

Case-History

Rapidly Increasing Press-in Piling Projects in New York Metropolitan Area (Part 2)

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INTRODUCTION

In March 2019, the Giken America Corporation, a U.S. subsidiary of GIKEN LTD., opened a New York City office as its new headquarters in the Americas with a goal to focus on the most populous region of North America. This article will be discussing the press-in piling projects along the Gowanus Canal in the Borough of Brooklyn as part of GIKEN's recent achievements in the New York Metro region.

GOWANUS CANAL – EPA (ENVIRONMENTAL PROTECTION AGENCY) SUPERVISED CLEANUP SITE

The Gowanus Canal is a 2.9km long and 30m wide canal located in the industrial zone of Brooklyn which discharges into the New York Harbor. It was built in the mid-1800s for the purpose of industrial transportation. Since the mid-20th century, however, the cargo volume drastically decreased with the main mode of domestic cargo transportation taken over by trucking. Manufactured gas plants, paper mills, tanneries, and other chemical plants on the sides of the canal operated and discharged their waste water into it. That in combination with the overflow of surface water and untreated sewage made the canal one of the most contaminated water bodies in the United States. High levels of toxic chemical compounds, fecal coliforms, and heavy metals including mercury, lead, and copper were found. Due to its proximity to Manhattan and the high-end residential neighborhoods in Brooklyn, the area near the canal started to experience rapid gentrification, prompting the canal's environmental cleanup. The EPA listed it on the National Priority List of Superfund sites (Federally supervised priority environmental cleanup sites) in 2010 and the cleanup preparation work started in 2013. Fig. 1 shows the general location of the canal in the boroughs of New York City and Fig. 2 shows an aerial photograph of the canal and the surrounding urban areas.



Fig.1. Location of Gowanus Canal in Brooklyn, New York

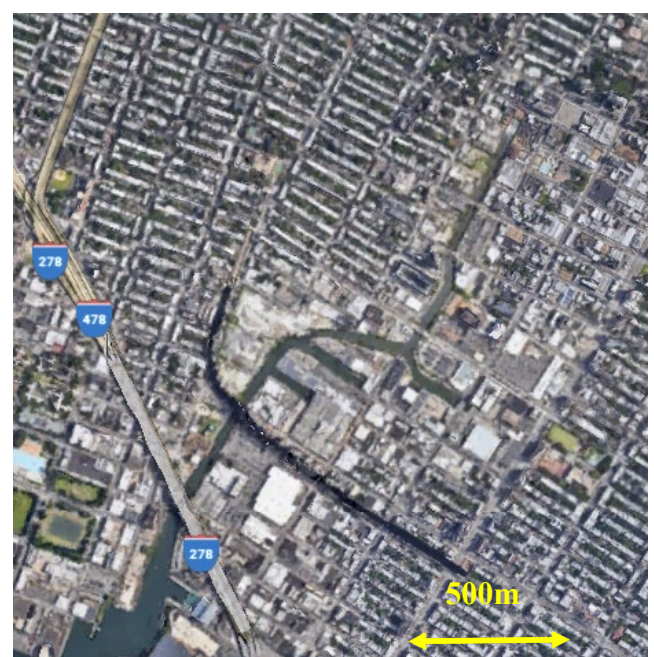


Fig. 2. Aerial View of Gowanus Canal (Google Map)

The cleanup scope of work involves the dredging of approximately 450,000 cubic meters of highly contaminated sediment, placement of clean soil material and its capping, and construction of retention tanks to reduce the discharges from combined sewer outfalls. In addition, the deteriorated bulkheads facing the canal have to be reconstructed at many locations at the expenses of the landside property owners before dredging. The pilot work was started at the 4th Street Turning Basin in 2016.

