



Research Results

UMR Node

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RP2C
*repair of buildings & bridges
with composites*

IDENTIFICATION OF PERFORMANCE CHARACTERISTICS OF CONCRETE RAILINGS WITH PULTRUDED FRP REINFORCEMENT

PROJECT NO. II.5

SUMMARY

The use of Fiber Reinforced Polymer (FRP) reinforcement is a practical alternative to conventional steel rebars in concrete structures subjected to aggressive environments. The solution is attractive for bridge deck and rail applications, as it eliminates corrosion of the steel reinforcement, which is the major instrument of degradation. Due to the peculiar physical and mechanical characteristics of advanced composite materials, the design philosophy of FRP reinforced concrete (RC) structures differs from that of traditional RC.

As part of this project, a new version of the open post Federal Lands Modified Kansas Corral Bridge Rail reinforced with pultruded Glass FRP (GFRP) rebars was designed, in order to contribute in developing a truly steel-free deck and rail system (Figure 1). The technology has been recently showcased in the accelerated construction of a bridge deck in Greene County, MO, using innovative prefabricated GFRP stay-in-place reinforcing panels.

A systematic approach was adopted for both the structural and functional design of the GFRP RC open-post rail. The design goals were: a) ensure compliance with the AASHTO Standard Specifications (2002), and AASHTO LRFD (1998) provisions for Test Level 2 equivalent static strength criteria, while providing additional redundancy to evaluate upgrade to the TL-3 category; b) devise a simple prefabricated reinforcement layout compatible with the GFRP deck panels. The final design was validated on the basis of the experimental static response of two full-scale post/deck overhang connection subassemblies.

Note: For additional information on this project please visit : <http://campus.umn.edu/rb2c/>

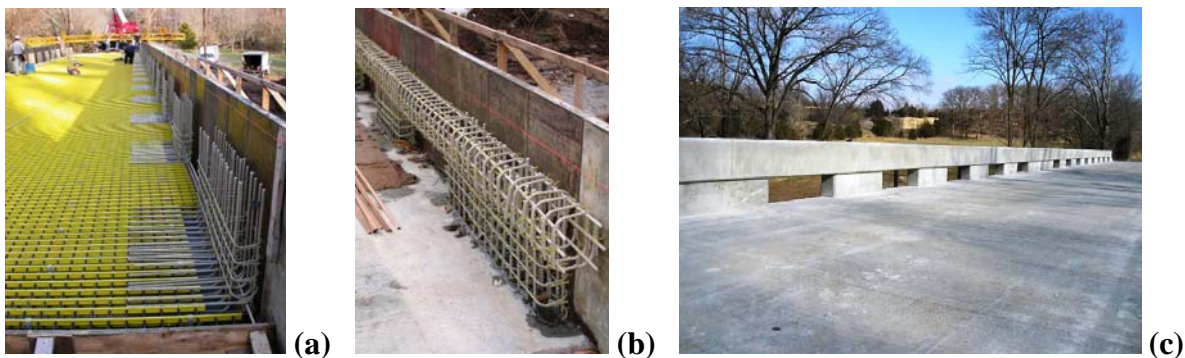


Figure 1. GFRP RC open post railing: reinforcement configuration (a), (b); and finished rail on Bridge 14802301, Greene County, MO (c).

