

SECTION 324 – SUSTAINABLE OUTFALL STABILIZATION

324.01 DESCRIPTION

Work includes all labor, material, and equipment to construct a sustainable outfall stabilization, the purpose of which is to create stable, environmentally acceptable constructed outfall conditions. The sustainable outfall stabilization work shall include, but not be limited to, sideslope stabilization, grade control, vegetative establishment, and aquatic habitat enhancement. This specification further describes work indicated on plans and details. Other restrictions and requirements indicated in project permits shall also apply. All work is to be field adjusted based on channel conditions at the time of construction to meet design intent and ensure long term channel stability.

324.02 REFERENCE STANDARDS

The most restrictive requirements of the latest publications of the following specifications will be complied with for this project:

ASTM	Standard – C33, C136, D2487, D4355, D4491, D4533, D4571, D4632, D6241
MDE	Maryland’s Waterway Construction Guidelines, latest revision Best Management Practices for Working in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains
MDSHA	Standard Specifications for Construction and Materials, July 2021 or latest edition – 901, 919
M-NCPPC	Section 111 – As Built Drawings (Record Drawings) Section 200 – Excavation, Filling and Grading Section 321 – Stream Restoration Section 322 – Storm Drainage and Stormwater Management Section 322A – Pipe Post Installation Inspections Section 721 – Tree Preservation Section 723 – Landscape Soil

324.03 DEFINITIONS

Not applicable.

324.04 MATERIALS

- A. Compacted Fill: Satisfactory soil types for compacted fill include ASTM D2487 Soil Classification Groups GW, GP, GM, SW, SP and SM or a combination of these soil groups. Soil shall be free of debris, waste, frozen materials, and other deleterious matter.

- B. Topsoil/Compost: Topsoil and Compost shall meet M-NCPPC Section 723 – Landscape Soil.
- C. Wood and Woody Organic Matter: Unless specifically shown on plans, all trees and woody growth slated for removal shall either be reused within the stream channel or riparian enhancement areas, removed offsite or chipped and spread onsite as directed by the M-NCPPC Construction Manager (CM).

Root wads shall consist of a non-decaying, unused 8-foot (minimum) log, 12 to 36 inches in diameter, with a root ball attached (minimum 48 inches in diameter). All root wad material shall be approved by the M-NCPPC CM prior to installation.

Log drops shall consist of non-decaying, unused 8-foot (minimum) logs, 12 to 36 inches in diameter, with no root ball attached. All log drop material shall be approved by the M-NCPPC CM prior to installation.

Woody debris (for riparian enhancement areas) shall consist of non-decaying, unused woody material of varying sizes, shapes, and dimensions, with and without attached root balls. All woody debris material shall be approved by the M-NCPPC CM prior to installation.

- D. Stabilization Matting: Unless specified otherwise on the plans or details, all erosion control matting (ECM) shall be Rolanka BioD-Mat 70 (<https://rolanka.com/product/biod-mat-70-woven-bristle-coir-mat/>), or approved equal.

Matting containing monofilament and/or plastics of any kind is not permitted for use on Parkland.

All matting, sod, and other materials are to be secured using biodegradable stakes. Metal sod staples are not permitted for use on Parkland.

- E. Imbricated Stone: Imbricated stone shall conform to MDSHA rock sizes (Section 901). Rocks must have a density of greater than 160 lbs / cu. ft. and be comprised of angular stones. Concrete or white rock will not be accepted. Imbricated stone deliveries shall be approved by the M-NCPPC CM prior to installation to ensure conformance with intermediate axis measurements defined on the plans.

Stone of serpentine origin is not permitted for use on Parkland.

- F. Aggregate: Bed Stability Mix (BSM) consists of a graded rock mixture and boulders to support surface flow of the stream. BSM composition is defined on the plans and all stone material sizes shall conform with MDSHA Section 901.

In addition to conformance with MDSHA Section 901 (Tables 901 A and B), aggregate must conform to the following ASTM/AASHTO gradation table (M 43). Washed

aggregate and river rock/gravel must also conform to ASTM C-33.

- G. Geotextile Filter Fabric (Non-Woven): In addition to conformance with MDSHA Subsection 919, non-woven geotextile filter fabric must conform to 919.01, Maryland Application Class E, and Table H.1: Geotextile Fabrics in the MDE “2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control.” The fabric must have minimum grab strength of 200 pounds and minimum puncture strength of 450 pounds.
- H. Riparian Seed Mix: Riparian seed mix shall be applied at a rate of 20 lbs/acre of pure live seed native species. M-NCPPC Riparian Seed Mix consists of:
 - 25% Creeping red fescue (*Festuca rubra*)
 - 20% Virginia wild rye (*Elymus virginicus*)
 - 15% Purple top (*Tridens flavus*)
 - 30% Riverbank wild rye (*Elymus riparius*)
 - 10% Deer tongue grass (*Diachanthelium clandestinum*)

In addition, native riparian seed mix should be supplemented with a minimum of 50 lbs/acre oats or barley (Nov 1 – Mar 15), 15 lbs/acre foxtail millet (May 15 – Aug 15) or 25 lbs/acre annual ryegrass (Mar 16 – May 14; Aug 16 – Oct 31).

All straw mulch applied on top of seed shall be weed-free.

- I. For materials related to pipe, endwall, manhole, and headwall installations, refer to M-NCPPC Specification 322.

324.05 SUBMITTALS

- A. Contractor must submit to M-NCPPC a list with reference of three (3) projects of similar magnitude, where this type of work has been completed within the last five (5) years.
- B. Provide submittals for source of supply of all materials used as shown on the plans.
- C. Contractor must submit redline as-builts (signed and sealed by an Engineer in the State of Maryland) to the M-NCPPC CM for review and approval. See M-NCPPC Specification 111 – As Built Drawings (Record Drawings).

