

MAS Building @Jln Sultan Ismail

Method of construction of hand dug caisson under the existing ceiling height constraint

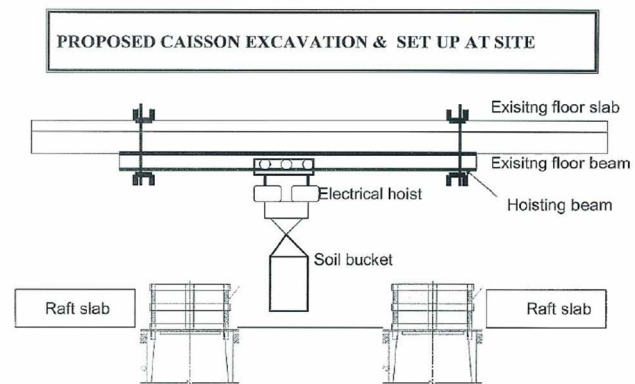
(by Ir. Oh Chin Wah, Executive Director) (2013 Jul-Sep)

This project is the refurbishment and upgrading of the existing 35 storey building that includes the demolition of existing podium and construct new hotel tower of 50 storeys on top of existing podium structure. Our scope is limited to the construction of underpinning caisson foundation under the existing podium basement slab and also the new caisson wall that serve as future basement retaining wall structure. In this technical write up, the emphasize is focus on the method of construction of hand dug caisson under the existing ceiling height constraint, as well as type of load testing to be carried out on the caisson pile.

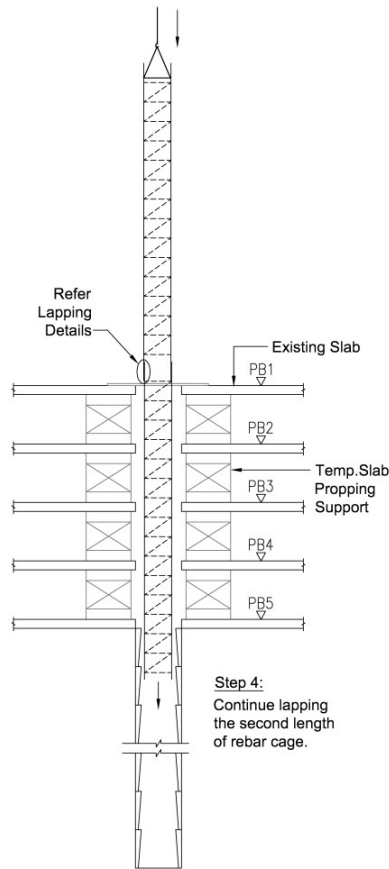
The existing podium is 5 level of basement car park which the caisson underpinning foundation will be carried out at the lowest level of existing basement. Due to the constraint of the existing headroom that only allow the clearance height of 2.1m, the standard height of caisson frame is unable to fit in. Therefore, the caisson frame must be redesigned and modified in order to suit to the existing height constraint. In this case, the gantry of the hoisting equipment is modified to be suspended from the existing floor slab using 2 number of holding down bolt at both end of the hoisting beam. With the elimination of the vertical frame support, the clearance height of 2.1m is sufficient for the hanging of hoisting equipment and the soil bucket together as shown in the photo and figure below:



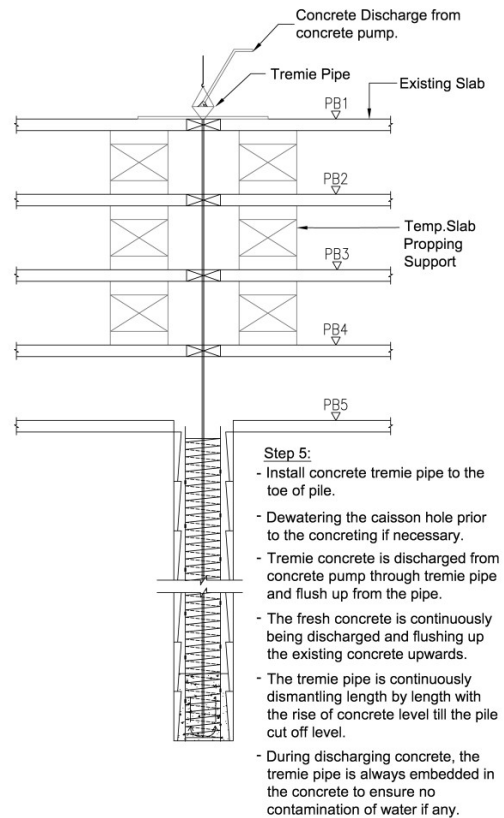
Setting-up of Caisson Frame



Upon the completion of the caisson excavation which the pile length is varies from 30m to 40m from the existing basement level, another challenging task is how to carry out the installation of rebar cage into the caisson bored hole, as well as the concreting of the caisson shaft with the consideration of the existing 5 level of basement structure. Append following herewith the method of statement on how to carry out the rebar installation and the casting of caisson shaft.

