



US Army Corps  
of Engineers ®

# ENGINEERING AND CONSTRUCTION BULLETIN

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**Subject:** Single degree of freedom Blast Effects Design Spreadsheets (SBEDS)

**Applicability:** Guidance

1. Purpose: This bulletin announces the availability of the Single degree of freedom Blast Effects Design Spreadsheets (SBEDS) for use in the design of structures to resist the airblast from detonation of explosives. SBEDS can be downloaded from the USACE Protective Design Center website:

<https://pdmcx.pecp1.nwo.usace.army.mil/software/sbeds/index.php>.

2. Background: Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, requires inhabited structures not meeting minimum standoff requirements to be designed to resist the airblast effects from an explosive device detonated at the reduced standoff distance provided. Currently, several programs need to be run to accomplish the design. These existing programs were developed for the design of structures to resist wartime (conventional and nuclear) threats. As such, these programs are more suited for robust components such as heavily reinforced concrete and steel plate systems. Use of such programs when designing more conventional components, i.e. rolled steel shapes, cold-formed steel members, concrete masonry units, etc. are quite involved. Providing designers a more efficient tool suitable for satisfying the UFC requirements is the reason for the development of SBEDS.

3. Features: SBEDS is an Excel® workbook that calculates the single degree of freedom (SDOF) response for ten typical structural components. It can also be used with a user defined general SDOF system. The user inputs the basic structural geometry, component boundary conditions, material properties, response mode (flexure with compressive or tensile membrane included) and blast load. Blast load can be input manually, read from an input file, or generated for a hemispherical surface burst given the charge weight and standoff distance. SBEDS calculates the parameters of the equivalent SDOF system and determines the dynamic response using a time-stepping SDOF calculator. Output includes the maximum response parameters as well as history plots. SBEDS follows the guidance contained in Army TM 5-1300, Structures To Resist The Effects Of Accidental Explosions, and UFC 3-340-01 (FOUO), Design and Analysis of Hardened Structures to Conventional Weapons Effects as applicable. See the above website for further discussion of features.

4. Distribution: SBEDS is approved for public release; distribution unlimited.

5. POC: The HQUSACE point of contact for this bulletin is Joseph Hartman, CECW-CE-H, 202-761-0301.

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