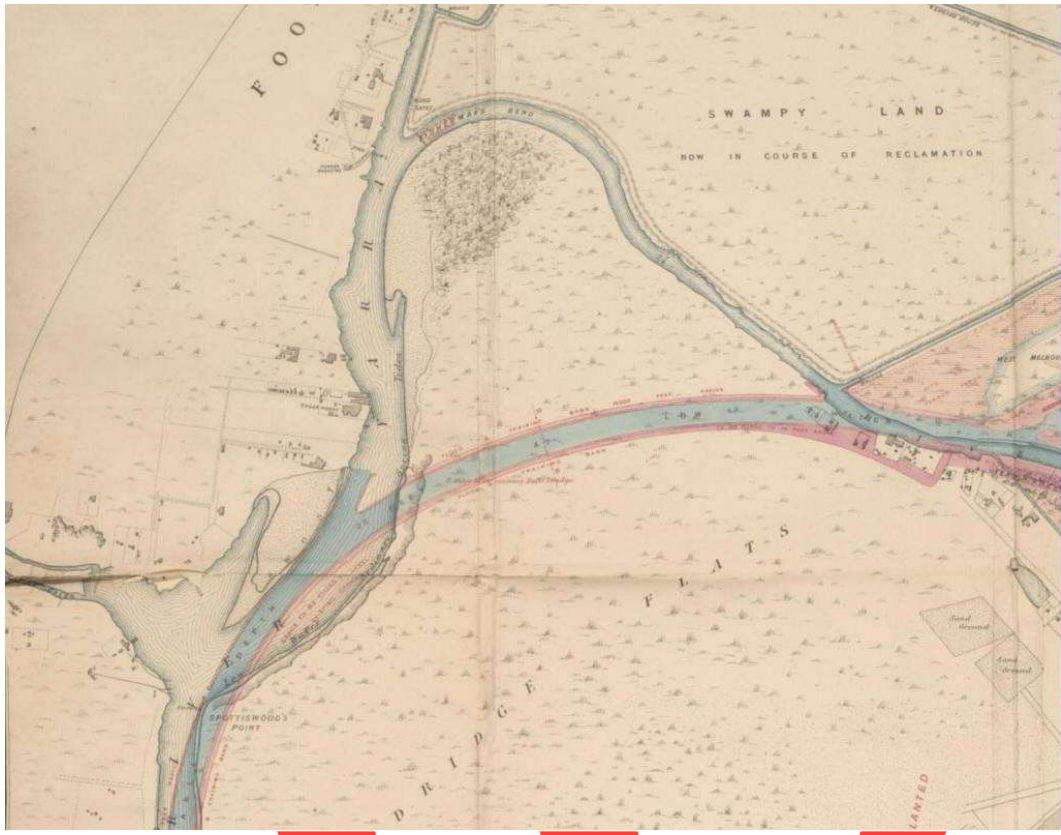
Design and Constructability Issues of Driven Piles in the Yarra Delta Region



