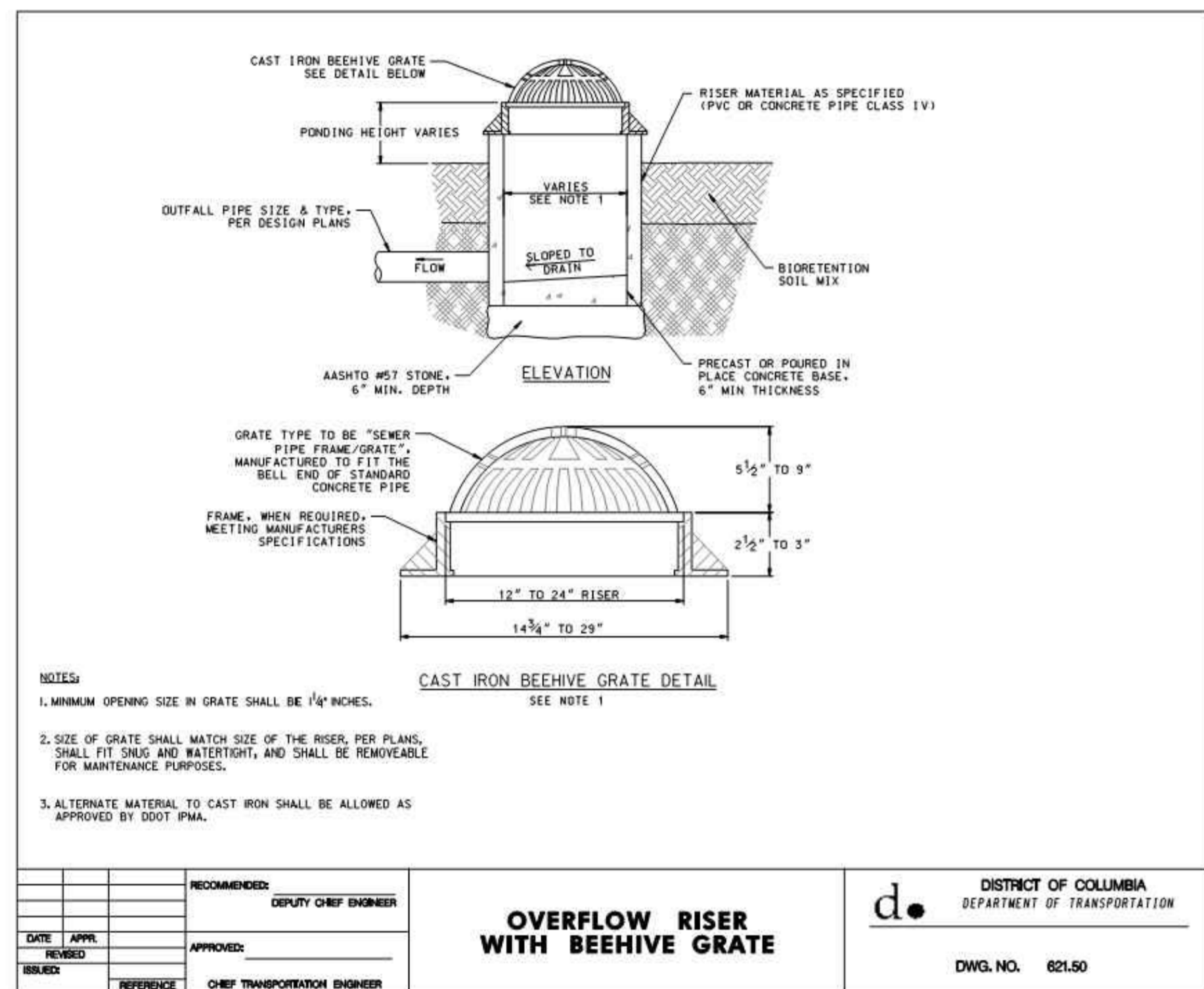
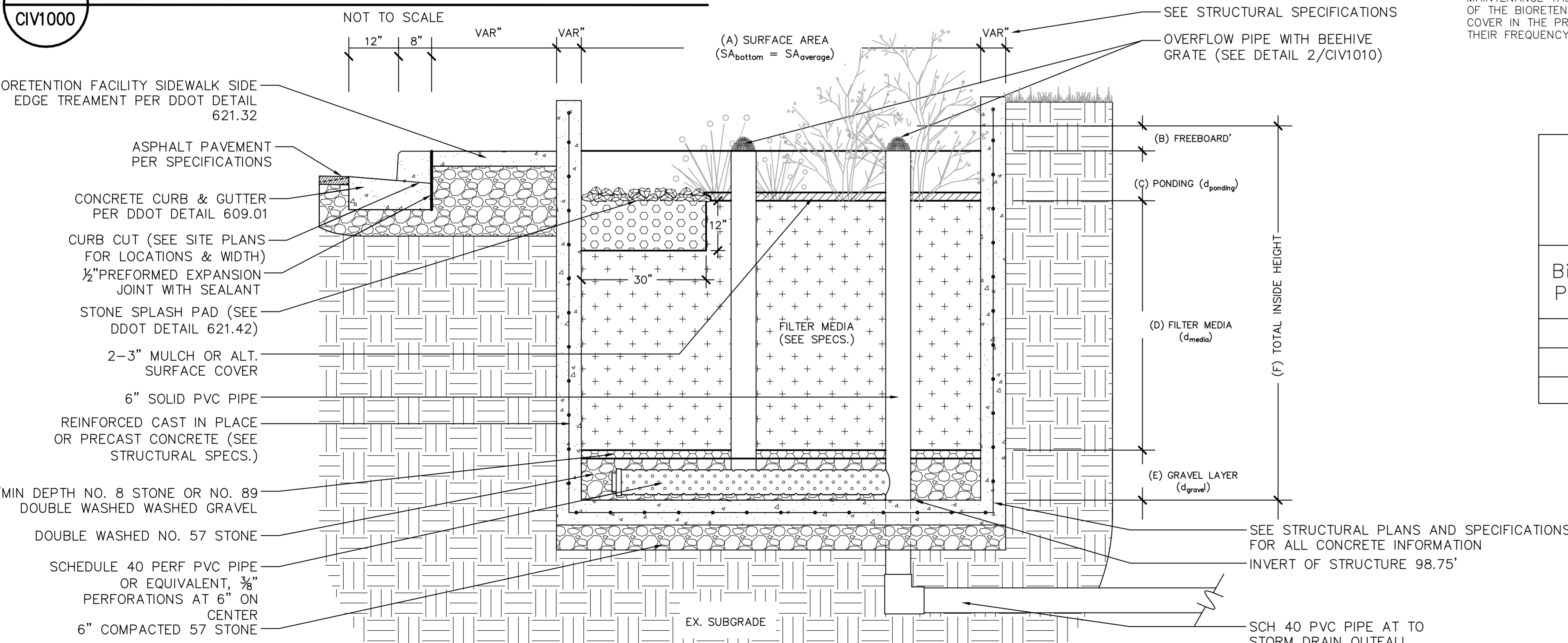


