



A PilePro Group Company

Overview

O-Pile® is the most versatile, efficient and cost-effective steel retaining wall/support system that can replace standard Z sheet pile, combined pipe/beam SSP, slurry, secant, contiguous concrete walls and other conventional concrete constructions.



O-Pile® Attributes

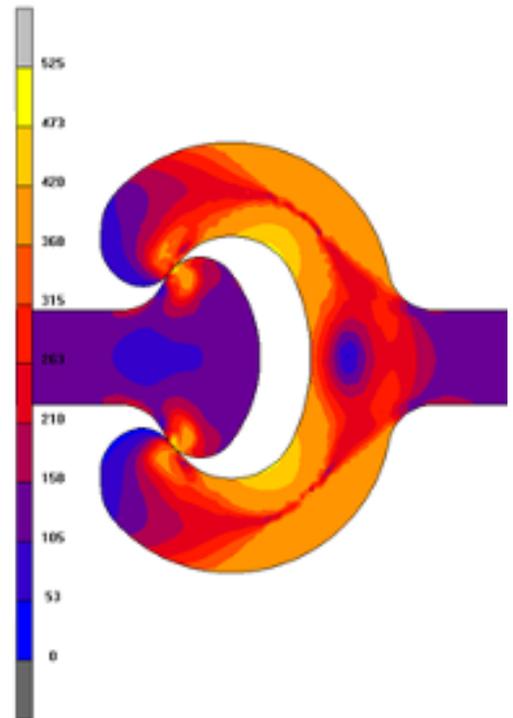
O-Pile® is a patented system with a series of important attributes:

1. Bending Moment Capacity (BMC) – O-Pile® systems are stronger than Z, U or combined sheet pile walls as they can be made using high strength hot rolled coil that exceeds the capabilities of hot rolling, allowing for a much larger Bending Moment Capacity. For example O-Pile® is available in X80 to provide 80,000 yield strength, where by hot rolling sheet piling is limited to less than 65,000 and typically uses steel with a yield strength of 36,000,000 or 50,000,000 psi. The selection of the steel grade has a marked impact on the structural resistance of the pile wall. Selecting a stronger steel grade such as X70 or X80 often allows using piles of smaller diameter or wall thickness. To configure an O-Pile® please go to www.O-Pile.com.

2. Strong Connection – WOM/WOF connector (19.5 Kips/inch) clearly shows the high pull-out resistance of this connection. See Figure 1.

“Greater interlock strength improves integrity during driving and allows forces to be redistributed laterally along the wall.” USACE: 2.1 Metal Sheet Piling UFGS -31 41 16 Page 13 (August 2009)

FIGURE 1



The WOM/WOF connection has a high pull out capacity of 19.5 Kips/inch or 194 kN (19.4 MT) .

3. Double Pipe Thickness – With O-Pile®, you can “dial in” thickness to meet specific structural load/durability needs to ensure overall safety. For increased durability, thickness can be increased in the upper 15’ of the pipe, specifically at the splash- and low-water zones, while the lower majority of the pipe remains at a thickness to meet load-bearing requirements. Additional costly measures, such as coatings, special steel grades or cathodic protection, become unnecessary. This gives the most efficient use of steel and the most cost-effective solution for durability. See Figure 2.

4. DTH (Down the Hole) Drilling – State-of-the-art DTH drilling capability will advance O-Pile® systems into any ground or rock strata at levels of productivity not achieved before. DTH drilling has been used in these challenging environments: post glacial soils of Norway, boulders of Sweden, granite of Finland, deep bed rock of Hong Kong, through heavy structure in Macau, etc. The O-Pile®: DTH Pile is installed with the centric drilling method using ring bits of a larger diameter than standard bits. The ring bit drills a hole larger than the pile to accommodate the WOF/WOM connectors. Sized of from 6” pipe to 40” pipe can be installed using the O-Pile®: DTH currently. Pipes with diameters above 1016mm utilize a driving method that is more akin to driving Z-sheet pile. See Figure 3.

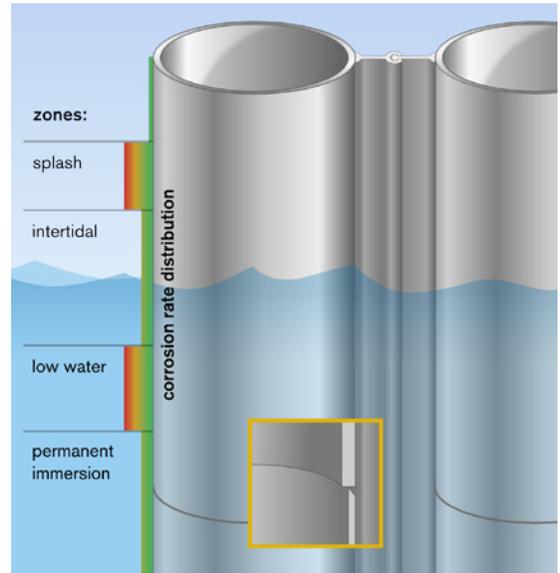
5. Superior Sealant – WADIT®, the globally proven sheet pile interlock sealant, comes pre-applied in the WOF interlock chamber before delivery to the job site. For more information on WADIT®, visit page 11.

