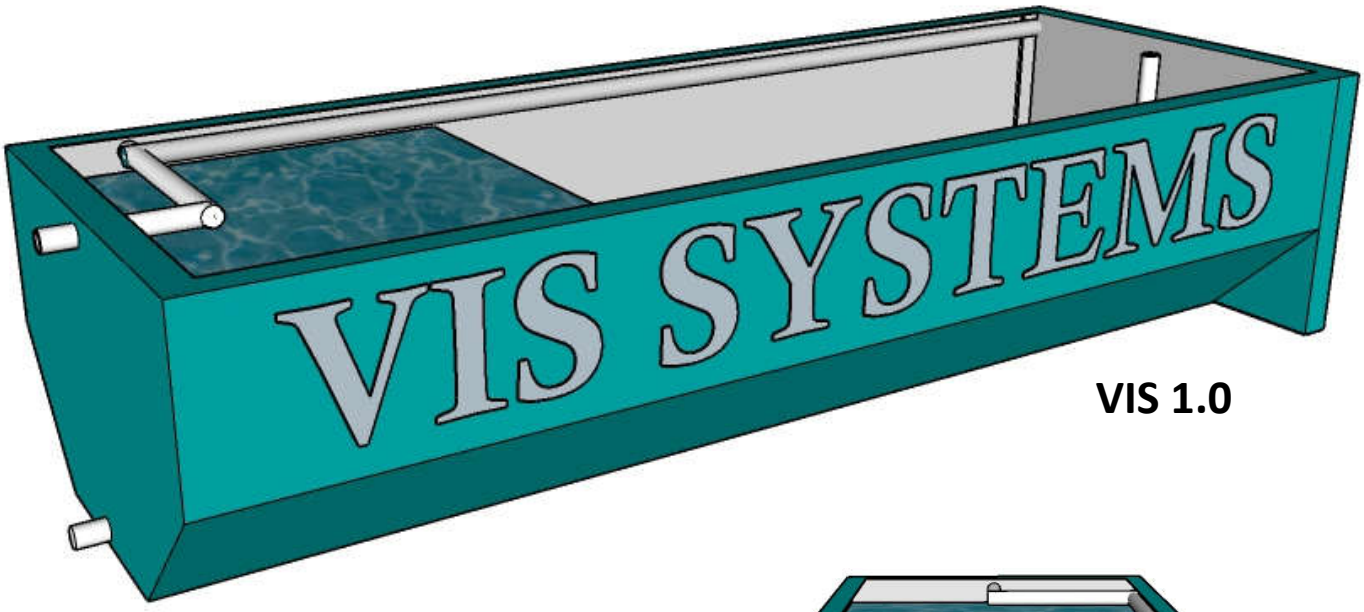
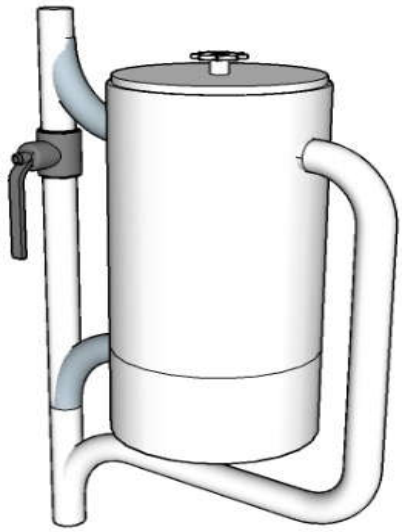
CEDAR GROVE® VIS Systems

FILTRATION SOLUTIONS FOR VEHICLE IMPACTED STORMWATER

VIS Systems by Cedar Grove are a line of containerized mobile systems designed to filter stormwater pollution off vehicle impacted surfaces, including roads, bridges, and parking structures. They are modeled around the proven success of in-ground bioretention systems, but designed to be mobile and utilized in-line with existing stormwater drainage structures.



