

LARGE COLUMN BLAST AND RESIDUAL CAPACITY TESTING FACILITY

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One threat always present from an antiterrorism perspective is the attack on a structure that causes a failure to ground floor column(s). Failure of a column, or multiple columns, has the potential of leading to progressive collapse of a structure, which could in turn lead to the loss of many lives. The Defense Threat Reduction Agency has designed and constructed a testing facility providing the opportunity to subject large columns to explosives charges and determine the residual capacity of the damaged columns. This testing facility was designed to accommodate columns of many shapes and sizes. Current testing has included square columns ranging from 400 mm to 1300 mm with a span of 4.5 m. Four hydraulic rams, with the capability of applying a total force of 35,600 kN, are included with this facility and are used to apply a realistic preload to the columns prior to the blast load, and an axial load to the columns after the blast test has been conducted. Various types of instrumentation are included in the blast and residual capacity tests to measure the blast environment, response of the column to the blast, response of the column to the post-blast axial loading, and the force being applied to the column by the hydraulic rams during this loading.

With this facility DTRA has the capability of subjecting many types of large columns to blast loads, document the damage done to the column, and the perform a post blast axial capacity test to determine whether the column would fail due to the damage from the blast load. This facility also provides the ability to test column retrofit techniques in a relatively inexpensive manner to determine their effectiveness in helping the columns endure the blast loads.