# SHEET INDEX DESCRIPTION SITE DEVELOPMENT AND GRADING PLAN SEDIMENT & EROSION CONTROL AND STORMWATER MANAGEMENT PLAN SEDIMENT AND EROSION CONTROL NOTES AND STORMWATER MANAGEMENT NOTES AND DETAILS

- SUBJECT PROPERTY IS ZONED R-12 PER THE 10-6-2013 COMPREHENSIVE ZONING PLAN. THIS PROJECT IS SUBJECT TO THE AMENDED FIFTH EDITION OF THE SUBDIVISION AND LAND
- INC., ON OR ABOUT APRIL 2015.
- TOPOGRAPHY SHOWN HEREON IS BASED ON A FIELD RUN SURVEY PREPARED BY BENCHMARK ENGINEERING, INC., DATED APRIL 2015, CONTOUR INTERVAL IS 2'.
- THE COORDINATES SHOWN HEREON ARE BASED UPON THE HOWARD COUNTY GEODETIC CONTROL WHICH IS BASED UPON THE MARYLAND STATE PLANE COORDINATE SYSTEM. HOWARD COUNTY
- MONUMENTS 38D5 & 38D6 WERE USED FOR THIS PROJECT. NO GRADING, REMOVAL OF VEGETATIVE COVER OR TREES, PAVING AND NEW STRUCTURES SHALL BE
- PERMITTED WITHIN THE STREAMS, OR THEIR REQUIRED BUFFERS AND FLOODPLAIN UNLESS DEEMED NECESSARY BY THE DEPARTMENT OF PLANNING AND ZONING.
- THERE ARE NO STEEP SLOPES (25%% OR GREATER) IN EXCESS OF 20,000 SF ON THIS
- THERE IS NO NEED FOR A FLOOD STUDY FOR THIS PROJECT. THERE ARE NO FLOODPLAINS STREAMS OR WETLANDS LOCATED ON-SITE.
- TO THE BEST OF OUR KNOWLEDGE THERE ARE NO CEMETERIES OR HISTORIC STRUCTURES
- A NOISE STUDY IS NOT REQUIRED FOR THIS PLAN.
- THIS SITE IS LOCATED WITHIN THE METROPOLITAN DISTRICT AND THE PLANNED SERVICE AREA. WATER AND SEWER WILL BE PUBLIC CONNECTIONS PROPOSED TO CONTRACT W-108-B-34740. THE SITE AREA IS LESS THAN 20,000 SF. THEREFORE, THE SITE SHALL BE EXEMPT FROM
- THE REQUIREMENTS OF SECTION 16.1200 OF THE HOWARD COUNTY CODE FOR FOREST CONSERVATION PER SECTION 16.1202(B)(1)(i) OF THE SUBDIVISION REGULATIONS FOR DEVELOPMENT ON LAND WHICH IS LESS THAN 40,000 SF IN SIZE.
- PREVIOUS DPZ FILES: PLAT BOOK 60 FOLIO 115,
- PERIMETER LANDSCAPING IS NOT REQUIRED FOR THIS PROPERTY AS ALL LINES ARE INTERNAL
- DRIVEWAYS SHALL BE PROVIDED PRIOR TO RESIDENTIAL OCCUPANCY TO INSURE SAFE ACCESS FOR FIRE AND EMERGENCY VEHICLES PER THE FOLLOWING MINIMUM REQUIREMENTS:
  - A) WIDTH 12' (16' SERVING MORE THAN ONE RESIDENCE). B) SURFACE - 6" OF COMPACT CRUSHER RUN BASE WITH TAR AND CHIP COATING (1-1/2'

  - D) STRUCTURES (CULVERTS/BRIDGES) CAPABLE OF SUPPORTING 25 GROSS TONS (H25
  - E) DRAINAGÉ ELEMENTS CAPABLE OF SAFELY PASSING 100 YEAR FLOODPLAIN WITH NO MORE
  - THAN 1 FOOT DEPTH OVER DRIVEWAY. F) STRUCTURE CLEARANCES - MINIMUM 12 FEET.
  - G) MAINTENANCE SUFFICIENT TO INSURE ALL WEATHER USE.
- WINDOWS, CHIMNEYS, OR EXTERIOR STAIRWAYS NOT MORE THAN 16 FEET IN WIDTH MAY PROJECT
- NOT MORE THAN 4 FEET INTO ANY SETBACKS. PORCHES OR DECKS, OPEN OR ENCLOSED, MAY PROJECT NOT MORE THAN 10 FEET INTO THE FRONT OR REAR YARD SETBACK.
- A PRE-SUBMISSION COMMUNITY MEETING FOR THIS PROJECT IS NOT REQUIRED. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS/BUREAU OF
- ENGINEERING/CONSTRUCTION INSPECTION DIVISION AT (410) 313-1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF WORK.
- THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK BEING DONE.
  EXISTING UTILITIES SHOWN ARE BASED ON A FIELD SURVEY, HOWARD COUNTY GIS
- 21. ANY DAMAGE TO THE COUNTY'S RIGHT-OF-WAY SHALL BE CORRECTED AT THE BUILDER'S
- EXPENSE. CONTRACTOR SHALL ADJUST ELEVATIONS OF STRUCTURES AS NECESSARY. SHC SHALL BE THE RESPONSIBILITY OF THE OWNER. STORMWATER MANAGEMENT METHODS WERE DESIGNED BASED ON THE 2000 MARYLAND STORMWATER DESIGN MANUAL, VOLUMES I AND II. TREATMENT IS PROVIDED USING ENVIRONMENTAL
- SITE DESIGN METHODS, INCLUDING MICRO-BIORETENTION PRACTICE. THE FACILITY SHALL BE OWNED
- 24. BRL INDICATES ZONING BUILDING RESTRICTION LINE, OTHER RESTRICTIONS MAY 25. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS AND SPECIFICATIONS
- OF HOWARD COUNTY. THE STAKING OF FOUNDATIONS PRIOR TO CONSTRUCTION TO ENSURE COMPLIANCE
- WITH REGULATORY BUILDING RESTRICTION LINES IS RECOMMENDED. THE THE SUBJECT PROPERTY IS LOCATED WITHIN THE BWI AIRPORT ZONING DISTRICT.
- AIRPORT ZONING PERMITS No. 15-191 (LOTS 446 AND 447) AND No. 15-192 (LOTS 448 AND 449) WERE ISSUED ON MARCH 21, 2016.
- 28. SELIER SERVICE tO EXISTING LOT 447 FROM EXISTING SEWER CONSTRUCTED BY CONTRACT 23-S ONLY PROVIDES GRAVITY SEWER SERVICE TO THE FIRST FLOOR. IF BASEMENT SERVICE IS DESIRED AN ESECTOR PUMP FUR THE BASEMENT ONLY WILL BE NECESSARY. A WAIVER WILL

BE REQUIRED TO ALLOW BASEMENT SERVICE.

SITE ANALYSIS DATA CHART

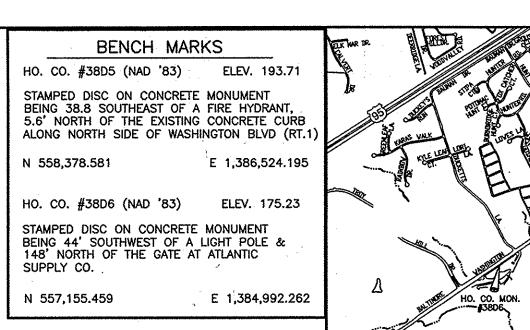
- A.) TOTAL PROJECT AREA \_\_\_\_\_\_\_ 0.28 AC. B.) AREA OF THIS PLAN SUBMISSION \_\_\_\_\_\_\_ 0.28 AC. C.) APPROXIMATE LIMIT OF DISTURBANCE \_\_\_\_\_ E.) PROPOSED USE OF SITE:\_\_\_\_ SINGLE FAMILY SEMI-DETACHED F.) TOTAL NUMBER OF UNITS ALLOWED AS SHOWN ON FINAL PLAT(S)\_ G.) TOTAL NUMBER OF UNITS PROPOSED\_
- 3 (1 GARAGE AND 2 DRIVEWAY) I.) PROVIDED PARKING PER UNIT:
- J.) APPLICABLE DPZ FILE REFERENCES: \_\_\_\_\_\_ PB 60 FOLIO 115, ECP-16-028
- K.) PROPOSED WATER AND SEWER SYSTEMS: X PUBLIC PRIVATE

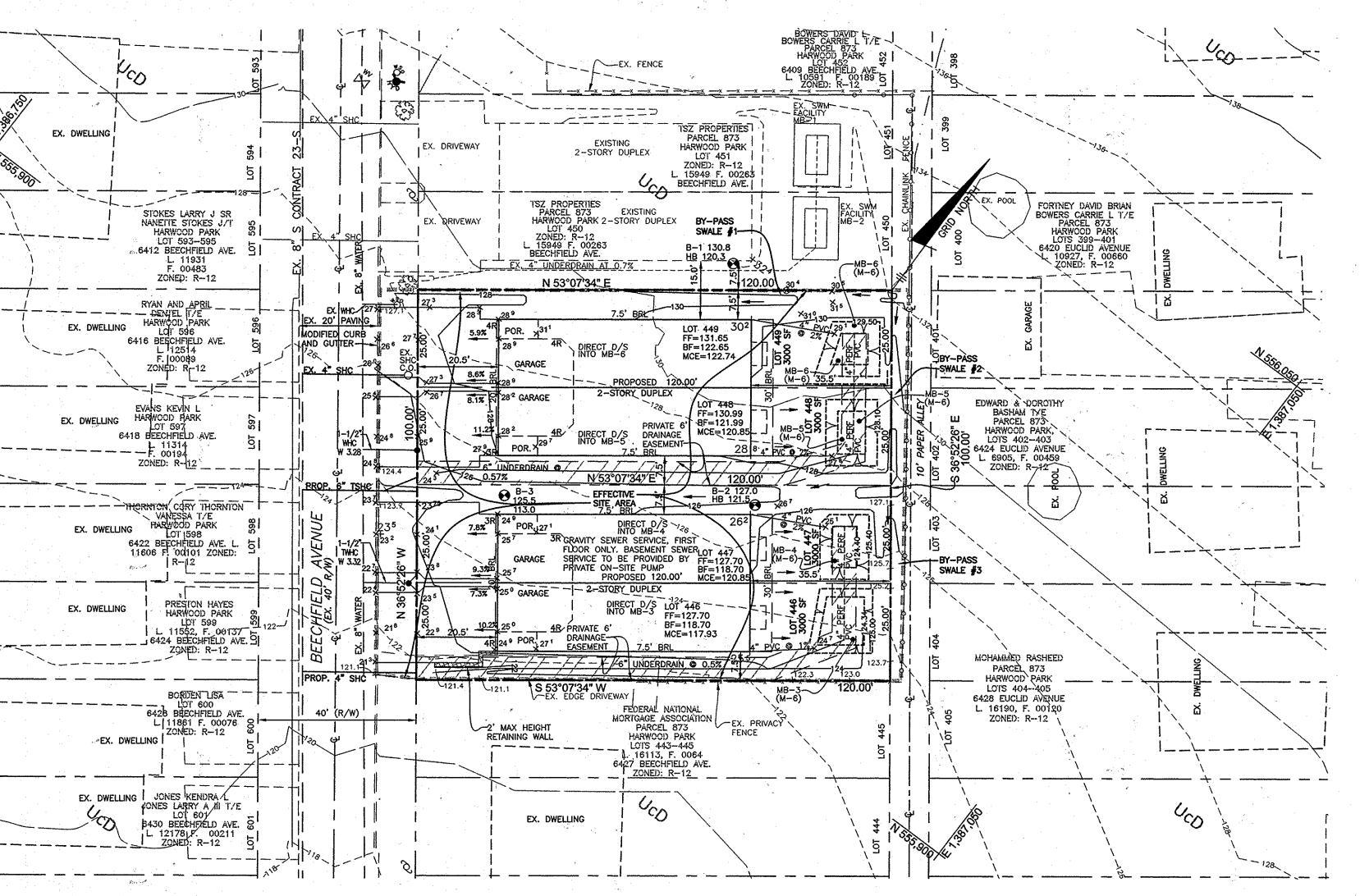
APPROVED: DEPARTMENT OF PLANNING AND ZONING 5-10-16 CHIEF, DIVISION OF LAND DEVELOPMENT 5.10.16

SOILS LEGEND UcD D Urban land-Chillum-Beltsville complex, 0 to 5 percent slopes 0.37 USDA - NRCS WEBSITE -SOIL SURVEY MAP No. 25- NO HYDRIC SOILS

