
Job Title

One Victoria, Manchester

Report Type

CFA Piling Specification

Prepared for

One Heritage

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CFA Piling Specification

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1. D30. SPECIFICATION FOR CFA PILING

To be read with Preliminaries/General Conditions.

Part 1 General Specification

2. General Requirements

1. Specification:

Comply with the latest edition of the Specification for Piling and Embedded Retaining Walls (hereinafter called the SPERW) unless specified otherwise in this specification.

Ensure that a copy of the SPERW is available at all times during the course of the works.

For the purpose of this contract, all references to Engineer in the SPERW are to be interpreted as being the Contract Administrator (CA).

2. Information To Be Provided With Tender: Provide the information listed as being required at Tender stage in SPERW.

3. Definitions And Standards: To be in accordance with SPERW.

4. Progress Report: the Contractor shall submit to the CA on the first day of each week a progress report showing the current rate of progress and progress during the previous period on all important items of each section of the Works.

5. Design: The Contractor is required to design and construct the specified CFA piling having the qualities of materials and workmanship specified and which meet the requirements of this Specification. The Contractor's design shall comprise the calculation of individual element sizes based on the ground conditions revealed by the site investigations together with the design of elements associated with the required testing regime. Should the Contractor propose an alternative system to CFA piling then the Contractor's design will include the choice of piling type and the design and specification of all necessary suitable testing regimes, monitoring regimes or other necessary items in accordance with SPERW.

The Contractor's preliminary design proposals are to be submitted at tender stage by the Contractor and shall be as stipulated in Part 2: Particular Specification.

The Contractor's final detailed design is to be submitted 10 full working days prior to mobilisation by the Contractor and shall be as stipulated in Part 2: Particular Specification.

The Contractor's design is to take into account all items that may affect the performance of the piles including the nature of the site, ground conditions, pile spacing and proposed future works on or adjacent to the site. Any reductions in working load due to pile group action are to be considered and the Contractor is to ensure that the safe working load of any particular pile group is no less than the sum of the Specified Working Loads (SWL) for the individual piles in the group. Any reductions in working load that may arise due to negative skin friction are to be considered and the Contractor is to ensure that design takes this into account.

6. Materials:

All steel reinforcement specified to comply with BS 4449 and cut and bent to BS 8666 is to be obtained from firm(s) 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).

Reinforced concrete to be in accordance with SPERW.

The sources of supply of materials shall not be changed until the Contractor can meet all the requirements of the Specification. Materials failing to comply with the Specification shall be removed promptly from the site.

7. Safety: to be in accordance with SPERW.

8. Ground Conditions: No responsibility is accepted by the EA or Employer for any opinions or conclusions given in any factual or interpretative ground investigation reports. The Contractor shall report immediately to the EA any circumstance which indicates that in the Contractor's opinion the ground conditions differ from those reported in or which could have been inferred from the ground investigation reports or preliminary pile results.

9. Tolerances: to be in accordance with SPERW. The contractor shall keep up to date records of all the as constructed pile locations and verticality and provide them to the CA upon request. If any piles are outside the tolerances specified, the CA shall be notified immediately to review the implications on the design. No claims for delay arising from this review and/or re-design shall be allowed.

10. Piling Method: the Contractor shall submit with his tender all relevant details of the method of piling, the plant and monitoring equipment he plans to adopt. Alternative piling methods may be stated subject to the approval of the EA and provided it is demonstrated that they satisfy the requirements of the Specification.

11. Piling Programme: the Contractor shall submit a provisional programme for the execution of the Works at the time of tender and a detailed programme prior to commencement of the Works. He shall inform the EA each day of the intended programme of piling for the following day and shall give 24 hours' notice of his intention to work outside normal hours and at weekends, where this is permitted. The Contractor shall ensure that during the course of the work, displacement or damage which would impair either performance or durability does not occur to completed elements.

12. Records: to be in accordance with SPERW.

13. Nuisance And Damage: Contractor to comply with SPERW.

14. Supervision And Control Of The Works: to be in accordance with SPERW.

15. Static Load Testing: to be in accordance with SPERW.

- 16. Services Affected By Piling** to be confirmed upon competition of site surveys
- 17. Services Regulations:** any work carried out to or which affects new or existing services must be in accordance with the byelaws or regulations of the relevant statutory authority.
- 18. Location Of Services:** The soils within the site are expected to be generally free of live services- Main Contractor to confirm prior to commencement of piling. The Contractor is to make adequate allowances for verification of the presence of services on site through obtaining current services information from relevant statutory authorities. The Contractor shall also undertake his own surveys as necessary to ensure any non-redundant services are not damaged by the construction. All services are to be located and the positions of any services found to be affected by the work are to be physically marked on site.
- 19. Disconnection Of Services:** Refer to the general specification for the procedures and responsibilities related to the disconnection of services.
- 20. Disconnection Of Drains:** locate and disconnect all disused drain connections. Seal within the site to approval.
- 21. Drains In Use:** protect drains, manholes, gullies, vent pipes and fittings still in use and ensure that they are kept free of debris at all times. Make good any damage arising from piling work and leave clean and in working order at completion.
- 22. Bypass Connections:** provide as necessary to maintain continuity of services to occupied areas of the same and adjoining properties. Give a minimum 72 hours notice to occupiers if shutdown is necessary during changeover.
- 23. Services Which Are To Remain:** Refer to the CA for details of retained services. Notify the CA and service authority or owner of any damage. Make all arrangements for repair to the satisfaction of the CA and service authority or owner. Bear any costs arising.

