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Determining Bearing Resistance of Cantilever Sheet Piles

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Current Situation

Steel sheet pile walls have become a fixture of bridge construction. They are lightweight, meet foundational requirements, are corrosion resistant, and may be used for both temporary and permanent installation. However, in Florida, sheet pile walls are currently used for horizontal/lateral loads only.

Some bridge designers have considered using sheet piles to support vertical loads as well as lateral loads. However, the concept has not survived the final design. Research has not been done to confirm the vertical capacity of sheet piles in the field.

Research Objectives

The objectives of this project were to develop recommendations to estimate the bearing capacity of steel sheet pile walls for vertical applications and to develop practical methods to determine and verify the bearing capacity in the field.

Project Activities

After a literature review, the University of Florida research team developed a numerical 3-D model that predicted the bearing capacity of the sheet piles under axial (both horizontal and vertical) loading. They then tested the results against various existing theories and literature.

Next, the team designed and developed a model-size prototype to conduct centrifuge load tests, which included a 22-section aluminum sheet wall driven into natural Florida sand. The team tested the model across various scenarios to investigate the effects of sheet pile stiffness, depth of penetration, unsupported length, boundary conditions, and load transfer on the bearing capacity. The results of the tests were then compared to the numerical modeling, as well as existing theories and literature.



A centrifuge test set up shows the various parts of the small-scale load test model.

Project Conclusions and Benefits

The results of this research provided a reliable model to estimate and determine the bearing capacity of sheet piles in the field for vertical applications, and a methodology to analyze and design steel sheet piles as foundations for vertical applications.

For more information, please see fdot.gov/research.