

## SCOPE OF WORK

The province of Nova Scotia is looking to develop a marine offshore supply base that will be used to support the offshore oil and gas and offshore wind energy sector. The design team was tasked to complete an options analysis of at least three different designs before proceeding with the detailed design of two selected options. The base shall be designed to accommodate two Atlantic Kestrel design vessels. The two marine structures shall also be designed to provide a minimum service life of 50 years and to accommodate the quayside loading of: 35kPa live load due to cargo, CL625 Truck loading, 13 tonne forklift, and 2-200 tonne cranes.

## PROJECT LOCATION

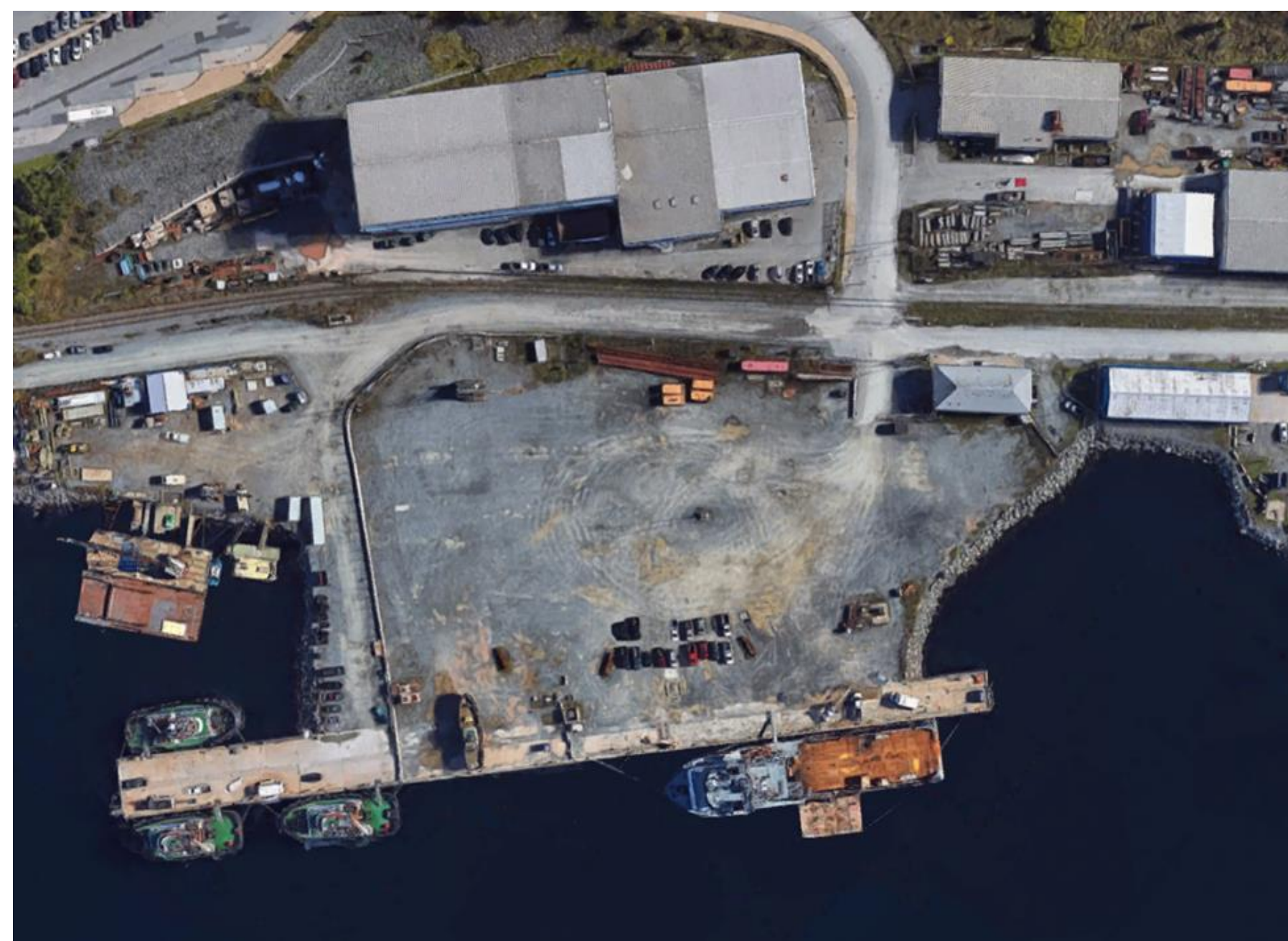


Figure 1: Project site, 3 Atlantic Drive. Irving Woodside Industrial Wharf

## DESIGN PROCESS

### Preliminary Considerations

- General layout
- Load analysis
- Options analysis

### Design #1: Steel Sheet Piles

- Subgrade and geotechnical
- Sheet pile embedment and specifications
- Anchor layout and design
- Bollard reinforcement detailing

### Design #2: HSS Piles

- Pile capacity and specifications
- Reinforced deck and pile cap design
- Concrete plug detailing and rock socket design

