# DESIGN AND OPTIMIZATION OF MODULAR MUNITION STORAGE CELLS TO REDUCE QUANTITY-DISTANCE

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The modular storage system has been one of the most common storage techniques of high-explosive bombs and other conventional ammunition for decades. Today, the armed forces design and construct these modular systems in accordance with principles to ensure safety of munitions storage regardless of the type of facility (e.g., Department of the Army Pamphlet 385–64). However, the lack of experimental data and the emergence of new technologies question the effectiveness of these safety standards to provide an optimized quantity-distance for the maximization of available space.

ERDC in conjunction with CIPPS were tasked to conduct research aimed to develop and structurally optimize a modern, economical, and effective modular storage system. The case of study consisted of 28,000-lb of Mark-84 bombs stacked per cell, surrounded by two high-strength thin steel plates on both faces with dry sand as infill. Empirical calculations were performed to characterize the dynamic response of the prototype modular system to an accidental detonation of the 28,000-lb of Mark-84. Moment-curvature and resistance-function, and pressure-impulse relationships were computed to evaluate the structural response and ultimately optimize the design to ensure: (1) no sympathetic detonation of adjacent cells and (2) reduce the hazardous fragmentation radius.

This paper will present the concept, procedures, and findings from the R&D.