1 BIORETENTION PLANTER UNDERDRAIN PIPE RISERS
NOT TO SCALE



2 BIORETENTION OVERFLOW RISER WITH BEEHIVE GRATE
NOT TO SCALE



BIORETENTION AREA INSTALLATION NOTES
BIORETENTION AREA CONSTRUCTION SEQUENCE

- STEP 1: STABILIZE CONTIGUOUS DRAINAGE AREA. CONSTRUCTION OF THE BIORETENTION AREA MAY ONLY BEGIN AFTER THE ENTIRE CDA HAS BEEN STABILIZED WITH VEGETATION. IT MAY BE NECESSARY TO BLOCK CERTAIN CURB OR OTHER INLETS WHILE THE BIORETENTION AREA IS BEING CONSTRUCTED. THE PROPOSED SITE SHOULD BE CHECKED FOR EXISTING UTILITIES PRIOR TO ANY EXCAVATION.
- STEP 2: PRECONSTRUCTION MEETING. THE DESIGNER, THE INSTALLER, AND DOEE INSPECTOR MUST HAVE A PRECONSTRUCTION MEETING, CHECKING THE BOUNDARIES OF THE CDA AND THE ACTUAL INLET ELEVATIONS TO ENSURE THEY CONFORM TO ORIGINAL DESIGN. SINCE OTHER CONTRACTORS MAY BE RESPONSIBLE FOR CONSTRUCTING PORTIONS OF THE SITE, IT IS QUITE COMMON TO FIND SUBTLE DIFFERENCES IN SITE GRADING, DRAINAGE, AND PAVING ELEVATIONS THAT CAN PRODUCE HYDRAULICALLY IMPORTANT DIFFERENCES FOR THE PROPOSED BIORETENTION AREA. THE DESIGNER SHOULD CLEARLY COMMUNICATE, IN WRITING, ANY PROJECT CHANGES DETERMINED DURING THE PRECONSTRUCTION MEETING TO THE INSTALLER AND THE INSPECTOR. MATERIAL CERTIFICATIONS FOR AGGREGATE, FILTER MEDIA, AND ANY GEOTEXTILES MUST BE SUBMITTED FOR APPROVAL TO THE INSPECTOR AT THE PRECONSTRUCTION MEETING.
- STEP 3: INSTALL SOIL EROSION AND SEDIMENT CONTROL MEASURES TO PROTECT THE BIORETENTION. TEMPORARY SOIL EROSION AND SEDIMENT CONTROLS (E.G., DIVERSION DIKES, REINFORCED SILT FENCES) ARE NEEDED DURING CONSTRUCTION OF THE BIORETENTION AREA TO DIVERT STORMWATER AWAY FROM THE BIORETENTION AREA UNTIL IT IS COMPLETED. SPECIAL PROTECTION MEASURES, SUCH AS EROSION CONTROL FABRICS, MAY BE NEEDED TO PROTECT VULNERABLE SIDE SLOPES FROM EROSION DURING THE CONSTRUCTION PROCESS.
- STEP 4: INSTALL PRETREATMENT CELLS. ANY PRETREATMENT CELLS SHOULD BE EXCAVATED FIRST AND THEN SEALED TO TRAP SEDIMENT.
- STEP 5: AVOID IMPACT OF HEAVY INSTALLATION EQUIPMENT. EXCAVATORS OR BACKHOES SHOULD WORK FROM THE SIDES TO EXCAVATE THE BIORETENTION AREA TO ITS APPROPRIATE DESIGN DEPTH AND DIMENSIONS. EXCAVATING EQUIPMENT SHOULD HAVE SCOOPS WITH ADEQUATE REACH SO THEY DO NOT HAVE TO SIT INSIDE THE FOOTPRINT OF THE BIORETENTION AREA. CONTRACTORS SHOULD USE A CELL CONSTRUCTION APPROACH IN LARGER BIORETENTION BASINS, WHEREBY THE BASIN IS SPLIT INTO 500- TO 1,000-SQUARE FOOT TEMPORARY CELLS WITH A 10- TO 15-FOOT EARTH BRIDGE IN BETWEEN, SO THAT CELLS CAN BE EXCAVATED FROM THE SIDE. PROMOTE INFILTRATION RATE. IT MAY BE NECESSARY TO RIP THE BOTTOM SOILS TO A DEPTH OF 6 TO 12 INCHES TO PROMOTE GREATER INFILTRATION.
