

City of Chattanooga

Stormwater Regulations Seminar

Geotechnical and Infiltration Testing



Infiltration Testing: *A Four-Step Process*

The Chattanooga *Rainwater Management Guide* (p. C-3) states that infiltration testing is a four-step process:

- Desktop analysis
- Test Pit Observation or Soil Boring
- Infiltration Testing
- Consideration of Infiltration Rate in Design and Modeling Application

Once again, what do these look like?

Desktop Analysis

The screenshot shows the USDA Web Soil Survey website. At the top, there is a banner with the USDA logo, the text "United States Department of Agriculture" and "Natural Resources Conservation Service", and the title "Web Soil Survey" in large yellow letters. Below the banner is a navigation menu with links for "Home", "About Soils", "Help", and "Contact Us". A breadcrumb trail indicates "You are here: Web Soil Survey Home".

Search


Enter Keywords

All NRCS Sites


Browse by Subject

- ▶ Soils Home
- ▶ National Cooperative Soil Survey (NCSS)
- ▶ Archived Soil Surveys
- ▶ Status Maps
- ▶ Official Soil Series Descriptions (OSD)
- ▶ Soil Series Extent Mapping Tool
- ▶ Geospatial Data Gateway
- ▶ eFOTG
- ▶ National Soil Characterization Data
- ▶ Soil Quality
- ▶ Soil Geography

The simple yet powerful way to access and use soil data.



Welcome to Web Soil Survey (WSS)




Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Soil surveys can be used for general farm, local, and wider area planning. Onsite investigation is needed in some cases, such as soil quality assessments and certain conservation and engineering applications. For more detailed information, contact your local [USDA Service Center](#) or your [NRCS State Soil Scientist](#).

Four Basic Steps

- 1 Define.**



Area of Interest (AOI) Use the Area of Interest tab to define your area of interest.

I Want To...

- ◊ [Start Web Soil Survey \(WSS\)](#)
- ◊ [Know the requirements for running Web Soil Survey – will Web Soil Survey work in my web browser?](#)
- ◊ [Know the Web Soil Survey hours of operation](#)
- ◊ [Find what areas of the U.S. have soil data](#)
- ◊ [Find information by topic](#)
- ◊ [Know how to hyperlink from other documents to Web Soil Survey](#)
- ◊ [Know the SSURGO data structure](#)

Announcements/Events

- ◊ [Web Soil Survey 3.1 has been released! View description of new features and fixes.](#)
- ◊ [Web Soil Survey Release History](#)

Test Pit Observation or Soil Boring



- Identification and depth of soil horizons (upper and lower boundary)
- Soil texture and color for each horizon
- Color patterns (mottling) and observed depth
- Depth to water table
- Depth to bedrock
- Observance of pores or roots (size, depth)
- Estimated type and percentage of coarse fragments
- Hardpan or limiting layers
- Strike and dip of horizons (especially lateral direction of flow at limiting layers)
- Additional comments or observations

Infiltration Testing

Two means of infiltration testing are allowed:

- Double-ring infiltrometer*
- Percolation Test*

Note: Notify the City at least 24 hours in advance so City personnel may observe testing.



Infiltration Testing

The double-ring infiltrometer test is likely more accurate, but also more expensive.



Infiltration Testing

Percolation tests are typically less accurate and less expensive.



As long as I can get a permit, why not use the cheaper method all of the time?

Once Again, Verification of Site Conditions Will Be Required.



If it does not perform after construction in accord with your design, someone will either have to add more Stay-On Volume, or will have to pay for off-site mitigation. Either way, your client will not be happy.

How Will The City Know If The Results Are Reasonable?

Three means of verification for the City:

- Compare to standard results.
- Post-construction and pre-Certificate of Occupancy testing after representative rainfall.
- Inspections by client/representative and Professional Engineer (every five years) submitted to City regularly.

