



CHESTERFIELD
BOROUGH COUNCIL

SPECIFICATION for the
MINI-PILE UNDERPINNING
CONTRACT for
33 The Crescent, Brimington,
CHESTERFIELD S43 1AZ

1 SCOPE OF THE CONTRACT

- 1.1 The contract is for the design, supply and installation of an underpinning system to support the existing buildings, which are showing signs of settlement. It is expected that a mini-pile foundation system will be required, although other forms of underpinning / stabilisation may also be considered. Testing of certain mini-piles may also be required.
- 1.2 All piling work and testing is to be in accordance with the relevant clauses of the latest editions of BS EN 1997, BS EN 1992 and BS 8004.

2 VISIT SITE

- 2.1 The Contractor shall be deemed to have visited and examined the site and its surroundings and to have satisfied themselves, prior to the submission of their tender, as to the nature of the ground (so far as is practicable from visual inspection, and taking into account any relevant information which may have been provided in the tender documents), the form and nature of the site and its relationship to existing buildings both within and outside the site boundaries. They shall also have assessed the extent and nature of the labour and materials necessary for completion of the underpinning works, the means of communication with and access to the site, the accommodation which they may require, and generally to have considered all necessary information (subject to the above-mentioned) as to risks, contingencies and all other circumstances influencing or affecting their tender.

3 DETAILED INFORMATION

- 3.1 The Chesterfield Borough Council (CBC) Structural Engineer for this project shall be John Muddiman:
tel: 01246 959723
email: john.muddiman@chesterfield.gov.uk
- 3.2 The Principal Designer (PD) and Contracts Administrator (CA) are listed in the contract documentation.
- 3.3 Drawing No. 22711 CBCPTS-XX-ZZ-DR-S-2033 shows the layout of the existing walls requiring support. The Underpinning Contractor is responsible for setting out the piling layout most suitable for their proposed underpinning system.
- 3.4 Enclosed are the following documents :
 - 3.4.1 Site General Arrangement drawing, showing the location plan
Ground Investigation Report

- 3.5 Pile loadings are to be calculated by the Piling Designer and used for the design of the piles. All designs are to be submitted to the CBC Structural Engineer for approval, prior to commencement of works.
- 3.6 A minimum factor of safety of 2.5 will be required on the mini-pile design.
- 3.7 The Underpinning Contractor is to supply the CBC Structural Engineer with a brief method statement at return of tender, indicating their proposed methods of working, pile layout, pile sizes, reinforcement arrangements, estimate of casing lengths required, size of needles, etc.
- 3.8 On acceptance of tender, a full method statement and risk assessments will be required within 1 week, including relevant CDM documentation.
- 3.9 The review of any drawing by the CBC Structural Engineer shall not relieve the Underpinning Contractor from their responsibility for the correctness of design, dimensions, levels etc.
- 3.10 The Piling Designer is to take account of the information contained in the borehole logs in considering the possible effect of down drag (negative skin friction) due to future consolidation settlement of the filled or weak ground indicated in the logs.
- 3.11 Structural walls, underpinned with mini-piles should be isolated by the dpc in the walls. If the DPC is damaged during the installation of the underpinning system, then this should be reinstated by the Underpinning Contractor to the satisfaction of the CBC Structural Engineer.
- 3.12 The Underpinning Contractor should state on their tender any preparation works they require, prior to them commencing on site (i.e. removal of boundary walls, sections of floor, etc.).
- 3.13 The Underpinning Contractor should also include a separate cost for carrying out any preparation works and reinstatement of all disturbed areas caused by the underpinning works.

4 SETTING OUT

- 4.1 Piling layouts are to be set out by the Underpinning Contractor.

The Underpinning Designer shall submit to the CBC Structural Engineer for review, a copy of the proposed layout.

