

RANDLE REEF REMEDIATION

Hamilton Harbour, Lake Ontario

CASE STUDY



Figure 1

BACKGROUND

For over a century, Hamilton Harbor, located in the western half of Lake Ontario, has been the dumping site for energy, steel, and municipal companies located in the Burlington Street area. According to the Bay Area Restoration Council (BARC), this industrial development has resulted in approximately 695,000 cubic meters of heavily polluted silt being deposited at the bottom of the harbor. Much of this pollution consists of polycyclic aromatic hydrocarbons (PAHs), which are known carcinogens, as well as other environmentally damaging, heavy metals. While the entire harbor is severely polluted, the highest concentration of pollutants are located at Hamilton Harbor's Randle Reef. This has earned the reef to be labeled as an area of concern by both the Canadian and American governments. Therefore, environmental remediation for the reef and surrounding harbor is essential to the health of the Hamilton/Burlington community and local ecology. (Bay Area Restoration Council, 2018)

ENGINEERED CONTAINMENT FACILITY (ECF)

The size and depth of the dual layered ECF constructed over the contaminated sediment in the harbor posed the most imminent challenge for the construction and engineering teams. The design of the Randle Reef ECF consists of two cells (see Figure 1). The inner cell serves as a waterproof barrier to trap in the contaminated sediments and acts as a holding area until the contaminated water is treated. (Bay Area Restoration Council, 2018) This 19,241 square meter cell is composed of 1,352 pieces of 22.5 meter long Waterloo Barrier® WEZ95. The WEZ95 was the ideal sheet piling for this project because it serves as a watertight environmental containment wall and its structural properties allow it to also serve as an anchoring wall. The outer wall of the ECF is composed of 1,378 pieces of 27 meter plated JZ127. The 24,486 square meter outer wall of the ECF surrounds the impermeable inner cell, and acts as a structural barrier to provide additional support. Plated JZ127 was selected for this portion of the ECF because it met all engineering specifications and was able to be rolled from the provided coil.

CASE STUDY

WATERLOO BARRIER®

Another aspect that made the WEZ95 the ideal sheet piling for this project was the shape of the interlock. Normal sheet piling interlocks would allow for too much water and contaminants to pass through them. Additionally, they also have an internal cavity that is too narrow to inject any sealant. Therefore, the WEZ95 offers a larger internal cavity than standard sheet piling. This allows C3 Environmental to inject their patented Waterloo Barrier System® between the sheets when installed (see Figure 2). This system fills the interlocks from end to end then dries to form a cement-like sealant that makes the interlock impermeable to contaminants. (Waterloo Barrier, n.d.)

LOGISTICAL CHALLENGES

Gathering and shipping the material for a project of this size brought some logistical challenges. First, the six – eight thousand tons of coil required for this project was shipped to Samuel Roll Form Group's luka, MS mill from U.S. Steel Stelco, located in Hamilton, ON. Once the rolling process was complete, the 89' JZ127 sheet piling was moved from Roll Form Group's facility in luka, Mississippi to Hamilton, Ontario. These long pieces of material had to be loaded onto three river barges and sent up the Mississippi river system, where it arrived in Chicago, IL. It was then transloaded onto the large lake vessel where it traveled through the Great Lakes, finally arriving in the Hamilton Harbor. The WEZ95 material was manufactured at the Roll Form Group's facility in Cambridge, ON, from where it was shipped to Hamilton, ON by truck. Once on site, the sheets were installed using vibratory and impact hammers (See figure 5).

OVERVIEW

After the sheet piling arrived at the staging area, the ECF took almost two years to construct and dredging the contaminated sediment is expected to take several more years. After the contamination is collected and treated by a local water treatment facility, the ECF will be capped by the Hamilton Port Authority and used as an additional port facility (Bay Area Restoration Council, 2018).

Works Referenced

Bay Area Restoration Council. "About the RAP." BARC, 2018, [Hamiltonharbour.ca/about_the_rap](https://hamiltonharbour.ca/about_the_rap).

C3 Environmental Limited. (n.d.). Waterloo Barrier [Brochure]. Breslau, Ontario.

C3 Environmental. (2020). Entombment - Randle Reef. Retrieved July 20, 2020, from <https://www.c3env.com/entombment-randle-reef>.

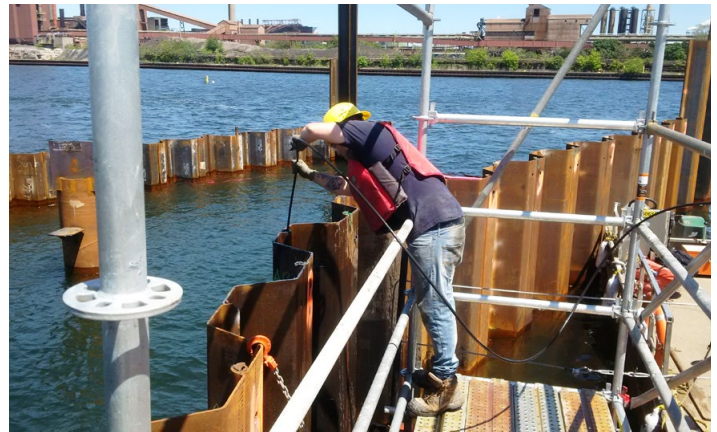


Figure 2



Figure 3

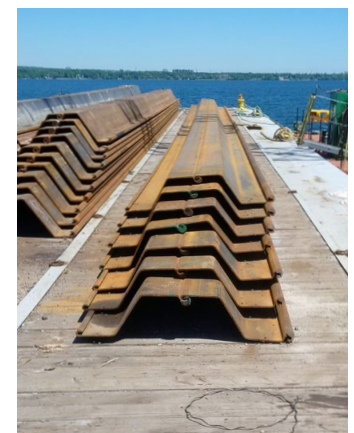


Figure 4

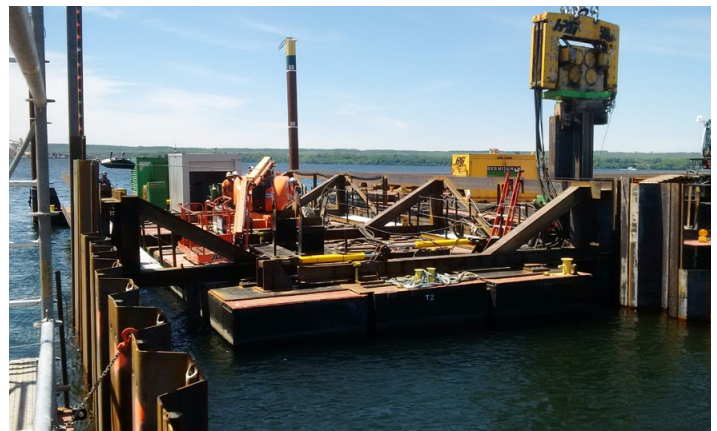


Figure 5