Verification By Comparing To Standard Results

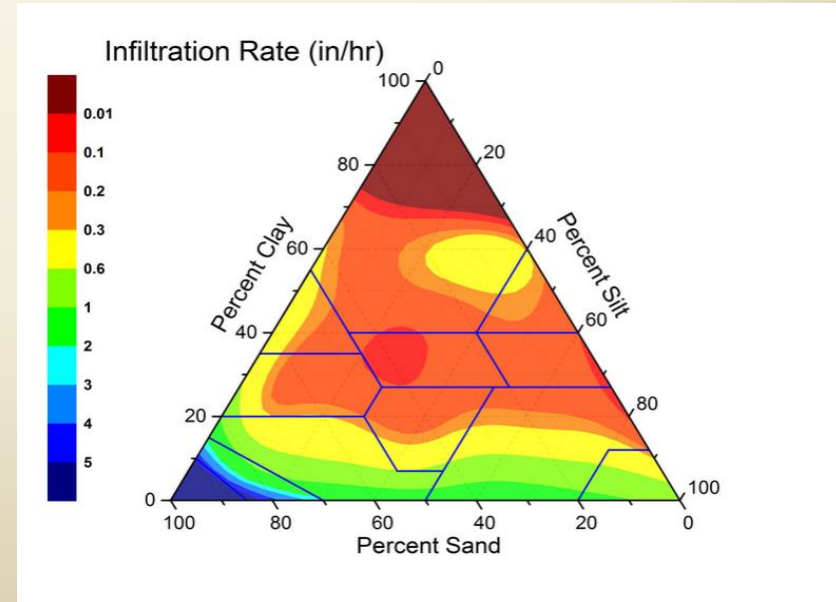
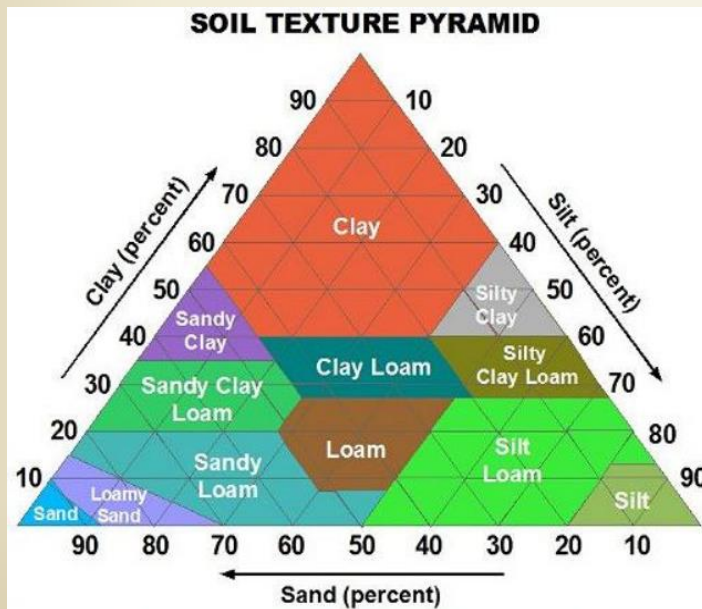
Field test results will be compared to standard infiltration rates, such as TR-55 Manual – Appendix “A” (p. A-1).

Hydrological Soil Group	Infiltration Rate*
Group A is sand, loamy sand or sandy loam	> 0.30 in/hr
Group B is silt loam or loam	0.15 – 0.30 in/hr
Group C soils are sandy clay loam	0.05 – 0.15 in/hr
Group D soils are clay loam, silty clay loam, sandy clay, silty clay or clay	< 0.05 in/hr

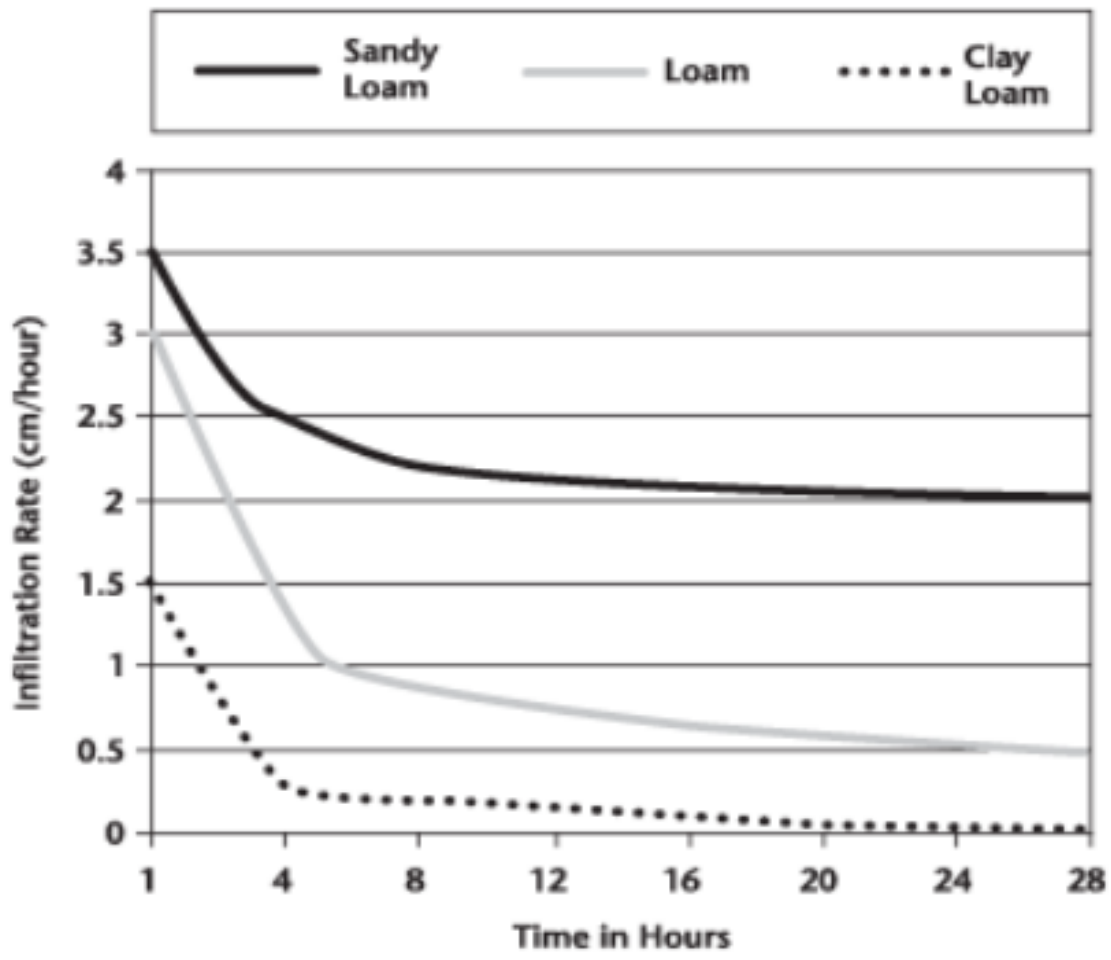
* Urban Hydrology for Small Watersheds TR-55 (USDA Soil Conservation Service, 1986)

