

Welcome to...

Innovating Infrastructure:
Pioneering Piling Solutions
at Yarm Viaduct

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ROGER BULLIVANT

RBL'S PRESENTERS



Jack Gardner
Operations Manager



Megan Goodchild
Marketing & Events Coordinator



Kevin Browning
Piling Manager

Contents

01 Our Business

02 Project Introduction

03 Design

04 Site Execution

05 Q&A



Our Business



ROGER BULLIVANT LIMITED

AT A GLANCE

Total employees.

500+

Linear metres of precast beam
manufactured annually.

>180,000 LM

Providing piling and foundation
solutions in the residential sector.

Residential

RBL has the capacity to
manufacture over 1 million metres
of precast pile every year.

1M

Fleet of piling rigs.

50+

100% of precast products manufactured
with low carbon concrete.

100%

Providing piling and foundation
solutions for various commercial projects.

Commercial

OUR PRODUCTS

WHAT WE DO

PILING



- Driven Precast Concrete Piles
- Driven Steel Tubular Piles
- RB Combipile
- Continuous Helical Displacement Piles (CHD)
- Continuous Displacement Auger Piles (CDA)
- Continuous Helical Auger Displacement Piles (CHAD)
- Continuous Flight Auger Piles (CFA)
- Contiguous Piled Retaining Walls

GROUND IMPROVEMENT



- Vibro Stone Columns
- Helical Displacement Inclusions (HDI)

FOUNDATION SYSTEMS



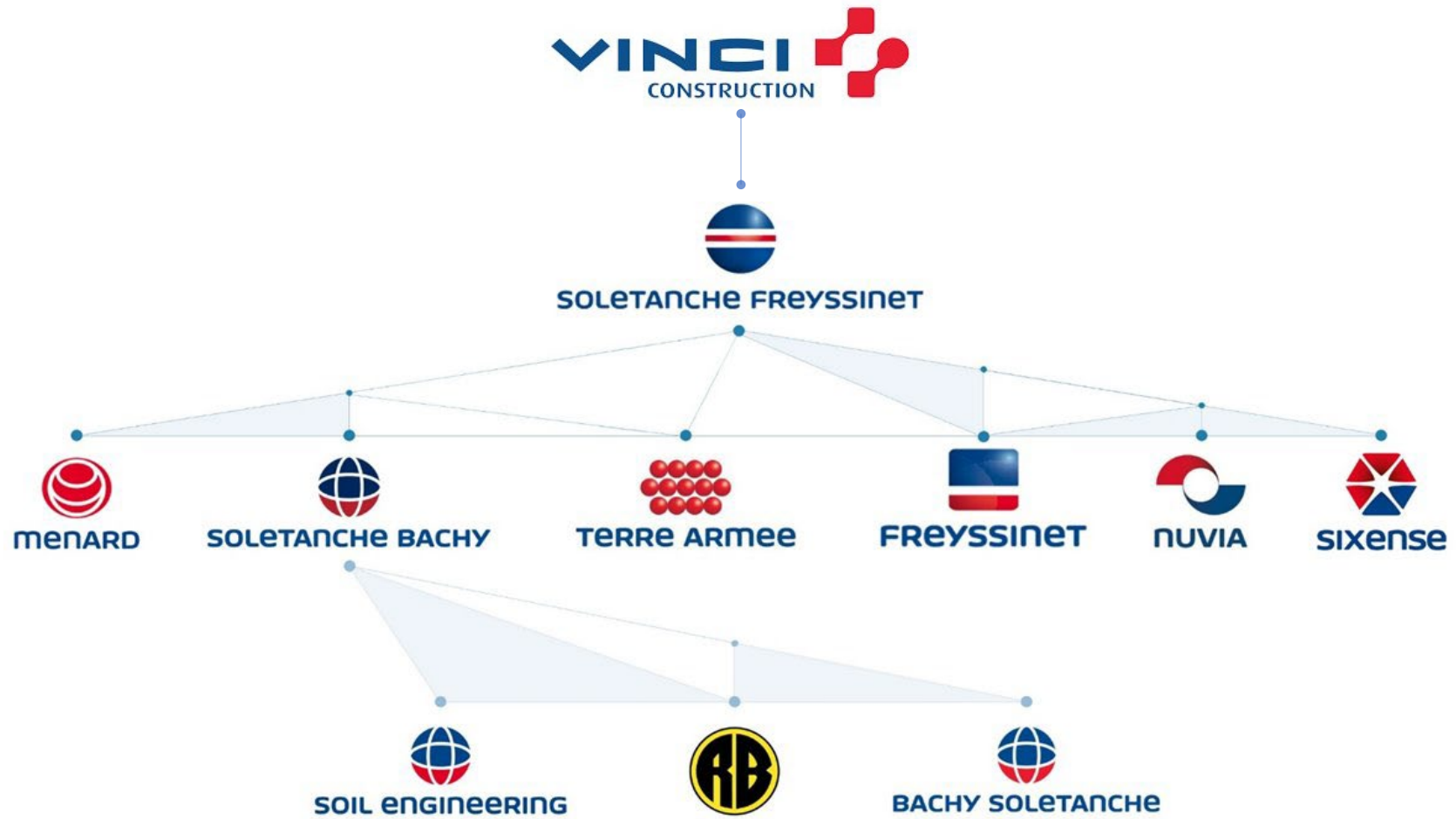
- RBeam Precast Concrete Ground Beams
- Precast Caps

RESTRICTED ACCESS



- Sectional Flight Auger (SFA)
- Bottom Driven Minipiles
- ODEX Piles
- Jack Piles & Jack Pile Raft
- Grundomat Piles
- Drill Bar Piles
- Underpinning

WORLD LEADING EXPERIENCE & EXPERTISE



LOCAL KNOWLEDGE NATIONAL SUPPORT



THINK FOR A SECOND
PUT SAFETY FIRST



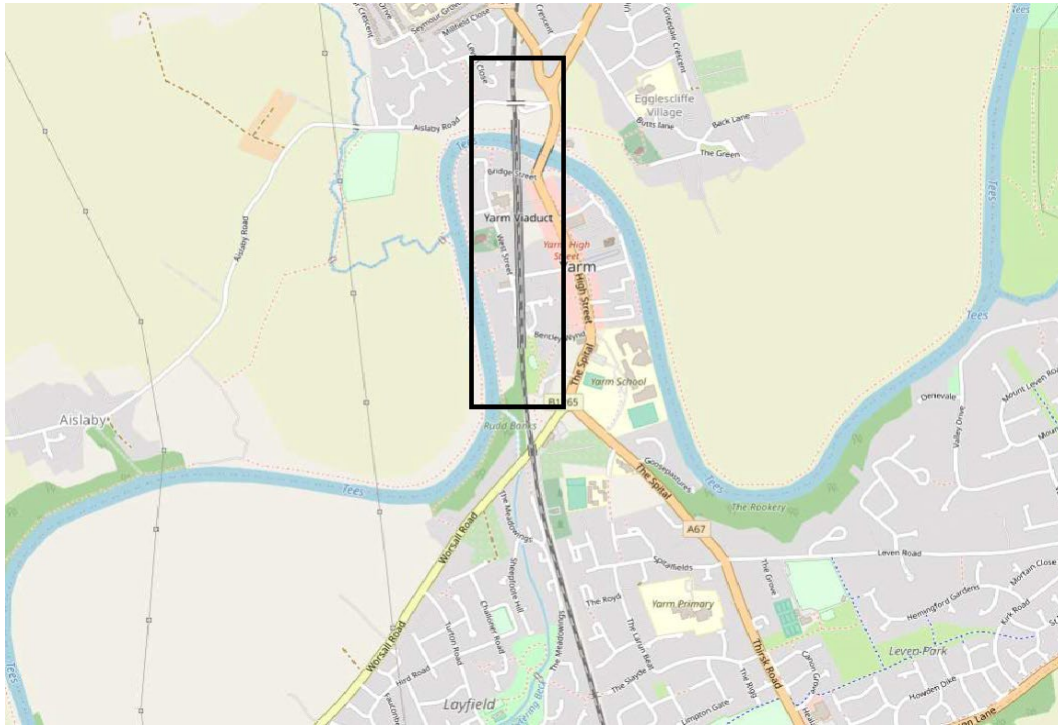
Project Background



LOCATION

PLAN

- Yarm Viaduct carries 2 rail tracks over the flood plain of the River Tees and the town of Yarm.
- The Viaduct was constructed between 1848 and 1852.
- Grade 2 listed structure, approximately 620m in length and comprises a 43 Nr, span masonry Viaduct.



