

GENERAL BIORETENTION CONSTRUCTION NOTES

1. AVOID COMPACTION OF EXISTING SUBGRADE BELOW BIORETENTION FACILITIES DURING CONSTRUCTION.
2. BIORETENTION SOIL MIX TO MEET SPECIFICATION IN THE CITY OF VANCOUVER SURFACE WATER GENERAL REQUIREMENTS, SECTION 4-7.01.
3. BIORETENTION SOIL MIX PLACEMENT, GRADING, AND COMPACTION SHALL NOT OCCUR WHEN THE BIORETENTION SOIL MIX IS EXCESSIVELY WET OR HAS BEEN SUBJECTED TO MORE THAN 1/2" OF PRECIPITATION WITHIN 48 HOURS PRIOR TO PLACEMENT. EXCESSIVELY WET IS DEFINED AS BEING AT OR ABOVE 22% SOIL MOISTURE BY A GENERAL TOOLS AND INSTRUMENTS DSMM500 PRECISION DIGITAL SOIL MOISTURE METER WITH PROBE (OR EQUIVALENT). THERE SHOULD BE NO VISIBLE FREE WATER IN THE MATERIAL. THE CONTRACTOR SHALL PLACE BIORETENTION SOIL MIX LOOSELY WITH A CONVEYOR BELT OR WITH AN EXCAVATOR OR LOADER FROM A HEIGHT NO HIGHER THAN 6 FEET, UNLESS OTHERWISE APPROVED BY THE ENGINEER (I.E., DO NOT DUMP MATERIAL DIRECTLY FROM TRUCK INTO CELL). COMPACT BIORETENTION SOIL MIX USING NON-MECHANICAL COMPACTION METHODS (E.G., BOOT PACKING, HAND TAMPING, OR WATER CONSOLIDATION) TO 83% (± 2%) OF THE MAXIMUM DRY DENSITY PER MODIFIED PROCTOR TEST (ASTM D1557), OR AS DIRECTED BY THE ENGINEER.
4. MAXIMUM DROP FROM TOP OF CURB TO TOP OF BIORETENTION SOIL SHALL INCLUDE CONSIDERATIONS FOR BIORETENTION SOIL SETTLEMENT.
5. FOR FACILITIES RECEIVING RUNOFF FROM OVER 5,000 SF OF IMPERVIOUS SURFACES, SETBACKS IN SURFACE WATER GENERAL REQUIREMENTS SECTION 4-5.10 APPLY. FOR OTHER FACILITIES, 12" MIN. REQUIRED SEPARATION ABOVE SEASONAL HIGH GROUNDWATER OR HYDRAULICALLY RESTRICTIVE LAYER.
6. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO THE VANCOUVER SURFACE WATER GENERAL REQUIREMENTS, AND CURRENT CITY STANDARDS. COORDINATE WITH CITY ENGINEER IN THE EVENT OF UTILITY CROSSINGS OR CONFLICTS.
7. INFILTRATION FACILITIES, TRENCHES, CHAMBERS, REGULATED UNDERGROUND INJECTION CONTROLS (UICS), ETC. SHALL NOT BE LOCATED BENEATH BIORETENTION FACILITIES.
8. THE DESIGNER SHALL SPECIFY A SITE SPECIFIC PLANTING PLAN.
9. SEE CONSTRUCTION PLANS FOR SPECIFIC PROJECT REQUIREMENTS.
10. STORMWATER FACILITY PLANTING SHALL OCCUR WITHIN THE FOLLOWING SEASONAL WINDOWS, DURING APPROPRIATE WEATHER CONDITIONS:
 - FALL: OCTOBER 1 TO DECEMBER 1
 - LATE WINTER/EARLY SPRING: FEBRUARY 1 TO MAY 1.

UNACCEPTABLE WEATHER CONDITIONS DURING APPROVED PLANTING SEASONS INCLUDE FREEZING RAIN, SNOW, ICY CONDITIONS, EXTREME WIND, WHEN THE GROUND IS FROZEN, OR DURING TEMPERATURES ABOVE 80 DEGREES FAHRENHEIT.

PRIOR TO PLANTING, BIORETENTION SOILS WITHIN STORMWATER FACILITIES SHALL BE PROTECTED ACCORDING TO STANDARD PLAN NO. B-7.0.
10. CONTRACTOR TO BE RESPONSIBLE FOR ALL MAINTENANCE OF BIORETENTION FACILITIES FOR 2 YEARS AFTER DATE OF FINAL ACCEPTANCE TO ENSURE PLANT ESTABLISHMENT DURING WARRANTY PERIOD.

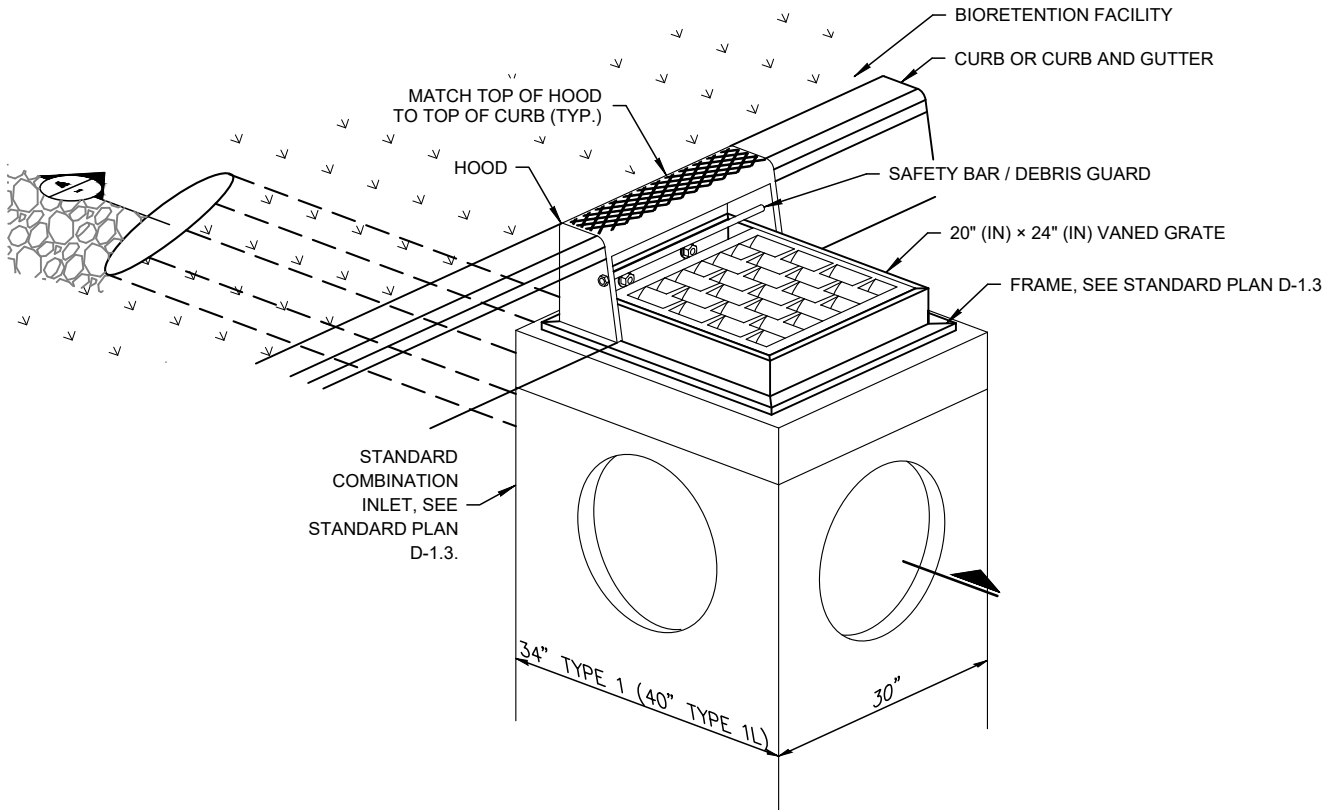


GENERAL NOTES FOR BIORETENTION FACILITIES

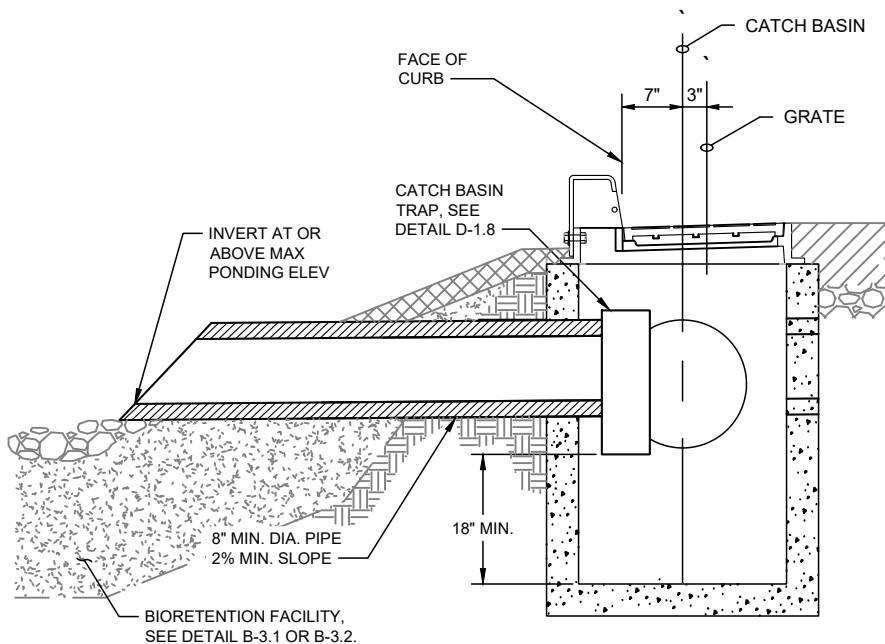
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SURFACE WATER MANAGEMENT

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BIORETENTION
DETAIL NO.
B-1.0



COMBINATION INLET - ISOMETRIC VIEW



SECTION A

NOTES:

1. THIS INLET REQUIRES THE PRECAST CATCH BASIN UNIT TO BE ROTATED 90 DEGREES SO THAT THE NARROW SIDE IS PARALLEL TO THE CURB LINE. WHEN CALCULATING OFFSETS FROM CURB TO CENTERLINE (CL) OF THE PRECAST CATCH BASIN, PLEASE NOTE THAT THE CL OF THE GRATE IS NOT THE CL OF THE PRECAST CATCH BASIN. SEE SECTION A.
2. INLET PER STANDARD PLAN D-1.3.

N.T.S.



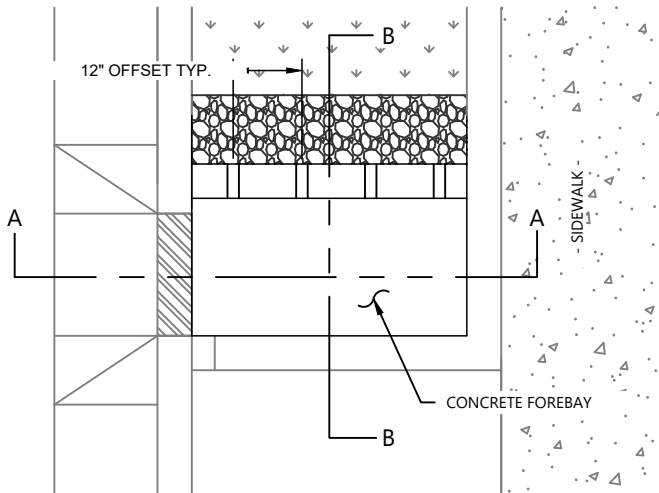
HIGH TRAFFIC INLET

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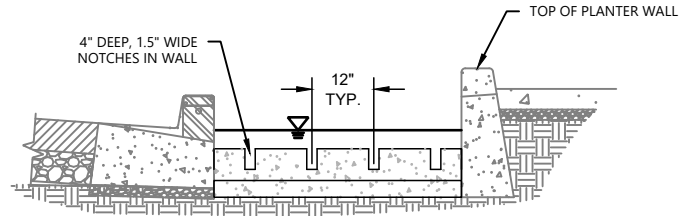
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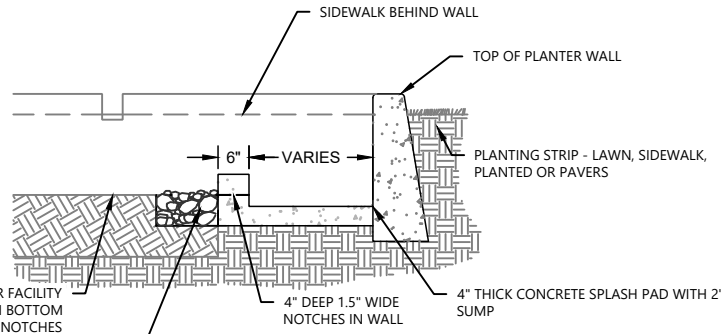
B-2.1



PLAN

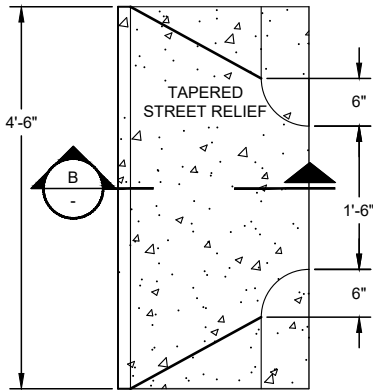


SECTION A-A

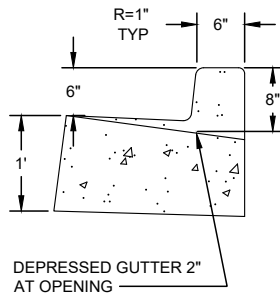


SECTION B-B

4" STREAMBED COBBLES PER WSDOT 9-03.11(4), 12" WIDE BY 6" DEEP ACROSS FULL LENGTH OF FOREBAY



PLAN



SECTION B

NOTES:

DETAIL - CURB INLET

1. FOREBAY AREA TO BE MIN 10% OF PLANTER OR FACILITY AREA, BASED ON PROJECTED PONDING ELEVATION OF FACILITY. MINIMUM DIMENSIONS (LxW) TO BE 2'x2'.
2. SEDIMENT STORAGE SUMP TO BE 2" MIN. ROADWAYS CLASSIFIED AS ARTERIALS (ACCORDING TO THE LATEST ARTERIAL MAP) MAY REQUIRE DEEPER SUMPS.
3. ROCK SPLASH PAD TO BE 12" WIDE BY 6" DEEP, 4" STREAMBED COBBLES PER WSDOT STANDARD SPECIFICATION SECTION 9-03.11(4).
4. SEDIMENT FOREBAY BASE AND WEIR WALL TO BE POURED MONOLITHICALLY. WEIR NOTCHES MAY BE BLOCKED OUT OR SAWCUT INTO WALL. TEST ELEVATION WITH WATER AND GRIND NOTCHES UNTIL FLOWS ARE EQUAL. IF A MONOLITHIC POUR FOR WEIR WALL IS NOT USED, PROVIDE DOWEL BARS TO TIE TO SIDE WALLS AND PROVIDE A WATER-TIGHT SEAL TO PREVENT WATER BYPASS ON BOTTOM AND SIDES. STRUCTURAL ENGINEER REQUIRED FOR APPROVAL OF ALTERNATE DESIGN.
5. IF LENGTH OF FOREBAY (L) EXCEEDS 10', CONSULT STRUCTURAL ENGINEER FOR DESIGN RECOMMENDATIONS.
6. ALL CONCRETE TO BE 3,000 PSI COMMERCIAL GRADE PER WSDOT STANDARD SPECIFICATION SECTION 6-02.
7. ELEVATION AT TOP OF WEIR WALL TO BE 2" MIN BELOW ELEVATION OF PROJECTED GUTTERLINE AT CURB INLET OR ENTRANCE TO FOREBAY.

