

Homeowner Incentive Program (HIP) 2.0 BMP- Material Specifications

Version 1.0

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Key to Specifications:

[Common Name]; (*technical name(s)*): [written spec.][Reference {i.e. WSDOT Standard Spec. 9-03.11(2) or WA State Ecology publication 94-038}]

Reference to Appendices if applicable. Special Notes.

Rock Materials

Cascade Stone; (ASTM #8 or #9 Stone): Clean, well-graded fine aggregate less than 1/2" in diameter and containing less than 5% fine material as determined by sieve analysis. Material shall be washed. Shall consist of screened sand, gravel, or other inert materials, or combinations thereof, and shall have hard, strong, durable particles free from adherent coatings and deleterious substances. *WSDOT Standard Spec. 9-03.1(4) C.* **Gradation Table found in Appendix A.**

Media Filter Drain Mix; (MFD): A blend of materials comprised of aggregate, horticultural grade perlite, agricultural grade dolomite, and non-calcined agricultural grade gypsum. MFD mix shall be premixed prior to placement and shall meet the following proportions per cubic yard:

Material	Quantity
Aggregate	0.75 cubic yards
Perlite	0.25 cubic yards
Dolomite	2.5 pounds
Gypsum	0.375 pounds

Aggregate for Media Filter Drain Mix shall conform to the following requirements for grading and quality:

Sieve Size	Percent Passing (by weight)
1/2"	100
3/8"	90-100
U.S. No. 4	10-56
U.S. No. 10	0-15
U.S. No. 200	0-1.5

Percent fracture, by weight, min: The fracture requirement shall be at least two fractured faces and will apply to material retained on the U.S. No. 4.

Aggregate for the Media Filter Drain shall be substantially free from adherent coatings. Shall be manufactured from ledge rock, talus, or gravel screened sand, gravel, or other inert materials, or combinations thereof, and shall have hard, strong, durable particles free from adherent coatings and deleterious substances.

Perlite for Media Filter Drain Mix shall conform to the following requirements for grading and quality:

- Horticultural grade, free of any toxic materials
- 0-30% passing US No. 18 Sieve
- 0-10% passing US No. 30 Sieve

Dolomite; $CaMg(CO_3)_2$ (calcium magnesium carbonate) for Media Filter Drain Mix shall conform to the following requirements for grading and quality:

- Agricultural grade, free of any toxic materials
- 100% passing US No. 8 Sieve
- 0% passing US No. 16 Sieve

Gypsum; Non-calcined, agricultural gypsum $CaSO_4 \cdot 2H_2O$ (hydrated calcium sulfate) for Media Filter Drain Mix shall conform to the following requirements for grading and quality:

- Agricultural grade, free of any toxic materials
- 100% passing US No. 8 Sieve
- 0% passing US No. 16 Sieve

WSDOT Highway Runoff Manual, Chapter 5, Dept. Ecology Vol. 5 – Runoff Treatment BMPs, Chapter 8.

Pea Gravel: Clean, well-graded fine aggregate less than 3/8" in diameter and containing less than 2.5% fine material as determined by sieve analysis. Materials shall be washed thoroughly to remove clay, loam, alkali, organic matter, or other deleterious substances. Shall consist of screened sand, gravel, or other inert materials, or combinations thereof, and shall have hard, strong, durable particles free from adherent coatings and deleterious

substances. *WSDOT Standard Spec. 9-03.1(2)*. **Gradation Table found in Appendix A.**

Permeable Ballast: Clean, well-graded aggregate at least 2" in diameter and containing at least 75% fractured faces and less than 0.5% fine material as determined by sieve analysis. Material shall be washed. Shall consist of angular, crushed, partially crushed, or naturally occurring granular material. *WSDOT Standard Spec. 9-03.9(2)*. **Gradation Table found in Appendix A.**

Quarry Spalls: Aggregate less than 8" in diameter and containing less than 10% of $\frac{3}{4}$ " diameter material as determined by visual inspection. Material shall be washed. Shall consist of broken stone or broken concrete rubble and shall be free of rock fines, soil, or other extraneous material. Concrete rubble shall not be contaminated by foreign materials such as fibers, wood, steel, asphalt, sealant, soil, plastic and other contaminants or deleterious material. Aggregate shall be hard, sound and durable. It shall be free from segregation, seams, cracks, and other defects tending to destroy its resistance to weather. *WSDOT Standard Spec. 9-13.1(5)*.

