***The Effect of Various Pile Head Displacement in Pile Design of IAB***

Author: Harsh Gandhi Advisor: Prof. Susan Faraji

Department of Civil and Environmental Engineering,

University of Massachusetts Lowell 

**Abstract**

The focus of this study is to analyze the effect of the range of span length on the design of HP piles in integral abutment bridges (IABs) under thermal expansion, that is, how the range of span length will impact the fixity point, the bending moment values, and the length of the segments of the piles. The study was done using LPILE, varying the displacement at the pile head from 0.05 to 0.5 inches, but keeping the thermal loading, soil profile and cross sectional properties of the pile constant.

For an HP12x74 pile, 8 cases were created for the pile head displacements  of 0.05, 0.1, 0.2, and 0.5 inches and orienting them in the weak and strong directions. Then the fixity point and moments at different segments of the pile were compared.

* For all the cases of different pile head displacement on HP12x74, the increment of pile head displacements will increase effective length of fixity point, unbraced pile length and maximum moment of top and 2nd segment by 0.50 ft, 0.25 ft, 75%, and 87% respectively.
* For all the cases of different pile head displacement on HP12x74 oriented in weak axis, the increment of pile head displacement will decrease effective length of fixity point by 4ft, unbraced length of top and 2nd segment by 1ft and 2ft, and maximum moments of top and 2nd segment by 96% and 82% in the pile due to more flexibility of pile with compared to strong axis.
* Increment in bridge span will increase the effective length of fixity point and bending moment. Also, pile oriented in weak axis will have less fixity point but have less moment at the pile head with compared to strong axis.

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