5 DESIGN OF PILES

- 5.1 Only augured piles are to be used.
- 5.2 The piles are to be designed to safely carry the vertical loads calculated from drawings identified in Cl. 3.4.3 without exceeding the following settlement at full working load:-
 - 5.2.1 10mm settlement at any pile; 5mm differential settlement between adjacent piles.
- 5.3 All load actions from building materials shall be calculated from BS 648 Schedule of weights of building materials and BS EN 1991 Actions on Structures Loadings for buildings.
- 5.4 Due to the weak nature of the filled ground overlying the bearing strata, the Underpinning Designer's attention is drawn to the requirement for the piles to be laterally stable under the design loading.
- 5.5 The Underpinning Contractor is to keep records of the materials removed during the pile boring and to provide (where requested) an assessment of the pile strength, in relation to these conditions. This information is vital as it will affect the design of other areas of construction on this site.
- 5.6 All design to be carried out in accordance with BS EN 1992, BS EN 1997 and BS 8004.
- 5.7 The Underpinning Contractor should include in their tender, the cost of any further Ground Investigation and / or testing they deem necessary for the correct design of the underpinning system.
- 5.8 The use of cement replacements or concrete additives is not permitted without the written consent of the CBC Structural Engineer.
- 5.9 Pile lengths should not exceed 75 x diameter.
- 5.10 Wet concrete should not be placed into water. Any ground water in the zone occupied by the pile should be pumped out continually, during the period of the works.
- 5.11 Minimum cement content for all concreting works to be 300kg/m³. Where concrete is to be placed under water or drilling mud by tremie, the cement content should not be less than 380 kg/m³. Concrete design is to be carried out for the ground conditions listed in the Ground Investigation Report.
- 5.12 The pile design may form part of a submission to the local authority as part of a Building Regulation application. Design is therefore also subject to their approval.

6 GROUND CONDITIONS

- 6.1 Where Ground Investigation data, derived from a recent borehole survey is available, it has been included with the tender enquiry and contains borehole logs and ground water levels, where available.
- 6.2 The tender shall be based on such factual Ground Investigation data and other information regarding the location, depth and condition of adjacent underground structures and services, which may be affected by the piling work as shall have been provided within the tender documents.
- 6.3 The Underpinning Contractor shall carry out such investigations as are necessary to confirm their assumed pile design. All pre-assumptions made shall be listed in the Contractor's tender.
- 6.4 In the event that ground conditions are encountered during the execution of the works which the Contractor considers to be more adverse than those which could reasonably have foreseen at the tender stage, and which necessitates a change of design and / or method of construction, the Contractor shall immediately notify the CBC Structural Engineer and shall submit to the CBC Structural Engineer their proposals for overcoming such adverse conditions.
- 6.5 Following receipt of the CBC Structural Engineer's instructions, the Contractor shall give notice in writing, in accordance with the conditions of contract, of any intention on their part to submit a claim for extension of time and / or financial reimbursement. No such claims will be admitted if, in the opinion of the CBC Structural Engineer, the conditions actually encountered could have been reasonably foreseen at the time of tendering by a Contractor experienced in underpinning works.
- 6.6 The Underpinning Designer should include in their tender the cost of any additional Ground Investigation that they require for the design of the piles.
- 6.7 Sulphate resisting cement is required to be used in piles unless tests carried out by the Underpinning Designer at their own cost establish that this precaution is not necessary. Acceptance criteria will be table 4.1, BS EN 1992-1. Note the use of cement additives or replacements will not be permitted without the written permission of the CBC project Structural Engineer.
- 6.8 The temperature of fresh concrete shall not be allowed to drop below 3°C. No frozen materials or materials containing ice shall be used. In cold weather, when the ambient air temperature is less than 5°C, all concrete is to be protected in accordance with BS EN 1992 and Concrete Society publication 'Concrete on site 11 - Winter working'..

7 DAMAGE TO ADJACENT PROPERTIES AND SERVICES

- 7.1 The Underpinning Contractor is to indemnify Chesterfield Borough Council against any claim for damage to adjacent or neighbouring properties and services and is responsible for the repair and / or reinstatement of those properties and services provided that the damage is resultant from the piling operations.
- 7.2 The Underpinning Contractor's rates should therefore include for any foreseeable precautions which must be taken during their operations. Secure fencing around the perimeter of the site is to be provided by the Underpinning Contractor.
- 7.3 The site should be left in a clean and tidy condition to the satisfaction of the CBC Structural Engineer.

Testing

- 7.4 The CBC Structural Engineer reserves the right to request test loading of the mini-piles.
- 7.5 Extra-over items are included in the tender summary for testing of piles.
- 7.6 All pile testing to be in accordance with ICE Specification for Piling.
- 7.7 The Underpinning Contractor's tender price is to include for all materials and labour required in making, storing and despatching test cubes to an approved independent testing laboratory and the laboratories fees.
- 7.8 All piles to be integrity tested. The approved testing laboratory must have received full accreditation from UKAS (United Kingdom Accreditation Service).