VIS 1.0



VIS 2.0

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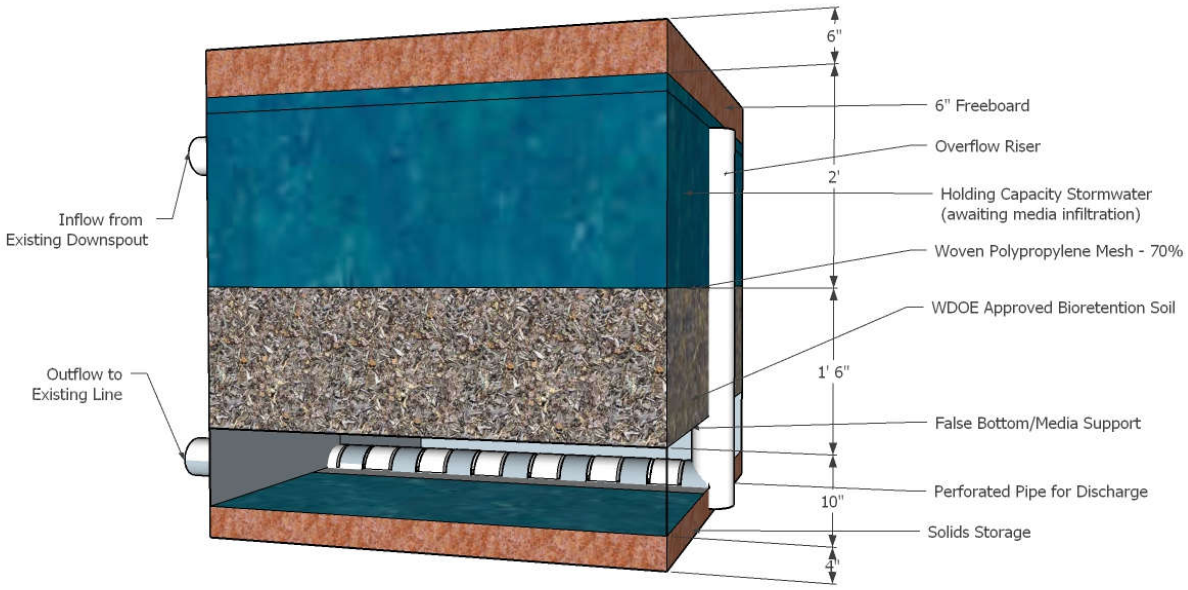
All VIS Systems use the Ecology specification for bioretention soil found in Section V-5.6 of the Stormwater Management Manual for Western Washington (SWMMWW). System size and type should be selected on a case by case basis to ensure that run-off captured by existing structures is infiltrated through the appropriate square footage of permeable bioretention soil media.



VIS Systems Media Cross Section

The type and number of systems, as well as the surface area to be treated, is to be calculated using the following procedures and based on an infiltration rate of 12”/hr.

- Western Washington: for treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the sand filter module in the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model. The model must indicate the unit is capable of processing 91 percent of the influent runoff file.

- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three flow rate based methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.

- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility

The below chart is the aggregate gradation requirement for bioretention soil.

Table 7.4.1
General Guideline for Mineral Aggregate Gradation

Sieve Size	Percent Passing
3/8”	100
#4	95-100
#10	75-90
#40	25-40
#100	4-10
#200	2-5

Compost to Aggregate Ratio, Organic Matter Content, Cation Exchange Capacity

- Compost to aggregate ratio: 60-65 percent mineral aggregate, 35 – 40 percent compost.

- Organic matter content: 5 – 8 percent by weight.

- Cation Exchange Capacity (CEC) must be > 5 milliequivalents/100 g dry soil Note: Soil mixes meeting the above specifications do not have to be tested for CEC. They will readily meet the minimum CEC.

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The following compost standards are required.

- Meets the definition of "composted materials" in WAC 173-350-220
- Produced at a composting facility permitted by the WA Department of Ecology.
- The compost product must originate from a minimum of 65 percent by volume from recycled plant waste as defined in WAC 173-350-100 as "Type I Feedstocks." A maximum of 35 percent by volume of other approved organic waste as defined in WAC 173-350-100 as "Type III", including postconsumer food waste, but not including biosolids, may be substituted for recycled plant waste.
- Stable (low oxygen use and CO2 generation)
- Moisture content range: no visible free water or dust produced when handling the material.
- Tested in accordance with the U.S. Composting Council "Testing Methods for the Examination of Compost and Composting" (TMECC), as established in the Composting Council's "Seal of Testing Assurance" (STA) program.
- Screened to the size gradations for Fine Compost under TMECC test method 02.02-B.
- pH between 6.0 and 8.5 (TMECC 04.11-A). If the pH falls outside of the acceptable range, it may be modified with lime to increase the pH or iron sulfate plus sulfur to lower the pH. The lime or iron sulfate must be mixed uniformly into the soil prior to use in the bioretention area.
- Manufactured inert content less than 5% by weight (TMECC 03.08-A)
- Minimum organic matter content of 40% (TMECC 05.07-A)

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- Soluble salt content less than 4.0 mmhos/cm (TMECC 04.10-A)
- Maturity greater than 80% (TMECC 05.05-A “Germination and Vigor”)
- Stability of 7 or below (TMECC 05.08-B “Carbon Dioxide Evolution Rate”)
- Carbon to nitrogen ratio (TMECC 04.01 “Total Carbon” and 04.02D “Total Kjeldahl Nitrogen”) of less than 35:1.

Additional Notes

- VIS systems are closed non-pressurized systems containing bioretention soil media. All systems include a secured lid to reduce exposure to the system being contaminated from outside sources.
- All systems contain an overflow bypass capable of allowing 100% of the inbound flow during excessive rain events.
- Inlet and outlet pipes must be sized no smaller than the pipe being diverted into the system.
- Polypropylene mesh used for false bottom media support as well as erosion minimization between stormwater and bioretention media layer to be 70-80% shade rating to allow for water penetration without blinding out.
- Solids storage in bottom of VIS Systems is a minimum of 2” to allow for media which has migrated through mesh to settle out without additional solids returning to the source storm drain.

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VIS System Maintenance

- Monthly inspections of systems recommended to ensure foreign materials from source stormwater are not impacting functionality of the system.

- VIS system exchange or media exchange to be done 2x per year. This timeline is to be based on system needs and saturation of potential pollutants in the filter media.

- Disposal location of filtration media to be determined by testing of contaminants in the filter media upon removal of media from the system.