

267 2807
267 3806

101

**TECHNICAL ENGINEERING AND DESIGN GUIDES
AS ADAPTED FROM THE
US ARMY CORPS OF ENGINEERS, NO. 10**

HYDRAULIC DESIGN OF FLOOD CONTROL CHANNELS



Published by
ASCE Press
American Society of Civil Engineers
345 East 47th Street
New York, New York 10017-2398



TABLE OF CONTENTS

Chapter 1. Introduction

1-1	Purpose	1
1-2	Scope	1
1-3	References	1
1-4	Explanation of Terms	1
1-5	Channel Classification	1
1-6	Preliminary Investigations for Selection of Type of Improvement	1

Chapter 2. Open Channel Hydraulic Theory

2-1	Physical Hydraulic Elements	3
2-2	Hydraulic Design Aspects	3
2-3	Flow through Bridges	10
2-4	Transitions	19
2-5	Flow in Curved Channels	26
2-6	Special Considerations	28
2-7	Stable Channels	30

Chapter 3. Riprap Protection

Section I

Introduction

3-1	General	35
3-2	Riprap Characteristics	35

Section II

Channel Characteristics

3-3	Side Slope Inclination	39
3-4	Channel Roughness, Shape, Alignment, and Gradient	39

Section III

Design Guidance for Stone Size

3-5	General	39
3-6	Design Conditions	39
3-7	Stone Size	39
3-8	Revetment Top and End Protection	45

Section IV

Revetment Toe Scour Estimation and Protection

3-9	General	46
3-10	Revetment Toe Protection Methods	47
3-11	Revetment Toe Protection Design	47
3-12	Delivery and Placement	48

Section V

Ice, Debris, and Vegetation

3-13	Ice and Debris	48
3-14	Vegetation	48

Section VI	
Quality Control	
3-15 Quality Control	49

Chapter 4. Special Features and Considerations

4-1 Sediment Control Structures	51
4-2 Air Entrainment	54
4-3 Hydraulic Jump in Open Channels	56
4-4 Open Channel Junctions	59
4-5 Hydraulic Model Studies	64

Appendices

Appendix A	References	67
Appendix B	List of Figures in Text	73
Appendix C	Notes on Derivation and Use of Hydraulic Properties by the Alpha Method	75
Appendix D	Computer Program For Designing Banked Curves for Supercritical Flow in Rectangular Channels	81
Appendix E	Theory of Combining Flow at Open Channel Junctions (Confluences)	91
Appendix F	Report on Standardization of Riprap Gradations	95
Appendix G	Velocity Estimation Based on Field Observations	113
Appendix H	Examples of Stone Size Calculations	115
Appendix I	Notation	117
Index		119