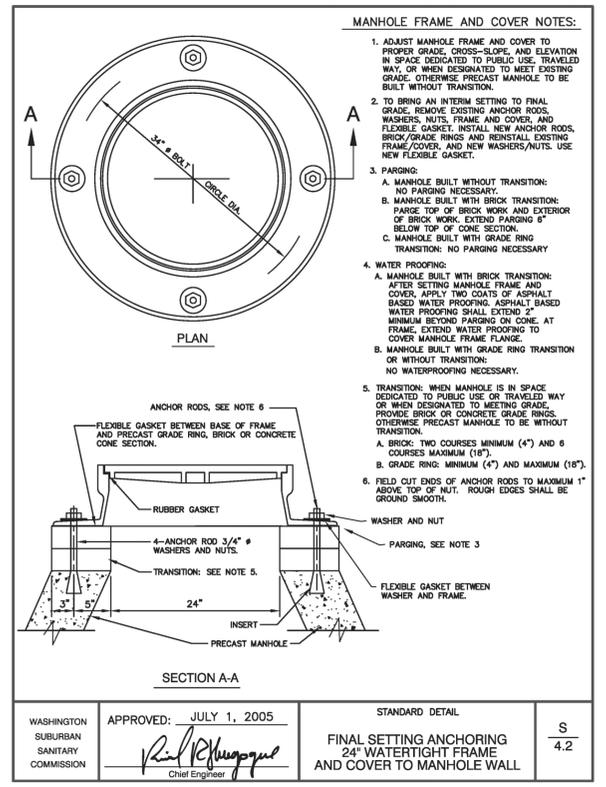
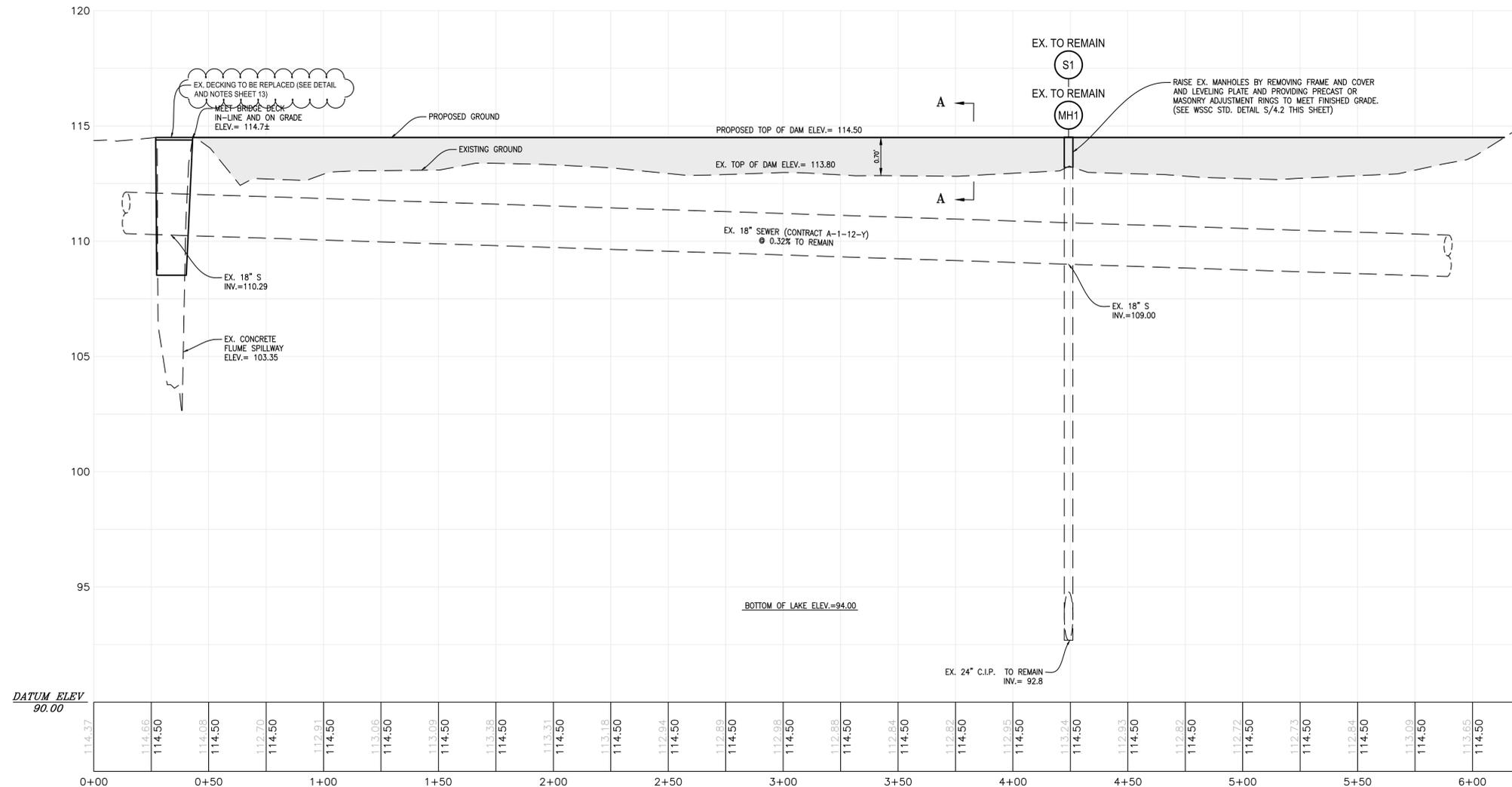
CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 5	OF: 22
DRAFT: JMV	DATE: FEB. 2015	FILE NO: C-1 C-8
SCALE: 1" = 30'	38-146-24.1	

PLANS APPROVED BY
 Harald W. Van Aller, P.E.
Harald W. Van Aller
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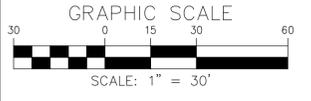
EMBANKMENT FILL MODIFICATION

MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND

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DESIGN: JBB	SHEET: 6	OF: 22
DRAFT: JMV	C-2	C-8
DATE: FEB. 2015	FILE NO.:	
SCALE: 1" = 30'		38-146-24.1

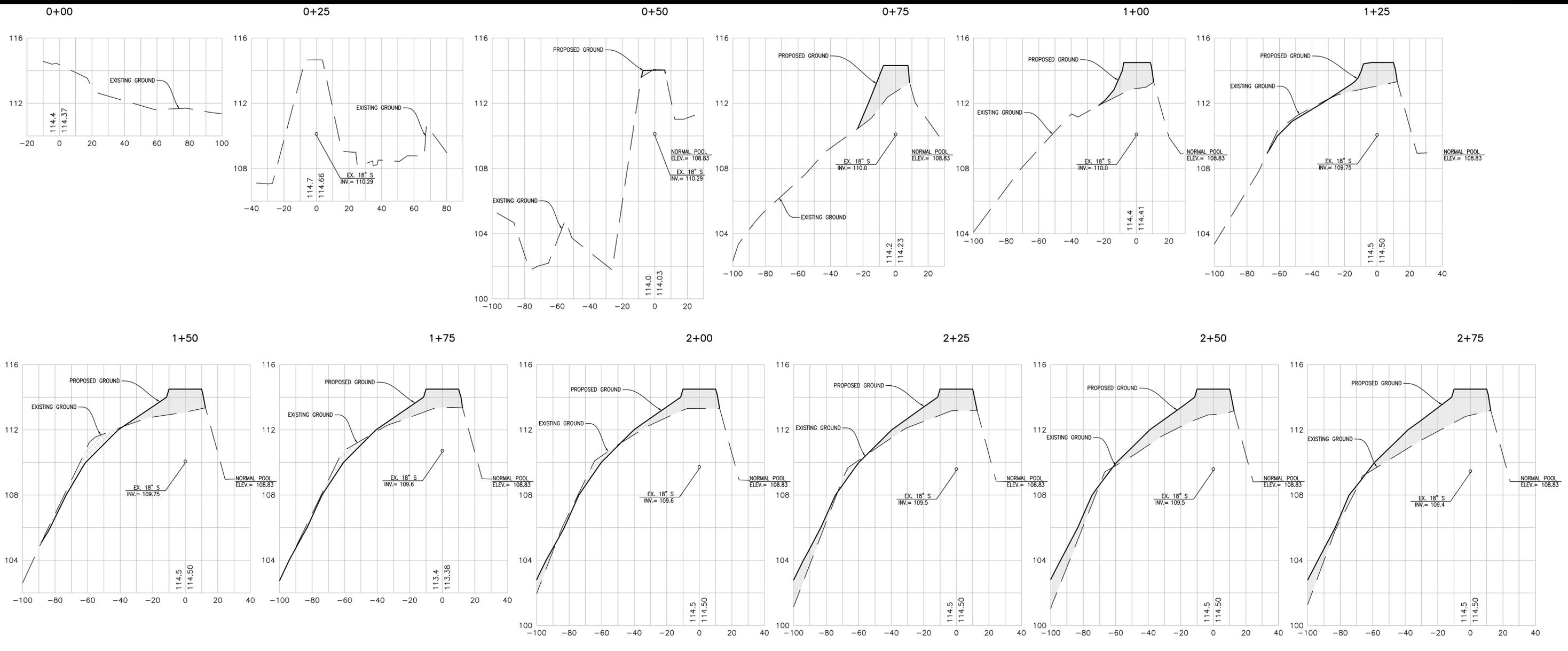
PLANS APPROVED BY
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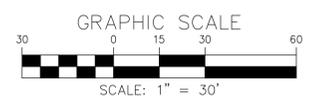
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NOTE:
BOTTOM OF LAKE
ELEV.=94.00



SEE TYPICAL EMBANKMENT FILL DETAIL (SHEET C-2) FOR ROAD SECTION AND GEOMETRY DETAILS.

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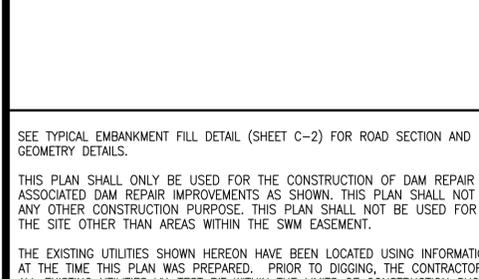
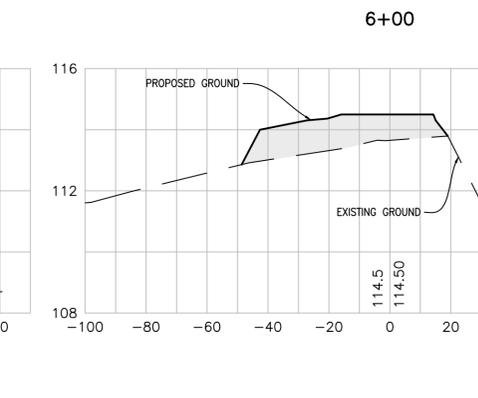
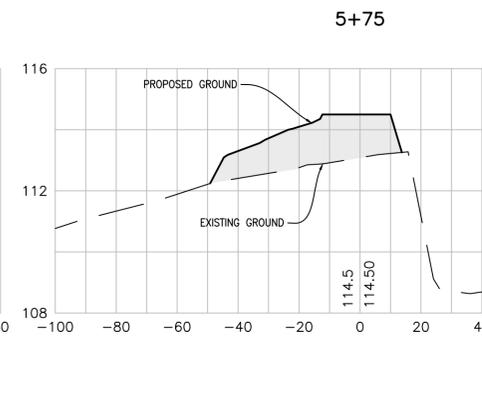
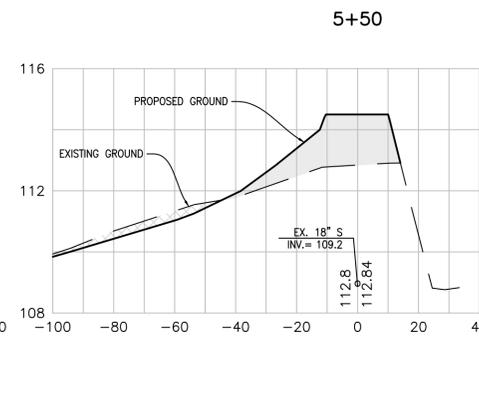
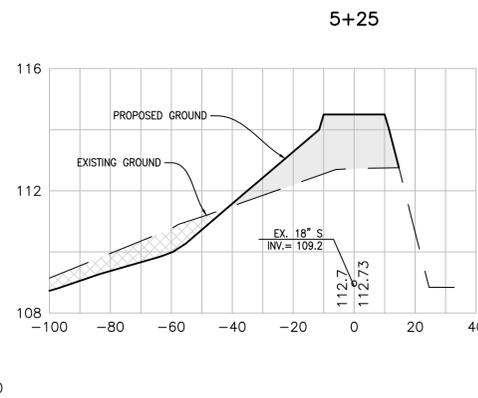
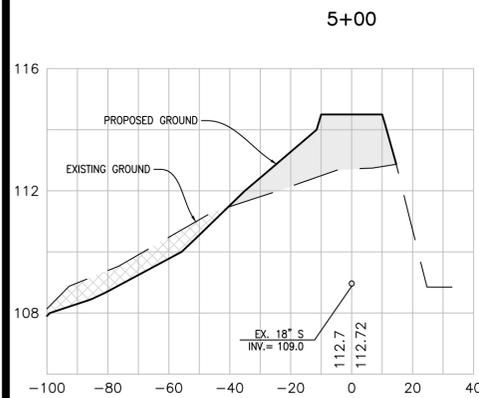
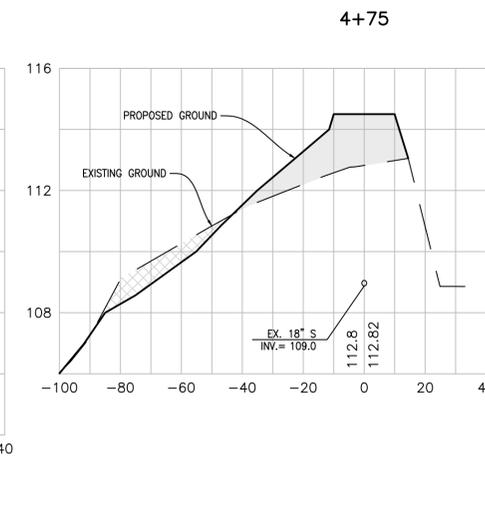
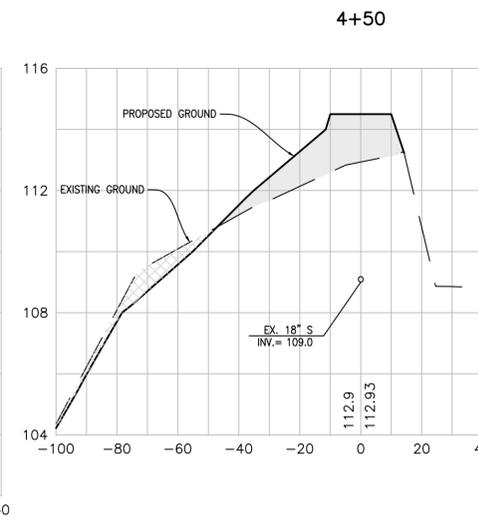
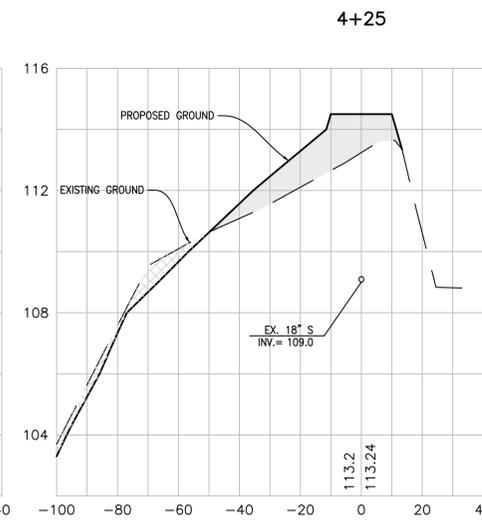
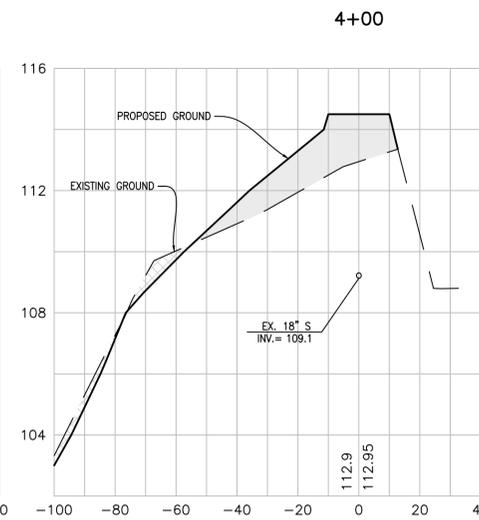
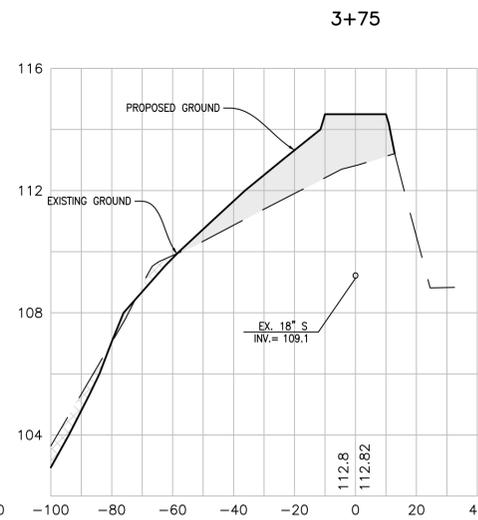
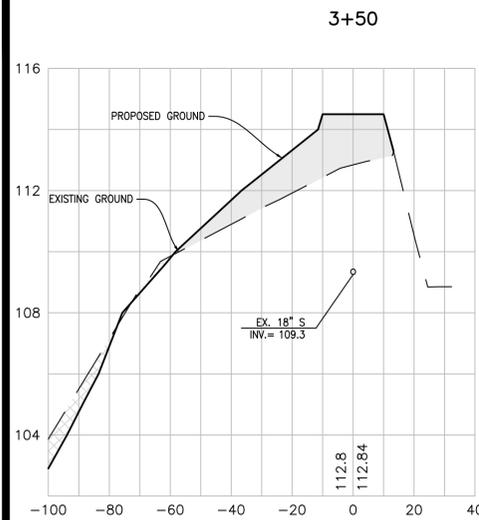


EMBANKMENT FILL PROFILES
MD DAM No. 8 DAM REPAIRS
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BERWYN (21st) ELECTION DISTRICT
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DESIGN: JBB	SHEET: 7	OF: 22
DRAFT: JMV	DATE: FEB. 2015	FILE NO.: C-8
SCALE: 1" = 30'	38-146-24.1	

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NOTE:
BOTTOM OF LAKE
ELEV.=94.00

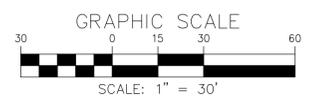
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MISS UTILITY

