

PRESTRESSED CONCRETE BEAMS AS STRUCTURAL ELEMENTS FOR AMMUNITION STORAGE MAGAZINES – EXPERIMENTAL STUDY

Zvi Savir, Idan Edri, Kamal Safe, Zavdiel Snead

Protective Structures Section, Fortifications Branch, Combat Engineer Corps, IDF

Blast, Ammunition Storage, Prestressed Concrete, Field Test

The use of pre-stressed concrete structural elements in protective structures is not recommended in the literature. Even so, for large structures such as ammunition storage magazines, using pre-stressed concrete tends to be more economical. Continuing an effort previously presented, a research program has been completed designed to evaluate the behavior of pre-stressed concrete beams in an accidental explosion scenario. Roof sections measuring 3 by 10.4 meters, containing two pre-stressed beams with a 10 meter free span and covered with earth were tested in two full scale field tests under different blast load levels produced by 10 ton and 100 ton ANFO charges. Free field blast pressure, internal pressure, and the roof maximum displacements were recorded. High-speed video camera was used to measure the internal vertical displacements. The response was compared to analytical calculations and an engineering tool was developed for the assessment of the damage expected at different blast loads.