## DESIGN #1: STEEL SHEET PILE BULKHEAD

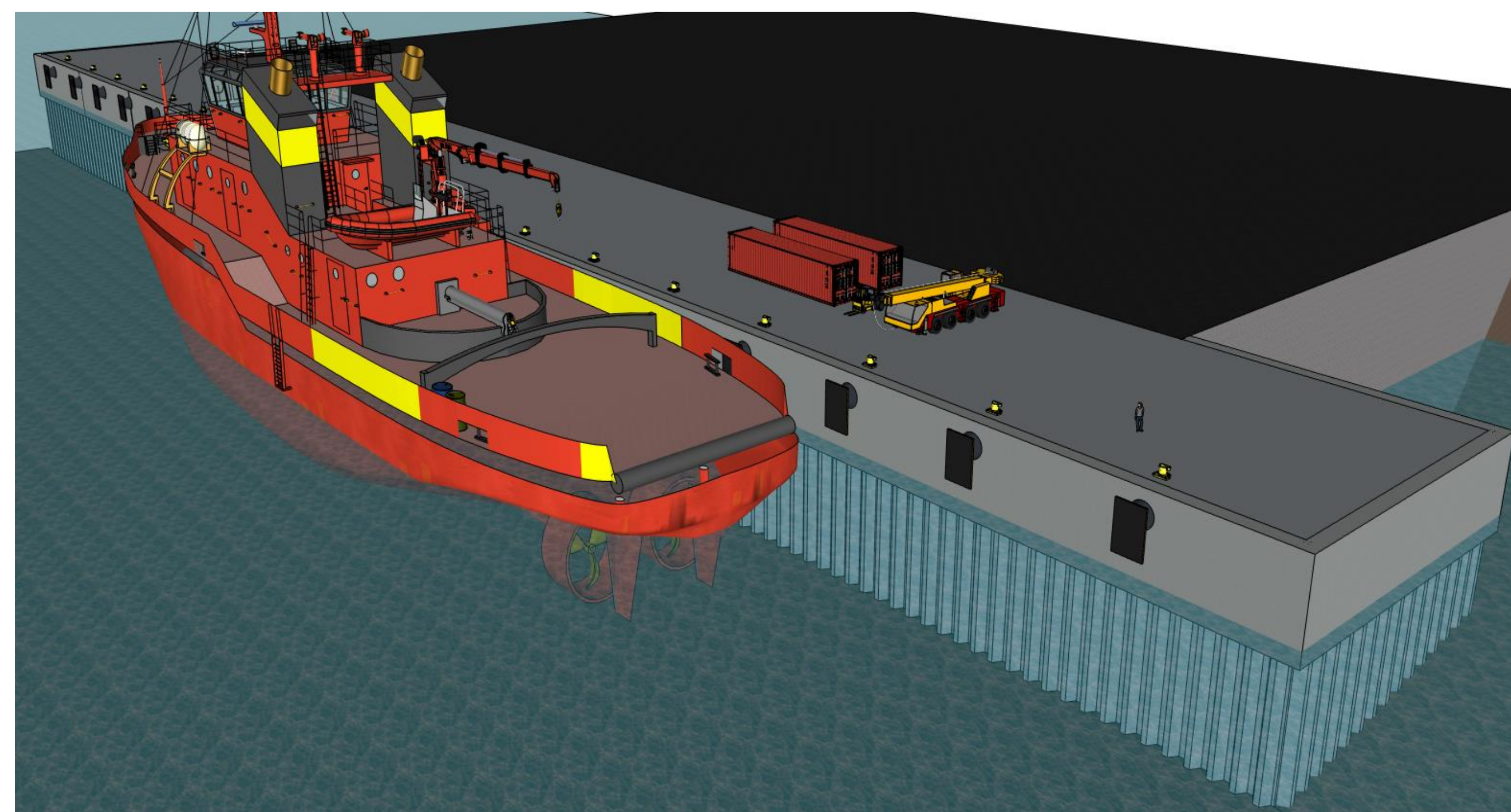


Figure 2 : Conceptual drawing of the steel sheet pile bulkhead design

### Design #1 Summary:

The bulkhead design was constructed with anchored AZ 48-700 steel sheet piles. The general layout is 203m x 21m, with a deck elevation of +5.0m. The construction cost estimate for this design is \$27,000,000.

