

PRESTRESSED CONCRETE BEAMS FULL SCALE BLAST TEST

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The use of prestressed concrete structural elements in protective structures is not recommended in the literature. Even so, for large structures such as ammunition storage magazines, using prestressed concrete tends to be more economical. A research program has been initiated to evaluate the behavior of prestressed concrete beams in an accidental explosion scenario. A roof section measuring 3 by 10.4 meters, containing two prestressed beams with a 10 meter free span was tested in a full scale field test. The section was covered with earth and placed at about 100 meters from an 80 tonne explosive bare charge, which was detonated in an international geophysical test. 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. Extensive cracking and tendon failure without structural collapse was observed. It was found that the dynamic resistance was greater than was expected in analytical and numerical models.