

Construction of the anchorage support:

Drilling or excavation of the hole to the specified depth and diameter as per design requirements - 18.0629m to the beginning of the fixed length, ensuring verticality and stability of the hole during construction.

Installation of Temporary Casing:

A temporary casing should be installed to prevent the sides of the hole from collapsing, especially when working below the water table or in loose soil conditions.

Placement of the Reinforcement:

Assembling the reinforcing cage or the threaded bar on the surface before lowering it into the drilled hole and ensure that the reinforcement is central within the hole and at the correct depth to achieve the design anchorage bond length.

Corrosion Protection:

Apply the protection to the threaded bar (typically a double corrosion protection system consisting of grout and a corrosion-inhibiting sheathing).

Grouting:

Mixing the grout to the specified mix design - consult with Dywidag, ensuring proper consistency and flow characteristics suitable for the project.
Pouring or pumping grout into the hole to encapsulate the bar, displacing any water or air, and ensuring there are no voids around the bar.

Setting and Curing:

Allowing sufficient time for the grout to set and gain strength, monitoring temperature, and other environmental conditions that might affect the curing process.

Anchor Testing:

Once the grout has cured, performing load tests on the anchors to verify their capacity. This may include proof loading or performing a pull-out test.

Connection to Sheet Piles:

Attaching the exposed end of the threaded bar to the sheet piles using appropriate connectors, nuts, and bearing plates, ensuring that the connections are tightened to the specified torque.

tress Adjustment:

Pre-stressing the anchors to the required load, if required by design, and locking off the load with lock nuts.

Protection and Finishing:

Applying any final corrosion protection measures to the exposed anchorage system, such as painting or sealing exposed metalwork.
Ensuring that all protective measures are in place and that the anchors are protected from mechanical damage during subsequent construction activities.

Monitoring and Adjustments:

Setting up a schedule for periodic inspections and monitoring anchor loads if necessary, especially if there is concern about potential ground movement or load transfer over time.
Adjusting the tension in the anchors if monitoring shows that it is required.

Documentation:

Keeping detailed records of the installation process, materials used, tests conducted, and any deviations from the planned process. This information is critical for future maintenance or if issues arise with the anchor system.

Anchored sheet pile cross-section

Assumed foundations of 3-storey residential building with presumptive foundation depth of 5m

Fill in with made ground

Sheet piles of the design by Nippon Steel - NS-SP-45H - are used in conjunction with EN10248 S500GP steel to adhere to the calculated design parameters. A bar anchor of free length 18.0629m and fixed length of 4.093m is used by means of a 63.5mm diameter threadbar manufactured by Dywidag Systems. A bond area of 2,2928m² adheres to the design guidelines.

5.0000

8.0000

0.3680

Mean high tide level

3.6911

4.0000

Saturation level (Active case)

2.4500

2.7000

OD level

0.0857

Mean low tide level

1.8000

8.9000

5.4500

50°

18.0629

10.3300

4.0930

0.0635

0.1784

16.5243

NP-SP-45H SHEET PILE

Water

Concrete

Made ground

Silt

Siltstone

When constructing the anchorage support for sheet pile walls, as depicted in the provided technical drawing, safety protocols are paramount to protect workers, the environment, and ensure structural integrity. The following safety considerations and techniques should be integrated into the construction process:

Worker Safety Training:

Conduct specialized training sessions for workers on the specific risks associated with anchor installation, including handling of heavy materials, working with grout, and operation of drilling equipment.

Personal Protective Equipment (PPE):

Ensure that all personnel are equipped with the appropriate PPE including, but not limited to, hard hats, safety glasses, gloves, steel-toed boots, and high-visibility clothing.

Equipment Safety Checks:

Implement a stringent inspection routine for all equipment used in the anchorage construction process, including drilling rigs, grout pumps, and lifting apparatus.

Temporary Works Design and Inspection:

Ensure temporary works, such as casing for anchor holes, are designed and checked by a qualified engineer and are inspected regularly during use.

Stability Monitoring During Drilling:

Monitor the stability of the excavation continuously, using sensors or visual inspections to detect any movement or signs of collapse.

Secure Handling and Placement:

Use established rigging procedures to safely lower the reinforcement into the anchor holes. Rigging equipment should be inspected before use to ensure it is capable of handling the loads safely.

Grout Handling Procedures:

Develop and implement safe handling procedures for grout to prevent skin contact and inhalation of fumes, including the use of masks and skin protection.

Anchorage Load Testing:

Conduct load testing of anchors in a controlled manner to avoid sudden release of energy, and ensure all personnel are clear of the test area.

Environmental Protections:

Implement spill containment strategies to prevent grout or other materials from contaminating the surrounding environment, particularly the water body adjacent to the construction site.

Anchorage bonded cross-section

Grout

Threadbar

Corrosion sheathing

Ø0.0635m

Ø0.3568m

PROJECT

ST PETERS MARINA,
NEWCASTLE RIVERSIDE
WALL

TITLE

SECTION VIEW AND
ANCHORAGE DESIGN

Durham

University

Department of Engineering

DATE

MAR '24

SCALE AT A3

AS SHOWN

DRAWING No.

ENGI-3351-VBCN68-1

REVISION

A1