

## Keller cuts project carbon emissions by more than 90%

Jurong Island, Singapore

As the world's largest geotechnical company, Keller wants to lead the sector in offering products and solutions that contribute towards a more sustainable future. One example of this is in Singapore, where Keller has worked to construct more environmentally friendly foundations for a major project.



### The project

Jurong Island is the heart of Singapore's chemicals industry, home to more than a hundred oil, petrochemical and manufacturing companies.

Over the last 20 years, Keller has delivered solid foundations for their developments in Singapore and has more than three decades' experience of working on the development of Jurong Island. With this pedigree, Keller was awarded the design-build contract for the foundations for this project.

### Finding another way

"The project had tanks and process plant structures such as pipe racks spread over a large area and precast concrete spun piling would traditionally have been the choice for the foundations to satisfy the performance criteria," says Deepak Raj, Managing Director for Keller's ASEAN Business Unit. "However, having established a strong, trusted relationship between ourselves with this customer, they had enough confidence in us to ask if we could find a better, more innovative way to do the job."

Based on the engineering requirements for the structures and the soil conditions, Keller proposed an alternative hybrid foundation solution of deep vibro compaction to densify the top sandy layers, along with vibro stone columns to reinforce the soft clayey strata underneath.

Not only are these methods together around 35-40% faster and more cost-effective than the traditional piling solution, but they're also much more environmentally friendly.

## Calculating carbon

"Piling contains rebar and concrete, so you need a lot of steel and cement – materials that use a lot of energy and produce high levels of CO2 emissions to manufacture," says Deepak. According to the International Energy Agency, the construction industry is responsible for around 40 percent of CO2 emissions, with about 8 percent coming from cement production.

"As a leading geotechnical contractor, it's our moral responsibility to contribute towards a more sustainable future and look at reducing CO2 wherever possible," he adds.

Keller's engineers used a universal carbon calculator devised by industry bodies the European Federation of Foundation Contractors and the Deep Foundations Institute to compare the piling proposal with Keller's vibro solutions.

## A huge saving

The result includes everything from the diesel used to power machines and material production, right through to worker transportation and waste disposal and revealed a stark difference.

The piling option would have generated around 22,000 metric tonnes of carbon dioxide equivalent (tCO2e), while the vibro methods produced just 1,900 tCO2e – 92% lower, saving the equivalent of driving the average car around the Earth 2,000 times.

Notably, materials consumption accounted for only 96 tCO2e of the vibro carbon total. That's because natural crushed stone is far less carbon intensive than manufactured materials, produces no waste and is lighter, reducing the number of trips needed to bring it to site.

Most of the emissions – 1,369 tCO2e – came from the diesel used to power Keller's machines. But here too, Keller is minimising its impact. The stone columns were installed with in-house designed and manufactured vibrocats, which are increasingly efficient and have lower fuel emissions compared to crane-hung rigs.

This has been a safe, successful project, despite COVID-related delays, and Deepak is looking forward to helping more clients find sustainable solutions in the future.

"For many companies, sustainability is becoming increasingly important," he says. "So if we can show how techniques are not only quicker and more cost-effective, but also much more environmentally friendly, that's great for them, for us and for the planet."

## Project facts

### Owner(s)

Confidential

### Keller business unit(s)

Keller Asia

### Main contractor(s)

Confidential

### Solutions

Bearing capacity / settlement control

### Markets

Industrial

### Techniques

Vibro compaction

Vibro stone columns / Vibro replacement