PROJECT BRIEF

Client:



Principal Contractor:

AMCO·GIFFEN

Principal Designer:

AECOM

Monitoring indicated the structure had been subject to movement/settlement both in the past and during recent years.

RBL were approached by Amco Giffen to provide options for a piled solution to underpin the structure.

SITE CONSTRAINTS

- Restricted access and close proximity to housing ruled out a driven solution.
- Section Flight Auger (SFA) piling was considered, however, RBL offered a Jack Piled Solution due to the site constraints.
- This proposal was taken forward and developed with the scheme designers.



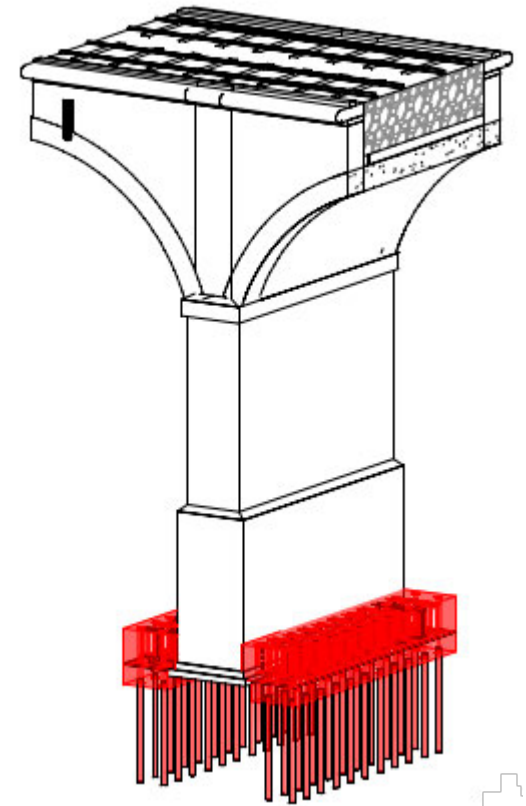
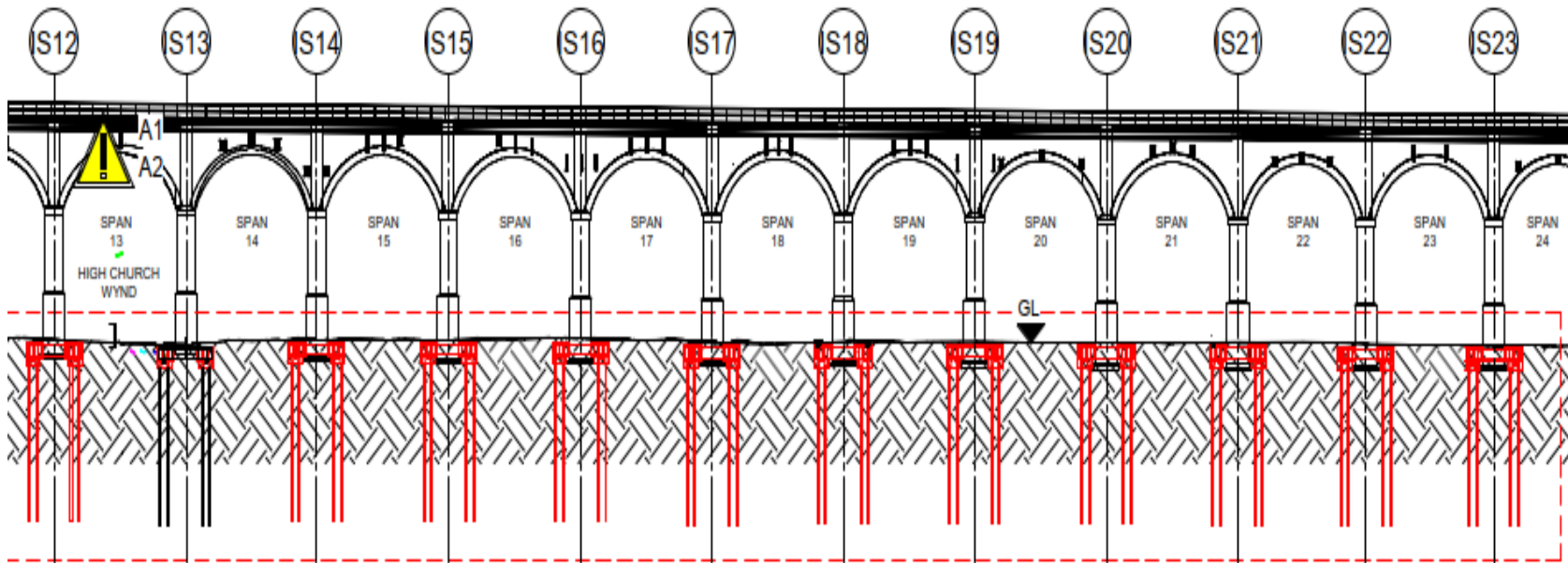
Design



RBL'S SOLUTION

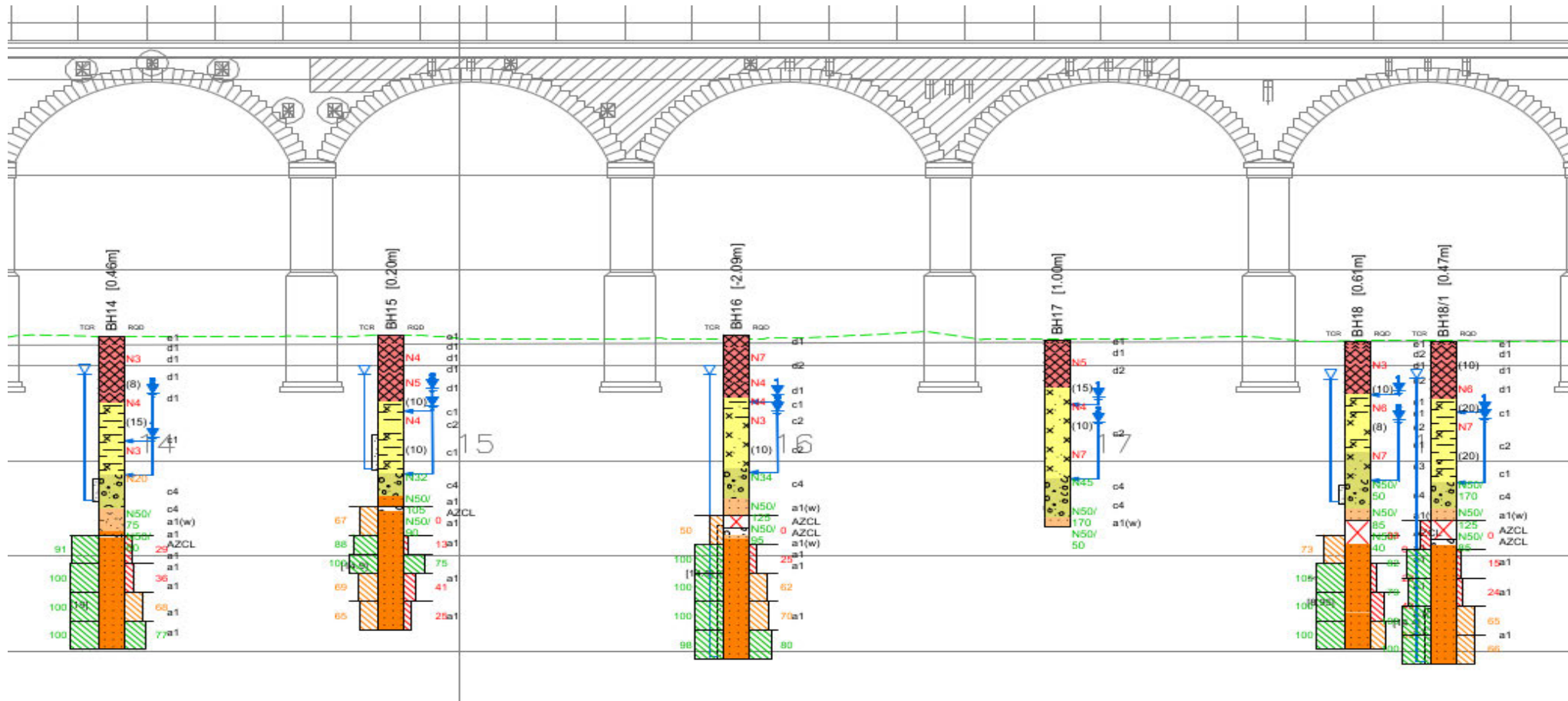
Jack Down Piling: This method was selected for its quiet and vibrationless installation process, significantly reducing the risk of disturbance to the existing structure and surrounding community.