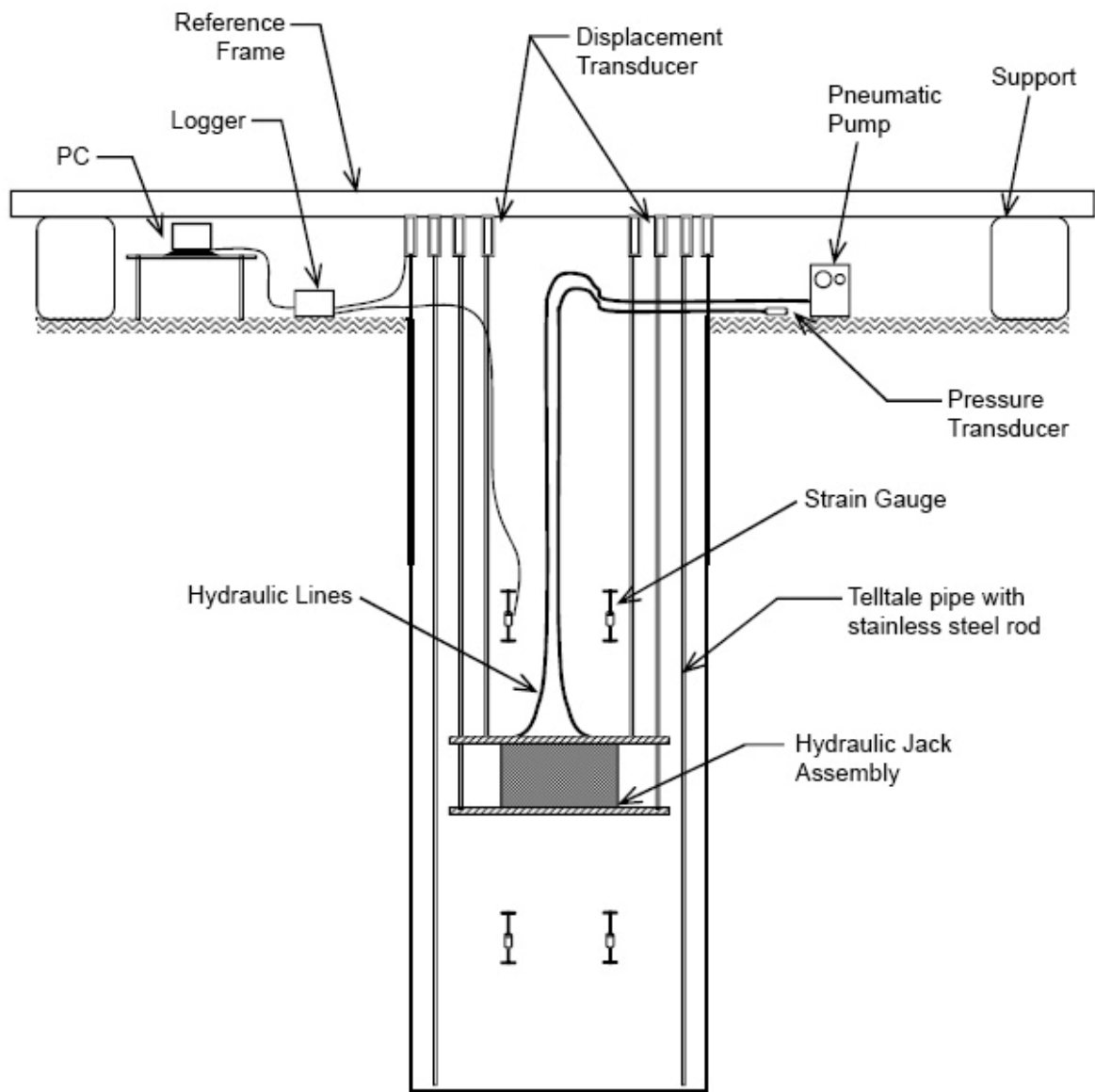


Reinforcement Cage Installation

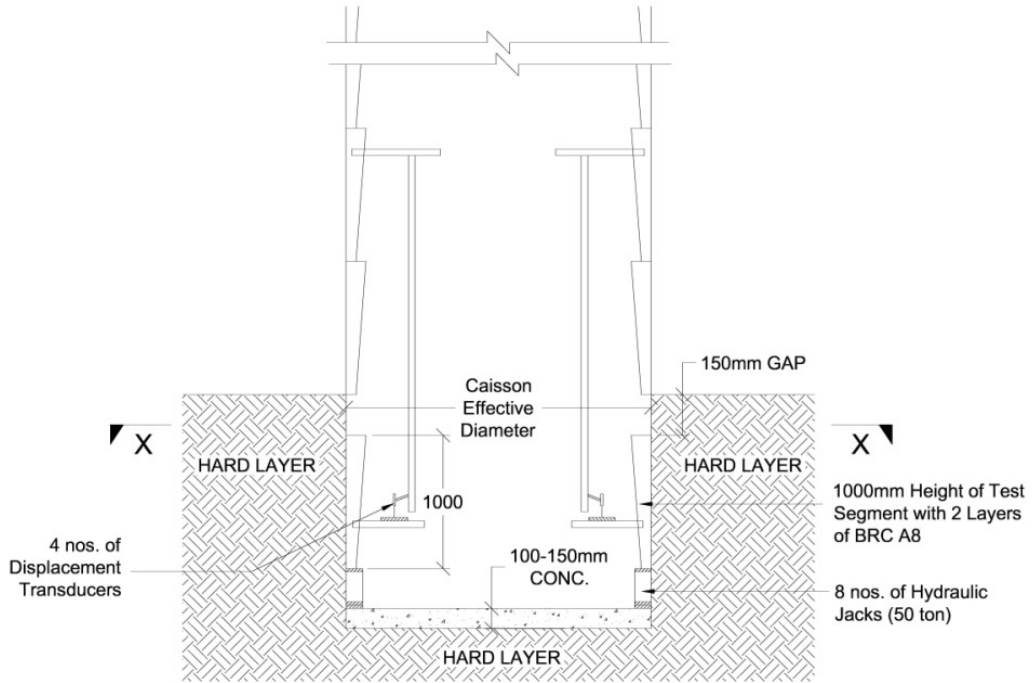


Concreting

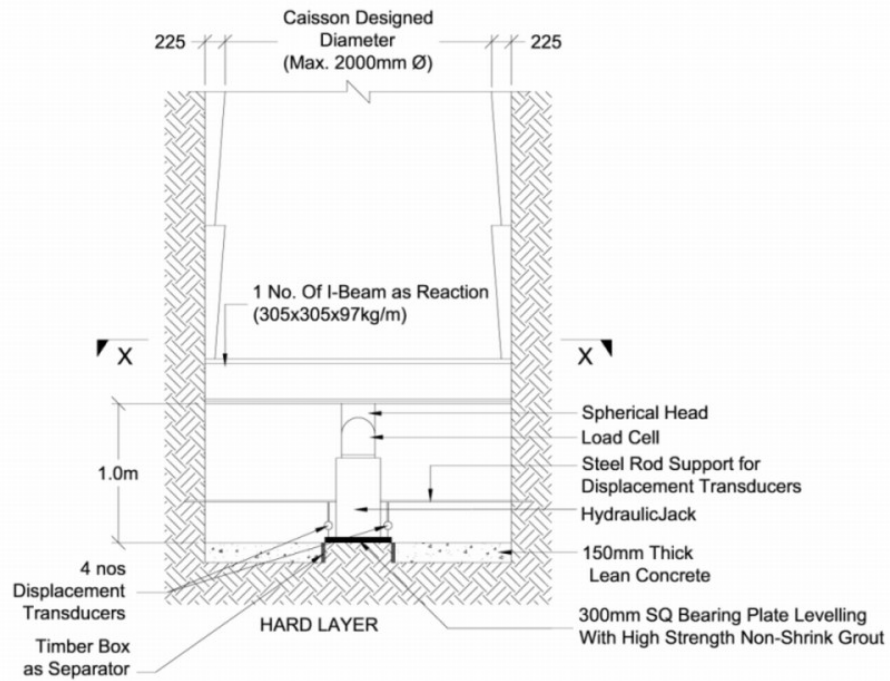
Bidirectional load test is being specified by the consultant to be carried on the preliminary test pile, as well as the working test pile in consideration of the space and head room control of the under the existing basement structure. This method is by inserting 2 number of high tonnage hydraulic jack into the pile shaft at the level of the pile length which the upward resistance and the downward resistance from the pile geotechnical capacity are almost equal. During the test, the hydraulic jack pressure is increasing in stages until reaching to the stage that either the upper or lower section of the shaft gives way or fail. From the result of measurement on settlement, the settlement curve on the upper and lower section will be plotted and the results will be derived to develop overall load settlement curve for the entire pile shaft. The other types of small-scale load test being selected are caisson shaft load test which is to test on the lining friction and plate bearing test which is to test on the base bearing of the shaft respectively.



Setting-up of Bidirectional Load Test



CAISSON SHAFT LOAD TEST SETTING-UP



CAISSON PLATE BEARING TEST SETTING-UP