



Blast Mitigation Software Developed by CTTSO/TSWG and the U.S. Army Protective Design Center

<https://pdc.usace.army.mil/>

- **HAZL: Window Fragment Hazard Level Analysis** - A robust model for calculating window response and personnel hazard. It uses a Single Degree of Freedom model for window response up to failure and a debris transport model for predicting fragment trajectory. For additional information, see: <https://pdc.usace.army.mil/software/hazl>
 - **WinDAS: Window Design and Analysis Software** - WinDAS automates the following three tasks related to window hazard identification and mitigation: conducting window hazard assessments, examining window hazard mitigation options for existing construction, and selecting blast-resistant windows for new construction. For additional information, see: <https://pdc.usace.army.mil/software/windas>
 - **CMUDS: (Concrete Masonry Unit Database Software)** supports the rapid search and retrieval of charge, applied load, damage level, and deflection data applicable to CMU structures. The user specifies the search conditions used to obtain the database records. Retrieved records may contain drawings, photographs, plots, as well as tabulated text and numeric information, all of which can be displayed in the various windows of the CMUDS graphical user interface (GUI). PDC has copies of CMUDS but does not distribute the CMUDS database. **SBEDS: Single-Degree-of-Freedom Blast Effects Design Spreadsheets** implements data from CMUDS. SBEDS is an Excel-based tool for design of structural components subjected to dynamic loads using single degree of freedom (SDOF) methodology. The U.S. Army Corps of Engineers Protective Design Center developed SBEDS as a tool for designers to use in satisfying Department of Defense (DoD) antiterrorism standards. For additional information, see: <https://pdc.usace.army.mil/software/sbeds>
- X **BIRM3D: Three-Dimensional Barrier Impact Response Model** - The Three-Dimensional Barrier Impact Response Model (BIRM3D) allows an engineer to evaluate the vulnerability of a barrier and the associated vehicle trajectory for a variety of impact scenarios without conducting costly vehicular crash tests. Current version 1.0a March 2004. PDC has a limited number of CD ROMs available. For additional information, see: <https://pdc.usace.army.mil/software/birm3d>.