NUMERICAL ANALYSIS OF STEEL STUD BLAST WALL DESIGN

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Ongoing research is developing possible wall designs for protection against airblast in conventional construction. The costs associated with experimentation necessitated the use of finite element (FE) simulations to "test" designs under simulated blast conditions. Numerical simulations are being used to assess concepts against known threat levels and to vary parameters to determine viable designs. Protection of the occupants within the structure from an external detonation is the primary objective. A design needs to prevent hazardous debris from entering the structure, while maintaining structural integrity, before that design can be considered for installation within a facility. This study involved the analysis of a steel stud system that hangs from above and bears against a step, also known as a brick ledge, on the bottom. A similar system had proven very costly to construct due to a complicated bolted connection at the floor level; therefore, the "step" bearing system was developed. The system is much easier to construct using this step system. The current stud wall design is adequate to support the blast loads, but the use of the step could allow the bottom of the wall to lift over the step and propel the bottom of the wall into the structure. The numerical analysis examined several details in the effort of determining a satisfactory overall blast wall design. Permission to publish was granted by the Director of Geotechnical and Structures Laboratory and is gratefully acknowledged. All simulations were performed High Performance Computing systems at the ERDC Major Shared Resource Center.