#### DESIGN TEXTBOOKS IN CIVIL ENGINEERING: VOLUME V

# WEIRS

## SERGE LELIAVSKY

Ph.D., M.I.C.E., F.Am.Soc.C.E.

formerly Director, Designing Service, Reservoirs and Nile Barrages Department, Ministry of Public Works, Cairo, Chief of Designing Office, Irrigation Projects Department, Ministry of Public Works, Cairo, Professor of Irrigation Design, Royal School of Engineering, Guiza, Cairo, Head of the Bridges Department, Egyptian State Railways, Cairo, Head of the Hydraulic Section of Lock and Dam Construction Works on the Dneiper Falls, Russia

1981

LONDON NEWYORK CHAPMAN AND HALL



## CONTENTS

1.	General Considerations on Location of Headworks	page 1
	1. Weir versus Pumping Station	1
	2. Elements of Economic Comparison	1
	3. Examples	2
	4. Effect on the Water Table	5
2.	Types of Cut-off Employed in Modern Weirs and Dams	11
	1. Introductory	, 11
	2. Statistical Examination	11
	3. Two Basic Types	12
	4. Timber Piling	23
	5. Cast Iron Piling	24
	6. Steel Piling	24
	7. Concrete Piling	28
	8. Particular Cases	29
3.	Temporary Sudds for Weir and Dam Construction	33
	1. Narrow versus Wide Types	33
	2. The Assiut Barrage Sudd on the Nile	34
	3. More Recent Experience with Sudd Construction on the Nile	37
	4. Other Types of Temporary Sudds	41
4.	Methods of Work in the Dewatered Enclosure	49
5.	Dewatering the Enclosure	52
	1. Introductory	52
	2. Characteristic Points of the Two Systems	52
	3. Basic Principles of a Dewatering Calculation	54
	4. The Circle of Influence of a Well-point	57
	5. Yield of a Well-point	58
	6. Interference of Several Wells	59
	7. Case when the Effective Depth is Less than the Thickness of the	
	Permeable Layer	60
	8. Groups of Well-points	60
	9. Circular and Rectangular Layouts	62

### CONTENTS

10. Dewatering Schemes near a River	64
11. Choice of System in Practice	65
12. Example of a Dewatering Scheme Operation	68
6. Weirs Constructed in Flowing Water	71
7. Solid Weirs and Overfall Dams	83
8. Movable Weirs. Typical Designs for their Metal Equipment	112
1. The Poirée Weir	112
2. The Chanoine Weir	115
3. The Rolling Gate	119
4. The "Roof" Weir (Bear-trap)	128
5. The Vertical Lift Gate	133
6. Swing Gates	146
7. Various Types	165
9. Vibrations and Water-Pressure Pulsations at Weirs and Dams	167
1. Gate Vibration	167
2. Flow Pulsations and Vibrations of Concrete	183
10. General Filtering Theory for Earthen Dams	191
1. Dupuit's Method	191
2. Dachler's Method	192
3. Casagrande's Method	198
4. Later Russian Solutions	201
11. Storage Computations	208
1. Elementary Case, when the Supply is Equal to the Demand	208
2. Case when the Supply is Greater than the Demand	. 214
3. Losses of Water from the Reservoir. Evaporation and Absorption	217
4. Storage Computations including Effect of Losses	223
5. Joseph's Problem. Century Storage	225
6. Simplified Calculation Methods	228
SUBJECT INDEX	231
AUTHOR INDEX	233

viii