



Oregon Department of Transportation

Kate Brown, Governor

Implementation of SHRP2 R19A:

Oregon Workshop Summary

January 17, 2018

Portland, Oregon ODOT Region 1 Office

Table of Contents

1. Introduction, Phases of the Project
 - a. Trial Use for Routine Bridge Design,
 - b. Evaluation of In-service Bridges to develop Design Standard Practice for Service Life Design,
and
 - c. Service Life Design Specification Template for Major Bridges
2. Workshop Agenda and Attendance List
3. Links to Presentations and ODOT Final Report
4. Conclusions of the Workshop

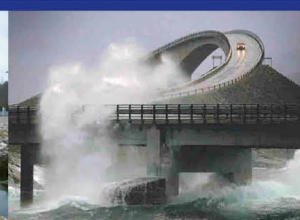
Introduction and Phases of the Oregon DOT R-19A Lead Adopter Project

This report documents the Workshop held January 17, 2018 to present the findings of the initial implementation of SHRP2 Project R-19A by Oregon DOT (ODOT). The implementation effort was funded through a Lead Adopter Award from FHWA based on the ODOT scope of work in a Round 4 SHRP2 application. The work was guided and assisted by the SHRP2 subject matter expert consulting firm CH2M HILL and sub consultant, COWI-North America. Primary technical expertise was provided by Mike Bartholomew and Anne-Marie Langlois. Technical leads at ODOT were Paul Strausser for In-service Bridge Design, Andrew Blower for Evaluation of In-service Bridge Decks, and Craig Shike for Design-Build Standard Specifications. This report of the Workshop describes the proposed future use of the results.

ODOT selected three approaches to investigate the benefits of using service life concepts for design of new bridges and for assessment of existing bridges. The first portion of the ODOT project was to use service life concepts in the design of a new replacement bridge in Central Oregon. The purpose of the effort was to identify any differences in detailing, material use, structural configuration or construction processes would change by specifically addressing service life in the design. A relatively simple single span bridge was selected for this trial application of service life methods. The SHRP2 funding was used to supplement the project PE budget where needed to perform additional work specifically related to service life design. We planned to use the experience from this project to implement and apply the fundamental steps in the service life design process to other bridges located in areas where extended service life is needed.

One of the most significant factors limiting the service life of existing structures is premature deterioration of bridge decks. For the second portion of the project ODOT used some of the SHRP2 funds to study chloride contamination of in-service bridge decks. Included in this portion of the project was evaluation and updating of current chloride testing techniques, core sample collection, chloride content testing and evaluation of remaining service life of bridge decks using Fick's second law of diffusion. A large portion of this study overlapped with ODOT's current projects to rehabilitate or perform maintenance activities on bridge decks. ODOT's project funds were used to supplement this study, where appropriate. The result is a series of case studies in bridge deck degradation used to guide bridge deck rehabilitation methods. We expect this effort to serve as a baseline for assessment of service life of existing bridges.

The third portion of the ODOT project was to develop a standard template for Service Life Design specifications for major bridges using design-build procurement. The specs could also be used for other procurement methods such as design-bid-build or CMGC with small editorial revisions appropriate to each technique. The specs were based on an initial effort to define service life requirements for a proposed major crossing of the Columbia River in a joint effort with Washington DOT. Those draft specs were revised based on lessons learned on several other major design-build bridge projects in the eastern US since that time by the SHRP2 subject matter expert team. Some of the recommended provisions may require modification based on project-specific requirements, so a comment log is provided to discuss how the alternative language is evaluated to address those requirements.



Service Life Design Workshop – Oregon DOT *Agenda*

January 17, 2017

Time	Topic	Speakers
8:00 am	Registration, Introductions, Continental Breakfast (Café Today)	
8:30 – 8:45 am	Welcoming Remarks	Bruce Johnson, ODOT
8:45 – 9:30 am	Introduction to Service Life Design	Mike Bartholomew, CH2M
9:30 – 10:15 am	Implementing Service Life Design for Concrete Structures	Anne-Marie Langlois, COWI
10:15 – 10:30 am	Break	
10:30 – 11:00 am	Overview of Material Testing for Service Life Design	Mike Bartholomew, CH2M
11:00 – 12:00 am	Testing & Evaluation of Existing Bridge Decks for Chloride Concentration	Andrew Blower & Ray Bottenberg, ODOT
12:00 – 12:30 pm	Workking Lunch (Provided by Café Today)	
12:30 – 1:15 pm	Service Life Design Tools for Chloride Ingress	Anne-Marie Langlois, COWI
1:15 – 2:15 pm	Ochoco Creek Bridge – Service Life Design	Paul Strausser, ODOT
2:15 – 3:00 pm	Service Life Design Specifications for Alternative Delivery Projects	Craig Shike, ODOT Anne-Marie Langlois, COWI
3:00 – 3:15 pm	Break	
3:15 – 4:00 pm	Summary of Other R19A Agency Projects	Mike Bartholomew, CH2M
4:00 – 4:30 pm	Lessons Learned & Questions	Mike Bartholomew, CH2M