River Rock; (River Rock Cobble): Clean, uniformly graded aggregate 3" to 8" in diameter. All fines shall be screened from the aggregate within $\frac{1}{4}$ " tolerance. Material shall be washed. Shall consist of round rocks that may be varied in color, free of organic and inorganic debris and trash.

Sand; (Type C33 Sand, Sand Drainage Blanket): Clean, well-graded fine aggregate less than No. 4 sieve and containing less than 3% fine material as determined by sieve analysis. Shall consist of screened sand or other inert materials, or combinations thereof, having hard, durable particles free from adherent coatings. Materials shall be washed thoroughly to remove clay, loam, alkali, organic matter, or other deleterious substances. *WSDOT Standard Spec. 9-03.13*. **Gradation Table found in Appendix A.**

Shoreline Gravel; (*Streambed Sediment*): Clean, well-graded aggregate less than 2- ½" in diameter and containing less than 9% fine material as determined by sieve analysis. Material shall be washed. Shall consist of naturally occurring water rounded aggregates and have hard, strong, sound, durable, fracture free pieces of igneous and metamorphic rock. Aggregate shall be free of weathered materials, seams of soft rock, any wood and other waste, and shall be free of any coating. Aggregates from quarries, ledge rock, and talus slopes are not acceptable. *WSDOT Standard Spec. 9-03.11(1)*. **Gradation Table found in Appendix A.**

Washed Drain Rock; (*Gravel Backfill for Drains or Gravel Backfill for Drywells*): Clean, well-graded, aggregate at least ¾" in diameter and containing less than 0.5% fine material as determined by sieve analysis. Material shall be washed. Shall consist of crushed, processed, or naturally occurring granular material. It shall be free from various types of wood waste or other extraneous or objectionable materials. *WSDOT Standard Spec. 9-03.12(4) Gravel Backfill for Drains or 9-03.12(5) Gravel Backfill for Drywells*. **Gradation Table found in Appendix A.**

Mulch and Compost Materials

Compost: Compost shall be fine, medium or coarse per gradations as shown in WSDOT Standard Spec. 9-14.4(8). Compost products shall be the result of the biological degradation and transformation of organic materials under controlled conditions designed to promote aerobic decomposition. Compost shall be stable with regard to oxygen consumption and carbon dioxide generation. Compost shall be mature with regard to its suitability for serving as a soil amendment or an erosion control BMP. The compost shall have a moisture content that has no visible free water or dust produced when handling the material. Compost production and quality shall comply with WAC 173-350. Backyard compost is not acceptable for use. Approved materials are published by the City of Bellingham. See **City of Bellingham Approved Mulch, Topsoil, and Compost for Use in the Lake Whatcom Watershed**. Located online at: lakewhatcomhip.org, search "Resources for

Professionals" *WSDOT Standard Spec. 9-14.4(8)* **Gradation Table found in Appendix A.**

Hog Fuel; (*Bark or Wood Chip Mulch, Wood Strand Mulch*): Wood residues processed through a chipper or mill to produce coarse chips. Residues may include bark, sawdust, planer shavings, wood chunks, and small amounts of mineral material. See **City of Bellingham Approved Mulch, Topsoil, and Compost for Use in the Lake Whatcom Watershed**. Located online at: lakewhatcomhip.org, search "Resources for Professionals" *WSDOT Std. Spec. 9-14.4(3) and 9-14.4(4)*.

