

CEBU-CORDOVA LINK EXPRESSWAY

OR “THE BRIDGE” OF CEBU, PHILIPPINES

◀ FEATURE STORY

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CEBU, Philippines. Infrastructure conglomerate Metro Pacific Investments Corporation (MPIC), through its unit Cebu Cordova Link Expressway Corporation (CCLEC), started the construction works for the P30-billion (USD575 million) Cebu Cordova Link Expressway (CCLEX), its first tollway project outside Luzon.

The Cebu-Cordova Link Expressway toll bridge and road project will link mainland Cebu, from the Cebu South Coastal Road, to the Mactan Circumferential Road in Brgy. Pilipog, Cordova, in Mactan. It aims to relieve congestion on the two other existing bridges on the island.

The Project started in July 2018 and it will be completed by 2021. Once completed, CCLEX is expected to have initial traffic of about 50,000 vehicles per day.

CCLEC has awarded the civil works covered by the project to the Cebu Link Joint Venture (CLJV), a consortium formed by the Spain-based Acciona Construcción S.A. and the Philippine construction companies D.M. Consunji Inc. and First Balfour Inc.

CLJV chose Trevi Foundations Philippines as the sub-contractor for the execution of the deep off-shore and on-shore foundations.

PROJECT OVERVIEW

The archipelagic country of the Philippines, in the western Pacific Ocean, covers about 7,641 islands grouped into three major island-regions, namely, Luzon, Visayas and Mindanao.

One of them is the island-province of Cebu, located in the central island-region Visayas, that includes the capital city, Cebu City, the fifth most populated city of the nation and the most densely populated in the whole Visayas region.

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There are several smaller islands around the big island of Cebu, including Mactan Island. The Cebu and Mactan islands are currently connected by two existing bridges: the Marcelo Fernan Bridge and the Mactan-Mandaue Bridge. To travel to and from Mactan and Cebu Islands, travellers have to cross the Mactan Channel only via these two existing bridges.

The proposed Cebu-Cordova Link Expressway Project will connect the city of Cebu and the municipality of Cordova, south of the two existing bridges, with the main goal to relieve the traffic congestion on the first two island bridges. The construction of the Cebu-Cordova Link Expressway will take three years and is due to open by 2021, which is also the 500th year anniversary of Christianity in the Philippines. A fourth bridge is also likely to be built in order to further relieve the traffic in Cebu City and Mactan.

Metro Pacific Tollways Corporation (MPTC), through its subsidiary company CCLEC, is building and will maintain and operate the CCLEX in partnership with the City Government of Cebu and the Municipal Government of Cordova, under the build-and-operate scheme of the public-private partnership (PPP) program developed by the Philippine government.

MPTC, the toll road arm of Metro Pacific Investments Corporation (MPIC) is the largest toll road concessionaire and operator in the Philippines, with expansion goals in the Visayas, other parts of the Philippines and neighboring countries, notably Thailand, Vietnam and Indonesia.

CCLEC combined the services of COWI A/S of Denmark as the main consultant, with the Philippines' DCCD Engineering Corporation as the subconsultant, and the project's technical advisor/owner's engineer. Norconsult, a Norwegian consultancy firm, also joined the team in its capacity as independent consultant.

Once completed, "The Bridge" will serve as an 8.5-kilometer (5.28 mi) long toll bridge, with two lanes in each direction and a ten-lane toll plaza. According to the MPTC, "The Bridge," which is close to the southern region of the island, could nearly halve the travel time between Mactan and Cebu. 50,000 vehicles per day are expected to travel the bridge.



"The Bridge" will consist of the Main Bridge alignment, starting from the Cebu South Coastal Road and ending at the Mactan circumferential road, inclusive of the main span bridge, approaches, viaducts, causeways, low-height bridges, at-grade road, toll plaza and a toll operations centre.

