



wassara

**STRAIGHT  
FORWARD  
DRILLING**



Foto:Nils Carmel / AMF Fastigheter

# WASSARA REINFORCED THE MALL 'GALLERIAN' IN STOCKHOLM

**Wassara's new hammer developed specifically for casing advancement and other Ground Engineering (GE) applications was used during reinforcement of a large shopping mall in central Stockholm. The drilling had to be performed in a confined space and through existing concrete foundation while the Mall was functioning as usual.**

## Challenge

The building that contains the mall "Gallerian" located in central Stockholm requires foundation reinforcement since a number of new floors will be added on top of the building.

The reinforcement was performed in the garage-space of the building while the mall was functioning as usual and with a large part of the garage area still in use.

Furthermore the drilling had to be performed through existing concrete foundation and in a confined space with the height of the ceiling being especially problematic.

Besab was commissioned by the project owner Skanska to perform the reinforcement part of the project.

## Solution

The foundation reinforcement was performed by steel core piling. First, thin steel casings were drilled through the overburden down to competent rock. When the holes were completed, steel-cores were lowered down and then finally the holes were filled with concrete.

The designer had chosen the Wassara technique given the settlement risk, since the drilling is done through existing concrete foundation. The aim was to avoid the risk of undermining the ground that the concrete foundations rested upon .



The W150GE hammer

### Drilling conditions

The overburden is comprised of concrete and construction aggregate for approximately the first five meters while at the depths of 6-30 meters it is comprised of stratified sands, gravel and small rounded stones (esker).

### Project size and time frame

The project consisted of more than 4 500 meters of drilling during a period starting in March 2016 and ending in February 2017. A total amount of 217 holes were drilled down to a depth from 6-30 meters, with succeeding placement of steel cores and lastly filling the void with concrete.

The casing sizes that were used are 219 x 6.3 mm, 193 x 5 mm and 168 x 5 mm with corresponding steel-core piles of 150 mm, 120 mm and 100 mm in diameter.

### Water treatment

The water used to power the hammer was municipally sourced, taken from a fire hydrant.

No water-handling system was necessary; the vast majority of the water, in fact, ran down the drill holes, and the small amounts that made it up to the surface vanished through the overburden.

### Result

During the project the Wassara technique once again proved that it is by far the best suited for this type of foundation work where there is a considerable settlement risk and complexity due to the confined space.

**The new Wassara GE-hammer succeeded with the designated tasks and proved its overall reliability during the longest test yet!**

Equipment used	
Hammer	Wassara W120 and Wassara W150GE
Water Pump	WASP 120E
Drilling fluid	Clean water from fire hydrant
Rig	MD 30 SPD (Källarmus) and Commachio MC5D
Casing system	Symmetrix (Atlas Copco)
Casing	219 x 6,3 mm, 193 x 5 mm and 168 x 5 mm
Steel-core	150 mm, 120 mm and 100 mm
Drill rods	115 x 8 mm and 140 x 8 mm
Bore hole length	~30 m (~65 ft.)
Scope of drilling	4 500m <
Formation	Concrete, construction aggregate, stratified sands, gravel and small rounded stones (esker)
Project year	March 2016 – April 2017