

## **Development and Experimental Validation of P-Y Curves for Rectangular Piles**

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### **ABSTRACT**

This study investigates the horizontal load characteristics of rectangular piles by utilizing soil parameters acquired from in-situ full-scale direct shear tests and plate load tests, and developing corresponding p-y curve models using hyperbolic equations. Comparison with in-situ horizontal loading test results of rectangular piles before and after grouting shows that p-y curves constructed based on soil shear strength and deformation characteristics accurately predict the behavior of rectangular piles under horizontal loading. Furthermore, the p-y curve model was used to investigate the impact of side friction resistance of rectangular piles and cohesive forces of gravelly soil on load response. The findings indicate that the soil resistance in front of the pile contributes significantly to the overall soil resistance of rectangular piles under horizontal loading, accounting for over 90% of the total. The impact of side friction resistance on pile deflection depends closely on the bond condition between the pile and the soil. Grouting treatment on the pile side can greatly enhance the resistance of side friction against horizontal loads. Additionally, the cohesive strength of gravelly soil significantly affects the load response of rectangular piles.

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