Continuous Flight Auger Piling

- 24. General:** all materials and work shall be in accordance with SPERW except where there may be a conflict of requirements, in which case this Specification shall take precedence.
- 25. Pile Qualities:** shall be in accordance with SPERW.
- 26. Setting Out:** The Contractor shall check the position and verticality of the rig immediately prior to the construction of each pile. Any checks by the EA shall not relieve the Contractor of his responsibility.
- 27. Size Of Piles:** The size of each pile shall not be less than the specified sizes.
- 28. Boring Of Piles:** to be in accordance with SPERW.
- 29. Depth Of Piles:** Any failure of a pile to reach the required depth, as given in the Particular Specification, shall be reported to the EA without delay and a full statement of reasons given.
- 30. Monitoring Of Pile Installation:** an automated system shall be provided for monitoring the construction of the piles in accordance with SPERW.
- 31. Noise And Vibration.** The method must be such that noise and vibration are limited in accordance with the guidance given in BS 5228.
- 32. Cutting Off Pile Heads:** when cutting off and trimming piles to the specified cut-off level, the Contractor shall take care to avoid shattering or otherwise damaging the rest of the pile. Any laitance or cracked or defective concrete shall be cut away and the pile repaired in a manner to provide a full and sound section up to the cut-off level.

Alternative Piling Methods

- 33. General:** If alternative piling methods to the specified method of piling are proposed then these must comply with SPERW together with the requirements of this specification, including clauses 24-32 above as applicable.
- 34. Use Of Driven Piles:** Driven piles are not to be used.
- 35. Information To Be Submitted At Tender Stage For Alternative Piling Methods:**
In addition to the general requirements of this specification and SPERW the Contractor must state how any risks or deficiencies associated with their chosen piling type are to be addressed. In the case of driven piles the Contractor must detail how the issues stated in clause 34 above are to be addressed.

Additional Site Investigation

- 36. Additional Site Investigation:** The Contractor should consider if any additional site investigation works are necessary in order to confirm the use of his proposed piling methodology.

3. PARTICULAR SPECIFICATION

Project Details

Site Location And Working Area: The site is located on land between Great Ducie street and Mirabel Street, to the north side of Manchester City Centre and Victoria train station. The site is intersected by Breslyn Street which runs between the two new multi storey mixed use buildings.

Nature Of The Works: The development proposals includes the construction of 2No new buildings; Block A 'Great Ducie Street' (a 10-13 storey mixed use reinforced concrete framed building) with commercial units and amenities at ground floor level and circa 84no. apartments above ground floor level. Block B 'Mirabel Street' (a 10-storey mixed use concrete frame building) providing parking and amenities at ground floor level and circa. 45no. apartments over.

Sequence Of Works: the contractor shall provide the EA in advance of the works with a method statement of the proposed sequence of the works for comment, for which the contractor is responsible.

Contract Drawings: Refer to Civic Engineers' Contract Drawing Register.

Responsibility For Design: the Contractor is responsible for the design and installation of the piles. The Contractor shall submit their design, including drawings, specification and calculations to the CA for comment ten working days in advance of commencing construction on site. This is not a check of the design and all responsibility for the design remains with the Contractor.

PERFORMANCE CRITERIA FOR PILES:

The following are the maximum permissible settlements:

	Overall	Differential
Design LOAD	10mm	5mm

The Contractor is to demonstrate to the CA, the predicted settlement by calculation, prior to constructing any piles.

Factor Of Safety To Be Used For Pile Design: A factor of safety of 3.0 is to be used for pile designs to BS 8004.

Permissible Damage: No damage to existing structures is permitted.

Site Levels: Refer to Architect's general arrangements for site levels.

Working Hours: Refer to the CA for any restrictions on permissible working hours.

Ground Investigation Reports: The Contractor is to base the design on the following ground investigation reports and their understanding of the properties of the strata identified within the reports.

A Phase II Site Investigation has undertaken by The LK Group and the final reporting of these investigations has been received and is available. Further targeted investigation has been specified by Civic Engineers with particular emphasis on trial pitting adjacent existing structures to determine existing foundation details and depths adjacent the site boundary. The second phase of investigation specified will be carried out upon site occupation and so is not yet available, The current interpretive ground investigation report and borehole logs have been

shared and discussed with piling contractors to provide indicative piling information shown on Civic Engineers drawings. The subcontractor is responsible for the final design of piled foundations and should make sufficient allowance based on this though further verification will be required by the Contractor.

