

CASE STUDY

Port of Hamilton Pier 12

Hamilton, Ontario

“Shipments for Phase 3 of the project had to be received prior to the end of the St. Lawrence Seaway’s shipping season. When the Burlington Lift Bridge is lowered for the winter, no marine traffic can get into or out of Hamilton Harbour. Starting Phase 3 on schedule meant having the sheet piling delivered in late 2019 and stored at an adjacent dock. Nucor Skyline facilitated the required offloading, storage, and re-handling of the sheet pile to enable a just-in-time style delivery to an already compact site. This permitted finishing work on Phase 2 and preparatory work on Phase 3 to take place unimpeded by the Phase 3 materials.”

— Erik Dean, General Superintendent,
Dean Construction



HISTORY

Located in Hamilton Harbour, at the far western end of Lake Ontario, is the Port of Hamilton. The Port is connected to the Great Lakes-St. Lawrence Seaway shipping network. With multiple Seaway-depth berths, the Port of Hamilton, and its sister port, the Port of Oshawa, are able to make marine shipments throughout the Great Lakes and international waters.

The port handles over 12 million tons of cargo and sees upwards of 700 vessels each year. It is ranked as the busiest of all Canadian Great Lakes ports. With so much traffic in and out of the port, it is imperative that its facilities be in good condition. The port authority reinvests more than \$10 million each year in building and maintaining infrastructure at the Port of Hamilton. These investments ensure that the port is able to meet its mandate of providing efficient transportation and facilitate trade for Ontario industries.

PROBLEM

In April of 2017, the Hamilton Port Authority retained GHD Engineering Services (GHD) of Quebec to conduct a conditional assessment of Pier 12 West. This section of the pier was originally constructed in 1948 using deep arch type sheet piling that was 16m in length. GHD found the wharf to be in very poor condition and beginning to fail. The decision was made to reconstruct the entire west half of the pier in three phases. At this time, GHD also provided the Hamilton Port Authority with detailed design drawings and tender documents for the reconstruction of the pier.

The maximum loads permitted at Pier 12 had been reduced over time and this limited the use of this important asset. Pier 12 is one of the busiest piers at the Port, with over 700,000 tons of cargo handled there each year, including fertilizer, aggregates, salt, and steel. The new dock structure is designed for

an increased surcharge load capacity of 1,000 pounds per square foot, doubling the original dock’s capacity of 500 pounds per square foot. The new structure is also designed to allow for future maintenance dredging of the adjacent Emerald Street Slip to ensure access by Seaway-draft vessels.

SOLUTION

The construction contract for Phase 1 was awarded to Barclay Construction of Ontario and consisted of rebuilding a 208m long section of the southern half of the pier’s west facing wall along the Emerald Street Slip. For Phase 1, the Hamilton Port Authority pre-purchased Z-shaped steel sheet piling from Nucor Skyline. The purpose of the pre-order was to expedite the delivery through the St. Lawrence Seaway before the closure for winter.

The Z-shaped sheet pile used is designed with

CASE STUDY**Port of Hamilton Pier 12****PROJECT PARTNERS**Owner

The Hamilton-Oshawa Port Authority –
Hamilton, ON

General Contractor

Dean Construction Co. Ltd – Windsor, ON

Engineer

GHD Ltd. – Quebec, QC

PRODUCTS

Z-shaped Sheet Piles: 196 pairs
Threaded Bar: 131 #20 Grade 80 bars

PROJECT TIME FRAME

January 2018 to November 2019

the Larssen interlock, one of the most water tight interlocks manufactured. The design length of the sheet piles was 19.5m to allow for an embedment depth of 9.1m. The sheet pile began to arrive in January 2018, and construction of this part of the project was completed within the year.

Phase 2 of the contract was awarded to Dean Construction of Ontario. This phase of the construction involved rebuilding a 168m long section of the northern half of the west facing wall, as well as the western half of the north facing wall of Pier 12. Nucor Skyline was asked by Dean Construction to supply the sheet pile for this phase of construction. The sheet pile installation was completed within the year.

The next and last phase of the reconstruction of Pier 12, Phase 3, was also awarded to Dean Construction. This phase began with sheet pile delivery at the end of 2019, and construction will be completed in the coming month. In Phase 3, 162m of steel sheet pile was driven in place to complete the new reinforcement

of Pier 12. Overall, there was a total of 330m of new steel sheet pile, walers, anchor piles, tie rods, and concrete cope wall between the two phases. Nucor Skyline supplied 131 pairs of 19.8m long Z-shaped sheet piles, as well as 131 #20 Grade 80 tie rods for the last two phases of the project.

The Port of Hamilton sits on reclaimed land that has had mixed use for the last 50 years. The conditions at the site range from loose silt, down to very hard clay till at the tip of the driven sheets. And, the conditions of the site varied from the west side of the pier to the east side. Dean Construction utilized the newly purchased 500 HPSI vibratory hammer to take the 17.8m to 19.8m long sheet pile down to the design toe of 10m into the lake bed.

At each phase of construction, the new sheet pile walls were driven within 1m of the existing sheet pile wall. The sheet piles were driven in the first quarter of the year, with the out of water work being done in the second quarter of the year.