# SITE DEVELOPMENT PLAN HARWOOD PARK

LOTS 446 - 449 1st ELECTION DISTRICT HOWARD COUNTY, MARYLAND



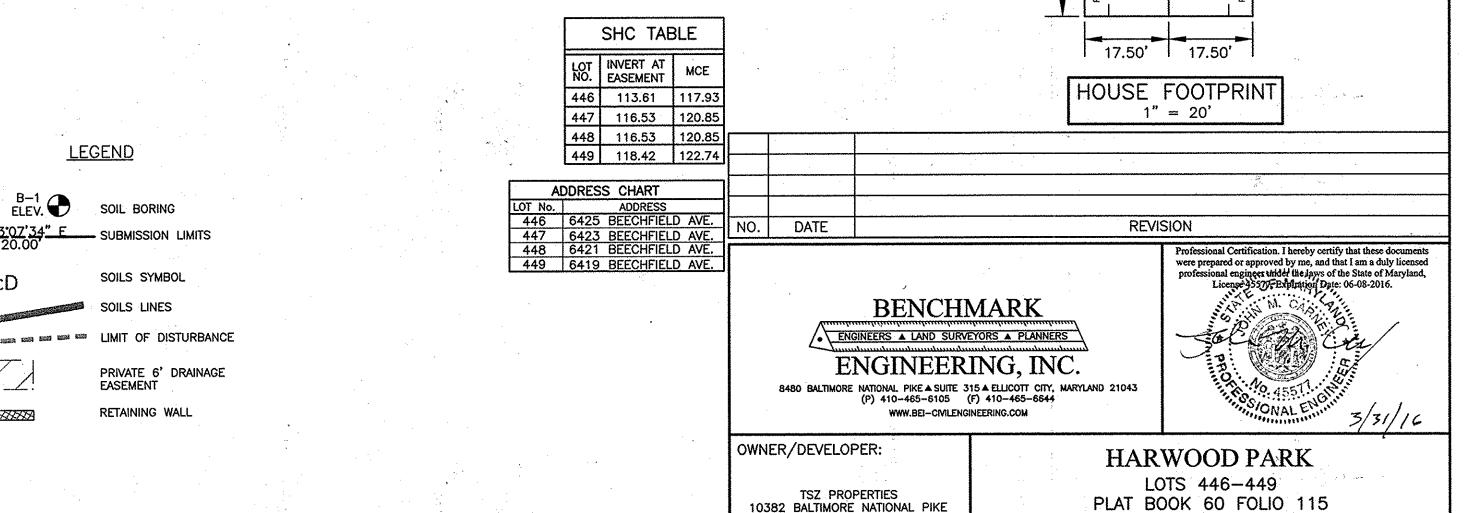


PLAN VIEW

GRAPHIC SCALE

( IN FEET )

1 inch = 20 ft.



ELLICOTT CITY, MARYLAND 21042

410-465-4103

c/o STEPHANIE PORTA

SCALE:

PERMIT INFORMATION CHART SUBDIVISION NAME: LOT/PARCEL HARWOOD PARK LOTS 446-449 N/A PARCEL P/O 87 CENSUS TRACT TAX MAP ELECTION ZONE PB 60 R-12 1ST 601204 **FOLIO 115** 

BEI PROJECT NO. 2672 MARCH, 2016 · 1" = 20' SHEET

SINGLE FAMILY SEMI-DETACHED DUPLEX UNITS

BEECHFIELD AVENUE

ELECTION DISTRICT NO. 1, HOWARD COUNTY, MARYLAND

SITE DEVELOPMENT AND GRADING

TAX MAP: 38 GRID: 13 PARCEL: P/O 873 ZONED: R-12

SDP-16-023

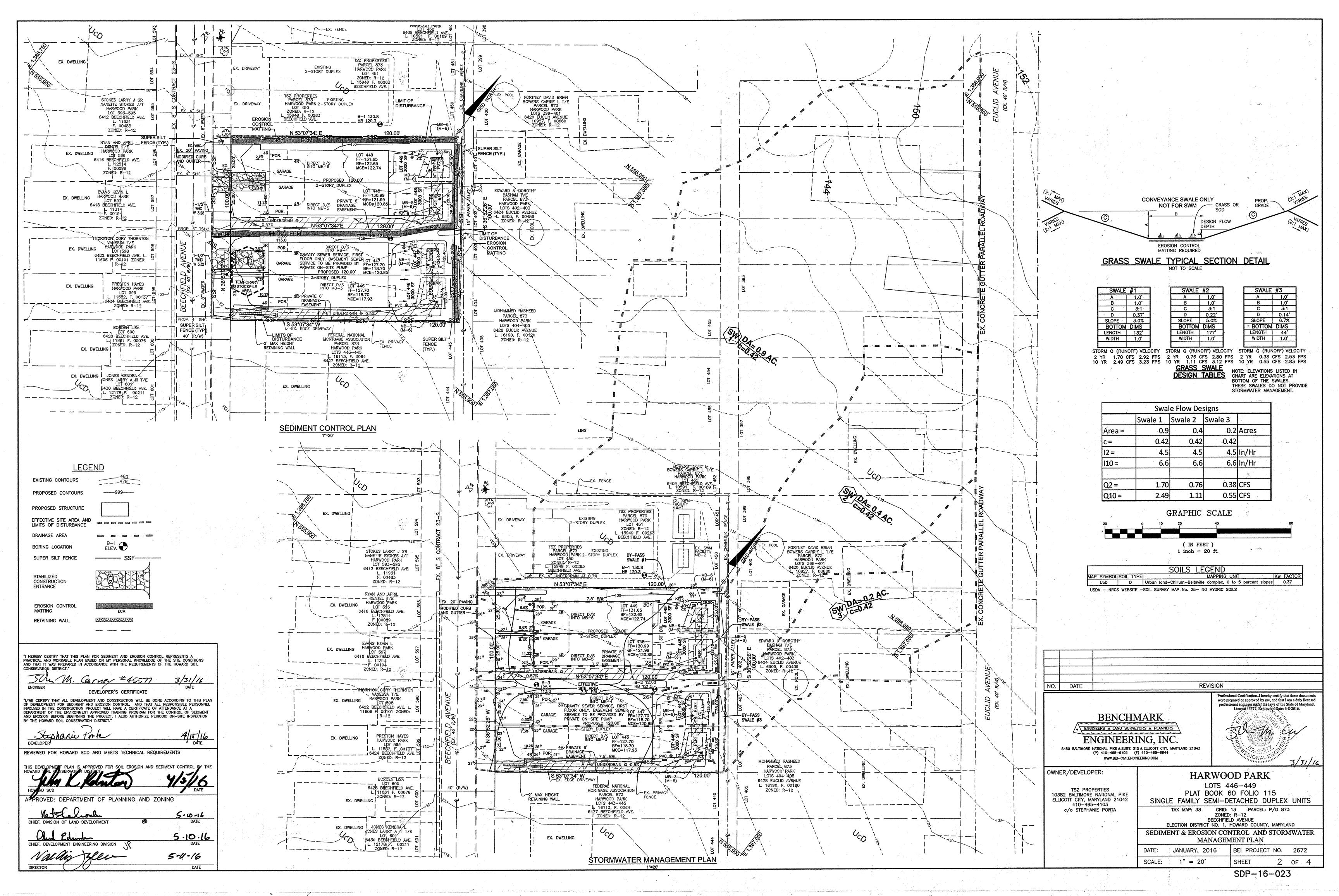
of 4

INTERNATIONAL &

SCALE: 1"=2000"

- THURGOOD MARSHAL

ADC MAP: 35



B-4 STANDARDS AND SPECIFICATIONS VEGETATIVE STABILIZATION 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

cremental stabilization; soil preparation, soil amendments and topsoiling; seeding and mulching; mporary stabilization; and permanent stabilization. Effects on Water Quality and Quantity
abilization practices are used to promote the establishment of vegetation on exposed soil. When soil is

abilized with vegetation, the soil is less likely to erode and more likely to allow infiltration of rainfall, ereby reducing sediment loads and runoff to downstream areas lanting 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 egetation will help reduce the movement of sediment, nutrients, and other chemicals carried by runoff to eiving waters. Plants will also help protect groundwater supplies by assimilating those substances

present within the root zone. diment control practices must remain in place during grading, seedbed preparation, seeding, mulching, Adequate Vegetative Establishment

spect seeded areas for vegetative establishment and make necessary repairs, replacements, and eseedings within the lanting season. Adequate vegetative stabilization requires 95 percent groundcover

If an area has less than 40 percent groundcover, restabilize following the original recommendations for time, fertilizer, seedbed preparation, and seeding, 3. If an area has between 40 and 94 percent groundcover, over-seed and fertilize using half of the rates originally specified.

Maintenance fertilizer rates for permanent seeding are shown in Table B.6. **B-4-1 STANDARDS AND SPECIFICATIONS** 

INCREMENTAL STABILIZATION ablishment of vegetative cover on cut and fill slopes.

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 stockgile ncremental Stabilization - Cut Slopes 1. Excavate and stabilize cut slopes in increments not to exceed 15 feet in height. Prepare seedbed

and apply seed and mulch on all cut slopes as the work progresses. Construction sequence example (Refer to Figure B.1): a. Construct and stabilize all temporary swates or dikes that will be used to convey runoff around the excavation.

b. Perform Phase 1 excavation, prepare seedbed, and stabilize. c. Perform Phase 2 excavation, prepare seedbed, and stabilize. Overseed Phase 1 areas as d. Perform final phase excavation, prepare seedbed, and stabilize. Overseed previously

seeded areas as necessary. te: Once excavation has begun the operation should be continuous from grubbing through the mpletion of grading and placement of topsoil (if required) and permanent seed and mulch. Any rruptions in the operation or completing the operation out of the seeding season will necessitate ne application of temporary stabilization

Incremental Stabilization - Fill Slopes 1. Construct and stabilize fill slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all slopes as the work progresses. 2. Stabilize slopes immediately when the vertical height of a lift reaches 15 feet, or when the grading

 At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner. 4. Construction sequence example (Refer to Figure B.2): a. Construct and stabilize all temporary swales or dikes that will be used to divert runoff around the fill. Construct silt fence on low side of fill unless other methods shown on the plans

address this area. b. At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner. c. Place Phase 1 fill, prepare seedbed, and stabilize. d. Place Phase 2 fill, prepare seedbed, and stabilize.

e. Place final phase fill, prepare seedbed, and stabilize. Overseed previously seeded areas as ote: Once the placement of fill has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any rruptions in the operation or completing the operation out of the seeding season will necessitate the elication of temporary stabilization.

> **B-4-4 STANDARDS AND SPECIFICATIONS** TEMPORARY STABLIZATION

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

ration ceases as prescribed in the plans.

Exposed soils where ground cover is needed for a period of 6 months or less. For longer duration of time, ermanent stabilization practices are required. Criteria

1. Select one or more of the species or seed mixtures listed in Table B.1 for the appropriate Plant

Hardiness Zone (from Figure B.3), and enter them in the Temporary Seeding Summary below along with application rates, seeding dates and seeding depths. If this Summary is not put on the plan and completed, then Table B.1 plus fertilizer and time rates must be out on the plan. 2. For sites having soil tests performed, use and show the recommended rates by the testing agency. Soil tests are not required for Temporary Seeding. . When stabilization is required outside of a seeding season, apply seed and mulch or straw mulch alone as prescribed in Section 8-4-3.A.1.b and maintain until the next seeding seasor

### **B-4-8 STANDARDS AND SPECIFICATIONS** STOCKPILE AREA

A mound or pile of soil protected by appropriately designed erosion and sediment control measures 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 Applie

Stockpile areas are utilized when it is necessary to salvage and store soil for later use 1. The stockpile location and all related sediment control practices must be clearly indicated on the erosion and sediment control plan. 2. 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 4.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. 6.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. 8. 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.

