ASCE Bridge Asset Management Collection

Curated by Dan M. Frangopol and Sriram Narasimhan

https://ascelibrary.org/bridge_asset_management

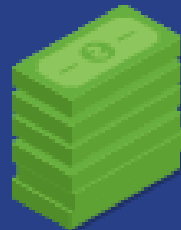There are over **617,000** bridges in the US

42% are at least 50 years old

46,154 bridges **(7.5%)** are considered structurally deficient, meaning in poor condition

In ASCE's 2021 Report Card for America's Infrastructure, the Bridges category scored a 'C'

The Federal Infrastructure Bill was recently passed

Infrastructure Investment and Jobs Act

Contains both a 5-year surface transportation reauthorization that increases investments, as well as an additional **$40** billion in investments for the nation's bridges

It is crucial to assist stakeholders and state Departments of Transportation (DOTs) in asset management and bridge maintenance to maximize use of this funding

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ASCE collection of studies focused on bridge maintenance and management

Effect of stakeholders' behavioral patterns
- Risk perception
- Risk attitudes
- Time preference

Bridge testing and inspection
- Review on the state-of-the-practice of bridge load testing
- Load rating planning framework using deep reinforcement learning

Climate change
- Understanding increased risks due to more frequent extreme weather events
- Incorporating climate change in the decision-making process

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Decision-making frameworks
- Network-level analysis
- Cost–benefit analysis
- Budget and performance constraints
- Managing uncertainty

Life-cycle management (LCM)
- Risk/reliability indices
- Overview of LCM for infrastructure networks
- Planning and optimization

Case study
- Rehabilitation/replacement of approach spans of I78 bridge at Hamburg, PA

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These studies will help decision-makers and engineers working on designing, managing, and rehabilitating bridges, leading to

- Safer infrastructure

- Higher bridge resilience and sustainability

- Smarter spending by minimizing life-cycle cost and maximizing bridge performance

- Optimal life-cycle inspection, monitoring, maintenance, and management

State DOTs and engineering firms need to be prepared for asset management, and this collection of studies will help them achieve better infrastructure maintenance

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There are more than 617,000 bridges across the United States. Currently, 42% of all bridges are at least 50 years old, and 46,154, or 7.5% ofthe nation's bridges, are considered structurally deficient, meaning they are in "poor" condition. With the passage of the InfrastructureInvestment and Jobs Act, the opportunity exists to invest in much needed bridge repairs and rehabilitation. These selected papers will assistall stakeholders, including state Departments of Transportation (DOTs), in asset management and prioritization of bridge maintenance projects to maximize use of this funding.

This collection is curated by Dan M. Frangopol, Dist.M.ASCE, Lehigh University, and Sriram Narasimhan, Ph.D., P.Eng (Ontario), M.ASCE,University of California, Los Angeles.

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This Collection includes:

Network-level Risk-based Framework for Optimal Bridge Adaptation Management Considering Scour and Climate Change
Journal of Infrastructure Systems

Bridge Load Testing: State-of-the-Practice
Journal of Bridge Engineering

Integrating the Risk of Climate Change into Transportation Asset Management to Support Bridge Network-Level Decision-Making
Journal of Infrastructure Systems

Determining Target Reliability Index of Structures based on Cost Optimization and Acceptance Criteria for Fatality
ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering

A Decision-Making Framework for Load Rating Planning of Aging Bridges Using Deep Reinforcement Learning
Journal of Computing in Civil Engineering

Investigation of the Effects of Time Preference and Risk Perception on Life-cycle Management of Civil Infrastructure
ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering

Condition-Based Multiobjective Maintenance Decision Making for Highway Bridges Considering Risk Perceptions
Journal of Structural Engineering

I-78 Bridge over Schuylkill River, Industrial Drive, and RBMN Railroad, Hamburg, PA: Bridge Replacement vs. Rehabilitation of Approach Spans
Structures Congress 2020

Life-Cycle Performance of Infrastructure Networks
Chapter 3 from Life-Cycle Design, Assessment, and Maintenance of Structures and Infrastructure Systems

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