

Case-History

Rapidly Increasing Press-in Piling Projects in New York Metropolitan Area (Part 1)

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INTRODUCTION

The Giken America Corporation is a U.S. subsidiary of GIKEN LTD. that was established in Orlando, Florida back in 1999. It had undertaken numerous sheet and pipe pile installation work as a speciality piling contractor using GIKEN's machines to showcase the advantages of the press-in piling method in North America. In 2010, it started to focus more on promoting its press-in piling technology to project owners and consultants while making GIKEN's press-in piling machines available for rental and sales for contractors. In March 2019, it opened a New York City office as its new headquarters in the Americas, intending to focus on the most populous region of North America. It also started collaboration with Mueser Rutledge Consulting Engineers (MRCE), a famed New York City-based geotechnical consultant, and Heavy Metal Rentals (HMR), a well-established construction equipment rental company based in Long Island, New York. Three press-in piling projects with their approximate locations shown in Fig. 1 will be discussed as part of GIKEN's achievements in the New York Metro region.

Earth Retaining Walls for Long Island Expressway/Cross Island Parkway Widening

When the Perini Corporation, then a New York-based heavy civil contractor, undertook an expressway widening and bridge replacement project in Long Island in New York in 2000. They submitted value engineering (VE) change proposals to the project owner, the New York State Department of Transportation, to build 10.5m (35ft) high self-standing pressed-in pipe pile walls for earth retaining at two different locations on the project in lieu of very large H-section soldier piles with precast concrete panels. The tall self-standing earth retaining walls were necessary because of space and environmental requirements. Giken America assisted Perini's preparation of the VE packages and later conducted the pipe pile installation. The piles were 914mm (36 inches) in diameter and 15.3 to 24.4m (50 to 80ft) in length with P-T interlocks. Water jetting and an auger attachment were utilized to facilitate pile installation into dense sand with gravel mixed in at some depths with SPT values varying from 20 to an equivalent above 100. See Fig. 2 for pipe pile installation work conducted next to the expressway. Pressed-in pipe piles benefitted both the project owner and the contractor with substantial cost savings. The piling work was conducted at two different times in 2001 and 2002.



Fig.1. Project Locations (Base map from Wikipedia on "Boroughs of New York City")



Fig.2. Tubular Pile Installation for Widening of Long Island Expressway

New York Metro Canarsie Tunnel Rehabilitation and Core Capacity Improvement

The New York subway's BMT Canarsie Line connects the boroughs of Brooklyn on the east and Manhattan on the west via a tunnel under the East River. In 2012, the historical Hurricane Sandy inundated and severely damaged the tunnel and related subway facilities. The tunnel's permanent repair is currently ongoing near the 1st Avenue Station in Manhattan. During the earlier part of the repair work, pressed-in sheet pile walls were installed for earth retaining with lower cost and lower noise/vibration than the original design of secant pile walls combined with soldier pile and lagging walls. This alternate shoring design with pressed-in sheet piles was proposed by MRCE with Giken America's assistance. The project location was in a busy and relatively narrow street sandwiched with high-rise apartment buildings on one side and popular stores in low-rise buildings on the other. Fill and fine sand were underlain with glacial till with SPT N-values ranging from less than 10 to way above 50. 14m (46ft) long Z-shaped sheet piles were chosen as earth retaining members. Some sections required a day-and-night piling operation to expedite the process without disturbing the area's residents or businesses. Giken America rented a Silent Piler F401-Z1400 model with its auger attachment to the Judlau/TC Electric Joint Venture. The duration of sheet pile installation was from December 2017 through April 2018. See Fig. 3 for piling work being safely conducted just next to an open sidewalk.

83-89 Columbia Street Building #3 New Boiler Plant and Site Work

Masaryk Towers Corporation, the manager of a high-rise apartment complex in the Lower East Side of Manhattan, built a new underground boiler room with pressed-in sheet pile walls that were installed for earth retaining. The original shoring design had been to retain 7.7m high soil to create 22.5m x 27.5m of underground space with a combination of soil-mixing and sheet pile walls. When contacted by the piling contractor for the project (Peterson Geotechnical Construction LLC) for a different type of piling equipment, HMR suggested the use of pressed-in sheet piles for the entire earth retention, which achieved a cost reduction, a shorter construction period, and minimum noise and vibration during piling. 15.2m (50ft) long Z-shaped sheet piles were pressed into sand and silt laminated layers with SPT N-values between 10 and 30. Giken America rented a Silent Piler F401-Z1400 model to the piling contractor for a couple of months in the summer of 2019. Fig. 4 shows sheet piles being installed just next to the high-rise apartment building.



Fig.3. Press-in Piling Next to Sidewalk 83-89 Columbia Street Building #3 New Boiler Plant and Site Work



Fig.4. Sheet Pile Installation next to a High-rise Apartment Complex Site

CONCLUSIONS

More and more New York area projects are enjoying the benefits that the press-in piling method provides. It has been solving difficulties associated with earth retaining and pile installation within the densely built metropolis and other crowded cities around the world. Collaboration with established local engineering consultants, equipment rental companies, and progressive engineering contractors appears to enhance the sphere of press-in piling technology.

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