<u>Maintenance</u>

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

# ENGINEER'S CERTIFICATE

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

John M. Carney #45577 DEVELOPER'S CERTIFICATE WE CERTIFY THAT ALL DEVELOPMENT AND CONSTRUCTION WILL BE DONE ACCORDING TO THIS PLAN

OF DEVELOPMENT FOR SEDIMENT AND EROSION CONTROL, AND THAT ALL RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I ALSO AUTHORIZE PERIODIC ON—SITE INSPECTION Y THE HOWARD SOIL CONSERVATION DISTRICT." Stesham Inte

REVIEWED FOR HOWARD SCD AND MEETS TECHNICAL REQUIREMENTS

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

The process of preparing the soils to sustain adequate vegetative stabilization. To provide a suitable soil medium for vegetative growth. Conditions Where Practice Applies Where vegetative stabilization is to be establishe

A. Soil Preparation 1. Temporary Stabilization rippers mounted on construction equipment. After the soil is loosened, it must not be

a. Seedbed preparation consists of loosening soil to a depth of 3 to 5 inches by means of suitable agricultural or construction equipment, such as disc harrows or chisel plows or rolled or dragged smooth but left in the roughened condition. Slopes 3:1 or flatter are to be tracked with ridges running parallel to the contour of the slope. b. Apply fertilizer and lime as prescribed on the plans. c. Incorporate lime and fertilizer into the top 3 to 5 inches of soil by disking or other

2. Permanent Stabilization a. A soil test is required for any earth disturbance of 5 acres or more. The minimum soil conditions required for permanent vegetative establishment are: i. Soil pH between 6.0 and 7.0.

ii. Soluble salts less than 500 parts per million (ppm). iii. Soil contains less than 40 percent clay but enough fine grained material (greater than 30 percent silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception: if love-grass 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.

 v. Soil contains sufficient pore space to permit adequate root penetration. b. Application of amendments or topsoil is required if on-site soils do not meet the above c. Graded areas must be maintained in a true and even grade as specified on the approved plan, then scarified or otherwise loosened to a depth of 3 to 5 inches. d. Apply soil amendments as specified on the approved plan or as indicated by the results of a

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

1. Topsoil is placed over prepared subsoil prior to establishment of permanent vegetation. The purpose is to provide a suitable soil medium for vegetative growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable so

Topsoil salvaged from an existing site may be used provided it meets the standards as set forth in these specifications. Typically, the depth of topsoil to be salvaged for a given soil type can be found in the representative soil profile section in the Soil Survey published by USDA-NRCS. 3. Topsoiling is limited to areas having 2:1 or flatter slopes where:

a. The texture of the exposed subsoil/parent material is not adequate to produce vegetative growth.

b. The soil material is so shallow that the rooting zone is not deep enough to support plants or furnish continuing supplies of moisture and plant nutrients. The original soil to be vegetated contains material toxic to plant growth.

11/2 inches in diameter.

d. The soil is so acidic that treatment with limestone is not feasible. Areas having slopes steeper than 2:1 require special consideration and design 5. Topsoil Specifications: Soil to be used as topsoil must meet the following criteria a. Topsoil must be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by the appropriate approval authority. Topsoil must not be a mixture of contrasting textured subsoils and must contain less than 5 percent by volume of cinders stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than

b. Topsoil must be free of noxious plants or plant parts such as Bermuda grass, quack grass, Johnson grass, nut sedge, poison ivy, thistle, or others as specified. c. Topsoil substitutes or amendments, as recommended by a qualified agronomist or soil scientist and approved by the appropriate approval authority, may be used in lieu of natural topsoil. 6. Topsoil Application

 Erosion and sediment control practices must be maintained when applying topsoil. b. Uniformly distribute topsoil in a 5 to 8 inch layer and lightly compact to a minimum thickness of 4 inches. Spreading is to be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations must be corrected in order to prevent the formation of depressions or water pockets.

c. Topsoil must not be placed if the topsoil or subsoil is in a frozen or muddy condition when the subsoil is excessively wet or in a condition that may otherwise be detrimental to proper grading and seedbed preparation. C. Soil Amendments (Fertilizer and Lime Specifications)

1. Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas of 5 acres or more. Soil analysis may be performed by a recognized private or commercial laboratory. Soil samples taken for engineering purposes may also be used for chemical analyses. 2. Fertilizers must be uniform in composition, free flowing and suitable for accurate application by appropriate equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers must all be delivered to the site fully labeled

according to the applicable laws and must bear the name, trade name or trademark and warranty of the producer. 3. Lime materials must be ground limestone (hydrated or burnt lime may be substituted except when hydroseeding) which contains at least 50 percent total oxides (calcium oxide plus magnesium oxide). Limestone must be ground to such fineness that at least 50 percent will pass through a #100 mesh sieve and 98 to 100 percent will pass through a #20 mesh sieve

4. Lime and fertilizer are to be evenly distributed and incorporated into the top 3 to 5 inches of 5. Where the subsoil is either highly acidic or composed of heavy clays, spread ground limestone

at the rate of 4 to 8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of

H-5 STANDARDS AND SPECIFICATIONS Controlling the suspension of dust particles from construction activitie

STATION

Fo prevent blowing and movement of dust from exposed soil surfaces to reduce on and off-site damage including Conditions Where Practice Applies

Mulches: See Section B-4-2 Soil Preparation, Topsoiling, and Soil Amendments, Section B-4-3 Seeding and Ilching, and Section B-4-4 Temporary Stabilization. Mulch must be anchored to prevent blowing. egetative Cover: See Section B-4-4 Temporary Stabilization. age: Till to roughen surface and bring clods to the surface. Begin plowing on windward side of site. Chisel-type plows spaced about 12 inches apart, spring-toothed harrows, and similar plows are

examples of equipment that may produce the desired effect. 4.Imgation: Sprinkle site with water until the surface is moist. Repeat as needed. The site must not be irrigated to

REMOVABLE PUMPING

5.Barriers: Solid board fences, slit fences, snow fences, burlap fences, straw bales, and similar material can be used to control air currents and soil blowing. 6.Chemical Treatment: Use of chemical treatment requires approval by the appropriate plan review authority.

GEOTEXTILE

**B-4-3 STANDARDS AND SPECIFICATIONS** 

The application of seed and mulch to establish vegetative cover 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.

SEEDING AND MULCHING

a.All seed must meet the requirements of the Maryland State Seed Law. All seed must be subject to re-testing by a recognized seed laboratory. All seed used must have been tested within the 6 months immediately preceding the date of sowing such material on any project Refer to Table B.4 regarding the quality of seed. Seed tags must be available upon reques to the inspector to verify type of seed and seeding rate.

b.Mulch alone may be applied between the fall and spring seeding dates only if the ground is frozen. The appropriate seeding mixture must be applied when the ground thaws. c. Inoculants: The inoculant for treating legume seed in the seed mixtures must be a pure

culture of nitrogen fixing bacteria prepared specifically for the species. Inoculants must not be used later than the date indicated on the container. Add fresh inoculants as directed on the package. Use four times the recommended rate when hydroseeding. Note: It is very important to keep inoculant as cool as possible until used. Temperatures

above 75 to 80 degrees Fahrenheit can weaken bacteria and make the inoculant less d.Sod or seed must not be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed (14 days min.) to permit dissipation of phyto-toxic materials.

a. Dry Seeding: This includes use of conventional drop or broadcast spreaders. 1. 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. il. Apply seed in two directions, perpendicular to each other. Apply half the seeding rate n each direction. Roll the seeded area with a weighted roller to provide good seed to soil contact.

b. Drill or Cultipacker Seeding: Mechanized seeders that apply and cover seed with soil. i. Cultipacking seeders are required to bury the seed in such a fashion as to provide at least 1/4 inch of soil covering. Seedbed must be firm after ii. Apply seed in two directions, perpendicular to each other. Apply half the seeding rate in each direction.

c. Hydroseeding: Apply seed uniformly with hydroseeder (slurry includes seed and i. If fertilizer is being applied at the time of seeding, the application rates should not exceed the following: nitrogen, 100 pounds per acre total of soluble nitrogen; P205 (phosphorous), 200 pounds per acre; K2O (potassium), 200 pounds per acre. ii. Lime: Use only ground agricultural limestone (up to 3 tons per agre may be applied by hydroseeding). Normally, not more than 2 tons are applied by hydroseeding at any one time. Do not use burnt or hydrated lime when hydroseeding. iii. Mix seed and fertilizer on site and seed immediately and without interruption. iv. When hydroseeding do not incorporate seed into the soil.

 Mulch Materials (in order of preference) a. Straw consisting of thoroughly threshed wheat, rye, oat, or barley and reasonably bright in color. Straw is to be free of noxious weed seeds as specified in the Maryland Seed Law and not musty, moldy, caked, decayed, or excessively dusty. Note: Use only sterile straw mulch in areas where one species of grass is desired. b. Wood Cellulose Fiber Mulch (WCFM) consisting of specially prepared wood cellulose processed into a uniform fibrous physical state.

i. WCFM is to be dyed green or contain a green dye in the package that will provide an appropriate color to facilitate visual inspection of the uniformly spread slury. ii.WCFM, including dve, must contain no germination or growth inhibiting factors. iii.WCFM materials are to be manufactured and processed in such a manner that the wood cellulose fiber mulch will remain in uniform suspension in water under agitation and will blend with seed, fertilizer and other additives to form a homogeneous slurry. \* The mulch material must form a blotter-like ground cover, on application, having moisture absorption and percolation properties and must cover and hold grass seed in contact with the soil without inhibiting the growth of the grass seedlings. iv.WCFM material must not contain elements or compounds at concentration levels that

will be phyto-toxic.
v. WCFM must conform to the following physical requirements; fiber length of approximately 10 millimeters, diameter approximately 1 millimeter, pH range of 4.0 to 8.5, ash content of 1.6 percent maximum and water holding capacity of 90 percent

2. Application a. Apply mulch to all seeded areas immediately after seeding. b. When straw mulch is used, spread it over all seeded areas at the rate of 2 tons per acre to a uniform loose depth of 1 to 2 inches. Apply mulch to achieve a uniform distribution and depth so that the soil surface is not exposed. When using a mulch anchoring tool, increase the application rate to 2.5 tons per acre. c. Wood cellulose fiber used as mulch must be applied at a net dry weight of 1500 pounds per acre. Mix the wood cellulose fiber with water to attain a mixture with a maximum of 50 pounds

of wood cellulose fiber per 100 gallons of water a. Perform mulch anchoring immediately following application of mulch to minimize loss by wind or water. This may be done by one of the following methods (listed by preference), depending upon the size of the area and erosion hazard: i. A mulch anchoring tool is a tractor drawn implement designed to punch and anchor mulch into the soil surface a minimum of 2 inches. This practice is most effective on large

areas, but is limited to flatter slopes where equipment can operate safely. If used on sloping land, this practice should follow the contour. ii. Wood cellulose fiber may be used for anchoring straw. Apply the fiber binder at a net dry weight of 750 pounds per acre. Mix the wood cellulose fiber with water at a maximum of 50 nounds of wood cellulose fiber per 100 gallons of water. iii. Synthetic binders such as Acrylic DLR (Agro-Tack), DCA-70, Petroset, Terra Tax II, Terra Tack AR or other approved equal may be used. Follow application rates as specified by the manufacturer. Application of liquid binders needs to be heavier at the edges where wind

catches mulch, such as in valleys and on crests of banks. Use of asphalt binders is strictly ੋਂ।v. Lightweight plastic netting may be stapled over the mulch according to manufacture recommendations. Netting is usually available in rolls 4 to 15 feet wide and 300 to 3,000 feet **B-4-5 STANDARDS AND SPECIFICATIONS** PERMANENT STABILIZATION

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

a. Select one or more of the species or mixtures listed in Table B.3 for the appropriate Plant Hardiness Zone (from Figure B.3) and based on the site condition or purpose found on Table B.2. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The Summary is to be placed on the plan. b. Additional planting specifications for exceptional sites such as shorelines, stream banks, or dunes or for special purposes such as wildlife or aesthetic treatment may be found in USDA-NRCS Technical Field Office Guild, Section 342 - Critical Area Planting.

c. For sites having disturbed areas over 5 acres, use and show the rates recommended by the d. For areas receiving low maintenance, apply urea form fertilizer (46-0-0) at 3 ½ pounds per 1000 square feet (150 pounds per acre) at the time of seeding in addition to the soil amendments shown in the Permanent Seeding Summary.

a. Areas where turfgrass may be desired include lawns, parks, playgrounds, and commercial sites which will receive a medium to high level of maintenance. b. Select one or more of the species or mixtures listed below based on the site conditions of purpose. Enter selected mixture(s), application rates, and seeding dates in the

PermanentSeeding Summary. The summary is to be placed on the plan. i. Kentucky Bluegrass: Full sun Mixture: For use in areas that receive intensive management. Imigation 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. ii. 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 Cultivars/Certified Kentucky Bluegrass Seeding Rate: 2 pounds mixture per 1000 square feet. Choose a minimum of three