Meeting Attendance Roster

Date: January 17, 2018

Time: 8:00 AM – 4:30 PM

Room: Oregon DOT 1st Floor Conference Room, "B"

Name		Attended	Lunch
Name	Raj Ailaney		
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Name	Mike Bartholomew		
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SHRP2 – R-19A Workshop – Oregon DOT January 17, 2018

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SHRP2 – R-19A Workshop – Oregon DOT January 17, 2018

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SHRP2 – R-19A Workshop – Oregon DOT January 17, 2018

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Andrew Blower

ODOT

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✓ ✓

Link to Presentations and Final Report:

Introduction to Service Life Design	Mike Bartholomew, CH2M
Implementing Service Life Design for Concrete Structures	Anne-Marie Langlois, COWI
Overview of Material Testing for Service Life Design	Mike Bartholomew, CH2M
Testing & Evaluation of Existing Bridge Decks for Chl. Conc.	Andrew Blower & Ray Bottenberg, ODOT
Service Life Design Tools for Chloride Ingress	Anne-Marie Langlois, COWI
Ochoco Creek Bridge – Service Life Design	Paul Strausser, ODOT
Service Life Design Specifications for Alternative Delivery Projects	Craig Shike, ODOT & Anne-Marie Langlois, COWI
Summary of Other R19A Agency Projects	Mike Bartholomew, CH2M
Proposed fib “Birth Certificate”	Mike Bartholomew, CH2M

SHRP2 R-19A ODOT Summary Report-Final

All presentations and Reports are posted at the following FTP Link until Feb 2, 2018. After that date, contact Bruce Johnson for copies at Bruce.V.Johnson@odot.state.or.us .

<ftp://ftp.odot.state.or.us/outgoing/SHRP2-19A/>

Conclusions of the Workshop:

New Large Signature Bridge Projects

1 – ODOT will use the newly refined Service Life Design Specification for Alternative Delivery projects developed under Phase 3 of the Oregon Lead Adopter Funding from FHWA, such as Design-Build and CM-GC delivered projects. This spec is considered a leap forward in providing appropriate guidance to contractors and contractor design firms in how to conduct and document service life principles for a major, high cost bridge that is intended to remain in service longer than routine bridges. It incorporates lessons learned from the first three large Design-Build projects in the US designed for a specific service life and one Canadian Public-Private Partnership bridge design effort.

New Routine Bridge Projects

2 – ODOT plans to continue and expand the effort under Phase 2 of the Oregon Lead Adopter Funding from FHWA to characterize deck deterioration from chloride loading and environmental drivers. ODOT will use this work to identify specific regions in the State that have consistent deterioration patterns and provide service life design guidance tailored to the requirements in each geographic region to achieve service life design goals for routine bridge design. This includes developing a "contour" map of surface chloride loading for coastal, Willamette Valley, Cascades, Central and Eastern climate regions.

3 – ODOT plans to develop and standardize specific mix designs, cover depths, reinforcement types applicable for each region and incorporate into the Bridge Design and Drafting Manual (BDDM) and standard specifications.

4 – Based on the overarching impact of concrete cover on bridge deck performance as a principle finding of the study, ODOT will consider adding requirements for measuring concrete cover dimensions on hardened concrete for all new and existing bridges as a requirement in the standard construction specifications and chloride sampling effort.

5 – ODOT plans to establish requirements for recording as-built documentation of durability properties (mix designs/test results, cover dimensions) during construction, perhaps similar to the proposed fib "Birth Certificate", as part of an enhanced asset management system.

6 – New BDDM guidance will also identify new bridge design cases where a stand-alone, bridge specific Service Life Design effort as conducted under Phase 1 of the Oregon Lead Adopter Funding from FHWA is required. Guidance will be provided on how to conduct and document the project-specific design effort.

In Service Monitoring and Rehabilitation Projects

7 – ODOT is moving forward in the development of a comprehensive plan for periodic sampling/coring of bridge decks for chloride profiling for condition assessment of a set of "indicator" bridges to be used in selecting preservation actions for similar bridges.

8 – We are planning to develop guidelines for in-place chloride level limits for decision making on preservation actions such as minor repairs, partial deck removal and overlay, and full deck removal and replacement.