

325 Deansgate

Piling and Underpinning Specification

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KJ

AC

Document History

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Piling

General

110 Piling specification

1. Standard: Comply with the current edition of 'Specification for piling and embedded retaining walls' (SPERW).
2. Recognized British Standard for SPERW requirements: None
3. References to Engineer in SPERW: For the purpose of this contract, interpret such references as being to the person administering the Contract on behalf of the Employer.

130 Piles

1. Standard: To SPERW, sections B2-B9, as appropriate to the pile type.
2. Permitted types: Any type of bored pile
3. Project specification: Submit proposals to cover the SPERW requirements in clause B1.2 and listed under this heading for the chosen pile type.
4. Other requirements: None

180 Augered cast-in-place piles

1. Standard: To SPERW, section B4.
2. Method of construction: Continuous flight auger
 - 2.1. Splitting of auger: Not permitted
3. Filling
 - 3.1. Material: Designed concrete as clause 480
 - 3.2. Placing: Inject through hollow stem of auger.
 - 3.3. Control of concreting/ grouting: By measuring volume above ground in accordance with SPERW, clause B4.4.6.3
4. Pile group designation:
 - 4.1. Diameter: As schedule
 - 4.2. Length: Submit proposals
5. Reinforcement
 - 5.1. Quantity: Submit proposals
 - 5.2. Extent: Submit proposals
6. Other requirements: None

System performance

210 Contractor design

1. Structural requirements
 - 1.1. Generally: As per relevant Structural Engineer's drawings and schedule
 - 1.2. Modifications: None
2. Design responsibility
 - 2.1. Piles: Complete design of piles in accordance with the designated code of practice to satisfy specified performance criteria
3. Pile layout: Refer to Structural Drawings
4. Pile design criteria: As clause 180 and piling schedule
5. Other requirements: None
6. Submission of information: As required by SPERW, table B1.1 and elsewhere, as appropriate for the pile type, materials and tests specified.
 - 6.1. Amendments to requirements specified in SPERW for information required

6.1.1. Prior to commencing design: None

6.1.2. Prior to commencing the works:

- Confirmation that installation of piles will not damage adjacent structures/ services
- Confirmation that proposed rig/ auger configuration is not susceptible to fighting for pile diameters and soil conditions under consideration
- Method of controlling piling operations to ensure compliance with design, including setting out
- Proposals for monitoring noise, vibration or ground movements
- Proposals for protection of adjacent façades
- Proposals for working close to existing façades

260 Specified working loads for piles

1. Pile group designation: All Bearing Piles
 - 1.1. Load magnitude: Refer to Piling Schedule

290 Basis for setting out

1. Site datum: Local datum
2. Site grid: Ordnance Survey

300 Commencing surface

1. Level: Existing ground level

310 Pile length – penetration

1. Pile group designation: All
2. Pile cut-off level: 75 mm above underside of pile cap
 - 2.1. Stratum: Sandstone at shallow depth; refer to SI Report
 - 2.2. Penetration of pile into stratum (minimum): to Contractor's design
 - 2.3. Other requirements: N/A

340 Installation tolerances for piles

1. Requirement: Substitute the following for the standard installation tolerances given in SPERW, table B1.4: Deviation from the vertical at any level, 1 in 75 Plan position with cut-off level above or at commencing surface level 75 mm in any direction.
2. Application/ reason: All piles

Products

470 Concrete generally

1. Standards: To BS 8500-2 and SPERW, section B21.
2. Project compressive strength testing of concrete: Required as SPERW, clause B21.8
3. Exchange of information: Provide concrete producer with information required by BS 8500-1, clauses 4 and 5.

480 Designed concrete

1. Description: For All Piling
2. Embedded metal: Carbon steel reinforcement
3. Compression strength class (cylinder/ cube minimum): C32/40
4. Target density (oven-dry): Normal.
5. Fibres: Not required
6. Aggregates
 - 6.1. Size (maximum): 20 mm
 - 6.2. Type/ Density: Normal weight.
 - 6.3. Coarse crushed concrete aggregates (CCA): CCA permitted
 - 6.4. Additional aggregate requirements: None

7. Design chemical class: DC-1
8. Consistence class: Contractor's choice
9. Permitted cement/ combinations: IIIB
10. Chloride class: Cl 0.40
11. Admixtures: Concrete producer's choice
12. Additional requirements: Contractor is to aim to provide a minimum of 70% replacement for Ordinary Portland Cement (OPC) CEM I. Currently, this is envisaged to be achieved through CEM IIIB combination / cement type with 66% to 80% of GGBS, as specified above. The contractor is to submit details of any alternative proposals how to achieve the targeted replacement percentage. Alternatives may include proprietary cement products or novel cement combinations compliant with BS 8500, and are to be reviewed by EOC.

