

## **CARROLL COUNTY STORMWATER MANAGEMENT FACILITIES SOILS TESTING POLICY for CONSTRUCTABILITY and INFILTRATION**

### **GENERAL:**

1. All test pits or borings must be backfilled immediately, labeled, and staked.<sup>3</sup> If the area is to be developed, the backfill should be adequately compacted to support the intended use.
2. Test pits for constructability may be performed and certified by a professional engineer or professional land surveyor licensed in Maryland.
3. All site plans with proposed stormwater management must have at minimum 1 test per acre based on the definition of the ESD Tract. One representative passing perc test, test pit, or soil boring at the correct depth and reasonable proximity must be performed for any of the approved ESD practices. Note that the number of tests may be controlled by the number and type of facilities proposed. Note grass swales may not be subject to soils testing depending on depth of excavation.
4. All subdivision plans with proposed stormwater management must have at minimum 1 test per lot. One representative passing perc test, test pit or soil boring at the correct depth and reasonable proximity must be performed on each lot that contains any of the approved ESD practices. Additionally, any lot or ESD Tract greater than 1 acre will require at a minimum an additional passing test and then one more for each additional acre. Note grass swales may not be subject to soils testing depending on depth of excavation.
5. All perc tests, test pits, or soil borings must extend at least 4 feet below the bottom of the proposed practice (infiltration test depth). Typically, no restricting layers (ground water, bedrock, and seasonal high ground water are allowed within 4 feet of facility bottom. For example, this restriction does not apply to submerged gravel wetlands.
6. Allowable Testing Methods are as Follows:
  - Test pits or soil borings (per Manual pages D.1.2 and D.1.3) are acceptable with soil descriptions, the elevation of the bottom of the proposed practice(s) noted, and a clear written statement by the geotechnical engineer that the proposed ESD practice will work (infiltrate or not infiltrate) at the locations and depths shown.
  - Carroll County Health Department approved perc tests are acceptable for drywells only. Perc tests may be performed and certified by any competent (experienced) professional engineer or land surveyor licensed in Maryland.
7. County reserves the right to require infiltration testing for publicly owned facilities.
8. Soils with a 20% or greater clay percentage will not be accepted for infiltration facilities regardless of field infiltration rates unless specifically stated as acceptable by a professional geotechnical engineer licensed in Maryland.
9. See the Carroll County Checklist pages 92, 95, 96, and 98. Note that enough Geotechnical soils testing to prove that the SWM concept is feasible must be completed during the concept phase and is a requirement for concept SWM approval.

### **GENERAL GEOTECHNICAL REPORT:**

1. All soils tests must provide soils information with specific written statements in the

geotechnical report regarding the following:

- Presence of restricting layers, i.e., bedrock.
- Ground water presence (yes/no), and elevation if present.
- The absence or presence of indicators of seasonal high ground water (mottling).

Specifically state if indications of seasonal high ground water are absent or present.

2. All passing and failed infiltration test information and locations must be provided in the geotechnical report. Show all passing and failed infiltration test locations on the plans, and drainage area maps.
3. The Carroll County certification block must be completed and included in the report (see Supplement page 44). Uncertified reports will not be accepted. Geotechnical reports must be certified by the registered professional on site during testing. Geotechnical reports may be an appendix of the SWM report.

### **STRUCTURAL FACILITIES:**

1. Soils classifications and field infiltration rate testing must be performed for all proposed structural infiltration/recharge facilities. Note that structural soils and infiltration tests are specific to the type of practice.
2. Testing is to be conducted by a qualified professional. This professional shall either be a registered professional engineer, or soils scientist or geologist and licensed by the State of Maryland.<sup>1</sup>

### **TEST PITS:**

1. Test pits must be used where the bottom of the proposed facility can be within 16 feet of the existing ground elevation. Infiltration/recharge must be accomplished, if possible. Facilities may not arbitrarily be designed greater than 16 feet below grade to avoid test pit requirements.
2. Proposed infiltration facilities must have double-ring infiltrometer tests and sieve analyses performed at the proposed bottom elevation. Then the test pits must be extended 4 feet below the proposed bottom elevation of the facility with additional sieve analyses performed.<sup>2</sup> The presence or absence of bedrock, groundwater, or indicators of seasonal high-water table must be noted. The double-ring infiltrometer tests must be performed in accordance with ASTM-D 3385 “Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer”.

### **SOIL BORINGS:**

When the bottom of the proposed facility must be 16 feet or greater (double trench box) below the existing ground elevation, you may use soil borings and the “Falling Head Infiltration Rate Test” at your own risk. If the soil borings result in questionable information, the County reserves the right to require test pits.

