MONTANA Department of Transportation
Research

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Performance Measures Report

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More Info:

The research is documented in Report FHWA/MT-23-003/9630-628

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CONCRETE-FILLED STEEL TUBE TO CONCRETE PILE CAP CONNECTIONS - FURTHER EVALUATION/IMPROVEMENT OF ANALYSIS/DESIGN METHODOLOGIES

https://www.mdt.mt.gov/research/projects/structures/seismic.aspx

The Montana Department of Transportation (MDT) commonly employs an accelerated bridge construction technique using concrete-filled steel tube (CFST) piles, which are connected at the top by concrete pile caps, to support short and medium-span bridges.

This system offers low initial costs, short construction times, low maintenance requirements, and a long service life. Additionally, CFSTs provide several structural advantages over conventional concrete columns, such as enhanced capacity and ductility.

However, the use of this system has been limited due to a lack of knowledge on the performance of the connections between the CFSTs and the concrete pile caps, and the absence of a complete design methodology.

To address this, MDT has sponsored several research projects focused on these connections over the past decade. This brief report highlights the benefits associated with this research, emphasizing how the findings and recommendations will result in more efficient, longer-lasting bridges in Montana.

While it is challenging to assign precise numerical values to the benefits of this research due to variability in project-specific factors and long-term impacts, the general advantages are evident. This research provides a comprehensive understanding of the performance and optimization of CFST to pile cap connections. The validated moment-rotation methodology will help engineers design more efficiently, preventing over-engineering and reducing material waste. Consequently, this research will lead to more widespread use of this system in bridge designs across Montana, allowing the state to capitalize on its inherent benefits.

The lower initial costs, reduced maintenance requirements, efficient use of resources, and accelerated construction timelines collectively contribute to the economic viability of this system. Moreover, the long-term benefits of enhanced structural resilience and extended infrastructure lifecycles reinforce the value of this research in ensuring sustainable and cost-effective transportation infrastructure.

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