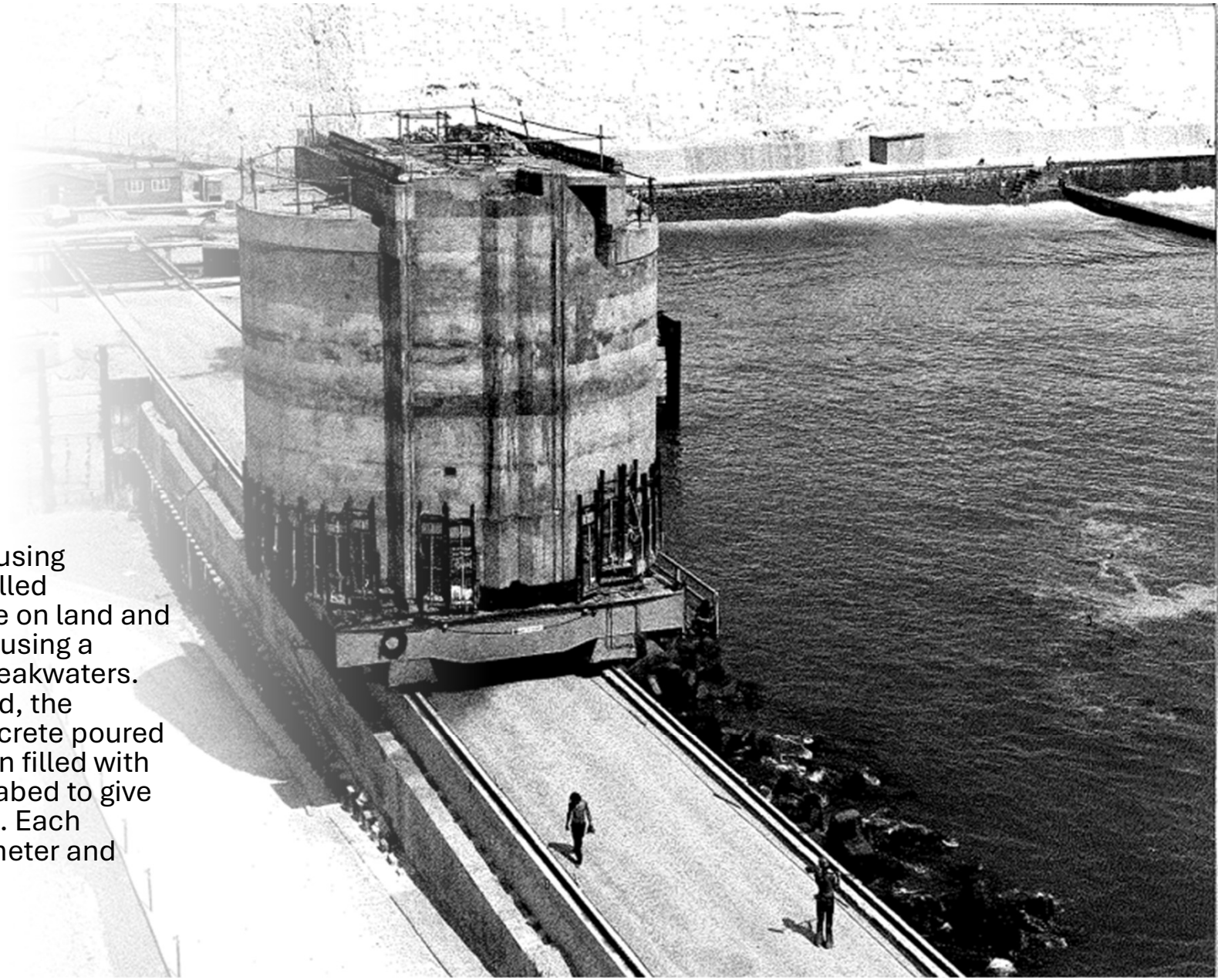
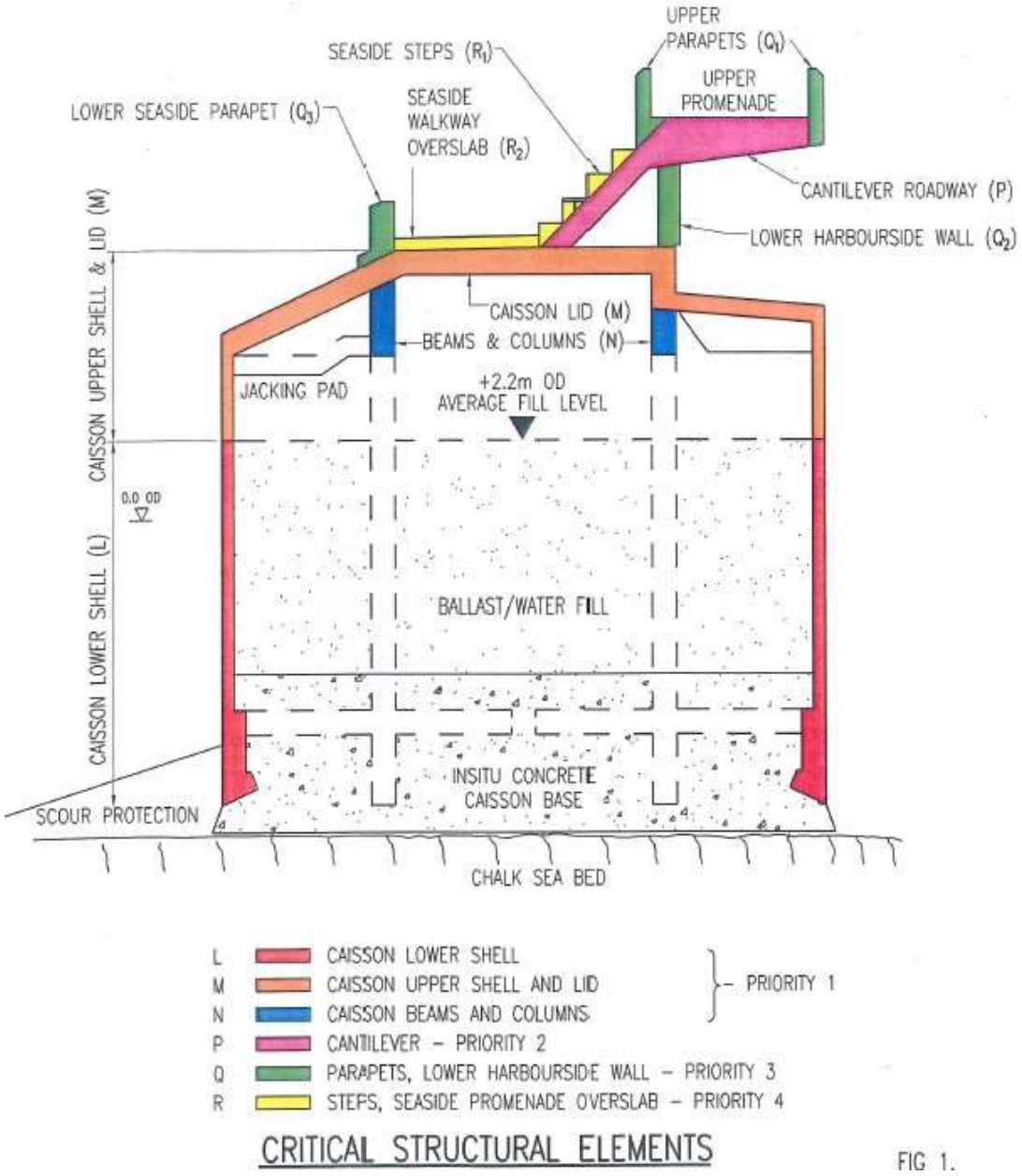
Brighton Marina long-term Breakwater maintenance works, 2025

