

CECW-CE

Manual  
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Engineering and Design  
**EARTHQUAKE DESIGN AND EVALUATION OF  
CONCRETE HYDRAULIC STRUCTURES**

**1. Purpose.** This manual provides guidance for performance-based design and evaluation of concrete hydraulic structures (CHS). It introduces procedures that show how to design or evaluate a hydraulic structure to have a predictable performance for specified levels of seismic hazard. Traditional design and evaluation procedures may still be used for feasibility and screening purposes. However, for critical facilities, they should be followed by the procedures of this manual to prevent sudden collapse even though the structure may suffer severe damage, to limit damage to a repairable level, or to maintain functionality immediately after the earthquake.

**2. Applicability.** This manual applies to all USACE commands having responsibilities for civil works projects.

**3. Distribution.** This manual is approved for public release. Distribution is unlimited.

**4. Discussion.** This manual covers requirements for the seismic design and evaluation of plain and reinforced concrete hydraulic structures. The types of concrete hydraulic structures addressed in this manual include dams, U- and W-frame locks, gravity walls, and intake/outlet towers. The guidelines are also applicable to spillways, outlet works, hydroelectric power plants, and pumping plants. The structures may be founded on rock, soil, or pile foundations and may or may not have backfill soil.

**FOR THE COMMANDER:**

  
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