6. Increased Savings – The increased Bending moment capabilities of O-Pile®, allow the user to construct a stronger wall using much less steel, and hence at a much lower cost. O-Pile® works with our customers to ensure we meet your specific project needs. We don’t just sell you a product, we enter into a partnership that starts at the design stage and extends through implementation. Simply put, we deliver the most technically advanced and highly economical. Since, we locally source pipes, we can always help you find the correct pile size in a broad range of steel grades, which allows you to implement a retaining wall or foundation structure with the best overall economy for all soil conditions and loading situations. O-Pile® offers a truly unmatched proven solution.



Actual view of O-Pile: DTH

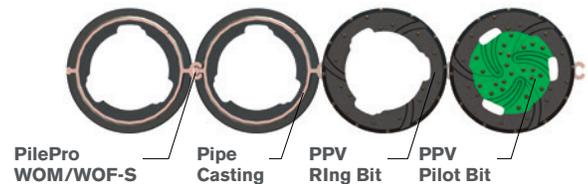
FIGURE 2



Call out box shows how thickness can be “dialed in” to meet safety needs (e.g. structural load and durability).

FIGURE 3

DTH-O-Pile
The Only SSP System that Can Be Driven Through Solid Rock.



General Installation and Applications for O-Pile®

O-Pile® Installation Methods:

1). Like Z-Sheet Pile: Typically, O-Pile® is installed using a drive or vibration method that requires less equipment because there is no need for a template. O-Pile® are driven similar to Z-sheet piles, which are easier to install than combined systems. Each pipe is supported by adjacent pipes with a small lead ahead of the rest, ensuring accurate wall alignment.

2). O-Pile® - DTH systems: Predictable, quantifiable installation is possible even with difficult driving conditions, such as bedrock or jobsites with heavy debris, consider O-Pile®: DTH. Using specialized centric drill bits O-Pile® can be driven through solid rock and other difficult environments. Compared to driving a conventional combined sheet piles with beams or pipes, the installation using a O-Pile®: DTH system is much less challenging due to one single fact: O-Pile®s are supported throughout their installation, whereas King pile combi-wall systems with pipes and beams are not. Installation using flexible strong WOM/ WOF connections are simplified by the use of a template and panel installation method. The installation of O-Pile®: DTH Piles is similar to driving sheet pile pairs in a basic two frame template. At no stage is there a pipe pile entirely unsupported throughout its length as it is driven to grade. Each pipe is supported by adjacent pipes with a small lead ahead of the rest, ensuring accurate wall alignment.