In detail, the CCLEX or "The Bridge," starting from the Cebu side, will consist of:

- ▶ CSCR OFF ramp, to be built alongside the existing CSCR Viaduct, with a 640 m (2,099.74 ft) length;
- ▶ CSCR ON ramp, to be built alongside the existing CSCR Viaduct with a 628 m (2,060.37 ft) length;

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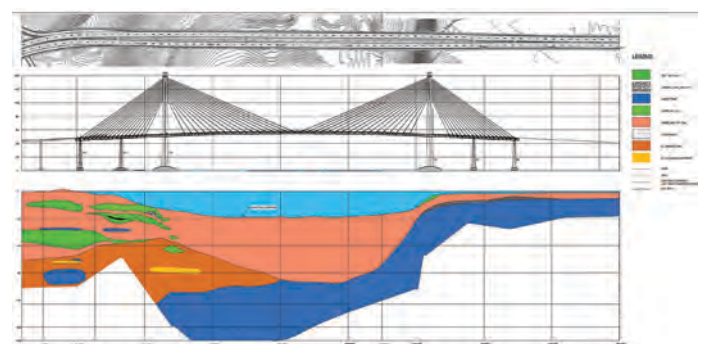
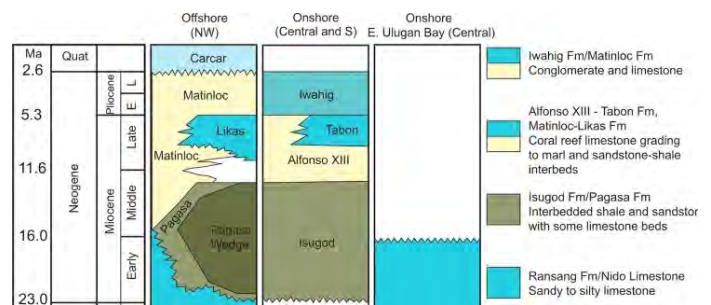
- ▶ The Cebu Viaduct with a 340 m (1,115.49 ft) length;
- ▶ The Main Bridge, made of cable-stayed twin pylons, with a total length of 829 m (2,719.82 ft), and a main span of 390 m (1,279.53 ft);
- ▶ The Cordova Viaduct with a 810 m (2,657.48 ft) length;
- ▶ A Toll Plaza with five-lane toll booths in each direction;
- ▶ The Causeway, connecting the toll plaza to MCR, will be 5.1 km (3.17 mi) long and consist of four low-level bridges: Cordova Channel Bridge 180 m (590.55 ft), Cordova Gabi Pilipog Bridge 300 m (984.25 ft), Cordova Fisherman Bridge 60 m (196.85 ft) and Cordova Pilipog Slab Bridge 60 m (196.85 ft). The expressway will end with a T-intersection at the MCR in Pilipog.

GEOLOGICAL CONDITIONS

The proposed alignment for the main structure in the Mactan channel, is heavily underlain by the recent deposits of Carcar limestone and Quaternary alluvium. The Carcar limestone is a geologically young unit fringing along the coastal areas of Cebu Island. The limestone is characterized as porous and coralline, bedded to massive and fossiliferous formations. Intercalations of marls and gradation into rubbly to conglomeratic limestone have been observed as well. On the other hand, the Quaternary alluvium in the area is composed of river channel deposits of sand, gravel and thin layer of silt and clay.

The geology of the area is deemed to have been strongly influenced by the mode of deposition of the Guadalupe River channel and the changing level of the sea along