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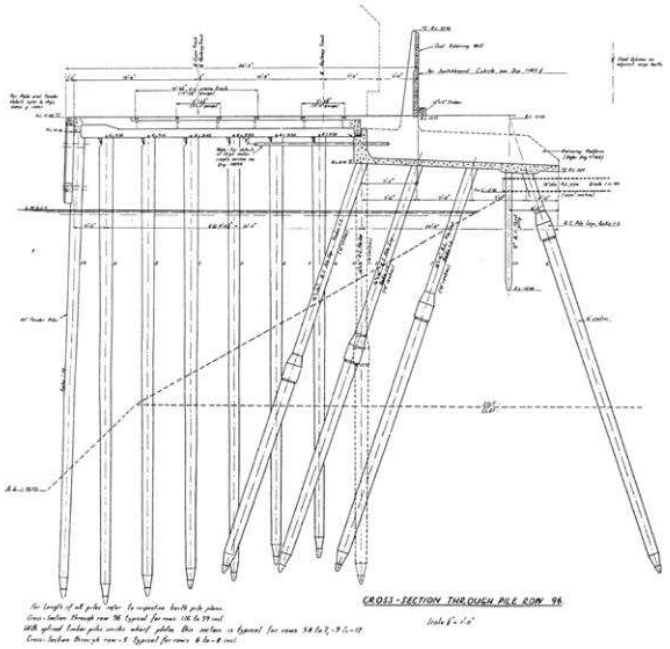
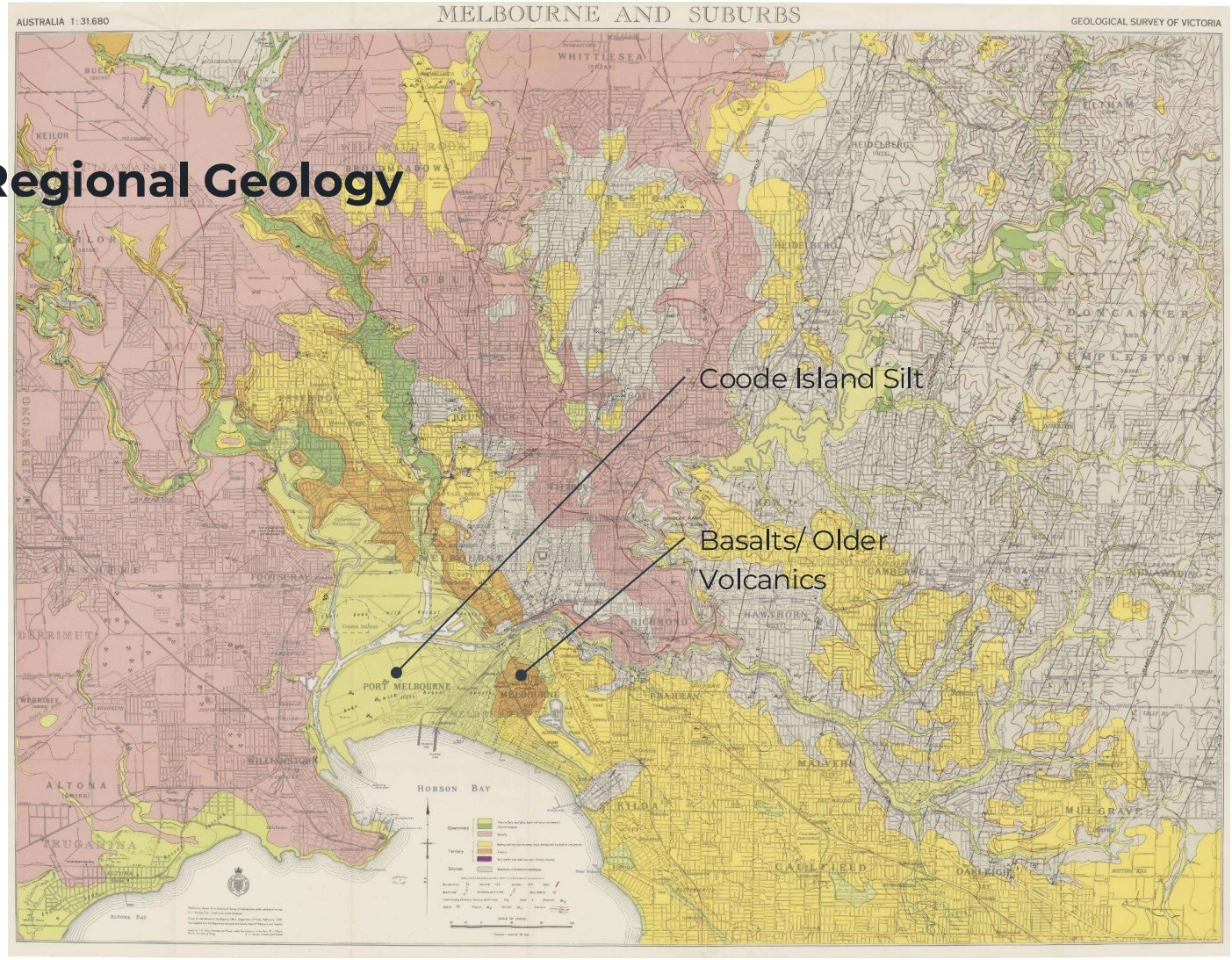
Introduction

- Driven piles are prevalent within the Yarra Delta Region.
- Driven piles continue to be a favoured means of construction within the Region.
- However, the Yarra Delta Region presents particular challenges and difficulties.
- The purpose of this presentation is to highlight key factors to consider during the pile design in the Yarra Delta Region