USE OF PRESS-IN PILING

In 2018, as part of the bulkhead reconstruction of the pilot work, press-in piling was added for testing after the use of a vibratory hammer had caused major ground settlement and resultant closure of the promenade of a high-end supermarket. The one-month-long press-in piling test for the total wall length of 273m exhibited much less noise, vibration, and settlement; satisfying most of the project requirements. Following the test result, the first full-scale segment of the Gowanus Canal remediation project at the Municipal Works Former MGP Site specified press-in piling for sheet pile installation. The soil conditions consisted of the top layer of contaminated soft soil and the underlying gravel layer with equivalent N-values reaching from 20 to 100. In addition, many debris including metal pieces was found to be in the canal floor and the pile line. The use of an auger attachment or water jetting was not allowed because of highly contaminated soil. Instead, predrilling was done by another method with excavated soil carefully and fully recovered and hauled away for treatment at a different location. Coated Z-shaped AZ46-700N sheet piles in lengths of 15.7m and 20.9m were installed. Fig. 3 shows a typical cross section of the new sheet pile bulkhead wall and Fig. 4 shows the line of installed sheet piles with the press-in piling machine (Giken F401-1400 model) in the distance. In order to verify the sheet pile wall's integrity against potential migration of contaminated water, sensors to detect complete engagement of the interlocks were welded at the bottom of each sheet pile pair as shown in Fig. 5. The total wall length of approximately 226m of this segment was completed with press-in piling in September 2020.

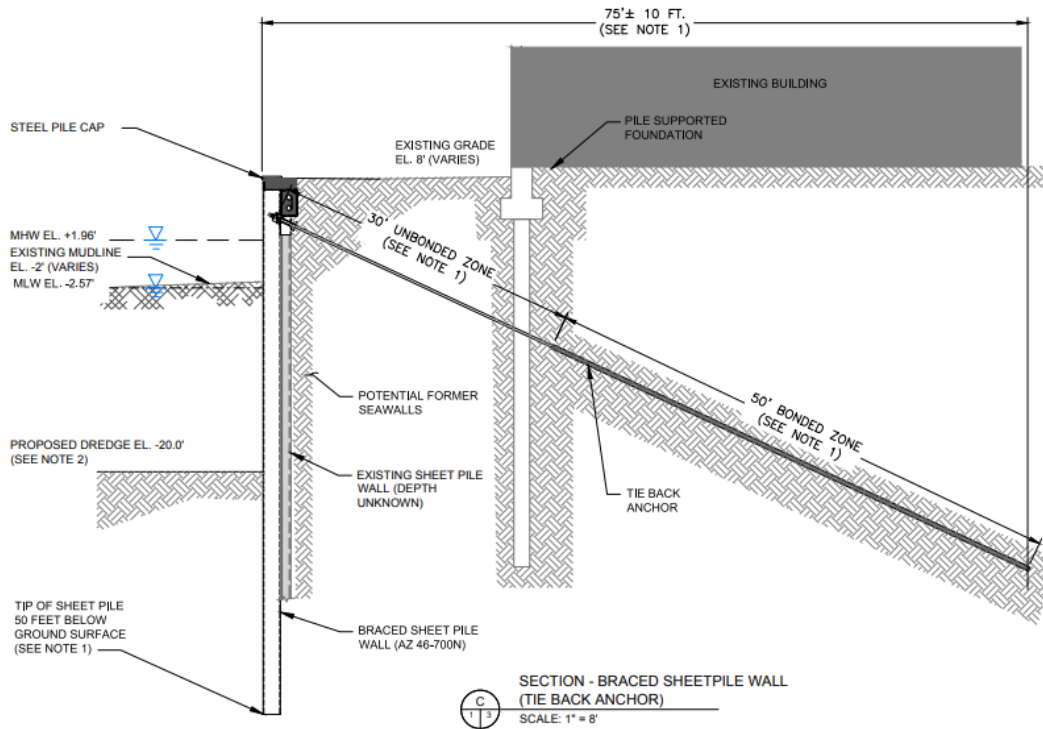


Fig. 3. Typical Cross Section of Existing and New Sheet Pile Walls with Tie Back Anchors



Fig. 4. Pressed-in Sheet Piles in the Gowanus Canal



Fig. 5. Non-declutching Sensor and Cable Conduit

SUMMARY

The low-noise and low-vibration advantages of the press-in piling method fulfilled the project's need to minimize the settlement and displacement of the existing canal frontage and nearby buildings as part of environmental remediation of the highly contaminated Gowanus Canal in New York. Also, the press-in piling's ability to achieve very accurate installation contributed to the formation of fully interlocked sheet pile walls as verified with non-declutching sensors. Other future segments of the remediation work are likely to utilize pressed-in sheet piles.

ACKNOWLEDGMENTS

The authors appreciate the support provided by Ian Vaz of Giken America Corp.