



low impact development technical workshop series

Inspection and Verification for Bioretention

Topics

Construction sequencing and TESC

Procedures and timing

Remedies for failing sites

WASHINGTON STATE UNIVERSITY
EXTENSION

 **HERRERA**

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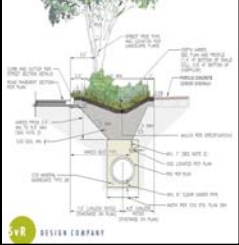
Inspection and verification timing and processes fall into three general phases of project



1. Pre-construction reviews.
2. Construction.
3. Verification/repair and final permit.

Inspection and verification

Pre-construction reviews...critical first steps



- Set guidelines, expectations and timing for inspections.
- Discuss construction sequencing.
- Review checklists.
- Include developer, builder, utilities, plan review, inspectors in pre-construction.
- Determine training needs.
- Make sure everyone knows where and what the requirements are...for an LID project, there may be stormwater requirements in landscaping guidelines.

Inspection and verification

Construction...likely three steps



Visit one....pre-BSM placement

- Certify native/existing soils comparable to design specs.
- TESC correctly installed.
- Rough grading to plans.
- Under-drain(s) and overflow.
- Field changes...process should have been covered at pre-construction.
- Photo documentation?

Inspection and verification

Construction...likely three steps



Visit two....pre-mulch or planting

- Verify that BSM meets composition guidelines and depth.
- For BSM composition: current lab report, truck-ticket, visual/texture. If questions on depth, expose to subgrade.
- TESC still installed correctly and upslope areas managed properly.

Inspection and verification

Construction...likely three steps



Visit three....post-construction

- Verify final grade.
- Verify contributing area as designed and stabilized.
- Verify BSM not clogged/infiltration rate adequate.
- Verify ponding depths, overflow, bottom swale area.
- Verify plants (type and density) and mulch (type and depth).

Post-construction (whole site)

- Final grades.
- 30-45 day follow up to remove TESC.
- Verify O&M plan in place.

Inspection and verification

Construction sequencing likely the most critical process for successful installation



Decision pathways

1. Site flat or sloping away from facility likely ok to:
 - Complete bioretention area with roads, utilities and storm infrastructure.
 - Install conventional TESC and barriers.

Inspection and verification

Construction sequencing likely the most critical process for successful installation



Decision pathways

1. Site flat or sloping away from facility likely ok to:
 - Complete bioretention area with roads, utilities and storm infrastructure.
 - Install conventional TESC and barriers.
2. Site sloping to facility (≥ 1 du/ac):
 - Protection during construction challenging. Strategies:
 - a) Divert flows around facility and treat during construction.
 - b) Partially complete and allow storm flows through facility.

Inspection and verification

Construction sequencing likely the most critical process for successful installation




Construction activity sloping to bioretention facility

- Good construction and sediment and erosion practice.
- Upslope stabilized.
- Flow diverted around bioretention areas.

Inspection and verification

Construction sequencing likely the most critical process for successful installation



Construction activity sloping to bioretention facility

1. Without under-drain

- Delineate or partially grade to define facility. Keep construction traffic off area.
- Install TESC and stabilize upslope construction area as best as possible.
- If flows allowed through facility, leave at least 6" above final grade. Line or mulch? Keep construction traffic off area.

Inspection and verification

Construction sequencing likely the most critical process for successful installation



Construction activity sloping to bioretention facility

2. With under-drain

- Place infrastructure.
- If possible leave rest of facility at least 6" above grade.
- Install TESC and stabilize upslope construction area as best as possible.
- If flows allowed through facility, leave or backfill at least 6" above final grade. Cover under-drain with plastic and fabric. Line or mulch whole facility? Keep construction traffic off area.

Construction sequencing likely the most critical process for successful installation



Partial excavation and completion of facility after homes finished and landscaping stabilized requires clear agreement among developer, homebuilder and jurisdiction.

Inspection and verification

Remedies for failing sites



Poor TESC and sediment to facility

- Excavate to depth that sediment deposits and potential clogging not present (usually 6").
- Replace BSM, mulch and plants.



Compaction of existing soils

- Important question is: does the facility still infiltrate at design rate. Perform infiltration test or verify pre-construction density.