8 TESTING CONCRETE

- 8.1 The strength of the concrete used in the work shall be determined by compression tests in accordance with BS EN 206 and BS EN 12390, on standard cubes, which shall be cast in specially prepared metal moulds. The Underpinning Contractor's prices shall include for concrete and all labour and materials required in making, marking, storing and despatching the cubes to an approved independent testing laboratory, also for the cost of transport and the laboratory's testing fees.
- 8.2 The approved testing laboratory must be one which has received full accreditation from UKAS for this function.
- 8.3 Samples of concrete for testing shall be taken from all batches of concrete used in the works so that all of the concrete can be checked for compliance and any failures can be clearly identified at an early stage.

- 8.4 Four cubes shall be made from each sample, two for testing at 7 days and two for testing at 28 days. The 7 day tests are for prediction and the 28 day tests are for compliance.
- 8.5 All cubes shall be clearly marked with a serial number. The Underpinning Contractor shall maintain a register of the cubes and shall arrange with the testing laboratory for the compression tests to be made at the ages required.
- 8.6 Records of the daily maximum and minimum storage temperatures shall be kept both during the period the cubes remain on site and in the laboratory.
- 8.7 The CBC Structural Engineer shall be at liberty to order additional cubes to be made and cube moulds must be kept in reserve for this purpose.
- 8.8 In the event of cubes tested in accordance with the required procedures failing to comply with the requisite strength, the testing laboratory shall be advised to keep broken cubes for inspection. The CBC Structural Engineer reserves the right to reject the work represented by these cubes according to the criteria of BS EN 206-1 Tables 14 and 15:
- 8.9 The testing of concrete with a slump cone and the preparation of concrete cubes shall be carried out in the presence of the Clerk of Works.
- 8.10 The Underpinning Contractor shall be responsible for recording on an appropriate drawing the location of each sample batch of concrete after placing.

9 LENGTH OF PILES

- 9.1 A schedule of the piles should be provided within the Tender. The Tenderer is requested to complete the anticipated length, rate / metre and cost for each pile and carry the sub-total to the summary, all based on the Ground Investigation report. The actual lengths will be determined by the Underpinning Contractor during construction, to the agreement of the CBC Structural Engineer.
- 9.2 A full report of all pile lengths and ground conditions should be supplied to the CBC Structural Engineer, within 3 days of the completion of the works.

10 CASING OF PILE

- 10.1 The Underpinning Contractor is to include in their tender for any permanent casing which will be required. The cost of any temporary casings required are to be borne by the Underpinning Contractor.

11 MATERIALS

- 11.1 All materials are to conform to all the relevant British and European Standards.
- 11.2 All piles are to be sulphate resisting cement to be to BS 4027. No additives to be used in the mix without the express permission of the CBC Structural Engineer in writing, before commencement of work on site. If testing demonstrates sulphate resistant cement is not required, Portland Cement to BS EN 197-1 shall be used.
- 11.3 Where stated on the contract drawings, piles and ground beams should be designed to accommodate the effects of heave resulting from future removal of trees on the site.

12 READY MIXED CONCRETE

- 12.1 Where the Underpinning Contractor proposes to use ready mixed concrete, the supplier shall be authorised by the British Ready Mixed concrete Association and shall carry their Quality Control Certificate.
- 12.2 Details of the composition of the concrete mix, including the source and type of all constituent materials, must be submitted to the CBC Structural Engineer in writing and their approval obtained, prior to starting work.
- 12.3 The production and supply of the concrete shall comply with this specification. In this case note sulphate resisting cement is required.
- 12.4 The name and works address of the supplier shall be submitted to the CBC Structural Engineer and their written acceptance of the use of such ready-mixed concrete shall be obtained, prior to placing any order. Arrangements shall be made by the Underpinning Contractor for the supplier's works to be inspected by the Supervising Officer (SO) from CBC, if they consider it to be necessary.
- 12.5 Notwithstanding any such inspection and / or authorisation by the SO, the Contractor shall take full responsibility that all ready-mixed concrete complies with the requirements of this specification.
- 12.6 The concreting materials shall comply with the requirements of this specification and shall be tested in accordance with the SO's instructions for sampling of materials. The cost of such tests will be the responsibility of the Underpinning Contractor.
- 12.7 The Underpinning Contractor shall ensure that a record is kept at the supplier's works of the exact time when the concreting materials are mixed. This time shall be inserted on the delivery note sent with the truck driver, and shall be initialled by the responsible time-keeper at the mixing plant.

