Concrete Face Rockfill Dams— Design, Construction, and Performance

Proceedings of a Symposium sponsored by the Geotechnical Engineering Division of the American Society of Civil Engineers in conjunction with the ASCE Convention in Detroit, Michigan

October 21, 1985

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PREFACE

This October 1985 Symposium on the Concrete Face Rockfill Dam (CFRD) follows the Symposium on Rockfill Dams held at the Portland, Oregon June 1958 ASCE Convention. The 1958 Symposium was published in ASCE Transactions, Vol. 125, Part II, 1962, and included discussions and closure discussions in an exclusive volume. Most of the world's high rockfill dams of all types were presented in that Symposium.

The 37 papers in this October 1985 Symposium are for the CFRD only. This type of dam is being used with greater frequency and to greater heights in the last decade and at present.

The developments leading to the progress are many, and are presented in the papers in this Symposium. Major features contributing to progress are the use and development of the smooth drum vibratory roller and design improvements in the cut-off to the foundation and concrete face slab and joints. Papers on the performance of the existing modern dams, special papers on rockfill zoning, dam construction and seismic analyses, and on dams currently under design are included.

The symposium was proposed to the GT Executive Committee by Richard L. Volpe, Chairman of the Embankment Dams and Slopes Committee. J. Barry Cooke and James L. Sherard were appointed as the Symposium Committee Chairman and Co-Chairman. Papers were invited and the favorable response is evident in this volume. Members of "The Symposium Commitee" are the reviewers who submitted prompt and thorough reviews.

It is the current practice of the Geotechnical Engineering Division that each paper published in a special technical publication (STP) be reviewed for its content and quality. These special technical publications are intended to reinforce the programs presented at convention sessions or specialty conferences and to contain papers that are timely and may be controversial to some extent. Because of the need to have the STP available at the convention, time available for review is generally not as long and reviews may not be as comprehensive as those given to papers submitted to the Journal of the Division. These STP reviews ordinarily are carried out within a three month time frame. Therefore, it should be recognized that there is a difference in the purpose and technical status of contributions to the special technical publications as compared to those in the Journal. Reviews of papers published in this volume were conducted by the Embankment Dams and Slopes Committee of the Geotechnical Engineering Division. The following committee members or cooperating persons from the general membership reviewed these papers:

Shalom Blaj
Donald H. Babbit
Hugh M. Brown
Richard E. Burnett
Gilles J. Bureau
J. Barry Cooke
Johnnie V. Holm
Don R. Hooper
David E. Kleiner
G. Robert Koch
Richard L. Kulesza
Thomas M. Leps
Andrew H. Merritt
Michael J. Morris

Ralph B. Peck
Nelson L. de S. Pinto
Warren H. Schumann
James L. Sherard
Arthur G. Strassburger
William F. Swiger
Gerald R. Thiers
Mircea S. Vasilescu
Richard L. Volpe
Thurman R. Wathen

The papers contained in these proceedings are eligible for discussions in the Geotechnical Journal and are eligible for ASCE awards. Discussions are invited and encouraged. They should be made to the book, "The Concrete Face Rockfill Dam", followed by the title of paper and name of author. The closing date for submission of discussions is February 1, 1986. Discussions, including closures, will be published in a future volume of the GT Journal.

J. Barry Cooke, F. ASCE
James L. Sherard, F. ASCE

Editors

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PERFORMANCE OF COGOTI DAM UNDER SEISMIC LOADING

by Luis Arrau,[1] Ismael Ibarra,[2]
and Guillermo Noguera[3]

ABSTRACT: At the time of its completion in 1938, the 280 ft (85 m) high Cogoti concrete face rockfill dam was exceeded in height by only one other dam of its type in the world, Salt Springs Dam. The dam contains 915,000 cu yd (700,000 m3) of dumped rockfill, and the total area of the face slab is 172,000 sq ft (16,000 m2). Cogoti Dam is located in north central Chile approximately 170 miles (275 km) north of Santiago. Due to the remote location from major sources of cement and availability of rock, a concrete face rockfill dam design was selected. Since the completion of Cogoti, central Chile has been subjected to four major earthquakes ranging from 7.1 to 7.9 Richter. The 1943 earthquake (7.9 Richter) with epicenter 55 miles distance was the most severe with ground acceleration at the dam site estimated at 0.19 g. Although Cogoti was constructed of high-lift dumped rockfill without compaction or sluicing, no earthquake damage to the face slab has occurred. Substantial settlement did occur, but the dam is considered effective in withstanding seismic loadings.

Introduction

In numerous publications the Cogoti Dam has been reported as having been subject to important seismic loadings. These references name the Cogoti Dam but do not describe its design, construction, and performance details. The purpose of this paper is to provide such information and to evaluate the dam's performance under important seismic loadings.

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