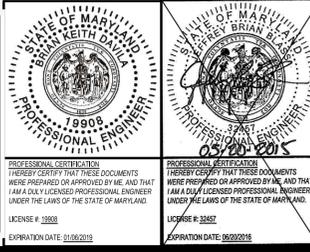
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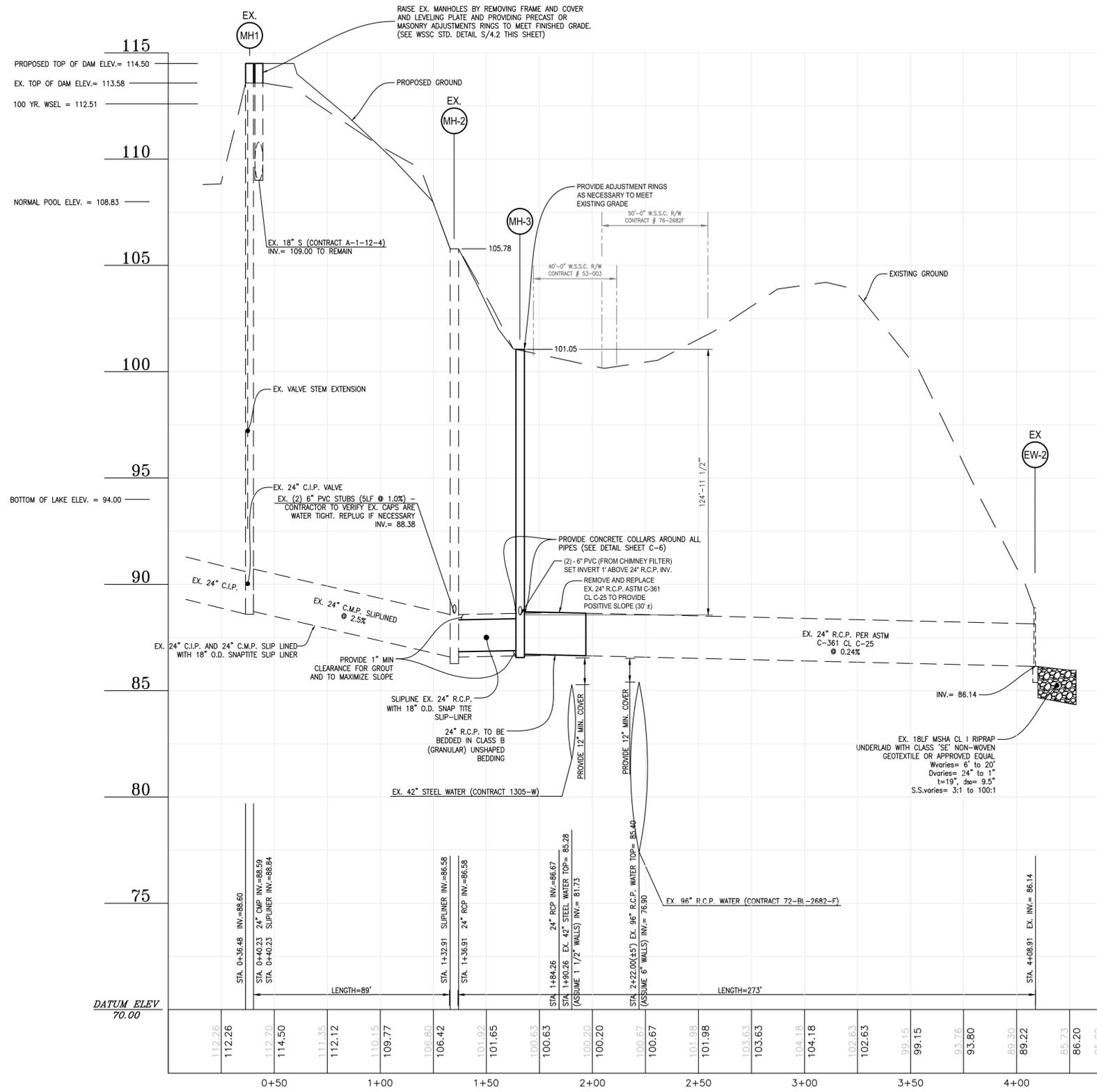
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BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND

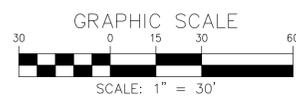
CPJ Charles P. Johnson & Associates, Inc.
Civil and Environmental Engineers • Planners • Landscape Architects • Surveyors
1751 Elton Rd., Ste. 300 Silver Spring, MD 20903 301-434-7000 Fax: 301-434-9394
www.cpjia.com • Silver Spring, MD • Gaithersburg, MD • Annapolis, MD • College Park, MD • Frederick, MD • Fairfax, VA

CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 8	OF: 22
DRAFT: JMV	C-4	C-8
DATE: FEB. 2015	FILE NO.:	
SCALE: 1" = 30'	38-146-24.1	

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EX. LAKE DRAIN PROFILE
 HORIZONTAL SCALE: 1" = 30'
 VERTICAL SCALE: 1" = 3'



MISS UTILITY

Call "Miss Utility" at 1-800-257-7777, 72 hours prior to the start of work. The excavator must notify all public utility companies with underground facilities in the area of proposed excavation and have those facilities located by the utility companies prior to commencing excavation.

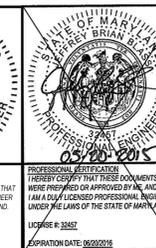
PLANS APPROVED BY
 Harald W. Van Aller, P.E.

Harald W. Van Aller

November 5, 2018

14-MR-0062R

Dam Safety Division
 Maryland Dept. of the Environment

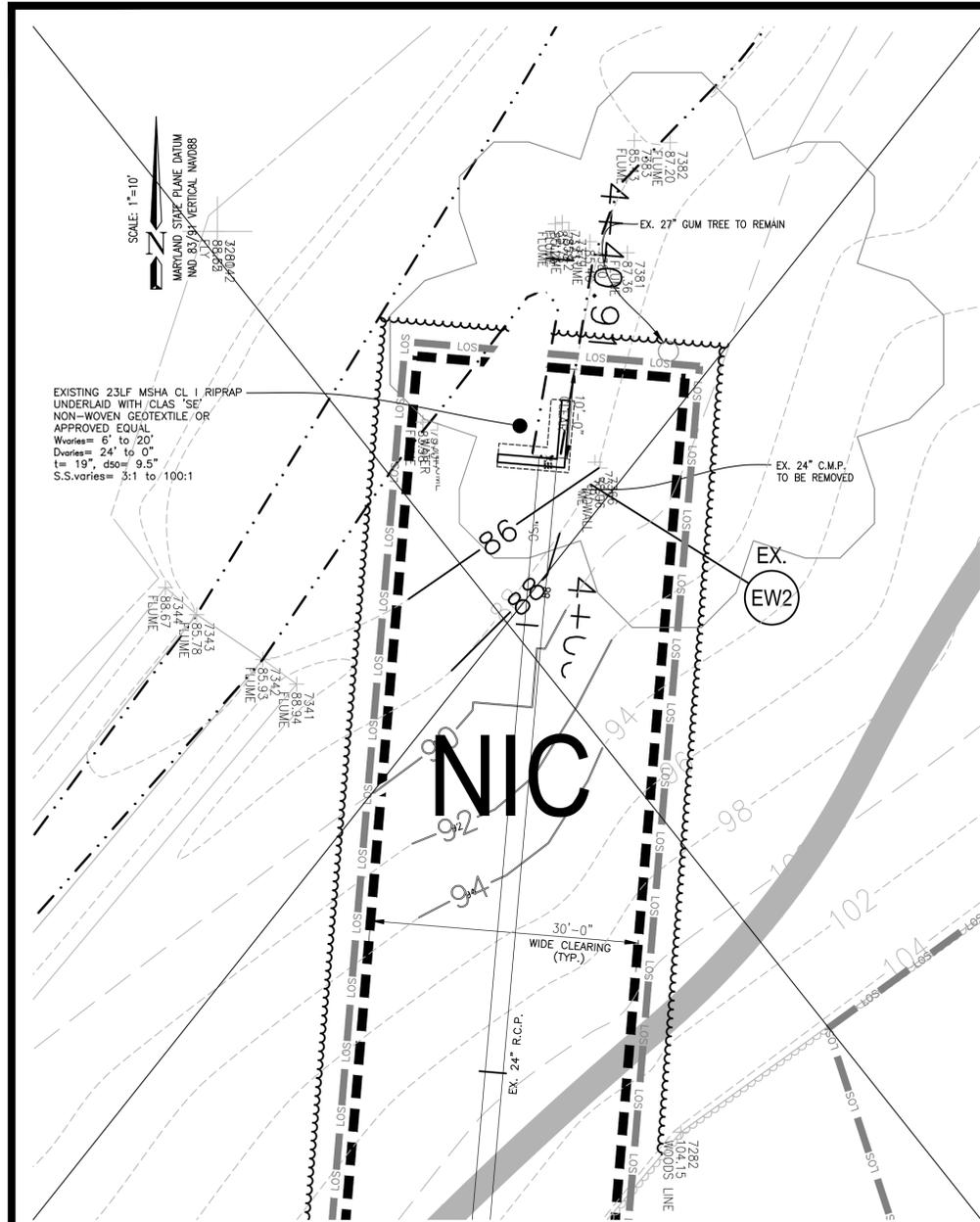


EXISTING LAKE DRAIN
 MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
 BERWYN (21st) ELECTION DISTRICT
 PRINCE GEORGE'S COUNTY, MARYLAND

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CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 9	OF: 22
DRAFT: JMV	DATE: FEB. 2015	FILE NO.: C-8
SCALE: 1" = 30'	SCALE: 1" = 30'	FILE NO.: 38-146-24.1

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OUTFALL INSET
(SCALE: 1" = 10')

PIPE SIZE	TYPE	LENGTH (LF)
24"	R.C.P. C-361 CL C-25 TO BE REMOVED AND REPLACED	120 LF
24"	C.M.P. (TO BE REMOVED)	262 LF
24"	G.I.P. (TO BE REMOVED)	19 LF

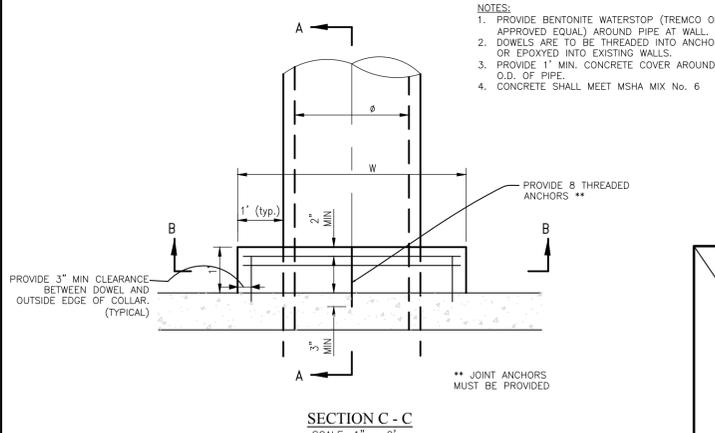
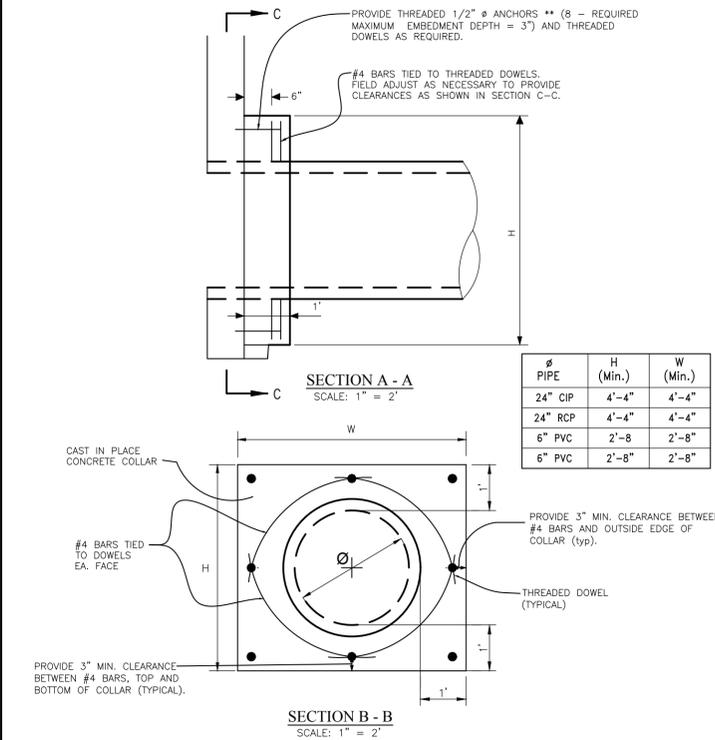
NO.	TYPE	COORDINATES		TOP ELEVATION		BASE DIAMETER	THROAT DESIGN	STEP LOCATION	REMARKS
		NORTHING	EASTING	UPPER	LOWER				
EW1	ENDWALL	486775.38	1342965.05	INV.	87.96				EX. TO BE REMOVED
EW2	ENDWALL	486772.86	1342992.88	INV.	89.22				TYPE E ENDWALL STANDARD No. MD-356-01 (Ø=24")
MH1	MANHOLE	486753.59	1343223.95	TOP	114.50	36" X 36"		3:00	EX. TO BE MODIFIED
MH2	MANHOLE	486752.35	1343241.24	TOP	103.17	48"		3:00	TYPE A MANHOLE STANDARD No. PG 50-23.0
MH3	MANHOLE	486752.78	1343225.01	**SEE SHEET 9	**SEE SHEET 9	48"		3:00	TYPE A MANHOLE STANDARD No. PG SD 21.0

NOTES:

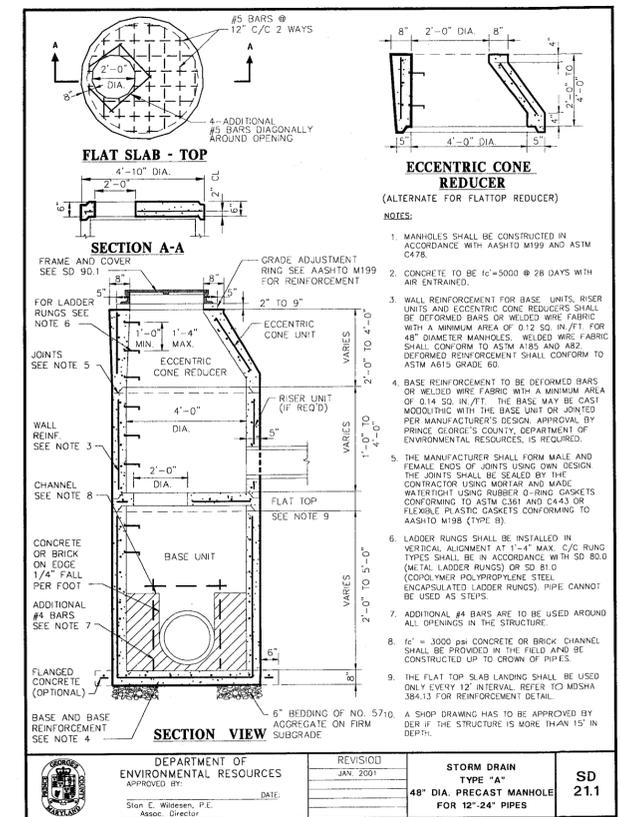
- NO PIPE SHALL BE CONSTRUCTED INTO THE CORNER OF A SQUARE OR RECTANGULAR STORM DRAIN STRUCTURE (TO BE USED AS A SAFETY MEASURE), PER MSHA STD. No. MD-384.13 - SEE DETAIL ON THIS SHEET.
- ALL PRECAST STRUCTURES AND SUPPLIERS OF "ALTERNATIVE EQUAL STRUCTURES" ARE TO BE PREVIOUSLY APPROVED BY MCDOT.
- STATION AND OFFSET (OR COORDINATE) TO MANHOLES ARE TO CENTER OF STRUCTURE.
- STATION AND OFFSET (OR COORDINATE) TO A-INLETS ARE TO CENTER OF STRUCTURE AT FRONT OF CURB.
- STATION AND OFFSET (OR COORDINATE) TO ENDSECTION ARE TO CENTER OF LOWER FLARED END.
- STATION AND OFFSET (OR COORDINATE) TO ENDWALL/HEADWALL ARE TO TOP CENTER OF WALL.

MISS UTILITY

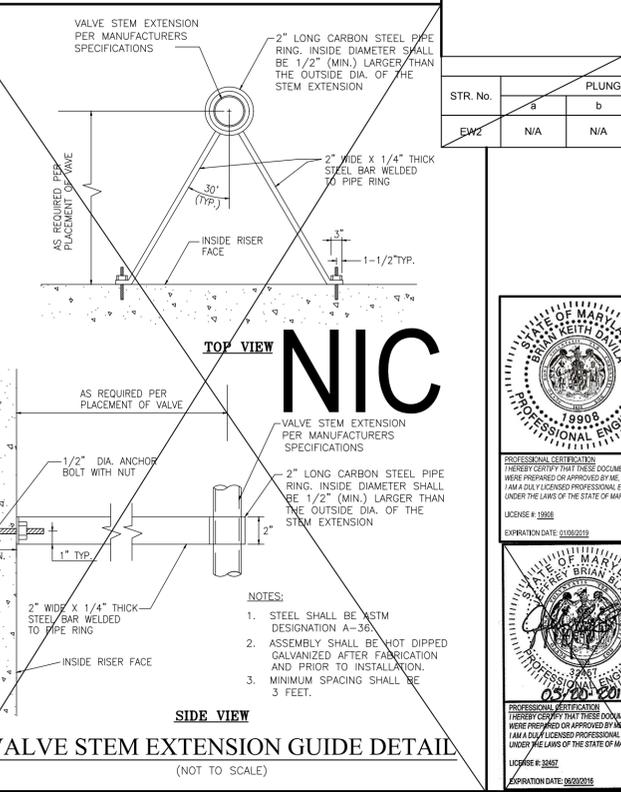
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CAST-IN-PLACE CONCRETE COLLAR DETAILS FOR MH3
(SCALE: 1" = 2')



PLANS APPROVED BY
Harald W. Van Aller, P.E.
Harald W. Van Aller
November 5, 2018
14-MR-0062R
Dam Safety Division
Maryland Dept. of the Environment

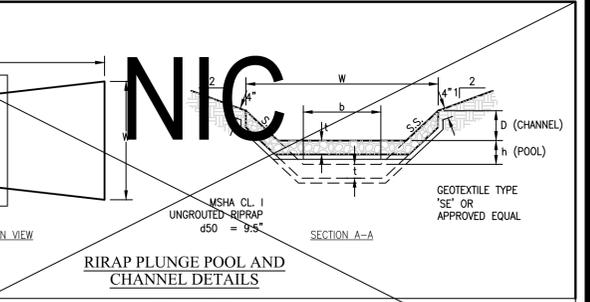


QUANTITIES FOR ESTIMATING PURPOSES ONLY

OPENING	D	A	B	C	E	H	L	CONC. C.Y.	STEEL LB.
12	0.79	9"	6"	6"	1'-9"	1'-9"	3'-6"	0.76	55
15	1.23	9"	6"	6"	1'-9"	2'-0"	4'-3"	0.99	61
18	1.77	9"	6"	6"	1'-9"	2'-0"	5'-0"	1.27	58
21	2.42	9"	6"	6"	1'-9"	2'-0"	5'-0"	1.78	17
24	3.14	9"	6"	6"	2'-0"	2'-0"	6'-6"	1.84	106
27	3.98	9"	6"	6"	2'-0"	3'-0"	7'-3"	2.11	115
30	4.91	9"	6"	6"	2'-0"	3'-0"	8'-0"	2.57	140
33	5.94	9"	6"	6"	2'-0"	3'-0"	8'-6"	2.92	148
36	7.07	12"	16"	16"	3'-0"	3'-0"	9'-6"	4.99	235
42	9.62	12"	16"	16"	3'-0"	4'-0"	11'-0"	6.12	303
48	12.57	12"	16"	16"	3'-0"	5'-0"	12'-6"	7.34	341
54	15.96	12"	16"	16"	3'-0"	5'-0"	14'-0"	8.77	438
60	19.64	12"	16"	16"	3'-0"	6'-0"	15'-6"	10.26	496
72	28.27	12"	16"	16"	3'-0"	7'-0"	17'-0"	12.68	597

GENERAL NOTES:

- MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M199 AND ASTM C978.
- CONCRETE TO BE 40'-5000 @ 28 DAYS WITH AIR ENTRAINMENT.
- WALL REINFORCEMENT FOR BASE UNITS, RISER UNITS AND ECCENTRIC CONE REDUCERS SHALL BE DEFORMED BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.12 SQ. IN./FT. FOR 48" DIAMETER MANHOLES. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A653 AND A82. DEFORMED REINFORCEMENT SHALL CONFORM TO ASTM A615 GRADE 60.
- BASE REINFORCEMENT TO BE DEFORMED BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.14 SQ. IN./FT. THE BASE MAY BE CAST MODULITH WITH THE BASE UNIT OR JOINED PER MANUFACTURER'S DESIGN. APPROVAL BY PRINCE GEORGE'S COUNTY DEPARTMENT OF ENVIRONMENTAL RESOURCES IS REQUIRED.
- THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR USING MORTAR AND MADE WATERPROOF USING RUBBER O-RING CASSETS CONFORMING TO ASTM C361 AND C443 OR FLEXIBLE PLASTIC CASSETS CONFORMING TO AASHTO M198 (TYPE B).
- LADDER RUNGS SHALL BE INSTALLED IN VERTICAL ALIGNMENT AT 1'-4" MAX. C/C RUNG TYPES SHALL BE IN ACCORDANCE WITH SD 80.0 (METAL LADDER RUNGS) OR SD 81.0 (CONCRETE POLYPROPYLENE STEEL ENCAPULATED LADDER RUNGS). PIPE CANNOT BE USED AS STEPS.
- ADDITIONAL #4 BARS ARE TO BE USED AROUND ALL OPENINGS IN THE STRUCTURE.
- 40' ± JACO BARI CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND BE CONSTRUCTED UP TO CROWN OF PIPES.
- THE FLAT TOP SLAB LANDING SHALL BE USED ONLY EVERY 12' INTERVAL. REFER TO MSHA 384.13 FOR REINFORCEMENT DETAIL.
- A SHOP DRAWING HAS TO BE APPROVED BY DER IF THE STRUCTURE IS MORE THAN 15' IN DEPTH.