Steel transverse beams were strategically placed through the existing brickwork piers which were supported by piled reinforced concrete caps.



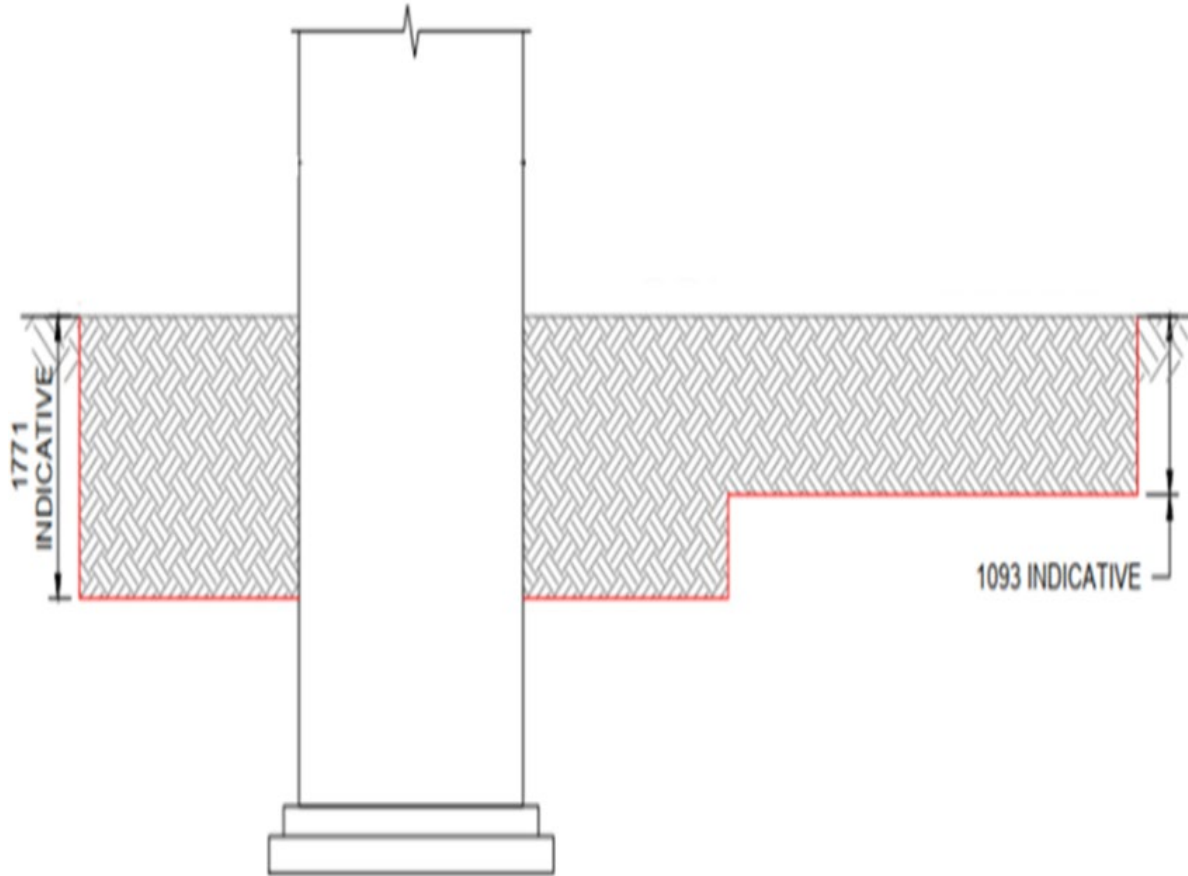
GROUND CONDITIONS

Soft alluvial clays, sands and gravels over Sandstone Bedrock.