Kentucky Bluegrass Cultivars with each ranging from 10 to 30 percent of the total mixture by weight.
iii.Tall Fescue/Kentucky Bluegrass: Full Sun Mixture: For use in drought prone areas and/or for areas receiving low to medium management in full sun to medium shade. Recommended mixture includes; Certified Tall Fescue Cultivars 95 to 100 percent, Certified Kentucky Bluegrass Cultivars 0 to 5 percent. Seeding Rate: 5 to 8 pounds pe 1000 square feet. One or more cultivars may be blended.

iv. 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 ½ to 3 pounds per 1000 squarefeet Notes: Select turigrass varieties from those listed in the most current University of Maryland Publication, Agronomy Memo #77, "Turfgrass Cultivar Recommendat 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.

c. Ideal Times of Seeding for Turf Grass Mixtures Western MD: March 15 to June 1, August 1 to October 1 (Hardiness Zones: 5b, 6a) entral 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).

d. Till areas to receive seed by disking or other approved methods to a depth of 2 to 4 inches, level and rake the areas to prepare a proper seedbed. Remove stones and debris over 1  $\ensuremath{\frac{1}{2}}$ inches in diameter. The resulting seedbed must be in such condition that future mowing o grasses will pose no difficulty. e. If soil moisture is deficient, supply new seedings with adequate water for plant growth (½ to

1 inch every 3 to 4 days depending on soil texture) until they are firmly established. This is not especially true when seedings are made late in the planting season, in abnormally dry or hot seasons, or on adverse sites. B. Sod: to provide quick cover on disturbed areas (2:1 grade or flatter)

a. Class of turigrass must be Maryland State Certified. Sod labels must be made available to the job foreman and inspector. b. Sod must be machine cut at a uniform soil thickness of % inch, plus or minus % inch, at the time of cutting. Measurement for thickness must exclude top growth and thatch. Broken

pads and tom or uneven ends will not be acceptable.

c. Standard size sections of sod must be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper 10 percent of the section. d. Sod must not be harvested or transplanted when moisture content (excessively dry or wet)

may adversely affect its survival. e. Sod must be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period must be approved by an agronomist or soil scientist prior to its installation. 2. Sod Installation

a. During periods of excessively high temperature or in areas having dry subsoil, lightly rrigate the subsoil immediately prior to laying the sod. b. Lay the first row of sod in a straight line with subsequent rows placed parallel to it and tightly wedged against each other. Stagger lateral joints to promote more uniform growth and strength. Ensure that sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would cause air drying of the roots.

. 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. nsure solid contact exists between sod roots and the underlying soil surface. d. Water the sod immediately following rolling and tamping until the underside of the new sod pad and soil surface below the sod are thoroughly wet. Complete the operations of laying,

a. In the absence of adequate rainfall, water daily during the first week or as often and sufficiently as necessary to maintain moist soil to a depth of 4 inches. Water sod during the eat of the day to prevent wilting b. After the first week, sod watering is required as necessary to maintain adequate moisture

tamping and imigating for any piece of sod within eight hours.

THE CONTRACTOR IS RESPONSIBLE FOR

PUMPING ALL STANDING WATER THROUGH A

WITHIN 24 HOURS OR LESS FOLLOWING ANY

FILTERING DEVICE TO A CLEAR WATER OUTFALL

I----SSF----

c. Do not mow until the sod is firmly rooted. No more than 1/3 of the grass leaf must be removed by the initial cutting or subsequent cuttings. Maintain a grass height of at least 3 HOWARD SOIL CONSERVATION DISTRICT (HSCD)
STANDARD SEDIMENT CONTROL NOTES

1. A pre-construction meeting must occur with the Howard County Department of Public Works, Construction Inspection Division (CID), 410-3133-1855 after the future LOD and protected areas are marked clearly in the field. A minimum of 48 hours notice to CID must be given at the following stages:

a. Prior to the start of earth disturbance, b. Upon completion of the installation of perimeter erosion and sediment controls, but before proceeding with any other earth disturbance or grading, c. Prior to the start of another phase of construction or opening of another grading d. Prior to the removal or modification of sediment control practices

2. All vegetative and structural practices are to be installed according to the provisions of this plan and are to be in conformance with the <u>2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL</u>, and revisions thereto.

3. Following initial soil disturbance or re-disturbance, permanent or temporary stabilization is required within three (3) calendar days as to the surface of all perimeter controls, dikes, swales, ditches, perimeter slopes, and all slopes steeper than 3 horizontal to 1 vertical (3:1); and seven (7) calendar days as to all other disturbed areas on the project site except for those areas under active aradina.

4. All disturbed areas must be stabilized within the time period specified above in accordance with the 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL for topsoil (Sec. B-4-2), permanent seeding (Sec. B-4-5), temporary seeding (Sec. B-4-4) and mulching (Sec. B-4-3). Temporary stabilization with mulch alone can only be applied between the fall and spring seeding dates if the ground is frozen. Incremental stabilization (Sec. B-4-1) specifications shall be enforced in areas with >15' of cut and/or fill. Stockpiles (Sec. B-4-8) in excess of 20 feet must be benched with stable outlet. All concentrated flow, steep slope, and highly erodible areas shall receive soil stabilization matting (Sec. B-4-6).

5. All sediment control structures are to remain in place, and are to be maintained in operative condition until permission for their removal has been obtained from the CID.

6. Site Analysis: 0.28 Acres Total Area of Site: 0.31 Acres Area Disturbed: 0.15 Acres Area to be roofed or paved: 0.16 Acres \*CUT/FILL NUMBERS Area to be vegetatively stabilized: 900 \* Cu Yds ARE FOR SEDIMENT CONTROL PURPOSES Total cut: 100 \* Cu Yds ONLY. CONTRACTOR Total fill:

Off-site waste/borrow area location: 7. Any sediment control practice which is disturbed by grading activity for placement of

utilities must be repaired on the same day of disturbance 8. Additional sediment control must be provided, if deemed necessary by the CID. The site and all controls shall be inspected by the contractor weekly; and the next day after each rain event. A written report by the contractor, made available upon request, is part of every

 Inspection date •Inspection type (routine, pre-storm event, during rain event)

 Name and title of inspector • Weather information (current conditions as well as time and an=mount of last recorded •Brief description of project's status (e.g. percent complete) and/or current activities Evidence of sediment discharges

• Identification of sediment controls that require maintenance •Identification of missing or improperly installed sediment controls • Compliance status regarding the sequence of construction and stabilization requirements Photographs

 Monitoring/sampling • Maintenance and/or corrective action performed •Other inspection items as required by the General Permit for Stormwater Associated with Construction Activities (NPDES, MDE)

9. Trenches for the construction of utilities is limited to three pipe lengths or that which can and shall be back filled and stabilized by the end of each work day, whichever is shorter. 10. Any major changes or revisions to the plan or sequence of construction must be reviewed and approved by the HSCD prior to proceeding with construction. Minor revisions may be allowed by the CID per the list of HSCD—approved field changes. 11. Disturbance shall not occur outside the L.O.D. A project is to be sequenced so that

grading activities begin on one grading unit (maximum acreage of 20 ac. per grading unit) of a time. Work may proceed to a subsequent grading unit when at least 50 percent of the disturbed area in the preceding grading unit has been stabilized and approved by the CID. Unless otherwise specified and approved by the CID, no more than 30 acres cumulatively may 12 Wash water from any equipment, vehicles, wheels, payement, and other sources must be

treated in a sediment basin or other approved washout structure. 13. Topsoil shall be stockpiled and preserved on-site for redistribution onto final grade.

14. All silt fence and super silt fence shall be placed on—the—contour, and be imbricated at 25' minimum intervals, with lower ends curled uphill by 2' in elevation. 15. Stream channels must not be disturbed during the following restricted time periods

• Use I and IP March 1 - June 15 • Use III and IIIP October 1 - April 30

Identification of plan deficiencies

• Use IV March 1 - May 31 16. A copy of this plan, the <u>2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL</u>, and associated permits shall be on—site and available whe

PERMANENT SOIL STABILIZATION MATTING

The planting dates listed are averages for each Zone and may require adjustment to reflect local conditions, especially near the boundaries of the zone.

DAY 2: THE CONTRACTOR(S) IS TO IDENTIFY AND MARK ANY HAZARDOUS CONDITIONS THAT MAY EXIST ONSITE, SUCH AS OVERHEAD POWERLINES, OLD WELLS, GAS LINES, ETC. STEP DURATION 1 DAY DAY 3-4: CLEAR AND GRUB AS NECESSARY FOR THE INSTALLATION OF PERIMETER CONTROLS. INSTALL

OBTAIN GRADING PERMIT AND HOLD A PRE-CONSTRUCTION MEETING. STEP DURATION 1 DAY.

STABILIZED CONSTRUCTION ENTRANCE, SUPER SILT FENCES AND SILT FENCES. STEP DURATION 2

Table B.3: Recommended Planting Dates for Permanent Cover in Maryland <sup>V</sup>

Mar 1 to May 15

Aug 1 to Oct 15

May 16 to Jun 15

Mar 1 to May 15

Mav 16 to Sep 14

Mar I to May 1:

Mar 1 to May 15

Sep 15 to Nov 30\* 🕇

Recommended Seeding Dates by Plant Hardiness Zone 31

бb

Mar I to May 15; Aug

iar I to May 15; Aug

Mar I to May 15; Aug

Mar I to May IS: Au

to Oct 15

to Oct 15

to Nov 15

May 16 to Jul 31

May 16 to Jul 31

7a and 7b

Feb 15 to Apr 30

Aug 15 to Oct 31

Nov I to Nov 30 •

Feb 15 to Apr 30++

May 1 to May 31\*

Feb 15 to Apr 30

May 1 to Sep 30\*

Feb 15 to Apr 30

Feb 15 to Apr 30

Oct I to Dec 15\*4

7a and 7b

Feb 15 to Apr 30; Aug

Feb 15 to Apr 30; Au

Fcb 15 to Apr 30; Aug

Feb 15 to Apr 30; Aug

15 to Nov 30

15 to Nov 30

15 to Nov 30

15 to Dec 15

May 1 to Aug 14

May I to Aug 14

Mar I to May 15; Aug Feb 15 to Apr 30; Aug

5b and 6a

Mar 15 to May 31

Aug 1 to Sep 30

Jun 1 to Jun 159

Mar 15 to May 3

Jun I to Aug 31

Mar 15 to May 3

Mar 15 to May 31

Sep I to Nov 15\*

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 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

Additional planting dates for the lower Coastal Plain, dependent on annual rainfall and temperature trends. Recommend adding a nurse crop, as noted above, i

++Warm-season grasses need a soil temperature of at least 50 degrees F in order to germinate. If soil temperatures are colder than 50 degrees, or moisture is not adequate, the seeds will remain dormant until conditions are favorable. In general, planting during the latter portion of this period allows more time for weed emergence and weed control prior to planting. When selecting a planting date, consider the need for weed control vs. the likelihood of having sufficient moisture for

4 Frequent freezing and thawing of wet soils may result in frost-heaving of materials planted in late fall, if plants have not sufficiently rooted in place.

When seeding toward the end of the listed planting dates, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table 1 and

Sod usually needs 4 to 6 weeks to become sufficiently rooted. Large containerized and balled-and-burlapped stock may be planted into the winter months as long as

Table B.1: Temporary Seeding for Site Stabilization

5b and 6a

Mar 15 to May 31; Aug 1 to Sep 30

Mar 15 to May 31; Aug 1 to Sep 30

Mar 15 to May 31; Aug 1 to Sep 30

Mar 15 to May 31; Aug 1 to Sep 30

Mar 15 to May 31; Aug 1 to Oct 31

Jun I to Jul 31

Jun 1 to Jul 31

Seeding rates listed above are for temporary seedings, when planted alone. When planted as a nurse crop with permanent seed mixes, use 1/3 of the seeding rate listed above

1/ Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as

for barley, oats, and wheat. For smaller-seeded grasses (annual ryegrass, pearl millet, foxtail millet), do not exceed more than 5% (by weight) of the overall permanent

seeding mix. Cereal tye generally should not be used as a nurse crop, unless planting will occur in very late fall beyond the seeding dates for other temporary seedings.

