# Table of Contents

**TOPIC**

**Chapter 1: Introduction to Bridge Maintenance**

1.1 Fundamentals of Bridge Maintenance  
1.2 The Bridge Maintenance Unit  
1.3 When to Call the Engineer  
1.4 Terminology  
1.5 Benefits of Preventive Maintenance and Consequences of Deferred Maintenance  
1.6 Chapter 1 Reference List  

**Chapter 2: Bridge Maintenance Management**

2.1 Bridge Inspection  
2.2 Management Systems  
2.3 Bridge Maintenance Planning  
2.4 Bridge Maintenance Contracting  
2.5 Quality Control and Quality Assurance  
2.6 Chapter 2 Reference List  

**Chapter 3: Bridge Anatomy**

3.1 Bridge Components and Elements  
3.2 Bridge Types and Design Details  
3.3 Chapter 3 Reference List  

**Chapter 4: Bridge Mechanics**

4.1 Introduction  
4.2 Basic Structural Mechanics  
4.3 Bridge Deck  
4.4 Superstructure  
4.5 Substructure  
4.6 Culverts  
4.7 Redundancy and Fracture Mechanics  
4.8 Waterway and River Mechanics  
4.9 Chapter 4 Reference List  

**Chapter 5: Concrete Basics**

5.1 Concrete Overview  
5.2 Components and Properties of Hydraulic Cement Concrete  
5.3 Polymer Concrete  
5.4 Other Types of Concrete  
5.5 Identification of Deteriorated Concrete  
5.6 Removal of Deteriorated Concrete  
5.7 Replacement of Deteriorated Concrete  
5.8 Crack Repair  
5.9 Chapter 5 Reference List  

TOC-1
Chapter 6: Approach Slabs and Approach Roadway
6.1 Approach Slab Function and Potential Issues
6.2 Assessing Problems
6.3 Preventive and Basic Maintenance of Approach Slabs and Approach Roadway
6.4 Repair and Rehabilitation of Approach Slabs
6.5 Approach Pavement Expansion and Its Effect on Structures
6.6 Chapter 6 Reference List

Chapter 7: Maintenance and Preservation Techniques for Bridge Decks and Slabs
7.1 Bridge Decks and Slabs Maintenance Introduction
7.2 Concrete Decks
7.3 Steel Decks
7.4 Timber Decks
7.5 Fiber Composite Decks
7.6 Chapter 7 Reference List

Chapter 8: Deck Expansion Joints
8.1 Purpose and Significance of the Expansion Joint
8.2 Nomenclature of Expansion Joints
8.3 Common Types of Expansion Joints
8.4 Expansion Joint Defects
8.5 Preventive and Basic Maintenance of Deck Expansion Joints
8.6 Repair and Rehabilitation of Deck Expansion Joints
8.7 Elimination of Deck Expansion Joints
8.8 Chapter 8 Reference List

Chapter 9: Railing Systems and Safety Features
9.1 Purpose of Tailing Systems
9.2 Components and Types of Railing Systems
9.3 Preventive and Basic Maintenance of Railing Systems
9.4 Repair and Rehabilitation of Railing Systems
9.5 Chapter 9 Reference List

Chapter 10: Deck Drainage
10.1 Common Types of Deck Drainage Systems
10.2 Preventive and Basic Maintenance of Deck Drainage
10.3 Repair and Rehabilitation of Deck Drainage
10.4 Chapter 10 Reference List

Chapter 11: Superstructure
11.1 Preventive and Basic Maintenance of Concrete Superstructures
11.2 Preventive and Basic Maintenance of Steel Superstructures
11.3 Preventive and Basic Maintenance of Timber Superstructures
11.4 Maintenance and Repair of Concrete Superstructures
11.5 Repair and Rehabilitation of Steel Superstructures
11.6 Repair and Rehabilitation of Timber Superstructures
11.7 Chapter 11 Reference List

TOC-2
Chapter 12: Special Superstructure Elements
12.1 Common Types of Bridge Bearings
12.2 Preventive and Basic Maintenance of Bearings
12.3 Repair and Rehabilitation of Bearings
12.4 Gusset Plates
12.5 Cables
12.6 Earthquake Restrainers
12.7 Chapter 12 Reference List

Chapter 13: Substructures
13.1 Preventive and Basic Maintenance of Concrete Substructures
13.2 Preventive and Basic Maintenance of Steel Substructures
13.3 Preventive and Basic Maintenance of Timber Substructures
13.4 Repair and Rehabilitation of Concrete Substructures
13.5 Repair and Rehabilitation of Steel Substructures
13.6 Repair and Rehabilitation of Timber Substructures
13.7 Shoring and Temporary Supports
13.8 Maintenance of Seismic Retrofit Components
13.9 Chapter 13 Reference List

