



Frequently Asked Questions

Slab-on-Ground Construction

Answers from the PTI Slab-on-Ground Committee

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QUESTION: Section 1806.7.2 of the 1997 Uniform Building Code requires minimum reinforcing steel in "slabs-on-ground with turned-down footings". Does this code section apply to post-tensioned slabs-on-ground designed in accordance with Section 1816?

ANSWER: **No.** The 1997 Uniform Building Code (UBC), Chapter 18, *Foundations and Retaining Walls* provides two alternatives for the design of foundations for stud-bearing walls: (1) footings designed in accordance with the structural provisions of the code, and (2) footings for which a design is not required and is not provided. Such footings, generally of structural plain concrete, meet the requirement set forth in Table 18-I-C and the other prescriptive provisions of the code. Section 1806.7.2 is intended to apply only to foundations designed prescriptively (where an engineered design, with calculations, is not provided). Foundations designed using an engineered procedure are exempt from Section 1806.7.2. This interpretation is supported by a written opinion from the ICBO technical staff (available from the Post-Tensioning Institute).

COMMENTARY:

Designed footings include post-tensioned slabs-on-ground in accordance with Section 1816. This section, based on Chapter 6 of the Second Edition of the PTI *Design and Construction of Post-Tensioned Slabs-on-Ground* (the "PTI method"), is part of the structural provisions of the code. The PTI method presents a specific engineered procedure to resist the effects of expansive soils, and is an essentially complete set of structural design provisions. The PTI method applies to ribbed or stiffened foundations and to uniform thickness foundations. Ribbed foundations encompass

Slabs-on-Ground with Turned-Down Footings; such slabs typically include the perimeter footings (turned-down footings) and all interior footings. Differential settlement, according to the PTI method, is controlled by Section 1816.4.9. Section 1806.7.2 is not applicable to post-tensioned slabs. In post-tensioned construction, the slabs and the ribs are usually cast in one pour.

Engineers designing post-tensioned slabs-on-ground in Seismic Zones 3 and 4 recognize that the 1997 UBC prescriptive provision for non-structural slabs-on-ground are also intended to provide for the transmission of design base shear and overturning forces from the structure to the supporting soil (including the superstructure-to-foundation connection). When following the PTI method, engineers thus check Sections 1806.6 and 1809.1 through 1809.4 in addition to Section 1816; these sections may require the placement of mild reinforcement in addition to the post-tensioning. Local mild reinforcement may be required, among other reasons, to account for stress concentrations, to act as chords or collectors, or to resist local shears or bending moments induced by shear wall tie downs.

Non-designed footings follow the requirements of Table 18-I-C. Among the other prescriptive provisions of the code is Section 1806.7.2 that codifies for footings in Seismic Zones 3 and 4 the long standing design practice in California of including mild reinforcement. This practice ties the footings together and provides (without the need for a design) some control of differential settlement. The footings remain as structural plain concrete even with the No. 4 or No. 5 bars specified. In conventional residential foundations, the slabs and the footings are usually cast in separate pours.



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