



**DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD  
2461 EISENHOWER AVENUE  
ALEXANDRIA, VIRGINIA 22331-0600**

DDESB-PD

**OCT 10 2013**

MEMORANDUM FOR DIRECTOR OF ENGINEERING, HUNTSVILLE CENTER, U.S.  
ARMY CORPS OF ENGINEERS, ATTENTION: CEHNC-ED

SUBJECT: Approval of 7-Bar Structural Strength Designation for Earth-Covered Magazine,  
Concrete Oval Arch constructed to U.S. Army Corps of Engineers Standard  
Drawing Series 421-80-09

- References:
- (a) CEHNC-ED Memorandum of 30 August 2013, Subject: New Earth-Covered Magazine (ECM) Series 421-80-09, with enclosures
  - (b) U.S. Army Corps of Engineers, Huntsville Center Drawings, Earth-Covered Magazine, Concrete Oval Arch 421-80-09 with 8'-0" and 10'-0" Door, dated September 2013 (23 Sheets)
  - (c) DoD 6055.09-M, Department of Defense Ammunition and Explosives Safety Standards, 29 February 2008, Administratively Reissued 4 August 2010
  - (d) U.S. Army Corps of Engineers, Huntsville Center Drawings, Magazine, Concrete Oval-Arch Earth-Covered, revision 3, dated 11 June 1998 (10 Sheets)
  - (e) DDESB TP 15, Approved Protective Construction, Revision 3, May 2010

As requested by reference (a), we have reviewed the reference (b) drawings for compliance with Department of Defense explosives safety criteria found in reference (c). Based on our evaluation, the design contained in reference (b) is approved as a 7-Bar earth-covered magazine (ECM). This new design supersedes the previous reference (d) Concrete Oval-Arch ECM design.

The new drawing series corrects omissions, updates the design to meet current Architectural, Engineering and Construction Computer Aided Design standards and improves overall constructability of this design which was developed as part of the ESKIMO full-scale ECM test series. Lessons learned from previous construction efforts have been incorporated in the new design, a conventional load analysis was completed to assist designers during the site adaptation process, and special inspection requirements were added to improve quality verification of explosives safety related construction elements.

The allowable Hazard Division (HD) 1.1 explosive limit for the reference (b) design is 500,000 pounds net explosive weight (NEW).

The design of reference (b) will be added to Table AP 1-1 of reference (e), as approved for new construction and reference (d) will be relocated from Table AP 1-1 to Table AP 1-2 of reference (e), and considered not approved for new construction. However, any explosives safety site plans that use the reference (d) design and, as of the date of this memorandum, are currently within the review/approval process will continue to be processed by the DDESB.

The point of contact for this action is Mr. William Robertson, (571) 372-6776, DSN 372-6776, E-mail address: [wiliam.l.robertson3.civ@mail.mil](mailto:wiliam.l.robertson3.civ@mail.mil).



THIERRY L. CHIAPELLO  
Executive Director  
DDESB

cc:  
USATCES  
AFSC/SEW  
NOSSA/N511  
MARCORSYSCOM/AM-EES  
NAVFAC EXWC/CI7  
NAVFAC ATLANTIC/CI



**DEPARTMENT OF THE ARMY**  
HUNTSVILLE CENTER, CORPS OF ENGINEERS  
P.O. BOX 1600  
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO  
ATTENTION OF:

CEHNC-ED

30 August 2013

MEMORANDUM FOR Department of Defense Explosives Safety Board, Policy Development Division (Ms. Lea Ann Cotton) 4800 Mark Center Drive, Suite 16E12, Alexandria, VA 22350


SUBJECT: New Earth-Covered Magazine (ECM) Series 421-80-09

1. We request your approval of the new series as a Department of Defense (DoD) approved 7-bar ECM. The new series updates the drawings to meet current Architectural, Engineering and Construction Computer Aided Design standards, improved plan readability, constructability, and correct omissions within the construction drawings. Another key element performed during the revision was the incorporation of lessons learned from previous MSM projects at various User organizations. The headwall components of the blast-resistant structure were analyzed under the 7-bar blast loading from DoD 6055.09-M paragraph V2.E5.5.2.4.2 using the methodology of Unified Facilities Criteria (UFC) 3-340-02. In addition to the blast analysis, a conventional structural load analysis was performed to identify some key loading limits, which will assist the designer during the site-adaption process. Many upgrades were made to the drawing package to improve the drawings in an effort to enhance construction of all new magazines. We recommend the 421-80-09 be considered a 7-bar structural designation, based on the justifications utilized to determine its' predecessor's, 33-15-74, 7-bar structural designation.

2. We will provide electronic versions of the narrative and drawings by way of email. The drawings will be in Bentley Micro Station, Autodesk AutoCAD and Portable Document Format file formats.

3. We appreciate the opportunity to support you on this effort. Our point of contact for this action is Mr. Josh Umphrey at commercial 256-895-1652 or DSN 760-1652. We look forward to providing explosives effects consultation and support to you in the near future.

Encl



BOYCE L. ROSS, P.E.  
Director of Engineering

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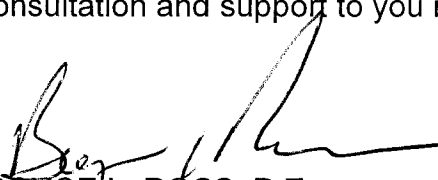
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BOYCE L. ROSS, P.E.  
Director of Engineering

SUBJECT: New Earth-Covered Magazine (ECM) Series 421-80-09

CF:

ED Read File

EDC- Read File

EDS-S (Coulston, Umphrey)

	Initial	Date
EDC-S, Coulston	<u>JWC</u>	<u>29 Aug 13</u>
EDC, Murdock	<u>Jm</u>	<u>8/29/13</u>

## APPENDIX A

## STATEMENT OF TECHNICAL REVIEW

## COMPLETION OF INDEPENDENT TECHNICAL REVIEW

The Huntsville Center has completed the new Modular Storage Magazine 421-80-09. Notice has hereby given that an independent technical review, which is appropriate to the level of risk and complexity inherent in the project, has been conducted. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This verification included review of assumptions; methods, procedures, and materials used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with the law and existing Corps policy. The independent technical review was accomplished by a team established in accordance with EC 1110-105. All comments resulting from the independent technical review have been resolved and no outstanding issues remain.

Roy S. Wright  
Technical Review Team Leader

28 Aug 13  
Date

Jeff Coulter  
Technical Manager

28 Aug 13  
Date

## CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

There were no significant concerns encountered during the independent technical review.

As noted above, all concerns resulting from the independent technical review of the project have been fully resolved.

[Signature]  
Director of Engineering

1/29/13  
Date