- STEP 6: ORDER OF MATERIALS. IF USING A GEOTEXTILE FABRIC, PLACE THE FABRIC ON THE SIDES OF THE BIORETENTION AREA WITH A 6-INCH OVERLAP ON THE SIDES. IF A STONE STORAGE LAYER WILL BE USED, PLACE THE APPROPRIATE DEPTH OF NO. 57 STONE (WASHED CLEAN AND FREE OF FINES) ON THE BOTTOM. INSTALL THE PERFORATED UNDERDRAIN PIPE, PACK NO. 57 STONE AT LEAST 2 INCHES ABOVE THE UNDERDRAIN PIPE, AND ADD THE CHOKING LAYER OR APPROPRIATE GEOTEXTILE LAYER AS A FILTER BETWEEN THE UNDERDRAIN AND THE FILTER MEDIA LAYER. IF NO STONE STORAGE LAYER IS USED, START WITH AT LEAST 2 INCHES OF NO. 57 STONE ON THE BOTTOM AND PROCEED WITH THE LAYERING AS DESCRIBED ABOVE.
- STEP 7: LAYERED INSTALLATION OF MEDIA. APPLY THE MEDIA IN 12-INCH LIFTS UNTIL THE DESIRED TOP ELEVATION OF THE BIORETENTION AREA IS ACHIEVED. WAIT A FEW DAYS TO CHECK FOR SETTLEMENT AND ADD ADDITIONAL MEDIA, AS NEEDED, TO ACHIEVE THE DESIGN ELEVATION.
- NOTE: THE BATCH RECEIPT CONFIRMING THE SOURCE OF THE FILTER MEDIA MUST BE SUBMITTED TO THE DOEE INSPECTOR.
- STEP 9: PREPARE FILTER MEDIA FOR PLANTS. PREPARE PLANTING HOLES FOR ANY TREES AND SHRUBS. INSTALL THE VEGETATION, AND WATER ACCORDINGLY. INSTALL ANY TEMPORARY IRRIGATION.
- STEP 10: PLANTING. INSTALL THE PLANT MATERIALS AS SHOWN IN THE LANDSCAPING PLAN, AND WATER THEM AS NEEDED.
- STEP 11: SECURE SURFACE AREA. PLACE THE SURFACE COVER (I.E., MULCH, RIVER STONE, OR TURF) IN BOTH CELLS. DEPENDING ON THE DESIGN, COIR OR JUTE MATTING WILL BE USED IN LIEU OF MULCH. THE MATTING WILL NEED TO BE INSTALLED PRIOR TO PLANTING (STEP 10), AND HOLES OR SLITS WILL HAVE TO BE CUT IN THE MATTING TO INSTALL THE PLANTS.
- STEP 12: INFLOWS. IF CURB CUTS OR INLETS ARE BLOCKED DURING BIORETENTION INSTALLATION, UNBLOCK THESE AFTER THE CDA AND SIDE SLOPES HAVE GOOD VEGETATIVE COVER. IT IS RECOMMENDED THAT UNBLOCKING CURB CUTS AND INLETS TAKE PLACE AFTER TWO TO THREE STORM EVENTS IF THE CDA INCLUDES NEWLY INSTALLED ASPHALT, SINCE NEW ASPHALT TENDS TO PRODUCE A LOT OF FINES AND GRIT DURING THE FIRST SEVERAL STORMS.
- STEP 13: FINAL INSPECTION. CONDUCT THE FINAL CONSTRUCTION INSPECTION USING A QUALIFIED PROFESSIONAL, PROVIDING DOEE WITH AN AS-BUILT, THEN LOG THE GPS COORDINATES FOR EACH BIORETENTION FACILITY, AND SUBMIT THEM FOR ENTRY INTO THE MAINTENANCE TRACKING DATABASE.