324.06 QUALITY ASSURANCE

- A. Finished surfaces must be held to tolerances of 0.5 feet laterally or 0.1 foot in elevation unless otherwise specified.
- B. The contractor must be familiar with and shall implement best practices as outlined in MDE’s Guidelines to Waterway Construction and MDE Best Management Practices for Working in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains.

- C. The contractor shall always have at least one representative on-site with authority over work who has successfully completed the MDE Responsible Personnel Certification (RPC) training course and can provide upon request their RPC number and date completed.
- D. Pipe, endwall, manhole, headwall and plunge pool installations shall comply with M-NCPPC Specifications 322 and 322A.

324.07 CONSTRUCTION

- A. All construction shall take place “in the dry” using Maryland Department of Environment approved stream diversion techniques to dewater the construction area and minimize downstream sediment (as applicable if the channel contains baseflow). Contractor is responsible for control of water throughout construction, including storm flows and runoff through disturbed areas.

In-stream areas where pump-around is removed at the end of the workday must be completed and stabilized daily. Disturbed areas above baseflow shall receive native riparian seed mix and weed-free straw mulch at the end of each workday. Once stream flow is re-established at the end of the workday, the contractor shall allow sufficient time to inspect the new flow pattern and make appropriate adjustments to ensure non-erosive conditions before vacating the site.

- B. Contractor shall implement MDE Waterway Construction Guidelines and MDE Best Management Practices for Working in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains.
- C. Contractor shall lay out critical points of all structures (centerline stations, offsets, elevations etc.) to review with the M-NCPPC CM prior to structure installation. All dimensions, orientations, and elevations shall be field adjusted prior to installation in coordination with the M-NCPPC CM to ensure proper orientation, stable installation, fish passage (as applicable), and smooth tie-in to adjacent features, as well as to minimize disturbance to trees/tree roots and ensure functionality of completed construction. Contractor shall maintain proper equipment on-site to check grades as construction progresses. Contractor shall be responsible for maintaining stakeout during construction until final acceptance by the M-NCPPC CM.
- D. Footer rocks shall utilize material from the largest 50th percentile of material class specified on the plans. Footer rocks shall be placed so top surface angles towards the upstream/outmost edges of structure in order to better allow for secure placement of top rocks. Base of footer rocks shall be set at least 18” below bottom depth of adjacent pools.
- E. Construction of revetments, including grade control, bank stabilization and aquatic habitat structures, shall be inspected by the M-NCPPC CM under baseflow (not pump-around)

conditions (or, for dry outfalls, after a storm event) to determine any modifications required prior to acceptance. Additional inspections following storm events may result in additional minor modifications. Contractor is encouraged to utilize construction equipment for compaction of completed structures to ensure stability, as well as small pumps to wash in material after the completion of each structure.

- F. Contractor is responsible for ensuring smooth transitions at upstream and downstream ends of work areas and between the channel bed and its banks.

Where plunge pools are proposed, see Specification 322 Section 322.07(I).L.

- G. All exposed stone (including stone toe, imbricated rock walls, rock packs, etc.) above bankfull depth/on channel banks shall be backfilled with topsoil/compost to within 2-inches of rock surface and vegetated with native riparian seed and mulched with weed-free straw.
- H. Voids should not be left in any completed in-stream structures. Continuous filter fabric shall be placed under and along upstream face of all imbricated rock structures. Imbricated rocks shall tightly abut each other, and structures should be backfilled with BSM and/or streambed mix to fill all voids, including hand placement of stone.
- I. Completed streambed profile shall follow revetment drops as defined on the plans, unless otherwise approved by the M-NCPPC CM.
- J. Any disturbed banks shall be seeded with Native Riparian Seed and stabilized with weed-free straw mulch. Erosion control matting shall be installed as directed by the M-NCPPC CM.
- K. Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, and/or skinning and bruising of bark or excavated materials. Contractor shall coordinate all tree protection measures and tree removals with the M-NCPPC CM prior to construction. Protection measures, such as hardwood mats, tree planking, root aeration matting, equipment restrictions, mulch roads, tree protection fencing, root pruning, etc. must be installed before equipment enters work areas. Additional tree protection measures not indicated on the plan set may be required at the direction of the M-NCPPC CM. All requirements of Section 721 Tree Preservation must be observed.
- L. Access routes and stockpile/staging areas shall be field adjusted with Parks to minimize impacts to natural resources. Equipment restrictions (e.g., < 8 PSI loaded ground pressure) and/or protection measures such as hardwood mats and mulch may be required by M-NCPPC in sensitive areas. Access routes will be limited to 16' width, unless otherwise shown on the plans. Access routes shall be removed and restored as directed by the M-NCPPC CM upon construction completion.

M. Restore any improvements damaged by this work to their original condition, as acceptable to the M-NCPPC CM or other parties or authorities having jurisdiction.

324.08 MEASUREMENT AND PAYMENT

Payment will be full compensation for all material, labor, equipment, tools and incidental items necessary to complete the work. Payment shall be made as shown in the bid proposal. ECM shall be paid based on the quantity of matting installed, with stakes incidental to the installation of the matting. Rock Sills, Cascades, Step Pools, Cross Vanes, J-Hooks, Small Cross Vanes, Stone Toes, Riffle Grade Controls, Soil Lifts, Root Wads, and other structures shall be paid for based on the quantity of material utilized for construction or as shown on the bid proposal. Excavation, backfill, labor, coordination of structure layout, bedding stone, drainage/scour stone, geotextile filter fabric, stakes, and other materials and labor required for complete installation or any structure shall be considered incidental to the costs of the revetments.