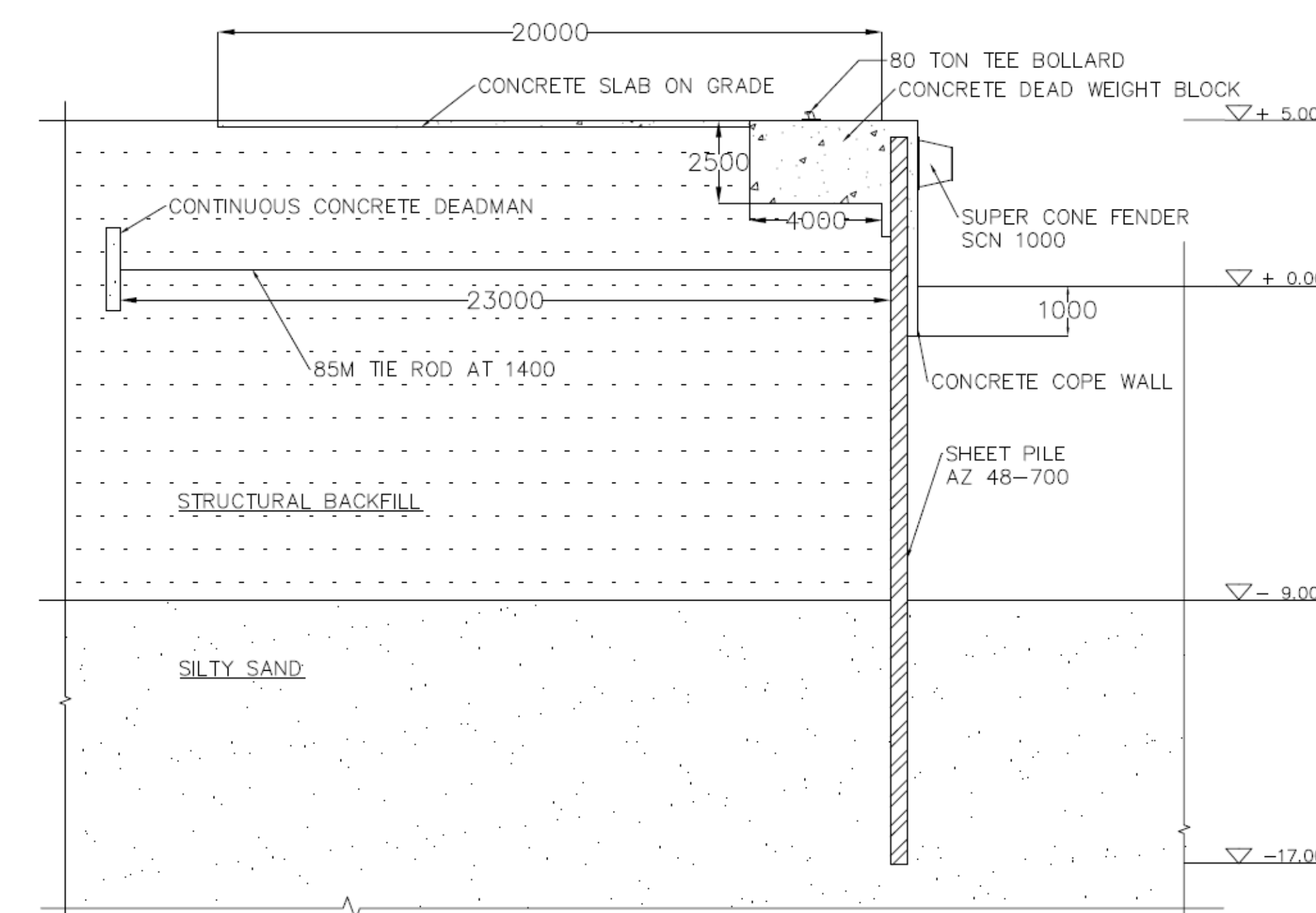


Figure 3: Steel sheet pile cross section

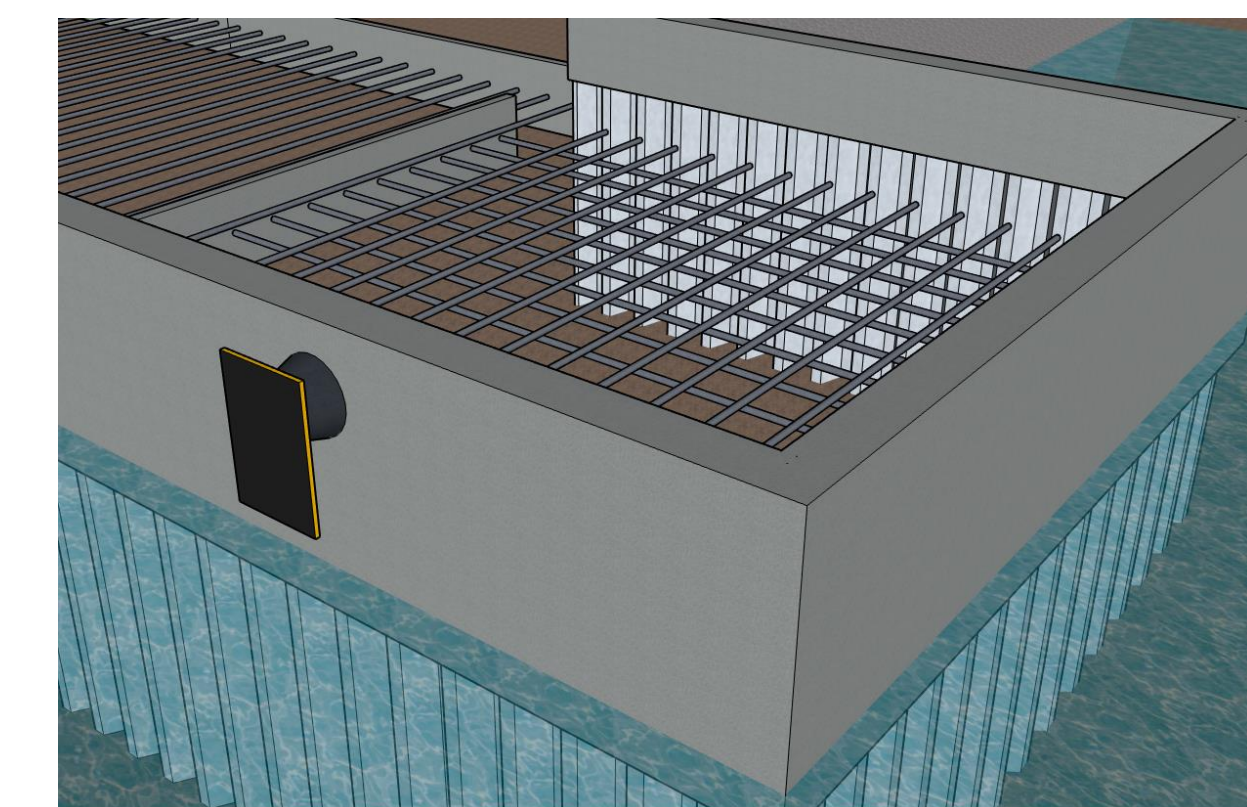


Figure 4: Corner tie rod arrangement

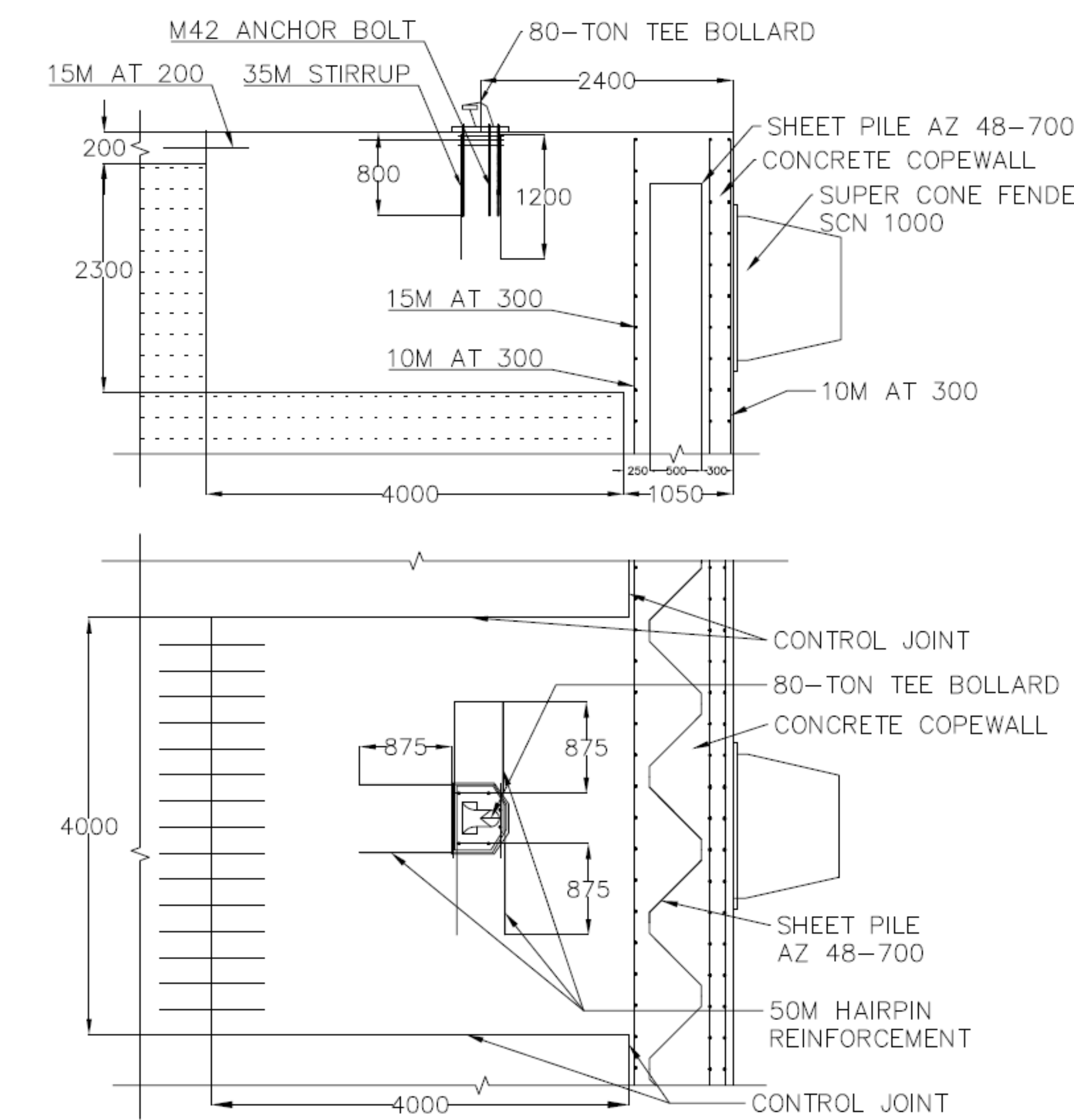