530 Reinforcement generally

1. Steel reinforcement: To BS 4449.
 - 1.1. Type/ Strength grade: Ribbed bar, grade 500B
2. Cutting and bending: To BS 8666.
3. Lap lengths (minimum): Designed to BS EN 1992-1
4. Supplier: Firm holding a valid certificate of approval issued under a product certification scheme operated by a third-party certification body with appropriate Category 2 accreditation from the United Kingdom Accreditation Service (UKAS).
5. Other requirements: Debond reinforcement that is above cut-off level, and clean off debonding agent when pile has been trimmed
Submit proposals for mechanical couplers

540 Cover to reinforcement

1. Cover (nominal): 75 mm
2. Method of ensuring correct cover: Submit details.

550 Laps in reinforcement

1. Length (minimum): To be designed to BS EN 1992-1

Execution

610 Method statement

1. Requirement: Submit proposed method of installation to achieve the design parameters, including:
 - 1.1. Details of equipment.
 - 1.2. Programme showing sequence and resources.
 - 1.3. Confirmation that performance requirements for load and settlement will be achieved.

615 Records and submission of information during the works

1. Generally: As required in SPERW, tables B1.1, B1.6 and elsewhere, as appropriate for the pile types, materials and tests specified.
2. Amendments to requirements: Report integrity test results and findings within five days of testing

650 Performance of working piles

1. Substandard performance: Give notice if the performance of any pile is likely to be less than that of a similar pile when its test behaviour has been accepted

680 Prohibition of support fluid

1. Usage: Not permitted.

685 Excavated material

1. Disposal: Contractor's responsibility

690 Disposal of pile heads

1. Cutting down and disposal: Contractor's responsibility.

696 Method of placing pile filling

1. Designation: All piles
 - 1.1. Requirement: Through auger stem

705 Monitoring construction of augered piles

1. Requirements additional to SPERW, clause B4.4.5 and B4.10
 - 1.1. Monitor the following and record with pile records: The total number of strokes of concrete or grout pump for completion of each pile

710 Instrument failure when auguring piles

1. Manual monitoring: Use a stop watch.

755 Preparation of pile heads for integrity testing

1. Preparation: To suit test method.
2. Inconsistencies: Submit report on inconsistencies which could inhibit execution or interpretation of test.

760 Pile integrity testing – general

1. Method: Submit proposals
 - 1.1. Satisfactory evidence in support of proposals: Submit.
2. Period between casting and testing (minimum): Seven days
3. Piles to be tested
 - 3.1. Pile group designation: All piles
 - 3.2. Number of piles to be tested: All
 - 3.3. Locations: All

785 Axial maintained load proof testing of working piles

1. Type of test: Compression, with multi-cycle loading
2. Pile group designation: Select one of the piles receiving the highest compressive force as per the piling schedule (e.g. located near South-East corner of the core)
 - 2.1. Number of tests: 1 No
 - 2.2. Test pile construction: As for working piles
 - 2.3. Test load (maximum): As per pile schedule
3. Special requirements:

810 Timing of pile load testing

1. Period between installation and load testing (minimum): Seven days
2. Dynamic and rapid load testing:

825 Work to pile heads after testing

1. Preliminary/ anchor piles:
2. Working piles: Cut back concrete to expose reinforcement to provide full lap between pile reinforcement and pile cap starter bars or cut back concrete to expose reinforcement, and fix pile cap starter bars to pile reinforcement using mechanical couplers

Completion

910 Health and safety file

1. Piling completion report: Collate and submit a full set of pile records for inclusion in the health and safety file.
2. Content and date for submission: As SPERW, clause B1.12.2.
 - 2.1. Record plan: Give the number of each pile and its final location relative to nearest grid line.
 - 2.2. Additional requirements: When sectional completion of piling is agreed, submit completion report for each section within two weeks of installation of final pile in section

920 Piling guarantee

1. Type: Insurance backed. Administered by an independent insurance protection company.
 - 1.1. Guarantee period (minimum): 12 years from completion
 - 1.2. Documentation: Provide certificates/ guarantees at completion of piling works.

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Underpinning - Mass concrete

Tendering

10 Information to be provided with tender

1. Submit: A full description of underpinning proposals including:
 - 1.1. Drawings: As necessary for understanding the proposals.
 - 1.2. Method statement.

General

110 Underpinning – contractor design

1. Purpose: To found the existing adjacent pub building below the level of excavation
2. Extent: Boundary between the proposed building and the existing pub beyond the existing pub basement area
3. Type: Mass concrete
4. Features: Deep underpin adjacent to the lift pit area
5. Structural requirements
 - 5.1. Generally: To be designed in line with all relevant design codes and guidance
 - 5.2. Modifications:
6. Design responsibility
 - 6.1. Piles: N/A
 - 6.2. Other:
7. Load factor: To BS EN 1997-1 and BS 8004.

