

Development of Live Load Distribution Factors for CT Girder Bridges

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Abstract

In December of 2020 the Hampden Grist Mill Bridge (HGMB), the first ever composite tub (CT) girder bridge was opened to the public in Hampden, ME [1] with additional structures completed since the end of 2020. CT girders are lightweight, non-corrosive beams that can reduce bridges' maintenance, increase lifespan, and decrease life-cycle costs compared to conventional steel and concrete girders. As CT girder bridges become more common a design guide will simplify girder design and increase industry acceptance of the technology. Included in the design guide will be standardized live load distribution factors for the CT girders constructed with a concrete deck. Distribution factors quantify the amount of load applied to a single girder of the bridge so each girder can be designed as a single beam. Research from live load tests on HGMB show differences in live load distribution from the AASHTO type C concrete box girder bridge distribution factors used to-date [2]. To develop live load distribution factors, a suite of finite element models will be created by varying parameters such as span length, girder stiffness, deck thickness, and girder spacing. These models that will be subjected to multiple load cases to maximize moments and shears on each girder. The simulation results will be used to develop CT girder-specific live load distribution factors for more rational and efficient girder design.



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References

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