The Brighton Marina Breakwaters are the ‘arms’ extending into the sea which enclose the harbour. They were built in the 1970’s.

The Breakwaters were built using modular cylindrical units called ‘caissons.’ These were made on land and then moved out and placed using a special crane to form the Breakwaters. When in place on the seabed, the caissons had a ‘plug’ of concrete poured to form a base and were then filled with ballast dredged from the seabed to give them weight to stay in place. Each caisson is 13 metres in diameter and weighs over 600 tonnes.



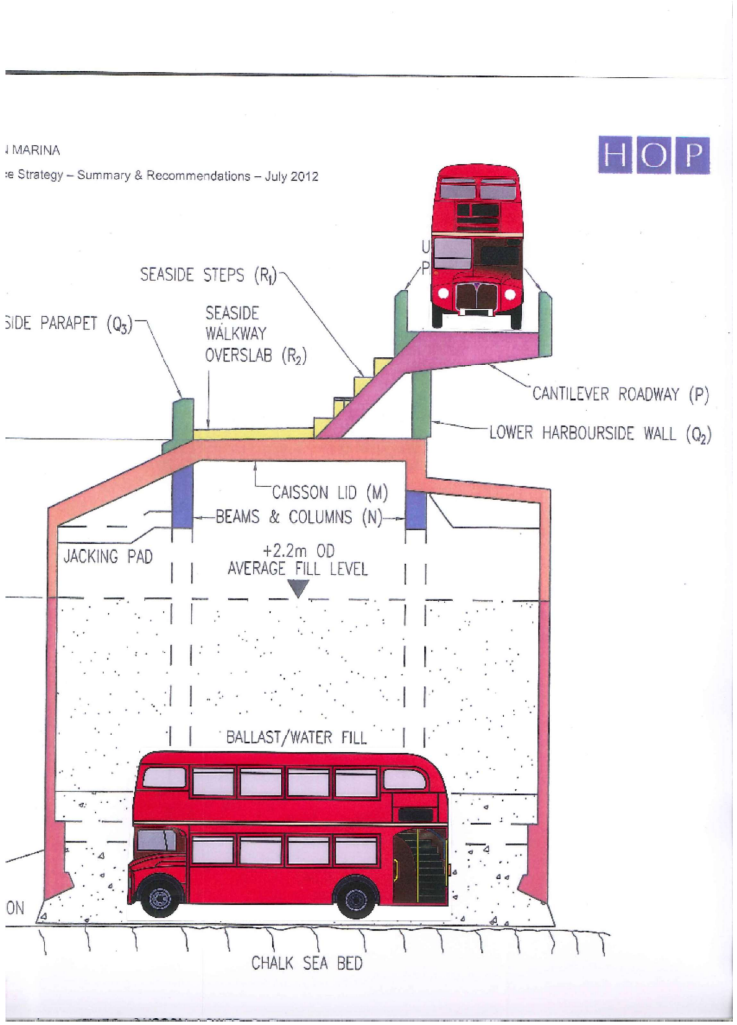
A cross-section of a single caisson. The lower shell, shown red, is less than 300mm thick and formed of reinforced concrete. Initiation of corrosion of the steel in this reinforced concrete means the structure is losing strength as time passes and our maintenance work is to address this problem and extend the life of the structure for many years to come, by changing a lightweight hollow structure into a solid concrete structure. This is achieved by digging out the existing ballast and replacing it with concrete.



