

Flexural Strength of Micro-pile Threaded Connections

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Abstract

Micro-piles are a foundation system especially suitable for Integral Abutment Bridges (IAB) at shallow bedrock sites, where typical H-section piles cannot be driven, allowing the development of the required length of fixity (See Figure 1). However, due to the monolithic action of the IAB, thermal expansion/contraction undergo by the super-structure must be resisted by the foundation system, and thus, micro-piles must be designed to carry axial and lateral load. Additionally, micro-piles are built-down from steel pipe sections of smaller length than the required depth and interconnected by means of threaded joints, which in turns represents a source of structural weakness that can develop early failure in bending. Thus, predicting the flexural strength of threaded joints is required during the design process, however, there is no validated method to predict strength nor stiffness of threaded connections subjected to bending loads. This work presents and validates a method for predicting moment capacity of threaded connections based on a literature review of several field and laboratory tests of micro-piles subjected to bending loading. The method is validated by comparison of predicted and observed failure moment at the connection for 47 tests found in the literature, showing excellent agreement.

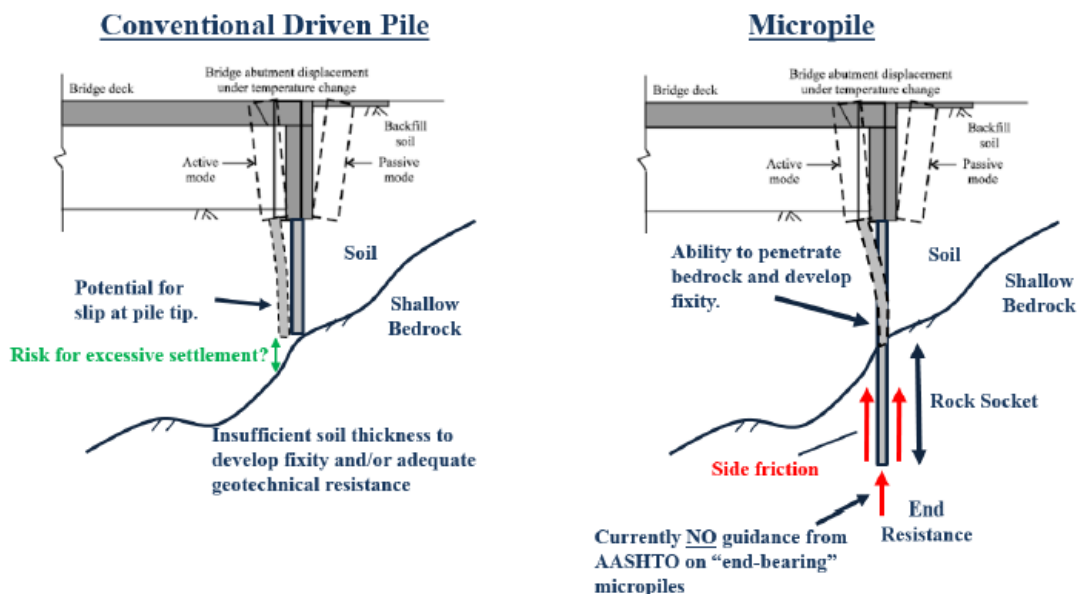


Figure 1 Driven piles vs. micro-piles (Modified from FHWA, 2011)

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References

FHWA. (2011). "Long-term behavior of integral abutment bridges." Rep. No. FHWA/IN/JTRP-2011/16. Indianapolis, IN.