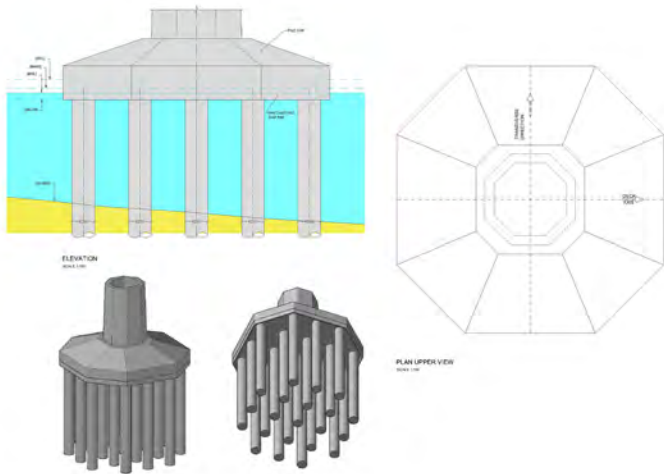
the Mactan Channel. The soil investigation outcome suggests that the Carcar limestone is the underlying rock of the general area, namely starting from the fringes of the Guadalupe River towards the Cordova side of the bridge. The rock is enveloped by a thick layer of unconsolidated gravelly sand units with zones/layers of still unconsolidated conglomerates. The gravel and/or boulders recovered are andesitic in origin and rounded to sub-rounded. The topmost portion of the sequence is a thick cover of mostly sand deposits with zones/layers of finer materials, low plasticity silt and clay.



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TREVI FOUNDATIONS PHILIPPINES SCOPE AND ROLE IN THE EXECUTION OF “THE BRIDGE”

Trevi Foundations Philippines was chosen as specialist subcontractor to carry out and build the foundations of the Cebu–Cordova Link Expressway. The scope of Trevi Foundations Philippines covers the construction of over 450 bored piles as foundation works, most of which are off-shore, with a total drilling length of over 13 linear kilometers. The diameters of the bored piles range from the smallest, 1.5 m (4.92 ft), up to the largest, 2.5 m (8.2 ft). These vertical structural foundations, with lengths varying from 11 m (36.09 ft) to 70 m (229.66 ft), will carry the weight of the Cebu–Cordova Link Expressway Project underground into the sub-surface depths.

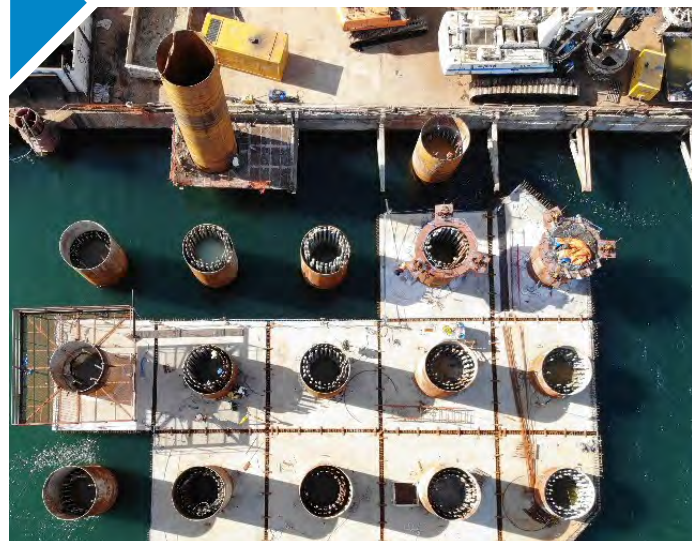
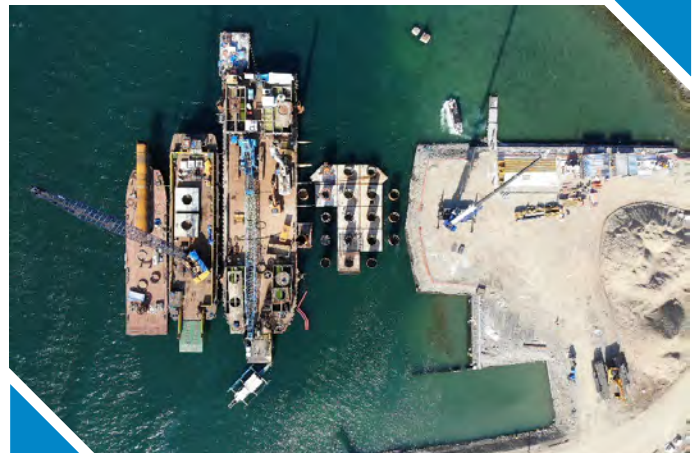