CONSTRUCTION SUPERVISION
SUPERVISION DURING CONSTRUCTION IS RECOMMENDED TO ENSURE THAT THE BIORETENTION AREA IS BUILT IN ACCORDANCE WITH THE APPROVED DESIGN AND THIS SPECIFICATION. QUALIFIED INDIVIDUALS SHOULD USE DETAILED INSPECTION CHECKLISTS THAT INCLUDE SIGN-OFFS AT CRITICAL STAGES OF CONSTRUCTION, TO ENSURE THAT THE CONTRACTOR'S INTERPRETATION OF THE PLAN IS CONSISTENT WITH THE DESIGNER'S INTENTIONS.

DOEE'S CONSTRUCTION PHASE INSPECTION CHECKLIST CAN BE FOUND IN APPENDIX L - CONSTRUCTION INSPECTION CHECKLISTS.

BIOTENTION MAINTENANCE CRITERIA
WHEN BIORETENTION PRACTICES ARE INSTALLED, IT IS THE OWNER'S RESPONSIBILITY TO ENSURE THEY, OR THOSE MANAGING THE PRACTICE, (1) BE EDUCATED ABOUT THEIR ROUTINE MAINTENANCE NEEDS, (2) UNDERSTAND THE LONG-TERM MAINTENANCE PLAN, AND (3) BE SUBJECT TO A MAINTENANCE COVENANT OR AGREEMENT, AS DESCRIBED BELOW.

