



Issue Date	4/06/2020
Code/Section	2018 IBC 1808.6.2, 1809.4, 1901.2, 1907.1, 2018 IRC R401.4, AH105.2.
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Purpose:

Clarification of the allowable use and design of shallow Slabs-On-Ground (SOG), also called slabs-on-grade, as foundations.

Interpretation:

SOG that do not meet the minimum depth of 12 inches per IBC Section 1809.4 shall not support a *structure*.

Exceptions: (The slab must still be designed, even if it meets an exception for depth)

1. SOG that only support equipment
2. SOG that only support *structures* that only support equipment
3. SOG that only support storage racks
4. SOG that only support non-bearing and non-lateral partitions.
5. Any combination of the above exceptions.
6. IRC Section AH105.2 for IRC projects.
7. SOG designed in accordance with PTI DC 10.5. This includes the maximum tension of $6\sqrt{f_c}$ in the concrete.

Concrete SOG that support a *structure* shall use IBC Section 1808.6.2 or 1901.2 design and construction methods.

Exception: SOG that meet exceptions 1 thru 5 above can use alternative methods of analysis that are *approved*. One alternative method of analysis that is *approved* is the Shentu, Jiang, and Hsu method. The presence of control joints shall be considered.

SOG that resist uplift cannot use alternative methods of analysis.

SOG serving as foundations do not need a geotechnical investigation or soils special inspections if the following design values and statements are used:

1. Vertical foundation pressure no greater than 500 psf.
2. Subgrade modulus or Winkler spring coefficient of no greater than 60 psi/in.
3. The construction drawings include a statement that the designer has determined that loose, soft, organic, expansive, or collapsible soils or unprepared fill are not present at the site.

The *building official* can require a geotechnical investigation be conducted per IBC Section 1803.5.2, 1803.5.3, or IRC Section R401.4.

Rationale and Reference:

The use of slabs-on-ground as foundations is accepted with limitations by the City of Los Angeles in the LADBS document number P/BC 2017-100 entitled "Acceptable design and analysis methods for use of existing slabs-on-grade as foundations." Some of the policies and assumptions of that document are adopted in this document, and some are not.

The commentary to IBC Section 1809.4 states the minimum depth of embedment of 12 inches is to protect from soil movement caused by freezing and thawing in mild climate areas. The City of Phoenix can see temperature below freezing however it is for short durations when it does occur and as such our frost line is very shallow. The structural reviewers of the City additionally think the minimum depth is also intended to protect from moisture induced soil movement.

Feedback received from Valley Geotechnical Engineers indicates that the top layer of soil can be loose or soft soils and the minimum depth may help address that concern. Additionally, the minimum depth also helps reduce moisture changes under a foundation.

The allowance for not meeting this embedment of 12 inches is using IBC Section 104.11. Prior to this document the City was allowing slabs supporting storage racking to use larger soil bearing values as part of the storage racking TRT document.

Storage racks are defined in the IBC. The definition is not invoked by this policy as it excludes many types of storage racks that would commonly still be referred to as storage racks.

There is a tendency to design slabs on grade with post-tensioned reinforcement simply for crack control that does not actually meet the maximum tension values of PTI DC 10.5. If this is the case, then those sections serving as foundations must meet the minimum depth of embedment.

The Shentu, Jiang, and Hsu method is described in the paper "Load-Carrying Capacity for Concrete Slabs on Grade" published in the Volume 123 issue 1 - January 1997 ASCE Journal of Structural Engineering. This method is currently in use by the EnerCalc program and likely others. This method recognizes post-cracking capacity whereas ACI 318-14 does not.

The exclusion of uplift to these alternative methods is because they have only been developed for gravity loading, and the use of post-cracking strength does not make sense for resisting uplift.

Slabs-on-ground that resist uplift not associated with equipment are serving the same function as other concrete members that must be designed to ACI 318 methods in accordance with IBC Section 1901.2 and as such the lateral force induced uplift of wind or earthquakes makes ACI 318 design required.

The assumed soil capacities are taken from the LADBS document P/BC 2017-100 mentioned above and are considered conservative minimum values.

The IBC definition of shallow foundation makes it clear the slabs-on-grade are shallow foundations.