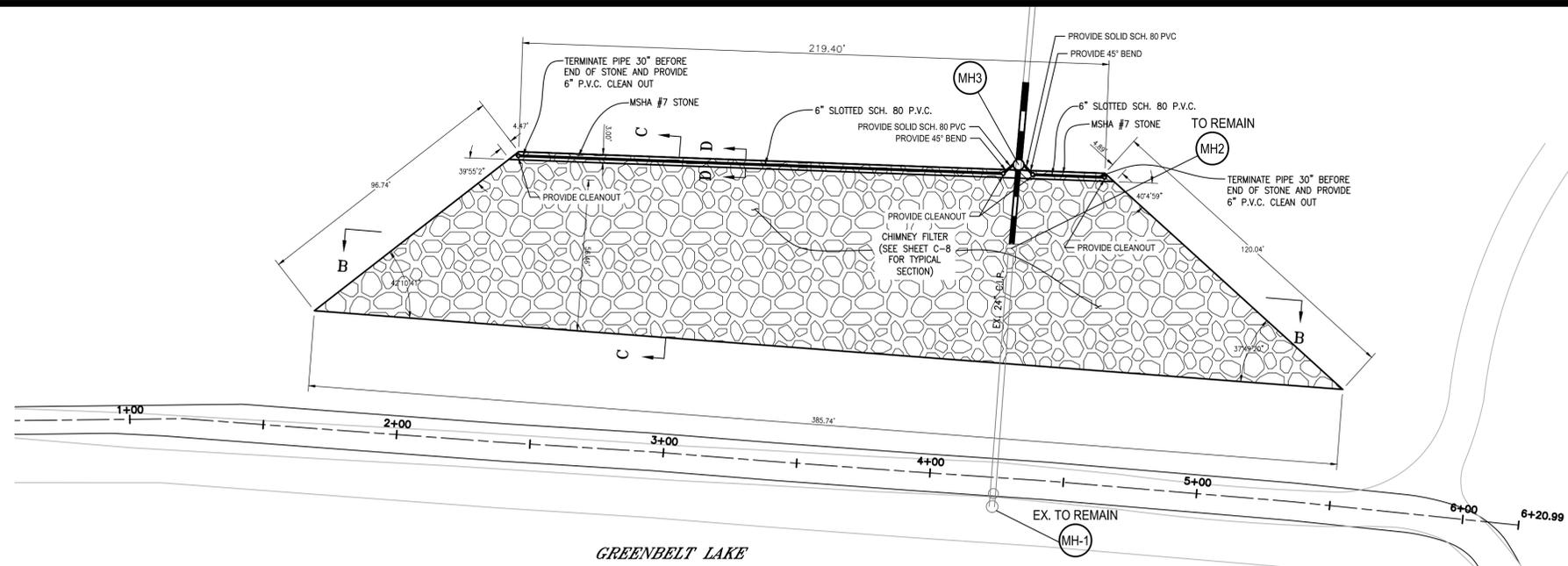
LAKE DRAIN DETAILS

MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND

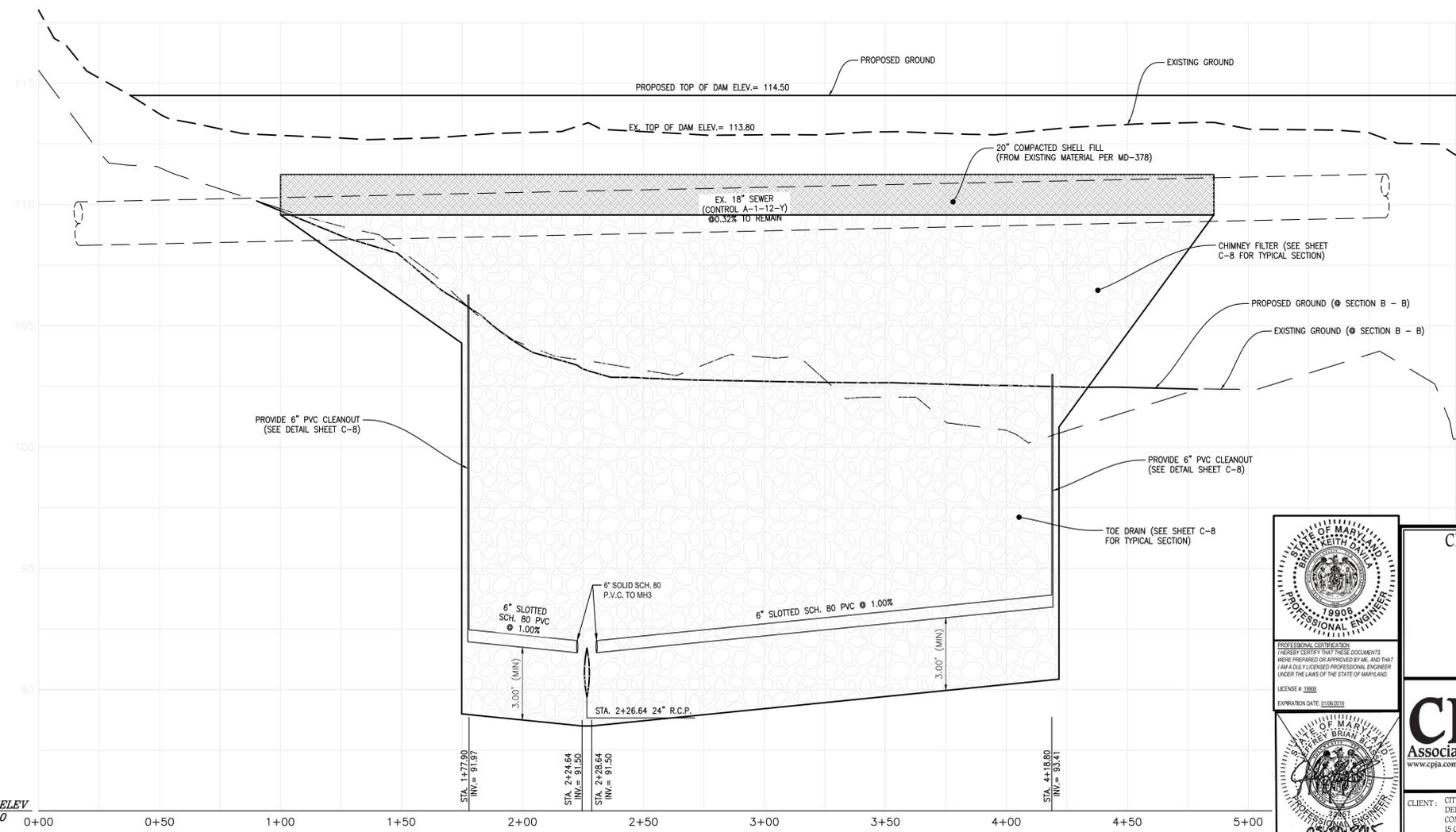
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CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE

PRELIMINARY PLAN NO. N/A SITE PLAN NO. N/A
DESIGN JBB SHEET 10 OF 22
DATE FEB. 2015 FILE NO. C-6 C-8
SCALE 1" = 30' 38-146-24.1

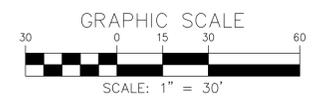


CHIMNEY FILTER SCHEMATIC PLAN VIEW
(SCALE: 1" = 30')



CHIMNEY FILTER PROFILE (B - B)
(SCALE: 1" = 30')

PLANS APPROVED BY
Harald W. Van Aller, P.E.
Harald W. Van Aller
November 5, 2018
14-MR-0062R
Dam Safety Division
Maryland Dept. of the Environment



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THE EXISTING UTILITIES SHOWN HEREON HAVE BEEN LOCATED USING INFORMATION AVAILABLE AT THE TIME THIS PLAN WAS PREPARED. PRIOR TO DIGGING, THE CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES VIA TEST PIT WITHIN THE LIMITS OF CONSTRUCTION SHOWN ON THIS PLAN AND CONFIRM THAT NO CONFLICTS EXIST. ANY CONFLICTS MUST BE BROUGHT TO THE ATTENTION OF CPJ AND THE OWNER PRIOR TO STARTING CONSTRUCTION.

MISS UTILITY

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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 # 19908
EXPIRATION DATE: 01/01/2018

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 # 28427
EXPIRATION DATE: 06/01/2018

CHIMNEY FILTER PLAN VIEW AND PROFILES

MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND

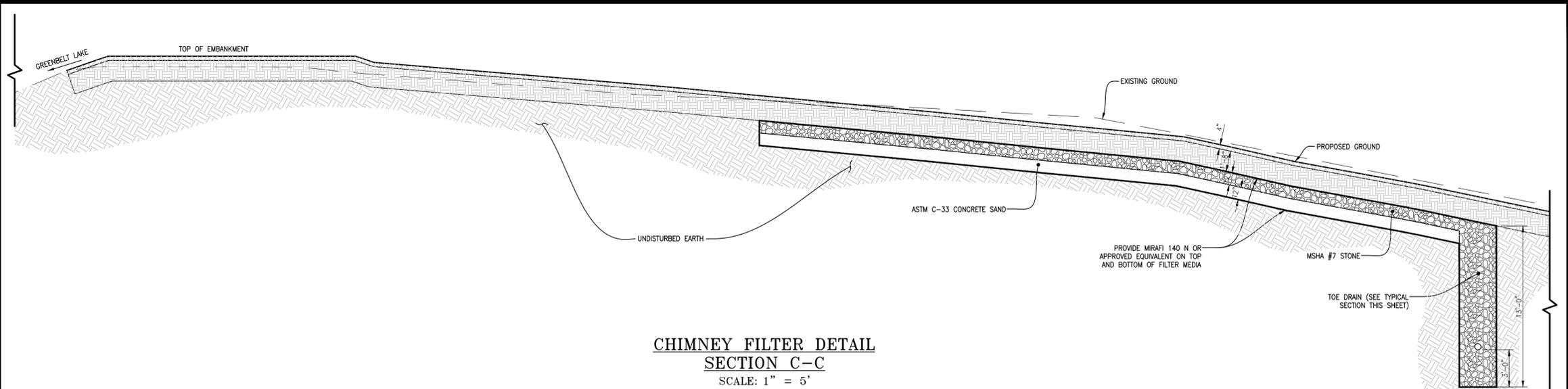
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CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 11	OF: 22
DRAFT: JMV	C-7	C-8
DATE: FEB. 2015	FILE NO.:	
SCALE: 1" = 30'		38-146-24.1

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Chimney Filter Installation Notes

- 1) All materials for chimney filter installation must be submitted to and approved by the Engineer-in-Charge and the Owner's Project Manager prior to delivery to site. Samples of sand and stone material to be used in the chimney filter shall be tested by the geotechnical engineer of record to ensure compliance with correct gradations of the specified materials.
- 2) Materials to be used on this project consist of the following:
 - i) ASTM C-33 Sand - The minimum dry density of the compacted sand shall be equal to 70 percent of the dry density obtained by compacting a single specimen of sand using the energy and methods described in ASTM D698A. The test consists of a one point test performed on sand that has been air dried thoroughly prior to compaction. The sand shall have no more than 3% material passing a #200 sieve as stockpiled on-site and no more than 5% material passing a #200 sieve as installed. The geotechnical engineer of record shall confirm this requirement.
 - ii) Stone aggregate shall be double-washed with a gradation meeting ASTM C-33 size #7.
 - iii) Under drain pipe and fittings shall be 6" diameter polyvinyl chloride (P.V.C.) meeting Schedule 80.
- 3) All chimney filter installation work is to be done under supervision of a professional geotechnical engineer.
- 4) Chimney filter material is to be placed in a maximum of eight (8) inch thick lifts compacting in between each lift.
- 5) Compaction of each lift of sand shall be accomplished via the following process:
 - i) Place lift the full length of the chimney filter prior to compaction.
 - ii) Flood the lift with clean potable water immediately prior to compaction from a source approved by the Engineer-in-Charge and the Owner's Project Manager.
 - iii) Make a minimum of two (2) passes with a vibratory plate compactor weighing at least 160 pounds with a minimum centrifugal weight of 2,450 pounds at a vibrating frequency of no less than 5,000 cycles per minute or by a vibratory smooth-wheeled roller weighing at least 325 pounds with a centrifugal weight of 2,250 pounds at a vibrating frequency of no less than 4,500 cycles per minute just after the water level has dropped below the surface of the sand.
- 6) Chimney filter material shall be placed to avoid segregation of particle sizes and to ensure the continuity and integrity of all zones. No foreign material shall be allowed to intermix with or otherwise contaminate the chimney filter materials. The contractor shall completely remove any chimney filter material found to be contaminated with foreign materials prior to installing additional chimney filter material.
- 7) Traffic shall not be permitted to crossover filter zones at random. Equipment crossovers shall be maintained, and the number and location of such crossovers shall be established and approved prior to beginning the chimney filter placement. Each cross over shall be cleared of contaminating material and shall be inspected and approved by the professional geotechnical engineer supervising the installation before placement of additional chimney filter material.
- 8) Any damage to the foundation surface or the trench sides or bottom occurring during placement of chimney filter material shall be repaired before chimney filter placement is continued.
- 9) The upper surface of the chimney filter should be constructed concurrently with adjacent zones of earth fill and shall be maintained at a minimum elevation of one (1) foot above the upper surface of the adjacent earth fill.



Mirafi® 140N

Mirafi® 140N is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Mirafi® 140N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids. Mirafi® 140N meets AASHTO M288-06 Class 3 for Elongation > 50%.

TenCate Geosynthetics Americas Laboratories are accredited by a2La (The American Association for Laboratory Accreditation) and Geosynthetic Accreditation Institute - Laboratory Accreditation Program (GAILAP) NITPEP.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	lbs (N)	120 (534)	120 (534)
Grab Tensile Elongation	ASTM D4632	%	50	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	50 (223)	50 (223)
CBR Puncture Strength	ASTM D6241	lbs (N)	310 (1380)	
Apparent Opening Size (AOS) ¹	ASTM D4751	U.S. Sieve (mm)	70 (0.212)	
Permeability	ASTM D4491	sec ²	1.7	
Flow Rate	ASTM D4491	gal/min/ft ² (l/min/m ²)	135 (5500)	
UV Resistance (at 500 hours) ²	ASTM D4355	% strength retained	70	

¹ ASTM D4751: AOS is a Maximum Opening Diameter Value
² Modified

Physical Properties	Unit	Typical Value ³	
		12.5 x 360 (3.8 x 110)	15 x 360 (4.5 x 110)
Roll Dimensions (width x length)	ft (m)	12.5 x 360 (3.8 x 110)	15 x 360 (4.5 x 110)
Roll Area	yd ² (m ²)	500 (418)	600 (502)
Estimated Roll Weight	lb (kg)	137 (62)	165 (75)

³ ASTM D4439 Standard Terminology for Geosynthetics: typical value, as for geosynthetics, the mean value calculated from documented manufacturing quality control test results for a defined population obtained from one test method associated with on specific property.

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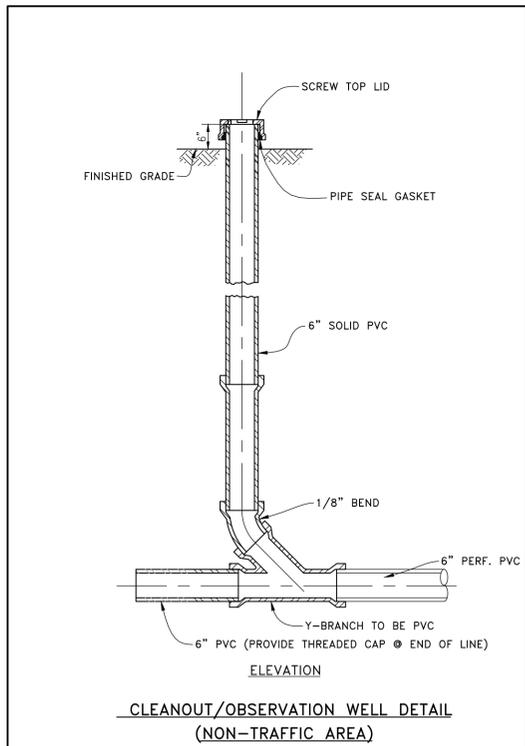
GMA ACCREDITED
GAILAP-25-07
Testing Lab 1201-D1 & 1201-D2

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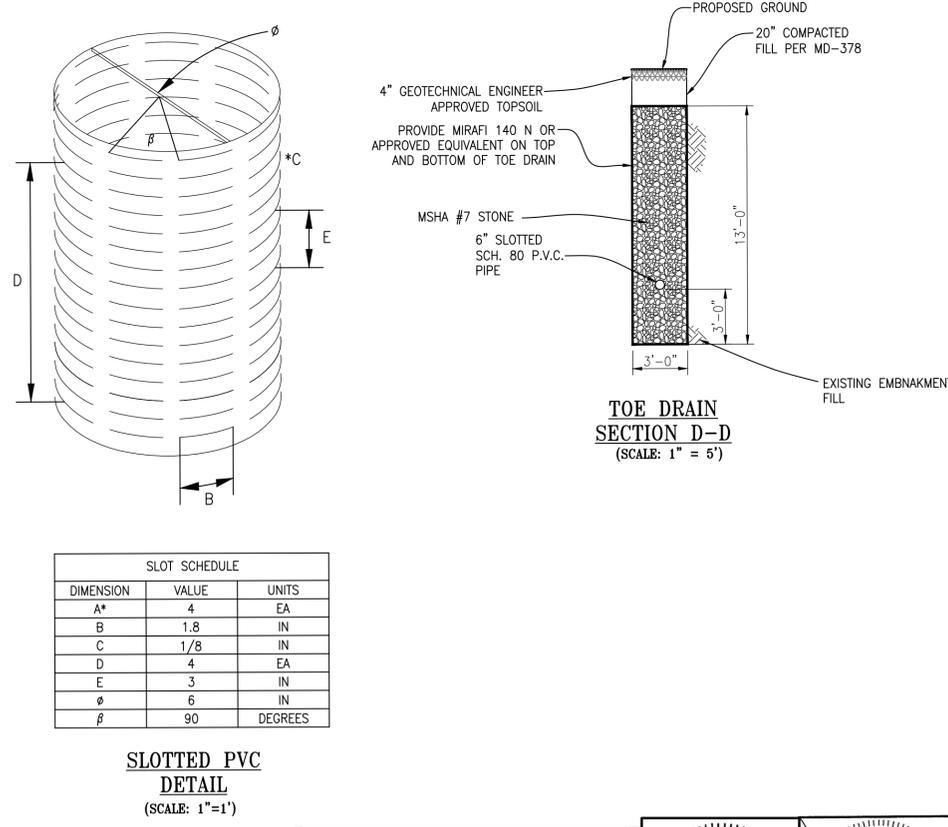
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1. FOR AN UNDERGROUND OBSERVATION WELL/CLEANOUT MOUNTED AT FINISHED GRADE, PROVIDE A TUBE MADE OF NON-CORROSIVE MATERIAL, SCHEDULE 80 PVC, OR EQUAL AT LEAST THREE FEET LONG WITH AN INSIDE DIAMETER OF AT LEAST SIX INCHES.
2. THE TUBE SHALL HAVE A FACTORY-ATTACHED CAST IRON OR HIGH-IMPACT PLASTIC COLLAR WITH RIBS TO PREVENT ROTATION WHEN REMOVING SCREW-TOP LID. THE SCREW-TOP LID SHALL BE CAST IRON OR HIGH-IMPACT PLASTIC THAT WILL WITHSTAND ULTRA-VIOLET RAYS.
3. THE TOP OF THE COVER TO BE APPROXIMATELY FLUSH WITH FINISHED GRADE.



PLANS APPROVED BY
Harald W. Van Aller, P.E.

