

## Genting Mall @Genting Highland

### Soil Nail Tied-Back Caisson Pile Wall at Genting Mall

(by Ms.Yap Fui It, Asst Design Engineer) (2014 Apr-Jun)

#### Introduction

The development consists of indoor retails & shopping mall, namely Genting Mall, at Genting Highlands. The soil nail tied-back caisson pile wall is located between the new Genting Mall & existing Genting Grand Hotel. The retaining height of caisson wall is ranging from 11m to 19m. The caisson pile wall is then tied-back with multi layers of permanent soil nail and covered with R.C. skin wall.

#### Details of Soil Nail Tied-Back Caisson Pile Wall

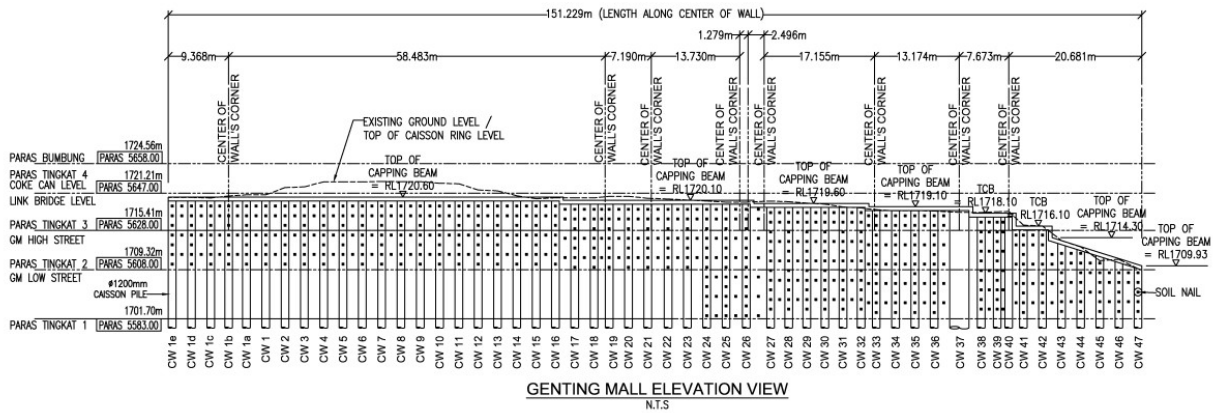
The soil nail tied-back caisson pile wall is designed by the project Consultant. Total wall length of 152m is formed by 52 nos. of 1200mm diameter of caisson pile with the spacing of 3m c/c, which is required to be socketed more than 3.5m into Granite bedrock. The first 4 layers of permanent soil nail to be installed are 18m length or minimum 3m rock socket into Grade III Granite bedrock with 1.5m spacing in vertical direction. The subsequent layers of permanent soil nail to be installed are 12m length or same criteria of rock socket length and nail spacing as above layer. Finally, a 300mm thick of RC skin wall shall be constructed in front of the caisson pile wall with embedding soil nail bearing plate within the concrete wall.



Figure 1: Fabrication of R.C.Skin Wall after the Earthwork Excavation in Stages.



Figure 2: Construction of Skin Wall and Soil Nail Bearing Plate Installation.



Elevation view of Tied-back Caisson Pile Wall

### Construction Challenges

The main challenge during caisson excavation was encountering higher level of Grade I or II bedrock, i.e. before the required design level in some of the caisson piles. The situation was resolved by shortening the rock socket length to cut down the caisson pile construction time. At the same time, maintaining a substantial rock mass in front of the wall as shown in Figure 4, upon consulting and approved by the Geotechnical Engineer, in order to prevent kick out at the pile toe level.