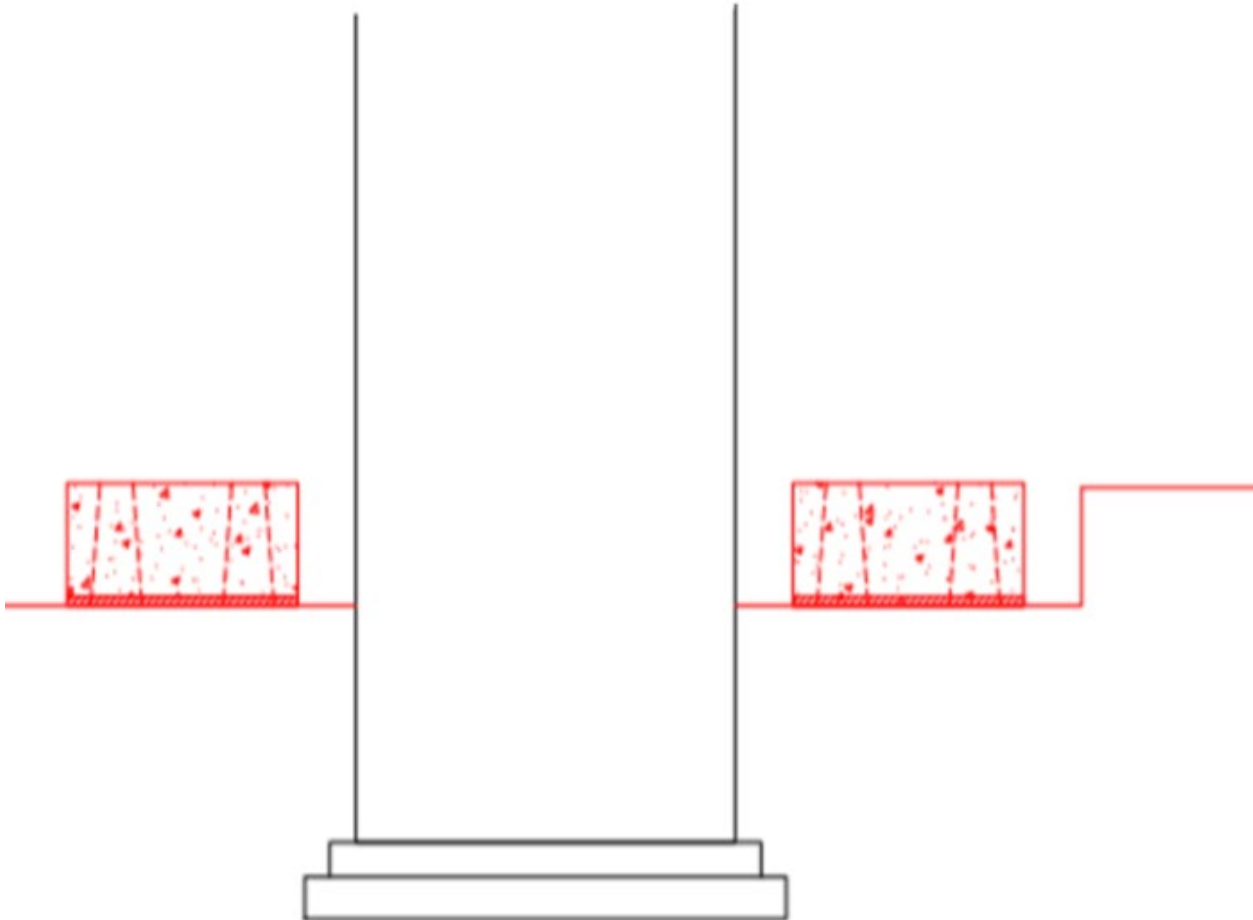
STAGE 1

REDUCED LEVEL DIG



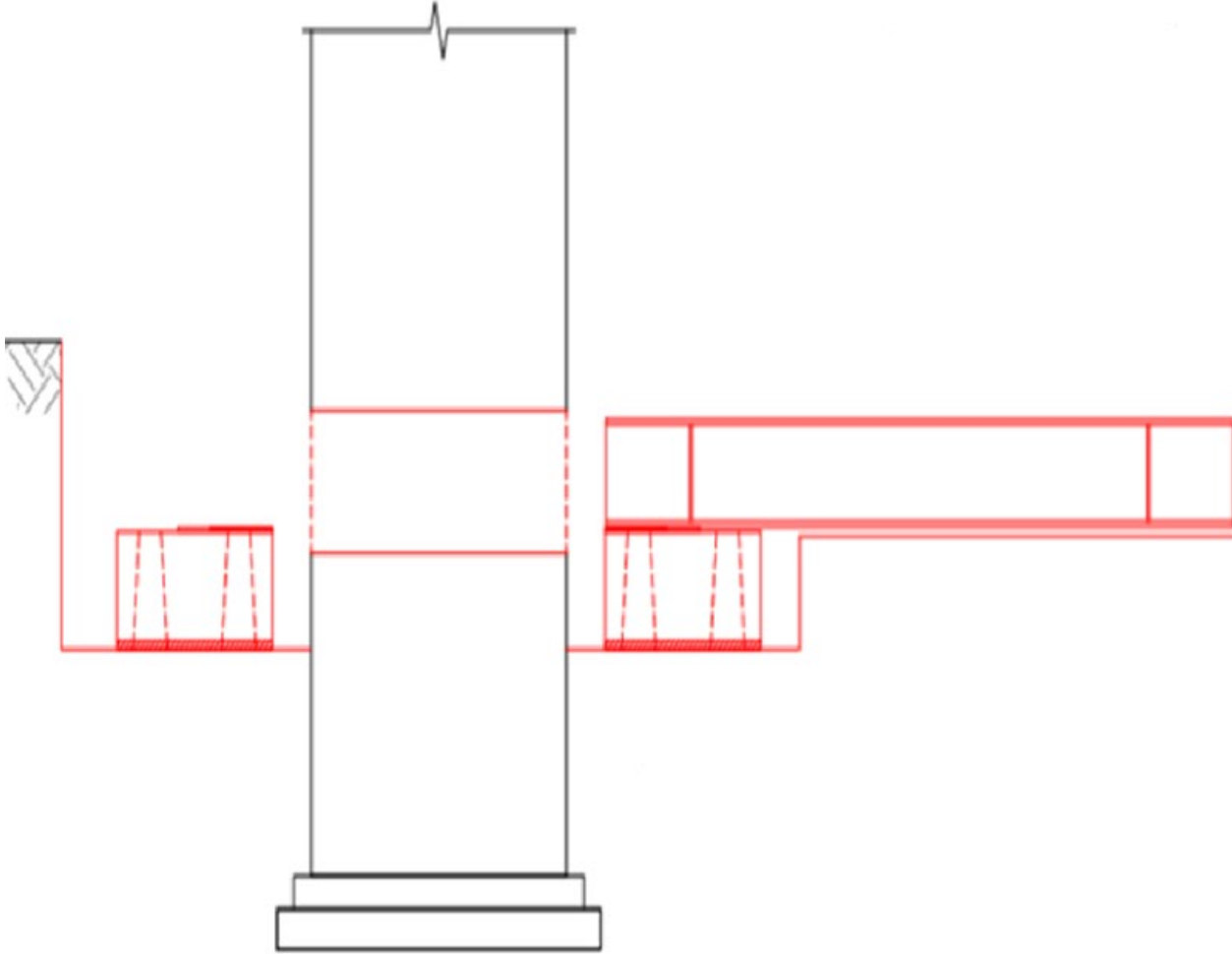
STAGE 2

FIRST STAGE CONCRETE POUR & CASE PILE CAPS WITH VOID FORMER



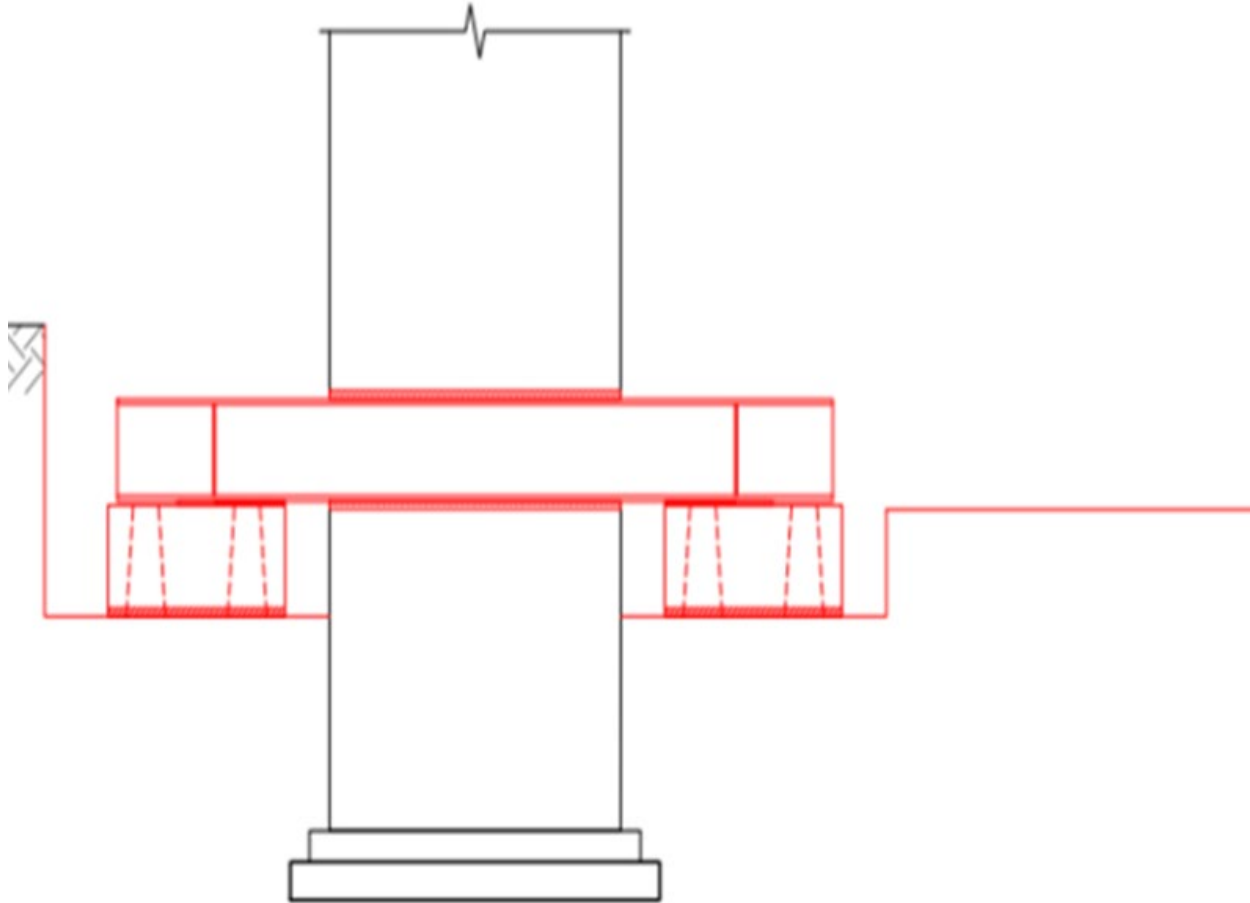
STAGE 3

CORE THROUGH PIERS & LIFT NEEDLE BEAMS AND SLIDE INTO POSITION



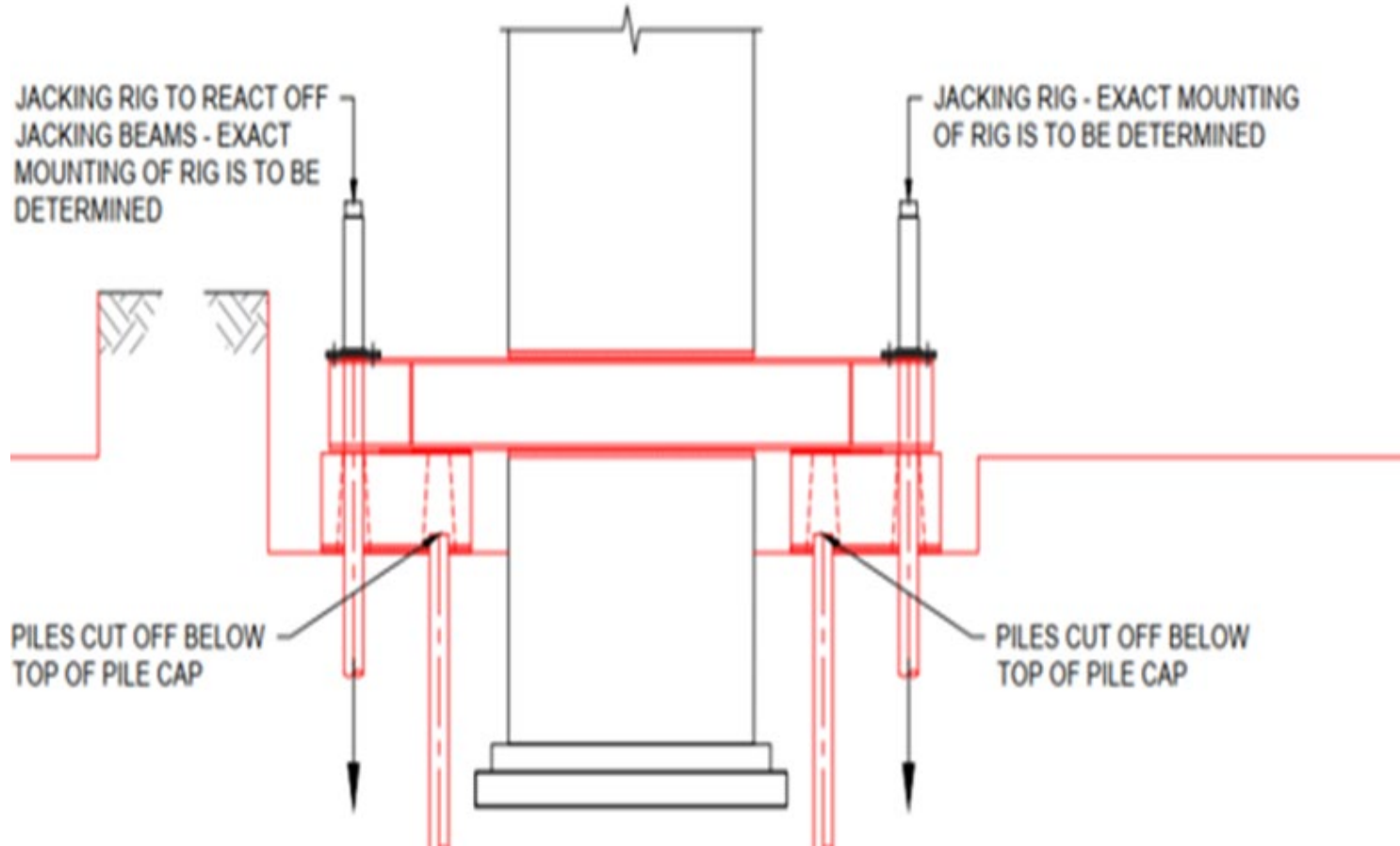
STAGE 4

POSITION NEEDLE BEAMS & GROUT INTO PIER



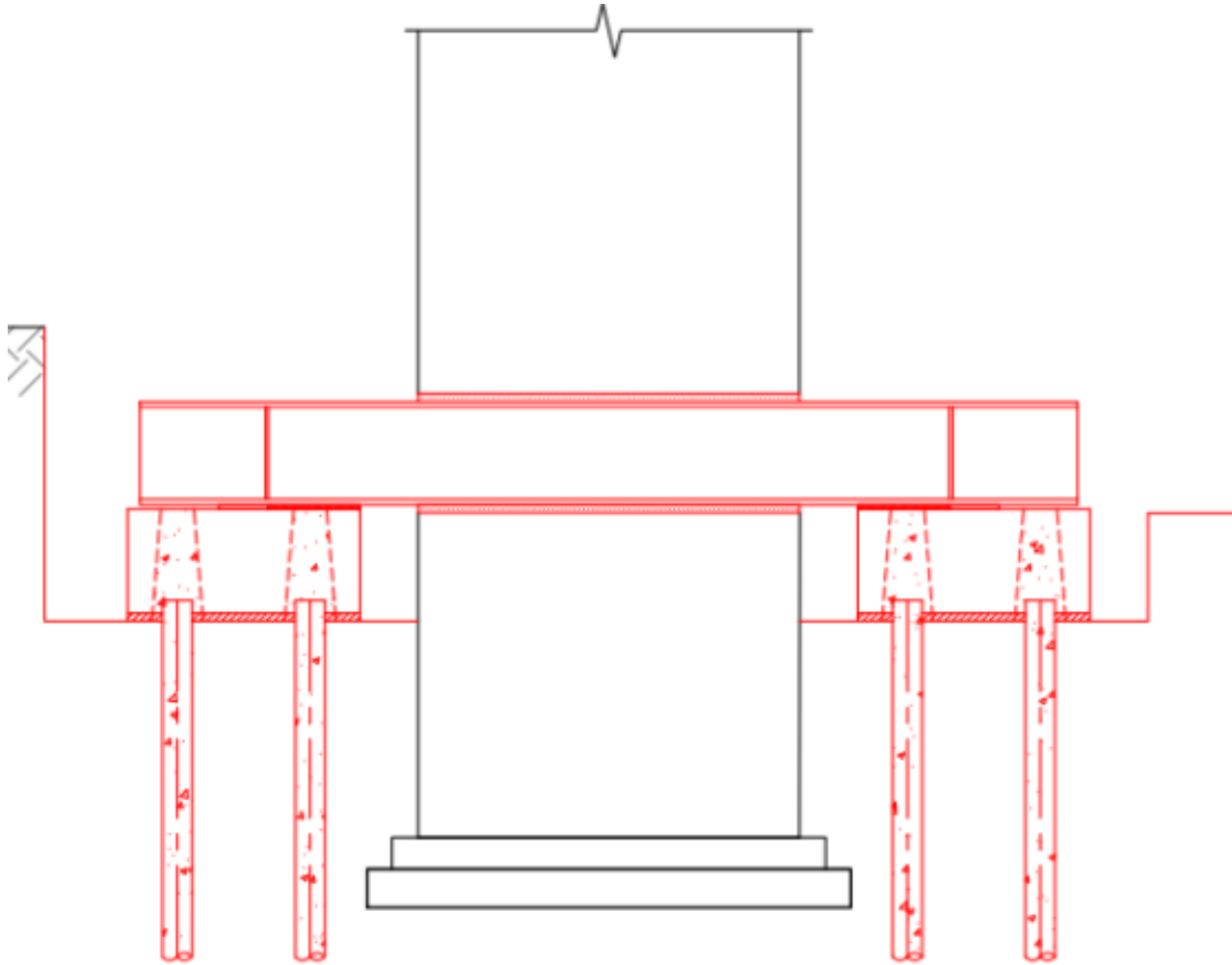
STAGE 5

INSTALL 178MM DIA JACK PILES THROUGH PREFORMED HOLE IN SEQUENCE