Harald W. Van Aller

November 5, 2018
14-MR-0062R

Dam Safety Division
Maryland Dept. of the Environment

CHIMNEY FILTER DETAILS

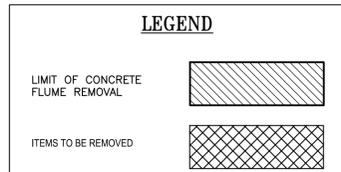
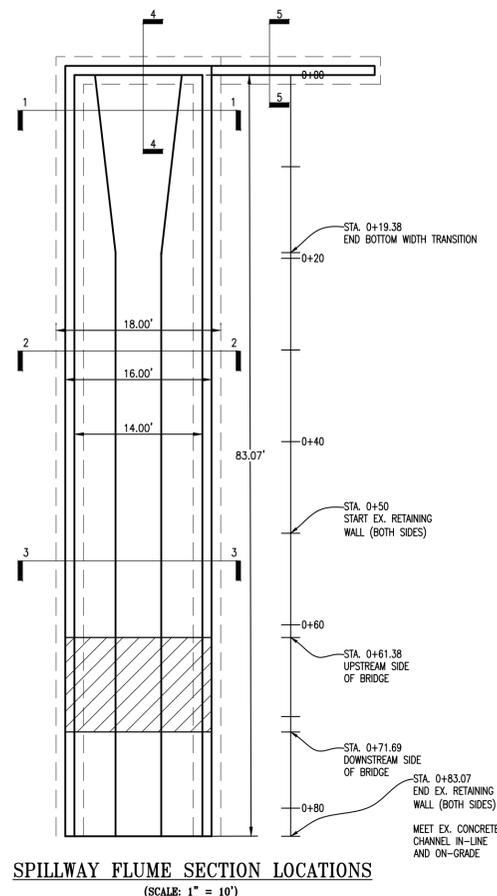
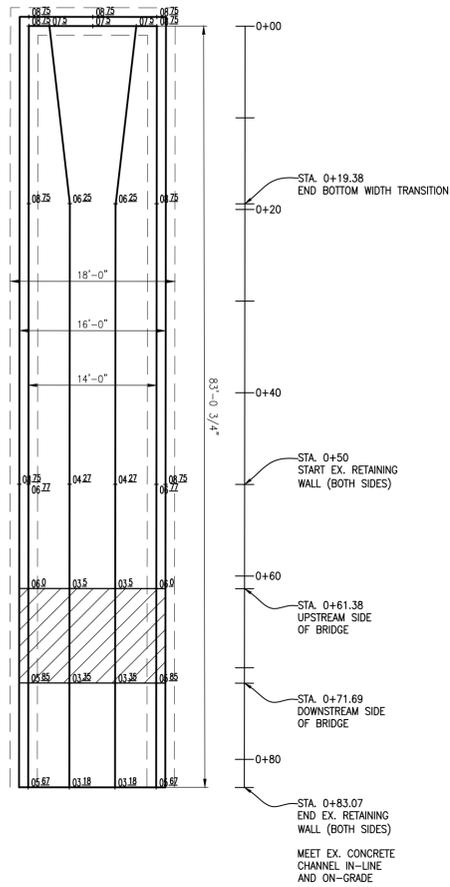
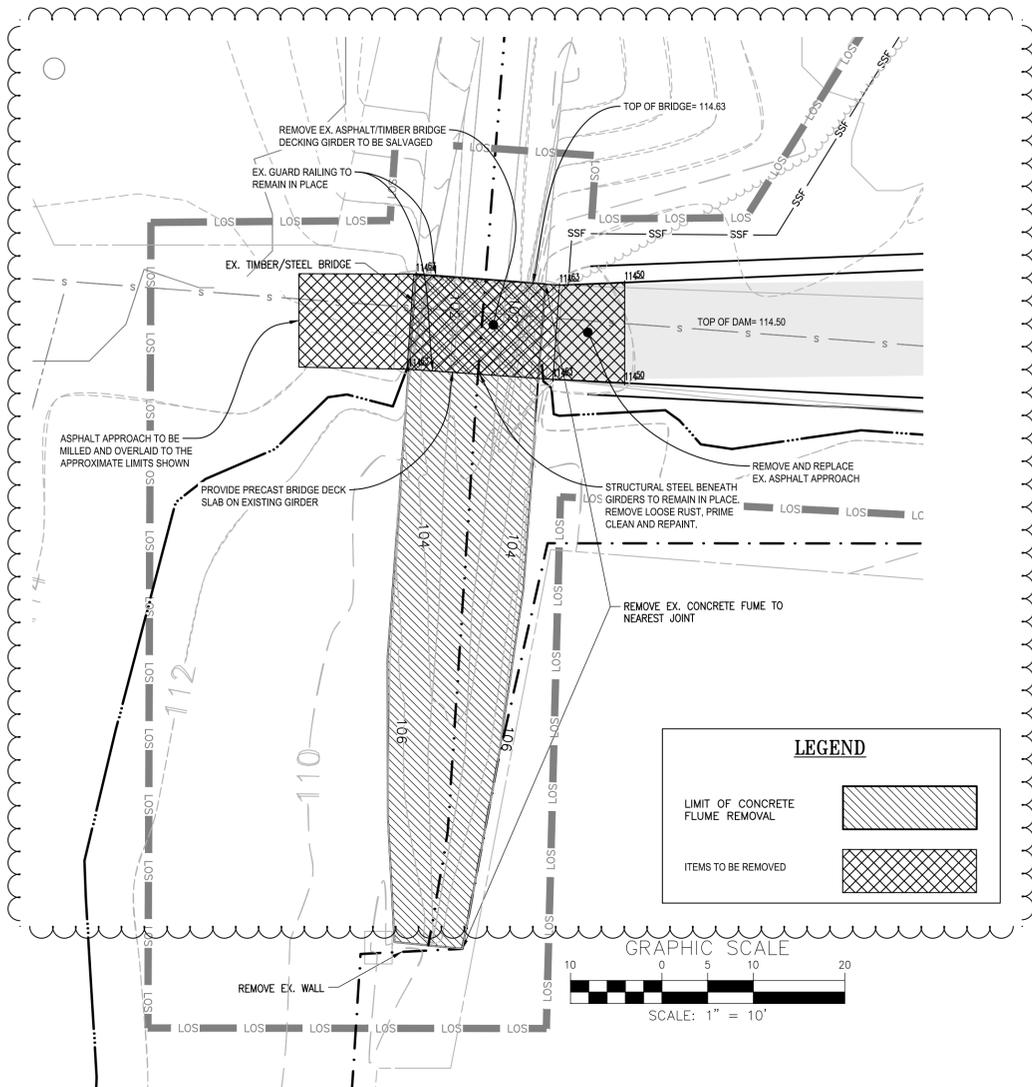
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DESIGN: JBB	SHEET: 12	OF: 22
DRAFT: JMV	C-8	C-8
DATE: FEB. 2015	FILE NO.:	
SCALE: AS SHOWN	38-146-24.1	

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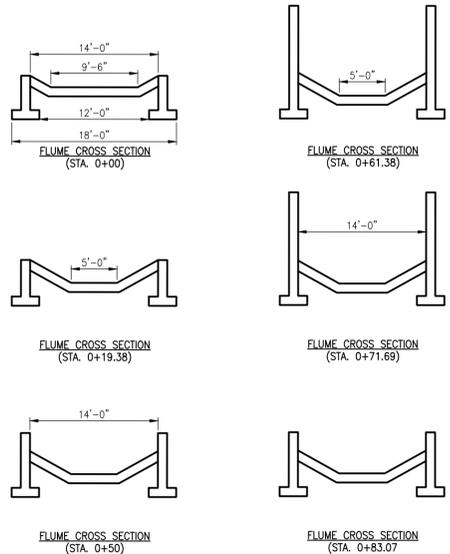


SPILLWAY FLUME SCHEMATIC PLAN
(SCALE: 1" = 10')

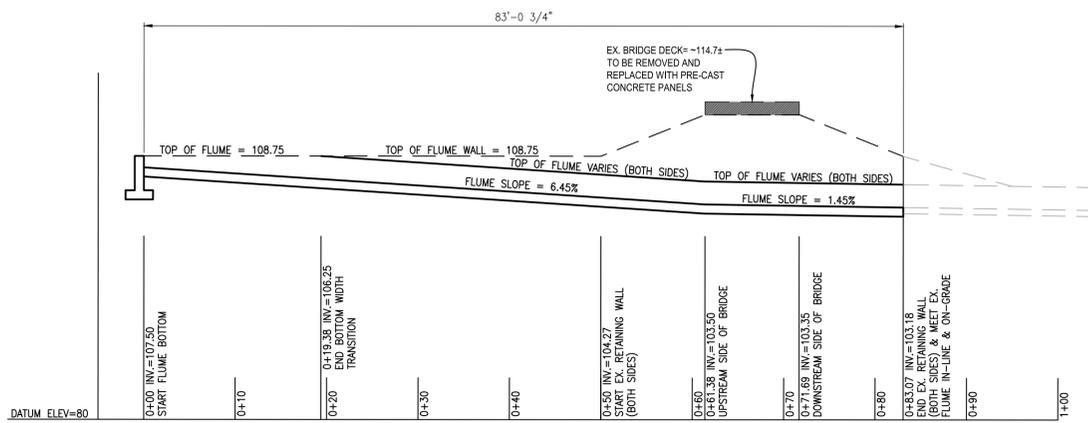
SPILLWAY FLUME SECTION LOCATIONS
(SCALE: 1" = 10')

SPILLWAY REPLACEMENT
(SCALE: 1" = 10')

NOTE:
CONTRACTOR TO PROVIDE SHOP DRAWINGS AND STRUCTURAL CERTIFICATION FOR PRECAST BRIDGE DECK DESIGN (GW LIMIT = 40,000 LBS)



SPILLWAY REPLACEMENT SECTIONS
(SCALE: 1" = 10')



SPILLWAY FLUME PROFILE
(SCALE: 1" = 10')

PLANS APPROVED BY
Harold W. Van Aller, P.E.
Harold W. Van Aller
November 5, 2018
14-MR-0062R
Dam Safety Division
Maryland Dept. of the Environment



STRUCTURAL CERTIFICATION
I hereby certify that the structural design of this stormwater management facility is in accordance with applicable codes and that the plan for this has been designed for specified loading(s) as indicated hereon.
Jeffrey B. Blass
Design Engineer Signature Date: **05-20-2015**
JEFFREY B. BLASS 32457
Printed Name Registration Number
ACI-350 Design Loading

MISS UTILITY
Call "Miss Utility" at 1-800-257-7777, 72 hours prior to the start of work. The excavator must notify all public utility companies with underground facilities in the area of proposed excavation and have those facilities located by the utility companies prior to commencing excavation.

SPILLWAY REPLACEMENT PLAN VIEW
MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND

CPJ Charles P. Johnson & Associates, Inc.
Civil and Environmental Engineers • Planners • Landscape Architects • Surveyors
1751 Elton Rd., Ste. 300 Silver Spring, MD 20903 301-434-7000 Fax: 301-434-9394
www.cpa.com • Silver Spring, MD • Gaithersburg, MD • Annapolis, MD • College Park, MD • Frederick, MD • Fairfax, VA

CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 13	OF: 22
DRAFT: JMV	DATE: FEB. 2015	FILE NO: S-1 S-2
SCALE: AS SHOWN		38-146-24.1

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STRUCTURAL NOTES

1. BUILDING CODES
 - A. ALL CONSTRUCTION SHALL CONFORM WITH THE 2012 INTERNATIONAL BUILDING CODE AND ALL SUBSEQUENT SUPPLEMENTS.
 - B. IN ADDITION, ALL CONSTRUCTION SHALL CONFORM WITH THE GOVERNING LOCAL BUILDING CODE.

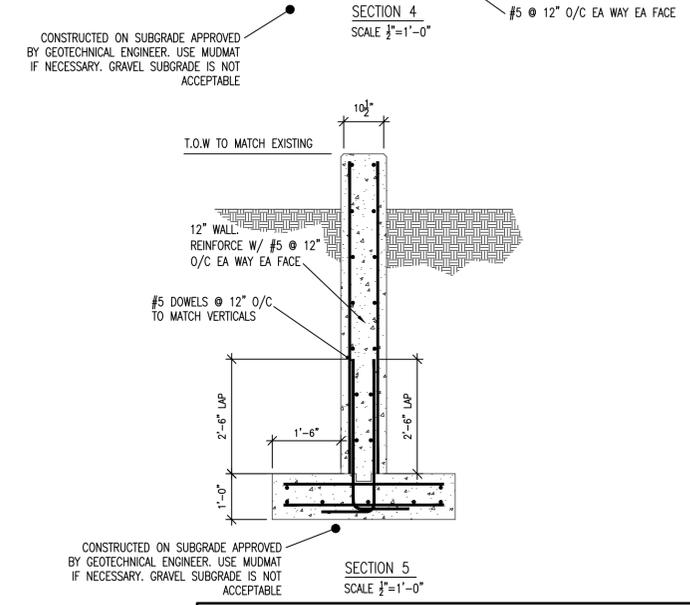
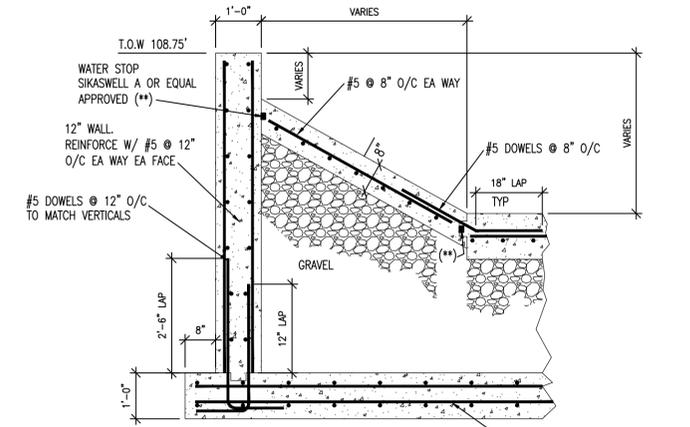
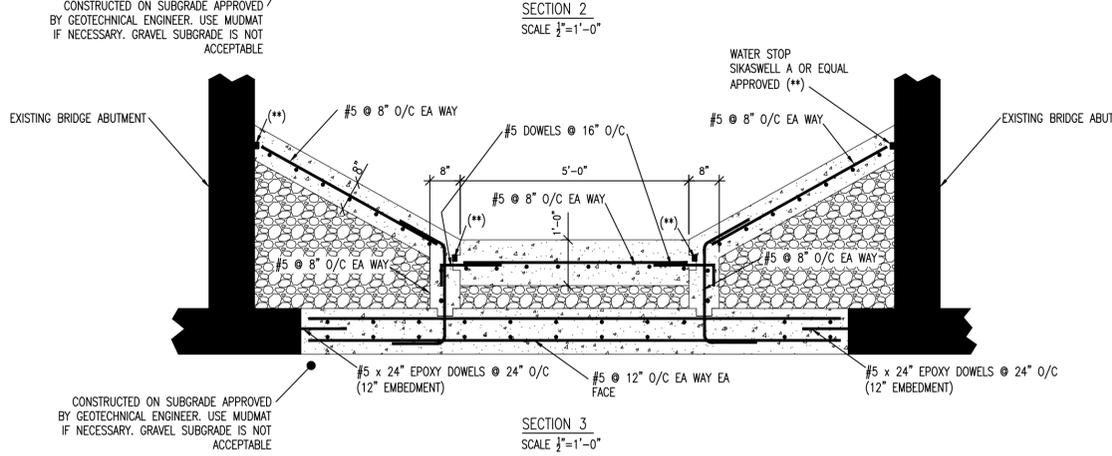
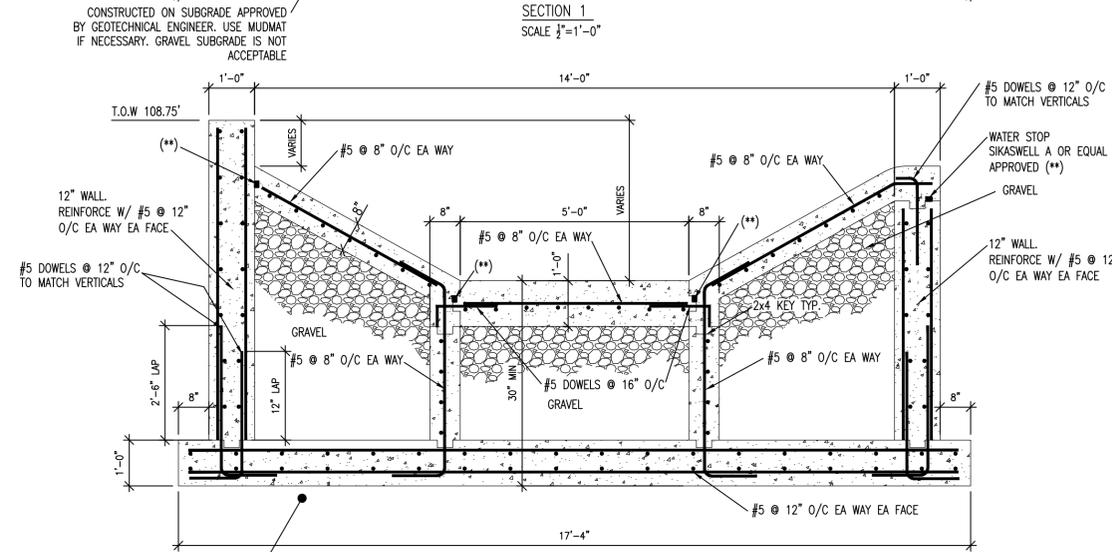
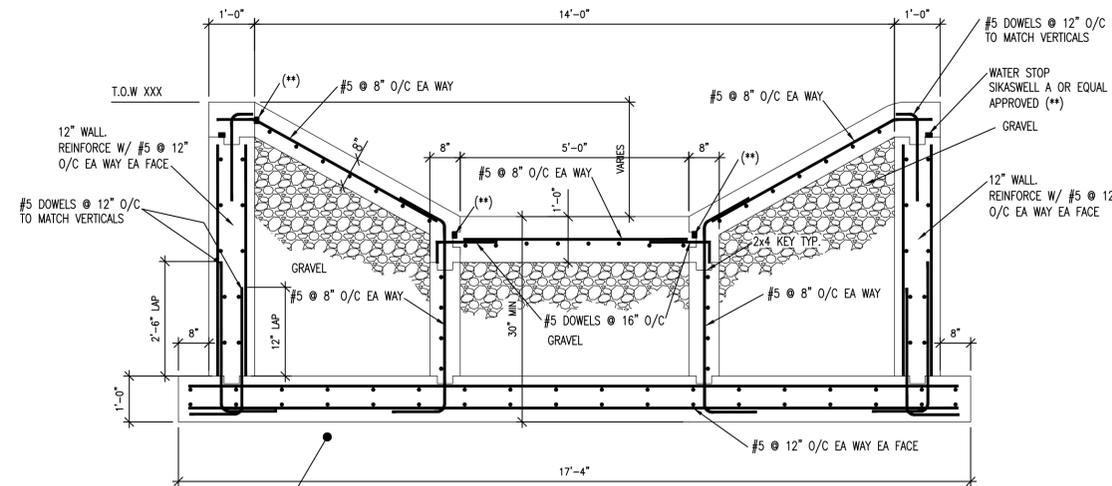
REVISIONS THEREOF AND ADDITIONS THERETO AND SPECIAL PROVISIONS FOR MATERIAL CONSTRUCTION
2. MISCELLANEOUS
 - A. THE CONTRACTOR SHALL REVIEW CIVIL DRAWINGS PREPARED BY CPJ ASSOCIATES, DATED XXX FOR LOCATION AND DIMENSION OF CHASES, INSERTS, OPENINGS, SLEEVES, DEPRESSIONS AND OTHER PROJECT REQUIREMENTS WHICH IMPACT THE STRUCTURAL COMPONENTS.
 - B. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS SHOWN ON THE CONTRACT DRAWINGS BEFORE PROCEEDING WITH CONSTRUCTION. ALL DISCREPANCIES AND OMISSIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT.
 - C. THE CONTRACTOR SHALL NOT SUBMIT REPRODUCTIONS OF THE STRUCTURAL CONTRACT DOCUMENTS AS SHOP DRAWINGS.
 - D. SCALES SHOWN ON THE STRUCTURAL CONTRACT DRAWINGS ARE FOR GENERAL INFORMATION ONLY. DIMENSIONAL INFORMATION SHALL NOT BE OBTAINED BY SCALING THE DRAWINGS.
3. FOUNDATIONS
 - A. ALL FOUNDATIONS HAVE BEEN DESIGNED FOR AN ASSUMED NET ALLOWABLE SOIL BEARING PRESSURE OF 2000 PSF. THE ALLOWABLE SOIL BEARING PRESSURE SHALL BE FIELD VERIFIED BY A REGISTERED GEOTECHNICAL ENGINEER AND APPROVED PRIOR TO PLACING FOUNDATIONS. SHOULD THE ACTUAL SOIL BEARING PRESSURE BE LESS THAN 2000 PSF, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER.
 - B. ALL EXCAVATION AND BACKFILLING OPERATIONS WITHIN THE STRUCTURE FOOTPRINT, INCLUDING ALL COMPACTION TESTS AND INSPECTIONS, SHALL BE DONE UNDER THE DIRECTION AND SUPERVISION OF A REGISTERED GEOTECHNICAL ENGINEER. CONTRACTOR SHALL BACKFILL AROUND PERIMETER OF THE STRUCTURE AT AN EVEN RATE SO AS NOT TO CAUSE AN OVERTURNING MOMENT.
 - C. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ALL FOUNDATION AND SOIL CONDITIONS WHICH DIFFER FROM THOSE ANTICIPATED OR INDICATED IN THE CONTRACT DOCUMENTS.
 - D. ALL EXISTING SOIL CONTAINING GRAVEL, CONSTRUCTION OR DEMOLITION DEBRIS, ORGANIC SUBSTANCES, OR OTHER FOREIGN OBJECTS SHALL BE REMOVED FROM THE REGION WITHIN THE FOOTPRINT OF THE STRUCTURE.
4. CAST IN PLACE CONCRETE
 - A. ALL CONCRETE CONSTRUCTION SHALL CONFORM TO THE CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES (ACI 350). LATEST LOCAL APPROVED
 - B. IN ADDITION TO THE ABOVE, ALL CONCRETE WORK SHALL CONFORM TO THE FOLLOWING:
 1. RECOMMENDED PRACTICE FOR HOT WEATHER CONCRETING (ACI 305).
 2. RECOMMENDED PRACTICE FOR COLD WEATHER CONCRETING (ACI 306).
 3. RECOMMENDED PRACTICE FOR CONCRETE FORMWORK (ACI 347).
 - C. ALL CONCRETE, UNLESS NOTED OTHERWISE, SHALL BE STONE AGGREGATE CONCRETE HAVING A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4500 PSI (SHA MIX #6). ALL CONCRETE EXPOSED TO WEATHER SHALL HAVE AN AIR ENTRAINMENT OF 5% ±.1 NO ADMIXTURES CONTAINING CALCIUM CHLORIDE SHALL BE PERMITTED. MAXIMUM AGGREGATE SIZE SHALL BE 1", WATER/CEMENT RATIO SHALL BE 0.45, MAXIMUM SLUMP SHALL BE 4". ALL CONCRETE, EXCEPT FOOTINGS, SHALL CONTAIN A WATER REDUCING ADMIXTURE. PORTLAND CEMENT SHALL CONFORM TO ASTM C 150 AND NORMAL WEIGHT AGGREGATES SHALL CONFORM TO ASTM C 33.
 - D. ALL REINFORCING BARS SHALL BE NEW BILLET STEEL CONFORMING TO ASTM A 615 GRADE 60. ALL WELDED WIRE FABRIC (W.W.F.) SHALL CONFORM TO ASTM A 185. LAP ALL REINFORCING BARS A MINIMUM OF 48 BAR DIAMETERS AND ALL W.W.F. A MINIMUM OF TWO FULL GRIDS, UNLESS OTHERWISE INDICATED.
 - E. ALL REINFORCING SHALL BE DETAILED, FABRICATED AND PLACED IN ACCORDANCE WITH THE CRSI "MANUAL OF STANDARD PRACTICE", ACI 315 "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT", ACI SP 66 "DETAILING MANUAL".
 - F. ALL CONCRETE MIX DESIGNS, INCLUDING CEMENT CONTENT, WATER CEMENT RATIO, FINE AND COARSE AGGREGATE CONTENT AND ALL ADMIXTURES, SHALL BE REVIEWED BY ENGINEER PRIOR TO PLACING FIRST CONCRETE.
 - G. ALL CONCRETE SHALL BE SAMPLED AND TESTED BY THE TESTING AGENCY. THE CONTRACTOR SHALL NOTIFY THE TESTING AGENCY 48 HOURS PRIOR TO THE PLACING OF ANY CONCRETE.
 - H. GROUND BLAST FURNACE SLAG CAN NOT BE USED TO REPLACE THE PORTLAND CEMENT IN A CONCRETE MIX, AND FLY ASH OR POZZOLAN CAN NOT BE USED TO REPLACE THE PORTLAND CEMENT IN A CONCRETE MIX.
 - I. MINIMUM COVER FOR ALL REINFORCING SHALL BE AS FOLLOWS UNLESS OTHERWISE INDICATED:

FOUNDATIONS	3 INCHES
WALLS	2 INCHES
5. RETAINING WALLS
 - A. RETAINING WALLS HAVE BEEN DESIGNED WITH BACKFILL MATERIAL HAVING THE FOLLOWING CHARACTERISTICS:

EARTH PRESSURE CALCULATED BASED EQUIVALENT FLUID PRESSURE OF 60H AND UNIT WEIGHT OF 125 PCF.

IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO INSURE THE BACK FILL MATERIAL MEETS THESE CHARACTERISTICS.
 - B. RETAINING WALLS HAVE BEEN DESIGNED FOR THE FOLLOWING MINIMUM FACTORS OF SAFETY:

OVERTURNING	2.0 OR BETTER
SLIDING	1.5 OR BETTER
BOUYANCY	1.5 OR BETTER
 - C. DO NOT BACKFILL UNTIL CONCRETE HAS REACHED ITS DESIGN STRENGTH AT 28 DAYS.



MISS UTILITY
 Call "Miss Utility" at 1-800-257-7777, 72 hours prior to the start of work. The excavator must notify all public utility companies with underground facilities in the area of proposed excavation and have those facilities located by the utility companies prior to commencing excavation.

SPILLWAY REPLACEMENT NOTES & DETAILS
 MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
 BERWYN (21st) ELECTION DISTRICT
 PRINCE GEORGE'S COUNTY, MARYLAND

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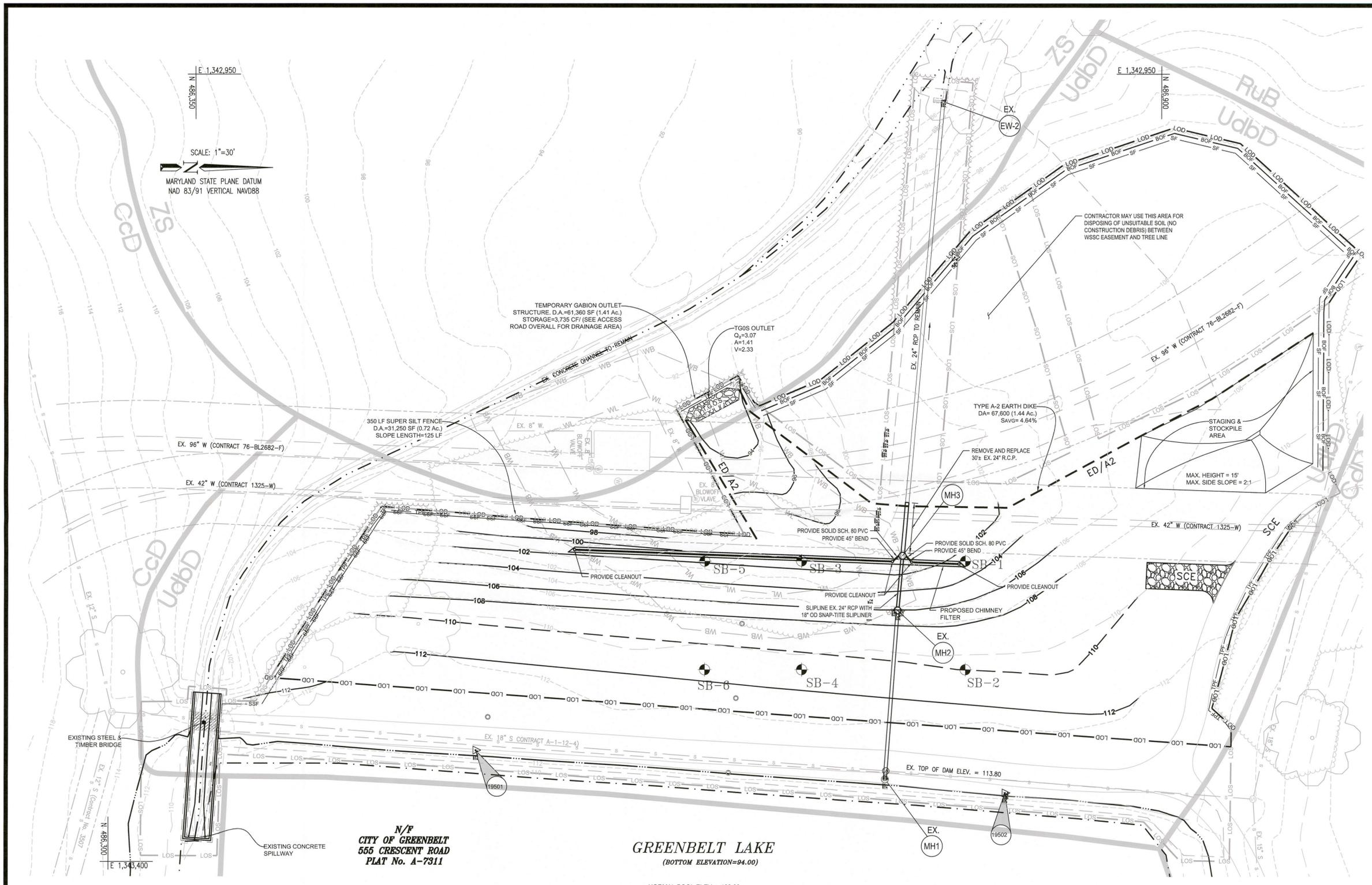
CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 14	OF: 22
DRAFT: JMV	DATE: FEB. 2015	FILE NO: S-2
SCALE: 1/2"=1'-0"		38-146-24.1

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PLANS APPROVED BY
Harald W. Van Ailer, P.E.
Harald W. Van Ailer
 November 5, 2018
14-MR-0062R
 Dam Safety Division
 Maryland Dept. of the Environment

STRUCTURAL CERTIFICATION
 I hereby certify that the structural design of this stormwater management facility is in accordance with applicable codes and that the plan for this has been designed for specified loading(s) as indicated hereon.
Jeffrey B. Blass
 Design Engineer Signature Date: 05-20-2015
JEFFREY B. BLASS 32457
 Printed Name Registration Number
 ACI-350 Design Loading





SCALE: 1"=30'
 MARYLAND STATE PLANE DATUM
 NAD 83/91 VERTICAL NAVD88

E 1,342,950
 N 005,989.900

TEMPORARY GABION OUTLET
 STRUCTURE, D.A.=61,360 SF (1.41 Ac.)
 STORAGE=3,735 CF (SEE ACCESS
 ROAD OVERALL FOR DRAINAGE AREA)

TGOs OUTLET
 $Q_2=3.07$
 $A=1.41$
 $V=2.33$

TYPE A-2 EARTH DIKE
 DA= 67,600 (1.44 Ac.)
 SAVG= 4.64%

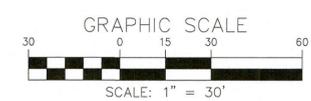
REMOVE AND REPLACE
 30" EX. 24" R.C.P.

STAGING &
 STOCKPILE
 AREA
 MAX. HEIGHT = 15'
 MAX. SIDE SLOPE = 2:1

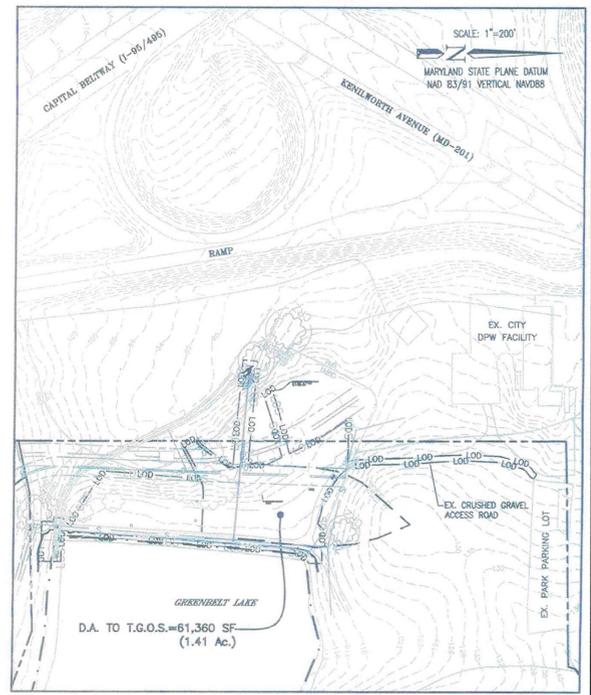
N/F
 CITY OF GREENBELT
 555 CRESCENT ROAD
 PLAT No. A-7311

GREENBELT LAKE
 (BOTTOM ELEVATION=94.00)

NORMAL POOL ELEV. = 108.83
 100-YR. WSEL = 112.51



PLANS APPROVED BY
 Harald W. Van Aller, P.E.
Harold W. Van Aller
 November 5, 2018
 14-MR-0062R
 Dam Safety Division
 Maryland Dept. of the Environment



PROJECT AREA ACCESS ROAD OVERALL
 (SCALE: 1" = 200')

- GENERAL NOTES:**
1. THIS PLAN SHALL ONLY BE USED FOR CONSTRUCTION OF SEDIMENT CONTROL AND ASSOCIATED SEDIMENT CONTROL IMPROVEMENTS AS SHOWN.
 2. ALL SEDIMENT CONTROL ARE TO BE MAINTAINED TO THE SATISFACTION OF THE PRINCE GEORGE'S COUNTY SEDIMENT CONTROL INSPECTOR AT ALL TIMES AT NO ADDITIONAL COST TO THE OWNER.
 3. THE EXISTING UTILITIES SHOWN HEREON HAVE BEEN LOCATED USING INFORMATION AVAILABLE AT THE TIME THIS PLAN WAS PREPARED. PRIOR TO DIGGING, THE CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES VIA TEST PIT WITHIN THE LIMITS OF CONSTRUCTION SHOWN ON THIS PLAN AND CONFIRM THAT NO CONFLICTS EXIST. ANY CONFLICTS MUST BE BROUGHT TO THE ATTENTION OF CPJ AND THE OWNER PRIOR TO STARTING CONSTRUCTION.

MISS UTILITY
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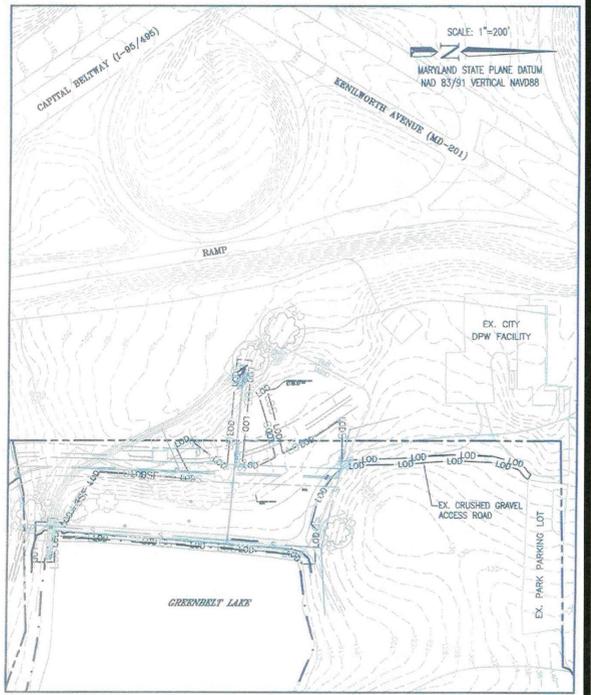
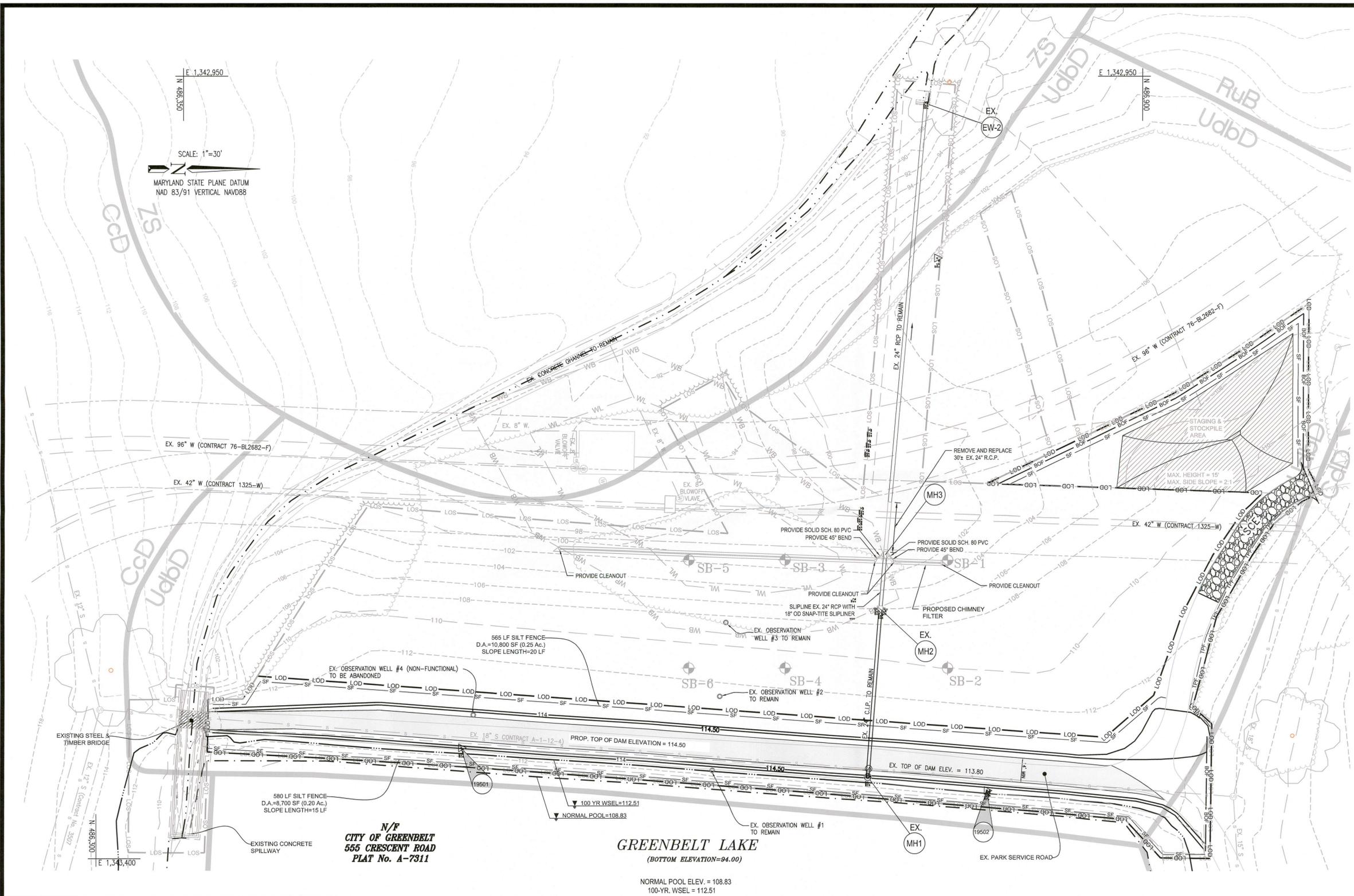
GRADING, EROSION, & SEDIMENT CONTROL PLAN PHASE 2A

MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
 BERWYN (21st) ELECTION DISTRICT
 PRINCE GEORGE'S COUNTY, MARYLAND

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CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS CELIA CRAZE	PRELIMINARY PLAN NO. N/A	SITE PLAN NO. N/A
DESIGN: JBB	SHEET 16	OF 22
DRAFT: JMV	ES-4	ES-10
DATE: FEB. 2015	FILE NO.:	
SCALE: 1" = 30'		38-146-24.1

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PROJECT AREA ACCESS ROAD OVERALL
(SCALE: 1" = 200')

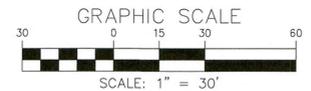


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PLANS APPROVED BY
Harold W. Van Aller, P.E.
November 5, 2018
14-MR-0062R
Dam Safety Division
Maryland Dept. of the Environment



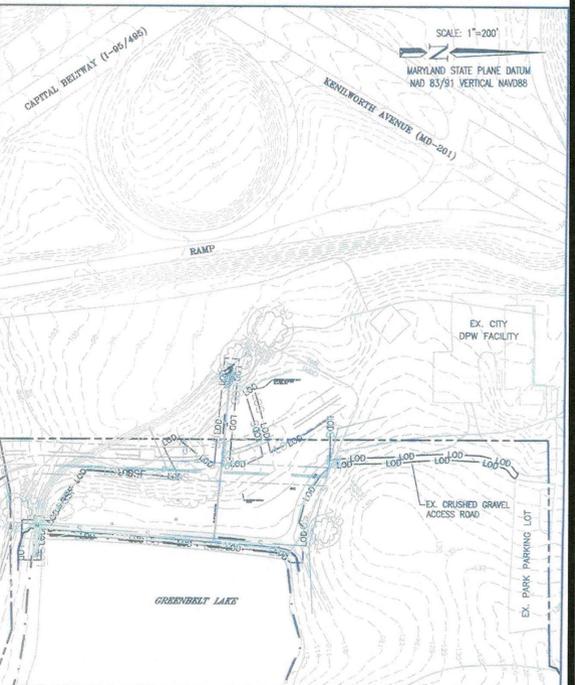
GRADING, EROSION, & SEDIMENT CONTROL PLAN PHASE 2B

MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
BERWYN (21st) ELECTION DISTRICT
PRINCE GEORGE'S COUNTY, MARYLAND

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CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 17	OF: 22
DRAFT: JMV	DATE: FEB. 2015	ES-5
SCALE: 1" = 30'	FILE NO.: 38-146-24.1	ES-10

SCALE: 1"=30'
 MARYLAND STATE PLANE DATUM
 NAD 83/91 VERTICAL NAVD88



PROJECT AREA ACCESS ROAD OVERALL
 (SCALE: 1" = 200')