Low-Phosphorus Mulch: Material containing less than 1,400ug/L (alternatively, parts per billion [ppb]) of soluble reactive phosphorus (SRP) as determined by the City of Bellingham laboratory testing or alternative, approved method. Approved materials are published by the City of Bellingham. See **City of Bellingham Approved Mulch, Topsoil, and Compost for Use in the Lake Whatcom Watershed**. Located online at: lakewhatcomhip.org, search "Resources for Professionals"

Soil-Based Materials

Low-Phosphorus Rain Garden Soil Mix; (*Bioretention soil mix; Lake Whatcom Friendly Rain Garden soil mix*): Shall be a well-blended mixture of mineral aggregate and compost measured on a volume basis. Consist of approximately two parts HIP-approved compost (35 to 40%) by volume and three parts mineral aggregate (sand component, see gradation table below) (60 to 65%). Any soil-based or organic materials used, or added to, this mixture shall conform to the definition of compost in the HIP specification book and be found on the **City of Bellingham Approved Mulch, Topsoil, and Compost for Use in the Lake Whatcom Watershed**. Located online at: lakewhatcomhip.org, search "Resources for Professionals" The mixture shall be well blended to produce a homogeneous mix, and have an organic matter content of 4% to 8%.

Aggregate for Rain Garden Soil Mix (sand component) shall be well graded and conform to the following requirements for grading and quality:

Sieve Size	Percent Passing (by weight)
3/8"	100
U.S. No. 4	95-100
U.S. No. 10	75-90
U.S. No. 40	25-40
U.S. No. 100	4-10
U.S. No. 200	2-5

Dept. Ecology Vol. 5 – Runoff Treatment BMPs, Chapter 5.

Low-Phosphorus Topsoil: Pre-mixed material listed as "topsoil," see **City of Bellingham Approved Mulch, Topsoil, and Compost for Use in the Lake Whatcom Watershed**. Located online at: lakewhatcomhip.org, search "Resources for Professionals". Materials not found on this list must be submitted to the City of Bellingham for materials testing at least one month prior to use in order to be considered as an alternate.

Pipe and Drains

Atrium Grate: Drain cover designed to prevent debris from clogging overflow/outlet pipe. Must be of adequate diameter to cover entire pipe end and fit securely. Grating shall not allow mulch to pass through.

References and links in Appendix B.

Catch Basin; (Overflow Structure, Junction Box, Yard Drain): Constructed of durable plastic or pre-cast concrete, this structure must extend to a minimum of 24" below ground surface. Diameter ranges between 24" to 9". Shall contain adequate knock-outs or inlet/outlet junctions for application.

Catch Basin to provide a minimum of 8" of sump depth storage below the outlet. [References and links in Appendix B.](#)

Fine Mesh Screen: Shall prevent large debris and floatables from entering downturned elbow. 4" insert bird screens are acceptable as are more flexible screening that can be secured around the outlet pipe.

Perforated Pipe: Shall be straight-run 2 or 3-hole triple wall or smooth wall piping, constructed of PVC or HDPE plastic. Corrugated piping or rolled materials are not acceptable. (*WSDOT Standard Spec. 9-05.2(6) and 9-05.23*)

Pipe Couplings and Fittings; (Clean Outs, Tees, Wyes, Caps, Elbows): Shall be constructed of PVC or HDPE plastic. Clean outs shall be removable as needed for inspections and maintenance. Tees, wyes, caps and elbows shall be glued in place or installed using a pipe-to-pipe fitting of proper diameter to create a durable connection. (*WSDOT Standard Spec. 9-05.1(5) and 9-05.23*)

Rigid Solid Pipe: Shall be straight-run triple wall or smooth wall piping, constructed of PVC or HDPE plastic. Corrugated piping or rolled materials are not acceptable. (*WSDOT Standard Spec. 9-05.1(5) and 9-05.23*)

Solid Lids and Grates (for catch basins): Shall be locking-type lids constructed of durable material and meet the intended vehicular or non-vehicular application.

Trench Drain: 3 to 12" wide channel-type drain that can bear associated loads. Plastic, fiberglass, cast iron, metal or concrete are acceptable materials for construction. [References and links in Appendix B.](#)

Trench Drain Grate: Metal, cast iron or composite drain cover. Shall be secured to the trench drain body and be removable for maintenance purposes. [References and links in Appendix B.](#)

Type 1 Catch Basin Control Structure: Shall meet specifications of a Type 1 catch basin meeting or exceeding WSDOT Standard Plan B-5.20-01.