- 12.8 In the case of plant mixed concrete, the concrete shall be continuously agitated by rotating the truck mixer drum both during transit and while awaiting discharge. Adequate re-mixing shall take place immediately prior to discharge.
- 12.9 In the case of truck mixed concrete in which the mixing is carried out entirely in the truck mixer, the water shall not be added until after the arrival of the truck mixer on site and the Contractor shall keep a record of the exact time when the water is added.
- 12.10 The times of arrival of all trucks shall be carefully recorded at the site and be available for the inspection of the SO at all times.
- 12.11 A record book shall be kept on the site of all concrete delivered and this shall contain a delivery ticket for each batch of concrete recording the following information:
- (a) Name of the ready mixed concrete plant
 - (b) Serial number of ticket
 - (c) Date and time of loading, i.e. time of first contact between cement and water
 - (d) Truck number or vehicle identification
 - (e) Name of purchaser
 - (f) Name and location of the site
 - (g) Details or references to specifications, e.g. code number, order number
 - (h) Amount of concrete in cubic metres
 - (i) Declaration of conformity with reference to the specifications and to EN 206-1
 - (j) Name or mark of the certification body if relevant
 - (k) Time at which the concrete arrives at the site
 - (l) Time of the beginning of unloading
 - (m) Time of the end of unloading
 - (n) Whether test cubes were taken from batch

In addition, the delivery ticket shall give details of the following:

- (a) Strength class
- (b) Exposure classes
- (c) Chloride content class
- (d) Consistence class or target value
- (e) Limiting values of concrete composition, if specified
- (f) Type and strength class of cement, if specified
- (g) Type of admixture and addition, if specified
- (h) Special properties, if required
- (i) Maximum nominal upper aggregate size
- (j) In case of light-weight or heavy-weight concrete: density class or target density
- (k) Slump
- (l) Details of any water added and authorising signature

13 BORED CAST-IN-PLACE PILES

- 13.1 The Underpinning Contractor is to state in their tender the details of any additional soil sampling and testing that they deem necessary, in order to substantiate their design and should include for the cost of any such testing in their tender price.
- 13.2 All piles are to be constructed using sulphate-resisting Portland cement. No additives shall be used in the mix without the prior written approval of the CBC Structural Engineer.
- 13.3 No cement replacement materials shall be used in the mix without the prior written approval of the Engineer.
- 13.4 Aggregates shall consist of approved naturally occurring material.
- 13.5 Minimum cement content 300 kg/m³. Where concrete is to be placed under water or drilling mud by tremie, this should be increased to 380 kg/m³.
- 13.6 Concrete to be designed mix in accordance with BS 8500 : Part 1.
- 13.7 Reinforcement grade and type to the Underpinning Contractor's requirements to satisfy their design.
- 13.8 The Underpinning Contractor is to state in their tender whether he proposes to use bentonite in the bores.
- 13.9 Minimum pile diameter to be 150mm or length divided by 75, whichever is the greater, subject to the Underpinning Contractor's final design.
- 13.10 The piles to be designed for the working loads given on drawings listed under Clause 3.4.3
- 13.11 If required, the CBC Structural Engineer is to choose a pile to sustain a static load test.

14 INFORMATION TO BE PROVIDED AT TENDER STAGE

The Underpinning Contractor is to provide the following information with their tender :-

- 14.1 Details of how they propose to establish the depth to the bearing stratum and assessment of bearing capacity.
- 14.2 Anticipated length of piles appropriate for the site conditions.
- 14.3 Minimum pile diameter.
- 14.4 Typical pile design, stating assumptions made in the design.
- 14.5 Typical reinforcement details.
- 14.6 Details of anticipated pile casings and lengths.

- 14.7 Method statement on how the works are to be carried out.
- 14.8 Anticipated duration of piling contract and number of visits to carry out the works.
- 14.9 A schedule for the piles is included with the tender documents. The tenderer is to complete the anticipated length, rate per metre and cost for each pile and carry the sub-total to the summary, all based on the Ground Investigation reports. The actual pile lengths will be determined by the Underpinning Contractor, during construction.
- 14.10 Details of typical needle arrangement to support walls.
- 14.11 A copy of the Underpinning Contractor's Health and Safety Policy.

15 CUTTING OFF PILE HEADS - ADDITIONAL REQUIREMENTS

- 15.1 The concrete is to be cast to 400mm minimum above the required cut-off level and reduced in height by the Contractor to the levels shown on their approved drawings.