N.T.S.



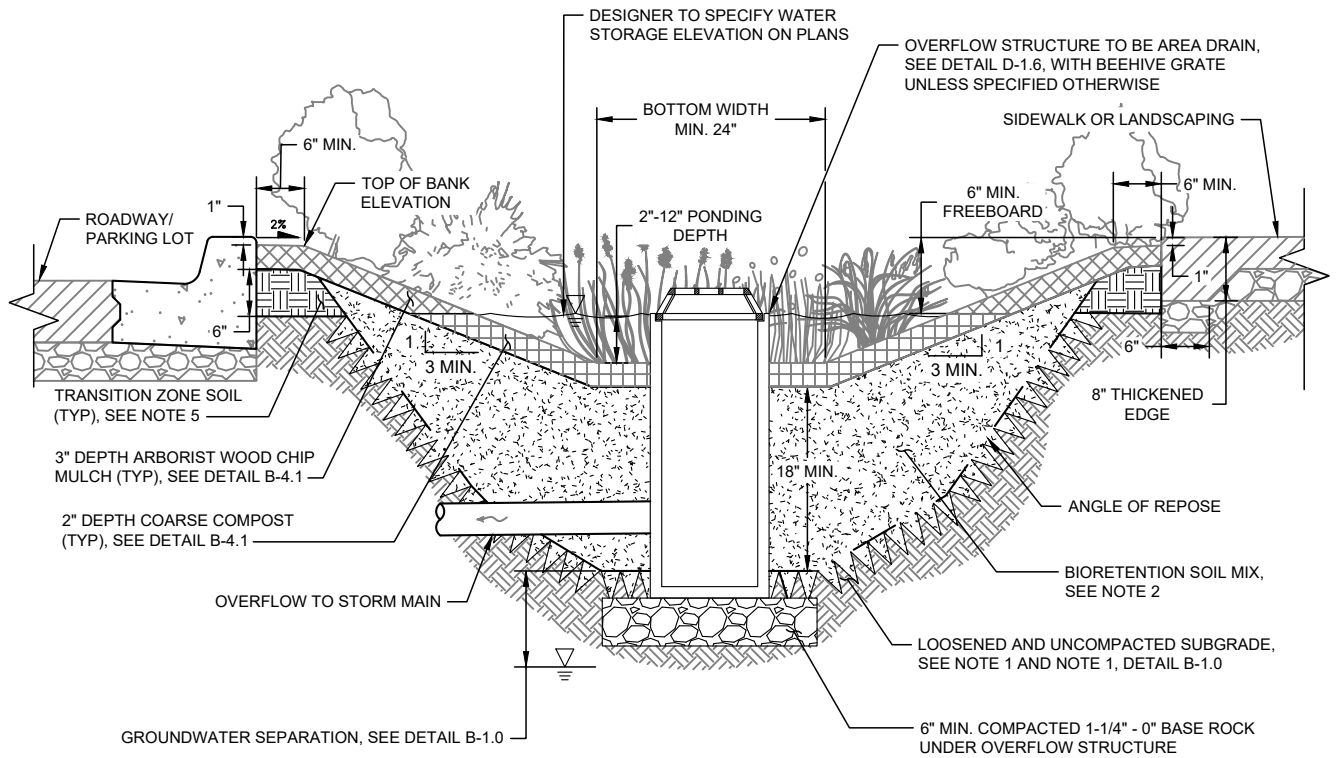
CONCRETE SEDIMENT FOREBAY

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BIORETENTION
DETAIL NO.

B-2.2



NOTES:

1. FRACTURE AND LOOSEN SUBGRADE (PERPENDICULAR TO THE SLOPE) TO A DEPTH OF 6 INCHES MINIMUM IMMEDIATELY PRIOR TO PLACEMENT OF BIORETENTION SOIL MIX AND UNDERDRAIN AGGREGATE.
2. 18" MIN. BIORETENTION SOIL MIX ON BOTTOM AND SIDES TO TOP OF PONDING AREA. SEE NOTE 2, DETAIL B-1.0. DO NOT USE FILTER FABRIC BETWEEN SUBGRADE AND THE BIORETENTION MIX.
3. MAXIMUM LONGITUDINAL SLOPE (ALONG DIRECTION OF FLOW) OF BIORETENTION SWALES SHALL BE 2.5% WITHOUT ADDING CHECK DAMS.
4. WHERE SIDEWALK OR PAVEMENT ABUTS BIORETENTION, INSTALL PAVEMENT FIRST AND PROVIDE THICKENED EDGE (8" MIN.) TO PREVENT UNDERMINING.
5. TRANSITION ZONE SOIL SHALL BE BIORETENTION SOIL MIX OR COMPOST-AMENDED SOIL, COMPACTED TO 90% MAX. STANDARD PROCTOR DENSITY (ASTM D698).

N.T.S.



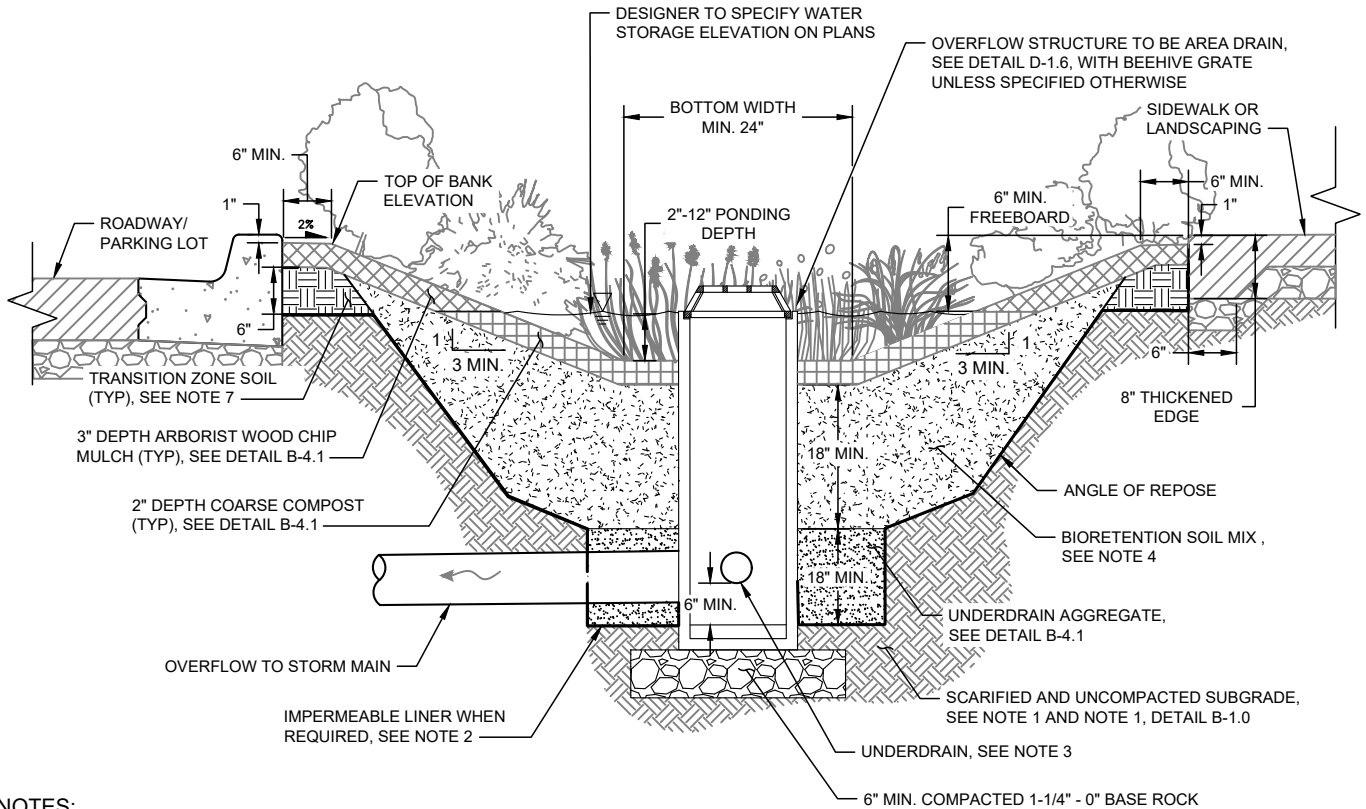
BIORETENTION WITH SIDE SLOPES, NO UNDERDRAIN

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BIORETENTION
DETAIL NO.

B-3.1



NOTES:

1. FRACTURE AND LOOSEN SUBGRADE (PERPENDICULAR TO THE SLOPE) TO A DEPTH OF 6 INCHES MINIMUM IMMEDIATELY PRIOR TO PLACEMENT OF BIORETENTION SOIL MIX AND UNDERDRAIN AGGREGATE, EXCEPT WHEN LINER IS REQUIRED.
2. LINER TO BE INSTALLED ONLY WHEN REQUIRED IN THE CITY OF VANCOUVER SURFACE WATER GENERAL REQUIREMENTS. IMPERMEABLE LINER TO BE 30 MIL MIN. HDPE OR EPDM PER GRI TEST METHOD GM13 (HDPE) OR GM 21 (EPDM) OR APPROVED EQUAL.
3. UNDERDRAIN TO BE 8" MIN. (PUBLIC) SLOTTED PVC PER ASTM D1785 SCH 40 WITH SOLVENT WELDED JOINTS. SLOTS MUST BE 0.0064 INCHES WIDE X 0.3 INCHES APART ON CENTER. SLOTS TO BE ORIENTED AS SPECIFIED IN THE CONTRACT. FIELD CUTTING OF SLOTS IS NOT ALLOWED. SLOPE PIPE AT 0.5% MIN., UNLESS OTHERWISE SPECIFIED. PROVIDE ONE CLEANOUT MIN. PER 100 FEET OF UNDERDRAIN, AND AT EACH END. MATCH CROWN ELEVATION OF UNDERDRAIN TO OVERFLOW PIPE UNLESS OTHERWISE SPECIFIED.
4. 18" MIN. BIORETENTION SOIL MIX ON BOTTOM AND SIDES TO TOP OF PONDING AREA. SEE NOTE 2, DETAIL B-1.0.
5. MAXIMUM LONGITUDINAL SLOPE (ALONG DIRECTION OF FLOW) OF BIORETENTION SWALES SHALL BE 2.5% WITHOUT ADDING CHECK DAMS.
6. WHERE SIDEWALK OR PAVEMENT ABUTS BIORETENTION, INSTALL PAVEMENT FIRST AND PROVIDE THICKENED EDGE (8" MIN.) TO PREVENT UNDERMINING.
7. TRANSITION ZONE SOIL SHALL BE BIORETENTION SOIL MIX OR COMPOST-AMENDED SOIL, COMPACTED TO 90% MAX. STANDARD PROCTOR DENSITY (ASTM D698).

N.T.S.