Regional Geology

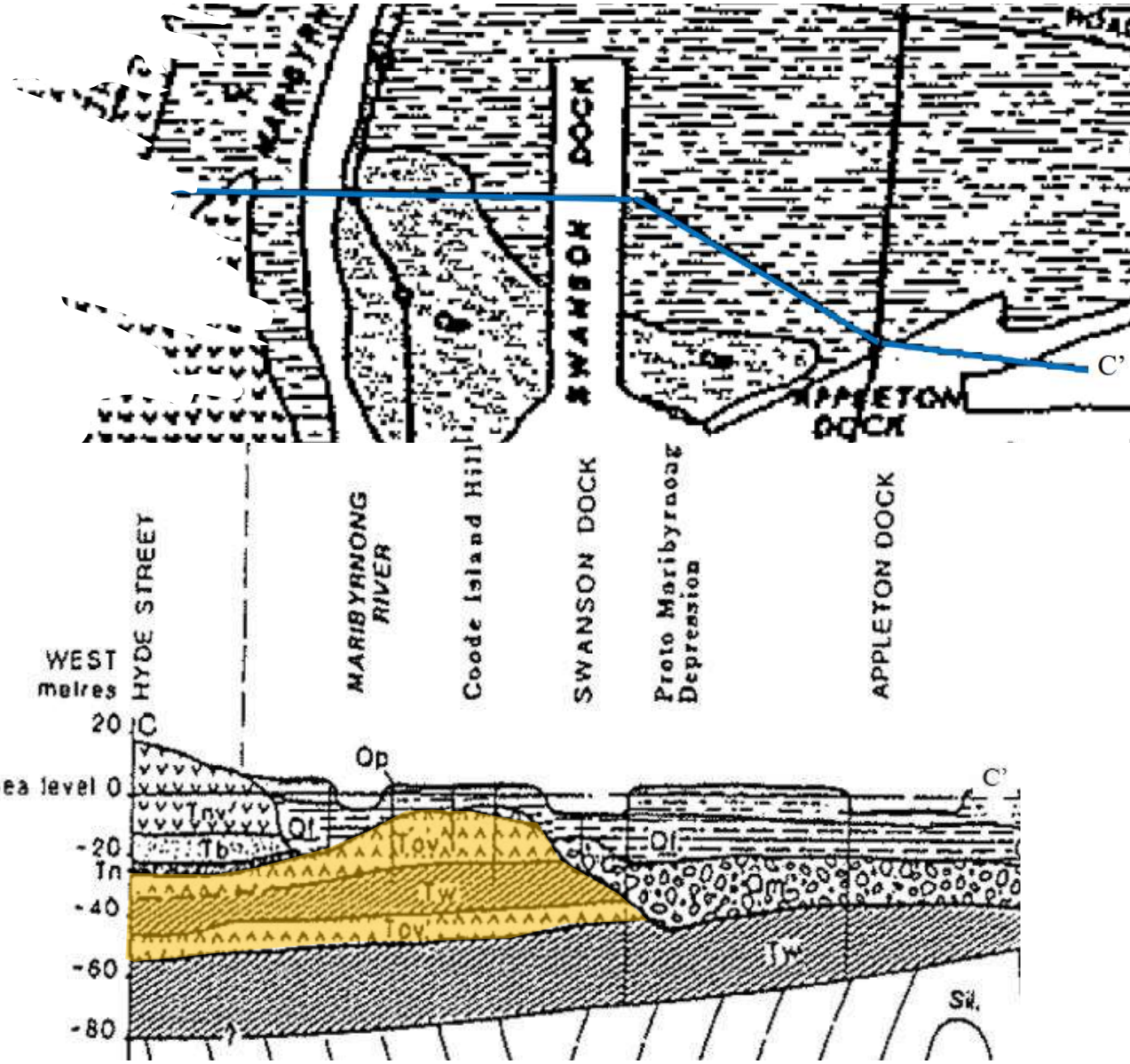


Coode Island Silt

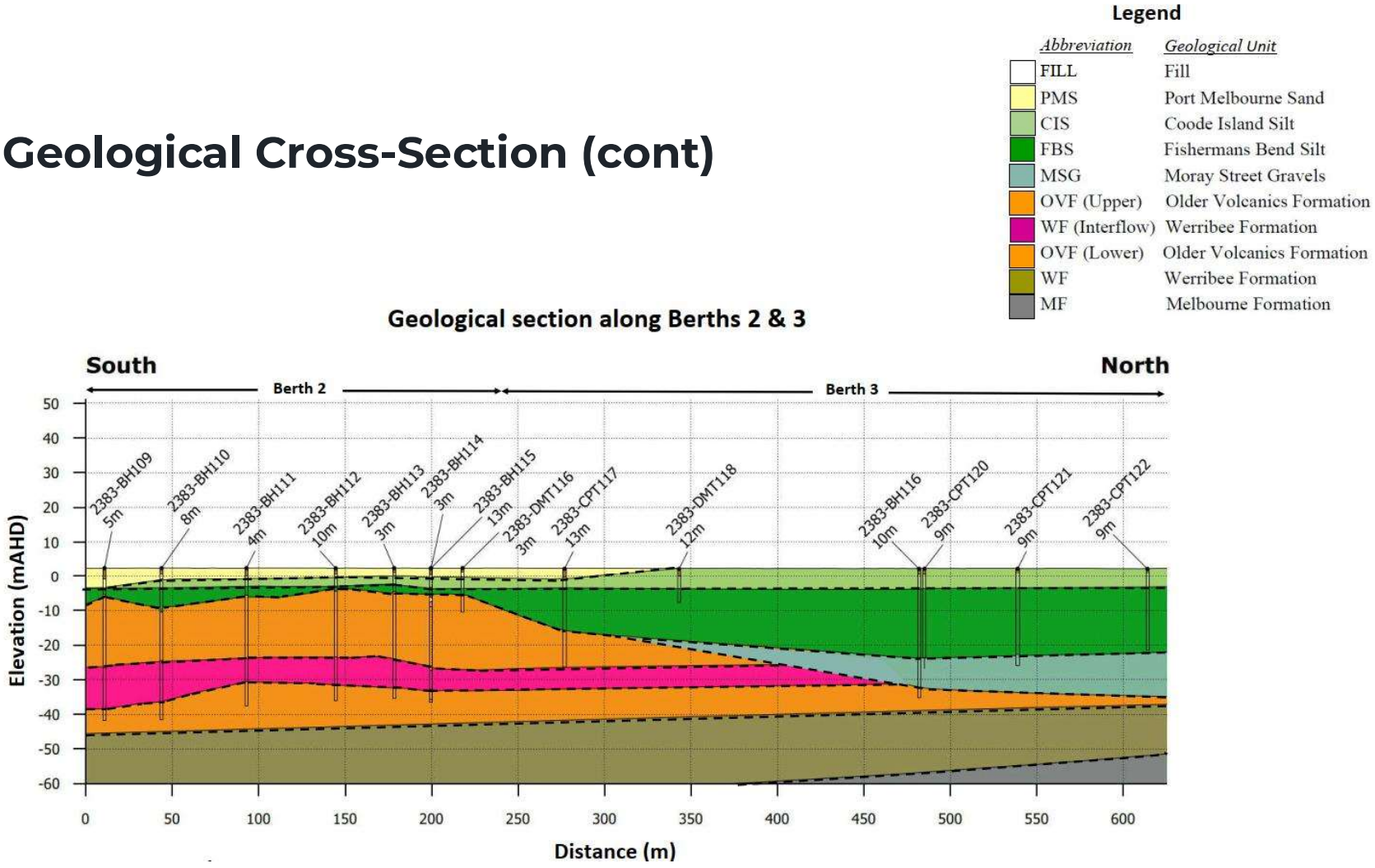
Newer Volcanics

Geological Cross-Section