165 Exploratory holes

1. Requirement
 - 1.1. Excavate holes to determine:
 - Depth of existing foundations
 - Width of existing foundations
 - Foundation materials
2. Timing: Before commencing excavation for underpinning.
3. Findings: Submit details.
4. Backfill
 - 4.1. Below foundation level: Lean mix concrete
 - 4.2. Above foundation level but below ground supported slabs: Compacted hardcore
 - 4.3. Elsewhere: Compacted hardcore

170 Disconnection of services in working areas

1. Disconnections required:
 - 1.1. Timing: Before commencing underpinning works within the building.
2. Reconnection: Ensure that services cannot be reinstated by site operatives without consent.

Types of underpinning

210 Continuous mass concrete underpinning

1. Underpinning blocks
 - 1.1. Depth: Depth of excavation
 - 1.2. Length (maximum): 1.0 m
 - 1.3. Width on either side of wall centre line (minimum): As per drawing

- 1.4. Depth of hard pack: 75-125 mm
2. Materials
 - 2.1. Concrete: Designated as clause 445
 - 2.2. Hard packing: 1:1.25:2 cement:sand:fine aggregate with 10 mm maximum size aggregate
 - 2.2.1. Water content: Sufficient only to ensure that packing binds together.
3. Sequence: Underpin to be built sequentially using hit and miss sequence.
Each pin should be numbered as follows: 1, 3, 5, 2, 4, 1, 3, etc, so that no adjacent underpins are carried out sequentially. All sections marked 1 to be excavated, cast and dry-packed before starting excavation of sections marked 2, etc.
4. Curing periods (minimum)
 - 4.1. Between casting underpinning block and pinning up: Submit proposals
 - 4.2. Between completion of pinning up and commencement of excavation for the next sequence of underpinning: Submit proposals
 - 4.2.1. Extend curing periods to allow for inclement weather.
5. Shear connection between underpinning blocks: Not required

Types of piling - Not Used

Accessories for underpinning

435 In situ concrete

1. Description: To underpins
2. Standard: To: BS EN 1992-1.
3. Concrete: Designated as clause 445
 - 3.1. Immature concrete: Protect from drying, frost and loading for a minimum period of 7 days.
 - 3.2. Extend period to allow for inclement weather.

440 Making concrete generally

1. Standard: To BS 8500-2 and SPERW, section B21
2. Exchange of information: Provide concrete producer with information required by BS 8500-1, clauses 4 and 5.
3. Other requirements: None

445 Designated concrete

1. Description: For mass concrete underpinning
2. Designation: FND2
3. Fibres: Not required
4. Aggregates
 - 4.1. Size (maximum): 20 mm
 - 4.2. Coarse crushed concrete aggregates (CCA): Permitted at a mass fraction not exceeding 30% of coarse aggregate
 - 4.3. Additional aggregate requirements:
5. Special requirements for cement/ combinations: 65% GGBS
6. Consistence class: Contractor's choice
7. Chloride class: Normal
8. Admixtures: Concrete producer's choice
9. Additional mix requirements: Ready-mixed concrete production plant; currently certified by a body accredited by UKAS to BS EN ISO/IEC 17065 for product conformity certification of ready-mixed concrete

Execution

610 Repair of masonry

1. Specification:
2. Timing:

- At least seven days before commencement of underpinning operations if masonry is damaged
- After completion of underpinning if damage occurred due to the underpinning operations

615 Construction of mass concrete underpinning

1. Block and working space: Excavate together.
2. Formation
 - 2.1. Preparation: Remove or compact loose material.
 - 2.2. Protection: Cover with 50 mm thickness of concrete if there will be a delay of more than four hours between completion of excavation and casting of concrete underpinning.
3. Split sleeves: Provide around drain/ service passing through underpinning. Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.
4. Clearance around drain/ service (minimum): 50 mm
5. Dowels/ Shear key/ Front shutter: Provide where required.
6. Casting underpinning: In one lift, leaving a gap for packing up beneath existing foundation.
7. Packing: On completion of concrete curing period, hard pack gap between underpinning block and existing foundation. Allow packing to cure before commencing excavation for the next sequence of underpinning.

Testing

760 Materials testing laboratory

1. Laboratory: Accredited by United Kingdom Accreditation Service (UKAS) or other national equivalent.
 - 1.1. Name and UKAS reference number: Submit well in advance of requirement.

Completion

910 Health and safety file—mass concrete underpinning

1. Requirement: Collate and submit a full set of records for inclusion in the health and safety file.
 - 1.1. Number of copies: Three
2. Content: For each underpinning block record:
 - 2.1. Date of casting.
 - 2.2. Depth of base below datum.
 - 2.3. Length.
 - 2.4. Width either side of wall.
 - 2.5. Details of drains and services built into block and diameter of sleeving.
3. Latest date for submission: Within 14 days of completion of each section