Guidelines for the design of buried pipes to resist effects of internal explosion, open trench and underground blasts

Abstract

Due to complexity in the formulation and solution of basic equations of motion for structures of complicated shapes subjected to transient pulse, response of underground structures due to blast loads could be effectively studied through modeling using Abagus numerical software package. Consequently, in the analysis, design and simulation of underground structures specifically pipes to resist the effect of blasts, experimental results of geotechnical and material properties are required. These properties as revealed by several, researchers, investigators and pipe manufacturers are used in this study. In addition, using Unified Facilities Criteria (2008) for surface blast for commonly used explosives at 100m stand-off points, peak acceleration, vertical horizontal velocities, seismic velocities, reflected pressure, incident pressure, shock front velocity and arrival time for soils are determined. In addition to this, using empirical method, theses parameters were also determined for underground blast at stand-off pints of 100m. Correlation of consequences of blast and San Fernando earthquake of 1971 in terms of magnitude and level of damage to structures are also high-lighted. The responses of buried concrete and steel pipes are presented that will assist in the design of underground pipes to resist the effects of internal explosion, underground and open trench blasts. © 2010 ejge.