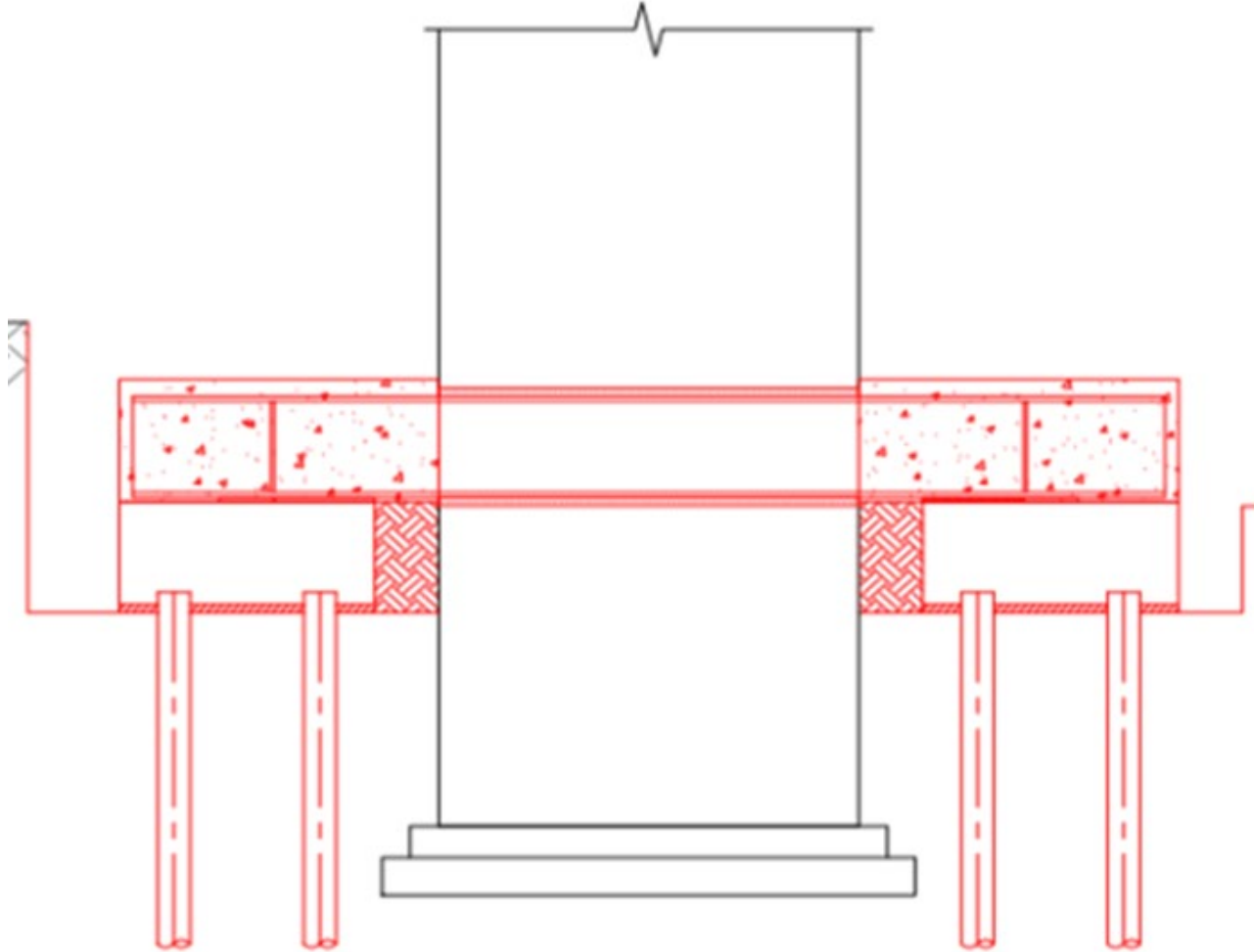
STAGE 6

GROUT PILES AND INFILL VOIDS



STAGE 7

CONSTRUCT SECOND STAGE – POUR OF PILE CAPS



Project Execution



KEY DATES

28/11/2023 - Pre-award meeting scheduled and works awarded.

12/02/2024 – Contract agreed and works programmed in to start July 2024.

25/04/2024 - New jack piling rigs and associated equipment purchased.

16/05/2024 – 8,528m of recycled steel tube purchased ready for the works to begin.