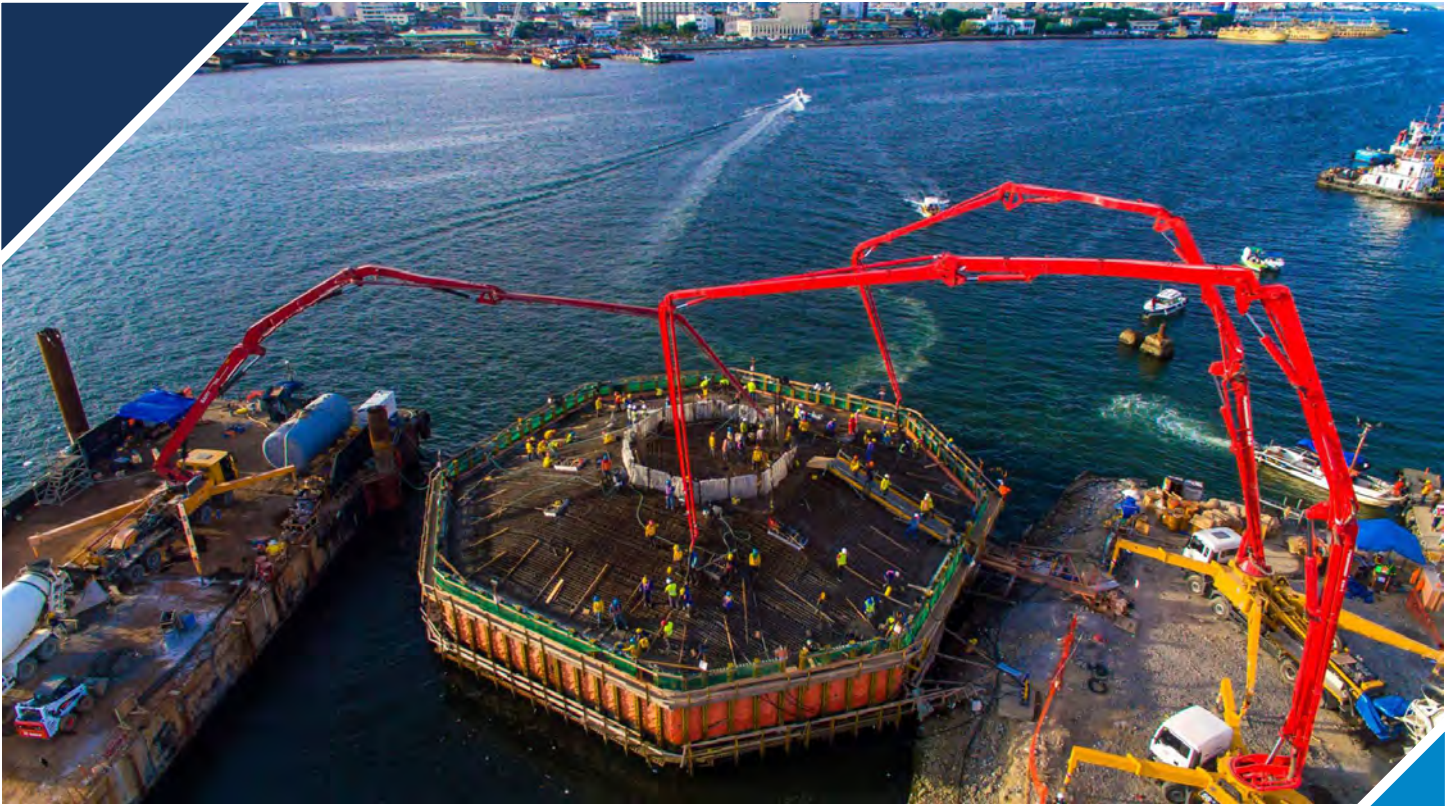
The biggest technical challenge Trevi has to face lies in the execution of those wide and long diameter piles off-shore, in the middle of the much congested and busy marine channel. Due to the large size of the piles, along with the heavy weight of their matching steel reinforcement cages, the use of huge drilling rigs, heavy machineries and equipment is mandatory. Therefore, the logistics management of the project as a whole is certainly another big challenge for Trevi.