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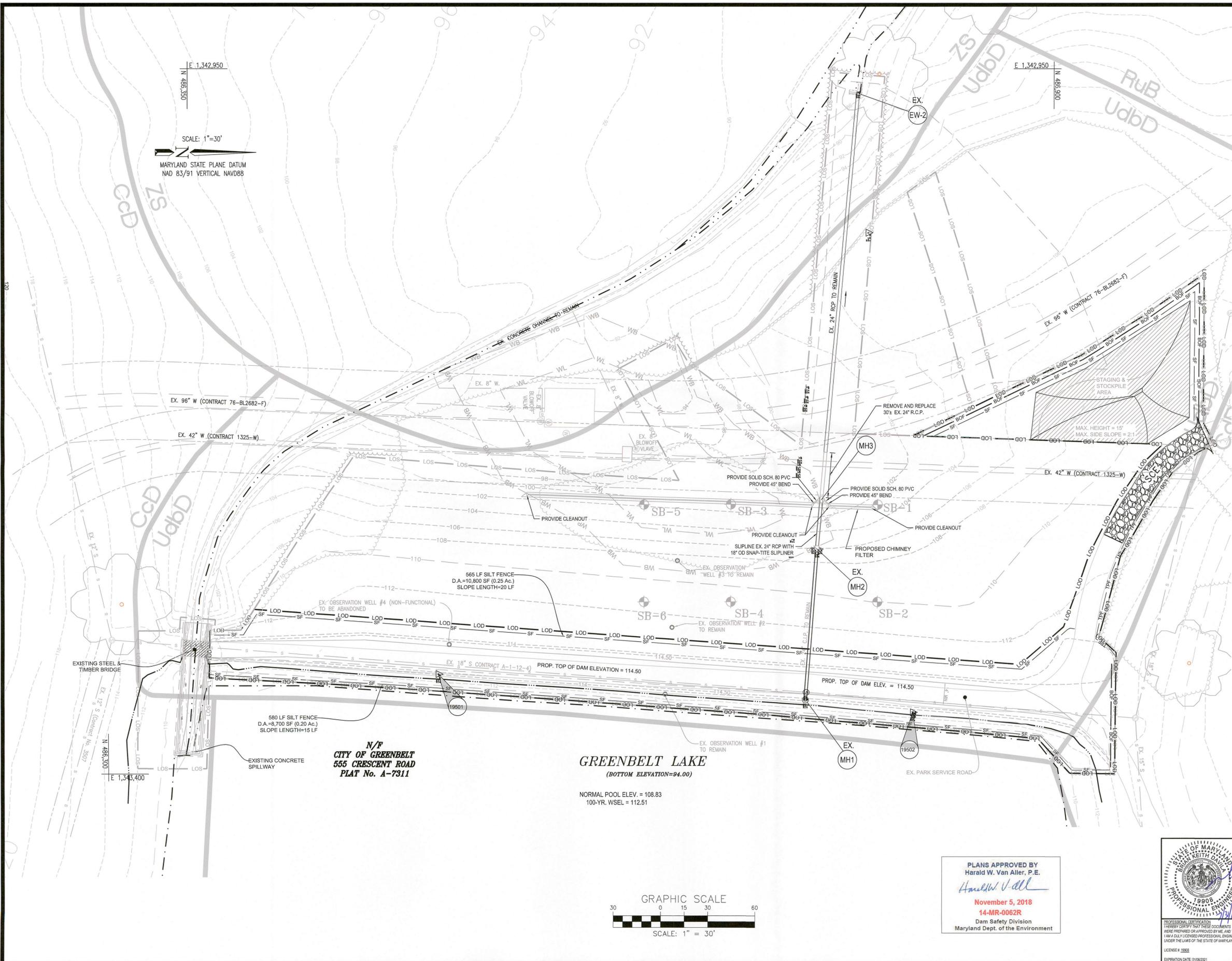
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GRADING, EROSION, & SEDIMENT CONTROL PLAN PHASE 3

MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
 BERWYN (21st) ELECTION DISTRICT
 PRINCE GEORGE'S COUNTY, MARYLAND

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CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 45 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 18	OF: 22
DRAFT: JMV	ES: 6	ES: 10
DATE: FEB, 2015	FILE NO:	
SCALE: 1" = 30'	38-146-24.1	



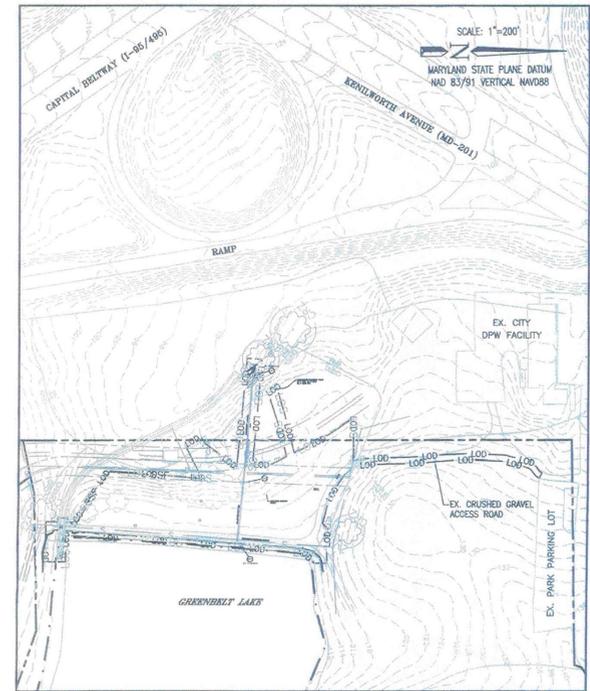
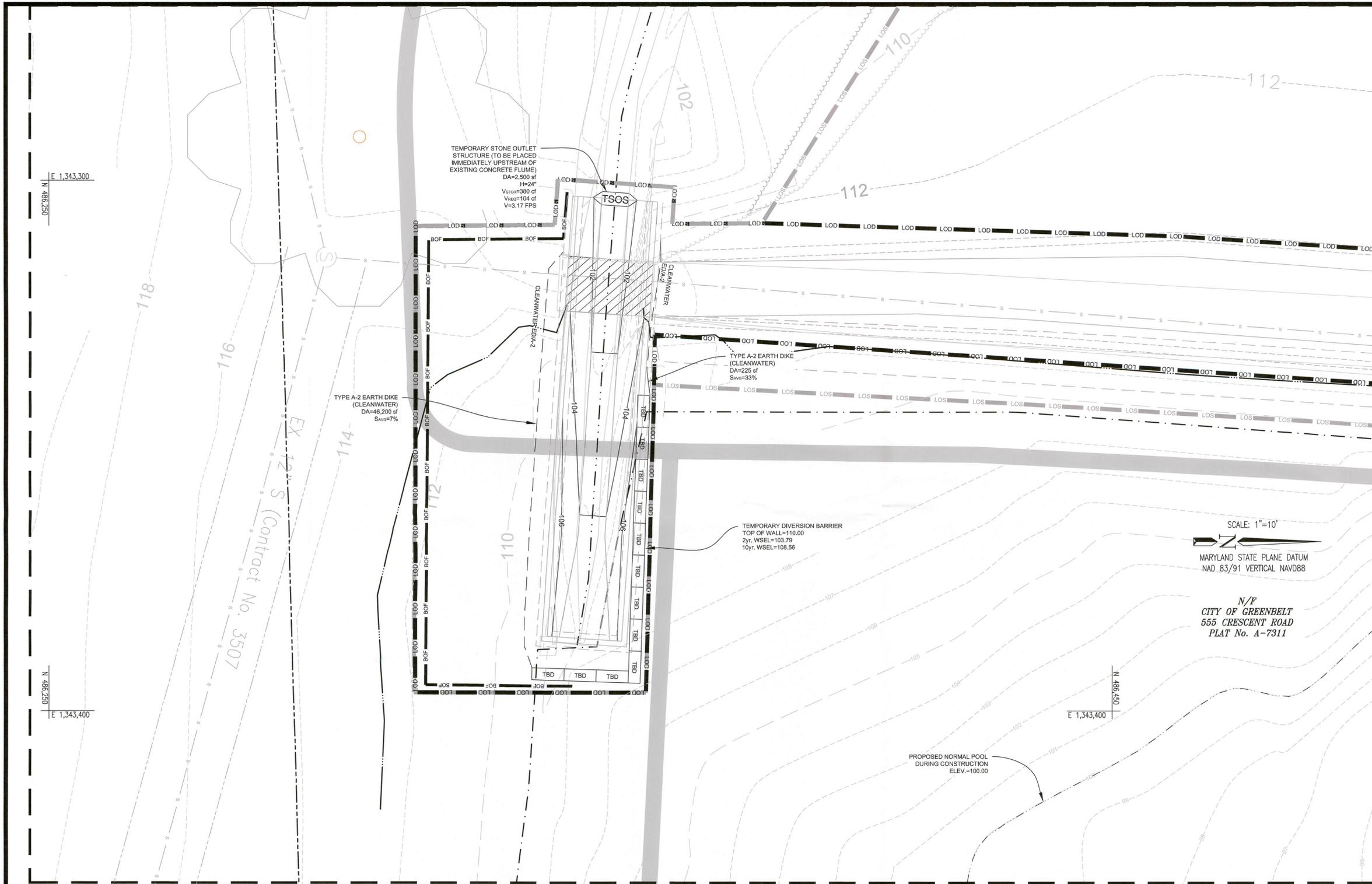
N/F
 CITY OF GREENBELT
 555 CRESCENT ROAD
 PLAT No. A-7311

GREENBELT LAKE
 (BOTTOM ELEVATION=94.00)

NORMAL POOL ELEV. = 108.83
 100-YR. WSEL = 112.51

PLANS APPROVED BY
 Harold W. Van Aller, P.E.
 November 5, 2018
 14-MR-0062R
 Dam Safety Division
 Maryland Dept. of the Environment





PROJECT AREA ACCESS ROAD OVERALL
(SCALE: 1" = 200')

CONCRETE SPILLWAY INSET
(SCALE: 1" = 10')

SCALE: 1" = 10'
MARYLAND STATE PLANE DATUM
NAD 83/91 VERTICAL NAVD88

N/F
CITY OF GREENBELT
555 CRESCENT ROAD
PLAT No. A-7311



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PLANS APPROVED BY
 Harald W. Van Aller, P.E.
 November 5, 2018
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GRADING, EROSION, & SEDIMENT CONTROL PLAN PHASE 3
 MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
 BERWYN (21st) ELECTION DISTRICT
 PRINCE GEORGE'S COUNTY, MARYLAND

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CLIENT: CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO: N/A	SITE PLAN NO: N/A
DESIGN: JBB	SHEET: 19	OF: 22
DRAFT: JMV	DATE: FEB., 2015	FILE NO.: ES-7 ES-10
SCALE: 1" = 10'	FILE NO.: 38-146-24.1	

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B-4-8 STANDARDS AND SPECIFICATIONS FOR STOCKPILE AREA

Definition
A mound or pile of soil protected by appropriately designed erosion and sediment control measurer.

Purpose
To provide a designated location for the temporary storage of soil that controls the potential for erosion, sedimentation, and changes to drainage patterns.

Conditions Where Practice Applies
Stockpile areas are utilized when it is necessary to salvage and store soil for later use.

- Criteria**
- The stockpile location and all related sediment control practices must be clearly indicated on the erosion and sediment control plan.
 - The footprint of the stockpile must be sized to accommodate the anticipated volume of material and based on a side slope ratio no steeper than 2:1. Benching must be provided in accordance with section B-3 land grading.
 - Runoff from the stockpile area must drain to a suitable sediment control practice.
 - Access the stockpile area from the upgrade side.
 - Clear water runoff into the stockpile area must be minimized by use of a diversion device, such as an earth dike, temporary swale, or diversion fence. Provisions must be made for discharging concentrated flow in a non-erosive manner.
 - Where runoff concentrates along the toe of the stockpile fill, an appropriate erosion/sediment control practice must be used to intercept the discharge.
 - Stockpiles must be stabilized in accordance with the 3/7 day stabilization requirement as well as Standard B-4-1 Incremental Stabilization and Standard B-4-4 Temporary Stabilization.
 - If the stockpile is located on an impervious surface, a liner should be provided below the stockpile to facilitate cleanup. Stockpiles containing contaminated material must be covered with impermeable sheeting.

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

GENERAL NOTES:

- THIS PLAN SHALL ONLY BE USED FOR CONSTRUCTION OF SEDIMENT CONTROL AND ASSOCIATED SEDIMENT CONTROL IMPROVEMENTS AS SHOWN. THIS PLAN SHALL NOT BE USED FOR ANY OTHER CONSTRUCTION PURPOSE. THIS PLAN SHALL NOT BE USED FOR GRADING OF THE SITE.
- ALL SEDIMENT CONTROL ARE TO BE MAINTAINED TO THE SATISFACTION OF THE PRINCE GEORGE'S COUNTY SEDIMENT CONTROL INSPECTOR AT ALL TIMES AT NO ADDITIONAL COST TO THE OWNER.
- THE EXISTING UTILITIES SHOWN HEREON HAVE BEEN LOCATED USING INFORMATION AVAILABLE AT THE TIME THIS PLAN WAS PREPARED. PRIOR TO DIGGING, THE CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES VIA TEST PIT WITHIN THE LIMITS OF CONSTRUCTION SHOWN ON THIS PLAN AND CONFIRM THAT NO CONFLICTS EXIST. ANY CONFLICTS MUST BE BROUGHT TO THE ATTENTION OF CPJ AND THE OWNER PRIOR TO STARTING CONSTRUCTION.

B-4 STANDARDS AND SPECIFICATIONS FOR VEGETATIVE STABILIZATION

Definition
Using vegetation as cover to protect exposed soil from erosion.

Purpose
To promote the establishment of vegetation on exposed soil.

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

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

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

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

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

Adequate Vegetative Establishment
Inspect seeded areas for vegetative establishment and make necessary repairs, replacements, and reseeds within the planting season.

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

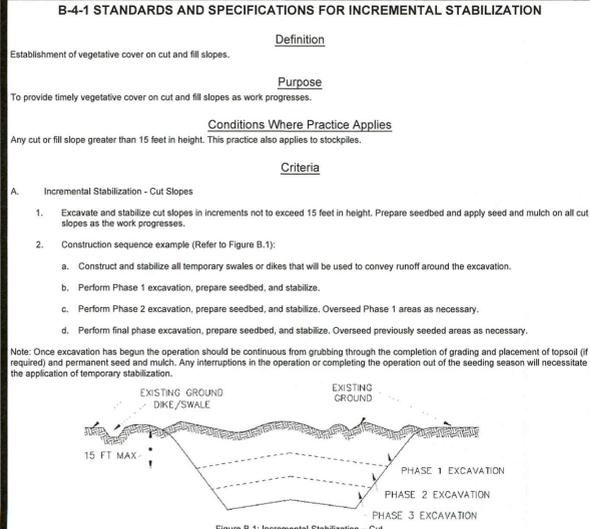
B-4-1 STANDARDS AND SPECIFICATIONS FOR INCREMENTAL STABILIZATION

Definition
Establishment of vegetative cover on cut and fill slopes.

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

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

- Criteria**
- A. Incremental Stabilization - Cut Slopes
- Excavate and stabilize cut slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all slopes as the work progresses.
 - Construction sequence example (Refer to Figure B.1):
 - Construct and stabilize all temporary swales or dikes that will be used to convey runoff around the excavation.
 - Perform Phase 1 excavation, prepare seedbed, and stabilize.
 - Perform Phase 2 excavation, prepare seedbed, and stabilize. Overseed Phase 1 areas as necessary.
 - Perform final phase excavation, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.
- Note: Once excavation has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.



Call "Miss Utility" at 1-800-257-7777, 72 hours prior to the start of work. The excavator must notify all public utility companies with underground facilities in the area of proposed excavation and have those facilities located by the utility companies prior to commencing excavation.

B-4-2 STANDARDS AND SPECIFICATIONS FOR SOIL PREPARATION, TOPSOILING, AND SOIL AMENDMENTS

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

Purpose
To provide a suitable soil medium for vegetative growth.

Conditions Where Practice Applies
Where vegetative stabilization is to be established.

- A. Soil Preparation
- Temporary Stabilization
 - Seedbed preparation consists of loosening soil to a depth of 3 to 5 inches by means of suitable agricultural or construction equipment, such as disc harrows or chisel plows or rippers mounted on construction equipment. After the soil is loosened, it must not be rolled or dragged smooth but left in the roughened condition. Slopes 3:1 or flatter are to be tracked with ridges running parallel to the contour of the slope.
 - Apply fertilizer and lime as prescribed on the plans.
 - Incorporate lime and fertilizer into the top 3 to 5 inches of soil by disking or other suitable means.
 - Permanent Stabilization
 - A soil test is required for any earth disturbance of 5 acres or more. The minimum soil conditions required for permanent vegetative establishment are:
 - Soil pH between 6.0 and 7.0.
 - Soluble salts less than 500 parts per million (ppm).
 - Soil contains less than 40 percent clay but enough fine grained material (greater than 30 percent silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception: If lowgrass will be planted, then a sandy soil (less than 30 percent silt plus clay) would be acceptable.
 - Soil contains 1.5 percent minimum organic matter by weight.
 - Soil contains sufficient pore space to permit adequate root penetration.
 - Application of amendments or topsoil is required if on-site soils do not meet the above conditions.
 - Graded areas must be maintained in a true and even grade as specified on the approved plan, then scarified or otherwise loosened to a depth of 3 to 5 inches.
 - Apply soil amendments as specified on the approved plan or as indicated by the results of a soil test.
 - Mix soil amendments into the top 3 to 5 inches of soil by disking or other suitable means. Rake lawn areas to smooth the surface, remove large objects like stones and branches, and ready the area for seed application. Loosen surface soil by dragging with a heavy chain or other equipment to tighten the surface where site conditions will not permit normal seedbed preparation. Track slopes 3:1 or flatter with tracked equipment leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. Leave the top 1 to 3 inches of soil loose and friable. Seedbed loosening may be unnecessary on newly disturbed areas.

Figure B.2: Incremental Stabilization - Fill
A cross-section diagram showing a fill slope with three phases of stabilization. Phase 1 is the top layer, Phase 2 is the middle layer, and Phase 3 is the bottom layer. A 15 FT MAX height is indicated. Labels include 'EXISTING GROUND', 'EXISTING DRAINAGE SWALE', 'PHASE 1 STABILIZATION', 'PHASE 2 STABILIZATION', and 'PHASE 3 STABILIZATION'.

Criteria

B. Topsoiling

- Topsoil is placed over prepared subsoil prior to establishment of permanent vegetation. The purpose is to provide a suitable soil medium for vegetative growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable soil gradation.
- Topsoil salvaged from an existing site may be used provided it meets the standards as set forth in these specifications. Typically, the depth of topsoil to be salvaged for a given soil type can be found in the representative soil profile section in the Soil Survey published by USDA-NRCS.
- Topsoiling is limited to areas having 2:1 or flatter slopes where:
 - The texture of the exposed subsoil/parent material is not adequate to produce vegetative growth.
 - The soil material is so shallow that the rooting zone is not deep enough to support plants or furnish continuing supplies of moisture and plant nutrients.
 - The original soil to be vegetated contains material toxic to plant growth.
 - The soil is so acidic that treatment with limestone is not feasible.
- Areas having slopes steeper than 2:1 require special consideration and design.
- Topsoil Specifications: Soil to be used as topsoil must meet the following criteria:
 - Topsoil must be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by the appropriate approval authority. Topsoil must not be a mixture of contrasting textured subsoils and must contain less than 5 percent by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than 1 1/2 inches in diameter.
 - Topsoil must be free of noxious plants or plant parts such as Bermuda grass, quack grass, Johnson grass, nut sedge, poison ivy, thistle, or others as specified.
 - Topsoil substitutes or amendments, as recommended by a qualified agronomist or soil scientist and approved by the appropriate approval authority, may be used in lieu of natural topsoil.
- Topsoil Application
 - Erosion and sediment control practices must be maintained when applying topsoil.
 - Uniformly distribute topsoil in a 5 to 8 inch layer and lightly compact to a minimum thickness of 4 inches. Spreading is to be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations must be corrected in order to prevent the formation of depressions or water pockets.
 - Topsoil must not be placed if the topsoil or subsoil is in a frozen or muddy condition, when the subsoil is excessively wet or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

Soil Amendments (Fertilizer and Lime Specifications)

- Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas of 5 acres or more. Soil analysis may be performed by a recognized private or commercial laboratory. Soil samples taken for engineering purposes may also be used for chemical analyses.
- Fertilizers must be uniform in composition, free flowing and suitable for accurate application by appropriate equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers must all be delivered to the site fully labeled according to the applicable laws and must bear the name, trade name or trademark and warranty of the producer.
- Lime materials must be ground limestone (hydrated or burnt lime may be substituted except when hydroseeding) which contains at least 60 percent total oxides (calcium oxide plus magnesium oxide). Limestone must be ground to such fineness that at least 50 percent will pass through a #100 mesh sieve and 98 to 100 percent will pass through a #20 mesh sieve.
- Lime and fertilizer are to be evenly distributed and incorporated into the top 3 to 5 inches of soil by disking or other suitable means.
- Where the subsoil is either highly acidic or composed of heavy clays, spread ground limestone at the rate of 4 to 8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of topsoil.