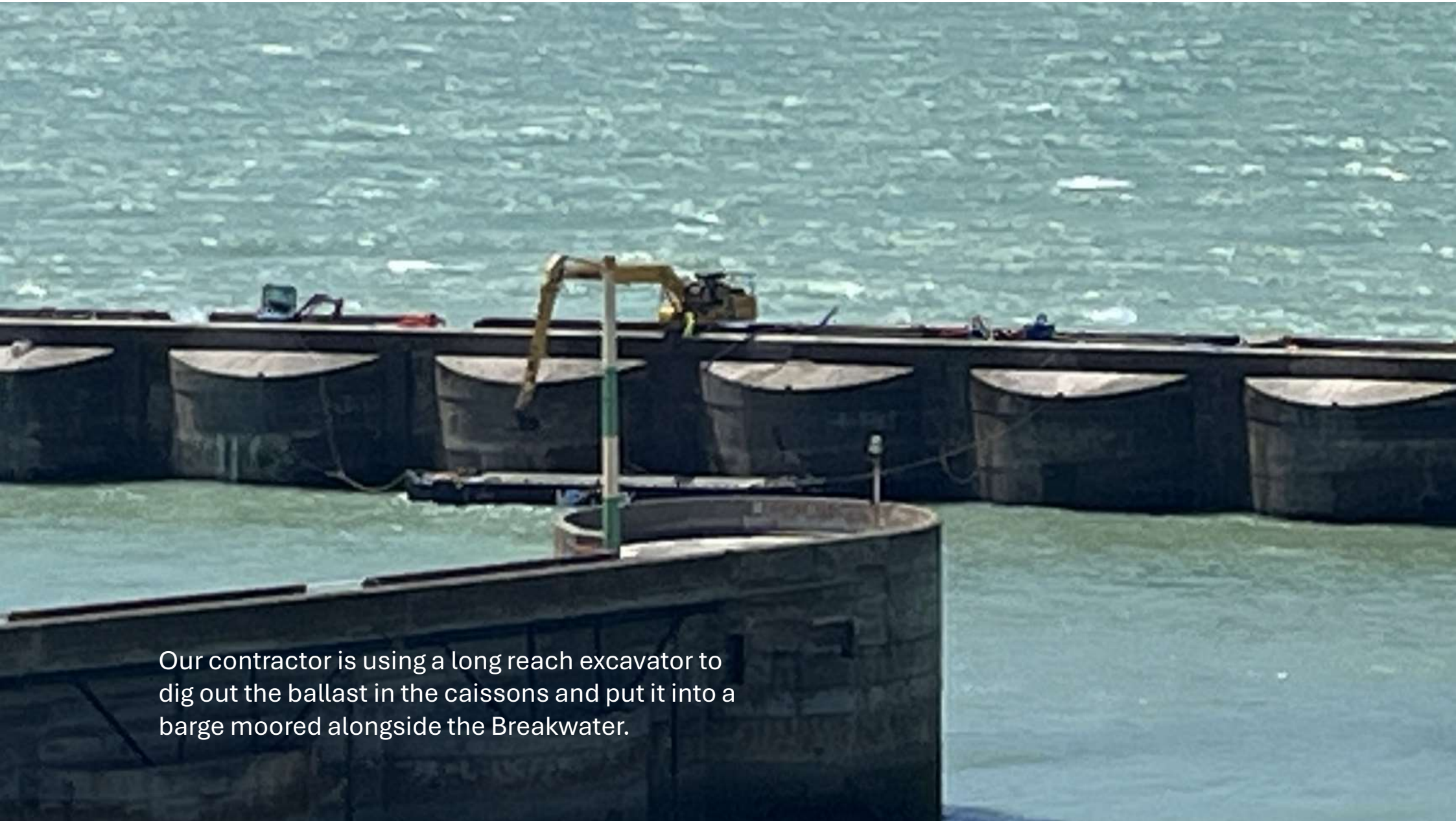
CRITICAL STRUCTURAL ELEMENTS

FIG 1.