Chapter 14: Culverts
14.1 Purpose and Definition of a Culvert
14.2 Components of Culverts
14.3 Common Types of Culverts
14.4 Culvert Defects
14.5 Preventive and Basic Maintenance of Culverts
14.6 Repair and Rehabilitation of Culverts
14.7 Chapter 14 Reference List

Chapter 15: Channel and Waterway
15.1 Identifying Scour and Erosion – Waterway Mechanics
15.2 Preventive and Basic Maintenance for Channels and Waterway
15.3 Repair and Rehabilitation of Channel and Waterway
15.4 Chapter 15 Reference List

Chapter 16: Masonry Bridges
16.1 Common Types of Masonry Bridges and Masonry Bridge Elements
16.2 Preventative and Basic Maintenance of Masonry Bridges
16.3 Repair and Rehabilitation of Masonry Bridges
16.4 Chapter 16 Reference List

Chapter 17: Movable Bridges
17.1 Common Types of Movable Bridges
17.2 Operation of Movable Bridges
17.3 Preventive and Basic Maintenance of Movable Bridges
17.4 Chapter 17 Reference List
Chapter 18: Coatings / Painting
18.1 Background on Bridge Coatings Systems
18.2 Evaluating Bridges for Preventive Maintenance Painting
18.3 Review of Preventive Maintenance for Coating Systems
18.4 Containment and Worker Protection
18.5 Surface Preparation
18.6 Applying Coatings
18.7 Chapter 18 Reference List

Chapter 19: Maintenance and Preservation of Ancillary Features
19.1 Utilities
19.2 Bridge Mounted Sign Structures
19.3 Chapter 19 Reference List

Chapter 20: Concrete Deck Evaluation Procedures and Decision Aid Matrices
20.1 Reinforced Concrete Bridge Deck Evaluation Introduction
20.2 Deck Investigation Techniques
20.3 Evaluating Test Results
20.4 Deck Evaluation Decision Matrices
20.5 Chapter 20 Reference List

Chapter 21: Prefabricated/Temporary Bridges
21.1 Commonly Found Prefabricated Bridges
21.2 Parameters for Prefabricated Bridge Placement
21.3 General Usage and Maintenance
21.4 Chapter 21 Reference List

Chapter 22: Bridge Deck Decision Aid Matrices
22.1 Decision Aid Introduction
22.2 Reinforced Concrete Deck Decision Aid Matrices
22.3 Steel Deck Decision Aid Matrices
22.4 Timber Deck Decision Aid Matrices
22.5 Fiber Reinforced Polymer (FRP) Deck Decision Matrices
22.6 Chapter 22 Reference List

Chapter 23: Superstructure Decision Aid Matrices
23.1 Decision Aid Introduction
23.2 Concrete Superstructure Decision Aid Matrices
23.3 Steel Superstructure Decision Aid Matrices
23.4 Timber Superstructure Decision Aid Matrices
23.5 Bearing Decision Matrices
23.6 Chapter 23 Reference List

Chapter 24: Bridge Substructure Decision Aid Matrices
24.1 Decision Aid Introduction
24.2 Reinforced Concrete Substructure Decision Aid Matrix
24.3 Steel Substructure Decision Aid Matrix
Chapter 24: Timber Substructure Decision Aid Matrix

Chapter 25: Culvert Matrix

Appendix A:
A.1 Bridge Cleaning
A.2 Sealing Cracks and Joints in Bituminous Wearing Surface
A.3 Crack Sealing in Portland Cement Concrete Decks
A.4 Sealing Concrete Decks
A.5 Replacing Asphalt Wearing Surface
A.6 Lubricating Bearings
A.7 Sealing Concrete Substructures
A.8 Painting Bridge Steel
A.9 Spot Painting Bridge Steel
A.10 Repairing Concrete Decks
A.11 Repairing/Replacing Joints
A.12 Repairing/Replacing Steel Members
A.13 Repairing Sheared Anchor Bolts/Replacing Bearings
A.14 Repairing Concrete Substructures
A.15 Repairing Erosion or Scour
A.16 Placing Thin Polymer Overlays
A.17 Shotcrete Repairs
A.18 Full Depth Bridge Deck Repairs
A.19 Bonded FRP Repairs to Concrete
A.20 Repairing Paved Slope Protection
A.21 Repairing Stone Slope Protection
A.22 Repairing/Replacing Steel Truss Ends

Appendix B: References
B.1 Example Inspection Report
B.2 Summary of Condition States and Feasible Actions
B.3 Comparison of Non-Destructive (NDT) Methods Table
B.4 Summary of NDT Methods
B.5 AWPA Tables

Appendix C: Acronym List

Appendix D: Unit Conversion Tables