Bridges for Service Life Beyond 100 Years: Innovative Systems, Subsystems and Components

SHRP 2 | Project R19A
SHRP 2- Project (R19A)

Bridges for Service Life beyond 100 Years: Innovative Systems, Subsystems, and Components

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Lloryd Sterling – Water Proofing Bridge Deck
( working with Ad-Hoc AASHTO T-9, lead by Bruce Johnson)
Main Project Product

Guide for “Bridges for Service Life”

The Guide includes 17 Chapters
Chapter 1: Design for Life General Discussion (80%)
Chapter 2: Definitions
Chapter 3: Materials (steel and concrete) (90%)
Chapter 4: Construction (issues related to service life) (30%)
Chapter 5: Life Cycle Cost Analysis (90%)
Chapter 6: Bridge System Selection (considering service life) (90%)
Chapter 7: Bridge Deck (90%)
Chapter 8: Jointless Bridges (90%)
Chapter 9: Bridge Joints (50%)
Chapter 10: Bridge Bearings (80%)
Chapter 11: Fatigue and Fracture (?)
Chapter 12: Corrosion Protection of Steel Bridges (80%)
Chapter 13: Corrosion Protection of Reinforced Concrete (30%)
Chapter 14: Inspection
Chapter 15: Bridge Management
Chapter 16: Sustainability
Chapter 17: Expert System
General categories of information included in each Chapter

1- Introduction
2- Factors Affecting Service Life
3- Options for Enhancing Service Life
4- Strategy for developing solution for specific problem
5- Management Plan
6- Tools to analyze, design, predict
7- Examples
Example of factors affecting service life of bridge deck
Cast-in-Place Bridge Deck Selection & Design for Service Life

Reduced Service Life of Cast-in-Place Bridge Deck

Caused by Obsolescence

Caused by Deficiency

Load Induced

Natural or Man-made Hazards

Production/Operation Defects
Cast-in-Place Bridge Deck Selection & Design for Service Life

Load Induced

Traffic Induced Loads
- Wear / Abrasion
- Overload

Fatigue
- Reinforcing Fatigue
- Concrete Fatigue

System Dependent Loads
- Differential Shrinkage
- Thermal
- System Framing Restraint
Cast-in-Place Bridge Deck Selection & Design for Service Life

Production/Operation Defects

Design / Detailing
- Placement
- Curing
- Formwork

Construction
- Vibration during Const.
- Casting Schedule
- Casting Sequence

Inspection
- Visual
- NDT

Maintenance
Sources of Information
Contributing To
Guide for Bridges for Service Life
Sources of Information Incorporated In the Guide

Available information in AASHTO specifications

Synthesis of state of the knowledge

Results of R19A research (about 25%)

Related material from Other SHRP2 projects

Industry input

Input from other experts

AASHTO and DOT input

Other, such as fib C5 Commission

Guide for Bridges for Service Life
Example of New Ideas
Seamless Bridge Deck to Pavement Connection

Allows Bridge to Expand or Contract without any Expansion
Joints anywhere, even at the end of Approach Slab
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Thank You