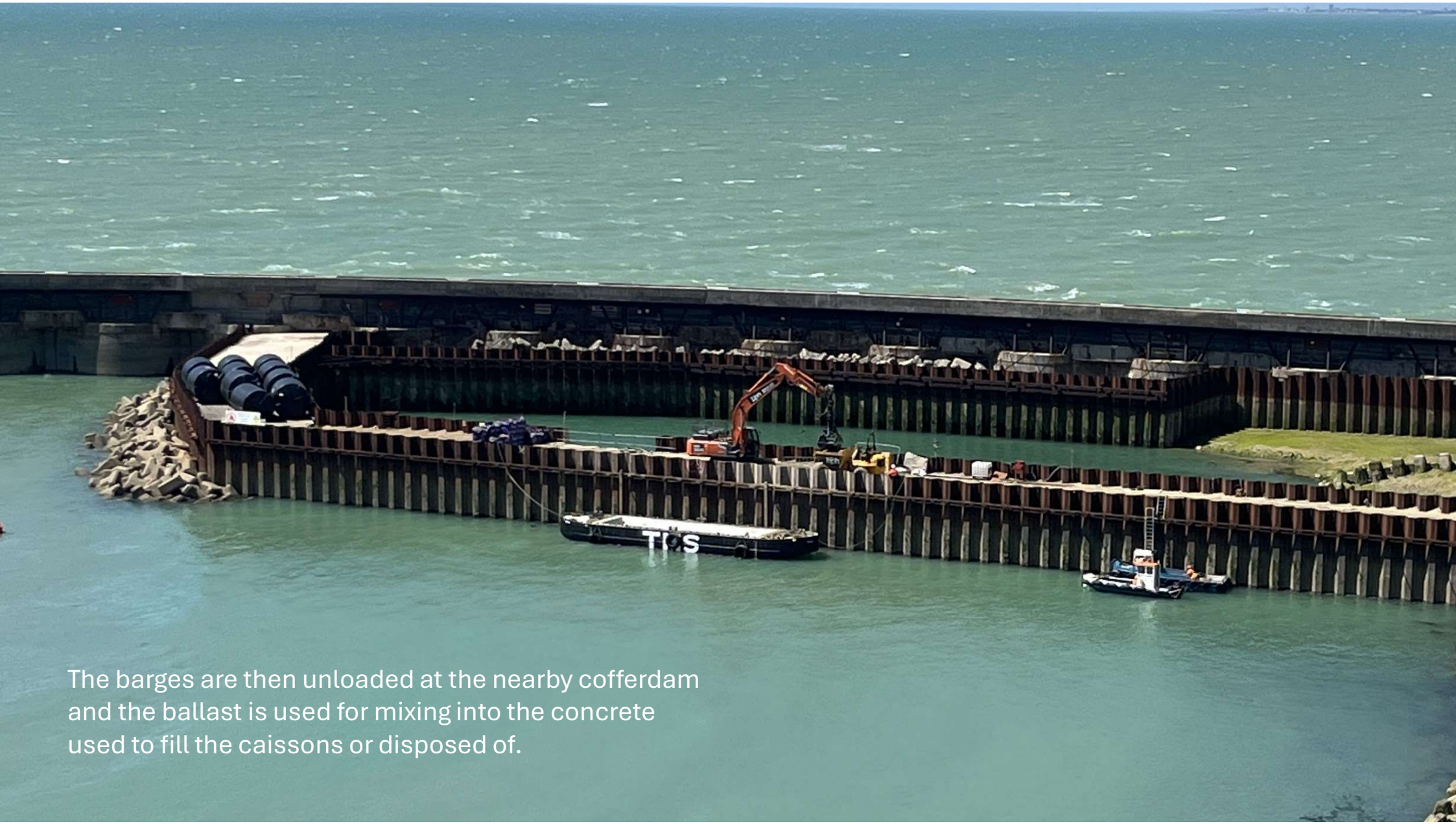
An idea of the scale of the Breakwaters.