Follow Infiltration Testing Requirements per Appendix D.1, Pages 3 and 4 of the “Manual” with the following exceptions:

1. A 6” solid casing may be used in place of the specified 5” casing. A 5” casing is the minimum diameter casing that Carroll County will accept.
2. Two inches of No. 8 stone (pea gravel) must be placed in the bottom of the casing to protect the soil from scouring and sedimentation.
3. Only 24” of water is to be used in the pre-soak and the infiltration testing. It is the registered professional engineer, soils scientist or geologist’s responsibility to have the necessary equipment to accurately measure water levels in the casing.

## **MD-378 FACILITIES:**

1. Per MD-378-7:
  - Determine if high piping potential soils exist at the embankment location and assume that onsite soils will be used for the embankment shell.
  - Determine all required soils information for design of filter and drainage diaphragms.
2. Determine bearing capacity of soils supporting the embankment and associated structures.<sup>2</sup> Standard Penetration Tests (SPTs) of 10 or more blows per foot are required at the base of the clay core trench.
3. Weir walls require SPTs and soil classification at the base of the footer. Determine bearing capacity, internal friction angle, and/or friction coefficient for design.
4. See the final phase Carroll County SWM checklist and the Carroll County MD-378 checklist for details.

## **ESD FACILITIES:**

The Following ESD Practices Require Passing Onsite Soils/Infiltration Testing.

- A-2 Permeable pavement: See Tech Memo #2
  - Permeable pavement areas  $\leq 10,000$  ft<sup>2</sup> one infiltration test per facility.
  - Permeable pavement areas greater than 10,000 ft<sup>2</sup> must meet the criteria for structural infiltration trenches.
- A-3 Reinforced turf: See Tech Memo #2
  - When used with an open graded stone reservoir to provide ESD volume, A-2 permeable pavement requirements apply.
  - Reinforced turf may be used without a stone reservoir and no ESD credit to obtain an open space land use designation. No soils tests are required.
- M-2 Submerged Gravel Wetlands: require 1 test per facility minimum, in the location of the facility for constructability.
- M-3 Landscape Infiltration: 1 test per facility, in the location of the facility for constructability and infiltration.
- M-4 Infiltration Berm: slope stability test or letter from the geotechnical engineer specifically stating that slopes are stable for this use.
- M-5 Drywells:
  - In HSG A or B soil this office will accept a single soils test for more than one drywell if the following conditions are met.
    - The drywells are within 200 feet of the test and are on the same contour or will have the same bottom elevation as the test and the passing test is closer (more representative) than any failed tests.
    - The geotechnical engineer is willing to provide a written statement that in their judgement the soils on the site or in the area of the proposed drywell meet the definition of HSG A or B soils and will infiltrate according to the requirements in the MDE manual.
  - In HSG C or D soils one passing test per drywell at the location of the facility at the correct elevation.
    - The only exception is if test pits are excavated between two drywells on the same contour at the minimum 20 foot spacing where the test pit would extend into both drywells.
  - Commercial Drywells must meet the criteria for the structural infiltration trenches.

- M-6 Micro-Bioretenention without Underdrains: one test per facility in the facility, double ring or falling head test.
- M-6 Micro-Bioretenention with Underdrain: one test per facility for constructability.
- M-7 Rain Gardens: 1 test per facility, in the location of the facility for constructability and infiltration.
- M-8 Bio-swales: 1 test minimum per facility for constructability. One additional test per 200 linear feet for constructability.
  - Examples:
    - 1 to 200 linear foot bio-swale will require 1 test.
    - > 200 to 400 linear foot bio-swale will require 2 tests.
    - > 400 - 600 linear foot bio-swale will require 3 tests.
- M-9 Enhanced Filters: Any ESD practices designed with an enhanced filters must meet the criteria for structural infiltration trenches (see the Carroll County Stormwater Management Checklist pages 95 & 98).
- Carroll County “M-10 Micro Infiltration Trenches”: See M-5 Drywell testing requirements.
- MDE approved alternative stormwater management practices/ “High Flow Filters”: 1 test per facility, in the location of the facility for constructability.

#### **Testing requirements for Karst geology or carbonite rock.**

- In areas mapped as Karst or where evidence of Karst geology (sinkholes) or carbonite rock are visible, borings are required at the location of each proposed SWM or ESD practice or facility. The borings must be extended to bedrock and the rock type must be determined. If the soil borings extend 20 ft. beyond the proposed facility bottom or below existing ground (whichever is deeper) without encountering bedrock, we will assume that no karst geology is present.
- If Karst geology is determined to be present from the soil tests, all SWM facilities must be lined with an impermeable liner. Infiltration will not be allowed.

*1 2000 MD Stormwater Design Manual, Volumes I and II, Appendix D.1, Page 1.*

*2 Carroll County Stormwater Management Plan Review Checklist, pages 92, 95, 96, & 98.*

*3 2000 MD Stormwater Design Manual, Volumes I and II, Appendix D.1, Page 3.*

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