Cereal rye has allelopathic properties that inhibit the germination and growth of other plants. If it must be used as a nurse crop, seed at 1/3 of the rate listed above

Type of Plant Material

Sod - Cool-Season

Table B.3 Notes:

Plant Species

o. multiflorum

Oats (Avena sativa

ınual Ryegrass (*Lolium pereni* 

Baricy (Hordeum vulgare)

Wheat (Triticum aestivum)

Cereal Rye (Secale cereale)

rm-Season Grasses

xtail Millet (Setaria italica)

earl Millet (Pennisetum glaucum)

Seeds - Cool-Season Grasses

(includes mixes with forbs and/or legume:

(includes mixes with forbs and/or legumes

Seeds - Warm-Season/Cool-Season Grass Mixes

Unrooted Woody Materials; Bare-Root Plants; Bulbs, Rhizomes, Corms, and Tubers 21

Containerized Stock; Balled-and-Burlapped

later plantings, especially on droughty sites

the ground is not frozen and soil moisture is adequate.

plant with the permanent seeding mix. (See Table B.2, Note 1, for more information,

Additional planting dates during which supplemental watering may be needed to ensure plant establishment

Seeding Rate 1

1b/1000 ft<sup>2</sup>

1.0

1.7

2.8

2.8

0.7

0.5

tested. Adjustments are usually not needed for the cool-season grasses

Dats are the recommended nurse erop for warm-season grasses.

SEQUENCE OF CONSTRUCTION - INDIVIDUAL HOUSE

For sandy soils, plant seeds at twice the depth listed above.

0.5

1.0

1.0

1.0

0.5

0.5

DAY 4-10: CLEAR AND GRUB REMAINDER OF SITE WITHIN INSTALLED PERIMETER CONTROLS. GRADE SITE AND STABILIZE IN ACCORDANCE WITH PERMANENT SEEDBED NOTES. STEP DURATION 6 DAYS.

DAY 11: INSTALL EROSION CONTROL MATTING IN THE DITCHES AND SWALES. STEP DURATION 1 DAY DAY 12-60: CONSTRUCT HOUSE, INSTALL DRIVEWAY AND UTILITIES. SPOIL FROM THE TRENCHING OF TH SEPTIC AREA IS TO BE PLACED ON THE UPHILL SIDE OF THE EXCAVATION. STEP DURATION 49

DAY 61-63: INSTALL LANDSCAPING, FINE GRADE AND STABILIZE ANY REMAINING DISTURBED AREAS IN ACCORDANCE WITH PERMANENT SEEDBED NOTES, STEP DURATION 3 DAYS.

DAY 64-66: INSTALL STORMWATER MANAGEMENT MEASURES. NOTES. . STEP DURATION 3 DAYS.

DAY 67-68: UPON APPROVAL OF HOWARD COUNTY SEDIMENT CONTROL INSPECTOR, REMOVE ALL SEDIMENT CONTROL DEVICES. PERMANENTLY STABILIZE AS REQUESTED. STEP DURATION 2 DAYS.

SOILS LEGEND D Urban land-Chillum-Beltsville complex, 0 to 5 percent slopes 0.37 USDA - NRCS WEBSITE -SOIL SURVEY MAP No. 25- NO HYDRIC SOILS

REVISION NO. DATE sional Certification. I hereby certify that these docume ere prepared or approved by me, and that I am a duly lic onal engineer under the laws of the State of Maryland License 45517; Expiration Date: 6-8-2016. **BENCHMARK** 

ENGINEERING, INC. 8480 BALTIMORE NATIONAL PIKE A SUITE 315 A ELLICOTT CITY, MARYLAND 21043 (P) 410-465-6105 (F) 410-465-6644

WWW.BEI-CIVILENGINEERING.COM OWNER/DEVELOPER: TS7 PROPERTIES

HARWOOD PARK LOTS 446-449-PLAT BOOK 60 FOLIO 115

ZONED: R-12 ELECTION DISTRICT NO. 51 HOWARD COUNTY, MARYLAND SEDIMENT AND EROSION CONTROL **NOTES AND DETAILS** BEI PROJECT NO. 2672 JANUARY, 2016

WRAPPED FIRST WITH 1/4 IN GALVANIZED HARDWARE A -0 - 0 - A CLOTH, THEN NONWOVEN GEOTEXTILE 0000 0000 0000 0000 SECTION A-A 0000 0000 -ANTICIPATED 0000 (0009) SURFACE ELEV LCLEAN STONE
% TO 14 TH (0000) 0000 Re 0 0 0 3 \$ 0 0 0 9 Y 0000 0000 (0009) 0000 6 IN MIN. USE CORRUGATED METAL OR PLASTIC PIPE WITH 1 INCH DIAMETER PERFORANDAS BEACHESTON 14 IN CENTER. USE A MINIMUM 12 INCH DIAMETER INNER PIPE WITH AN OUTER PIPE A MINIMUM 6 INCHES LARGER II DIAMETER. BOTTOM OF EACH PIPE MUST BE CAPPED WITH WATERTIGHT SENTTOM CAP ON EXCAVATE 8 FEET X 8 FEET X 4 FEET DEEP PIT FOR PIPE PLACEMENADON WEEGLEARS, TO 11/2 IN STONE OR EQUIVALENT RECYCLED CONCRETE, 6 INCHES PEPTH PROPERTIES PLACEMENTE VENT SET TOP OF INNER AND OUTER PIPES MINIMUM 12 INCHES ABOVE ANTICIPATED WATER SURFACE PIPE ELEVATION (OR RISER CREST ELEVATION WHEN DEWATERING A BASIN). BACKFILL PIT AROUND THE OUTER PIPE WITH 1/4 TO 11/2 INCH CLEAN STONE OR EQUIVALENT RECYCLED CONCRETE AND EXTEND STONE A MINIMUM OF 6 INCHES ABOVE ANTICIPATED WATER SURFACE

TANK TANK TA GROUND SURFACE— GALVANIZED CHAIN LINK FENCE WITH WOVEN SLIT FILM GEOTEXTILE **ELEVATION** WOVEN SLIT FILM GEOTEXTILE-CROSS SECTION

DETAIL E-3 SUPER SILT FENCE

RAINFALL EVENT

CONSTRUCTION SPECIFICATIONS

FASTEN 9 GAUGE OR HEAVER GALVANIZED CHAIN LINK FENCE (2% INCH MAXIMUM OPENING) 42 INCHES IN HEIGHT SECURELY TO THE FENCE POSTS WITH WIRE TIES OR HUG RINGS. FASTEN WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H $^-$ 1 MATERIALS, SECURELY TO THE UPSLOPE SIDE OF CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID SECTION. EMBED GEOTEXTILE AND CHAIN LINK FENCE A MINIMUM OF 8 INCHES INTO THE GROUND.

WHERE ENDS OF THE GEOTEXTILE COME TOGETHER, THE ENDS SHALL BE OVERLAPPED BY 6 INCHES, FOLDED, AND STAPLED TO PREVENT SEDIMENT BY PASS. EXTEND BOTH ENDS OF THE SUPER SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE

PROVIDE MANUFACTURER CERTIFICATION TO THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL CHAIN LINK FENCING AND GEOTEXTILE.

PLAN VIEW CONSTRUCTION SPECIFICATIONS PLACE STABILIZED CONSTRUCTION ENTRANCE IN ACCORDANCE WITH THE APPROVED PLAN. VEHICLE 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. MAINTAINING POSITIVE DRAINAGE, PROTECT PIPE INSTALLED THROUGH THE SCE WITH A MOUNTABLE BERM WITH 5:1 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

PROFILE

50 FT MIN.

LENGTH.

**DETAIL B-1 STABILIZED CONSTRUCTION ENTRANCE** 

PREPARE SUBGRADE AND PLACE NONWOVEN GEOTEXTILE, ÁS SPECIFIED IN SECTION H-1 MATERIALS. PLACE CRUSHED AGGREGATE (2 TO 3 INCHES IN SIZE) OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) AT LEAST 6 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE SCE. 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 MUD TRACKED ONTO PAVEMENT IS NOT ACCEPTABLE UNLESS WASH WATER IS DIRECTED TO AN APPROVED SEDIMENT CONTROL PRACTICE.

- EXISTING PAVEMEN'

1

PIPE (SEE NOTE 6)

-EARTH FIL

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

(\* INCLUDE SHEAR STRESS) OVERLAP AT ROLL CONSTRUCTION SPECIFICATIONS: USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR

USE PERMANENT SOIL STABILIZATION MATTING MADE OF OPEN WEAVE SYNTHETIC, NON-DEGRADABLE FIBERS OR ELEMENTS OF UNIFORM THICKNESS AND DISTRIBUTION THROUGHOUT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2X2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PADENT MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PADENT MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PADENT MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PADENT MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PADENT MATERIAL TO PROVIDE THE PADENT M SECURE MATTING USING STEEL STAPLES OR WOOD STAKES. STAPLES MUST BE "U" OR "T" SHAPED STEEL WRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1 ½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "I" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPE AT THE BOTTOM.

UNROLL MATTING IN DIRECTION OF WATER FLOW, CENTERING THE FIRST ROLL ON THE CHANNEL CENTER LINE. WORK FROM CENTER OF CHANNEL OUTWARD WHEN PLACING ROLLS. LAY MATTING SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING. OVERLAP OR ABUT EDGES OF MATTING ROLLS PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE NEXT DOWNSTREAM MAT. KEY IN THE TOP OF SLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.

F SPECIFIED BY THE DESIGNER OR MANUFACTURER AND DEPENDING ON THE TYPE OF MAT BEING INSTALLED ONCE THE MATTING IS KEYED AND STAPLED IN PLACE, FILL THE MAT VOIDS WITH TOP SOIL OR GRANULAR

ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION. MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

10382 BALTIMORE NATIONAL PIKE ELLICOTT CITY, MARYLAND 21042 410-465-4103 c/o STEPHANIE PORTA

SINGLE FAMILY SEMI-DETACHED DUPLEX UNIT

SCALE: 3 of 4

KOVED: DEPARTMENT OF PLANNING AND ZONING 2.1017 CHIEF. DIVISION OF LAND DEVELOPMENT 5.10.16 DEVELOPMENT ENGINEERING DIVISION 5-11-16

DISCHARGE TO A STABLE AREA AT A NONEROSIVE RATE. A REMOVABLE PUMPING STATION REQUIRES FREQUENT MAINTENANCE. IF SYSTEM CLOGS, PULL OUT INNER PIPE AND REPLACE GEOTEXTILE. KEEP POINT OF DISCHARGE FREE OF EROSION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

STANDARD SYMBOL

**⊠**RPS

- REMONDRED TETOPIPLIMP

∕HOOK ÅND CHAIN FOR REMOVAL

45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SUPER SILT FENCE.

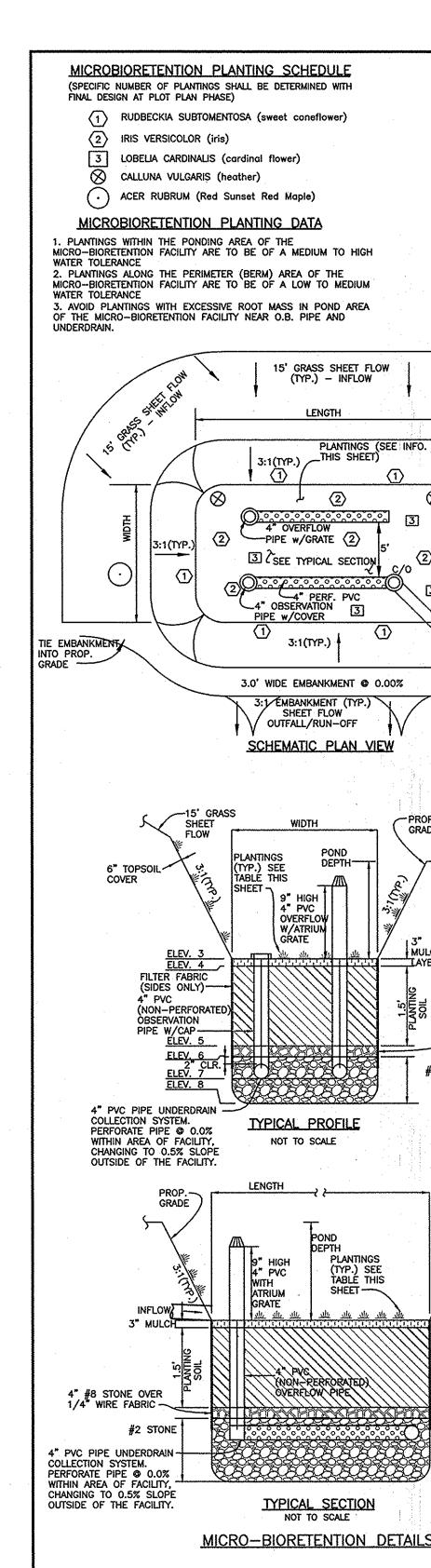
MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL MARYLAND DEPARTMENT OF ENVIRONMENT
WATER MANAGEMENT ADMINISTRATION

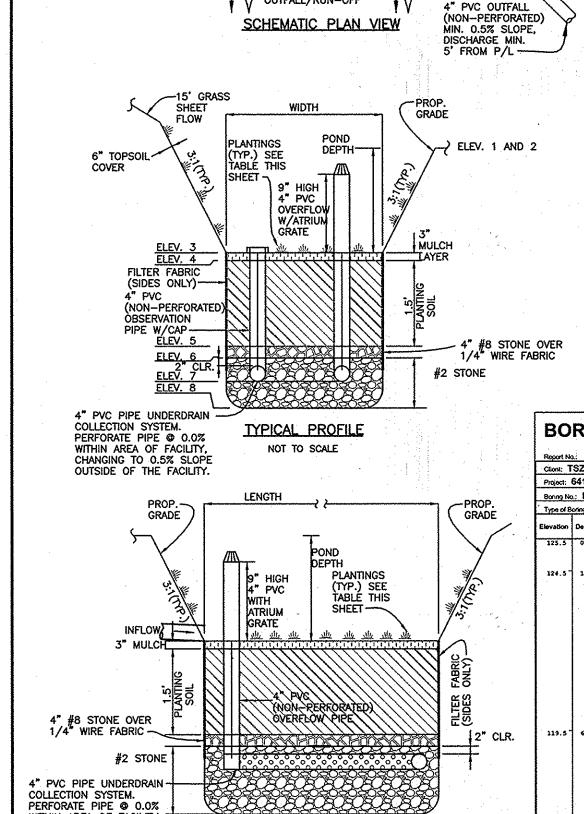
MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS, UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL

DETAIL B-4-6-C

STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.