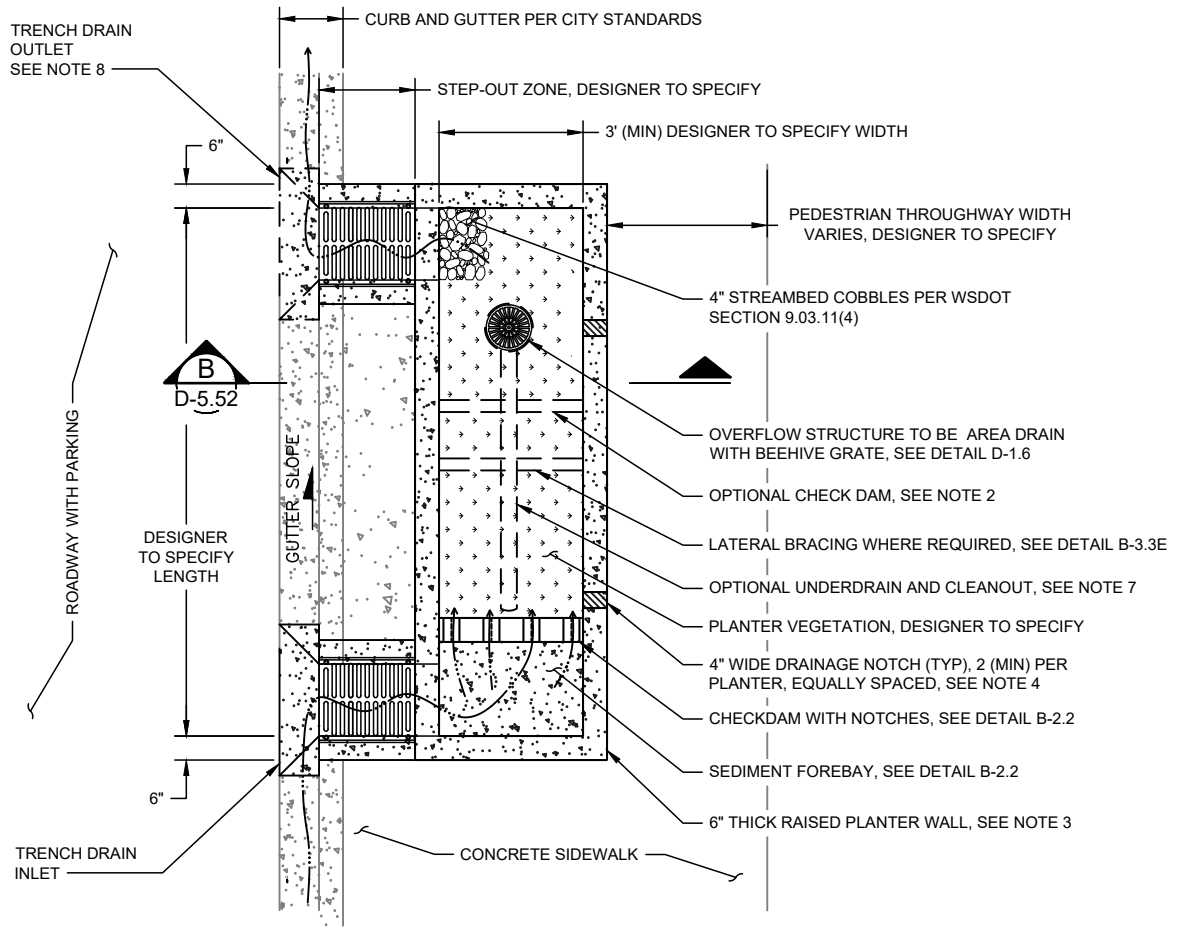
BIORETENTION WITH SIDE SLOPES, UNDERDRAIN

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BIORETENTION
DETAIL NO.

B-3.2



PLAN VIEW

NOTES

1. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE (SEE STD. PLAN NO. B-3.3B) AND BIORETENTION SOIL MATERIAL.
2. CHECK DAMS SHALL BE SPACED TO PROVIDE PONDING PER SITE SPECIFIC DESIGN.
3. THE PLANTER WALL SLOPE IS TYPICALLY DESIGNED TO MATCH THE LONGITUDINAL SLOPE OF THE ADJACENT ROADWAY/SIDEWALK. THE FACILITY SUBGRADE, HOWEVER, SHOULD BE FLAT. CHECK DAMS MAY BE USED TO TERRACE FACILITIES TO PROVIDE SUFFICIENT PONDING FOR HIGHER-SLOPED INSTALLATIONS.
4. LAY OUT DRAINAGE NOTCHES TO PREVENT PONDING BEHIND PLANTER WALL WITH 5' MAXIMUM SPACING BETWEEN NOTCHES.
5. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS.
6. LINER TO BE INSTALLED ONLY WHEN REQUIRED IN THE CITY OF VANCOUVER SURFACE WATER GENERAL REQUIREMENTS. IMPERMEABLE LINER TO BE 30 MIL MIN. HDPE OR EPDM PER GRI TEST METHOD GM13 (HDPE) OR GM 21 (EPDM) OR APPROVED EQUAL.
7. UNDERDRAIN TO BE 8" MIN. (PUBLIC) SLOTTED PVC PER ASTM D1785 SCH 40 WITH SOLVENT WELDED JOINTS. SLOTS MUST BE 0.0064 INCHES WIDE X 0.3 INCHES APART ON CENTER. SLOTS TO BE ORIENTED AS SPECIFIED IN THE CONTRACT. FIELD CUTTING OF SLOTS IS NOT ALLOWED. SLOPE PIPE AT 0.5% MIN., UNLESS OTHERWISE SPECIFIED. PROVIDE ONE CLEANOUT MIN. PER 100 FEET OF UNDERDRAIN, AND AT EACH END. MATCH CROWN ELEVATION OF UNDERDRAIN TO OVERFLOW PIPE UNLESS OTHERWISE SPECIFIED.
8. PLANTERS IN PUBLIC RIGHT OF WAY SHALL BE DESIGNED WITH EMERGENCY OVERFLOW TO THE STREET IN THE EVENT THE PLANTER OUTLET IS OBSTRUCTED OR CLOGGED.

N.T.S.

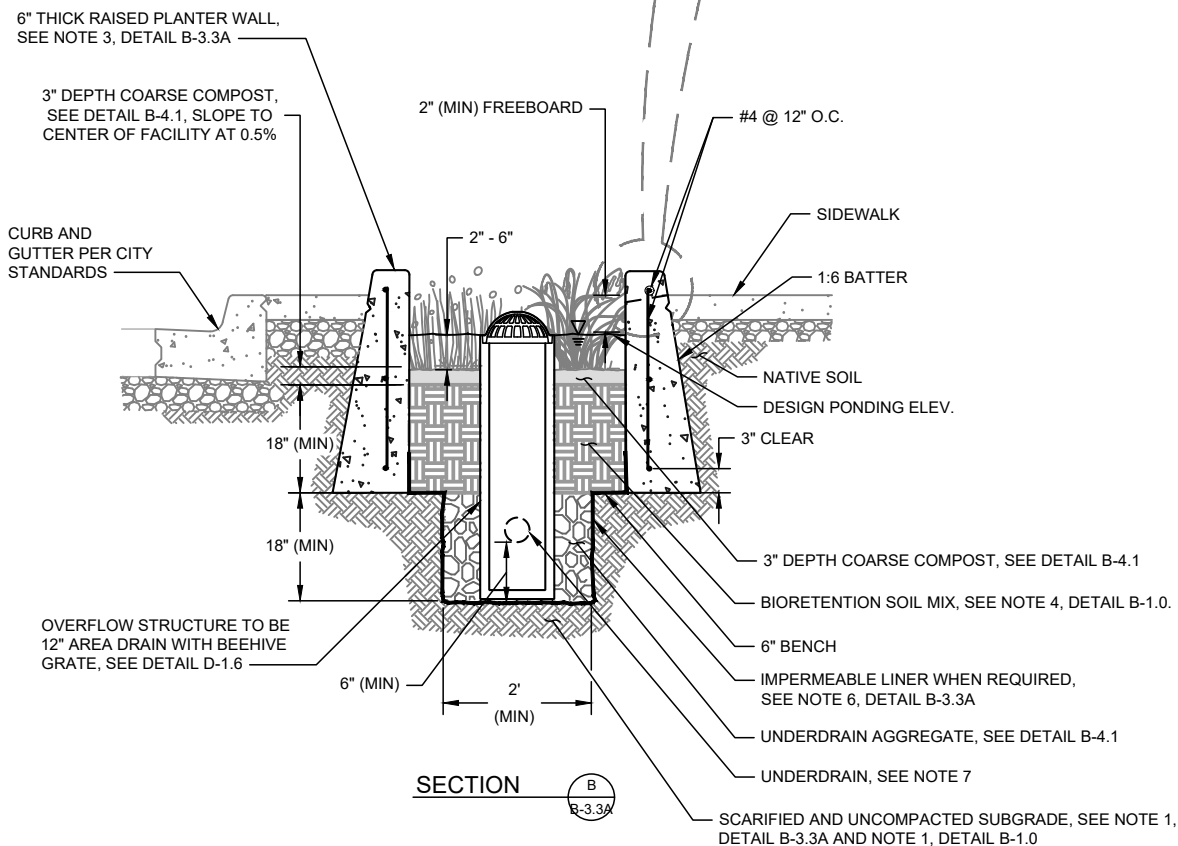
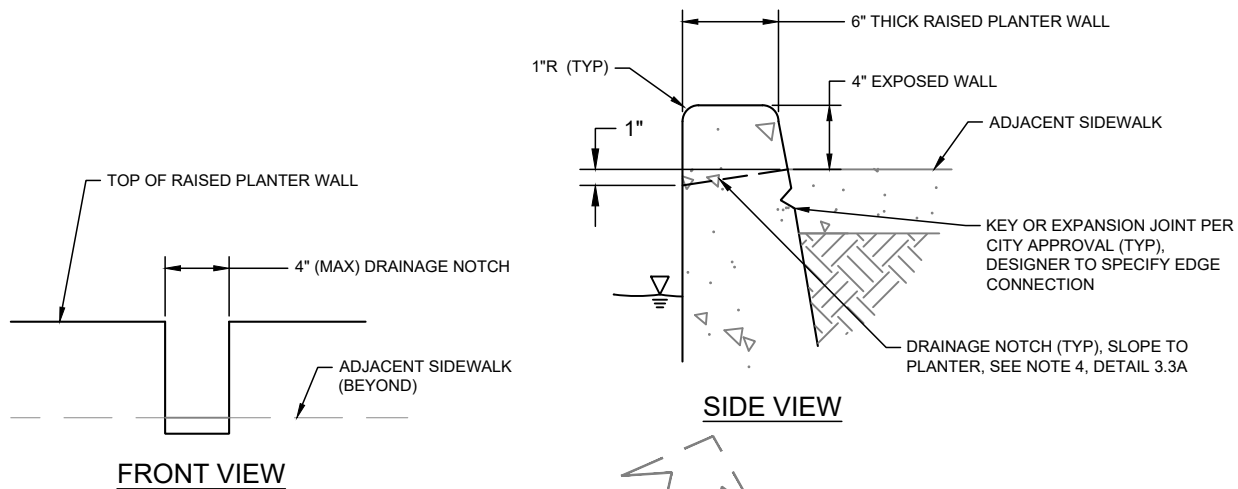


BIORETENTION PLANTER STEP-OUT ZONE - PLAN

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BIORETENTION
DETAIL NO.
B-3.3A



NOTES

SEE STANDARD PLAN NO. B-3.3A, IN-STREET CATCH BASIN - PLAN, FOR DETAIL NOTES.

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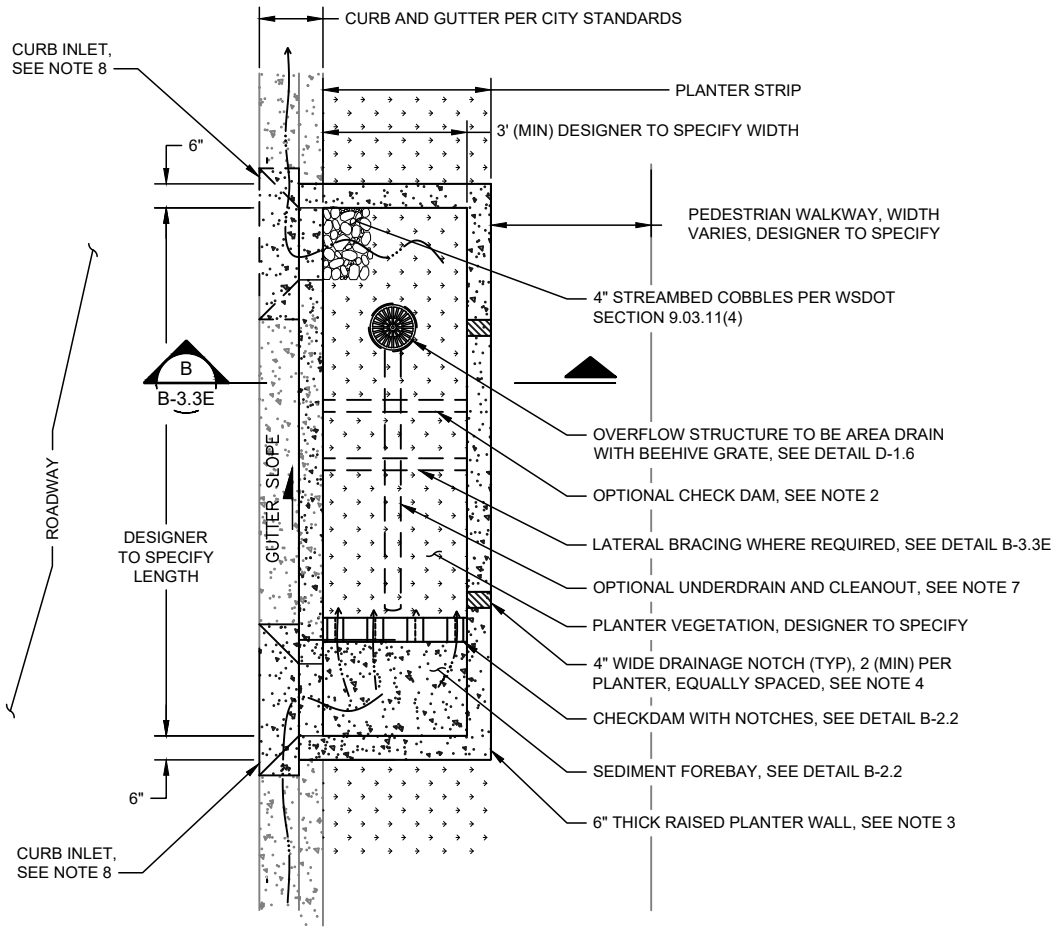


BIORETENTION PLANTER STEP-OUT ZONE- SECTION

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BIORETENTION
DETAIL NO.
B-3.3B



PLAN VIEW

NOTES

1. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE (SEE STD. PLAN NO. B-3.3D) AND BIORETENTION SOIL MATERIAL.
2. CHECK DAMS SHALL BE SPACED TO PROVIDE PONDING PER SITE SPECIFIC DESIGN.
3. THE PLANTER WALL SLOPE IS TYPICALLY DESIGNED TO MATCH THE LONGITUDINAL SLOPE OF THE ADJACENT ROADWAY/SIDEWALK. THE FACILITY SUBGRADE, HOWEVER, SHOULD BE FLAT. CHECK DAMS MAY BE USED TO TERRACE FACILITIES TO PROVIDE SUFFICIENT PONDING FOR HIGHER-SLOPED INSTALLATIONS.
4. LAY OUT DRAINAGE NOTCHES TO PREVENT PONDING BEHIND PLANTER WALL WITH 5' MAXIMUM SPACING BETWEEN NOTCHES.
5. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS.
6. LINER TO BE INSTALLED ONLY WHEN REQUIRED IN THE CITY OF VANCOUVER SURFACE WATER GENERAL REQUIREMENTS. IMPERMEABLE LINER TO BE 30 MIL MIN. HDPE OR EPDM PER GRI TEST METHOD GM13 (HDPE) OR GM 21 (EPDM) OR APPROVED EQUAL.
7. UNDERDRAIN TO BE 8" MIN. (PUBLIC) SLOTTED PVC PER ASTM D1785 SCH 40 WITH SOLVENT WELDED JOINTS. SLOTS MUST BE 0.0064 INCHES WIDE X 0.3 INCHES APART ON CENTER. SLOTS TO BE ORIENTED AS SPECIFIED IN THE CONTRACT. FIELD CUTTING OF SLOTS IS NOT ALLOWED. SLOPE PIPE AT 0.5% MIN., UNLESS OTHERWISE SPECIFIED. PROVIDE ONE CLEANOUT MIN. PER 100 FEET OF UNDERDRAIN, AND AT EACH END. MATCH CROWN ELEVATION OF UNDERDRAIN TO OVERFLOW PIPE UNLESS OTHERWISE SPECIFIED.
8. PLANTERS IN PUBLIC RIGHT OF WAY SHALL BE DESIGNED WITH EMERGENCY OVERFLOW TO THE STREET IN THE EVENT THE PLANTER OUTLET IS OBSTRUCTED OR CLOGGED.