16 STATIC LOAD TESTING OF PILES

- 16.1 The Underpinning Contractor is to include in their tender for carrying out a load test on a working pile. If required, the CBC Structural Engineer is to choose the pile to be tested.
- 16.2 The pile is to be tested for an applied load of 1.5 x design verification load in accordance with clause 10.14 of the ICE Specification for Piling.
- 16.3 Prior to testing, the pile head is to be cut off or built up to the required level and formed to give a plane surface which is normal to the axis of the pile, sufficiently large to accommodate the loading and settlement measuring equipment and adequately reinforced or protected to prevent damage from the applied load.
- 16.4 The load test is to be applied by means of a jack which obtains its reactions from Kentledge heavier than the required test load.
- 16.5 The load test is to be carried out a minimum of 14-days after the pile has been installed, subject to the results of the 7-day cube tests carried out on the concrete placed in the pile.
- 16.6 Following completion of the load test, the pile head is to be reduced to the required cut-off level and left in a state, ready for incorporation into the permanent works.

17 INDIRECT METHODS FOR TESTING PILES

- 17.1 The Underpinning Contractor is to include in their tender for the integrity testing of piles by an independent UKAS approved specialist testing company.
- 17.2 All piles are to be tested for integrity.
- 17.3 Integrity tests shall be carried out a minimum of seven days after piles have been cast. The pile heads are to be clean, free from water, laitence, loose concrete, overspilled concrete and blinding concrete, and readily accessible for the purpose of testing.

18 REQUIREMENTS FOR PILE DESIGN

- 18.1 The piles are to be founded at a suitable depth identified in the Ground Investigation, with regard to the design requirements.
- 18.2 The Underpinning Contractor is to keep a record of the material removed from each bore, and is to provide (if requested) an assessment of the pile strength, based on the material encountered.
- 18.3 The piles are to be designed to safely carry the working loads given without exceeding the settlement criteria of 10mm at any pile position and 5mm differential settlement between adjacent piles.
- 18.4 The Underpinning Contractor is to give due consideration to the nature of the ground strata and the requirement for the piles to be laterally stable under the design loading.
- 18.5 The piles are to be designed with a factor of safety of 2.5.

19 PLACING OF REINFORCEMENT

- 19.1 Reinforcement in the form of a cage shall be assembled with additional support, such as spreader forks and lacings, necessary to form a cage which can be lifted and placed without permanent distortion. Intersecting bars shall be fixed together by approved means. Hoops, links or helical reinforcement shall fit closely around the main longitudinal bars and be bound to them by approved wire, the ends of which shall be turned into the interior of the pile. Reinforcement shall be placed and maintained in position to provide the specified projection of reinforcement above the final cut-off level.
- 19.2 The cover to all reinforcement in cast-in-place piles shall be not less than 40mm, unless otherwise approved. Spacers shall be designed and manufactured using durable materials which will not lead to corrosion of the reinforcement or spalling of the concrete cover.
- 19.3 Reinforcement Grade - all reinforcement should be of the minimum grade specified in the Underpinning Contractor's design.

20 ADDITIONAL WORK

- 20.1 No additional work is to be carried out without written instruction of the CBC Structural Engineer.
- 20.2 All spoil from the underpinning works is to be removed from the site which is to be left in a clean and tidy manner.
- 20.3 Reinstatement - The area of the underpinning works are to be reinstated to a condition at least as good as that prior to the commencement of the works.

TENDER SUMMARY

Establishment charges, i.e. transport, plant and equipment
To site, set up, dismantle and remove upon completion,
fencing and welfare facilities £_____

Dismantle, move and erect rig
at each pile location __ no at £_____ = £_____

Provide needle beams or
other specified support system __ no at £_____ = £_____
(design\supply and install)

Provide piles

_____ metres of _____ dia. pile at £_____/metre = £_____

Permanent casing _____ metres at £_____/metre = £_____

Ground Investigation works to confirm design = £_____

Reinstatement of site after works £_____

TOTAL COST = £_____

Extra over rate/metre of pile £_____/metre

Rate for length of pile omitted/metre £_____/metre

Standing rate £_____/hour

Breaking through obstructions £_____/hour

Extra over for test loading one pile £_____

Extra over price for additional
permanent casing/metre £_____/metre

Report on pile lengths and depths/
identification of ground conditions £_____/item

TESTING:-

Extra over price for Integrity Test £_____/pile £_____/all
piles

Extra over price for Static Load
Test by Kentledge/Anchor piles* £_____/pile

Extra over price for Dynamic Testing £_____/pile

Estimated number of piles per day _____/day

Report on Testing
where appropriate

£ _____/item*

Delete