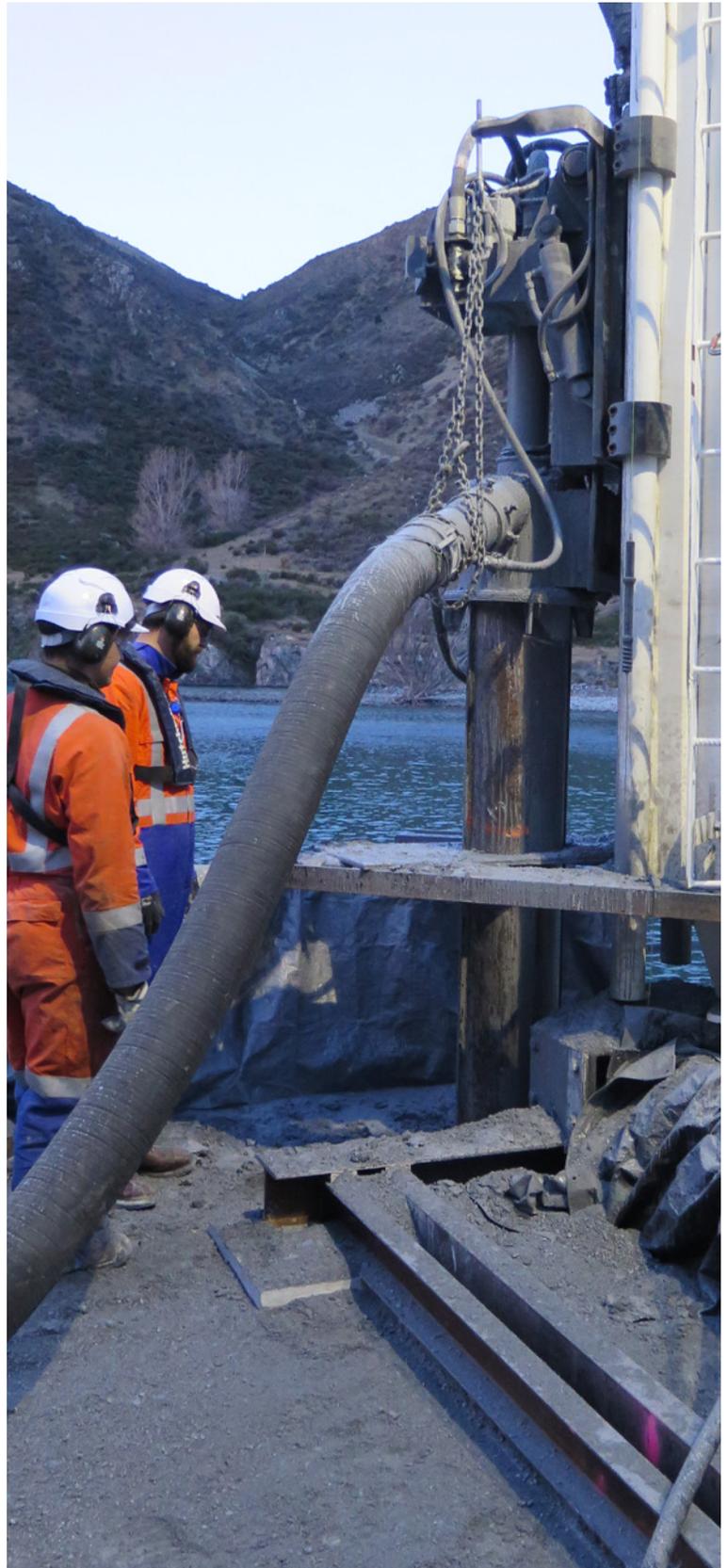
Structures Well-Suited for O-Pile®

Permanent Structures – O-Pile® systems can also be installed reliably under challenging conditions, whereby the solution brings considerable savings in construction time and produces an end result of good overall economy. O-Pile® Systems may even completely eliminate the need to build temporary retaining walls, because you can leave the systems in place, fill it in with concrete and build on top of it.

Temporary Structures – As a temporary retaining wall structure O-Pile® systems are particularly suitable for challenging soil conditions where the implementation of conventional retaining wall structures is difficult or impossible. The tried and true ball and socket interlock is renowned for its reuse capabilities.

Horizontally loaded structures – O-Pile® systems are an excellent solution for projects that require a higher bending stiffness and resistance than conventional Z- or U-sheet pile walls. An O-Pile® system built using large diameter piles provide high bending stiffness and resistance pound for pound, for the same amount of weight.

Vertically loaded structures – If the piles are extended to bedrock, the vertical load bearing capacity of the O-Pile®: DTH wall is very high. Thus the structure can act as a horizontally loaded wall subject to earth pressure and a foundation structure able to bear high vertical loads at the same time.



Application Examples for O-Pile®

Building with a basement – O-Pile® may be used to good advantage in buildings with one or more basement stories. At these projects the O-Pile® walls serves as a permanent joint structure for vertical and horizontal loads. The solution is cost-effective because separate retaining wall structures are not needed. The O-Pile® walls can be surface treated and allowed to remain an exposed wall structure, for example, in a parking garage in a basement without internal cladding.

Building with a column frame – The O-Pile® walls may consist of piles of variable length. Part of the piles of the O-Pile® walls can be extended to bedrock to ensure horizontal support for the lower end of the wall structure and to act as foundation piles that transmit column loads. The O-Pile® walls may also be built as a combi-wall (OZ system) whose sheet piles are installed between the pipe piles by driving them by percussion or vibration after the installation of the pipe piles.

Construction-period retaining wall – The O-DTH wall is an effective solution for construction period retaining wall structures if the soil contains layers that are difficult to penetrate, high water tightness is required of the retaining wall, it is desired to minimize the number of support levels, or the retaining wall should be extended to rock. Installation of O-DTH walls usually using the down-the-hole drilling method causes less vibration in the penetration of compact soil layers than the installation of sheet pile walls, which makes the O-Pile® walls very suitable for installation close to vibration- sensitive structures.