N.T.S.

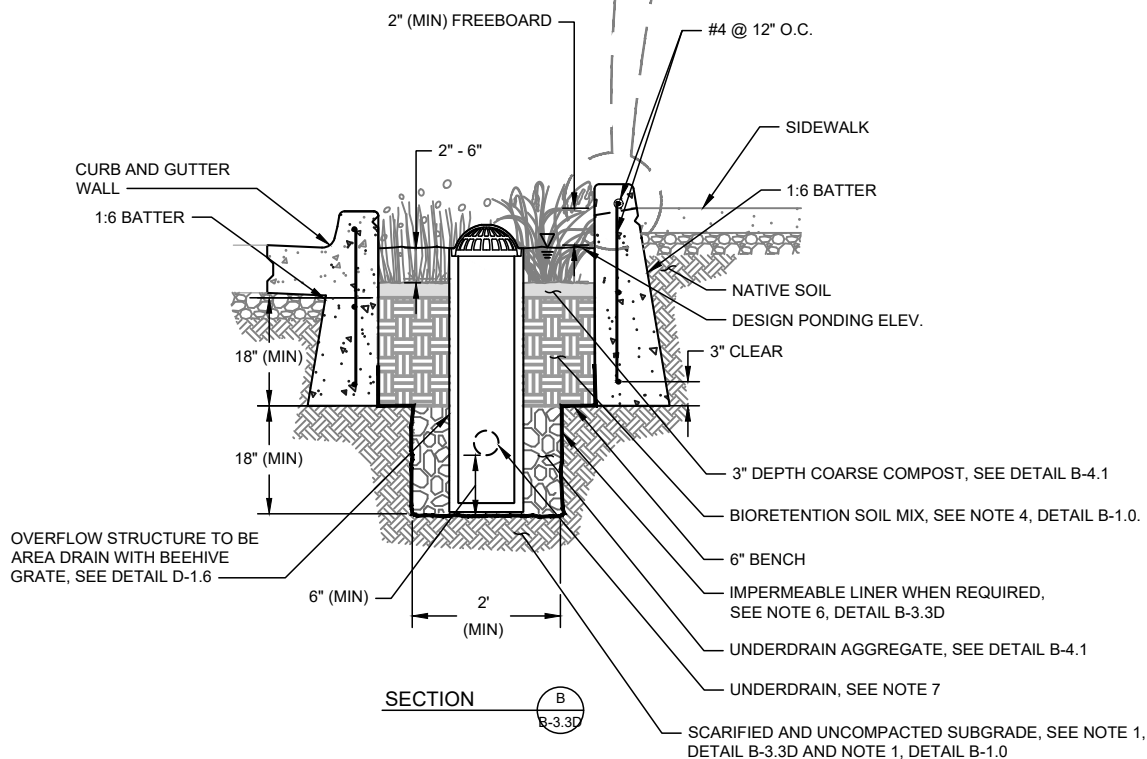
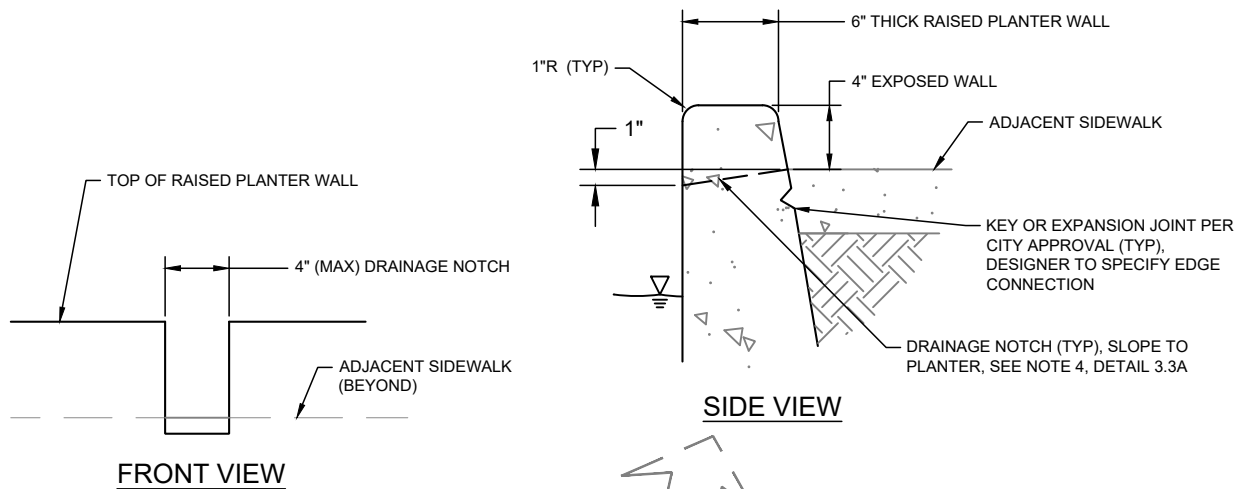


BIORETENTION PLANTER NO STEP-OUT ZONE

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BIORETENTION
DETAIL NO.
B-3.3C



NOTES

SEE STANDARD PLAN NO. B-3.3C FOR DETAIL NOTES.

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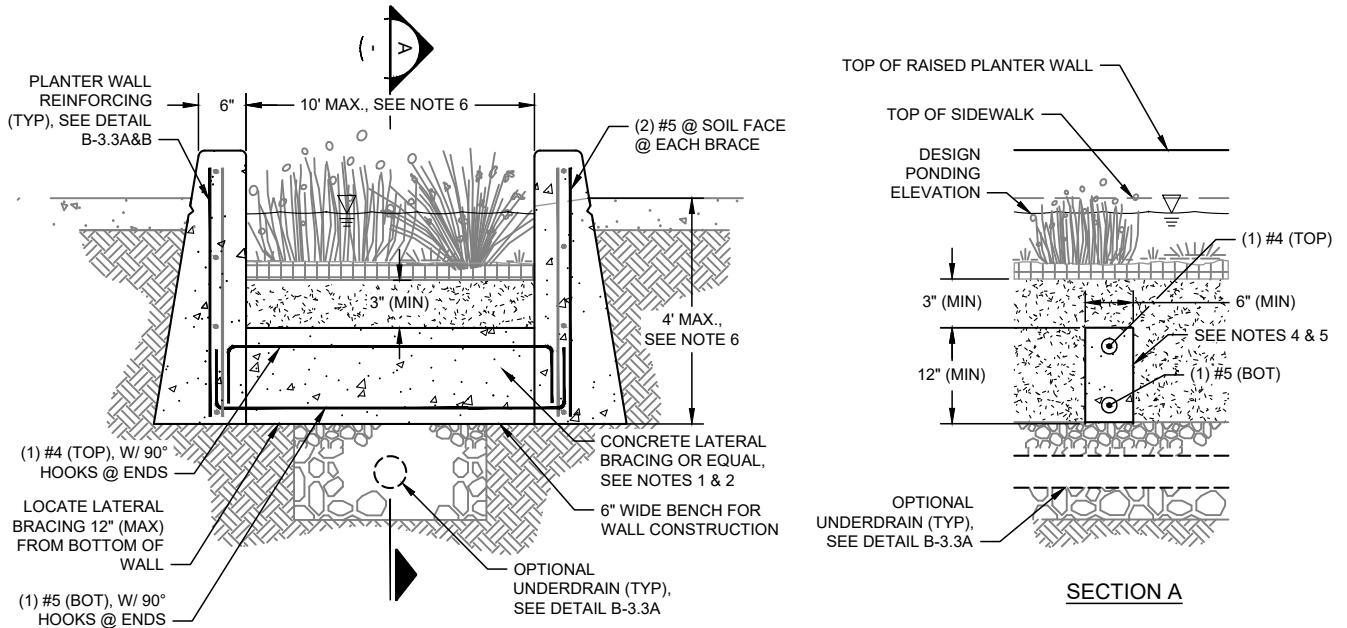
BIORETENTION PLANTER NO STEP-OUT ZONE SECTION

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BIORETENTION
DETAIL NO.

B-3.3D



CONCRETE LATERAL BRACING (WALLS UP TO 4')

NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR LATERAL BRACING SHALL CONFORM TO CITY OF VANCOUVER STANDARDS AND WSDOT STANDARD SPECIFICATIONS.
2. PLANTER WALLS EXTENDING MORE THAN 36 INCHES BELOW ADJACENT LOAD-BEARING SURFACE MUST HAVE FOOTING OR LATERAL BRACING.
3. ALL PLANTER WALLS SHALL EXTEND TO BOTTOM OF BIORETENTION SOIL OR DEEPER.
4. CONCRETE LATERAL BRACING SHALL BE CONTINUOUS (NO JOINTS).
5. LATERAL BRACING SHALL BE PROVIDED EVERY 6 FEET (MAX) FOR WALLS UP TO 4 FEET IN HEIGHT.
6. MAXIMUM PLANTER DIMENSIONS WITHOUT A STRUCTURAL ENGINEER'S STAMP TO BE WALL HEIGHT OF 4', AND INTERNAL WIDTH OF 10'.

N.T.S.



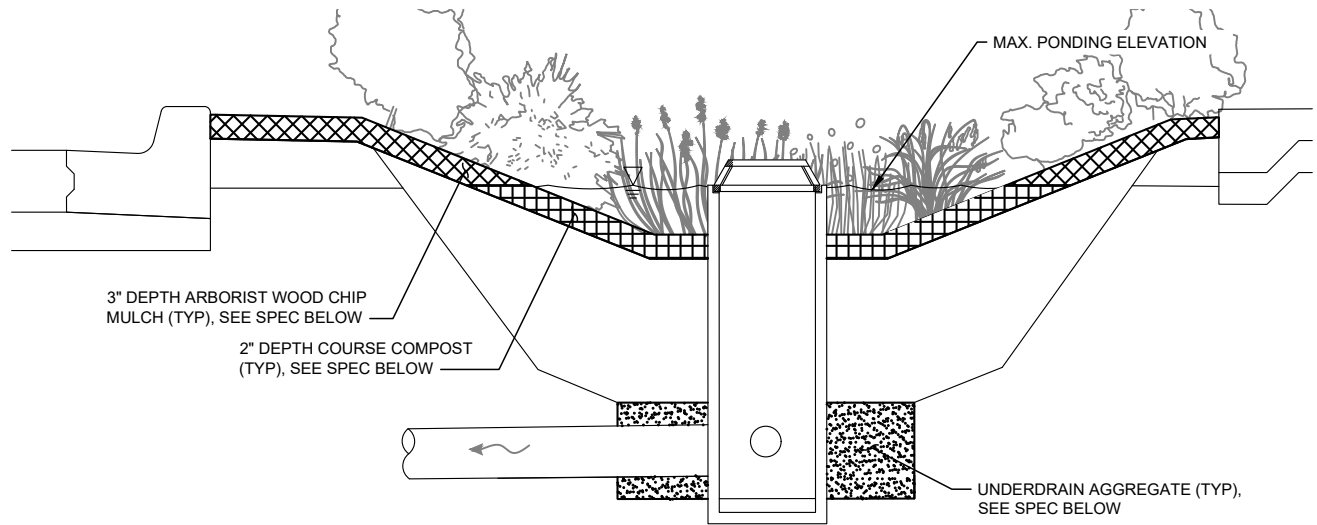
BIORETENTION PLANTER - LATERAL BRACING

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BIORETENTION
DETAIL NO.

