DESIGN AND NUMERICAL ANALYSIS OF NEW TYPE 4 7BAR RATED EARTH COVERED BUILDING (ECB)

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ABSTRACT

An earth covered explosive storehouse (ESH), also known as Earth Covered Building (ECB), is designed with a strong blast resistant headwall and doors. The earth covers the roof, side wall and the rear. The headwall, doors, roof, rear wall and side walls of the ECB are subjected to specified levels of external blast loading and impact by high velocity fragmentation from potential detonation within an adjacent ECB.

Significant advantage of 7bar Type 4 ECB is that they can be constructed at reduced inter-magazine distances provided they are designed to a 90% confidence level that under specified loading from the potential detonation within the adjacent ECB, they do not collapse and create a source of sympathetic detonation.

Existing Australian Type 4 7bar ECB's have previously undergone full scale testing performed on a prototype structure in order to demonstrate compliance to Type 4 7Bar performance requirements. Given the advancement in numerical modelling capabilities since undertaking these tests, Australian Defence have encouraged the use of numerical analysis to be undertaken on a new bespoke Type 4 7bar ECB to demonstrate the design satisfies the Australian Defence Explosive Ordnance Publication (eDEOP101) performance requirements.

This paper presents the basis of blast engineering design of the new bespoke Type 4 7Bar ECB. The paper outlines the applicable references, design methodology, design blast loads, material properties, performance limits and analysis results for the critical structural elements of the Type 4 ECB in order to demonstrate compliance with explosive safety performance requirements within the Australian explosive ordnance regulations.