



Madison County Building Department

Phone: (540) 948-6102; Website: www.madisonco.virginia.gov

Expansive (Shrink-Swell) Soil Policy

Date: 01-26-2021 (revised 07-01-2022)

Re: Expansive (shrink-swell) Soil Policy

Madison County has areas with known or suspected expansive soils; these types of soils are also referred to as shrink-swell soils. These types of soils can have a devastating effect on a building's foundation. Therefore, it is imperative that these types of soils are accounted for in the design and construction of a building or structure.

Per the Virginia Construction Code (VCC):

Section 1803.5.3 (of the 2018 VCC), In areas likely to have expansive soil, the building official shall require soil tests to determine where such soils do exist.

From the 2018 Virginia Residential Code:

R401.4 Soil tests. Where quantifiable data created by accepted soil science methodologies indicate expansive, compressible, shifting or other questionable soil characteristics are likely to be present, the building official shall determine whether to require a soil test to determine the soil's characteristics at a particular location. This test shall be done by an approved agency using an approved method.

The Madison County Building & Zoning Department will evaluate each site using the County's GIS. The GIS has a layer showing suspected expansive (shrink-swell) soils, which is based on the best available data from the USDA soil survey maps. This layer shows a green shaded area (24-inch footing depth), an orange shaded area (moderate shrink-swell potential), and a red/pink shaded area (severe/high shrink-swell potential).

The following link can be used to access the Madison County GIS website:

<https://www.webgis.net/va/Madison/>

Click on the layers tab, open the civic planning sub-tab, check both boxes labeled shrink-swell soils

The following shall apply to all proposed buildings and structures, including additions and accessory structures. Decks, gazebos, and small sheds or utility buildings are exempt.

- All soil testing shall be performed by a Virginia Registered Design Professional, Geotechnical Engineer, or a Certified Professional Geologist. The soil test shall comply with section 1803 of the VCC (Virginia USBC).
- If a proposed building or structure is located within a green shaded area or within 500 feet of the green shaded area, the footing shall be a minimum of 24 inches below grade.
- If a proposed building or structure is located within the orange (moderate potential) or the red/pink (severe/high potential) shaded areas or within 500 feet of either shaded area, a site-specific soils test will be required. If the soil test shows moderate or significant/high shrink-swell soils are present, the foundation will need to be designed by a Virginia Registered Design Professional (RDP; engineer or architect).
- In lieu of a soils test, the permit applicant has the option of assuming expansive (shrink-swell) soils exist, and the foundation shall be designed by a Virginia RDP (engineer or architect).

Please call the Madison County Building Department with any questions at (540) 948-6102.

This policy shall take effect immediately and shall supersede any previous policy covering the same content or subject.

Jamie R. Wilks CBO
Madison County Building Official

See page 3 for Testing and Reporting requirements

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Expansive Soils Testing and Reporting requirements

Testing

1803.5.3 Expansive soil. In areas likely to have expansive soil, the building official shall require soil tests to determine where such soils do exist. Soils meeting all four of the following provisions shall be considered expansive, except that tests to show compliance with Items 1, 2 and 3 shall not be required if the test prescribed in Item 4 is conducted:

1. Plasticity index (PI) of 15 or greater, determined in accordance with ASTM D4318.
2. More than 10 percent of the soil particles pass a No. 200 sieve (75 μm), determined in accordance with ASTM D422.
3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D422.
4. Expansion index greater than 20, determined in accordance with ASTM D4829.

1803.6 Reporting.

Where geotechnical investigations are required, a written report of the investigations shall be submitted to the building official by the permit applicant at the time of permit application. This geotechnical report shall include, but need not be limited to, the following information:

1. A plot showing the location of the soil investigations.
2. A complete record of the soil boring and penetration test logs and soil samples.
3. A record of the soil profile.
4. Elevation of the water table, if encountered.
5. Recommendations for foundation type and design criteria, including but not limited to: bearing capacity of natural or compacted soil; provisions to mitigate the effects of expansive soils; mitigation of the effects of liquefaction, differential settlement and varying soil strength; and the effects of adjacent loads.
6. Expected total and differential settlement.
7. Deep foundation information in accordance with Section 1803.5.5.
8. Special design and construction provisions for foundations of structures founded on expansive soils, as necessary.
9. Compacted fill material properties and testing in accordance with Section 1803.5.8.
10. Controlled low-strength material properties and testing in accordance with Section 1803.5.9.