B-3.3E



COARSE COMPOST SPECIFICATION:

FURNISH COMMERCIALY MANUFACTURED COMPOST THAT:

- IS PROCESSED THROUGH THERMOPHILIC COMPOSTING MEETING THE EPA'S DEFINITION OF "PROCESS TO FURTHER REDUCE PATHOGENS".
- IS FROM A COMMERCIAL COMPOST FACILITY THAT HOLDS A CURRENT OREGON DEQ COMPOSTING PERMIT OR IS REGISTERED WITH ECOLOGY OR OREGON DEQ AS A COMPOSTING FACILITY.
- MEETS THE REQUIREMENTS OF THE US COMPOSTING COUNCIL (USCC) AND IT'S SEAL OF TESTING ASSURANCE (STA) PROGRAM.
- HAS A CARBON-TO-NITROGEN RATIO BETWEEN 25:1 AND 45:1. COMPOST MAY BE MIXED WITH FIR OR HEMLOCK BARK, OR CLEAN WOOD CHIPS OR SAWDUST, TO RAISE THE CARBON-TO-NITROGEN RATIO ABOVE 25:1.
- IS FREE OF GARBAGE AND TRASH.
- ORIGINATING FROM RECYCLED PLANT WASTE AS DEFINED BELOW:
 - SOURCE-SEPARATED YARD AND GARDEN WASTES
 - WOOD WASTES
 - AGRICULTURAL CROP RESIDUES
 - WAX-COATED CARDBOARD
 - PRECONSUMER VEGETATIVE FOOD WASTES
 - OTHER SIMILAR SOURCE-SEPARATED MATERIALS THAT THE DEQ HAS DETERMINED TO HAVE A COMPARABLE LOW LEVEL OF RISK IN HAZARDOUS SUBSTANCES, HUMAN PATHOGENS, AND PHYSICAL CONTAMINANTS
 - BIOSOLIDS AND MANURE FEEDSTOCKS ARE NOT ALLOWED.
- MEETS THE PARTICLE SIZE AND GRADATION PARAMETERS IN TABLE 1
- CONTRACTOR SHALL SUBMIT TWO 1-GALLON SAMPLES OF THE COMPOST, GATHERED PER STA PROTOCOL (AVAILABLE FROM THE U.S. COMPOSTING COUNCIL) FOR APPROVAL BY THE PROJECT ENGINEER.

SIEVE SIZE	MIN. PERCENT PASSING (BY DRY WEIGHT)
3-INCH	100 PERCENT
1-INCH	90 PERCENT
3/4-INCH	70 PERCENT
5/8-INCH	70 PERCENT
1/2-INCH	60 PERCENT
1/4-INCH	30 - 60 PERCENT

ARBORIST WOOD CHIP MULCH SPECIFICATION:

- FURNISH WOOD CHIP MULCH THAT IS CHIPPED FROM CLEARED SITE VEGETATION OR FROM AN APPROVED OFFSITE SOURCE. ENSURE THAT CHIPPED MATERIAL IS FREE OF ANY NOXIOUS WEEDS OR INVASIVE VEGETATION.
- MULCH MAY CONTAIN WOOD, WOOD FIBER, BARK, BRANCHES, AND LEAVES, BUT MAY NOT CONTAIN WEEDS, WEED SEEDS, TRASH, OR VISIBLE AMOUNTS OF SOIL.
- PROVIDE WOOD CHIP MULCH IN THE FOLLOWING SIZE RANGE:
3-INCH TO 1/4-INCH CHIPPED WOOD MATERIAL AND VEGETATIVE DEBRIS. MINIMIZE FINE MATERIAL WITHIN BLEND.

UNDERDRAIN AGGREGATE SPECIFICATION:

- UNDERDRAIN AGGREGATE MUST CONSIST OF SCREENED SAND, GRAVEL OR OTHER INERT MATERIALS, OR COMBINATIONS THEREOF, FROM SOURCES APPROVED BY THE ENGINEER, HAVING HARD, DURABLE PARTICLES FREE FROM ADHERENT COATINGS.
- THE MATERIALS MUST BE WASHED THOROUGHLY TO REMOVE CLAY, LOAM, ALKALI, ORGANIC MATTER, OR OTHER DELETERIOUS SUBSTANCES.
- PARTICLES HAVING A SPECIFIC GRAVITY LESS THAN 1.95 MUST NOT EXCEED 1.0 PERCENT OF THE TOTAL WEIGHT. ORGANIC MATTER, BY CALORIMETRIC TEST, MUST NOT BE DARKER THAN THE REFERENCE STANDARD COLOR (ORGANIC PLATE NO. 3) AASHTO T21 UNLESS OTHER TESTS PROVE A DARKER COLOR TO BE HARMLESS.
- GRADATION AND PARTICLE SIZE PARAMETERS MUST BE AS SHOWN IN TABLE 2.

SIEVE SIZE	PERCENT PASSING
3/4-INCH	100 PERCENT
1/4-INCH	30 TO 60 PERCENT
U.S. NO. 8	20 TO 50 PERCENT
U.S. NO. 50	3 TO 12 PERCENT
U.S. NO. 200	0 TO 1 PERCENT

N.T.S.



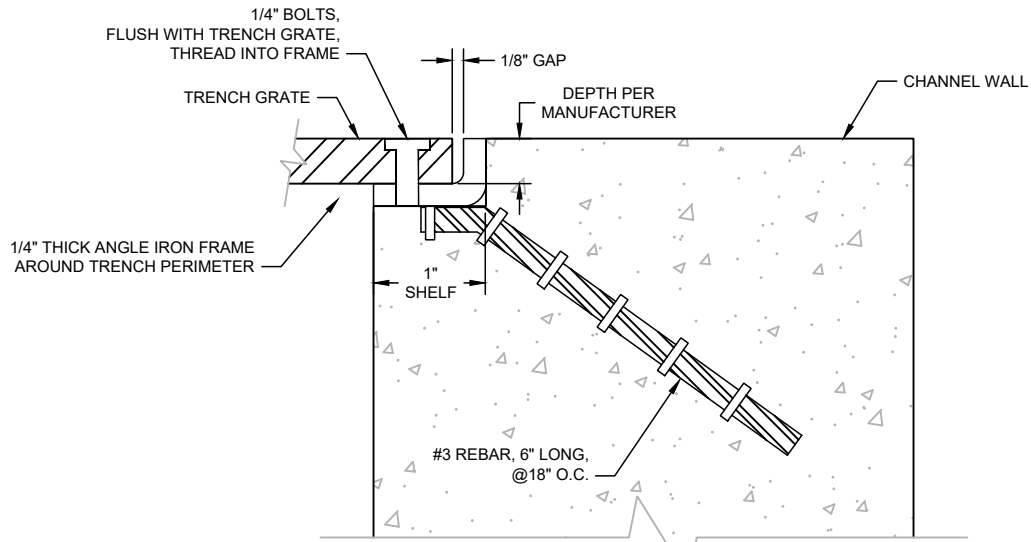
STORMWATER FACILITY MULCH AND UNDERDRAIN AGGREGATE

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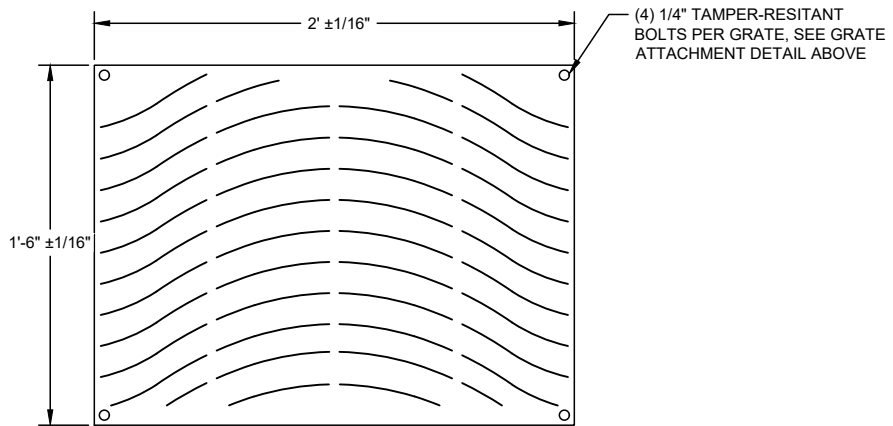
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BIORETENTION
DETAIL NO.

B-4.1



FRAME AND GRATE ATTACHMENT DETAIL



TRENCH GRATE

CONSTRUCTION NOTES:

1. CAST IRON, NATURAL FINISH.
2. NO OPENING GREATER THAN 3/8".
3. PROTECT THREADED HOLES IN FRAME FROM CLOGGING DURING FRAME INSTALLATION.
4. GRATE TO BE RATED FOR H-20 LOADING, WITH A NON-SLIP SURFACE HAVING A STATIC COEFFICIENT OF FRICTION BETWEEN 0.60 AND 1.0 PER ASTM C1020. GRATES ON INCLINES GREATER THAN 4% SHALL HAVE A COEFFICIENT OF 0.80 TO 1.0.
5. GRATE TO BE ADA COMPLIANT.

N.T.S.



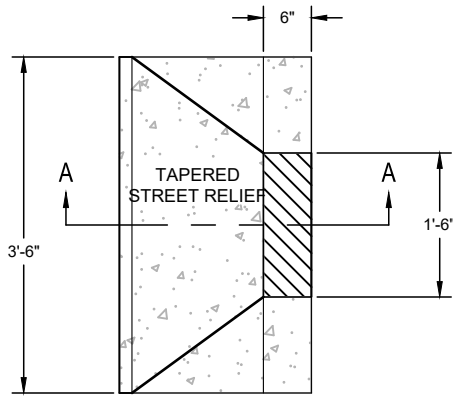
CURB OPENING INLET FRAME AND GRATE

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SURFACE WATER MANAGEMENT

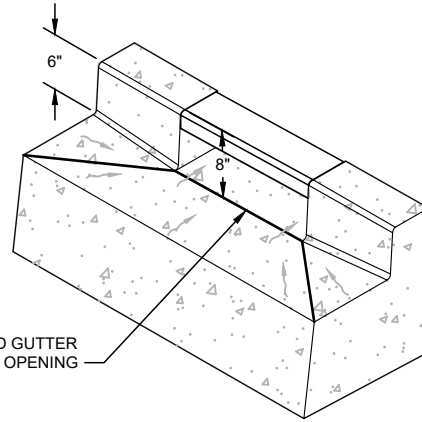
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BIORETENTION
DETAIL NO.

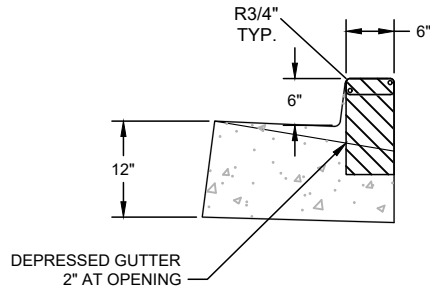
B-5.2



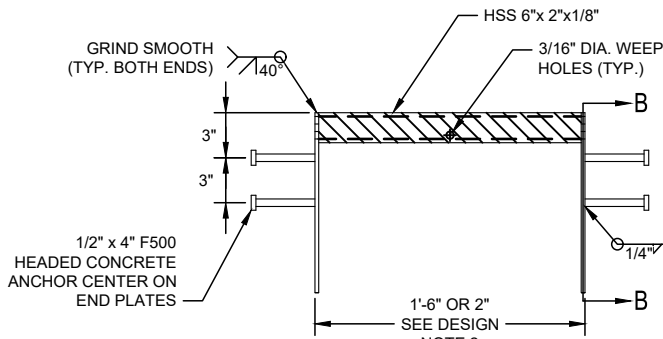
PLAN



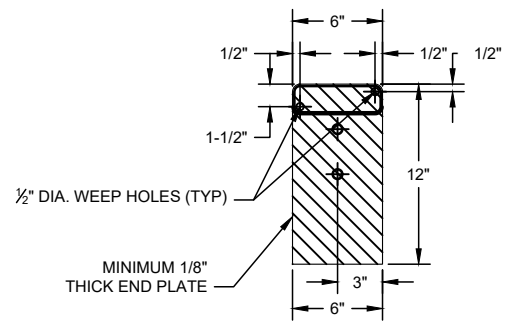
ISOMETRIC



SECTION A-A



ELEVATION



SECTION B-B

METAL INLET ASSEMBLY

CONSTRUCTION NOTES:

1. HEADED CONCRETE ANCHORS SHALL MEET THE REQUIREMENTS OF ASTM A-108.
2. HSS 6" X 2" X 1/8" TUBE SHALL MEET THE REQUIREMENTS OF ASTM A-500 GRADE B.
3. END PLATES SHALL MEET THE REQUIREMENTS OF ASTM A-36.
4. ENTIRE ASSEMBLY SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A-123.

GENERAL NOTES:

1. INCLUDE METAL CURB INLET ON ARTERIALS AND WHERE PARKING IS ADJACENT TO THE CURB OPENING.

N.T.S.



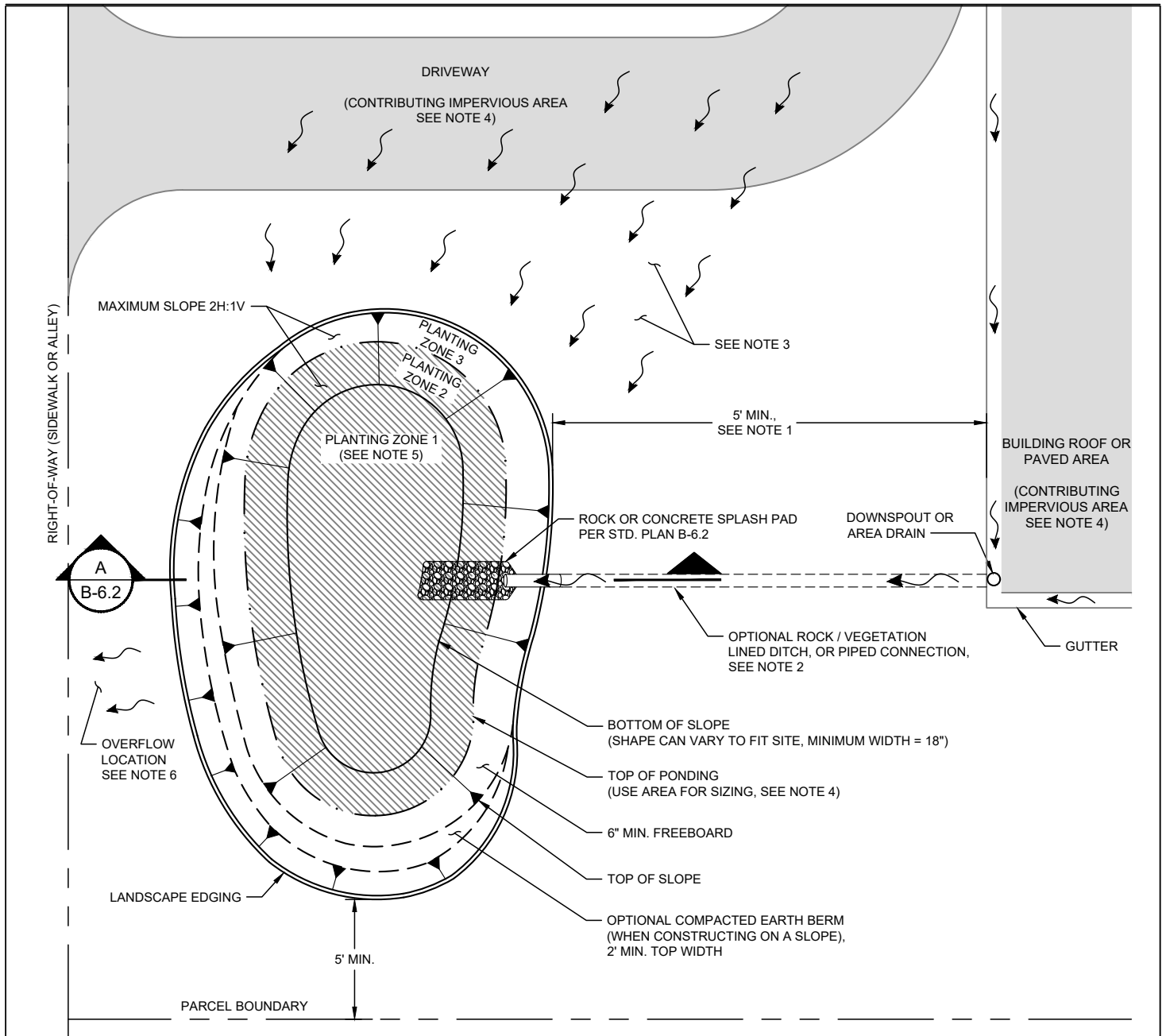
METAL INLET ASSEMBLY

CITY OF VANCOUVER
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BIORETENTION
DETAIL NO.