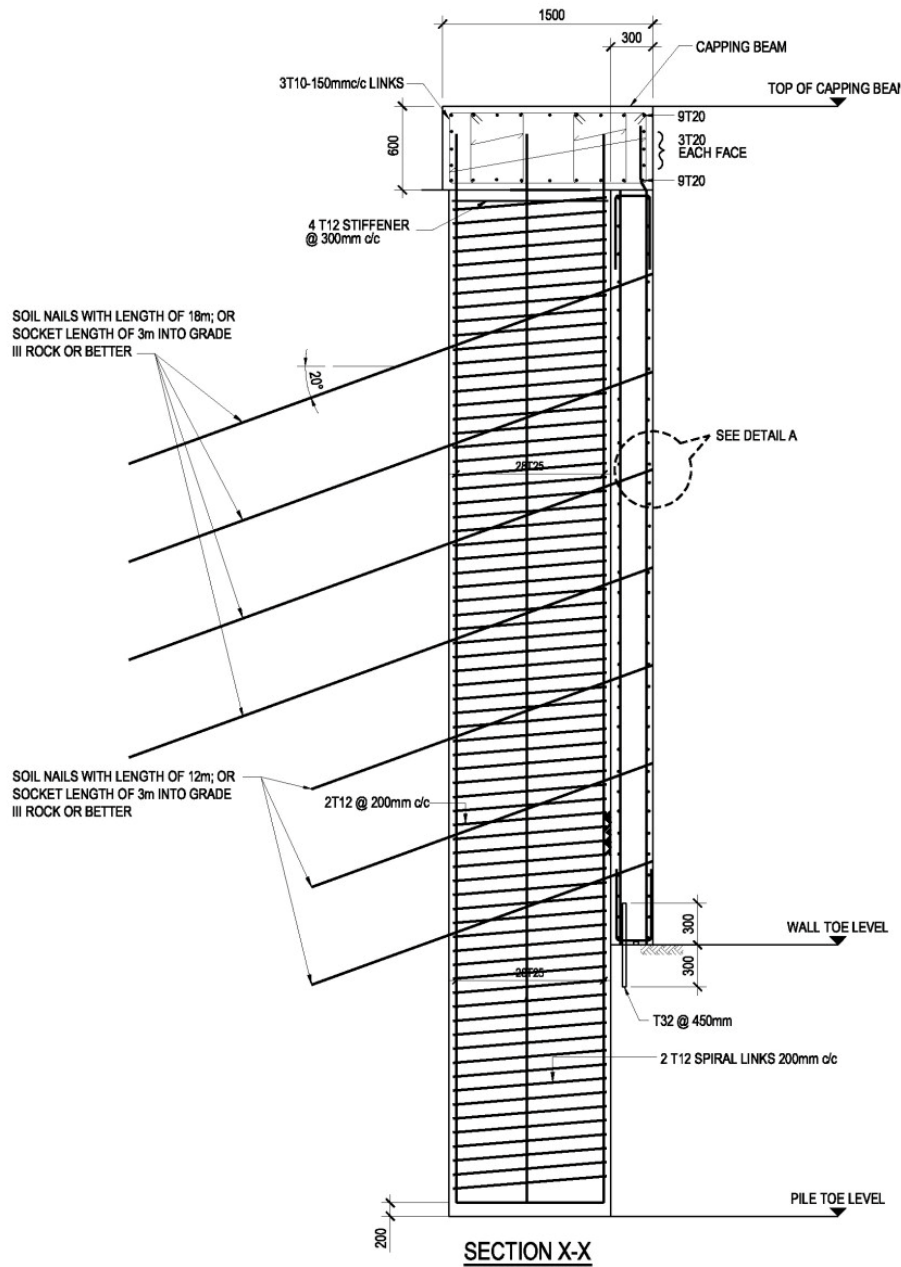


Figure 3 : Typical Section of Wall

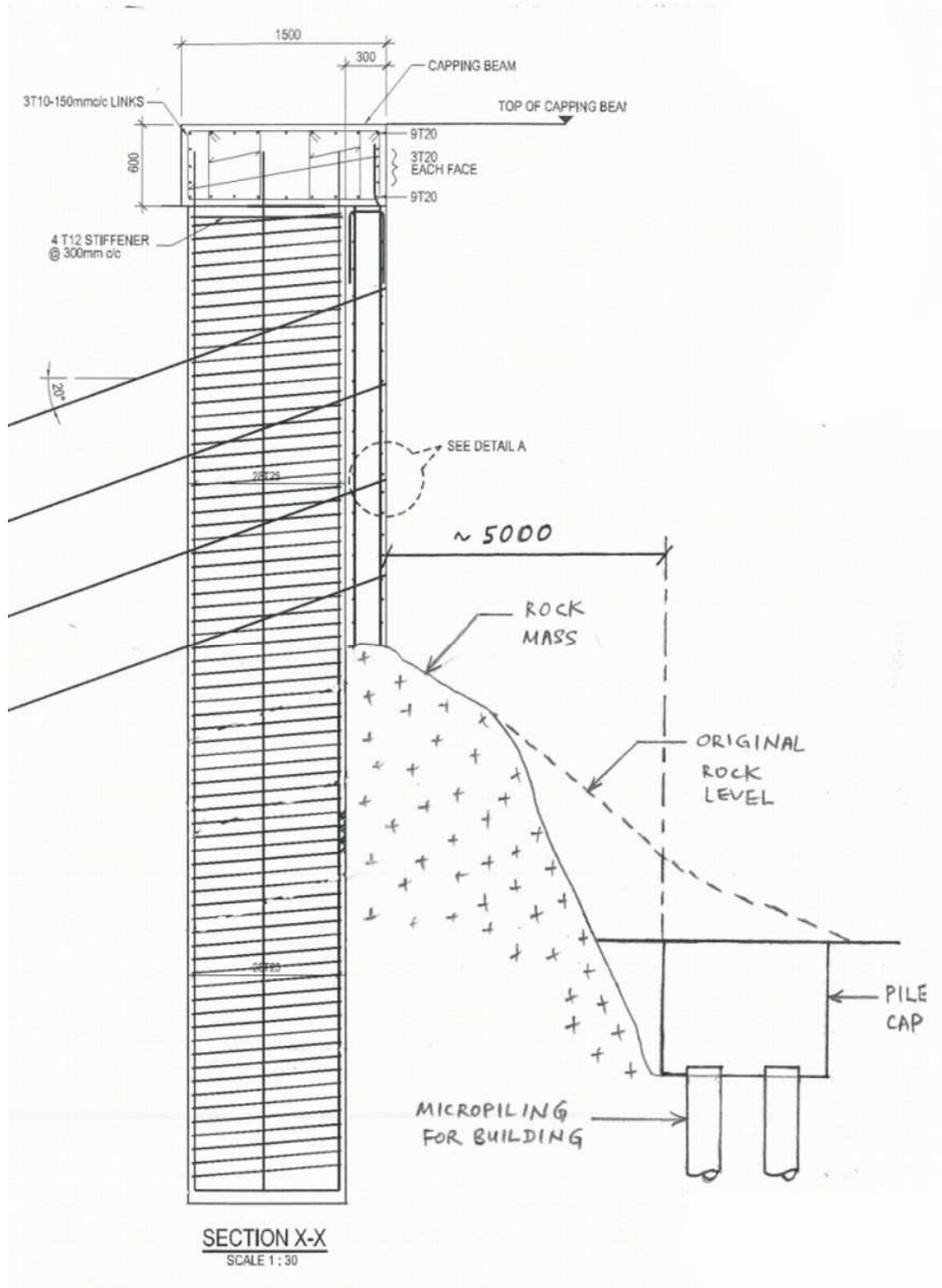


Figure 4 : Section of Wall Excavation When high Bedrock Level

On the other hand, most of the overburden soil above the Granite bedrock is highly weathered Granite, i.e Grade IV, with boulders scattering around. Another challenge to face is during the mass rock excavation in front of the wall which required manual splitting and hacking, as shown in Figure 5 and 6.



Figure 5 : Rock Splitting at Genting Mall



Figure 6 : Rock Hacking at Genting Mall