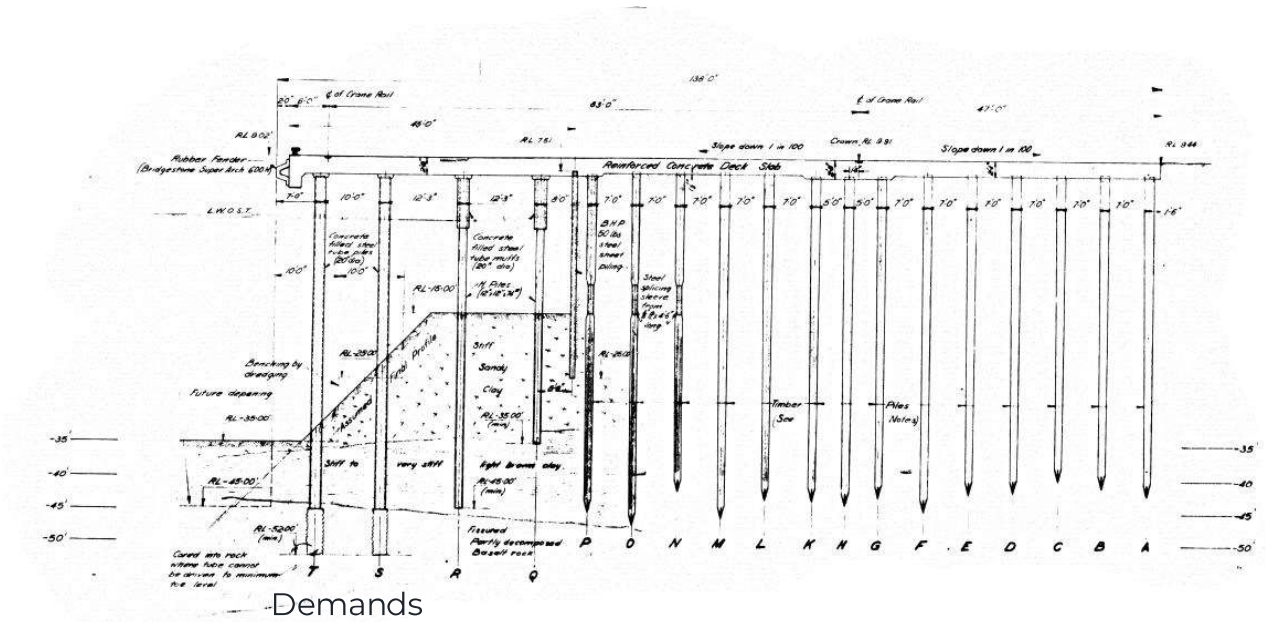
- Tnv- New Volcanics
- Tov- Older Volcanics
- Tw- Werribee Formation
- Qm- Moray St Gravel
- Oc- Coode Island Silt
- Of- Fishermans Bend Silt