B-5.3



NOTES:

1. TOP OF RAIN GARDEN SHALL BE 5 FEET MIN. FROM BUILDINGS WITHOUT BASEMENTS OR WITH FOUNDATION WATERPROOFING AND 10 FEET MIN. FROM BUILDINGS WITH BASEMENTS WITHOUT WATERPROOFING.
2. ROOF DOWNSPOUT CONNECTION OPTIONAL. CONNECT WITH STABILIZED DITCH OR SLOPE PIPED CONNECTION AT 2% (PREFERRED), 1% MIN. USE 4" MIN. CORRUGATED POLYETHYLENE PIPE.
3. SHEET FLOW INTO RAIN GARDEN MAY BE KEPT WIDELY DISTRIBUTED OVER A STABILIZED SURFACE (PAVEMENT, PEA GRAVEL, GRASS). IF CONCENTRATED, PROVIDE A 2' MIN. WIDTH SWALE WITH 4" DEPTH, 1"-3" WASHED GRAVEL, STREAMBED COBBLE, OR WITH GRASS-LIKE VEGETATION TO PREVENT EROSION.
4. RAIN GARDEN SHALL BE SIZED USING THE RAIN GARDEN HANDBOOK FOR WESTERN WASHINGTON (<https://fortress.wa.gov/ecy/publications/documents/1310027.pdf>) OR A MINIMUM OF 5% OF THE CONTRIBUTING AREA.
5. PLANTING ZONE INFORMATION ON STANDARD PLAN NO. B-6.2.
6. AN OVERFLOW LOCATION MUST BE DESIGNATED IF THE RAIN GARDEN IS NOT SIZED TO MEET 'BEST' CRITERIA IN THE RAIN GARDEN HANDBOOK. OVERFLOW LOCATION SHALL BE NOTED ON THE PLANS AND CONSIST OF A STABILIZED (ROCK, TURF, THICK GROUND COVER, OR SIMILAR) SURFACE DISCHARGING TO A SAFE LOCATION IN THE PUBLIC RIGHT-OF-WAY

GENERAL NOTES:

1. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO THE VANCOUVER SURFACE WATER GENERAL REQUIREMENTS, CURRENT CITY STANDARDS, AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH CITY ENGINEER IN THE EVENT OF UTILITY CROSSINGS OR CONFLICTS.
2. CALL 811 OR 1-800-424-5555 AT LEAST TWO WORKING DAYS BEFORE ANY EXCAVATION TO ALLOW UTILITY COMPANIES TO LOCATE AND MARK THEIR LINES. ANY EXCAVATION WITHIN TWO FEET OF PAINTED LINES MUST BE DONE BY HAND.

N.T.S.



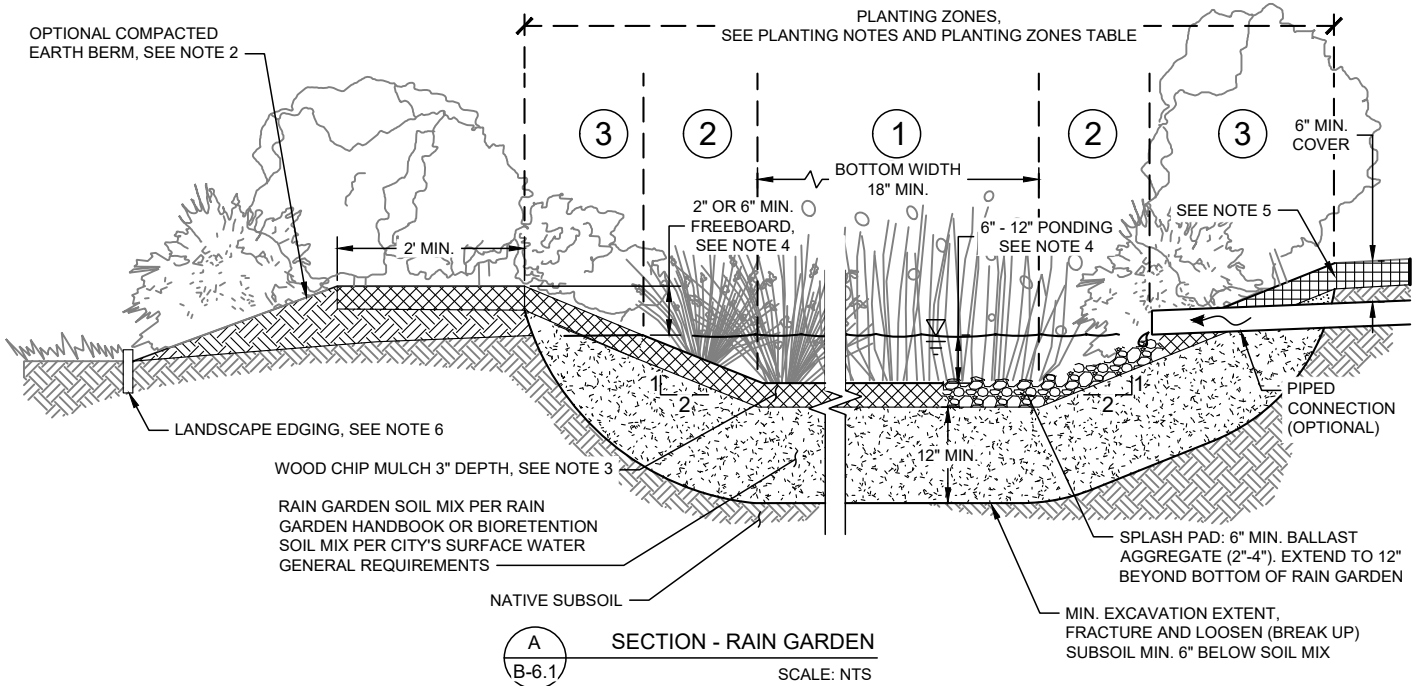
RAIN GARDEN PLAN

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SURFACE WATER MANAGEMENT

DRAWN BY	APPROVED BY	APPROVAL DATE
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BIORETENTION
DETAIL NO.

B-6.1



GENERAL NOTES:

1. UNDERDRAINS ARE NOT ALLOWED WITHIN RAIN GARDENS.
2. DO NOT COMPACT THE RAIN GARDEN SOIL MIX.
 - A. DO NOT OPERATE HEAVY EQUIPMENT WITHIN THE RAIN GARDEN
 - B. DO NOT PLACE OR AMEND RAIN GARDEN SOIL WHEN THE GROUND IS FROZEN OR WHEN THE SOIL IS EXCESSIVELY WET.
3. FOR OVERFLOW REQUIREMENTS, SEE NOTE 6 ON STANDARD PLAN B-6.1.

PLANTING NOTES:

1. REFER TO THE RAIN GARDEN HANDBOOK FOR WESTERN WASHINGTON FOR GUIDANCE ON PLANT SELECTION, PLACEMENT, AND SPACING BY ZONE.
2. PLANTS MUST BE PERENNIAL AND ADAPTED TO THE CONDITIONS ENCOUNTERED IN ITS ZONE IN THE RAIN GARDEN. SEE PLANTING ZONE TABLE.
3. EVERGREEN AND DECIDUOUS VEGETATION MAY BE USED BUT THE MAJORITY OF MATERIAL MUST PROVIDE A SIGNIFICANT ABOVE GROUND PRESENCE YEAR ROUND.
4. PLANTING DESIGN SHOULD MINIMIZE COMPACTION OF SOIL THROUGH PLANNED MAINTENANCE ACCESS. ANNUAL PLANTS REQUIRING SOIL DISTURBANCE FOR HARVESTING (E.G., CARROTS) OR ANNUAL REPLANTING ARE NOT PERMITTED.

NOTES:

1. RAIN GARDEN TO BE SIZED USING THE RAIN GARDEN HANDBOOK FOR WESTERN WASHINGTON (<https://fortress.wa.gov/ecy/publications/documents/1310027.pdf>) OR A MINIMUM OF 5% OF THE CONTRIBUTING AREA.
2. RAISED BERM MAY BE USED WHEN CONSTRUCTING ON SLOPES. BERM SHALL BE FIRM, NON-YIELDING NATIVE SOIL OR IMPORTED SILTY OR CLAYEY SOILS COMPACTED BY FOOT PRESSURE IN 3-INCH LIFTS. IF SITE SOILS ARE SANDY, CONSIDER IMPORTING DENSER, NON-PERMEABLE SOILS FOR RAISED BERM. TOP WIDTH SHALL BE 24-INCHES MIN. SEE RAIN GARDEN HANDBOOK FOR MORE INFORMATION.
3. ARBORIST WOOD CHIP MULCH PER STANDARD PLAN NO. B-4.1.
4. FREEBOARD (OVERFLOW CONTAINMENT) SHALL BE 2" MINIMUM FOR CONTRIBUTING AREAS UNDER 1,000 SQUARE FEET, OR 6" FOR CONTRIBUTING AREAS 1,000 SQUARE FEET OR GREATER.
5. CONTINUE MULCH FOR A MINIMUM OF 2'-0" PAST THE TOP OF BANK ELEVATION AND INSTALL LANDSCAPE EDGING IF RAIN GARDEN IS ADJACENT TO LAWN.
6. LANDSCAPE EDGING SHOULD BE INSTALLED AROUND EDGE OF RAIN GARDEN WHENEVER ADJACENT TO LAWN. EDGING TO BE 6" WIDE TRENCH FILLED WITH MULCH OR ROCKS, PAVERS, OR METAL EDGING.

TABLE: PLANTING ZONES

ZONE	PLANT TYPE	LOCATION
①	EMERGENTS, PERENNIALS & LOW SHRUBS (PLANTS THAT CAN TOLERATE STANDING WATER)	FACILITY BOTTOM
②	EMERGENTS, PERENNIALS & LOW SHRUBS (PLANTS THAT CAN TOLERATE OCCASIONAL STANDING WATER)	LOWER SLOPE TO TOP OF PONDING
③	GROUNDCOVERS / SHRUBS (PLANTS THAT PREFER DRIER SOILS)	UPPER SLOPE / SURFACE GRADE
① ② ③	ACCENT SHRUB (SELECT APPROPRIATE SHRUB BASED ON ZONE)	SURFACE GRADE / LOWER SLOPE / FACILITY BOTTOM
③	TREE	CENTER WITHIN UPPER SLOPE. CONSIDER CANOPY OF FULL-GROWN TREE. ALLOW CLEARANCE FOR WALKWAYS.

N.T.S.



RAIN GARDEN SECTION

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SURFACE WATER MANAGEMENT

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BIORETENTION
DETAIL NO.

B-6.2

REQUIREMENTS FOR BIORETENTION SOIL PREPARATION AND SOIL PROTECTION

SOIL PREPARATION

PRIOR TO THE PLACEMENT OF MULCH OR EROSION CONTROL BLANKETS, THE SOIL SURFACE SHALL BE ROUGHENED USING A BOW RAKE OR SIMILAR TOOL TO CREATE RIDGES OR FURROWS A MINIMUM OF 1" DEPTH, THAT RUN PERPENDICULAR TO THE SLOPE AND NATURAL DIRECTION OF WATER FLOW.

EXCESSIVE COMPACTION OF BIORETENTION SOILS SHALL BE AVOIDED DURING SURFACE ROUGHENING. SOIL SHALL BE MULCHED OR COVERED WITH EROSION CONTROL BLANKETS AS QUICKLY AS POSSIBLE AFTER ROUGHENING.

SOIL PROTECTION

NO STOCKPILING OF MATERIALS OR MECHANICAL COMPACTION OF SOILS SHALL BE ALLOWED WITHIN STORMWATER FACILITIES AFTER SOIL PLACEMENT OCCURS. BIORETENTION SOILS MUST BE PROTECTED AND TEMPORARY SIGNAGE INSTALLED ACCORDING TO TEMPORARY SIGNAGE STANDARDS WITHIN THIS SECTION.

MULCHING

BIORETENTION FACILITIES GRADED WITH FLAT TO MILD SLOPES (SIDE SLOPES 3:1 OR LESS AND LONGITUDINAL SLOPES LESS THAN 5 PERCENT) THAT WILL BE PLANTED PRIOR TO OCTOBER 15, SHOULD BE PROTECTED WITH HYDRAULICALLY-APPLIED EROSION CONTROL PRODUCTS (HECPs) TO PROVIDE TEMPORARY EROSION AND SEDIMENT CONTROL. MULCH WILL PROVIDE PROTECTION FROM SOIL COMPACTION AND PROVIDE WEED SUPPRESSION.