MAINTENANCE OF BIORETENTION AREAS SHOULD BE INTEGRATED INTO ROUTINE LANDSCAPE MAINTENANCE TASKS. IF LANDSCAPING CONTRACTORS WILL BE EXPECTED TO PERFORM MAINTENANCE, THEIR CONTRACTS SHOULD CONTAIN SPECIFICS ON UNIQUE BIORETENTION LANDSCAPING NEEDS, SUCH AS MAINTAINING ELEVATION DIFFERENCES FOR PONDING, PROPER MULCHING, SEDIMENT AND TRASH REMOVAL, AND LIMITED USE OF FERTILIZERS AND PESTICIDES.

MAINTENANCE TASKS AND FREQUENCY WILL VARY DEPENDING ON THE SIZE AND LOCATION OF THE BIORETENTION. THE LANDSCAPING TEMPLATE CHECKLIST, AND THE TYPE OF SURFACE COVER IN THE PRACTICE. A GENERALIZED SUMMARY OF COMMON MAINTENANCE TASKS AND THEIR FREQUENCY IS PROVIDED IN TABLE 3-24.

Table 3-24 Typical Maintenance Tasks for Bioretention Practices

Frequency	Maintenance Tasks
Upon establishment	<ul style="list-style-type: none"> For the first 6 months following construction, the practice and CDA should be inspected at least twice after storm events that exceed 0.5 inch of rainfall. Conduct any needed repairs or stabilization. Inspectors should look for bare or eroding areas in the CDA or around the bioretention area and make sure they are immediately stabilized with grass cover. One-time, spot fertilization may be needed for initial plantings. Watering is needed once a week during the first 2 months, and then as needed during first growing season (April through October), depending on rainfall. Remove and replace dead plants. Up to 10% of the plant stock may die off in the first year, so construction contracts should include a care and replacement warranty to ensure that vegetation is properly established and survives during the first growing season following construction.
At least 4 times per year	<ul style="list-style-type: none"> Mow grass filter strips and bioretention with turf cover Check curb cuts and inlets for accumulated grit, leaves, and debris that may block inflow
Twice during growing season	<ul style="list-style-type: none"> Spot weed, remove trash, and rake the mulch
Annually	<ul style="list-style-type: none"> Conduct a maintenance inspection Supplement mulch in devoid areas to maintain a 3-inch layer Prune trees and shrubs Remove sediment in pretreatment cells and inflow points
Once every 2-3 years	<ul style="list-style-type: none"> Remove sediment in pretreatment cells and inflow points Remove and replace the mulch layer
As needed	<ul style="list-style-type: none"> Add reinforcement planting to maintain desired vegetation density Remove invasive plants using recommended control methods Remove any dead or diseased plants Stabilize the CDA to prevent erosion

STANDING WATER IS THE MOST COMMON PROBLEM OUTSIDE OF ROUTINE MAINTENANCE. IF WATER REMAINS ON THE SURFACE FOR MORE THAN 72 HOURS AFTER A STORM, ADJUSTMENTS TO THE GRADING MAY BE NEEDED OR UNDERDRAIN REPAIRS MAY BE NEEDED. THE SURFACE OF THE FILTER BED SHOULD ALSO BE CHECKED FOR ACCUMULATED SEDIMENT OR A FINE CRUST THAT BUILDS UP AFTER THE FIRST SEVERAL STORM EVENTS. THERE ARE SEVERAL METHODS THAT CAN BE USED TO REHABILITATE THE FILTER. THESE ARE LISTED BELOW, STARTING WITH THE SIMPLEST APPROACH AND RANGING TO MORE INVOLVED PROCEDURES (I.E., IF THE SIMPLER ACTIONS DO NOT SOLVE THE PROBLEM):