Permeable Pavement and Associated Materials

Edge Restraints; (*curbs*): Durable material intended to keep permeable pavers in place when exposed to heavy pressure, such as vehicular applications. Can be manufactured or custom built out of wood, plastic, metal, concrete or masonry. **References and links in Appendix B.**

Grid Paver System: Durable material designed to allow stormwater flows to pass through into an infiltration basin below. Grid paver systems are adequate for slopes up to 10% and can handle vehicular traffic when installed per manufacturer's specifications. **References and links in Appendix B.**

Permeable Interlocking Paver (PIP) system: Interlocking pavement system consisting of manufactured blocks with pre-designed gaps between each block to allow surface flow of water to fully infiltrate between and around pavers. **References and links in Appendix B.**

Permeable Pavers: Durable block materials less than two square feet in surface area and with a minimum gap of $\frac{1}{4}$ " around each block. For pavers larger than 1ft^2 , add $\frac{1}{4}$ " additional gap per square foot of area. For maximum size pavers (2ft^2), the gap shall be minimum $\frac{1}{2}$ " around each or 1" in between adjacent pavers.

Permeable Paver Joint Filler: Clean, washed, uniformly graded, aggregate containing no fine material. Aggregate shall be of size and gradation to sufficiently provide infiltration from a bucket of water being poured onto the surface. If using a manufactured permeable-interlocking-paver (PIP) system, joint filler shall conform to the manufacturer's specifications and provide initial infiltration rate greater than 100 inches per hour.

Poured Permeable Surfacing; (*pervious concrete, porous asphalt*): Specially formulated mixtures of uniform open-graded coarse aggregate, additives, and potable water. The depth of the surface varies, depending on the required bearing strength and pavement design requirements. Specific mixes should be prepared following the guidelines of BMP T5.15: Permeable

Pavements from the most recently published version of the Department of Ecology's Stormwater Management Manual for Western Washington. For design depths, the minimum requirements for permeable pavement applications are:

Facility	Min. Depths of Pervious Concrete
Sidewalks	0.35 feet
Car Parking	0.67 feet
Truck Parking	0.75 feet
Facility	Min. Depths of Porous Asphalt
Sidewalks	0.25 feet
Car Parking	0.33 feet
Truck Parking	0.67 feet

Erosion Controls

Catch Basin Inserts; (Inlet Protection): Shall be installed below or above, or as a prefabricated cover at each inlet grate, as shown in the Plans.

Geotextile fabric in all prefabricated catch basin insert devices shall meet or exceed the requirements of WSDOT Std. Spec. Section 9-33.2, Table 1, for Moderate Survivability, and the minimum filtration properties of Table 2.

Department of Ecology BMP C220: Storm Drain Inlet Protection standard, Stormwater Management Manual for Western Washington. WSDOT Std. Spec. 8-01.3(9)D.

Grass Seed: Shall be certified in accordance with WAC 16-302. Seed mixes shall be commercially prepared and supplied in sealed containers. The labels shall show:

- (1) Common and botanical names of seed,
- (2) Lot number,
- (3) Net weight,

- (4) Pounds of Pure live seed (PLS) in the mix,
- (5) Origin of seed.

All seed vendors must have a business license issued by supplier's state or provincial Department of Licensing with a "seed dealer" endorsement.

WSDOT Std. Spec. 9-14.2. **This material is ONLY HIP-eligible as a method of restoring disturbed areas after construction of an approved HIP-eligible drainage improvement.**

Sandbags; (gravel bags): Shall be filled with clean sand or pea gravel. Bags shall be of burlap or woven synthetic material. Bags shall be of a size and strength to hold a minimum 1.0 cubic foot of material. Synthetic material bags shall have a manufacturer's survivability rating greater than the anticipated period of installation. Burlap bags shall be at least 10-ounce burlap of all natural material. Re-use of excavated materials for the purposes of sand bag filling is not acceptable.

