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Ground-breaking work

Foundations can be a most challenging aspect of construction, especially with increasing pressures to keep costs down. Difficult ground conditions are, however, becoming easier to handle, and efficiency is improving, due to machine advances.

Joe Malone reports.

Foundations jobs can take many forms, but new technology is concentrating on the usual elements of efficiency, safety and an ability to operate wherever the work is needed – however tight the space may be.

As an example, construction work is said to be well underway for the reconstruction and deepening of the Port of Durban, South Africa, and BSP's specialised equipment is proving to be an important part of the project. The Port of Durban is South Africa's largest break-bulk and dry-bulk handling precinct in the Transnet ports system, which has been developed in phases since the early twentieth century.

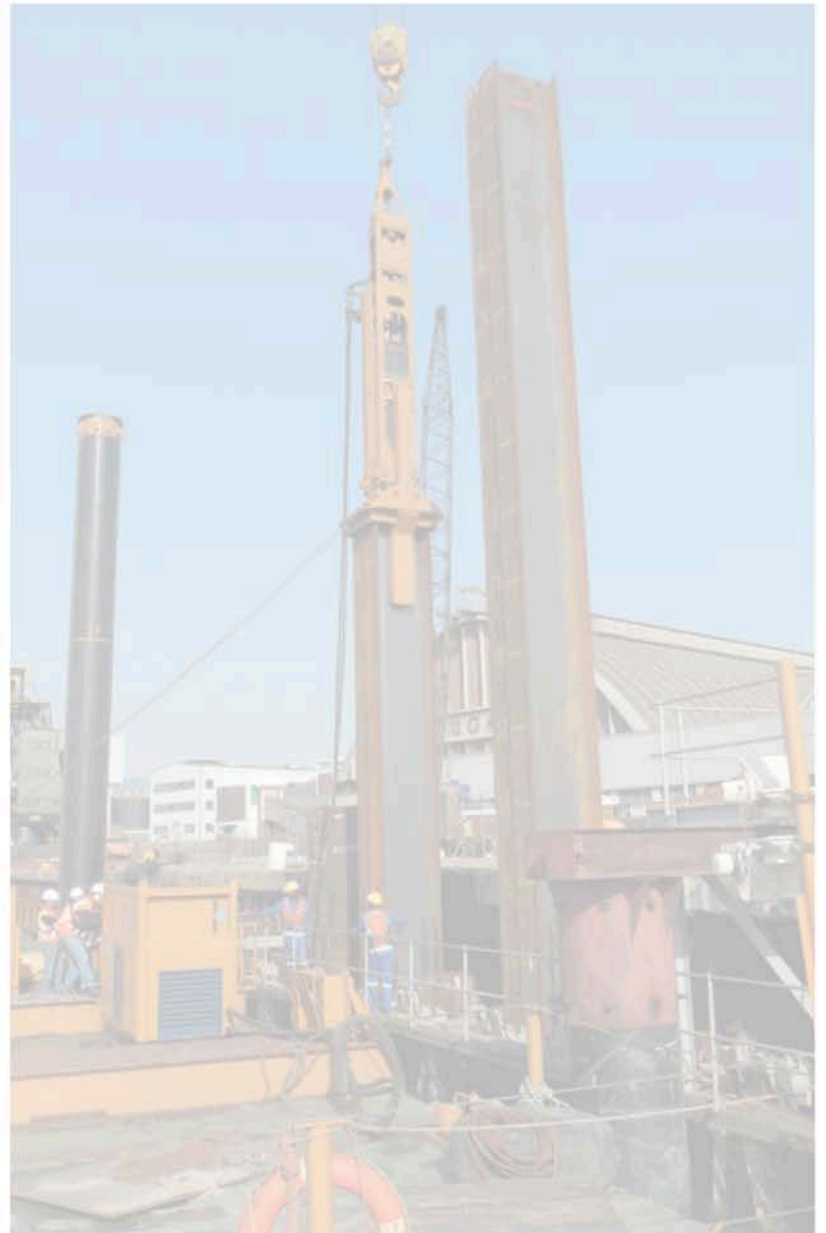
To carry out the piling operation, the contractors on the project used two BSP hydraulic impact hammers. First, a CG240, with a 16 tonne dropweight, was suspended from a Kobelco 180 tonne crawler crane and mounted on a 40 m by 15 m floating barge, drove the 27 tonne king piles. Then, a suspended CX85 with a 7 tonne dropweight was used to drive the sheet piles and form the combination wall.

Prior to installing the piles, BSP said it carried out an important modification to its CG240 hammer. It involved having legs fitted rather than a pile sleeve which reduced the overall weight. This enabled the hammer to drive the king piles while avoiding any clash with the pile template, which had to be kept in place until driving was complete.

The wharf covers 120 hectares and includes 15 berths that are collectively able to handle over 7 million tonnes a year. BSP said the development will ensure that the infrastructure will be operational for the next 50 years as well as catering for the newer generations of vessels using the port's facilities.

Following extensive assessment on the condition of the Maydon Wharf quay wall at the Port, it was found that seven of the 14 berths were in a critical condition and in imminent danger of collapse.

