AMERICAN SOCIETY OF CIVIL ENGINEERS
AND
UNITED STATES COMMITTEE ON LARGE DAMS

JOINT ASCE-USCOLD COMMITEE ON CURRENT UNITED STATES PRACTICE IN THE DESIGN AND CONSTRUCTION OF :

ARCH DAMS

EMBANKMENT DAMS

CONCRETE GRAVITY DAMS

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DESIGN CRITERIA FOR LARGE DAMS

INTRODUCTION

In 1962-63 the American Society of Civil Engineers and the United States Committee on Large Dams organized a Joint Committee on Design Criteria for Dams. Impetus for this action came from disasters such as those at Malpasset and Vaiont. Subsequently the disasters at Mattmark and Baldwin Hills gave additional emphasis to the task.

The Committee held its first meeting at San Francisco on 9 April 1963. There was unanimous agreement that it would be unwise to publish recommended design criteria as standards to be adopted and used universally. Dams must be designed by competent engineering organizations based on a thorough investigation of dam site and reservoir conditions, and on the requirements of the project, utilizing careful engineering analyses of the conditions to which the structure, the foundations and the reservoir will be subjected. Sound judgment based on these studies and on experience must be exercised at each stage of project development.

Consequently, it could be extremely dangerous to publish recommended design criteria and thereby imply that by following these criteria an engineering organization could assure that a safe structure will result. For example, design criteria might include a recommended safety factor to be used in the stability analyses of earthfill dams. However, the safety of an earth dam depends upon many factors besides a routine stability analysis; the safety factor to be used in an individual case would depend on the extent to which the strength of the foundation and embankment materials could be determined, the zoning of the embankment, construction conditions, the probability of simultaneous occurrence of the combined conditions and the severity of these conditions assumed in the analysis, and a great many other factors. A factor of safety of 1.3 might be appropriate for certain limiting analyses; a factor of safety of 2.0 might not be conservative enough for others.

The Committee did consider, however, that it would be helpful to summarize the current practices of major engineering organizations in the U.S. which are engaged on a continuing basis in the planning, design and construction of large dams. It was hoped that dissemination of this information, besides providing a convenient reference to the practices of other organizations, would stimulate interest in improving practices, in providing facilities to secure more adequate information on the performance of structures and in suggesting areas where additional knowledge and improvement in practices is needed and can be achieved. As a result, the Committee appointed three subcommittees to survey existing practices on concrete gravity dams, concrete arch dams and earth and rockfill dams.

These subcommittees, the membership of which are listed elsewhere in this report, sent questionnaires to the principal engineering organizations involved in the design of dams to obtain information on their current practices. The data received were analyzed by the subcommittees and summary reports were prepared which are published in this report.

The subcommittee reports were reviewed by the main Committee at a meeting in Chicago on 9 November 1966 and it was agreed that they should be published in one edition of an ASCE publication. Subsequently, the Executive Committee of the U.S. Committee on Large Dams by action at its annual meeting in January 1967 approved publication of the report.

This action is only one of many which have been taken or are underway by ASCE and USCOLD related to the safety of dams. Others include the study of state regulations and report thereon by the USCOLD Committee on Review and Inspection of Dams, the studies by the USCOLD Committees on Foundations and Underground Works and on Failures and Accidents Other than in Connection with the Foundations. The current studies by UNESCO on the problem of regulations on dams to be established by the individual Governments is also one in which USCOLD has participated.

The Committee anticipates that ASCE and USCOLD will continue to undertake further tasks in the overall effort of the engineering profession to further the improvement of engineering in the large dam field.

JOINT ASCE-USCOLD COMMITTEE

ON DESIGN CRITERIA FOR LARGE DAMS

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