Silt Fencing: Shall be a minimum of 5 feet in height, UV stabilized and shall meet the geotextile requirements in WSDOT Std. Spec Section 9-33 Table 6. Support posts shall have sufficient strength and durability to support the fence through the life of the project. *Department of Ecology BMP C233: Silt Fence standard, Stormwater Management Manual for Western Washington.* *WSDOT Std. Spec 9-14.5(9).*

Sod: Rolled material for use in replacing grass surfacing that shall not be impregnated with fertilizer containing **no** (0.0%) phosphorus. The sod shall be field grown one calendar year or older, have a well-developed root structure, and be free of all weeds, disease, and insect damage. Prior to cutting, the sod shall be green, in an active and vigorous state of growth, and mowed to a height not exceeding 1 inch. The sod shall be cut with a minimum of 1 inch of soil adhering. *WSDOT Std. Spec. 9-14.6(8).* **This material is ONLY HIP-eligible as a method of restoring disturbed areas after construction of an approved HIP-eligible drainage improvement.**

Soil Coverage Tarp: Covering of stockpile or excavated spoils with plastic, vizqueen or tarp to prevent sediment runoff from precipitation. Shall conform to *Department of Ecology BMP C123: Plastic Covering standard, Stormwater Management Manual for Western Washington*.

Stabilized Construction Entrance: A construction site entrance that is reinforced or finished with media such as quarry spalls or hog fuel to minimize the tracking of sediment onto adjacent streets. See specifications for hog fuel and quarry spalls in HIP specifications.

Wattles: Shall consist of cylinders of biodegradable plant material such as weed-free straw, coir, compost, wood chips, excelsior, or wood fiber or shavings encased within biodegradable netting. Wattles shall be a minimum of 8 inches in diameter. Netting material shall be clean, evenly woven, and free of encrusted concrete or other contaminating materials such as preservatives. Netting material shall be free from cuts, tears, or weak places and shall have a minimum lifespan of 6 months and a maximum lifespan of not more than 24 month. *Department of Ecology BMP C235: Stormwater Management Manual for Western Washington. WSDOT Std. Spec. 9-14.5(5)*.

Other

Dispersion Trench Edging: For dispersion trench grade board to ensure adequate sheet flow dispersion is achieved. Material cannot be galvanized, but may be made of lumber, plastic (including recycled), or concrete. Must be set level and extend along the entire length of dispersion trench.

Dispersion Trench Support Post: For dispersion trench foundation support. Anchor support post into sound soils and connect to Dispersion Trench Edging to ensure level flow dispersion.


Geotextile for Drainage; (soil separation fabric): For lining sides of trenches and encapsulating specialty materials such as filter media or sand. Commercial "weed-block" fabric is not acceptable for this purpose.

Rigid, Waterproof Barrier: Pond liner or similar material (minimum 30 mil thickness) intended to prevent lateral movement of flows while detained in an infiltration or treatment system. Shall be installed when infiltration system is placed within 10' of structures with basements or crawlspaces and/or within 5' of structures with slab-on-grade foundations.

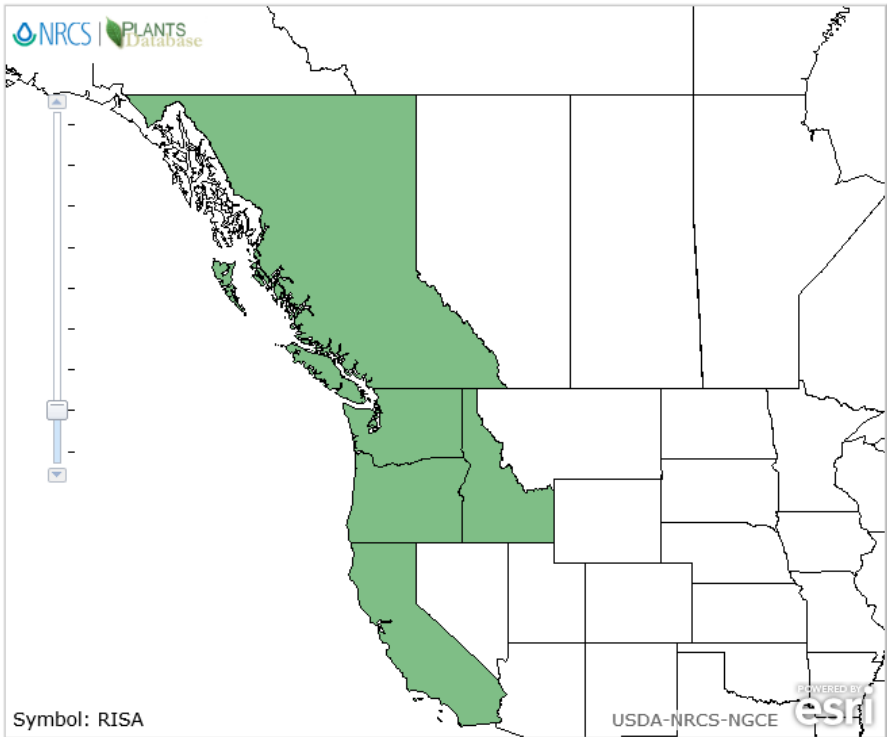
Native Plants; (groundcovers, understory, canopy, shrubs, trees, bioretention plantings): Plant species, or cultivars thereof, which existed in the Pacific Northwest forests prior to European contact. Eligible plants must be shown as native to **Washington State** on the United States Department of Agriculture (USDA) PLANTS Database, located online at: <http://plants.usda.gov>. An example is as follows for *Ribes sanguineum* (redflower currant):

