STRUCTURE LOAD CALCULATIONS FOR A FULL-SCALE OFFICE BUILDING

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A series of three-dimensional hydrodynamic computer code calculations has been completed predicting the loads on a full-scale concrete office structure resulting from the detonation of C-4 charges. The calculations varied the standoff distance between the charge and the building from 10 feet to 500 feet and the charge weights from 100 to 5 000 pounds. Each 3-D calculation used the results of a two-dimensional calculation of the detonation of a C-4 charge as initial conditions. Each calculation monitored the blast-induced loads at approximately 2000 points in and around the structure. Full time histories of all blast parameters were saved at each of the monitoring points or stations. The pressure time histories were then distributed to structure response calculators to provide boundary conditions or driving functions for the calculation of the structural response. The combination of load and response calculations were used to predict the level of damage to the structure.

A brief summary of the calculations is presented with results from the load calculations showing the effects of changing the charge position and charge size. More detailed results are shown for the cases used in experiments. Comparisons of the measured and calculated pressure loads are presented and preliminary analysis of the loads is presented. This work was sponsored by the Defense Threat Reduction Agency (DTRA) and the Technical Support Working Group (TSWG).