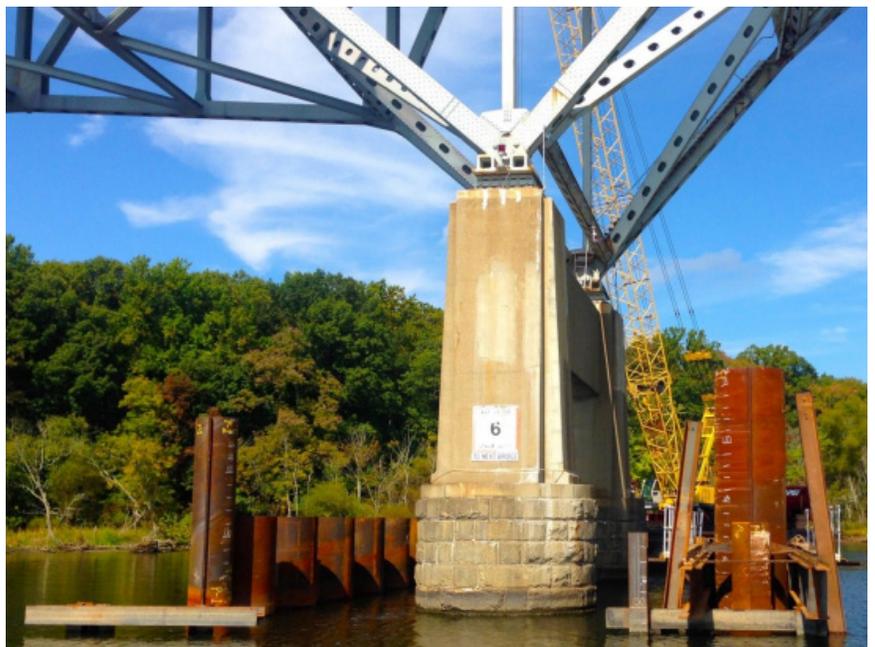
Bridge abutments – O-Piles® walls can be used as a bridge abutment. With the O-Pile® walls the vertical and lateral loads of the bridge and the horizontal loads of the embankment can be transmitted reliably to bedrock and soil. Use of the O-Pile® walls as an abutment allows building the bridge deck before excavation. Combined, for instance, with a method for moving the deck it minimizes the traffic interruption during construction. See Figure 1.

Retaining walls of varying shapes – O-Pile® walls may be used for building wall entities of different geometric shapes. For instance, the walls can be circular or make angles of various degrees. If necessary, different pile sizes can be combined in the O pile wall. Thus the structure can be optimized according to actual loads.

Excavations and structures extended into bedrock – If the support of the bottom of the retaining wall, the excavation level or water tightness requires extending the retaining wall securely into bedrock or several meters in to moraine containing stones and boulders, sheet pile walls can't be used without special measures such as pre-drilling, blastings, etc. A construction-period or permanent O-DTH walls can be drilled to the desired level in bed rock. The rock bounded by the wall may be excavated up to the wall, whereby construction work requires less space because a "rock shelf" on which the retaining wall rests is not needed.

Highway abutments: O-Pile® walls can be used as a bridge abutment. With the O-Pile® walls the vertical and lateral loads of the bridge and the horizontal loads of the embankment can be transmitted reliably to bedrock and soil. Use of the O-Pile® walls as an abutment allows building the bridge deck before excavation. Combined, for instance, with a method for moving the deck it minimizes the traffic interruption during construction.

Example of bridge abutment



Intermediate bridge supports – All O-Pile® walls can be used for intermediate supports of bridges subject to heavy horizontal loads, such as impact loads, under difficult soil and environmental conditions. A closed frame extending into bedrock can be built with an O-Pile® walls under an intermediate column and the soil removed from the top part for concreting. The structure requires no separate construction-period retaining structures and the foundation can be implemented in cramped conditions.

Harbor wharves – All O-Pile® walls can be used for building wharves in challenging soil conditions. With O-Pile® you can build a system using O-Pile®'s dynamic “dial-in” custom option that allows you to offer a thicker pipe to withstand corrosion rates in a zone of high attack, while maintaining a thinner thickness on the bottom portion to meet load bearing limits.

Trough structures – All O-Pile® walls can be used to implement water tight trough structures which allows, for example, building a road below ground water level without lowering the surrounding ground water level. If the pipe piles are extended water tightly into bedrock, there is no need to anchor the foundation slab of the trough structure against buoyancy. In construction-period retaining walls pipe piles can be used as construction-period pump wells to keep the excavation dry.

Tunneling: Train, under a highway for services so as not to disrupt the traffic flow.



Example of highway abutment



Example of tunneling