

# Thermal effect on the design loads of Multi-Story R.C. Buildings on Sloped Terrain in Saudi Arabia

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## Abstract

Reinforced concrete Structures are subjected to temperature changes daily and seasonal this is besides the live and dead loads applied to the building the changes in the temperature consequently produce temperature loads due to their interaction with the surrounding environment as well as the solar radiation exposure of the building. Such temperature loadings consequently lead to thermal stresses in most structural elements. These thermal loads will produce thermal stresses that can be considered comparable to or sometimes exceed the stresses of the dead and live loading due to insufficient thermal insulation which may lead to severe structural elements damage if it is not considered in the design phase. This paper presents a study of the effect of thermal loads on multi-story RC. buildings in Saudi Arabia with fixed and hinged support constraints with and without bracing system under seismic loads on sloped terrain. RC. buildings have a high vulnerability when designed on sloped terrains due to the mass and vertical irregularity that will increase the values of shear forces and torsional moments on the building. This work attempts to study the building's behavior on sloped terrain under the effect of thermal loads using ETABS V18.1. Etabs Models were analyzed to present the effect of thermal loads concentrating on the displacement, drift, deformations, and base shear.

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