

# **RESPONSE OF A FLAT PLATE STRUCTURE TO A COLUMN REMOVAL**

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## **ABSTRACT**

The Defense Threat Reduction Agency (DTRA) performed a test series on a reinforced concrete flat plate structure in order to demonstrate the response of the structure when a column was removed. Data from these tests was used to develop and validate computational models for this type of event. Two tests were conducted; the first was done with no loads on the structure and the second was conducted with a 75 psf load applied to the structure. DTRA's test facility allowed for two full bays of the structure to be built with half bays surrounding these full bays. Instrumentation included strain gauges, load pins, accelerometers, and displacement gauges. Results from the first test demonstrated a permanent deflection of 4 inches at the removed perimeter column. The second test, which did not attempt to remove the permanent deflection from the first test, resulted in an initial added deflection of 10.5 inches. Over time, the structure continued creeping and eventually the floor slab punched through all of the remaining columns for a complete failure. Active data was acquired during both tests which allowed comparison to high fidelity physics based models of this event.