

US 60 Smithland Bridge – Navigation Modeling

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Abstract

As part of the bridge type study for this major bridge replacement project over the Cumberland River, an innovative approach to addressing the needs of the navigation industry and expediting the new bridge span arrangement and Coast Guard approval process was used. Realistic 3-D virtual environment navigation modelling was utilized to quickly come to a decision on the necessary span length of the bridge, which would not have been foreseen during the bridge span arrangement/type study phase. The Seamen's Church Institute's world-class navigation simulation facility was utilized to leverage multiple pier placement locations and the expertise of experienced barge captains to evaluate various bridge span arrangement options. Significant project re-design time and costs were saved while achieving early concurrence on the required navigation clearances by the US Coast Guard. The new bridge features a 213.4m main span.

Keywords: Barge, navigation, simulation, modelling, long span bridge, truss

1 Introduction

The US 60 Cumberland River Bridge Replacement project at Smithland, Kentucky is being carried out by the Kentucky Transportation Cabinet (KYTC) to replace an existing structure opened to traffic in 1931. During the preliminary design phase of the project, a bridge span arrangement/type study was performed to determine the structure configuration and realistic costs as early as possible to facilitate funding and expedite the design process. As part of this study, and due to the unique geography and characteristics of the

Cumberland River in the vicinity of the bridge, navigation simulation modelling was utilized to guide the decision-making process and facilitate early buy-in from project stakeholders and regulatory agencies including the US Coast Guard (USCG). The realistic 3-D virtual environment navigation modelling was utilized to quickly come to a decision on the necessary span length of the bridge, which would not have been foreseen during the bridge span arrangement/type study phase.