22/07/2024 to 04/10/2024 – Phase 1 complete. 528 No. piles installed across 12 piers.

28/10/2024 to 22/11/2024 – Phase 2 complete. 88 No. piles installed across 2 piers.

03/02/2025 to 14/02/2025 – Phase 3 complete. 40 No. piles installed across 2 piers.

SPECIALIST EQUIPMENT



2x Jack pile 100T units – 330 bar working pressures

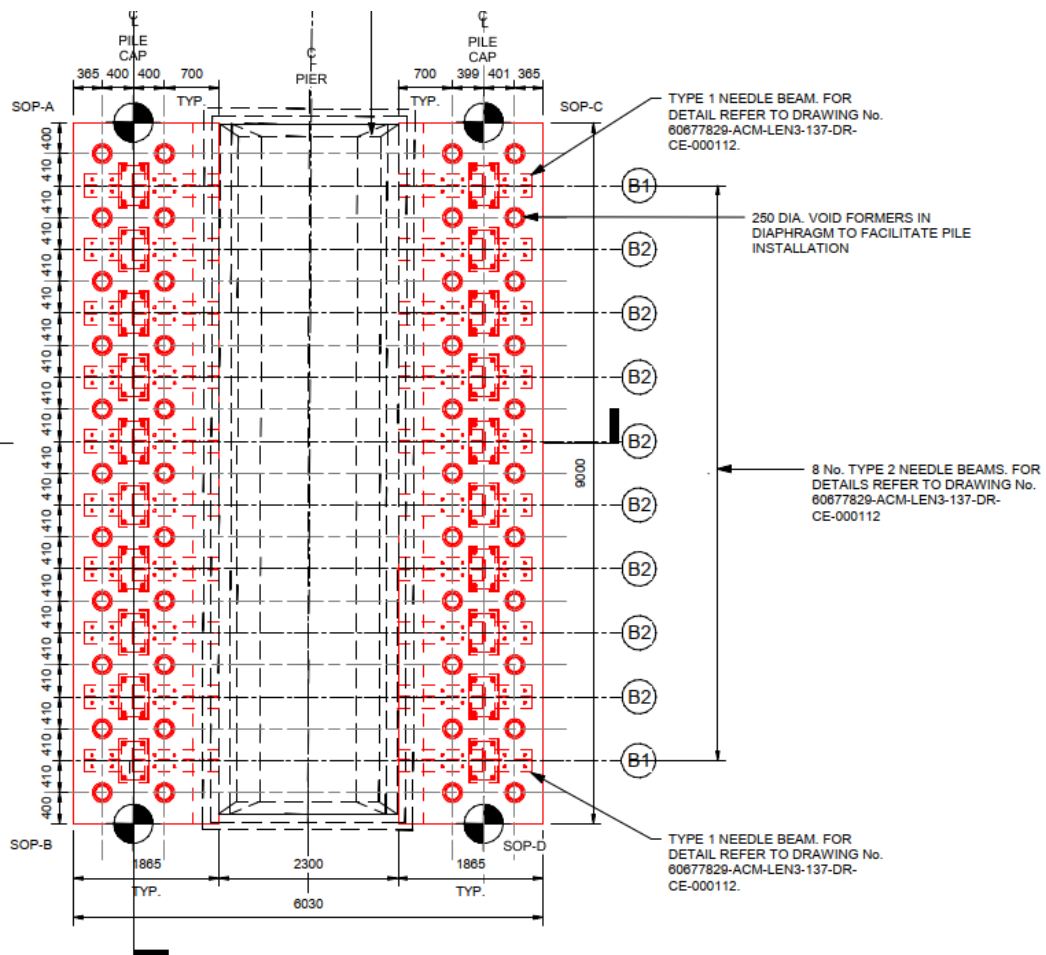
2x valve stations - 330 bar working pressures

2x Deutz Powerpack



PROJECT HANDOVER

PIERS 12-23 PILE LAYOUT



PLAN ON DIAPHRAGM (SECOND STAGE POUR)