Geological Cross-Section (cont)



Challenges



Geotechnical Context

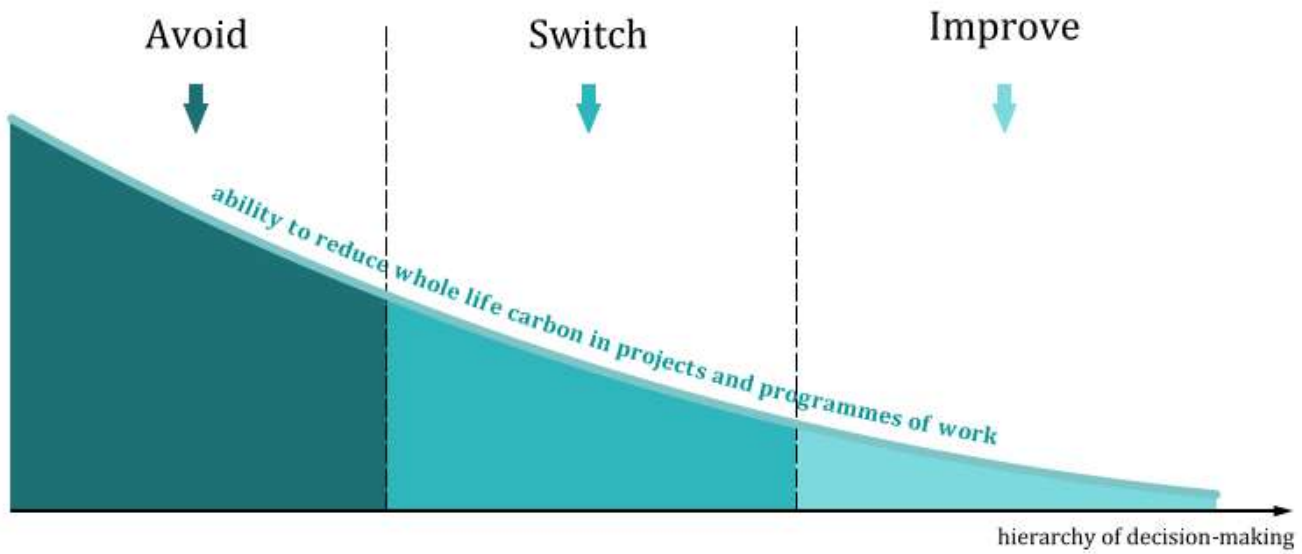
- CIS and FBS provide little shaft friction capacity in tension
- Highly variable rock levels.
- Piles unpredictably hitting refusal where unable to penetrate high rock flows