The Port of Durban project forms part of a larger R 307 billion



Two of BSP's hydraulic impact hammers are being used for the reconstruction and deepening of the Port of Durban, South Africa

(US\$ 19.83 billion) investment plan to upgrade and expand Transnet's railways, ports and pipelines between 2013 and 2019.

Specialist projects

Another important project is being carried out by Trevi Spa, a division of the Trevi Group which specialises in foundations and the consolidation of land. The company was recently awarded a contract for the repair and ongoing maintenance of the Mosul Dam in Iraq.

The preparation and signing of the contract, worth € 273 million (US\$ 310.02 million), took place under the supervision of the Iraqi Ministry of Water Resources (MWR).

The award follows an international tender issued in October >

FOUNDATIONS

Ground-breaking work

Trevi will manufacture structures and grout injections, which are aimed at repairing the grout curtain at the Mosul Dam, Iraq

2015, which followed an emergency procedure due to the critical situation of the dam.

The Mosul Dam is an earthfill dam located on the Tigris River, about 60 km north-west from the city of Mosul. The dam, built in the first half of the 1980s, is a multipurpose project conceived for irrigation, flood control, water supply and hydropower generation.

The contract comprises the repair of a number of manufactured structures and grout injections, which are aimed at repairing the grout curtain.

Trevi will install two rows of holes aligned with the dam, which will be grouted with mixtures able to intercept and close fissures and voids deriving from dissolution phenomena. Due to the location of the soluble layers, Trevi will execute and inject holes up to a depth of 200 m.

For the drilling and grouting, Soilmec SM-5 rigs will be used, while Soilmec SM-16 rigs with long stroke will be used for surface interventions.

Maximum impact

Liebherr has brought out a new hydraulic free-fall H 10 L hammer, which is said to be suitable for tough piling operations

Liebherr does the job

Liebherr's LB 24 rotary drilling rig used in Paris

Close to the city centre of Paris, France, Liebherr's LB 24 rotary drilling rig is being used by the construction company Bouygues SA for foundation work prior to the erection of a new apartment building.

In the business district La Défense, located west of the inner city, an 18-storey building comprising apartments and a school is under construction. A subway is also being built, as the complex is situated directly next to a track of the Parisian rapid transit system RER.

The Liebherr LB 24 rotary drilling rig was used for laying the foundation. The machine installed piles with a length of up to 30 m and a diameter of approximately 1,500 mm, using the Kelly drilling method.

Beams of 2 m in width, 4 m in height and 20 m in length are now being placed upon these piles, said Liebherr.

Liebherr also said that due to the compact space on the construction site, its LB 24 was the perfect tool.

The LB 24 belongs to the LB-series of Liebherr rotary drilling rigs. The machine is equipped with a 270 kW diesel engine and has a total weight of 76 tonnes. Another benefit of the LB 24 is its rope crowd system with a push and pull force of 20 tonnes.

In addition, the rotary drilling rig is equipped with the BAT rotary drive, manufactured by Liebherr, offering a torque of 270 kNm. The company said the main advantages of the hydraulic drive are automated torque adjustment, continuous speed optimisation and four electronically adjustable speed ranges. Further advantages of the rotary drive, Liebherr added, are its simple structure, its low maintenance requirements and its efficiency.

Liebherr's LB 24 rotary drilling rig was used by Bouygues SA in Paris, France



with a large radius. The H 10 L is the first hydraulic free-fall hammer developed and manufactured in-house by Liebherr, and is currently the largest model of three in the new series and has a maximum impact energy of 225 kNm.

Key advantages of the attachment include the modular weights, where the hammer can be perfectly adapted to the respective piling requirements, said Liebherr. It is also said to be extremely efficient as well as user-friendly in terms of transportation and maintenance. At the same time, in the standard version, the pile helmet is soundproof.

The control is integrated in the system of the Liebherr basic machines, which allows for better adjustment in accordance with the respective conditions, which therefore ensures more efficient operation. In addition to the LR 1300 piling rig, the duty cycle crawler crane HS 895 HD can also be used as a basic machine. Only a slight modification is required with both machines. The hammer can be operated directly from the on-board hydraulic system, meaning no additional power pack is required.

The leader elements of Liebherr's LRH 600 piling rig include easy and quick assembly of pin connections. A high degree of stability is ensured through the lattice boom design with the kicker also being secured via supporting tubes at the boom head. Two compensating cylinders ensure that the leader always remains parallel to the uppercarriage, which the company said provides maximum transmission of the torque. Inclination and radius on the rig can be adjusted using another pair of cylinders.

The LRH 600 achieves an effective working length of 51 m and a maximum radius of 15 m. Inclinations of up to 14° backwards and 9.5° forwards are also possible. The pull force extends to roughly 120 tonnes.

Movax has also launched a range of new products this year, including the DH-20 and DH-30 piling hammers.

Movax DH-20 and DH-30 piling hammers are excavator-mounted.

The leader elements of Liebherr's LRH 600 piling rig include easy and quick assembly of pin connections