ALL PRODUCTS SHALL BE MADE IN THE UNITED STATES, 100% BIODEGRADABLE, AND CONTAIN 100% RECYCLED, THERMALLY REFINED (WITHIN A PRESSURIZED VESSEL) VIRGIN WOOD FIBERS DERIVED FROM CLEAN, WHOLE WOOD CHIPS. THE HECPS SHALL BE PHYTOSANITIZED AND UPON APPLICATION FORM AN INTIMATE BOND WITH THE SOIL SURFACE TO CREATE CONTINUOUS, POROUS, ABSORBENT AND FLEXIBLE EROSION RESISTANT BLANKETS THAT ALLOW FOR HEALTHY PLANT GROWTH. HYDRAULIC MULCH (HM) WOOD WITH TACK IS AN ACCEPTABLE PRODUCT FOR THIS APPLICATION.

SUBMIT THE FOLLOWING INFORMATION TO THE CITY PRIOR TO MULCH APPLICATION:

- PRODUCT DATA: SUBMIT MANUFACTURER'S PRODUCT DATA AND INSTALLATION INSTRUCTIONS. INCLUDE REQUIRED SUBSTRATE PREPARATION, LIST OF MATERIALS AND APPLICATION RATES.
- CERTIFICATIONS: MANUFACTURER SHALL SUBMIT A LETTER OF CERTIFICATION THAT THE PRODUCT MEETS OR EXCEEDS ALL TECHNICAL AND PACKAGING REQUIREMENTS.


THE HM SHOULD MEET THE REQUIREMENTS DESCRIBED IN TABLE 1.

TABLE 1. PRODUCT PROPERTIES

PRODUCT		HM WOOD WITH TACK
PROPERTY	TEST METHOD	MINIMUM VALUE
<u>PHYSICAL</u>		
MASS PER UNIT AREA	ASTM D65661	≥ 9.9 OZ/YD2 (340 G/M2)
WATER HOLDING CAPACITY	ASTM D7367	≥ 1,200%
MATERIAL COLOR	OBSERVED	GREEN
<u>PERFORMANCE</u>		
VEGETATION ESTABLISHMENT	ASTM D73221	≥ 250 %
FUNCTIONAL LONGEVITY 2	ASTM D5338	≤ 3 MONTHS
<u>ENVIRONMENTAL</u>		
ECOTOXICITY	EPA 2021.0	48-HR LC50 > 100%
BIODEGRADABILITY	ASTM D5338	YES

1. ASTM TEST METHODS DEVELOPED FOR ROLLED EROSION CONTROL PRODUCTS AND HAVE BEEN MODIFIED TO ACCOMMODATE HYDRAULICALLY-APPLIED EROSION CONTROL PRODUCTS.
2. FUNCTIONAL LONGEVITY IS THE ESTIMATED TIME PERIOD, BASED UPON ASTM D5338 TESTING AND FIELD OBSERVATIONS, THAT A MATERIAL CAN BE ANTICIPATED TO PROVIDE EROSION CONTROL AND AGRONOMIC BENEFITS AS INFLUENCED BY COMPOSITION, AS WELL AS SITE-SPECIFIC CONDITIONS, INCLUDING; BUT NOT LIMITED TO – TEMPERATURE, MOISTURE, LIGHT CONDITIONS, SOILS, BIOLOGICAL ACTIVITY, VEGETATIVE ESTABLISHMENT AND OTHER ENVIRONMENTAL FACTORS.

N.T.S.

 CITY OF Vancouver WASHINGTON	SOIL MANAGEMENT BMP (1 OF 2)			BIORETENTION DETAIL NO. B-7.0
	CITY OF VANCOUVER DEPARTMENT OF PUBLIC WORKS SURFACE WATER MANAGEMENT			
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REQUIREMENTS FOR BIORETENTION SOIL PREPARATION AND SOIL PROTECTION (CONTINUED)

MULCHING (CONTINUED)

COMPLY WITH PRODUCT AND EQUIPMENT MANUFACTURER'S SPECIFICATIONS FOR INSTALLATION. APPLY HM WOOD WITH TACK AT ACCORDING TO THE RATES IN TABLE 2, UNLESS OTHERWISE SPECIFIED BY MANUFACTURER.

TABLE 2. HM WOOD WITH TACK APPLICATION RATES FOR SLOPE GRADIENT CONDITIONS.

SLOPE GRADIENT/CONDITION	HM WOOD WITH TACK
	LB/AC (KG/HA)
≤ 4H TO 1V	2,000 (2,240)
> 4H TO 1V AND ≤ 3H TO 1V	2,500 (2,800)

PLANTING SHALL OCCUR DIRECTLY WITHIN MULCH AND BEGIN WITHIN FIRST TWO WEEKS OF THE FALL PLANTING SEASON. APPLY STORMWATER FACILITY MULCH ACCORDING TO STANDARD PLAN B-4.1.

EROSION CONTROL BLANKETS

EROSION CONTROL BLANKETS SHALL BE USED TO PROTECT BIORETENTION SOILS WITH MODERATE TO STEEP SLOPES (SLOPES GREATER THAN OR EQUAL TO 3:1) AND IN FACILITIES WHERE SOILS WILL BE EXPOSED FOR MORE THAN 3 MONTHS OR PAST THE FIRST TWO WEEKS OF OCTOBER. EROSION CONTROL BLANKETS SHALL BE MADE OF NATURAL PLANT FIBERS UNALTERED BY SYNTHETIC MATERIALS, MEETING THE REQUIREMENTS OF WSDOT STANDARD SPECIFICATIONS SECTION 9-14.5(2)D, AND INSTALLED ACCORDING TO STANDARD PLAN B-7.1 AND B-7.2.

DURING INSTALLATION, ALLOW ADEQUATE MATERIAL FOR OVERLAPPING AND TRENCHING ACCORDING TO STANDARD PLAN B-7.1. EXTRA STAPLES OR ANCHORING MAY BE REQUIRED ON STEEP SLOPES IN ACCORDANCE WITH THE MANUFACTURERS' RECOMMENDATIONS.

BLANKETS AND STAKES/STAPLES SHALL BE REMOVED PRIOR TO PLANTING, BEING CAREFUL TO CONTAIN AND REMOVE ANY ACCUMULATED SEDIMENT, WEED SEEDS, AND DEBRIS WITHIN THE BLANKET. DURING REMOVAL, BLANKETS SHALL BE ROLLED FROM THE BOTTOM OF THE SLOPE OR THE DOWNSTREAM END OF A FACILITY TO THE TOP TO TRAP SEDIMENT FROM THE SLOPE WITHIN THE BLANKET ROLL.

TEMPORARY SIGNAGE


TEMPORARY SIGNS SHALL BE INSTALLED DURING THE PERIOD WHERE BIORETENTION SOIL MEDIA IS INSTALLED AND PRIOR TO PLANT INSTALLATION THAT INCLUDES THE FOLLOWING INFORMATION:

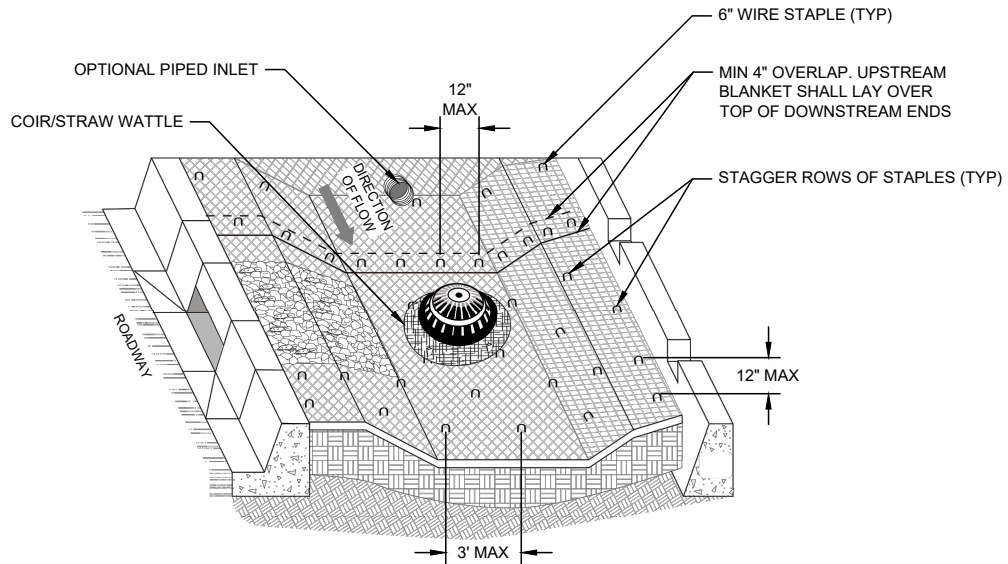
- THIS IS A STORMWATER FACILITY.
- STOCKPILING ANY MATERIAL IS PROHIBITED WITHIN THIS AREA.
- PLANTING OF THIS FACILITY WILL OCCUR IN FALL OR SPRING.
- PROTECT THIS FACILITY BY KEEPING ALL ANIMALS, FOOT TRAFFIC, AND DEBRIS OUT OF FACILITIES.
- TO REPORT ANY ISSUES OR INCIDENTS, PLEASE CONTACT ON-SITE CITY INSPECTOR (PROVIDE CONTACT INFORMATION).

HIGH VISIBILITY FENCE

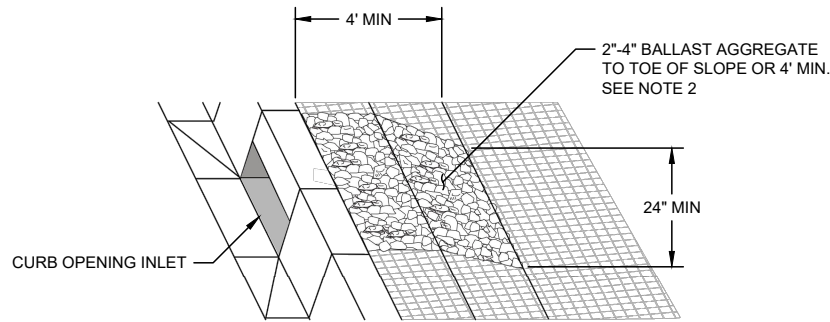
HIGH VISIBILITY FENCING SHALL BE INSTALLED AROUND THE BIORETENTION PERIMETER UNTIL THE ENTIRE SITE AND CONTRIBUTING AREA HAS BEEN STABILIZED.

N.T.S.

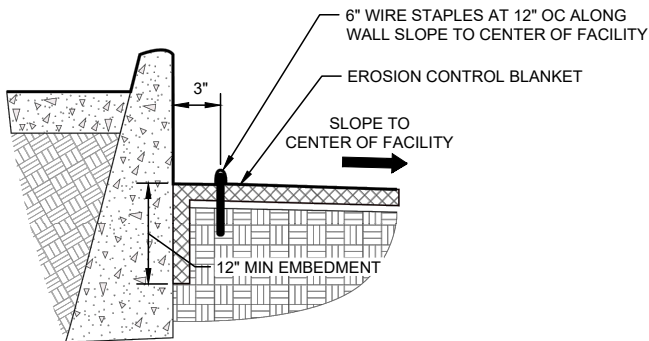
 CITY OF Vancouver WASHINGTON	SOIL MANAGEMENT BMP (2 OF 2)			BIORETENTION DETAIL NO. B-7.1
	CITY OF VANCOUVER DEPARTMENT OF PUBLIC WORKS SURFACE WATER MANAGEMENT			
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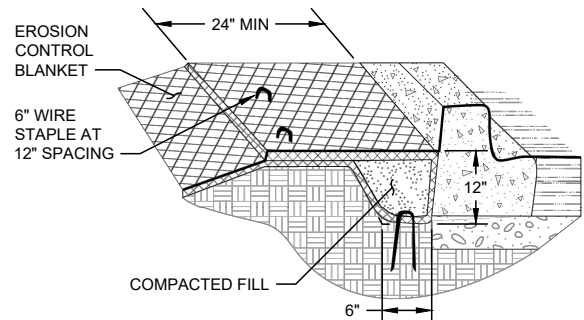
SOIL PROTECTION EROSION CONTROL BLANKET INSTALLATION



PROTECTION AT INLETS FOR SLOPED FACILITIES



INITIAL ANCHOR AT VERTICAL WALLS



SECONDARY ANCHOR TRENCH ADJACENT TO CURB, SIDEWALK, OR VERTICAL WALL

NOTES:

1. EROSION CONTROL BLANKET TO MEET THE REQUIREMENTS OF WSDOT STANDARD SPECIFICATIONS SECTION 9-14.5(2)D.
2. INSTALL 6" WIRE STAPLES AT 12" O.C. WITHIN BALLAST-PROTECTED AREA PRIOR TO ROCK PLACEMENT

N.T.S.