Demands

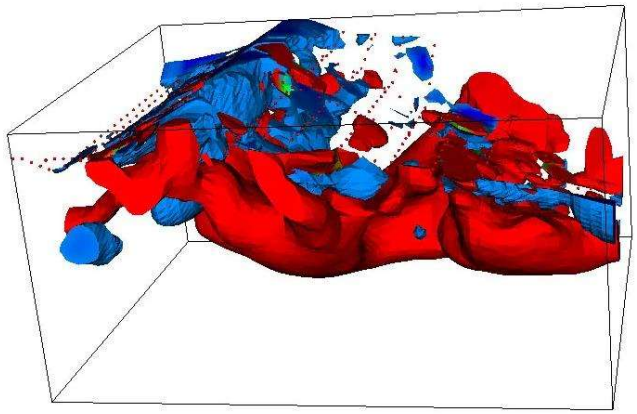
- Vessel sizes increasing
- Greater load bearing capacity required
- Reduction in construction timeframes – preference to reduce number of piles.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Challenge – UN SDG



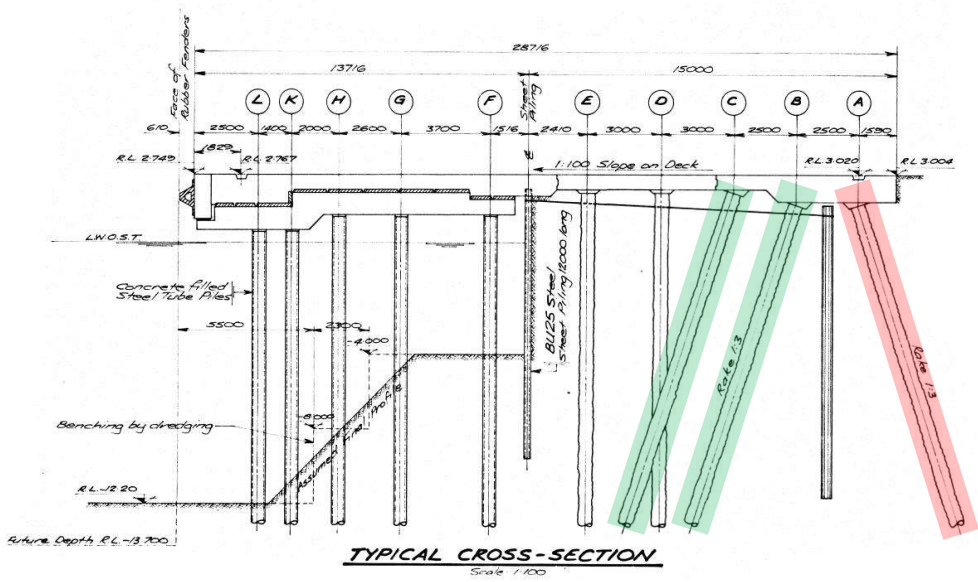
Key Considerations during Investigation Scoping/ Works



- The use of geophysical survey to investigate the depth, thickness and properties of the rock could be considered.
  - Seismic refraction and reflection
  - Cross hole seismic tomography
- Geophysical survey does not replace borehole investigation
- Result- better understanding of what is occurring in between boreholes to account for variability.

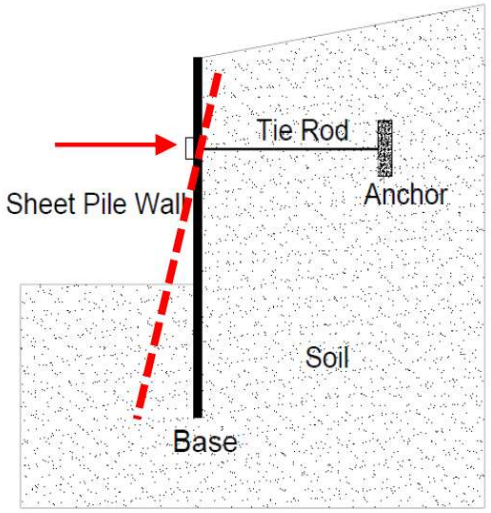
Key Considerations during Concept Design Development

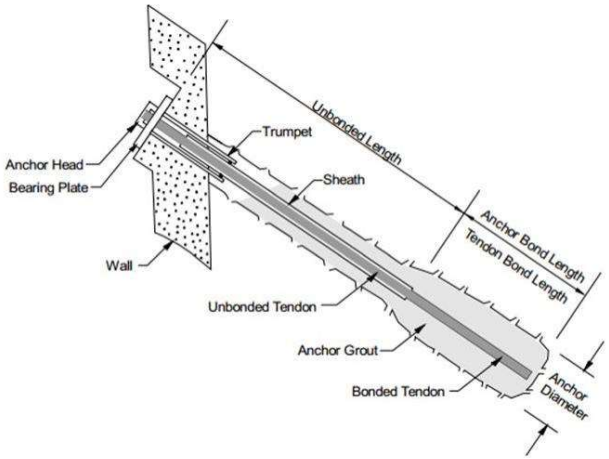
- Overall pile design to reduce the requirement for piles to develop large amount of tension.