The first stage of the work is to cut a large opening in the top of the caissons to provide access.



Our contractor is using a long reach excavator to dig out the ballast in the caissons and put it into a barge moored alongside the Breakwater.

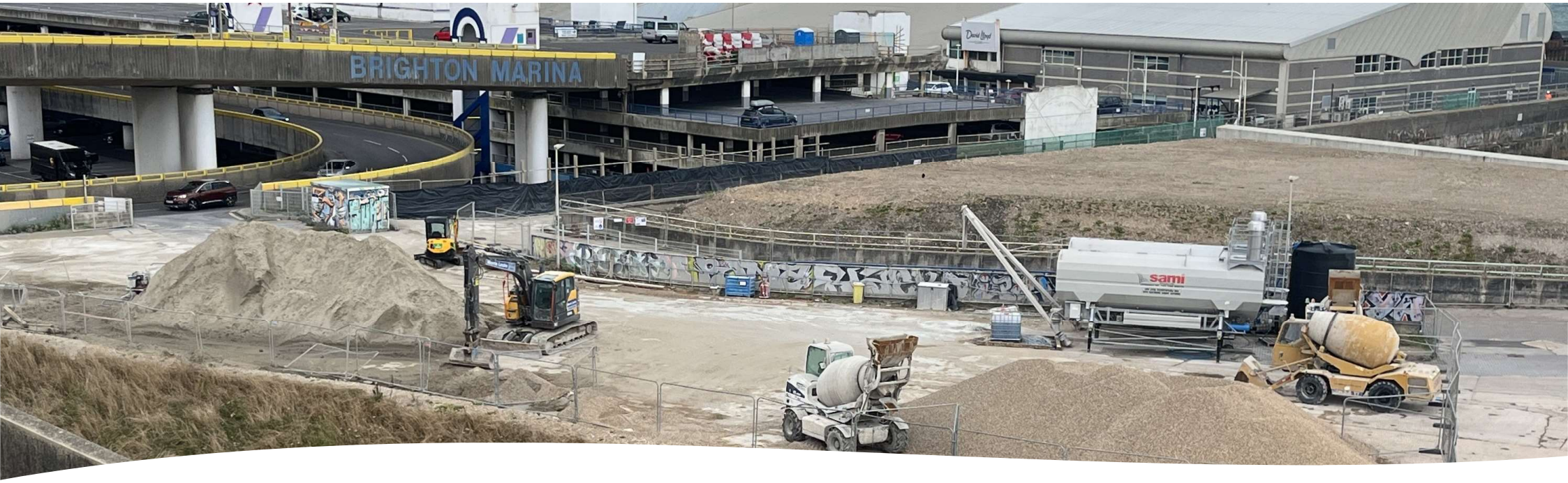


The barges are then unloaded at the nearby cofferdam and the ballast is used for mixing into the concrete used to fill the caissons or disposed of.

A small excavator inside a caisson assisting with digging out the ballast.

Inside a caisson during the digging out process.

In rough weather, seawater fills the caissons and has to be pumped out. This picture shows pumping almost finished.



- The contractor has been using Brighton Council's Black Rock site to mix concrete. In this picture you can see small concrete mixers which are filled with ballast extracted from the caissons (left-hand pile), coarse gravel (right-hand pile) and cement from silos to form concrete which is used to fill the caissons.

A caisson nearly filled with concrete.

Another almost filled caisson.

A layer of reinforcing steel is placed in the top ‘slab’ of each caisson to give strength and stop the surface breaking up.

The top of a fully-filled finished caisson.

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