The most demanding part of the project is the execution of the piles for the main bridge, with its cable-stayed innovative design and its two-pylon foundations. The widest and deepest piles of the whole project are offshore with regard to this main bridge structure. With said selected bored piles solution as structural foundations, T1 and T2, contain 21 bored piles each, with diameters of 2.5 m (8.2 ft) and different lengths up to 70 m (229.66 ft).

Precision and very limited positioning tolerances are among the other highly-technical challenges met in the project. Heavy steel cages, with a high number of huge steel bars, joined with treated couplers in off-shore activities, make the works much more challenging.

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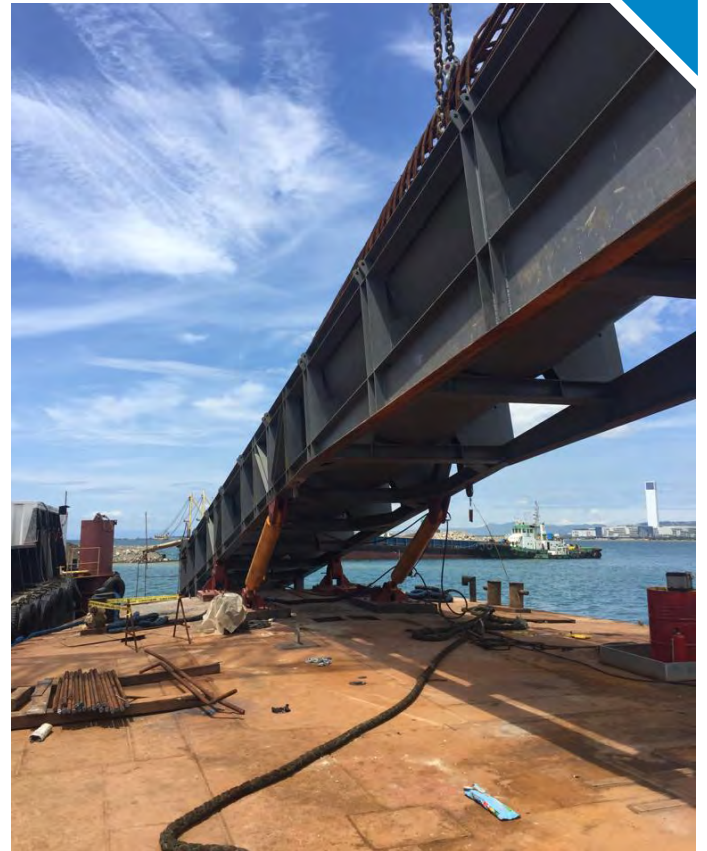




In order to shorten the time and increase the accuracy when installing the steel cages, special tools and equipment were studied and developed by Trevi's technical team in Italy and in the Philippines. The H.C.T.S. (Hydraulic Catapult Trevi System) was developed and is being implemented in the project.

DRILLING RIGS AND THE EQUIPMENT USED

To carry out the off-shore works, three barges are used, each equipped with the required equipment, with just some slight variations in their set up. Several Soilmec piling rigs were deployed and are being used for the project. One barge carries the Soilmec R-930 rig with its 250-ton service crane, vibro-hammer, service backhoe and slurry plant. On another barge, the Soilmec 870+R25 rig is deployed, with its 300-ton service crane, vibro-hammer, backhoe and slurry plant. The third barge carries the Soilmec SC100+RT3-s rig with its own vibro-hammer, backhoe and slurry plant.



The project is currently in progress. Trevi Foundations has already completed all the piles for the main bridge, while piling works for the other structures (ramps, viaducts and causeways) are still ongoing. As of today, the percentage of works completed under the scope of Trevi Foundations Philippines is about 66%. ▀