B-4-3 STANDARDS AND SPECIFICATIONS FOR SEEDING AND MULCHING

Definition
The application of seed and mulch to establish vegetative cover.

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

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

- A. Seeding
- Specifications
 - All seed must meet the requirements of the Maryland State Seed Law. All seed must be subject to re-testing by a recognized seed laboratory. All seed used must have been tested within the 6 months immediately preceding the date of sowing such material on any project. Refer to Table B.4 regarding the quality of seed. Seed tags must be available upon request to the inspector to verify type of seed and seeding rate.
 - Mulch alone may be applied between the fall and spring seeding dates only if the ground is frozen. The appropriate seeding mixture must be applied when the ground thaws.
 - Inoculants: The inoculant for treating legume seed in the seed mixtures must be a pure culture of nitrogen fixing bacteria prepared specifically for the species. Inoculants must not be used later than the date indicated on the container. Add fresh inoculants as directed on the package. Use four times the recommended rate when hydroseeding. Note: It is very important to keep inoculant as cool as possible until used. Temperatures above 75 to 80 degrees Fahrenheit can weaken bacteria and make the inoculant less effective.
 - Sod or seed must not be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed (14 days min.) to permit dissipation of phytotoxic materials.
 - Application
 - Dry Seeding: This includes use of conventional drop or broadcast spreaders.
 - Incorporate seed into the subsoil at the rates prescribed on Temporary Seeding Table B.1, Permanent Seeding Table B.3, or site-specific seeding summaries.
 - Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction. Roll the seeded area with a weighted roller to provide good seed to soil contact.
 - Drill or Cultipacker Seeding: Mechanized seeders that apply and cover seed with soil.
 - Cultipacker seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of soil covering. Seedbed must be firm after planting.
 - Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction.
 - Hydroseeding: Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer).
 - If fertilizer is being applied at the time of seeding, the application rates should not exceed the following: nitrogen, 100 pounds per acre total of soluble nitrogen; P2O5 (phosphorus), 200 pounds per acre; K2O (potassium), 200 pounds per acre.
 - Lime: Use only ground agricultural limestone (up to 3 tons per acre may be applied by hydroseeding). Normally, not more than 2 tons are applied by hydroseeding at any one time. Do not use burnt or hydrated lime when hydroseeding.
 - Mix seed and fertilizer on site and seed immediately and without interruption.
 - When hydroseeding do not incorporate seed into the soil.

B-4-4 STANDARDS AND SPECIFICATIONS FOR TEMPORARY STABILIZATION

Definition
To stabilize disturbed soils with vegetation for up to 6 months.

Purpose
To use fast growing vegetation that provides cover on disturbed soils.

Conditions Where Practice Applies
Exposed soils where ground cover is needed for a period of 6 months or less. For longer duration of time, permanent stabilization practices are required.

- A. Seeding
- Specifications
 - All seed must meet the requirements of the Maryland State Seed Law. All seed must be subject to re-testing by a recognized seed laboratory. All seed used must have been tested within the 6 months immediately preceding the date of sowing such material on any project. Refer to Table B.4 regarding the quality of seed. Seed tags must be available upon request to the inspector to verify type of seed and seeding rate.
 - Mulch alone may be applied between the fall and spring seeding dates only if the ground is frozen. The appropriate seeding mixture must be applied when the ground thaws.
 - Inoculants: The inoculant for treating legume seed in the seed mixtures must be a pure culture of nitrogen fixing bacteria prepared specifically for the species. Inoculants must not be used later than the date indicated on the container. Add fresh inoculants as directed on the package. Use four times the recommended rate when hydroseeding. Note: It is very important to keep inoculant as cool as possible until used. Temperatures above 75 to 80 degrees Fahrenheit can weaken bacteria and make the inoculant less effective.
 - Sod or seed must not be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed (14 days min.) to permit dissipation of phytotoxic materials.
 - Application
 - Dry Seeding: This includes use of conventional drop or broadcast spreaders.
 - Incorporate seed into the subsoil at the rates prescribed on Temporary Seeding Table B.1, Permanent Seeding Table B.3, or site-specific seeding summaries.
 - Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction. Roll the seeded area with a weighted roller to provide good seed to soil contact.
 - Drill or Cultipacker Seeding: Mechanized seeders that apply and cover seed with soil.
 - Cultipacker seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of soil covering. Seedbed must be firm after planting.
 - Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction.
 - Hydroseeding: Apply seed uniformly with hydroseeder (slurry includes seed and fertilizer).
 - If fertilizer is being applied at the time of seeding, the application rates should not exceed the following: nitrogen, 100 pounds per acre total of soluble nitrogen; P2O5 (phosphorus), 200 pounds per acre; K2O (potassium), 200 pounds per acre.
 - Lime: Use only ground agricultural limestone (up to 3 tons per acre may be applied by hydroseeding). Normally, not more than 2 tons are applied by hydroseeding at any one time. Do not use burnt or hydrated lime when hydroseeding.
 - Mix seed and fertilizer on site and seed immediately and without interruption.
 - When hydroseeding do not incorporate seed into the soil.

Criteria

B. Mulching

- Mulch Materials (in order of preference)
 - Straw consisting of thoroughly threshed wheat, rye, oat, or barley and reasonably bright in color. Straw is to be free of noxious weed seeds as specified in the Maryland Seed Law and not musty, moldy, clumped, decayed, or excessively dry. Note: Use only sterile straw mulch in areas where one species of grass is desired.
 - Wood Cellulose Fiber Mulch (WCFM) consisting of specially prepared wood cellulose processed into a uniform fibrous physical state.
 - WCFM is to be dyed green or contain a green dye in the package that will provide an appropriate color to facilitate visual inspection of the uniformly spread slurry.
 - WCFM, including dye, must contain no germination or growth inhibiting factors.
 - WCFM materials are to be manufactured and processed in such a manner that the wood cellulose fiber mulch will remain in uniform suspension in water under agitation and will blend with seed, fertilizer and other additives to form a homogeneous slurry. The mulch material must form a blotter-like ground cover, on application, having moisture absorption and percolation properties and must cover and hold grass seed in contact with the soil without inhibiting the growth of the grass seedlings.
 - WCFM material must not contain elements or compounds at concentration levels that will be phytotoxic.
 - WCFM must conform to the following physical requirements: fiber length of approximately 10 millimeters, diameter approximately 1 millimeter, pH range of 4.0 to 8.5, ash content of 1.6 percent maximum and water holding capacity of 90 percent minimum.
- Application
 - Apply mulch to all seeded areas immediately after seeding.
 - When straw mulch is used, spread it over all seeded areas at the rate of 2 tons per acre to a uniform loose depth of 1 to 2 inches. Apply mulch to achieve a uniform distribution and depth so that the soil surface is not exposed. When using a mulch anchoring tool, increase the application rate to 2.5 tons per acre.
 - Wood cellulose fiber used as mulch must be applied at a net dry weight of 1500 pounds per acre. Mix the wood cellulose fiber with water to attain a mixture with a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.
- Anchoring
 - Perform mulch anchoring immediately following application of mulch to minimize loss by wind or water. This may be done by one of the following methods (listed by preference), depending upon the size of the area and erosion hazard:
 - A mulch anchoring tool is a tractor draw implement designed to punch and anchor mulch into the soil surface a minimum of 2 inches. This practice is most effective on large areas, but is limited to flatter slopes where equipment can operate safely. If used on sloping land, this practice should follow the contour.
 - Wood cellulose fiber may be used for anchoring straw. Apply the fiber binder at a net dry weight of 750 pounds per acre. Mix the wood cellulose fiber with water at a maximum of 50 pounds of wood cellulose fiber per 100 gallons of water.
 - Synthetic binders such as Acrylic DLR (Agro-Tack), DCA-70, Petrosol, Terra Tax II, Terra Tack AR, or other approved equal may be used. Follow application rates as specified by the manufacturer. Application of liquid binders needs to be heavier at the edges where wind catches mulch, such as in valleys and on crests of banks. Use of asphalt binders is strictly prohibited.
 - Lightweight plastic netting may be stapled over the mulch according to manufacturer recommendations. Netting is usually available in rolls 4 to 15 feet wide and 300 to 3,000 feet long.

PERMANENT SEEDING SUMMARY

NO.	Species	Application Rate (lbs/ac)	Seeding Dates	Seeding Depths	Fertilizer Rate (10-20-20)			Lime Rate
					N	P ₂ O ₅	K ₂ O	
8	Tall fescue	100 lbs	2/15 - 4/30 8/15 - 10/31 11/1 - 11/30*	X - 1/2 in.				
9	Tall fescue	60 lbs	2/15 - 4/30 8/15 - 10/31 11/1 - 11/30*	X - 1/2 in.	45 pounds per acre (1.0lb/1000 sf)	90 lb/ac (2lb/1000 sf)	90 tons/acre (90lb/1000 sf)	
9	Perennial Ryegrass	20 lbs	2/15 - 4/30 8/15 - 10/31 11/1 - 11/30*	X - 1/2 in.				
9	Kentucky Bluegrass	40 lbs	2/15 - 4/30 8/15 - 10/31 11/1 - 11/30*	X - 1/2 in.				

*Note:
1. The planting dates listed are averages for each zone. These dates may require adjustment to reflect local conditions, especially near the boundaries of the zones. When seeding toward the end of the listed planting dates, or when conditions are expected to be less optimal, select an appropriate nurse crop from Table B.1 Temporary Seeding for Site Stabilization (2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control) and plant together with the permanent seeding mix.
2. When planted during the growing season, most of these materials must be purchased and kept in a dormant condition until planting. Bare-root grasses are the exception—they may be supplied as growing (non-dormant) plants.
*Additional planting dates for the lower Coastal Plain, dependent on annual rainfall and temperature trends. Recommend adding a nurse crop, as noted above, if planting during this period.

B. Sod: To provide quick cover on disturbed areas (2:1 grade or flatter).

- General Specifications
 - Class of turfgrass sod must be Maryland State Certified. Sod labels must be made available to the job foreman and inspector.
 - Sod must be machine cut at a uniform soil thickness of 1/4 inch, plus or minus 1/8 inch, at the time of cutting. Measurement for thickness must exclude top growth and thatch. Broken pads and torn or uneven ends will not be acceptable.
 - Standard size sections of sod must be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10 percent of the section.
 - Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.
 - Sod must be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period must be approved by an agronomist or soil scientist prior to its installation.
- Sod Installation
 - During periods of excessively high temperature or in areas having dry subsoil, lightly irrigate the subsoil immediately prior to laying the sod.
 - Lay the first row of sod in a straight line with subsequent rows placed parallel to it and to lightly wedged against each other. Stagger lateral joints to promote more uniform growth and strength. Ensure that sod is not stretched or overlapped and that joints are butted tight in order to prevent voids which would cause air drying of the roots.
 - Wherever possible, lay sod with the long edges parallel to the contour and with staggering joints. Roll and tamp, peg or otherwise secure the sod to prevent slippage on slopes. Ensure soil contact exists between sod roots and the underlying soil surface.
 - Water the sod immediately following rolling and tamping until the underside of the new sod pad and soil surface below the sod are thoroughly wet. Complete the operations of laying, tamping and irrigating for any piece of sod within eight hours.
- Sod Maintenance
 - In the absence of adequate rainfall, water daily during the first week or as often and sufficiently as necessary to maintain moist soil to a depth of 4 inches. Water sod during the heat of the day to prevent wilting.
 - After the first week, sod watering is required as necessary to maintain adequate moisture content.
 - Do not mow until the sod is firmly rooted. No more than 1/2 of the grass leaf must be removed by the initial cutting or subsequent cuttings. Maintain a grass height of at least 3 inches unless otherwise specified.

TEMPORARY SEEDING SUMMARY

NO.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths	Fertilizer Rate (10-10-10)		Lime Rate
					N	P ₂ O ₅	
-	Barley	96 lbs	2/15 - 4/30 8/15 - 11/30	1 in.	436 lb/ac (10lb/1000 sf)	2 tons/ac (90lb/1000 sf)	
	foxtail millet	30 lbs	05/01 - 08/14	0.5 in.			

B-4-5 STANDARDS AND SPECIFICATIONS FOR PERMANENT STABILIZATION

Definition
To stabilize disturbed soils with permanent vegetation.

Purpose
To use long-lived perennial grasses and legumes to establish permanent ground cover on disturbed soils.

Conditions Where Practice Applies
Exposed soils where ground cover is needed for 6 months or more.

- A. Seed Mixtures
- General Use
 - Select one or more of the species or mixtures listed in Table B.3 for the appropriate Plant Hardiness Zone (from Figure B.3) and based on the site condition or purpose found on Table B.2. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The Summary is to be placed on the plan.
 - Additional planting specifications for exceptional sites such as shorelines, stream banks, or dunes or for special purposes such as wildlife or aesthetic treatment may be found in USDA-NRCS Technical Field Office Guide, Section 342 - Critical Area Planting.
 - For sites having disturbed area over 5 acres, use and show the rates recommended by the soil testing agency.
 - For areas receiving low maintenance, apply urea form fertilizer (46-0-0) at 3 1/2 pounds per 1000 square feet (150 pounds per acre) at the time of seeding in addition to the soil amendments shown in the Permanent Seeding Summary.
 - Turfgrass Mixtures
 - Areas where turfgrass may be desired include lawns, parks, playgrounds, and commercial sites which will receive a medium to high level of maintenance.
 - Select one or more of the species or mixtures listed below based on the site conditions or purpose. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The Summary is to be placed on the plan.
 - Kentucky Bluegrass: Full Sun Mixture: For use in areas that receive intensive management. Irrigation required in the areas of central Maryland and Eastern Shore. Recommended Certified Kentucky Bluegrass Cultivars Seeding Rate: 1.5 to 2.0 pounds per 1000 square feet. Choose a minimum of three Kentucky Bluegrass cultivars with each ranging from 10 to 35 percent of the total mixture by weight.
 - Kentucky Bluegrass/Perennial Rye: Full Sun Mixture: For use in full sun areas where rapid establishment is necessary and when turf will receive medium to intensive management. Certified Perennial Ryegrass/Certified Kentucky Bluegrass Seeding Rate: 2 pounds mixture per 1000 square feet. Choose a minimum of three Kentucky bluegrass cultivars with each ranging from 10 to 35 percent of the total mixture by weight.
 - Tall Fescue/Kentucky Bluegrass: Full Sun Mixture: For use in drought prone areas and/or for areas receiving low to medium management in full sun to medium shade. Recommended mixture includes: Certified Tall Fescue Cultivars 95 to 100 percent, Certified Kentucky Bluegrass Cultivars 0 to 5 percent. Seeding Rate: 5 to 8 pounds per 1000 square feet. One or more cultivars may be blended.
 - Kentucky Bluegrass/Fine Fescue: Shade Mixture: For use in areas with shade in Bluegrass lawns. For establishment in high quality, intensively managed turf area. Mixture includes: Certified Kentucky Bluegrass Cultivars 30 to 40 percent and Certified Fine Fescue and 60 to 70 percent. Seeding Rate: 1 1/2 to 3 pounds per 1000 square feet.

Notes:
Select turfgrass varieties from those listed in the most current University of Maryland Publication, Agronomy Memo #77, "Turfgrass Cultivar Recommendations for Maryland." Choose certified material. Certified material is the best guarantee of cultivar purity. The certification program of the Maryland Department of Agriculture, Turf and Seed Section, provides a reliable means of consumer protection and assures a pure genetic line.

Central MD: March 15 to June 1, August 1 to October 1 (Hardiness Zones: 5b, 6a)
Central MD: March 1 to May 15, August 15 to October 15 (Hardiness Zone: 6b)
Southern MD, Eastern Shore: March 1 to May 15, August 15 to October 15 (Hardiness Zones: 7a, 7b)

- Till areas to receive seed by disking or other approved methods to a depth of 2 to 4 inches, level and rake the areas to prepare a proper seedbed. Remove stones and debris over 1 1/2 inches in diameter. The resulting seedbed must be in such condition that future mowing of grasses will pose no difficulty.
- If soil moisture is deficient, supply new seedlings with adequate water for plant growth (1/2 to 1 inch every 3 to 4 days depending on soil texture) until they are firmly established. This is especially true when seedlings are made late in the planting season, in abnormally dry or hot seasons, or on adverse sites.

Criteria

PERMANENT SEEDING SUMMARY

NO.	Species	Application Rate (lbs/ac)	Seeding Dates	Seeding Depths	Fertilizer Rate (10-20-20)			Lime Rate
					N	P ₂ O ₅	K ₂ O	
8	Tall fescue	100 lbs	2/15 - 4/30 8/15 - 10/31 11/1 - 11/30*	X - 1/2 in.				
9	Tall fescue	60 lbs	2/15 - 4/30 8/15 - 10/31 11/1 - 11/30*	X - 1/2 in.	45 pounds per acre (1.0lb/1000 sf)	90 lb/ac (2lb/1000 sf)	90 tons/acre (90lb/1000 sf)	
9	Perennial Ryegrass	20 lbs	2/15 - 4/30 8/15 - 10/31 11/1 - 11/30*	X - 1/2 in.				
9	Kentucky Bluegrass	40 lbs	2/15 - 4/30 8/15 - 10/31 11/1 - 11/30*	X - 1/2 in.				

*Note:
1. The planting dates listed are averages for each zone. These dates may require adjustment to reflect local conditions, especially near the boundaries of the zones. When seeding toward the end of the listed planting dates, or when conditions are expected to be less optimal, select an appropriate nurse crop from Table B.1 Temporary Seeding for Site Stabilization (2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control) and plant together with the permanent seeding mix.
2. When planted during the growing season, most of these materials must be purchased and kept in a dormant condition until planting. Bare-root grasses are the exception—they may be supplied as growing (non-dormant) plants.
*Additional planting dates for the lower Coastal Plain, dependent on annual rainfall and temperature trends. Recommend adding a nurse crop, as noted above, if planting during this period.

B. Sod: To provide quick cover on disturbed areas (2:1 grade or flatter).

- General Specifications
 - Class of turfgrass sod must be Maryland State Certified. Sod labels must be made available to the job foreman and inspector.
 - Sod must be machine cut at a uniform soil thickness of 1/4 inch, plus or minus 1/8 inch, at the time of cutting. Measurement for thickness must exclude top growth and thatch. Broken pads and torn or uneven ends will not be acceptable.
 - Standard size sections of sod must be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10 percent of the section.
 - Sod must not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.
 - Sod must be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period must be approved by an agronomist or soil scientist prior to its installation.
- Sod Installation
 - During periods of excessively high temperature or in areas having dry subsoil, lightly irrigate the subsoil immediately prior to laying the sod.
 - Lay the first row of sod in a straight line with subsequent rows placed parallel to it and to lightly wedged against each other. Stagger lateral joints to promote more uniform growth and strength. Ensure that sod is not stretched or overlapped and that joints are butted tight in order to prevent voids which would cause air drying of the roots.
 - Wherever possible, lay sod with the long edges parallel to the contour and with staggering joints. Roll and tamp, peg or otherwise secure the sod to prevent slippage on slopes. Ensure soil contact exists between sod roots and the underlying soil surface.
 - Water the sod immediately following rolling and tamping until the underside of the new sod pad and soil surface below the sod are thoroughly wet. Complete the operations of laying, tamping and irrigating for any piece of sod within eight hours.
- Sod Maintenance
 - In the absence of adequate rainfall, water daily during the first week or as often and sufficiently as necessary to maintain moist soil to a depth of 4 inches. Water sod during the heat of the day to prevent wilting.
 - After the first week, sod watering is required as necessary to maintain adequate moisture content.
 - Do not mow until the sod is firmly rooted. No more than 1/2 of the grass leaf must be removed by the initial cutting or subsequent cuttings. Maintain a grass height of at least 3 inches unless otherwise specified.

TEMPORARY SEEDING SUMMARY

NO.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths	Fertilizer Rate (10-10-10)		Lime Rate
					N	P ₂ O ₅	
-	Barley	96 lbs	2/15 - 4/30 8/15 - 11/30	1 in.	436 lb/ac (10lb/1000 sf)	2 tons/ac (90lb/1000 sf)	
	foxtail millet	30 lbs	05/01 - 08/14	0.5 in.			

B-3 STANDARDS AND SPECIFICATIONS FOR LAND GRADING

Definition
Reshaping the existing land surface to provide suitable topography for building facilities and other site improvements.

Purpose
To provide erosion control and vegetative establishment for extreme changes in grade.

Conditions Where Practice Applies
Earth distribution or extreme grade modifications on steep or long slopes.

