County of Shenandoah

BUILDING AND CODE ENFORCEMENT

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MEMORANDUM

DATE: 12-27-2007

TO: Approved Independent Third Party Inspection Agencies

FROM: Geary W. Showman, Building Code Official

SUBJECT: Shenandoah County's Frost Line Depth and Foundations.

This memorandum is to notify Inspection Agencies and your Technical Field Inspectors, that effective January 1, 2008, the Shenandoah County Board of Supervisors and the Building and Code Enforcement Department has changed the frost line depth from the existing 18" to a **minimum required footing depth of 24".** This Department has also developed a Residential Foundation Design, Construction, and Inspection Policy (copy included), because of problems that have developed over the last several years with extreme expansive soil conditions that exist in Shenandoah County. The largest issues have been the development of foundation cracks in cinder block and concrete poured foundation walls. It is my expectation that this change to the frost footing depth and the foundation policy will help resolve some of the footing and foundation issues and home owners' complaints.

Also, this Department would like to update our office files of approved Independent Third Party Inspection Agencies. We have included a copy of the office application and request that your agency or company complete the application with the required Virginia Principal Engineer Seal, signature, address, phone numbers, essential information about your company's qualifications for a testing and/or inspection agency, and qualifications and/or certifications of your technical field inspectors. Lack of response will remove your agency or company from our existing approved list.

Thank You in advance for your assistance in these issues. If you have any questions or need additional information, please feel free to contact this office or myself at 540-459-6185, fax 540-459-6193, or e-mail gshowman@shenandoahcountyva.us.

Geary W. Showman, Building Code Official

TO: Home Owners, Residential Builders and Third Party Inspectors

FROM: Geary W. Showman
Building Code Official

RE: Residential Foundation Design, Construction and Inspections

This policy has been instituted to provide a procedure for designing residential foundations and prevent foundation failures.

Foundation Design: There are (3) foundation design options for plan review submission based on the soils bearing capacity expressed in pounds per square foot/ (psf).

1. Use a minimum soil bearing capacity of 1,500 psf as prescribed by the 2006 IRC, Table (R401.4.1). This assumes no severe 'shrink/swell' soil as illustrated in the, Soil Survey of Shenandoah County, Virginia, or Shenandoah County's GIS web site.
2. Provide an original signed, sealed and dated Geotechnical Engineer Report that identifies the specific soil bearing capacity and design to it.
3. Provide an Engineered design based on the 'actual' soil bearing capacity.

Presumptive Load-Bearing Values of Foundation Materials (R401.4.1):	
Class of Material	**Load Bearing Pressure** Pounds per square foot
Crystalline bedrock	12,000
Sedimentary & foliated rock	4,000
Sandy gravel &/or gravel (GW & GP)	3,000
Sand, silty sand, Clayey sand, silty gravel, and clayey gravel (SW, SP, SM,SC,GM, & GC)	2,000
Clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CI, ML, MH and CH)	1,500**

** *In areas proven by quantifiable data created by sound soil science methodologies to have expansive, compressible, shifting or unknown soil characteristics, 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 made by an approved agency using an approved method. (USBC 401.4)*

The foundation design must specify the soil classification of the backfill, and be designed in accordance with the 2006 IRC, Section R404 Foundation Walls, ACI 318 &/or ASCE 5 and comply with the tables R404.1.1(1)-(4).

Footings & Poured Walls-Minimum strength of basement walls, foundation walls, exterior walls and other vertical concrete with 'severe' weathering potential shall have minimum compression strength of 3000 psi and shall be air entrained not less than 5% or more than 7%. (R402.2)

All foundation walls, piers and other permanent building supports shall be protected from frost to a depth of 24" (R403.1.4.1). Minimum insulation requirements of frost protected footings in heated buildings shall be R-6 and 2 ft. in depth. (R403.3) (IECC Table 602.1)

- Footings and foundations adjacent to slopes shall meet all criteria set forth in (R403.1.7)
- No less than (2) #5 reinforcing bars shall be provided around all window and door openings. Such bars shall extend 24" beyond the corners of openings. (ACI-318 05, 22.6.6.5)
- Foundation/ exterior basement walls shall be not less than 7 ½" thick. (ACI-318 05, 22.6.6)
- Thickness of structural plain concrete footings shall not be less than 8" (ACI-318 05, 22.7.4)(Or as amended by IRC 2006 R404.1.1)

Backfill Placement: In accordance with the IRC, backfill shall **NOT** be placed against the wall until the concrete has sufficient strength *AND* has been anchored to the floor above and laterally supported by basement slab. (R404.1.7)

For plain concrete footings and stem walls, sufficient strength is achieved within the number of days of curing as specified below:

Plain Concrete Footings and Foundation Stem Walls Average Daily Temperature and Minimum Curing before Backfill Placement[1]		
Average Daily Temperature 40 F – 55 F	Average Daily Temperature 55 F – 73 F	Average Daily Temperature > 73 F
14 Days	7 Days	3 Days

[1] *Exception*: The average test results of at least (2) standard cylinder specimens, molded, field cured and tested in accordance with the applicable edition of the ASTM-C39, indicate the attainment of at least 1700psi compressive strength.

******Note:* Only non-saturated, non-expansive, and non-compacted unbalanced fill may be placed adjacent to the plain concrete. OL, CH, and OH and/or organic material are unsuitable for backfill, approved backfill material must be on site available for inspection*****

Registered Design Professional services are required when walls are subject to hydrostatic pressure from ground water and for walls supporting more than 48" of unbalanced backfill that does not have permanent lateral support at the top and bottom. (R404.1.3)

Shenandoah County reserves the right to conduct quality control testing of backfill after accepting a Third Party Engineer's Report.

Structural Foundation Crack Repairs after the Certificate of Occupancy:

A Professional Engineer will make the determination if a foundation crack is or is not structural. Any structural foundation crack that is repaired after the 'Certificate of Occupancy' requires a building permit.

Foundation structural repair plans and specifications, prepared by a Professional Engineer, must be submitted for review and approval. Exception: If the structural crack is repaired with an approved epoxy injection system, plan review is not required prior to the issuance of a building permit.

Once a building permit is issued, an approved Third Party Engineer is to inspect the installation and submit a completed Building Inspection Certification Form to the Building Official.