Key Considerations during Concept Design Development

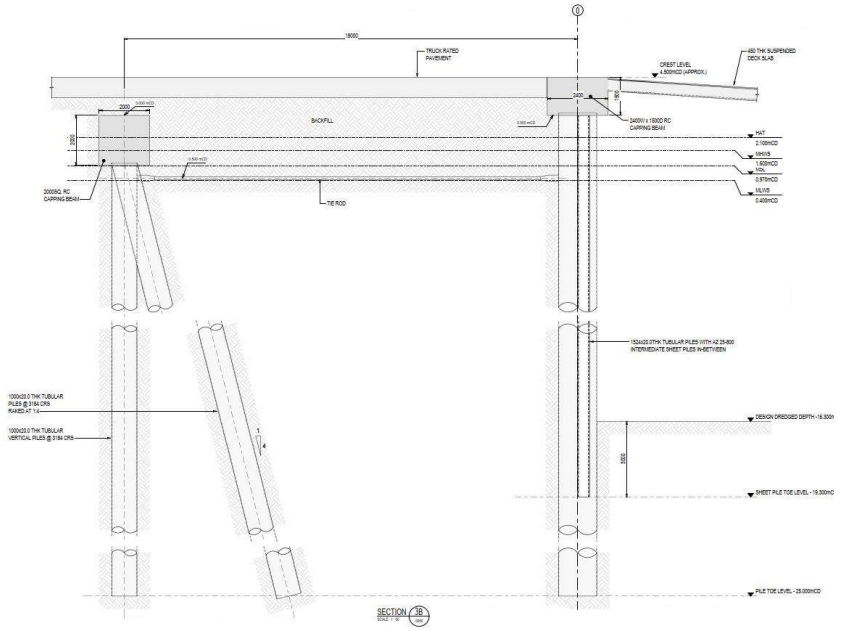
- Consider tie-back solution/ ground anchor to avoid the need for raker piles



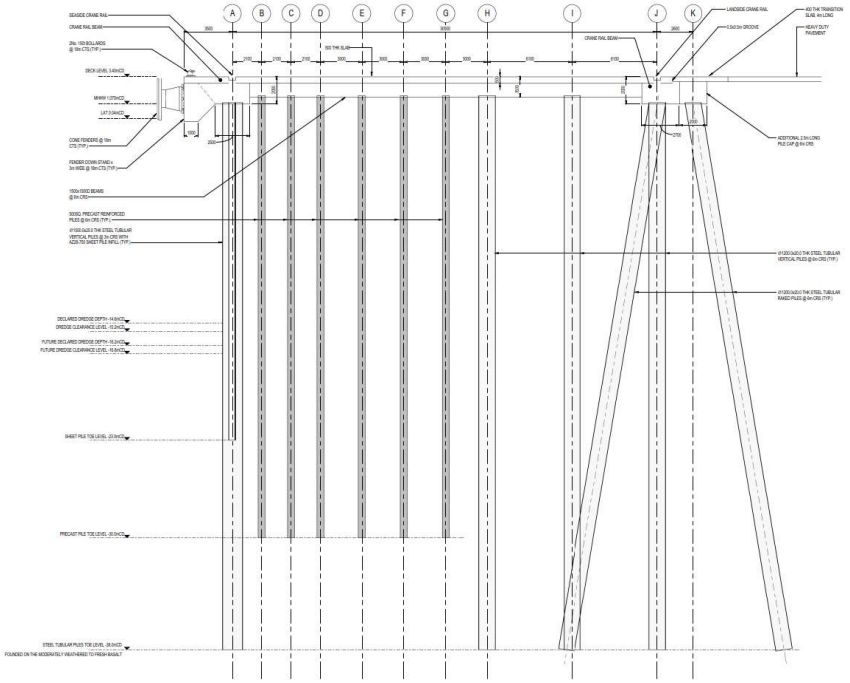


Key Considerations during Concept Design Development

- Tie-back solution to piled relieving slab.

