

Chapter 1 Introduction

1-1. 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.

1-2. Applicability

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

1-3. References

Required and related publications are listed in Appendix A.

1-4. Distribution Statement

This manual is approved for public release with unlimited distribution.

1-5. Mandatory Requirements

Engineers performing seismic design and evaluation of concrete hydraulic structures are required to satisfy specific mandatory requirements. The purpose of mandatory requirements is to assure that the structure meets minimum safety and performance objectives. Mandatory requirements usually pertain to critical elements of the design and evaluation, such as loads and load combinations, to analytical procedures used to determine force and displacement demands, and to methods used to determine member strength and displacement capacities. Mandatory requirements pertaining to the guidance contained in a particular chapter are summarized at the end of that chapter. No mandatory requirements are identified in the appendices. Instead, any mandatory requirements pertaining to information contained in the appendices is cited in chapters that reference those appendices. Where other Corps guidance documents are referenced, the engineer must review each document to determine which of its mandatory requirements are applicable to the design or/ evaluation of the project. Engineers performing the independent technical review must ensure that the designers and/or analysts have satisfied all mandatory requirements.

1-6. Scope

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 back-fill soil.