Figure 5: Bollard reinforcement detailing

## DESIGN #2: HSS PILE WHARF

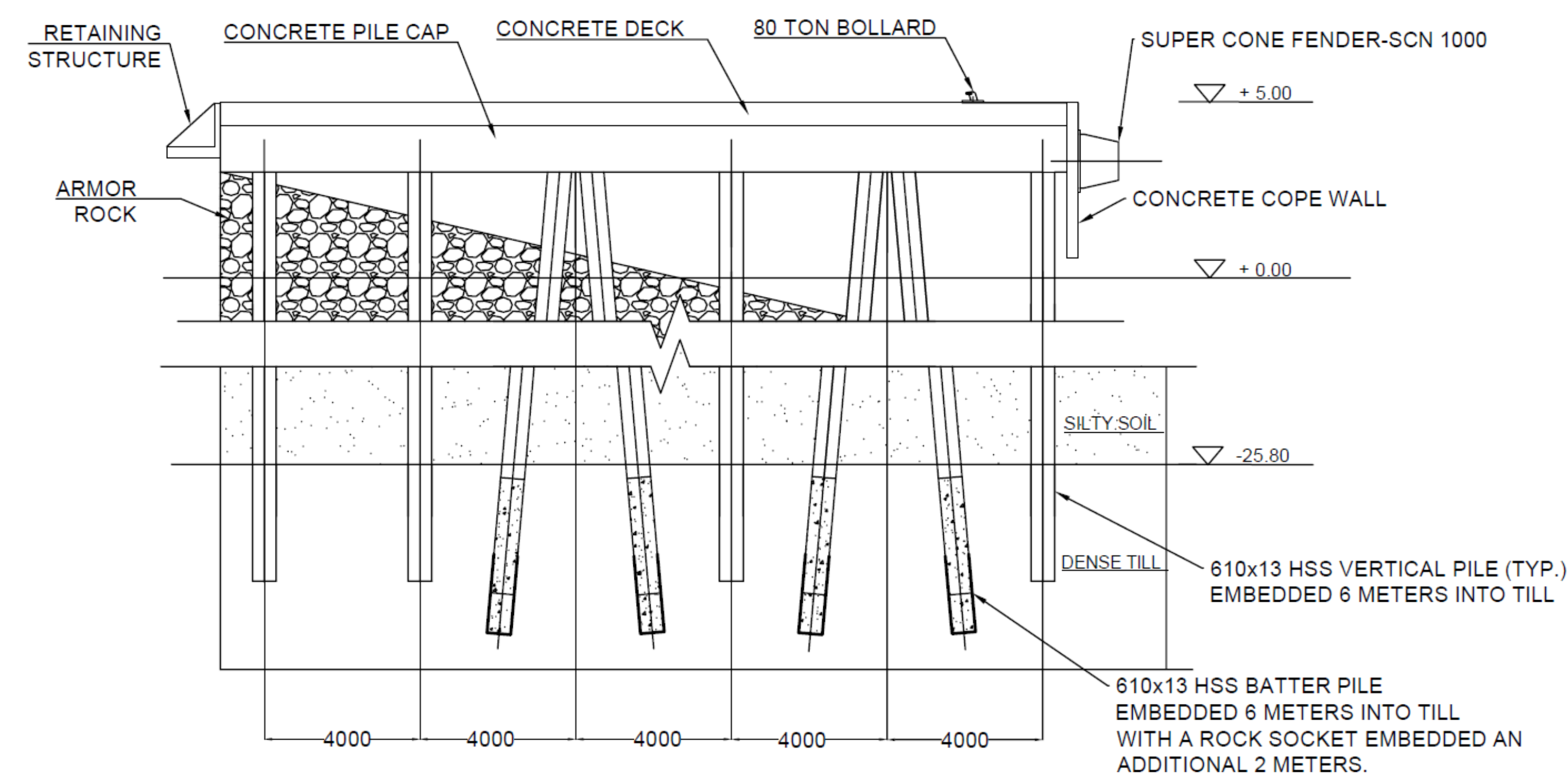


Figure 6: round HSS Pile cross section

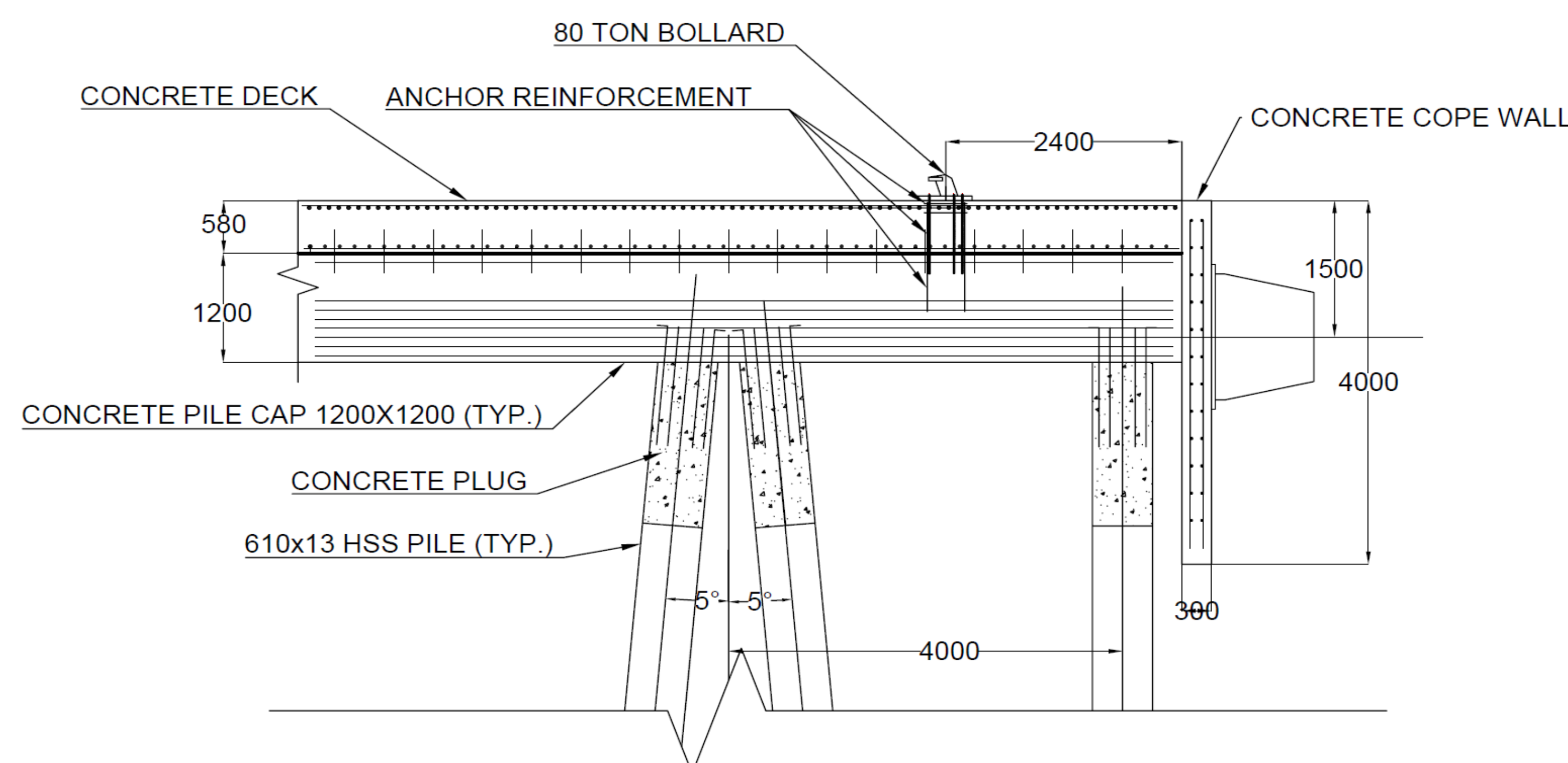


Figure 7: Pile connection details

