



THESE NOTES IN RED ARE OFFERED AS A GUIDE FOR DECISION MAKING WHEN YOU WANT TO MAKE CHANGES TO THIS DETAIL.

- INFILTRATION RATE OF NATIVE SOILS:** DOESN'T AFFECT THE DESIGN OF THIS FACILITY. FACILITIES THAT DON'T INFILTRATE MAY PROTECT WATER QUALITY AT THE SITE WHERE THEY RECEIVE RUNOFF, BUT IMPACT WATER QUALITY AND HABITAT VALUE THROUGH EROSION FLOWS IN DOWNSTREAM WATERWAYS. THIS FACILITY SHOULD ONLY BE USED WHEN SITE PLANNING WILL NOT ALLOW A FACILITY TO BE PLACED AT LEAST 10' FROM A BUILDING OR SITE WALL OR WHEN NATURAL CONDITIONS ARE THAT A HIGH GROUNDWATER TABLE IS WITHIN 3' OF THE BOTTOM OF THE FACILITY OR WHEN BEDROCK OR OTHER INFILTRATION BARRIER IS WITHIN 2' OF THE BOTTOM OF THE FACILITY.
  - LARGE STORM OVERFLOW:** AN AREA DRAIN OR OTHER STRUCTURAL OVERFLOW MAY NOT BE NEEDED WHERE OVERLAND FLOWS OVER A SIMPLE BERM WILL CONVEY LARGE VOLUME FLOWS SAFELY OVERLAND AWAY FROM STRUCTURES AND TOWARDS AN ALTERNATIVE CONVEYANCE SYSTEM.
  - VEGETATION:** THE MORE PLANTS THE BETTER AND THE BIGGER THE BETTER. WHERE TREES AND SHRUBS CAN BE SAFELY (IE VISIBILITY CONSIDERATIONS) PLANTED IN THE BASIN, THEY SHOULD BE. FOR EROSION CONTROL, CONSIDER HYDROSEEDING WITH GRASS SPECIES SIMILAR TO THE SPECIES THAT WILL LIKELY BE PLANTED AS PLUGS TO STABILIZE SOILS FOR THE LONG-TERM.
  - SIDE SLOPES:** DON'T EXCEED A SLOPE OF 3H:1V. PLANT ESTABLISHMENT IS DIFFICULT ABOVE THIS SLOPE BECAUSE SLOPES EXCEEDING THIS MUST BE COMPACTED. THIS ALSO REDUCES THE EFFECTIVE INFILTRATION AREA OF THE FACILITY.
  - THE IMPORTANCE OF CUT AND FILL FOR LINED FILTRATION FACILITIES:** SINCE WE'RE ONLY TREATING STORMWATER AND NOT INFILTRATING, THE BOTTOM OF AN INFILTRATION RAIN GARDEN CAN BE LOCATED IN CUT OR FILL.
  - APPROPRIATE VOLUMES:** RIM ELEVATION SHOULD BE SET SO THAT THE VOLUME OF THE WATER QUALITY STORM FLOWS THROUGH THE AMENDED PLANTING SOIL.
  - A BEEHIVE RIM IS RECOMMENDED BECAUSE IT'S LESS LIKELY TO GET CLOGGED WITH LEAVES AND TRASH. OTHER OUTLETS (DITCH INLET, PLUMBING BENDS PER CITY OF PORTLAND OVERFLOW STRUCTURE, ETC) COULD BE FINE, BUT WE SUGGEST AVOIDING A FLAT RIM.
  - SIZE THIS PIPE TO CONVEY THE 25-YEAR PEAK FLOW AFTER ATTENUATION FROM THE RAIN GARDEN.
  - TAKEN FROM ODOT MATERIAL SPECIFICATIONS FOR SPECIAL FILTER MATERIAL FOR BACKFILLING TRENCHES WITH PERFORATED DRAINS, SECTION 02610.