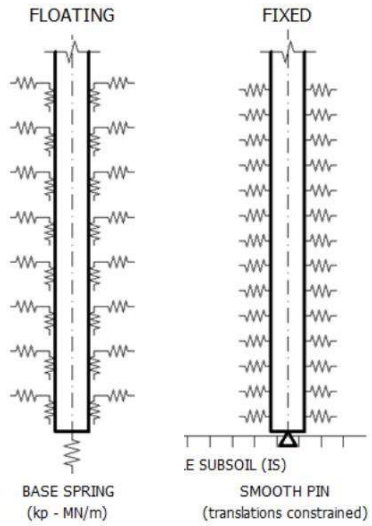


- Tie-back through reinforced concrete deck.



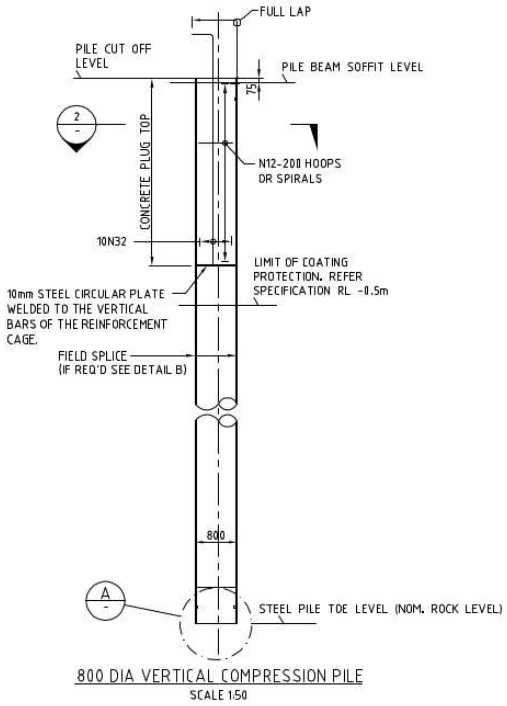
Key Considerations during Structural Analysis

- Pile fixity needs to be carefully considered in the evaluation of existing structures and design of new structures.

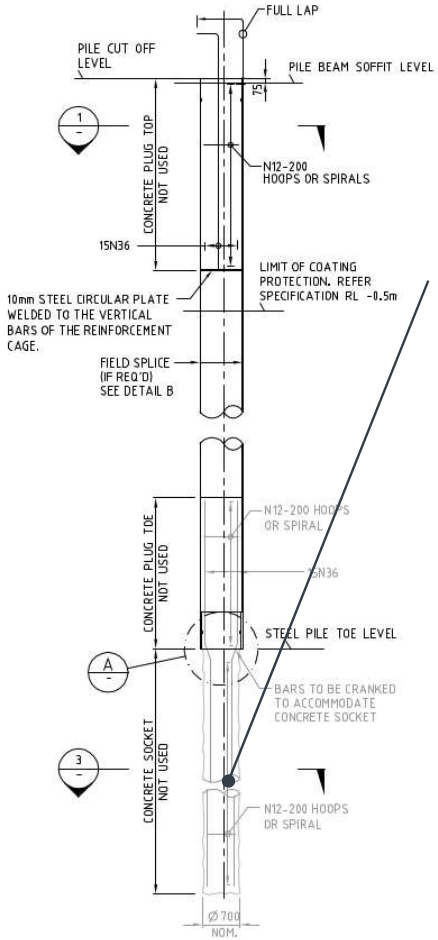


Key Considerations during Pile Design

- Solutions developing tension in piles



800 DIA VERTICAL COMPRESSION PILE
SCALE 1:50

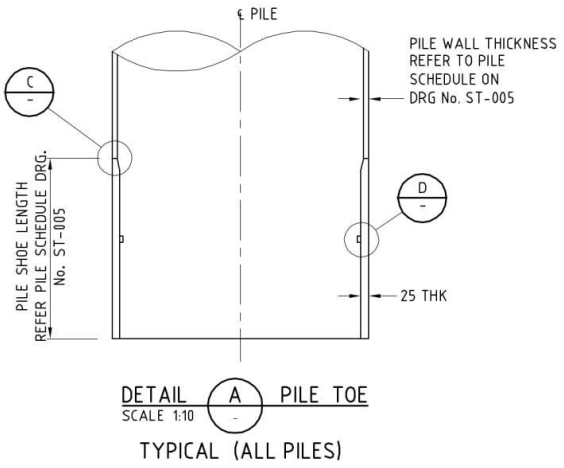


800 DIA VERTICAL PILE (WITH TENSION)
SCALE 1:50

Passive tension bar w/ grouted anchor could be used in lieu of rock socket

Key Considerations during Pile Design

- To penetrate high rock flows, pile shoes/ steel toes or rock punching ends with high penetrating capability can be considered.



Thank you

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