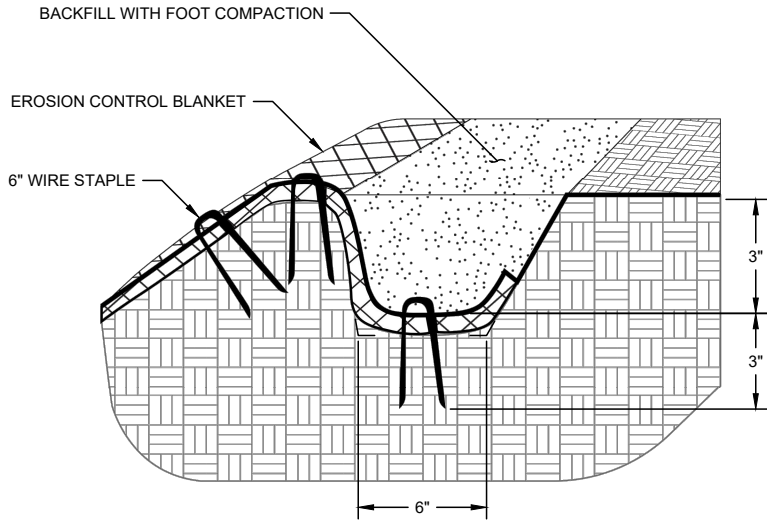
TEMPORARY EROSION CONTROL BLANKET

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
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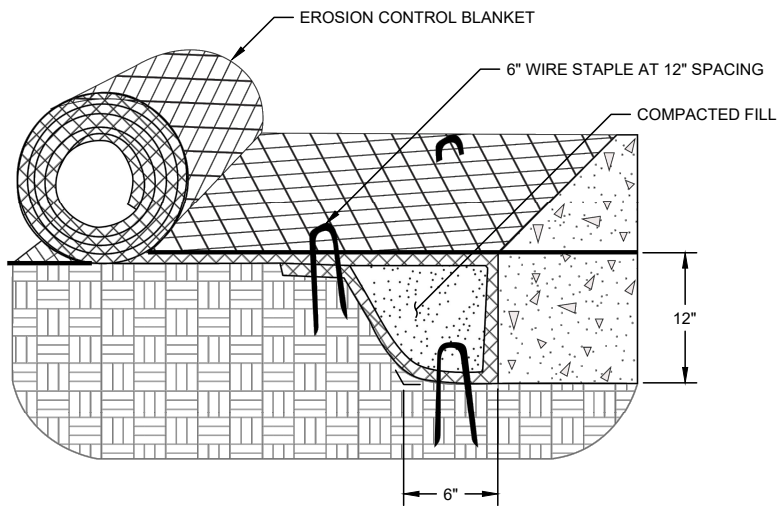
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BIORETENTION
DETAIL NO.

B-7.2



ANCHOR TRENCH ADJACENT TO LANDSCAPING



INITIAL CHANNEL ANCHOR TRENCH ADJACENT TO CURB OR SIDEWALK

N.T.S.



TEMPORARY EROSION CONTROL BLANKET ANCHORING

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SURFACE WATER MANAGEMENT

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BIORETENTION
DETAIL NO.

B-7.3

**Only plants listed are allowed for use in publicly-owned bio retention facilities. A minimum of 2 plant species are required per facility.
This list may also be used for privately-owned facilities if desired.**

Latin Name/ Common Name	Potential Mature Height	Planting Zone	On Center Plant Spacing	Evergreen	Sun and Shade Tolerance	Pruning Timing ¹	Maintenance Considerations
Groundcovers							
<i>Aquilegia formosa</i> / Western columbine	3'	B/C	24"	N	Full Sun to Full Shade	NA	No maintenance required. Allow seeds to fall in place and propagate new plants.
<i>Camassia leichtlinii</i> / Large camas	3'	B	6"	N	Full Sun to Part Shade	NA	No maintenance required. Allow seeds to fall in place and propagate new plants.
<i>Camassia quamash</i> / Common camas	18"	A/B	6"	N	Full Sun to Part Shade	NA	No maintenance required. Allow seeds to fall in place and propagate new plants.
<i>Carex morrowii</i> 'Ice Dance'/ Ice Dance Japanese sedge	12"	A/B	12"	Y	Part Shade to Full Shade	Late winter/ early spring	Clean out dead leaves in spring, if desired.
<i>Carex obnupta</i> / Slough sedge	4'	A	12"	Y	Full Sun to Full Shade	Late winter/ early spring	Remove dead leaves with a hand rake, if necessary. Excellent soil binder.
<i>Carex stipata</i> / Sawbeak sedge	3'	A/B	12"	Y	Full Sun	Late winter/ early spring	Remove dead leaves with a hand rake, if necessary. Excellent soil binder.
<i>Carex testacea</i> / Orange New Zealand Sedge	12"	B	12"	Y	Full Sun to Part Shade	Early spring	Leave some seed heads to repropagate plants in fall. Prune back only as needed, does not need annual pruning.
<i>Delphinium menziesii</i> / Menzie's larkspur	3'	B/C	24"	N	Full Sun to Part Shade	Late Summer	Large showy dark blue to purple flowers bloom late spring to early summer and are excellent for pollinators. Stalks and stems will die off and dry through summer. Dry stalks can be trimmed and removed, if desired. Seeds will produce new plants and roots will resprout next spring.
<i>Echinacea angustifolia</i> and <i>Echinacea sp.</i> / Blacksamson echinacea	24"	B/C	24"	N	Full Sun	Late Fall/Winter	Deadhead in winter if desired, but seedheads provide winter food for songbirds.
<i>Echinacea purpurea</i> / Purple coneflower	24"	B/C	24"	N	Full Sun to Part Shade	Late Fall/Winter	Deadhead in winter if desired, but seedheads provide winter food for songbirds.
<i>Helictotrichon sempervirens</i> / Blue oat grass	3'	B/C	3'	Y	Full Sun	NA	Dought-tolerant once established.
<i>Juncus arcticus ssp. littoralis</i> / Mountain rush	24"	A/B	12"	Y	Full Sun to Part Shade	NA	Remove dead leaves with a hand rake, if necessary.
<i>Juncus ensifolius</i> / Daggerleaf rush	18"	A	12"	Y	Full Sun	Late winter/ early spring	Remove dead leaves with a hand rake, if necessary.
<i>Juncus patens</i> / Spreading rush	3'	A	12"	Y	Full Sun to Part Shade	Late winter/ early spring	Remove dead leaves with a hand rake, if necessary.
<i>Juncus patens</i> 'Elk Blue'/ California Grey rush	24"	A	12"	Y	Full Sun to Part Shade	Late winter/ early spring	Remove dead leaves with a hand rake, as necessary
<i>Juncus tenuis</i> / Slender rush	30"	A	12"	Y	Full Sun	Late winter/ early spring	Remove dead leaves with a hand rake, as necessary
<i>Iris douglasiana</i> / Douglas' iris	18"	A/B	12"	N	Full Sun	Late fall	Clear out dead leaves, if desired, but not necessary
<i>Iris tenax</i> / Oregon iris	24"	B	12"	N	Full Sun to Part Shade	Late fall	Clear out dead leaves, if desired, but not necessary
<i>Pennisetum</i> 'Little Bunny', <i>Pennisetum sp.</i> /Fountain grass	18"	B/C	24"	N	Full Sun to Part Shade	Late winter	Leave dry vegetation over winter and clear out dead stalks late winter to make room for new spring growth. Divide plants every few years to reinvigorate growth.
<i>Polystichum munitum</i> / Western swordfern	3'	B/C	3'	Y	Part to Full Shade	NA	Clean out dead leaves, if desired.
<i>Rudbeckia fugida</i> 'Goldsturm'/ Black eyed susan	24"	B	24"	N	Full Sun to Part Shade	Winter	Deadhead in winter if desired, but seedheads provide winter food for songbirds.
Low Shrubs							
<i>Arctostaphylos uva-ursi</i> / Kinnikinnick	12"	B	12"	Y	Full Sun to Part Shade	NA	No hedge trimming or pruning.

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This list may also be used for privately-owned facilities if desired.**

Latin Name/ Common Name	Potential Mature Height	Planting Zone	On Center Plant Spacing	Evergreen	Sun and Shade Tolerance	Pruning Timing ¹	Maintenance Considerations
<i>Arctostaphylos uva-ursi</i> 'Vancouver Jade'/ Vancouver Jade Bearberry	12"	B	12"	Y	Full Sun to Part Shade	NA	No hedge trimming or pruning.
<i>Geranium</i> 'Gerwat' Rozanne/ Rozanne cranesbill	18"	B/C	24"	N	Full Sun to Part Shade	NA	Prune plants to encourage additional blooming, if desired. Prune side stems to control spread.
<i>Mahonia nervosa</i> / Cascade Oregon grape	24"	A/B	3'	Y	Full Sun to Shade	NA	No hedge trimming or pruning.
<i>Mahonia repens</i> / Creeping Oregon grape	24"	B	24"	Y	Full Sun to Shade	NA	No hedge trimming or pruning.
<i>Cornus sericea</i> 'Kelseyi'/ Kelsey's dwarf red-twig dogwood	3'	A/B	24"	N	Full Sun	Fall or winter	No hedge trimming or pruning.
<i>Cornus sericea</i> 'Isanti'/ Isanti dogwood	4' to 5'	A/B	3'	N	Full Sun	Fall or winter	Plant in areas along ROW where line of sight for vehicles and pedestrians can tolerate slightly higher growth. Still has smaller dogwood form and structure.
<i>Heuchera micrantha</i> native, 'Purple Palace', and other varieties/ Alumroot, Coralbells	24"	B	24"	Y	Full Sun to Part Shade	Early spring	Clear out dead leaves, if desired, but not necessary
<i>Lavendula angustifolia</i> 'Hidcote Blue' and <i>Lavendula</i> sp./ Hidcote Blue English lavender	3'	B	24"	Y	Full Sun	During flower bloom period for first 3 years	Prune back flower stalks and 1" to 2" of soft new growth during first three years of establishment to encourage a dense, full growth habit. No further pruning necessary after first three years.
<i>Potentilla fruticosa</i> 'Sunset'/ Sunset shrubby cinquefoil	24"	B	24"	N	Full Sun to Part Shade	Late winter/ early spring	Prune in dormant season to avoid negatively affecting flowering
<i>Ribes sanguineum</i> / Red flowering currant	8'	B/C	5'	N	Full Sun	Winter	Native shrub used as accent shrub or species of interest. Plant minimum of 4' from sidewalk or roadway edge to avoid need for pruning. Not appropriate where low vegetation is needed for safe line of sight. Important pollinator and wildlife plant.
<i>Spiraea betulifolia</i> / White spirea	3'	B/C	24"	N	Full Sun to Part Shade	Winter	Plant at least 1 foot from sidewalks and adjacent impervious surfaces to avoid pruning.
<i>Spiraea japonica</i> 'Little Princess' and <i>Spiraea japonica</i> sp./ Little Princess Japanese spiraea	3'	A/B	24"	N	Full Sun	NA	Needs regular watering during extreme dry periods. No pruning necessary.
<i>Symphoricarpos albus</i> / Snowberry	5'	B/C	3'	N	Full Sun to Full Shade	Fall or winter	Native shrub that can be grown in massings or used singly within facilities. Plant minimum of 3' from sidewalk or roadway edge to avoid need for pruning. Not appropriate where low vegetation is needed for safe line of sight.
<i>Teucrium chamaedrys</i> / Wall germander	24"	B/C	24"	Y	Full Sun	After flowering	Low, drought-tolerant shrubs loved by pollinators. Prune or shear after blooming to encourage bushy, compact growth habit.

Notes

1. Most plants should not require pruning unless there is a line of sight, clearance, or sidewalk conflict. Proper placement of plants away from sidewalks should help avoid need for regular pruning. Lavender is the only species that requires pruning during the first three years after planting in order to create the appropriate long-term growth form.

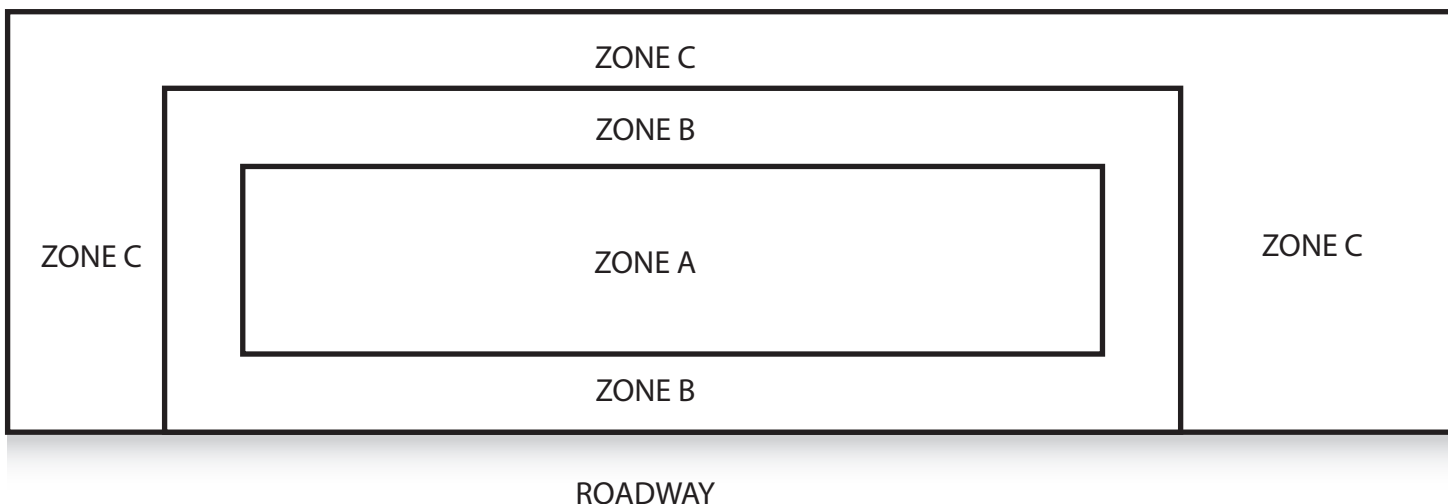
City of Vancouver Plant List for Bioretention Within the Public Right-of-Way

Zone A: Area of the facility within the maximum ponding elevation, with frequent standing water or saturated soils. Plants within this area within this area can tolerate temporary standing water and seasonally wet soil conditions.

Zone B: Area of the facility above the maximum ponding elevation, where soils are moist to dry. Plants within this area are selected to be drought tolerant, stabilize slopes, and be placed so that mature growth does not require frequent pruning or cause line of sight issues.

Zone C: Landscape areas adjacent to the stormwater facility. Typically planted with drought-tolerant plants. Plants within this area are selected to tolerate dry soils and help blend the facility within the surrounding landscape. Street trees may be located within Zone C, upon City approval. Trees must be selected so that root structures and leaf drop do not negatively impact stormwater infrastructure and performance.

BIORETENTION CELL WITH SIDE SLOPES PLANTING ZONES



PLANTER PLANTING ZONES