ALL FACILITIES ARE A CUT SITUATION

CONTRACTOR IS TO OBTAIN A SOIL MIX THAT

AND SPECIFICATIONS TABLE ON THIS PLAN AND

5.10-16

5.10.16

5-11-16

SATISFIES TABLE B.4.1 AND THE MATERIALS

ALSO PROVIDES AN FILTRATION RATE = 0.5

THIS WILL RESULT IN A DRAW DOWN TIME =

18 HOURS, LESS THAN 1.0 DAYS, FOR THE

INCHES PER HOUR AT 80% COMPACTION.

APPROVED: DEPARTMENT OF PLANNING AND ZONING

PONDING DEPTH OF 9".

(TYP.) - INFLOW

PLANTINGS (SEE INFO

2

\_this sheet)

 $\langle 2 \rangle$ 

ESD Practices Summary Table										
Lot No.	Practice	MDE	Number	Ownership/ Maintenance						
Lot 449	Micro-Bioretention	(M-6)	1	Private						
Lot 448	Micro-Bioretention	(M-6)	1	Private						
Lot 447	Micro-Bioretention	(M-6)	1	Private						
Lot 446	Micro-Bioretention	(M-6)	1	Private						

MB 3	(M-6)		MB 4	(M-6)	
Micro-Bio	pretention	,	Micro-Bio	retention	
Elevation 1	125.00	and the same of the same of the same	Elevation 1	125.40	
Elevation 2	125.00		Elevation 2	125.40	
Elevation 3	124.34		Elevation 3	124.40	
Elevation 4	124.17		Elevation 4	124.23	
Elevation 5	122.67		Elevation 5	122.73	
Elevation 6	122.34		Elevation 6	122.40	
Elevation 7	122.01	Search Sea of American Security	Elevation 7	122.07	
Elevation 8	119.76		Elevation 8	119.82	
Dimer	nsions		Dimer	nsions 🕄	
A width	A width 10.64		A width	6.38	
B length	B length 12.30		B length	10.50	
, a					
MB 5	(M-6)		MB 6	(M-6)	
Micro-Bio	pretention		Micro-Bio	pretention	
Elevation 1	128.10		Elevation 1	129.50	
Elevation 2	128.10		Elevation 2	129.50	
Elevation 3	127.20		Elevation 3	128.50	
Elevation 4	/127.03	properties of the second of the second	Elevation 4	128.33	
Elevation 5	125.53	arthumoù anivert a tournez ar a anabete :	Elevation 5	126.83	
Elevation 6	125.20		Elevation 6	126.50	
Elevation 7	124.87		Elevation 7	126.17	
Elevation 8	122.62		Elevation 8	123.92	

Dimensions

A width

B length

	ESD/Site Da	ita Summary	<b>,</b>	ও					
Name of Development:	Harwood Park Lot 446-449 SWM								
Watershed:	Patuxent Riv	Patuxent River							
Watershed Designation:	*2-13-11	Class:	I	-					
Area of Site:	13317	square feet							
Impervious Cover:	6731	square feet	Percent:	51%					
Area of A soils:	0	square feet	Percent:	0%					
Area of B soils:	0	square feet	Percent:	0%					
Area of C Soils:	. 0	square feet	Percent:	0%					
Area of D <sub>-</sub> Soils	,/ 13317	square feet	Percent:	100%					
Target RCN:	77								
Target Pe:	1.80	inches	* .						
Facility Achieved Pe:	2.75	inches	pass	153%					
Target ESDv.	999	cubic feet							
Achieved ESDv:	1004	cubic feet	Provided:	101%					

Dimensions

A width

B length

RO	וואי	NG LOG					GEOLAB, INC
Report N	o.	er de Marie de la Companya de la Co La companya de la Companya de				Date: 8/	4/2015
		operties			¥'		
·		Beechfield Avenue (1 of 1) Total (2 of 1) Depth	40.5 1 400.5				to 115-048
Bonng N		(7 Of 1) Depth	12.5 Elex: 125.5 +/- Started: 7/23/2015	Completed: 7/23			g location plan uke Schvelbinz
	1	DESCRIPTION O		Sample	Sample	Moisture	T
Elevation	1	(classific	cation)	Blows	Depth (Feet)	Content	REMARKS
125.5	0.0	Sod with root (organic	) matter and organic so	ál			Groundwater was
							encountered at a depth of 12 feet.
124.5	1.0		LT with fine sand, mois				
		(ML, Silty Loam)					
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119.5	6.0		one of the contract of the con		6.0		
		fine sand, moist (ML,	h-orange clayey SILT w Siltv Clav Loam)	ntn	6.5	21.0	1.
			. , ,				1.
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							, A. 7.7
			A*	***************************************	9.0	]	3
					9.5	16.2	
					]		y.
					1"		2
115	10.5	Light brown/grey claye	ey SILT with fine sand,	- Company			
	1	moist to wet (ML, Silly	( Clay Loam)				
	] :		•				
	7		2 -		1		
113	12.5	End of boring					
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LOT 446	MB 4	LOT 447	MB 5	LOT 448	MB 6	LOT 449	
Micro-Bioretention		on	Micro-Bioretentic	n	Micro-Bioretention		
Quantity	Name	Quantity	Name	Quantity	Name	Quantity	
-,	RUDBECKIA		RUDBECKIA		RUDBECKIA		
13	SUBTOMENTOSA -	6	SUBTOMENTOSA -	7	SUBTOMENTOSA -	6	
	(sweet coneflower)		(sweet coneflower)		(sweet coneflower)		
44	IRIS VERSICOLOR	_	IRIS VERSICOLOR	6	IRIS VERSICOLOR	5	
11	(Iris)	0	(Iris)	0	(Iris)	J	
	LOBELIA CARDINALIS		LOBELIA CARDINALIS	2	LOBELIA CARDINALIS	2	
0	(cardinal flower)	3	(cardinal flower)	3	(cardinal flower)	<u> </u>	
_	CALLUNA VULGARIS		CALLUNA VULGARIS	,	CALLUNA VULGARIS	2	
4	(heather)	2	(heather)	<u>د</u>	(heather)	4	
	ACER RUBRUM	4	ACER RUBRUM	4	ACER RUBRUM	1	
	(Red Sunset Red Maple)	1	(Red Sunset Red Maple)	1	(Red Sunset Red Maple)		
•	n Quantity	n Micro-Bioretentice Name RUDBECKIA SUBTOMENTOSA - (sweet coneflower) IRIS VERSICOLOR (Iris) LOBELIA CARDINALIS (cardinal flower) CALLUNA VULGARIS (heather) ACER RUBRUM	Micro-Bioretention       Quantity     Name     Quantity       RUDBECKIA     SUBTOMENTOSA - 6 (sweet coneflower)     6       11     IRIS VERSICOLOR (Iris)     6       LOBELIA CARDINALIS (cardinal flower)     3       CALLUNA VULGARIS (heather)     2	Micro-Bioretention  Quantity  Name  RUDBECKIA SUBTOMENTOSA - (sweet coneflower)  IRIS VERSICOLOR (Iris)  LOBELIA CARDINALIS (cardinal flower)  CALLUNA VULGARIS (heather)  ACER RUBRUM  Micro-Bioretention Name RUDBECKIA SUBTOMENTOSA - (sweet coneflower) IRIS VERSICOLOR (Iris) LOBELIA CARDINALIS (cardinal flower) CALLUNA VULGARIS (heather) ACER RUBRUM  ACER RUBRUM  ACER RUBRUM	Micro-Bioretention  Quantity  Name Quantity  RUDBECKIA SUBTOMENTOSA - 6 (sweet coneflower)  IRIS VERSICOLOR (lris)  LOBELIA CARDINALIS (cardinal flower)  CALLUNA VULGARIS (heather)  ACER RUBRUM  Micro-Bioretention Name Quantity RUDBECKIA SUBTOMENTOSA - 7 (sweet coneflower) IRIS VERSICOLOR (lris)  LOBELIA CARDINALIS (cardinal flower)  CALLUNA VULGARIS (heather)  ACER RUBRUM  ACER RUBRUM  Micro-Bioretention Name Quantity RUDBECKIA SUBTOMENTOSA - 7 (sweet coneflower) IRIS VERSICOLOR (lris)  LOBELIA CARDINALIS (cardinal flower)  CALLUNA VULGARIS (heather)  ACER RUBRUM  ACER RUBRUM	Micro-Bioretention  Quantity  Name Quantity  RUDBECKIA SUBTOMENTOSA - 6 (sweet coneflower)  IRIS VERSICOLOR (lris)  LOBELIA CARDINALIS (cardinal flower)  CALLUNA VULGARIS (heather)  ACER RUBRUM  Micro-Bioretention Name Quantity RUDBECKIA SUBTOMENTOSA - 7 (sweet coneflower) IRIS VERSICOLOR (lris)  LOBELIA CARDINALIS (cardinal flower)  CALLUNA VULGARIS (heather)  ACER RUBRUM  Micro-Bioretention Name RUDBECKIA SUBTOMENTOSA - (sweet coneflower) IRIS VERSICOLOR (lris)  LOBELIA CARDINALIS (cardinal flower) CALLUNA VULGARIS (heather) ACER RUBRUM  ACER RUBRUM  ACER RUBRUM	

В.4.С	Specifications for Micro-Bioretention. Rain Gardens, Landscape Infiltration & Infiltration Berms

### Material Specifications

The allowable materials to be used in these practices are detailed in Table B.4.1.

# 2. Filtering Media or Planting Soil

The soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the microbioretention practice that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The planting soil shall be free of Bermuda grass, Quackgrass, Johnson grass, or other noxious weeds as specified under COMAR 15.08.01.05.

### The planting soil shall be tested and shall meet the following criteria:

- Soil Component Loamy Sand or Sandy Loam (USDA Soil Textural Classification) • Organic Content - Minimum, 10% by dry weight (ASTM D 2974). In general, this can be
- met with a mixture of loamy sand (60%-65%) and compost (35% to 40%) or sandy loam (30%), coarse sand (30%), and compost (40%). Clay Content - Media shall have a clay content of less than 5%.
- pH Range Should be between 5.5 7.0. Amendments (e.g., lime, iron sulfate plus sulfur) may be mixed into the soil to increase or decrease pH.

There shall be at least one soil test per project. Each test shall consist of both the standard soil test for pH, and additional tests of organic matter, and soluble salts. A textural analysis is required from the site stockpiled topsoil. If topsoil is imported, then a texture analysis shall be performed for each location where the topsoil was excavated.

### 3. Compaction

It is very important to minimize compaction of both the base of bioretention practices and the required backfill. When possible, use excavation hoes to remove original soil. If practices are excavated using a loader, the contractor should use wide track or marsh track equipment, or light equipment with turf type tires. Use of equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high-pressure tires will cause excessive compaction resulting in reduced infiltration rates and is not acceptable. Compaction will significantly contribute to design

Compaction can be alleviated at the base of the bioretention facility by using a primary tilling operation such as a chisel plow, ripper, or subsoiler. These tilling operations are to refracture the soil profile through the 12 inch compaction zone. Substitute methods must be approved by the engineer. Rototillers typically do not till deep enough to reduce the effects of compaction from

Rototill 2 to 3 inches of sand into the base of the bioretention facility before backfilling the optional sand layer. Pump any ponded water before preparing (rototilling) base.