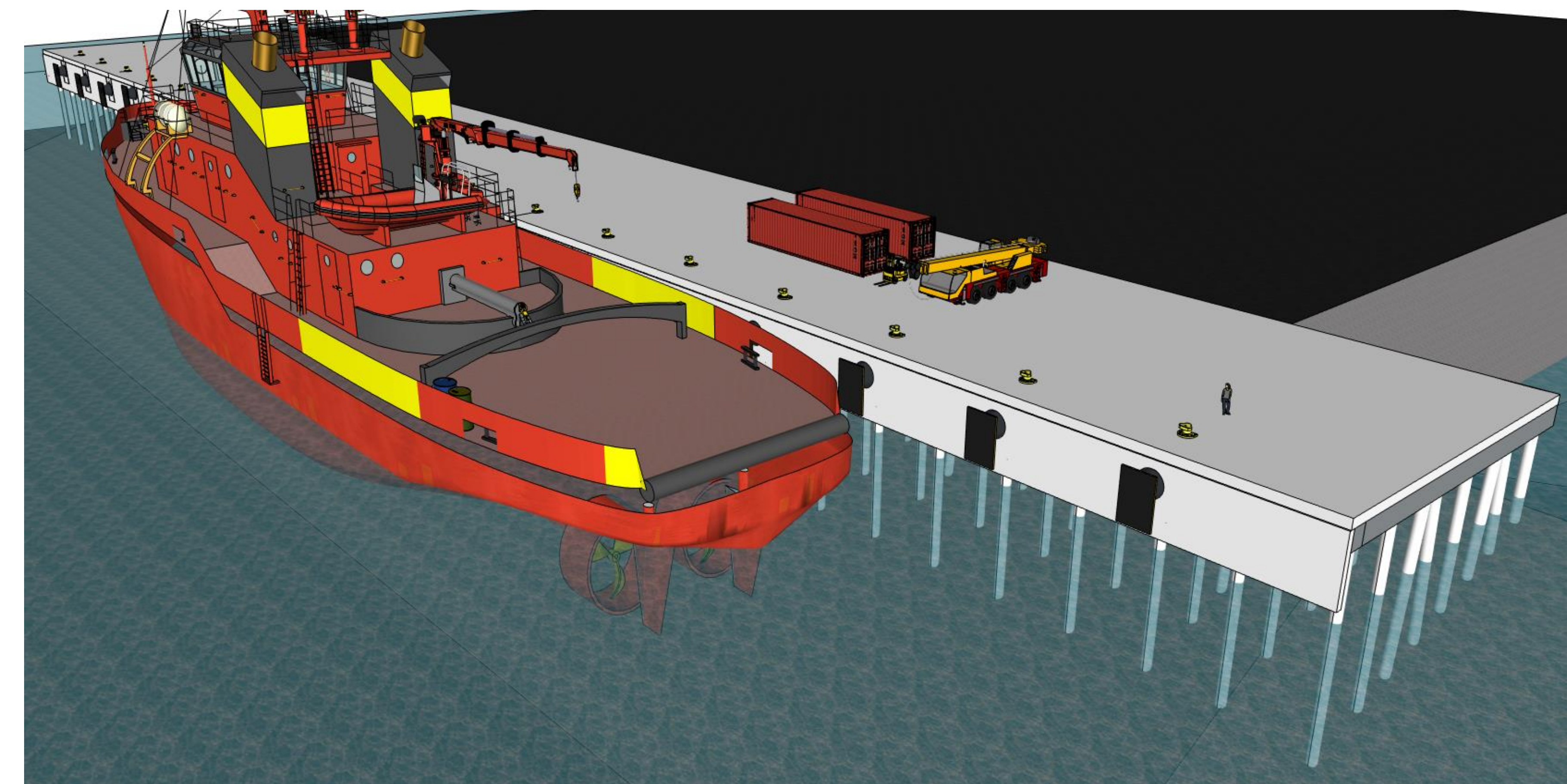


Figure 8 : Conceptual drawing of the HSS pile wharf design

### Design #2 Summary:

The HSS pile design was constructed with round 610x12.7 HSS piles. The general layout is 203m x 21m, with a deck elevation of +5.0m. The construction cost estimate for this design is \$26,000,000.

### Acknowledgements

- Group 9 would like to extend acknowledgements and appreciation to the Marine Group at CBCL; Greg Peters, Jeff Mackenzie, Aaron Kennedy and Sean Bent and our senior design project advisor Dr. Yi Liu for providing us with the necessary tools, guidance and support to successfully complete this project.

### References

- Autodesk. AutoCAD 2016 [computer software]. Autodesk, Inc. San Rafael, CA, USA
- Google Maps, 2017. 3 Atlantic Drive. Irving Woodside Industrial Wharf, Dartmouth NS. Retrieved March 30, 2019.
- SketchUp. [computer software]. Trimble, Inc. 2019.