SCALE 1 : 50



INSTALLATION SEQUENCE

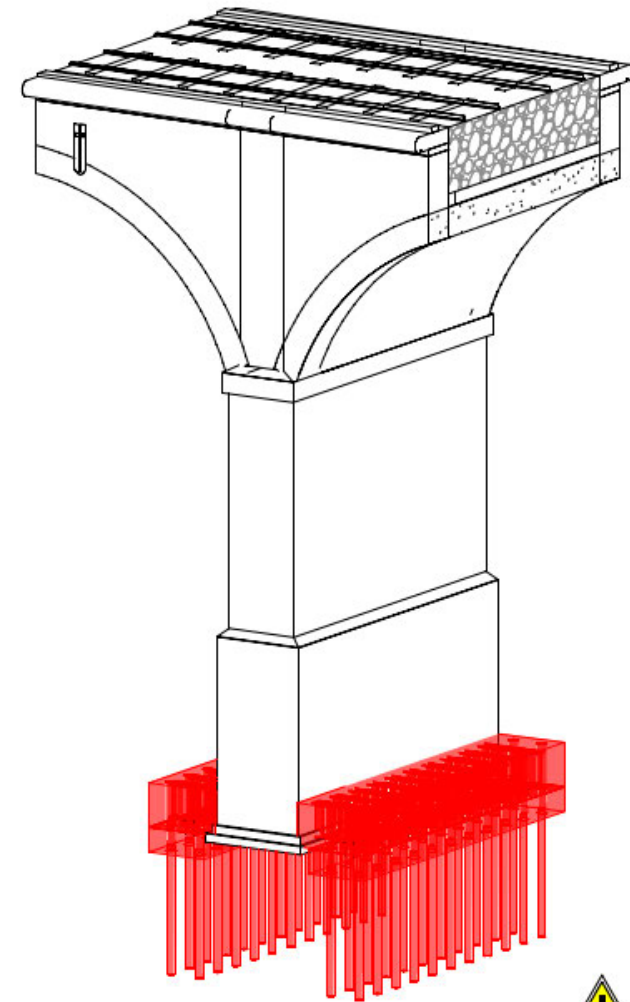
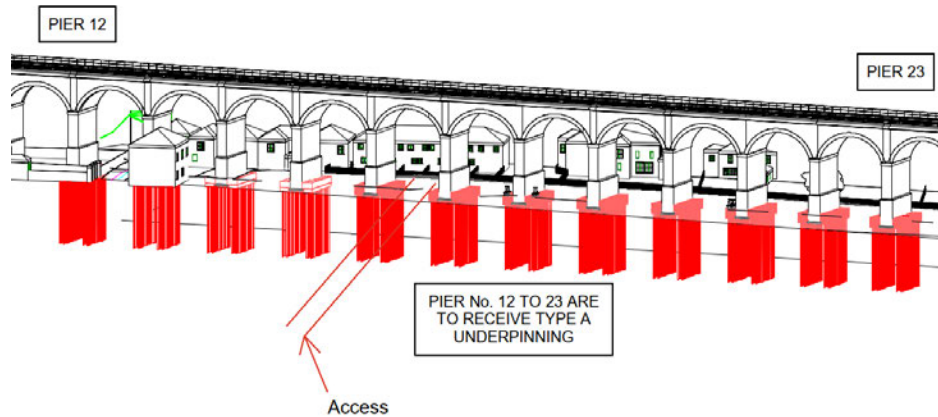
PHASE 1

Phase 1: 22nd July 2024 – program 10 weeks

Phase 1 requirements: To install 528nr, 178mm piles to 13m across piers 12 to 23.

Sequence: Start at pier 23 and work towards pier 12.

Key milestone date: Complete piers 18 to 23 by 30/08/2024.
Piers 18 to 23 completed on 21/08/2024.



3D VIEW - SPAN 12 (SPAN 13-23 SIMILAR)

PHASE 1

INSTALLATION METHODOLOGY

- Across piers 12 to 23, we installed piles using **two jack rigs** working on two piles at the same location on opposite sides of the piers.
- This was a prerequisite set out in the piling specification.
- The theory behind this was to ensure two piles were installed simultaneously on each side of the pier to ensure the jacking loads generated counteracted each other on opposite sides of the pier.
- This installation methodology ensured the pile installation didn't stress the structure causing further damage.

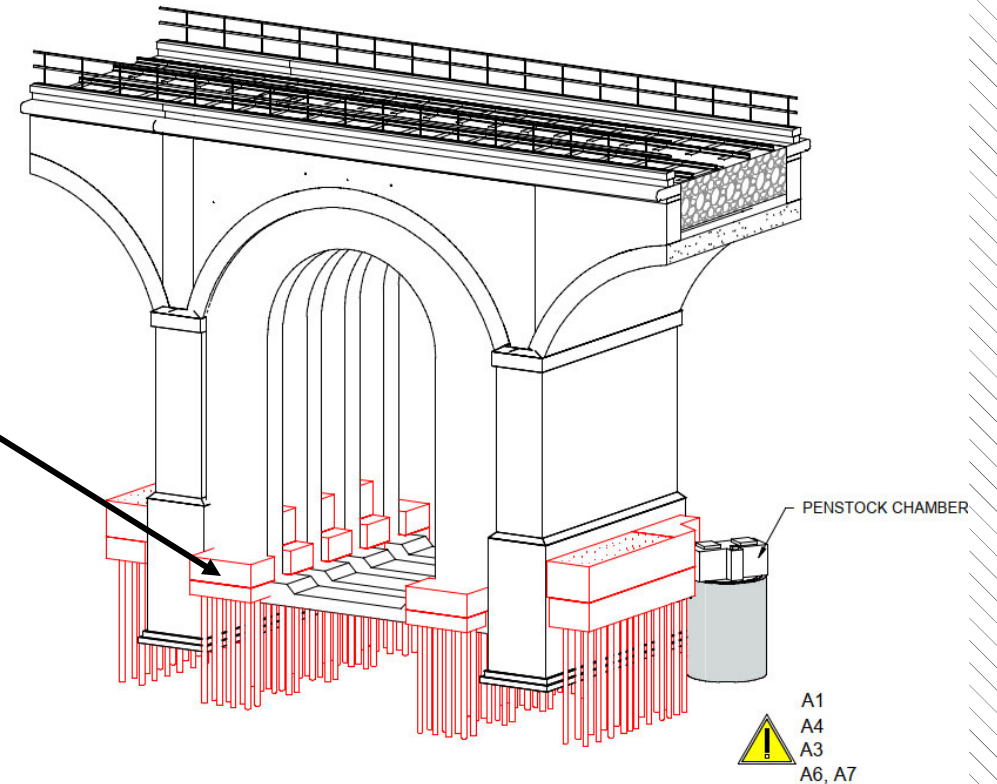
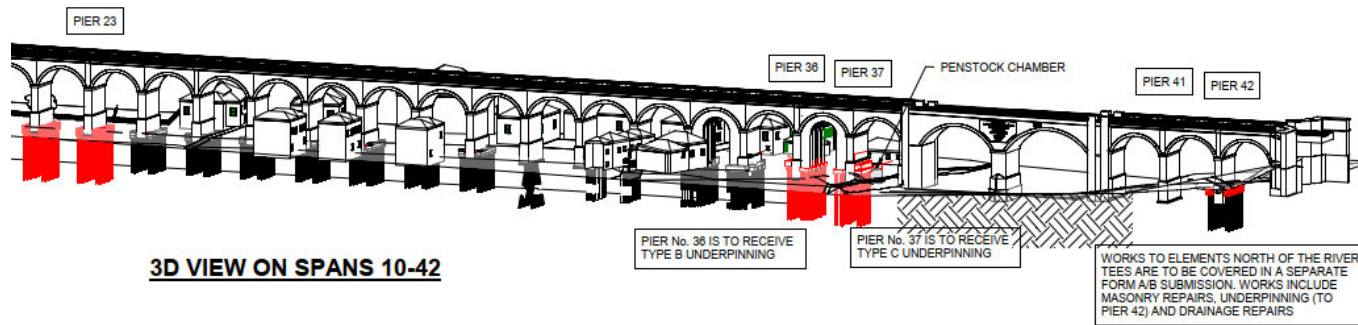


PHASE 2 INSTALLATION SEQUENCE

Phase 2: 28th October 2024

Phase 2 requirements: To install 88nr, 178mm piles to in between piers 36 to 37 abutments.

Key milestone date: Complete in 5 weeks.
RBL completed this work in 4 weeks.



PHASE 2

INSTALLATION METHODOLOGY

During phase 2, access into the pier abutments was restricted due to working room available on site.

The piles were installed from the support beams fixed to the exposed needle beams. 8nr piles installed per abutment.



