

Implementation and cost-efficiency of stainless steel bridge edge beams

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Abstract

Bridge edge beams may take up to 60% of the life-cycle measure costs of a bridge and cause considerable user costs because of roadworks. The Swedish Transport Administration presented new edge beam solutions that could become better for the society in terms of cost. Stainless steel has been considered for enhanced durability, preventing expensive maintenance. The purpose of this paper is to motivate the use of stainless steel in the solutions proposed. A life-cycle cost analysis is carried out to evaluate the cost-efficiency of a concrete integrated edge beam with stainless and carbon steel reinforcement in a bridge project. The influence of the discount rate is addressed by a sensitivity analysis. Stainless steel is shown to lead to cost-efficient edge beam solutions. Low discount rates encourage using better quality designs with higher investment costs but lower life-cycle measure costs and user costs, which supports the use of stainless steel.

Keywords: bridge edge beam system, edge beam, stainless steel, life-cycle cost analysis, maintenance, cost-efficiency, discount rate.

1 Introduction

The bridge edge beam system is a major concern among bridge managers in Sweden. The term bridge edge beam system is a group of elements whose functions are carried out at the borders of the bridge, that is, the edge beam, the railing and the drainage system among others (**Figure 1**). The overlay and the membrane sealer can also be included since their life-cycle measures are often bundled in the same life-cycle plan.

The bridge edge beam system is exposed to harsh conditions due to weather, frost, splashed salt water and car collisions. Consequently, its deterioration is accelerated. The Swedish Transport Ad-

ministration (Trafikverket) has documented that up to 60 % of the maintenance costs of Swedish bridges are associated to the bridge edge beam system [1]. The execution of life-cycle measures leads to roadworks which cause considerable user

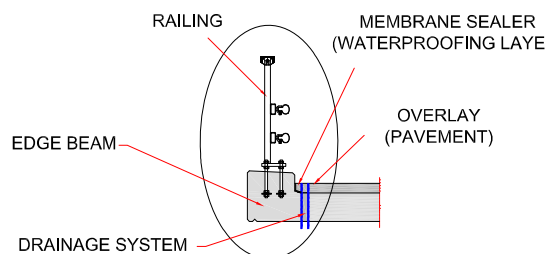


Figure 1: A typical bridge edge beam system