- OPEN THE UNDERDRAIN OBSERVATION WELL OR CLEANOUT AND POUR IN WATER TO VERIFY THAT THE UNDERDRAINS ARE FUNCTIONING AND NOT CLOGGED OR OTHERWISE IN NEED OF REPAIR. THE PURPOSE OF THIS CHECK IS TO SEE IF THERE IS STANDING WATER ALL THE WAY DOWN THROUGH THE SOIL. IF THERE IS STANDING WATER ON TOP, BUT NOT IN THE UNDERDRAIN, THEN THERE IS A CLOGGED SOIL LAYER. IF THE UNDERDRAIN AND STAND PIPE INDICATES STANDING WATER, THEN THE UNDERDRAIN MUST BE CLOGGED AND WILL NEED TO BE CLEANED OUT.
- REMOVE ACCUMULATED SEDIMENT AND TILL 2 TO 3 INCHES OF SAND INTO THE UPPER 6 TO 12 INCHES OF SOIL.
- INSTALL SAND WICKS FROM 3 INCHES BELOW THE SURFACE TO THE UNDERDRAIN LAYER. THIS REDUCES THE AVERAGE CONCENTRATION OF FINES IN THE MEDIA BED AND PROMOTES QUICKER DRAINAGE TIMES. SAND WICKS CAN BE INSTALLED BY EXCAVATING OR AUGURING (I.E., USING A TREE AUGER OR SIMILAR TOOL) DOWN TO THE TOP OF THE UNDERDRAIN LAYER TO CREATE VERTICAL COLUMNS THAT ARE THEN FILLED WITH A CLEAN OPEN-GRADED COARSE SAND MATERIAL (E.G., ASTM C-33, STANDARD SPECIFICATION FOR CONCRETE AGGREGATES, CONCRETE SAND OR SIMILAR APPROVED SAND MIX FOR BIORETENTION MEDIA). A SUFFICIENT NUMBER OF WICK DRAINS OF SUFFICIENT DIMENSION SHOULD BE INSTALLED TO MEET THE DESIGN DEWATERING TIME FOR THE FACILITY.
- REMOVE AND REPLACE SOME OR ALL OF THE FILTER MEDIA.

BIORETENTION VOLUME COMPUTATIONS

$$S_v = S_{A_{bottom}} \times [(d_{media} \times \eta_{media}) + (d_{gravel} \times \eta_{gravel})] + (S_{A_{average}} \times d_{ponding});$$

$\eta_{media} = 0.25; \eta_{gravel} = 0.4$

Bioretention Planter No.	(A) $S_{A_{bottom}} \& S_{A_{average}}$ (ft)	(B) Freeboard (ft)	(C) $d_{ponding}$ (ft)	(D) d_{media} (ft)	(E) d_{gravel} (ft)	(F) Total Inside Depth (ft)	Storage Volume S_v (ft ³)
1	2786	0.25	1.00	5.00	1	7.25	7383
TOTAL	2786						7383

3 BIORETENTION PLANTER DETAIL & COMPUTATIONS
NOT TO SCALE

ANY PROPOSED DEVIATION FROM THE STORMWATER MANAGEMENT DETAILS OR SPECIFICATIONS SHOWN ON THESE PLANS WILL REQUIRE SUBMISSION TO DOEE AS A FORMAL PLAN REVISION FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION. ALL SUBMITTALS RELATED TO THE STORMWATER MANAGEMENT FACILITIES SHALL BE PROVIDED TO THE OWNER, ARCHITECT, AND CIVIL ENGINEER FOR REVIEW AND COMPLIANCE VERIFICATION.

These plans are conditionally approved as submitted or noted during plan review and are subject to field inspection. Approved plans must be kept on site and are needed for all inspections. No changes or modifications to these plans. Changes require a revision permit with the revised plans. Trade Permits are required for Trade (e.g., Electrical or Plumbing)

Structural Review - Glenn Keshavan
DOE Review - Shwanti Zaky
DOE SE-SW Review - Sabu Charavi - 11-16-2023
HPH Review - Timothy Demee - 11-16-2023
DC Water Review - Valad Bhardwaj - 11-16-2023

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STORMWATER
MANAGEMENT NOTES
AND DETAILS

VKA CAPITOL REVISIONS

#	DATE	DESCRIPTION

DATE: 23-FEB-2023
DES. KUO DWN. BUR
SCALE: AS SHOWN
PROJECT/FILE NO. VC0626D
SHEET NO. CIV1100

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DISTRICT OF COLUMBIA
KYLE J. OLIVER
REGISTERED PROFESSIONAL ENGINEER
#ES000770
3/17/2023
CIVIL