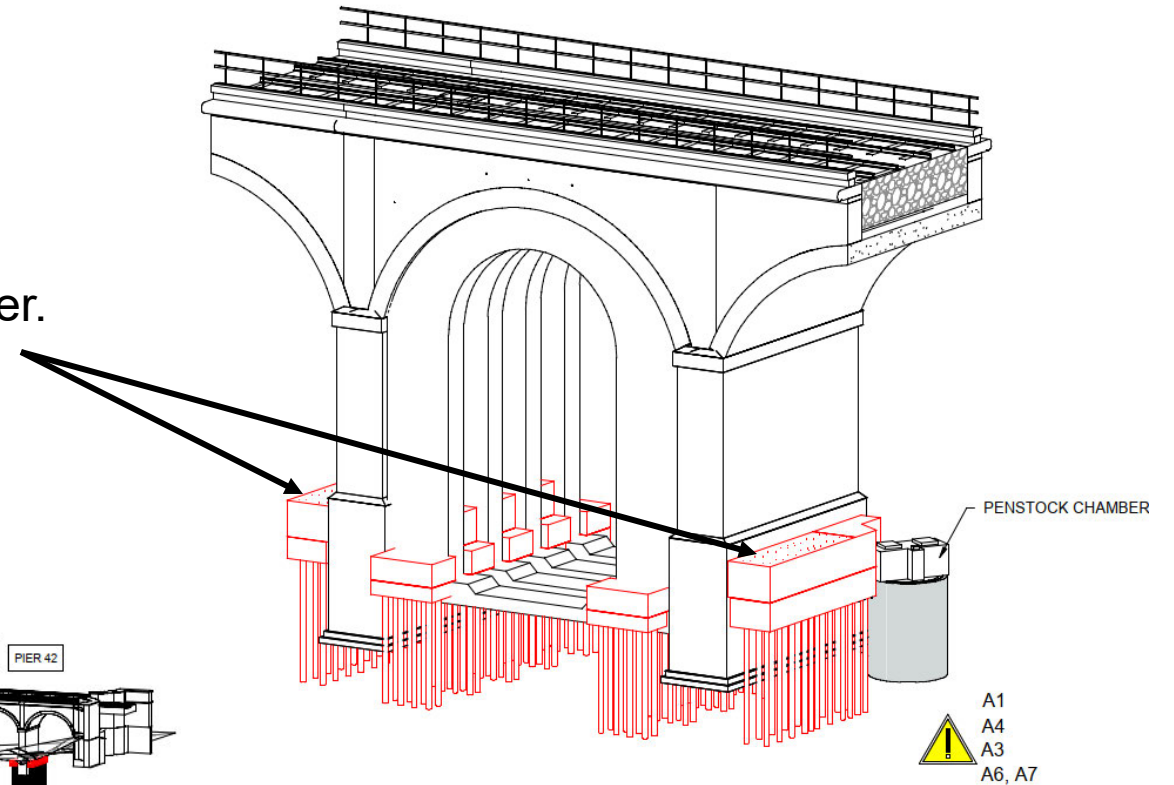
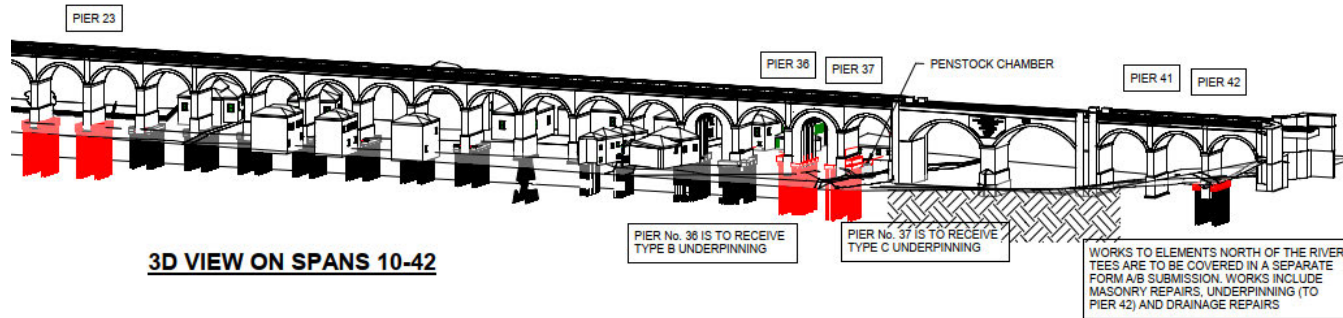
PHASE 3

INSTALLATION SEQUENCE

Phase 3: 3rd February – program 2 weeks

Phase 3 requirements: To install 40nr, 178mm piles to the two ends of piers 36 to 37 around an existing camber.

Key milestone date: Complete in 2 weeks.
RBL completed the works in 7 days.



PHASE 3

INSTALLATION METHODOLOGY

During phase 3, access around an existing manhole resulted in us piling from 3 different levels to complete the piles.

The piles were installed from the top of the underpinned slab.



MANAGING AN URBANISED ENVIRONMENT

- The site was located off the busy high street in Yarm, surrounded by occupied residents. The main access into site was open to nearby businesses.
- RBL were in constant contact with the residents, keeping everyone updated throughout the works.
- Information is key to get the surrounding environment to buy into the scheme. The site team managed this daily whilst on site and coordinated works with other subcontractors.

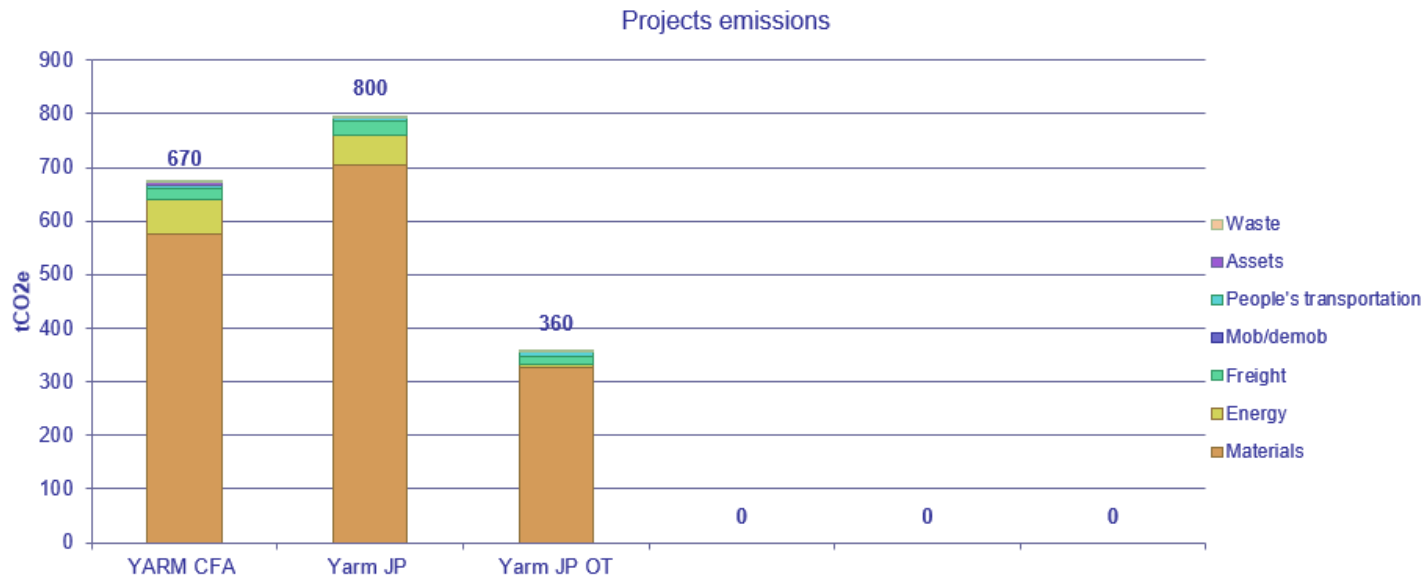


PROJECT REVIEW

ENVIRONMENTAL IMPACT

Using repurposed tubular products and bespoke procedures saved this project 555.54t CO₂e. That's a 97.21% saving over the production of new prime steel products.

We used HVO fuel to power the piling works. This fuel can be used as a substitute to diesel with the same performance but with up to 75% reduction of CO₂ emissions. Estimated reduction in CO₂ from using HVO fuel was 48741kg CO₂e.



PROJECT

SUSTAINABILITY IMPROVEMENTS

	YARM CFA	Yarm JP	Yarm JP OT				
Materials	574	706	327				tCO2e
Energy	67	53	5				tCO2e
Freight	18	27	16				tCO2e
Mob/demob	1	0	0				tCO2e
People's transportation	6	6	9				tCO2e
Assets	5	1	1				tCO2e
Waste	1	4	2				tCO2e
Total	670	800	360	0	0	0	tCO2e

Initial estimate to remove the spoil from the CFA piles would have resulted in an additional:

- 2,792kg CO₂e to transport muck away from site.
- 550t of spoil resulting in 630kg CO₂e.
- A total of 3422kg CO₂e saved from installing a recycled displacement pile.



Q&A