  - IN THE PAST A GEOTEXTILE WAS USED TO SEPARATE THE PLANTING SOIL FROM THE STORAGE ROCK BELOW (TO PRESERVE STORAGE IN THE ROCK VOIDS); HOWEVER, BOTH PRIVATE DESIGNERS AND PUBLIC AGENCIES HAVE FOUND THAT A GEOTEXTILE USED IN THIS APPLICATION IS VERY LIKELY TO CLOG. WHILE THIS ROCK SUBSTITUTE IS THE LATEST THINKING TO PROVIDE SEPARATION, IT HAS BEEN USED SUCCESSFULLY AT THE UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER AND IS CONSIDERED THE BEST ALTERNATIVE. MODIFYING THIS DETAIL TO USE A GEOTEXTILE INSTEAD OF THE PEA GRAVEL AND COARSE SAND LAYER MAY NOT BE VERY SUCCESSFUL, UNLESS YOU VERIFY THAT THE PLANTING SOIL MIX YOU'RE SPECIFYING WILL NOT CLOG THE GEOTEXTILE. DETAILING OF THESE TWO LAYERS WAS ADAPTED FROM A UNH GUIDANCE DOCUMENT ON BIORETENTION (RAIN GARDEN) FACILITIES AT [http://www.unh.edu/erg/cstev/fact\\_sheets/bio\\_i\\_fact\\_sheet\\_08.pdf](http://www.unh.edu/erg/cstev/fact_sheets/bio_i_fact_sheet_08.pdf)
  - THIS GUIDANCE HAS BEEN ADAPTED FROM A TECHNICAL MEMORANDUM ISSUED IN JANUARY 2009 BY THE WASHINGTON STATE UNIVERSITY ON BIORETENTION SOIL MIX: "Bioretention Soil Mix Recommendations for Western Washington" found online at [http://www.psparchives.com/publications/our\\_work/stormwater/BSMResults-Guidelines%20Final.pdf](http://www.psparchives.com/publications/our_work/stormwater/BSMResults-Guidelines%20Final.pdf). IN A PHONE CONVERSATION WITH THE MAIN AUTHOR, CHRIS HINMAN, THESE SOILS ARE CONSIDERED TO BE GOOD FOR ANY REGION, NOT JUST WESTERN WASHINGTON, AS THE TITLE MIGHT IMPLY.
- 18" IS THE MINIMUM DEPTH NEEDED TO PROVIDE ADEQUATE WATER QUALITY.
- THE VOID RATIO OF ALL OPEN GRADED ROCK, REGARDLESS OF SIZE, RANGES FROM 30-40%.
  - WHERE THE LINER IS NEEDED BECAUSE OF INADEQUATE SETBACKS TO BUILDING FOUNDATIONS, WALLS, OR OTHER INFRASTRUCTURE THAT MIGHT BE DAMAGED, THE LINER MUST BE DESIGNED TO COME UP TO AT LEAST THE MAXIMUM PONDING ELEVATION. IN THIS EXAMPLE, THE BERM ON THE LOW SIDE IS HOLDING WATER IN BUT IT'S ASSUMED THAT THIS WILL SERVE AS THE LARGE STORM (100-YEAR) OVERFLOW AND THAT NO INFRASTRUCTURE IS DOWNHILL THAT MIGHT BE DAMAGED BY THESE FLOWS (OTHERWISE, THE RAIN GARDEN SHOULD BE PLACED SOMEWHERE ELSE). THE UPPER SIDE IS ASSUMED TO HAVE SOMETHING THAT NEEDS TO BE PROTECTED AND THE LINER ON THIS SIDE SHOULD COME UP TO THE MAXIMUM WATER LEVEL.
- ANOTHER CONSIDERATION IS HOW MUCH SOIL WILL BE ABLE TO BE PLACED OVER THE LINER TO SUPPORT PLANTS. GRASSES NEED 12" MIN, SHRUBS NEED 18" MIN AND TREES NEED 36" MIN.
- FOR SUSTAINABILITY REASONS, CHOOSE BENTONITE CLAY MAT, THEN PE. AVOID PVC LINERS BECAUSE OF THE DAMAGE TO THE LARGER ENVIRONMENT IN THEIR PRODUCTION
- DON'T USE METALS SINCE THEY WILL EITHER RUST ADDING IRON TO YOUR DOWNSTREAM OR WON'T RUST (GALVANIZED) AND ADD ZINC TO YOUR DOWNSTREAM.
  - BARK MULCH FLOATS AND WILL FLOAT RIGHT OUT OF THE FACILITY, SO DON'T USE IT. USE COURSE WOOD CHIPS OR ROCK MULCH INSTEAD

Details created by a partnership of:



## Lined Filtration Rain Garden SEE NOTE 1

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1 of 1  
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