

Comments by the author of the introductory report: serviceability and maintenance

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Comments by the Author of the Introductory Report

Remarques de l'auteur du rapport introductif

Bemerkungen des Verfassers des Einführungsberichtes

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Serviceability and Maintenance

The Introductory Report for Theme 1c, Serviceability and Maintenance, presents an overview of the various life-cycle considerations applicable to structures from their conception as a mere idea to their eventual demolition or replacement. Also discussed is how planners, designers, materials suppliers, equipment specialists and builders can best serve the interests of the owner and public.

The five primary life-cycle aspects of concern are functional service, capacity to serve, environmental effects, time schedules and cost-benefit relations. Each of these primary aspects is comprised of many elements which must be weighed and evaluated taking into account human, social, economic and monetary values as well as the technical considerations.

It is concluded that the optimization of the five primary life-cycle aspects can be achieved at relatively little cost and that favorable serviceability and maintenance depend on adequate planning, design and construction.

One submission was selected under Theme 1c, Serviceability and Maintenance, for publication in the Preliminary Report. In the accepted paper Mr. Kuesel clearly describes the four phases that evolved to replace an old 2-lane bridge crossing the 7.4 km wide James River in Virginia, U.S.A. The bridge was not only obsolete but more importantly was in an advanced state of deterioration and in danger of collapsing.

During phase one the existing bridge was repaired sufficiently to provide a safe structure until a new parallel 2-lane trestle structure could be completed under phase two. By means of temporary crossover structures traffic utilized the new trestle span and the existing 800 m channel spans. The completion of phase two eliminated the need for use of 90% of the existing deteriorated bridge.

Under phase three a new four-lane channel crossing was constructed. The bridge was completed during phase four with the addition of a second two-lane trestle.

A noteworthy feature of the new trestle span was the precasting of the deck section in a monolithic unit 23 m long, consisting of four longitudinal beams, transverse diaphragms and a 20 cm deck slab. Heavy marine equipment placed the units which weighed 230 tons each. Extra prestressing steel was utilized to obtain a uniform stress across the section under dead load plus prestress thus eliminating creep flexural deflections and ensuring a smooth riding surface.

The replacement schedule was very carefully planned by the Consultants to allow for the completion of phases one and two within the limited financial resources available. Phases three and four could then be deferred until the necessary funds became available to complete them.

Consideration of life-cycle aspects of a project usually end with the demolition of a structure. However, new bridges usually become important and vital links in a highway or rail-road transportation system and as such when the time comes for their replacement, in part or total, due to obsolescence, consideration must be given to maintaining a continuous traffic flow during the construction period. This constraint of maintaining service should become an important element of any life-cycle analysis.