- A. Seed Mixtures
- The grading plan should be based on the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surroundings to avoid extreme grade modifications. Information submitted must provide sufficient topographic surveys and soil investigations to determine limitations that must be imposed on the grading operation related to slope stability, adjacent properties, drainage patterns, measures for water removal, and vegetative treatment, etc. Many jurisdictions have regulations and design procedures already established for land grading that must be followed. The plan must show existing and proposed contours for the area(s) to be graded including practices for erosion control, slope stabilization, and safe conveyance of runoff (e.g., waterways, lined channels, reverse benches, grade stabilization structures). The grading/construction plans are to include the phasing of these practices and consideration of the following:
- Provisions to safely convey surface runoff to storm drains, protect outlets or stable water courses to ensure that surface runoff will not damage slopes or other graded areas.
 - Cut and fill slopes, stabilized with grasses, no steeper than 2:1. (Where the slope is to be mowed, the slope should be no steeper than 3:1, but 4:1 is preferred because of safety factors related to mowing steep slopes.) Slopes steeper than 2:1 require special design and stabilization considerations to be shown on the plans.
 - Benching per Detail B-3-1 whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slopes, when it exceeds 30 feet; and for 4:1 slopes, when it exceeds 40 feet. Locate benches to divide the slope face as equally as possible and to convey the water to a stable outlet. Soils, seeps, rock outcrops, etc

H-1. STANDARDS AND SPECIFICATIONS

FOR CHANNEL

Definition

An open drainage conveyance lined with vegetation, riprap, gabions, concrete or other approved material.

Purpose

To convey concentrated runoff in a non-erosive manner.

Conditions Where Practice Applies

A channel is used when permanent conveyance of runoff is necessary. A channel lined with concrete should be considered only after all other design options have been deemed infeasible.

Design Criteria

- Capacity:** The channel must have a minimum capacity to adequately convey the peak rate of runoff from the 10-year, 24-hour storm.

Use the following Manning's coefficient of roughness (n):

Lined Material	Manning's n
Grass with soil stabilization matting for 4-5 inches	0.60
> 6 inches	0.40
Concrete (type)	0.015
Trowel Finish	0.019
Float Finish	0.019
Form	0.019
Gabion	0.030

- Velocity:** The maximum allowable design velocity for type of channel lining is shown in Table H.4.

Table H.4: Maximum Velocities for Channels

Channel Lining	Maximum Velocity (fps)
Seed and mulch	2.5
Solid sodding	4.0
Temporary soil stabilization matting over seed and mulch	6.0
Grass with permanent soil stabilization matting	8.5
Riprap	Refer to Figures D.2 and D.3
Gabion	Unlimited
Concrete	Unlimited

H.10

- Cross-Section:** Cross-sections should be triangular, parabolic, or trapezoidal in shape. Monolithic concrete or gabions may be rectangular.
- Freeboard:** The lined section must extend up the side slopes to a minimum of 0.25 feet above the design depth. The side slopes above the permanent lining must be vegetated or otherwise stabilized and extend a minimum of 0.25 feet above the top of the lining.
- Side Slopes and Lining Thickness:** Steepest permissible side slopes, horizontal to vertical (H:V), and minimum lining thicknesses are as follows:

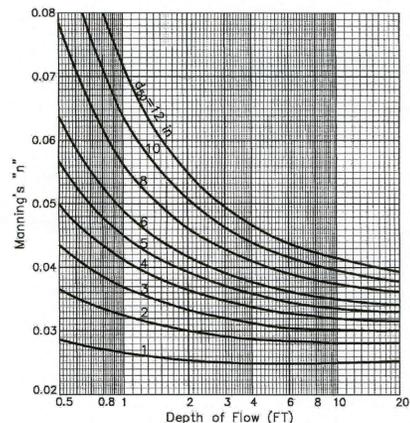
Table H.5: Steepest Permissible Side Slopes and Minimum Lining Thickness

Channel Type	Side Slopes	Minimum Lining Thickness
Non-reinforced concrete Hand-placed, formed concrete Height of lining, 1 1/2 feet or less	Vertical	4 inches
Non-reinforced concrete Hand-placed, screened concrete or mortared in place flagstone Height of lining, less than 2 feet Height of lining, more than 2 feet	1:1 2:1	4 inches
Slip Form Concrete Height of lining, less than 2 feet	1:1	4 inches
Riprap	2:1	1 1/2 times max. stone size plus thickness of filter or bedding.
Gabion	Per manufacturer specifications	Per manufacturer specifications
Permanent soil stabilization matting	2:1	Per manufacturer specifications

- Related Structures:** Design side inlets, drop structures, and energy dissipators to meet the hydraulic and structural requirements of the site.
- Filters or Bedding:** Provide for filters or bedding to prevent piping, reduce uplift pressure, and collect water as required and in accordance with sound engineering design. Provide weep holes and drains as needed.
- Concrete:**
 - Specify the proportion of concrete to be used for lining so that it is plastic enough for thorough consolidation and stiff enough to stay in place on side slopes. A dense durable product will be required. A mix that can be certified as suitable to produce a minimum strength of at least 3,000 pounds per square inch is required. Use Portland cement, Type I, II, IV, or V with an aggregate having a maximum diameter of 1 1/2 inches.
 - Provide weep holes in concrete footings and retaining walls to allow free drainage of water. Use non-corrosive pipe for the weep holes.

H.11

Figure H.12: Determining "n" for Riprap Lined Channel using Depth of Flow

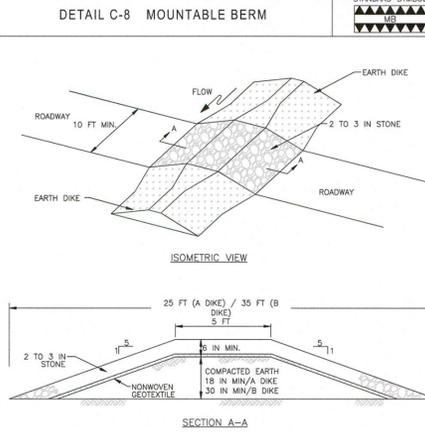


$$n = \frac{y^{1/4}}{[2.1 \log_{10} (\frac{y}{d_{50}})] + 14.0}$$

(y = Depth of Flow)

H.12

H.13



- CONSTRUCTION SPECIFICATIONS**
- USE MINIMUM WIDTH OF 10 FEET TO ALLOW FOR VEHICULAR PASSAGE.
 - PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, OVER THE EARTH MOUND PRIOR TO PLACING STONE.
 - PLACE 2 TO 3 INCH STONE OR EQUIVALENT RECYCLED CONCRETE AT LEAST 8 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE MOUNTABLE BERM.
 - MAINTAIN LINE, GRADE, AND CROSS SECTION; ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN SPECIFIED DIMENSIONS. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. MAINTAIN POSITIVE DRAINAGE.

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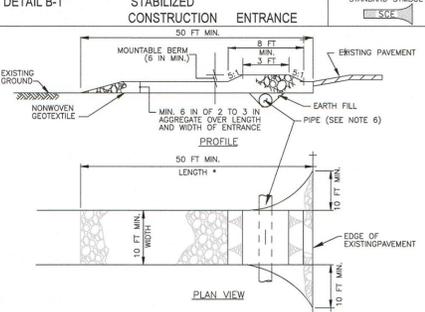
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- CONSTRUCTION SPECIFICATIONS**
- PLACE STABILIZED CONSTRUCTION ENTRANCE IN ACCORDANCE WITH THE APPROVED PLAN. VEHICLES MUST TRAVEL OVER THE ENTIRE LENGTH OF THE SCE. USE MINIMUM LENGTH OF 50 FEET (30 FEET FOR SINGLE RESIDENCE LOT). USE MINIMUM WIDTH OF 10 FEET. FLARE SCE 10 FEET MINIMUM AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
 - PIPE ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD THE SCE UNDER THE ENTRANCE. MAINTAIN POSITIVE DRAINAGE. PROTECT PIPE INSTALLED THROUGH THE SCE WITH A MOUNTABLE BERM WITH 2:1 SLOPES AND A MINIMUM OF 12 INCHES OF STONE OVER THE PIPE. PROVIDE PIPE AS SPECIFIED ON APPROVED PLAN. WHEN THE SCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY, A PIPE IS NOT NECESSARY. A MOUNTABLE BERM IS REQUIRED WHEN SCE IS NOT LOCATED AT A HIGH SPOT.
 - PREPARE SUBGRADE AND PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS.
 - PLACE CRUSHED AGGREGATE (2 TO 3 INCHES IN SIZE) OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) AT LEAST 8 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE SCE.
 - MAINTAIN ENTRANCE IN A CONDITION THAT MINIMIZES TRACKING OF SEDIMENT. ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN CLEAN SURFACE. MOUNTABLE BERM, AND SPECIFIED DIMENSIONS. IMMEDIATELY REMOVE STONE AND/OR SEDIMENT SPILLED, DROPPED, OR TRACKED ONTO ADJACENT ROADWAY BY VACUUMING, SCRAPING, AND/OR SWEEPING. WASHING ROADWAY TO REMOVE TRACKED DIRT AND DEBRIS IS NOT ACCEPTABLE UNLESS WASH WATER IS DIRECTED TO AN APPROVED SEDIMENT CONTROL PRACTICE.

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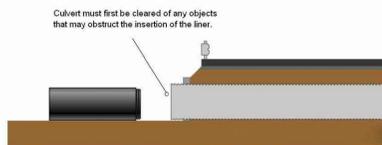
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SnapTite INSTALLATION STEPS

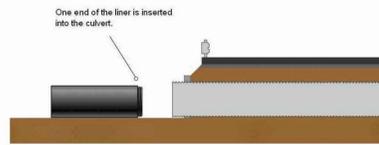
Ease of Installation

Installation Steps
Step 1 - Select and prepare the existing culvert. Inspect the culvert to ensure the liner can be inserted without obstruction. Flush and/or clean the existing culvert.



Pieces of wood are used to maintain grade and alignment.

Step 2 - Insert one end of Snap-Tite® Culvert Liner into existing culvert. This can be done using a variety of techniques. Leave about five feet of liner exposed. Prior to installation of first section, it may be necessary to create a "nose cone" by cutting the ends of the pipe.



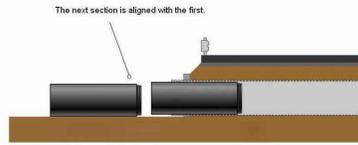
Typical Nose Cone Construction
 Make 8 Dowe Tabs. Drill hole 1/2" about 1" from point of Dowe Tab.
 Draw pieces toward each other by connecting wire to opposite holes and twisting the wire to tighten.
 All dimensions can be varied to suit specific conditions.



SnapTite

Ease of Installation

Step 3 - Position the next section of Snap-Tite® Culvert Liner with proper alignment. Place the opposing end of a second section against the exposed end of the first section. The two sections must be in alignment and have the same slope.

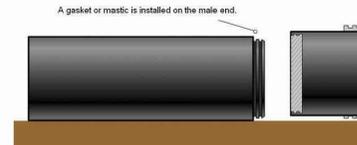


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Step 4 - Lubricate the male side of Snap-Tite® joint. A gasket is normally supplied with Snap-Tite® pipe. If it is installed on the male end to help make a watertight seal, and should be placed in the first groove. Make sure that one end of the gasket is touching the side of the groove that is closest to the end. Check the alignment of the gasket around the liner. Apply lubricant to the entire circumference of the liner. The lubricant must be applied evenly to reduce the chance of a torn or rolled gasket.

Lubricants
 Most standard pipe and gasket lubricants can be used with Snap-Tite® Culvert Liner and gaskets. Aromatic hydrocarbons (like gasoline) and most petroleum-based lubricants must be avoided. Vegetable oil and mineral oil are acceptable in most formulations. In environmentally challenging applications, spray-on lubricants like SLKSTYX™ may be the best choice. SLKSTYX™ can be applied at low concentrations.

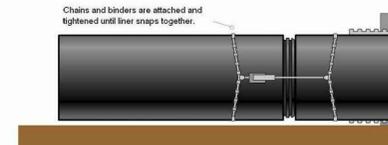


Options: Mastic can be applied to second large groove to reduce chance of leakage when joints are deflected. Carefully apply mastic to large groove. Too much or too little mastic can increase chance of leakage. (See Drawing 2: Male End of Snap-Tite® and Completed Snap-Tite Joint)

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Ease of Installation

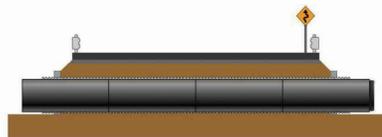
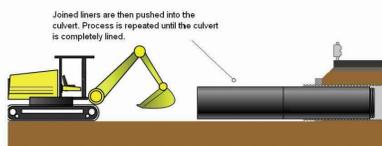
Step 5 - Attach the chains and couplings. Double-wrap the chains approximately four feet from the coupling end and tighten with binders. Attach one come-a-long on each side of the couplings, 180 degrees apart.



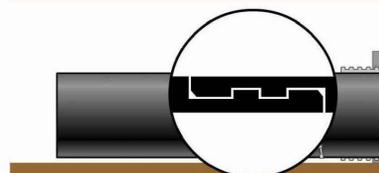
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Ease of Installation

Step 7 - Push joined liners into culvert and repeat until completely lined. Remove chains, push joined liners into culvert and repeat steps 1-6. Each new piece of pipe is wrapped onto the preceding pipe and pushed into the culvert, leaving enough pipe protruding from the culvert to join with the next length of liner.



Step 8 - Snap liner together. Align the ends of the male bevel inside the female bevel. Use a pry bar or move the come-a-long to different positions on liner if pipe is out of round to improve alignment. Be sure male end has been properly lubricated. Pull the couplings together slowly, forcing the female end to expand and allow the male end to move into the female end. Apply force slowly and make observations. Apply force to one side until liner slightly deflects, then apply force on other side. Look for the female side to increase in OD as force is applied.



Caution! If chain or come-a-long appears to be over-tensioned, stop operation! Quickly move away from the chain. When ends and grooves are aligned, the couplings will "snap" and lock together. Allow time for this to occur. If operation is stopped, check alignment. Often poor alignment or a stone or dirt in the end causes the need for additional pressure. Rotation of the liner will change alignment. Clean out the joint if needed.

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Ease of Installation

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Structural Design

Table 8-12
 Minimum Cover for Direct Burial Snap-Tite®
 DR 32.5 Pipe with AASHTO H-25 or HS-25 Load

Outside Diameter, OD, in.	Minimum Cover, H, ft.	Outside Diameter, OD, in.	Minimum Cover, H, ft.
10.75"	1'	28"	1'
12.75"	1'	30"	1'
14"	1'	32"	1'
16"	1'	36"	1'
18"	1'	42"	1'
20"	1'	48"	1'
22"	1'	54"	1.5'
24"	1'	63"	1.5'

Note: Minimum covers in this table were calculated assuming Class II backfill material compacted to 90% standard Proctor density and a minimum of 24-inches cover above the crown.

Table 8-13
 Temporary Minimum Cover Requirements for Snap-Tite® DR 32.5 Pipe with Light Construction Traffic

Vehicle Load Surface, psi	Minimum Cover, for 10" - 48" diameters, (ft)	Minimum Cover, for 54" - 60" diameters, (ft)
75	9"	12"
60	6"	9"
25	3"	6"

Table 8-14
 Maximum Cover for Snap-Tite® DR 32.5, Ft.

Diameter (ft)	Class 1			Class 2			Class 3		
	Compacted (ft)	Uncompacted (ft)	95% (ft)	90% (ft)	85% (ft)	95% (ft)	90% (ft)	85% (ft)	
10"	65	10	65	37	10	38	13	8	
12"	65	10	65	37	10	38	13	8	
14"	65	10	65	37	10	38	13	8	
16"	65	10	65	37	10	38	13	8	
18"	65	10	65	37	10	38	13	8	
20"	65	10	65	37	10	38	13	8	
22"	65	10	65	37	10	38	13	8	
24"	65	10	65	37	10	38	13	8	
28"	65	10	65	37	10	38	13	7	
30"	65	10	65	37	10	38	13	7	
36"	65	10	65	37	10	38	13	7	
42"	65	10	65	36	10	37	13	7	
48"	65	10	65	36	10	37	13	7	
54"	65	10	65	36	10	37	13	7	
63"	65	9	65	36	9	37	12	7	

Notes:
 1) Calculations assume no hydrostatic pressure and a density of 120 pcf for overburden material.
 2) Snap-Tite® may be installed deeper than 65 feet; however, the maximum cover calculations have been truncated at 65 feet for this table.
 3) Consult with a Snap-Tite® representative for burial depths deeper than 65 feet.
 4) Culverts are typically installed in conditions where ground water is not a problem. If ground water is a concern, contact Snap-Tite® for recommended installed burial depths.

SnapTite

Proper Bulkhead Building

Bulkhead Mix Design (Mix below is 1 Cu/Yd.)
 2400 lbs. of sand
 752 lbs. of cement or 8 bags
 225 lbs. of type C fly ash
 25 Gal. Water
 Retarder depending on temperature outside
 Pack Bulkhead 2' Deep on both ends

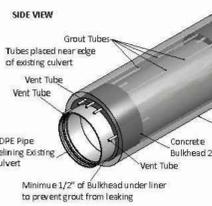
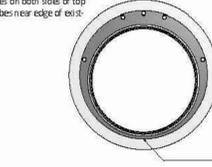


SnapTite

- Checklist of Best Practices for Bulkhead Building**
- Both ends must be bulkheaded properly with vent tubes and grout tube(s) before grouting can begin. Once the bulkheads have been completed, the minimum wait time before grouting is 24 hours to allow the bulkhead to cure.
 - Once the bulkhead mix is on site and ready to be packed into the culvert, start by packing bulkhead mix at least 1/2" thick and a minimum of 2' deep around the bottom of the liner to prevent grout mix from leaking out during the grouting process.
 - Place vent tubes at the highest point (12 O'Clock) on both ends of the culvert.
 - Pay special attention to the areas around the outside of the old culvert and if there is any deterioration or holes, pack those areas with the bulkhead mix.
 - Call 800-345-4726, press 6632 and ask for Steve Ramsey if you have any questions or call your local Snap-Tite Sales Representative.

FRONT VIEW

Vent tubes placed at 12, 3 and 9 o'clock
 Grout tubes placed on both sides of top vent tube. All tubes near edge of existing culvert.



Culvert Length	Vent Tubes Inlet Side	Vent Tubes Outlet Side	Grout Tubes Inlet Side (all at 12 O'Clock)	Grout Tubes Outlet Side (all at 12 O'Clock)
50' or less	12, 3, 9 O'Clock	12, 3, 9 O'Clock	1-10' Long	1-10' Long
50'-100'	12, 3, 9 O'Clock	12, 3, 9 O'Clock	1-10' Long	1-10' Long
100'-250'	12, 3, 9 O'Clock	12, 3, 9 O'Clock	1-10' Long	1-10' Long
250'-500'	12, 3, 9 O'Clock	12, 3, 9 O'Clock	1-10' Long / 1-40' Long / 1-120' Long	1-10' Long / 1-40' Long
500'-1000'	12, 3, 9 O'Clock	12, 3, 9 O'Clock	1-10' Long / 1-40' Long / 1-120' Long / 1-180' Long	1-10' Long / 1-40' Long / 1-120' Long
1000'-2000'	12, 3, 9 O'Clock	12, 3, 9 O'Clock	1-10' Long / 1-40' Long / 1-120' Long / 1-180' Long / 1-200' Long	1-10' Long / 1-40' Long / 1-120' Long / 1-180' Long
2000'-4000'	12, 3, 9 O'Clock	12, 3, 9 O'Clock	1-10' Long / 1-40' Long / 1-120' Long / 1-180' Long / 1-200' Long / 1-300'	1-10' Long / 1-40' Long / 1-120' Long / 1-180' Long

All Vent Tubes are to be 2" SCH 40 PVC Pipe 3' in Length
 All Grout Tubes are to be 2" SCH 40 PVC Pipe
 For Pipes over 400' in length, please see a Snap-Tite Sales Rep.

PLANS APPROVED BY
 Harald W. Van Aller, P.E.

 November 5, 2018
 14-MR-0062R
 Dam Safety Division
 Maryland Dept. of the Environment

SLIP-LINER DETAILS
 MD DAM No. 8 DAM REPAIRS
GREENBELT LAKE
 BERWYN (21st) ELECTION DISTRICT
 PRINCE GEORGE'S COUNTY, MARYLAND

CPJ Charles P. Johnson & Associates, Inc.
 Civil and Environmental Engineers • Planners • Landscape Architects • Surveyors
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CLIENT:	CITY OF GREENBELT DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT 15 CRESCENT ROAD GREENBELT, MD 20770-1886 CONTACT: MS. CELIA CRAZE	PRELIMINARY PLAN NO:	N/A	SITE PLAN NO:	N/A
DESIGN:	JBB	SHEET:	22A	OF:	22
DRAFT:	IMV	DATE:	FEB. 2015	FILE NO.:	
SCALE:	AS SHOWN				38-146-24.1