

CONTENTS

CHAPTER I.—MASONRY BRIDGES

	PAGE
1. Trend of Modern Practice—Types Classified	1
2. Masonry Bridges—Arch Design	2
3. Failure and Stability	7
4. Abutments and Piers	9
5. Construction	11
6. Centering and Falsework	20
7. Strengthening	26

CHAPTER II.—SMALL BRIDGES OF STEEL AND TIMBER

8. Material and Timber Construction	28
9. Steel Sections and Their Use	32
10. Commercial Sections as Stanchions	34
11. Culverts	39
12. Steel Bridges of Small Span	44
13. Plate Girders—Rigid Frames	48

CHAPTER III.—TRUSSED GIRDER BRIDGES

14. Types of Trusses	58
15. Elements of Design	59
16. Stress Diagrams	63
17. Heavy Trusses	65
18. Bowstring Girders	70

CHAPTER IV.—STEEL BRIDGES—CONSTRUCTIONAL DETAILS, FLOORS, ETC.

19. Pipe Bridges	73
20. Cantilever Bridges	74
21. Steel Piers	78
22. Compression Members	84
23. Bridge Floors	88
24. Camber and Deflection	92
25. Expansion Bearings	93
26. Wind Pressure	97

	PAGE
CHAPTER V.—STEEL ARCH BRIDGES	
27. General Observations	102
28. Proportion and Weight	108
29. Elements of Design	109
30. Calculations and Diagrams	110
31. Johnson Diagrams	111
32. Temperature and Wind Stress	112
33. Commercial Sections	113
34. Practical Construction	114
35. Bearings	119
36. Examples of Construction	121

CHAPTER VI.—SWING BRIDGES

37. Types Outlined	128
38. Elements of Design	129
39. Bearings	134
40. Rollers—Construction of Roller Path	137
41. Rollers—Bearing Strength	141
42. End Lifting Operation	142
43. Some Recent Swing Bridges	149

CHAPTER VII.—BASCULE DRAWBRIDGES AND VERTICAL LIFT BRIDGES

44. Rolling Lift Bridges	152
45. Constructional Features	154
46. Track Spans	156
47. Counterbalancing and Operation	158
48. Lighter Construction—Two-leaf Bridges—Locking	160
49. Hinged Bascule Bridges	163
50. Drawbridges	166
51. Vertical Lift Bridges	168

CHAPTER VIII.—FOUNDATIONS

52. Cylinders	178
53. Compressed Air	180
54. Caissons in Shallow Water	183
55. Concrete Cylinders	190
56. Piling Construction of Cofferdams	193
57. Supporting Piles	200
58. Foundations in Bad Ground	206

CONTENTS

xi

PAGE

CHAPTER IX.—ERECTION AND FIELDWORK

59.	Erection of Girders	214
60.	Hydraulic Stressing Gear	217
61.	Erection by Gantries	218
62.	Erection by Movable Bridges	218
63.	Erection of Arch Bridges	221
64.	Erection of Suspension Bridges	229
65.	Reconstruction Work	232
66.	Strengthening	237

CHAPTER X.—FERRO-CONCRETE BRIDGES—DESIGN

67.	General Principles Outlined	244
68.	Beam Construction	245
69.	Columns	248
70.	Foundations	249
71.	Arch Ribs	250
72.	Rigid-frame Bridges	252
73.	Underlying Principles of Design	256
74.	Stress Analysis	257

CHAPTER XI.—FERRO-CONCRETE BRIDGES— CONSTRUCTION

75.	Examples of Girder Bridges	262
76.	Arch Bridge with Continuous Arch	265
77.	Arched Rib Construction	268
78.	Concrete Combined with Cast Iron	271
79.	Pre-cast Work	275
80.	Structural Defects and their Avoidance	279
81.	Arch Bridges of Orthodox Type and Recent Erection	283
82.	Recent Developments	287
83.	Bridges with Double Decks	293
84.	Railway Bridges	295
85.	Reconstruction	297

CHAPTER XII.—SUSPENSION BRIDGES

86.	General Observations	301
87.	Cables	302
88.	Stiffening Trusses	303
89.	Construction in General	306
90.	Towers	310
91.	Anchorage	311
92.	Recent Progress	312

	PAGE
CHAPTER XIII.—WELDING IN BRIDGE CONSTRUCTION	
93. Fabrication of Structural Members	316
94. General Principles of Welding	317
95. Welding as Applied to Structural Work	318
96. Joints	324
INDEX	329