Verification By Comparing To Standard Results

We have also considered other sources and found similar results.



Then Why Are My Infiltration Rates So Much Better Than Standardized Results?

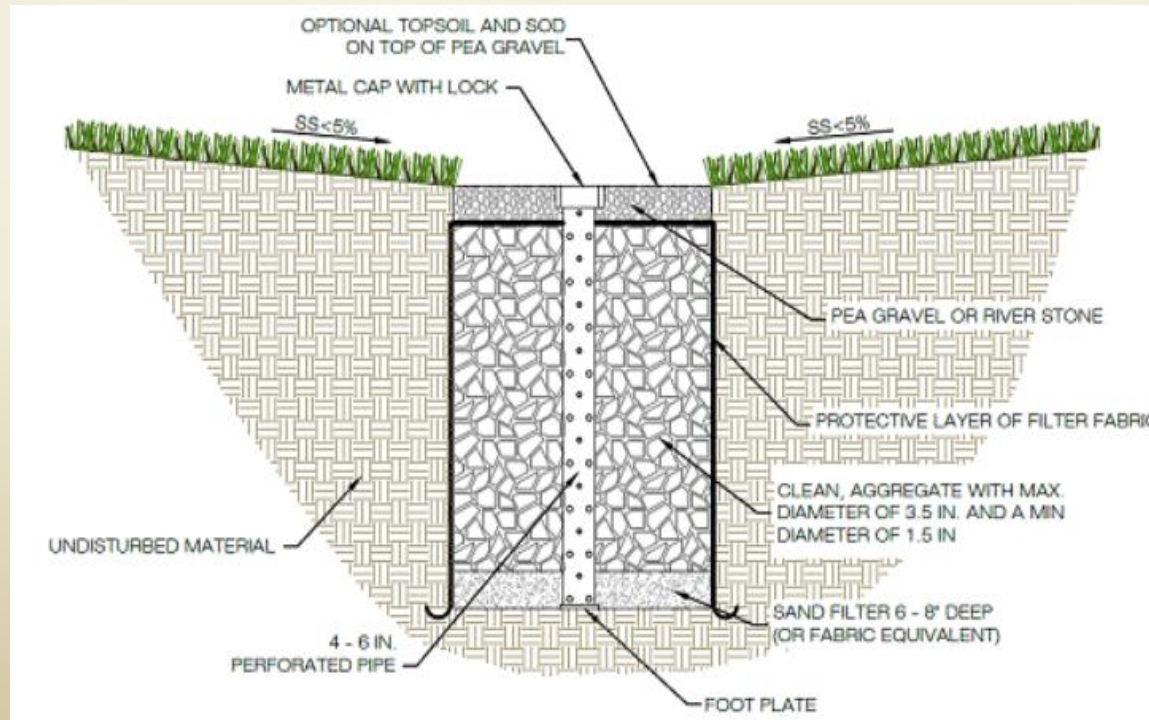


Were the soils thoroughly saturated? It has a major impact on performance.

This has been one of the greatest issues we have seen so far.

Post-Construction and Pre-Certificate of Occupancy Testing

Observation wells are required for all below-ground structures. These will be used (with a data logger) to verify that the systems are operating as designed before a CO is issued.



Regular Inspections

Clients and/or their representatives will be required to regularly inspect their BMPs. Professional engineers and/or landscape architects will also be required to do inspections at least once every five years to see if everything is still operating as designed.



Questions?