When backfilling the topsoil over the sand layer, first place 3 to 4 inches of topsoil over the sand, then rototill the sand/topsoil to create a gradation zone. Backfill the remainder of the topsoil to

When backfilling the bioretention facility, place soil in lifts 12" to 18". Do not use heavy equipment within the bioretention basin. Heavy equipment can be used around the perimeter of the basin to supply soils and sand. Grade bioretention materials with light equipment such as a compact loader or a dozer/loader with marsh tracks.

### 4. Plant Material

Recommended plant material for micro-bioretention practices can be found in Appendix A, Section A.2.3.

## 5. Plant Installation

Compost is a better organic material source, is less likely to float, and should be placed in the invert and other low areas. Mulch should be placed in surrounding to a uniform thickness of 2" to 3". Shredded or chipped hardwood mulch is the only accepted mulch. Pine mulch and wood chips will float and move to the perimeter of the bioretention area during a storm event and are not acceptable. Shredded mulch must be well aged (6 to 12 months) for acceptance.

Rootstock of the plant material shall be kept moist during transport and on-site storage. The plant root ball should be planted so 1/8th of the ball is above final grade surface. The diameter of the planting pit shall be at least six inches larger than the diameter of the planting ball. Set and maintain the plant straight during the entire planting process. Thoroughly water ground bed cover after installation.

Trees shall be braced using 2" by 2" stakes only as necessary and for the first growing season only. Stakes are to be equally spaced on the outside of the tree ball.

Grasses and legume seed should be drilled into the soil to a depth of at least one inch. Grass and legume plugs shall be planted following the non-grass ground cover planting specifications.

The topsoil specifications provide enough organic material to adequately supply nutrients from natural cycling. The primary function of the bioretention structure is to improve water quality. Adding fertilizers defeats, or at a minimum, impedes this goal. Only add fertilizer if wood chips or mulch are used to amend the soil. Rototill urea fertilizer at a rate of 2 pounds per 1000 square feet.

# Underdrains

# Underdrains should meet the following criteria:

- Pipe- Should be 4" to 6" diameter, slotted or perforated rigid plastic pipe (ASTMF 758, Type PS 28. or AASHTO-M-278) in a gravel layer. The preferred material is slotted, 4" rigid pipe (e.g., PVC or HDPE).
- Perforations If perforated pipe is used, perforations should be 3/8" diameter located 6" on center with a minimum of four holes per row. Pipe shall be wrapped with a 1/4" (No. 4 or 4x4) galvanized hardware cloth.
- Gravel The gravel layer (No. 57 stone preferred) shall be at least 3" thick above and below the
- The main collector pipe shall be at a minimum 0.5% slope. A rigid, non-perforated observation well must be provided (one per every 1,0000 square feet) to
- provide a clean-out port and monitor performance of the filter. A 4" layer of pea gravel (\( \)" to \( \)" stone) shall be located between the filter media and underdrain

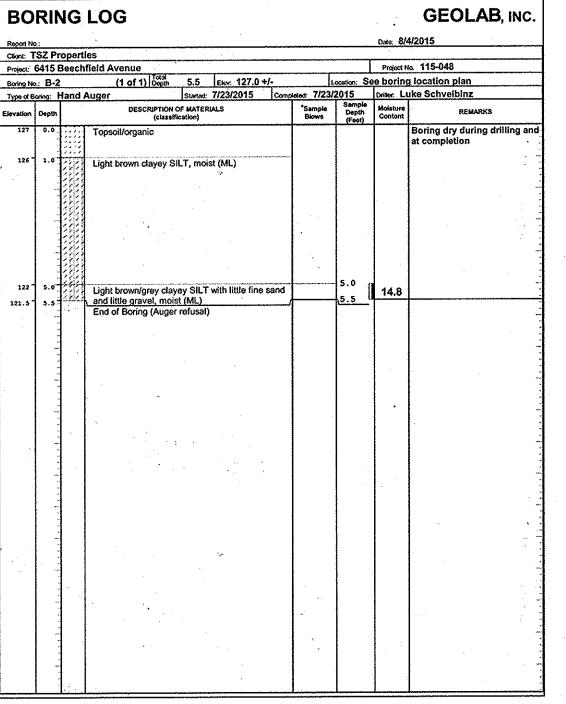
to prevent migration of fines into the underdrain. This layer may be considered part of the filter bed when bed thickness exceeds 24". The main collector pipe for underdrain systems shall be constructed at a minimum slope of 0.5%.

Observation wells and/or clean-out pipes must be provided (one minimum per every 1000 square feet

of surface area).

These practices may not be constructed until all contributing drainage area has been stabilized

BOF	ΚIN	GL	-UG							Geola	D, IN	C.
Report No.;					's <sup>s</sup>				Date: 5/2	9/2015		
Client TS												
			eld Avenue							Na. 115-048		
Bonng No.:			(1 of 1) Total Dopth	10.5	Ekw. 130.75					Location Plan		
Type of Bor	ng: Ha	ndau			5/14/2015	Complet	ed: 5/14/20			Kovalcik		
Elevation	Depth		DESCRIPTION (class)	OF MATE	trials 1)		"Sample Blows	Sample Depth (Feet)	Moisture Content	250	ARKS	, :
130.8	0.0	3333	Sod with root (organ	nic) mati	ter and organic	soil	·			Boring dry duri	ng drilling	and at
130.3	0.5		Tan silty CLAY with	little fin	e sand, moist	(CL,				completion.		
	-	49	Silty CLay Loam)				1					
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# MICRO-BIORETENTION (M-6) CONSTRUCTION SPECIFICATIONS

1. THE SUBGRADE FOR ALL BIORETENTION COMPONENTS SHALL BE PREPARED TO THE REQUIRED LINES AND GRADES. ANY FILL REQUIRED IN THE SUBGRADE SHALL BE COMPACTED TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL, EMBANKMENTS SHALL PREPARED BY STRIPPING TOPSOIL AND ANY OTHER UNSUITABLE MATERIALS FROM THE AREAS, AND BE COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DRY DENSITY REFERENCED TO AASHTO T-99 (STANDARD

THE ROCK OR GRAVEL SHALL CONFORM TO THE SPECIFIED GRADING LIMITS WHEN INSTALLED RESPECTIVELY IN THE RIP-RAP OR FILTER. 3. GEOTEXTILE CLASS C28 OR BETTER SHALL BE PROTECTED FROM PUNCHING, CUTTING, OR TEARING. ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE SHALL BE PREPARED BY PLACING ANOTHER PIECE OF GEOTEXTILE FABRIC OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE FABRIC. ALL OVERLAPS

WHETHER FOR REPAIRS OR FOR JOINING TWO PIECES OF GEOTEXTILE FABRIC SHALL BE A MINIMUM OF ONE FOOT. 4. STONE FOR THE RIP-RAP OR LEVEL SPREADERS MAY BE PLACED BY EQUIPMENT. THEY SHALL BE CONSTRUCTED TO THE FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. THE STONE FOR THE RIP-RAP OR LEVEL SPREADERS SHALL BE DELIVERED AND PLACED IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. STONE SHALL BE PLACED IN A MANNER TO PREVENT DAMAGE TO THE FILTER BLANKET OR GEOTEXTILE FABRIC, HAND PLACEMENT WILL BE REQUIRED TO THE EXTENT NECESSARY TO PREVENT

5. THE STONE LINER SHALL BE PLACED SO THAT IT BLENDS IN WITH THE EXISTING GROUND. IF THE STONE IS PLACED TOO HIGH THEN THE FLOW WILL BE FORCED OUT OF THE CHANNEL AND SCOUR ADJACENT TO THE STONE WILL OCCUR.

DAMAGE TO THE PERMANENT WORKS.

# use of rubber or plastic insulating materials at least 24 mils in thickness. OPERATION AND MAINTENANCE SCHEDULE FOR MICRO-BIORETENTION (M-6)

Site Preparation

embankment and other designated areas.

and minimum permeability.

Structure Backfill

Pipe Conduits

All pipes shall be circular in cross section

M-246 with watertight coupling bands or flanges.

zinc chromate primer or two coats of asphalt.

construction supervised by a geotechnical engineer.

grubbed and stripped to topsoil. All trees, vegetation, roots and other objectionable materia

shall be removed. Channel banks and sharp breaks shall be sloped to no steeper than 1:1.

Areas to be covered by the reservoir will be cleared of all trees, brush, logs, fences, rubbish

and other objectionable material unless otherwise designated on the plans. Trees, brush, and

management ponds, a minimum of a 25-foot radius around the inlet structure shall be

All cleared and grubbed material shall be disposed of outside and below the limits of the

objectionable material. Fill material for the center of the embankment, and cut off trench

passing the #200 sieve. Consideration may be given to the use of other materials in the

Materials used in the outer shell of the embankment must have the capability to support

Placement - Areas on which fill is to be placed shall be scarified prior to placement of fill.

Fill materials shall be placed in maximum 8 inch thick (before compaction) layers which are

to be continuous over the entire length of the fill. The most permeable borrow material shall

be placed in the downstream portions of the embankment. The principal spillway must be installed concurrently with fill placement and not excavated into the embankment.

Compaction - the movement of the hauling and spreading equipment over the fill shall be controlled so that the entire surface of each lift shall be traversed by not less than one

tread track of heavy equipment or compaction shall be achieved by a minimum of four complete passes of a sheepsfoot, rubber tired or vibratory roller. Fill material shall contain

sufficient moisture such that the required degree of compaction will be obtained with teh

equipment used. The fill material shall contain sufficient moisture so that if formed into a

When required by the reviewing agency the minimum required density shall not be less than

% of maximum dry density with a moisture content within ± 2% of the optimum. Each

layer of fill shall be compacted as necessary to obtain that density, and is to be certified by the Engineer at the time of construction. All compaction is to be determined by AASHTO Method T-99 (Standard Proctor).

Cut Off Trench - The cutoff trench shall be excavated into impervious material along or

parallel to the centerline of the embankment as shown on the plans. The bottom width of

being four feet. The depth shall be a least four feet below existing grade or as shown on

the plans. The side slopes of the trench shall be 1 to 1 or flatter. The backfill shall be compacted with construction equipment, rollers, or hand tampers to assure maximum density

Embankment Core — The core shall be parallel to the centerline of the embankment as

height shall extend up to at least the 10 year water elevation or as shown on the plans.

The side slopes shall be 1 to 1 or flatter. The core shall be compacted with constructio

equipment, rollers, or hand tampers to assure maximum density and minimum permeability. In addition, the core shall be placed concurrently with the outer shell of the embankment.