If the Contractor wishes to construct additional boreholes and soil testing sufficient to confirm the design, they should identify at Tender the amount of further Site Investigation that they require.

Commencing Surface: Refer to Civic Engineers drawings. Piling mat levels and design to be provided by the Contractor.

Temporary Works: The contractor is responsible for the design and construction of any temporary works (including piling mat design), retention systems, ramps and embankments required for access, and to enable safe construction of the piles. A method statement and design details of any temporary works shall be submitted to the CA for comment prior to commencing on site.

Continuous Flight Augered Pile Details

Pile Dimensions And Working Loads: 450mm diameter CFA piles assumed generally, to be confirmed by Contractor's pile design. Maximum anticipated pile loads are indicated on Civic Engineers General Notes Drawings.

Sampling And Testing Of Pile Materials: sampling for strength conformity to be in accordance with SPERW subject to the following modifications and additional requirement: The contractor is responsible for ensuring cube curing is carried out including the provision of all necessary equipment, power, water and security as may be necessary.

Cement: the following types of cement are permitted: Sulphate Resisting Portland cement (SRPC).

Cement Replacement: cement replacement materials are permitted only if the contractor can prove them to have no deleterious effects. Refer to the site investigation report recommendations for details of minimum BS8500 concrete classes. Approval from the EA is required before any materials are to be used.

Admixtures: Concrete or grout admixtures must be approved by the EA prior to being used.

Aggregate: the aggregate is to comply with BS 882 for coarse aggregate and sand from natural sources. Marine aggregates are not permitted. Maximum aggregate size: 10mm

Concrete Mixes: the concrete to be a designed mix in accordance with BS 8500 with a minimum cement content and maximum free-water/cement ratio to suit Table D2 of BRE Digest Special 1:2005 "Concrete in aggressive ground."

Concrete Grade: the concrete grade and maximum free water to cement ratio is to be designed by the piling contractor. Pile design is to be submitted at tender stage.

Workability: workability shall be high with a nominal slump of 125mm determined by the slump test to BS EN 12350.

Reinforcement: reinforcement to be Grade 500 with nominal cover of 50mm. Pile reinforcement anchorage lengths in to pilecaps/ground beams to be confirmed by the piling design

Disposal Of Excavated Material: all spoil material shall be responsibility of the contractor to dispose from the site. Carry out suitable contamination tests and dispose of excavated material in accordance with local authority requirement and Civic Engineers' Groundworks Specification.

Non-Destructive Methods For Testing Piles

Integrity Testing: shall be carried using the dynamic response method.

Piles To Be Tested: all piles shall be integrity tested.

Number Of Days: the Contractor must allow 7 days to elapse between pile casting and integrity testing.

Programming: the contractor shall submit a program for the integrity testing to the CA for approval.

Test Results: the time after testing at which the test results and findings shall be available to the CA shall meet the requirements of SPERW Clause 9.1.7.

Static Load Testing Of Piles – 1 in 100 piles, minimum 1 pile in each block.

Type Of Pile: Working piles at locations to be determined. Testing to be undertaken to a minimum of 1% of all piles. The performance specification does not account for working pile failure under static load testing. The Piling Contractor is to give details of how the risk of such failure can be minimised.

The construction of the pile shall meet the requirements of SPERW.

Type Of Test: The type of test shall be a Proof Load Test Procedure.

Loads to be applied in proof-testing of working piles:

Design Verification Load (DVL) = to SPERW requirements

Specified Working Load (SWL) = DVL

Special Construction Detail Requirements For Test Piles: A cap shall be provided to provide a horizontal surface compatible with the testing equipment. The piling Contractor is to submit details of the cap for the approval of the contract administrator.

Special Requirements For Pile-Testing Equipment And Arrangement: The piling Contractor shall provide a testing programme to the Employer's Agent 2 weeks prior to the proposed testing dates.

Pile Installation Criteria: The piling Contractor shall submit a detailed method statement for approval by the Contract Administrator, in keeping with the proposed installation of working piles for this contract.

Time Interval Between Pile Installation And Testing: Cube samples shall be taken of the concrete in the pile and the cap. pile testing shall not be started until the strength of the tested concrete exceeds 15N/mm²

Removal Of Temporary Works: All temporary works associated with the pile testing are to be removed from site immediately following completion of the pile testing.

Special Requirements For The Application Of A Lateral Load To A Pile Detailed In Accordance With The Expected Conditions Of Loading: None

Details Of Work To Be Carried Out To The Test Pile Cap Or Head At The Completion Of A Test: The Piling Contractor is to submit details to the CA of any additional or remedial works required to allow test piles to function as working piles.

Performance Criteria For Piles Under Test:

Loading increments and holding time to be in full accordance with SPERW.

Incorporation Of Test Piles Into The Permanent Works:

Test piles may be incorporated into the permanent works after testing has been carried out providing the Contractor ensures that the test piles will perform in the permanent works in accordance with this specification.

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