Ribes sanguineum Pursh
redflower currant


Show All



About our new maps



Symbol: RISA

USDA-NRCS-NGCE 

■ Native

■ Native, No County Data

■ Introduced

■ Introduced, No County Data

■ Both

■ Both, No County Data

Absent/Unreported

Native Status:

L48
 AK
 HI
 PR
 VI
 NAV
 CAN
 GL
 SPM
 NA

General Information

Symbol:	RISA
Group:	Dicot
Family:	Grossulariaceae
Duration:	Perennial
Growth Habit:	Shrub
Native Status:	CAN N L48 N

Characteristics

[Fact Sheet \(pdf\)](#) ([doc](#))

[Data Source and Documentation](#)

Appendix A – Material Gradations

Cascade Stone; (ASTM #8 or #9 Stone):

Table 1
Grading Requirements for Jointing Material (ASTM No. 9)

Sieve Size	Percent Passing
9.5 mm (3/8")	100
4.75 mm (No. 4)	85-100
2.36 mm (No. 8)	10-40
1.18 mm (No. 16)	0-10
300 µm (No. 50)	0-5

Table 2
Grading Requirements for Bedding Course (ASTM No. 8)

Sieve Size	Percent Passing
12.5 mm (1/2")	100
9.5 mm (3/8")	85 to 100
4.75 mm (No. 4)	10 to 30
2.36 mm (No. 8)	0 to 10
1.16 mm (No. 16)	0 to 5

WSDOT Standard Spec. 9-03.1(4)C (AASHTO Grading No. 8).

Pea Gravel:

Sieve Size	Class 1 Percent Passing		Class 2 Percent Passing	
	Min.	Max.	Min.	Max.
3/8"	99	100	99	100
No. 4	95	100	95	100
No. 8	68	86		
No. 16	47	65	45	80
No. 30	27	42		
No. 50	9	20	10	30
No. 100	0	7	2	10
No. 200	0	2.5	0	2.5

WSDOT Standard Spec. 9-03.1(2).

Permeable Ballast:

Sieve Size	Percent Passing
2½"	99-100
2"	65-100
¾"	40-80
No. 4	5 max.
No. 100	0-2
% Fracture	75 min.

All percentages are by weight.

WSDOT Standard Spec. 9-03.9(2).

Sand; (Type C33 Sand, Sand Drainage Blanket):

Sieve	Percent Passing			
	Natural Sand		Manufactured Sand	
	Min.	Max.	Min.	Max.
No. 4	99	100	99	100
No. 8	90	100	90	100
No. 16	60	90	60	90
No. 30	35	70	35	70
No. 50	10	30	20	40
No. 100	0	5	10	25
No. 200	0	3	0	10

WSDOT Standard Spec. 9-03.13.

Shoreline Gravel; (Streambed Sediment):

Sieve Size	Percent Passing
2½"	99-100
2"	65-95
1"	50-85
No. 4	26-44
No. 40	16 max.
No. 200	5.0-9.0

All percentages are by weight.