Backfill adjacent to pipes or structures shall be of the type and quality conforming to that

specified for the adjoining fill material. The fill shall be placed in horizontal layers not to

compaction equipment. The material needs to fill completely all spaces under and adjacent

to the pipe. At no time during the backfilling operation shall driven equipment be allowed to

operate closer than four feet, measured horizontally, to any part of a structure. Under no

Structure backfill may be flowable fill meeting the requirements of Maryland Department of

unconfined compressive strength. The flowable fill shall have a minimum pH of 4.0 and a minimum resistively of 2,000 ohm—cm. Material shall be placed such that a minimum of 6"

(measured perpendicular to the outside of the pipe) of flowable fill shall be under (bedding),

over and, on the sided of the pipe. It only needs to extend up to the spring line for rigid conduits. Average slump of the fill shall be 7" to assure flowability of the material. Adequate

measures shall be taken (sand bags, etc.) to prevent floating the pipe. When using flowable

horizontal layers not to exceed four inches in thickness and compacted by hand tampers or

equipment be allowed to operate closer than four feet, measured horizontally, to any part o

a structure. Under no circumstances shall equipment be driven over any part of a structure or pipe unless there is a compacted fill of 24 or greater over the structure or pipe. Backfill

material outside the structural backfill (flowable fill) zone shall be of the type and quality

Corrugated Metal Pipe - all of the following criteria shall apply for corrugated metal pipe:

1. Materials — (Polymer Coated steel pipe) — Steel pipes with polymeric coatings shall bave a minimum coating thickness of 0.01 inch (10 mil) on both sides of the pipe. This pipe and its appurtenances shall conform to the requirements of AASHTO Specifications M-245 &

Materials — (Aluminum Coated Steel Pipe) — This pipe and its appurtenances shall conform to the requirements of AASHTO Specification M—274 with watertight coupling bands or flanges. Aluminum Coated Steel Pipe, when used with flowable fill or when soil and/or water

Aluminum surfaces that are to be in contact with concrete shall be painted with one coat of

conditions warrant the need for increased durability, shall be fully bituminous coated per

requirements of AASHTO Specification M-190 Type A. Any aluminum coating damaged or

Materials — (Aluminum Pipe) — This pipe and its appurtenances shall conform to the requirements of AASHTO Specification M—196 or M—211 with watertight coupling bands or

flanges. Aluminum Pipe, when used with flowable fill or when soil and/or water conditions

Specification M-190 Type A. Aluminum surfaces that are to be contact with concrete shall be painted with one coat of zinc chromate primer or two coats of asphalt. Hot dip galvanized bolts may be used for connections. The pH of the surrounding soils shall be

2. Coupling bands, anti-seep collars, end sections, etc., must be composed of the same material and coatings as the pipe. Metals must be insulated from dissimilar materials with

warrant for increased durability, shall be fully bituminous coated per requirements of AASHTO

otherwise removed shall be replaced with cold applied bituminous coating compound.

conforming to that specified for the core of the embankment or other embankment

fill, all metal pipe shall be bituminous coated. Any adjoining soil fill shall be placed in

other manually directed compaction equipment. The material shall completely fill all voids adjacent to the flowable fill zone. At no time during the backfilling operation shall driven

Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 313 as modified. The mixture shall have a 100–200 psi; 28 day

circumstances shall equipment be driven over any part of a concrete structure or pipe, unless there is a compacted fill of 24" or greater over the structure or pipe.

exceed four inches in thickness and compacted by hand tampers or other manually directed

shown on the plans. The top width of the cores shall be a minimum of four feet. The

the trench shall be governed by the equipment used for excavation, with the minimum width

embankment if designed by a geotechnical engineer. Such special designs must have

shall conform to Unified Soil Classification GC, SC, CH, or CL and must have at least 30%

- The fill material shall be taken from approved designated borrow areas. If shall

stumps shall be cut approximately level with the ground surface. For dry stormwater

dam and reservoir as directed by the owner or his representative. When specified, a sufficient quantity of topsoil will be stockpiled in a suitable location for use on the

be free of roots, stumps, wood, rubbish, stones greater than 6", frozen or other

vegetation of the quality required to prevent erosion of the embankment.

ball it will not crumble, yet not be so wet that water can be squeezed out

Annual maintenance of plant material, mulch layer and soil layer is require Maintenance of mulch and soil is limited to correcting areas of erosion wash out. Any mulch replacement shall be done in the spring. Plant materi shall be checked for disease and insect infestation and maintenance w address dead material and pruning. Acceptable replacement plant material limited to the following: 2000 Maryland Stormwater Design Manu Volume II, Table A.4.1 and 2.

Schedule of plant inspection will be twice a year in spring and fall. This inspection will include removal of dead and diseased vegetation considered beyond treatment, treatment of all diseased trees and shrubs and replacement of all deficient stakes and wires.

Mulch shall be inspected each spring. Remove previous mulch layer before applying new layer once every 2 to 3 years

Soil erosion to be addressed on an as needed basis, with a minimum of once per month and after heavy storm events.

The top few inched of the filter media is to be removed and replaced with fresh material if water remains on the surface of the filter bed for longer than 24 hours following any rain event.

### MATERIALS & SPECIFICATIONS FOR MICRO-BIORETENTION NOTES: MATERIAL **SPECIFICATION** PLANTINGS ARE SITE SPECIFIC SEE APPENDIX.A; TABLE A.4 USDA SOIL TYPES: LOAMY SAND OR SANDY LOAM; CLAY CONTENT <5% LOAMY SAND 60-65 COMPOST 35-40% PLANTING SOIL (2.0' TO 4.0' DEEP) SANDY LOAM 30% COARSE SAND 30% & COMPOST 40% ORGANIC CONTENT AGED 6 MONTHS, MINIMUM, NO PINE OR WOOD CHIPS HREDDED HARDWOOD GEOTEXTILE (CLASS " PE TYPE 1 NONWOVEN 1/4" WIRE MESH 1/4" WIRE MESH GEOTEXTILE (1/4" WIRE MESH) UNDERDRAIN GRAVEL AASHTO M-43 3/8" PERF. © 6" O/C, 4 HOLES PER ROW; MINIMUN OF 3" OF GRAVEL OVER PIPES, NOT NECESSARY UNDERNEATH PIPES. PIPE SHALL BE WRAPPED WITH 1/4-INCH GALVANIZED HARDWARE CLOTH F758, TYPE PS28 OR AASHTO M-278 UNDERDRAIN PIPING SDR35 OR HDPE GEOTEXTILE (BELOW IMPERV. LINER) ASTM-D-4833 (PUNCTURE STRENGTH 125LB) ASTM-D-4632 (TENSILE STRENGTH 300 LB.)

### CONSTRUCTION SPECIFICATIONS

These specifications are appropriate to all ponds within the scope of the Standard for practice MD-378. All references to ASTM and AASHTO specifications apply to the most recent

3. Connections - All connections with pipes must be completely watertight. The drain pipe or barrel connection to the riser shall be welded all around when the pipe and riser are metal Areas designated for borrow greas, embankment, and structural works shall be cleared, Anti-seep collars shall be connected to the pipe in such a manner as to be completely

watertight. Dimple bands are not considered to be watertight

All connection shall use a rubber or neoprene gasket when joining pipe sections. The end of each pipe shall be re-rolled an adequate number of corrugations to accommodate the bandwidth. The following type connections are acceptable for pipes less than 24 inches in diameter: flanges on both ends of the pipe with a circular 3/8 inch closed cell neoprene gasket, prepunched to the flange bolt circle, sandwiched between adjacent flanges; a 12-inch wide standard lap type band with 12-inch wide by 3/8-inch thick closed cell circular neoprene gasket; and a 12-inch wide hugger type band with o-ring gaskets having a minimum diameter of 1/2 inch greater than the corrugation depth. Pipes 24 inches in diameter and larger shall be connected by a 24 inch long annular corrugated band using minimum of 4 (four) rods and lugs, 2 on each connecting pipe end. A 24-inch wide by 3/8-inch thick closed cell circular neoprene gasket will be installed with 12 inches on the end of each pipe. Flanged joints with 3/8 inch closed cell gaskets the full width of the

Helically corrugated pipe shall have either continuously welded seams or have lock seams with internal caulking or a neoprene bead.

4. Bedding - The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil is encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.

Backfilling shall conform to "Structure Backfill"

and shall equal or exceed ASTM C-361

6. Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings. Reinforced Concrete Pipe-All of the following criteria shall apply for reinforced concrete pipe: 1. Materials - Reinforced concrete pipe shall have bell and spigot joints with rubber gaskets

2. Bedding - Reinforced concrete pipe conduits shall be laid in a concrete bedding/cradle for their entire length. This bedding/cradle shall consist of high slump concrete placed under the pipe and up the sides of the pipe at least 50% of its outside diameter with a minimum thickness of 6 inches. Where a concrete cradle is not needed for structural reasons, flowable fill may be used a described in the "Structure Backfill" section of this standard. Gravel bedding is not permitted.

3. Laying pipe — Bell and spigot pipe shall be places with the bell end upstream. Joints shall be made in accordance with recommendations of the manufacturer of the material. After the joints are sealed for the entire line, the bedding shall be placed so that all spaces under the pipe are filled. Care shall be exercised to prevent any deviation form the original line and grade of the pipe. The first joint must be located within 4 feet from the riser.

4. Backfilling shall conform to "Structure Backfill".

5. Other details (anti-seep collars, valves, etc.) shall be shown on the drawings.

Plastic Pipe - The following criteria shall apply for plastic pipe:

1. Materials - PVC pipe shall be PVC-1120 or PVC-1220 conforming to ASTM D-1785 or ASTM D-2241. Corrugated High Density Polyethylene (HDPE) pipe, couplings and fittings shall conform to the following: 4' - 10" inch pipe shall meet the requirements of AASHTO M252 Type S, and 12" through 24" inch shall meet the requirements of AASHTO M294 Type S.

2. Joints and connections to anti-seep collars shall be completely watertiahi

3. Bedding — The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil is encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.

4. Backfilling shall conform to "Structure Backfill".

5. Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings. <u>Drainage Diaphragms</u> — When a drainage diaphragm is used, a registered professional engineer will supervise the design and construction inspection.

Concrete shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 414, Mix No. 3.

Rock riprap shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 311

## Geotextile shall be placed under all riprap and shall meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 921.09, Class C.

All work on permanent structures shall be carried out in areas free from water. The

contractor shall construct and maintain all temporary dikes, levees, cofferdams, drainage channels, and stream diversions necessary to protect the areas to be occupied by the permanent works. The contractor shall also furnish, install, operate, and maintain all necessary pumping and other equipment required for removal of water from various parts of the work and for maintaining the evacuations, foundation, and other parts of the work free from water as required or directed by the engineer for constructing each part of the work. After having served their purpose, all temporary protective works shall be removed or leveled and graded to the extent required to prevent obstruction in any decree whatsoever of the flow of water to the spillway or outlet works and so as not to interfere in any way with operation or maintenance of the structure. Stream diversions shall be maintained until the full flow can be passed through the permanent works. The removal of water from the required excavation and the foundation shall be accomplished in a manner and to the extent that will maintain stability of the excavated slopes and bottom required excavations and will allow satisfactory performance of all construction operations. During the placing and compacting of material in required excavations, the water level at the location being refilled shall be maintained below the bottom of the excavation at such locations which may require draining the water sumps from which the water shall be pumped.

All borrow areas shall be graded to provide proper drainage and left in a sightly condition. All exposed surfaces of the embankment, spillway, spoil and borrow areas, and berms shall be stabilized by seeding, liming, fertilizing and mulching in accordance with the Natural Resources Conservation Service Standards and Specifications for Critical Area Planting (MD-342) or as shown on the accompanying drawings.

# **Erosion and Sediment Control**

Construction operations will be carried out in such a manner that erosion will be controlled and water and air pollution minimized. State and local laws concerning pollution abatement will be followed. Construction plans shall detail erosion and sediment control measures.

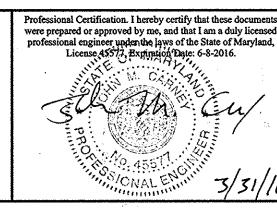
				ESD	Micr	o-Scale Practices Sumr	nary Tabl	e				
	Target Pe=	1.80	inches	Target Qe ≂	0.90	inches		Target ESDv	<b>=</b> 1	9	99 cf	,
		LIDE T	Takal DA	T-1-1 DA I A	0. I 1 1 1 1 1 1 1 -		ESDv				R	
Drainage Area	rainage Area Practice MDE Type Total DA Tota	Total DA Imp. Area   Qe   Imp. Treated by Practice   C			cf Req.	of Prov.	of prov Stone	75% Req.	Required	Provide		
ot 449	MB 6	(M-6)	1,736	1,120	1.14	1,120	164.2	132.2	117.8	PASS		
Lot 448	MB 5	(M-6)	1,885	1,120	1.05	1,120	164.2	134.1	60.0	PASS	33	N/A*
_ot 447	MB 4	(M-6)	1,807	1,120	1.09	1,120	164.8	133.9	69.3	PASS		160
Lot 446	мв з	(M-6)	1,726	1,120	1.14	1,120	164.1	124.2	58.3	PASS		
	/ To	otals	7,154	4,480	1.10	4,480	657	524	305		33	0

DATE REVISION BENCHMARK ENGINEERS A LAND SURVEYORS A PLANNERS

DATE:

SCALE:

ENGINEERING, INC. 8480 BALTIMORE NATIONAL PIKE A SUITE 315 A ELLICOTT CITY, MARYLAND 21043 (P) 410-465-6105 (F) 410-465-6644 WWW.BEI-CIVILENGINEERING.COM



HARWOOD PARK
LOTS 446-449 PLAT BOOK 60 FOLIO 115 SINGLE FAMILY SEMI-DETACHED DUPLEX UNIT
TAX MAP: 38 GRID: 13 PARCEL: 873  ZONED: R-12  ELECTION DISTRICT NO. 1  HOWARD COUNTY, MARYLAND
STORMWATER MANAGEMENT NOTES AND DETAILS

JANUARY, 2016

SDP-16-023

SHEET

BEI PROJECT NO. 2672

4

of 4