WSDOT Standard Spec. 9-03.11(1).

Washed Drain Rock:*Gravel Backfill for Drains*

Sieve Size	Percent Passing
1"	99-100
¾"	80-100
⅝"	0-40
No. 4	0-4
No. 200	0-2

WSDOT Standard Spec. 9-03.12(4)

Gravel Backfill for Drywell

Sieve Size	Percent Passing
1½"	99-100
1"	50-100
¾"	0-20
⅜"	0-2
No. 200	0-1.5

WSDOT Standard Spec. 9-03.12(5)

Compost:

Fine compost shall meet the following gradation:

Sieve Size	Percent Passing	
	Minimum	Maximum
1"	100	
¾"	90	100
¼"	75	100

Note: Maximum particle length of 4 inches.

Medium compost shall meet the following gradation:

Sieve Size	Percent Passing	
	Minimum	Maximum
1"	100	
¾"	85	100
¼"	70	85

Note: Maximum particle length of 4 inches. Medium compost shall have a carbon to nitrogen ratio (C:N) between 18:1 and 35:1. The carbon to nitrogen ratio shall be calculated using the dry weight of "Organic Carbon" using TMECC 04.01A divided by the dry weight of "Total N" using TMECC 04.02D.

Coarse compost shall meet the following gradation:

Sieve Size	Percent Passing	
	Minimum	Maximum
2"	100	
1"	90	100
¾"	70	100
¼"	40	60

Note: Maximum particle length of 6 inches. Coarse compost shall have a carbon to nitrogen ratio (C:N) between 25:1 and 35:1. The carbon to nitrogen ratio shall be calculated using the dry weight of "Organic Carbon" using TMECC 04.01A divided by the dry weight of "Total N" using TMECC 04.02D.

[Appendix B – Resources and Links](#)

DISCLAIMER: The following links are associated with specific products that are HIP-approved and are intended to help participants, designers, and contractors better understand expected function and specifications of approved materials. Any alternative material meeting the same specifications would be considered functionally similar and would also be HIP-eligible. These links are not considered an exhaustive list of available products and does not represent an endorsement of the products or manufacturers. Links were last checked for accuracy in September, 2016.

Atrium Grate: Refer to following links for guidance and specifications:

<http://www.polylok.com/catalog/tid/123/category/10>

<http://www.ndspro.com/atrium-grates>

Catch Basin; (*Overflow Structure, Junction Box, Yard Drain*):

Refer to following links for guidance and specifications for vehicular and non-vehicular installations:

<http://www.ndspro.com/catch-basins>

<http://www.graniteprecast.com/products/catch-basin/>

<http://www.polylok.com/catalog/tid/10/category/10>

Edge Restraints; (*curbs*):

Refer to following links for guidance and specifications for vehicular and non-vehicular installations:

<http://www.pinehallbrick.com/userfiles/techbullet8.pdf>

http://newlinehardscapes.com/diy-installations/tech_spec_03_edge_restraints.pdf

<http://www.pavetech.com/paveedge/edge.htm>

Grid Paver System:

Refer to following links for guidance and specifications for vehicular and non-vehicular installations:

<http://www.stabiligrid.com/>

<http://www.typargeosynthetics.com/products/porous-paving/bodpave-85-porous-pavers.html>

Permeable Interlocking Paver (PIP) system:

Refer to following links for guidance and specifications:

<http://aquapave.com/>

<http://www.mutualmaterials.com/products/eco-piora/>

<http://www.mutualmaterials.com/products/eco-stone/>

<http://www.ndspro.com/permeable-pavers>

Trench Drain:

Refer to following links for guidance and specifications for vehicular and non-vehicular installations:

<http://www.ndspro.com/channel-and-trench-drains>

<http://zurn.trenchdrainsystems.com/>

http://www.mifab.com/Catalog/Trench_Drains/index.html

Trench Drain Grate:

Refer to following links for guidance and specifications for vehicular and non-vehicular installations:

<http://www.drainagesolutionsinc.com/trenchdrain.html>

<http://www.ironagegrates.com/products/trench-drain-grates>

<http://zurn.trenchdrainsystems.com/>