CONSTRUCTION METHOD STATEMENT

The Firs, Church Grove, Hampton Wick, KT1 4AL

Project Number: 3230

Revision A

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BLUE ENGINEERING

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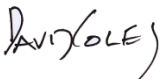
This document is to be read in conjunction with all other planning documents submitted including drawings 3230-200, 3230-201, 3230-202, 3230-203, 3230-204, 3230-205.

Report by



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1.0 DESCRIPTION OF EXISTING BUILDING AND SITE

1.1 The Firs, is a two-storey detached house built in the late 19th century and is situated in South-West London in the London Borough of Richmond. The existing property is formed from solid masonry wall construction, timber floors, a traditional duo-pitched timber roof and assumed brick corbel foundations. The property was extended in the 1940's to create a garage and kitchen and again in the 1960's to form a bathroom and cloakroom.

1.2 Access to the site is gained via the road, Church Grove.

1.3 A visual inspection of the site was undertaken. The findings were as follows:

i. The property appears in good condition with no signs of movement, recent or otherwise noted.
ii. There are a considerable number of large shrubs and trees on the site. Two of the trees – a yew and Prunus – lie within the proposed basement footprint will require removal.
iii. There are no existing basements that border either side of the property.
iv. The existing property did not display any signs of structural damage.

1.4 There are no known tube lines passing under or close to the property.

1.5 According to RSK's report (Ref: 132901-R1(0)-FRA), there are some utilities which will affected as a result of the proposed development.

1.6 Environment Agency flood map shown in fig. 1 indicates that the site is located outside Flood Zone 2 and 3. RSK's desk study describes the site as being located within flood zone 1 and the land is described as having a 1 in 1000 year probability of flooding from fluvial sources. Additionally, the site is at very low risk of surface water flooding. A more detailed assessment of the flood risk at the site can be found within RSK's Flood Risk Assessment and Surface Water Drainage Strategy (Ref: 132901-R1(0)-FRA).

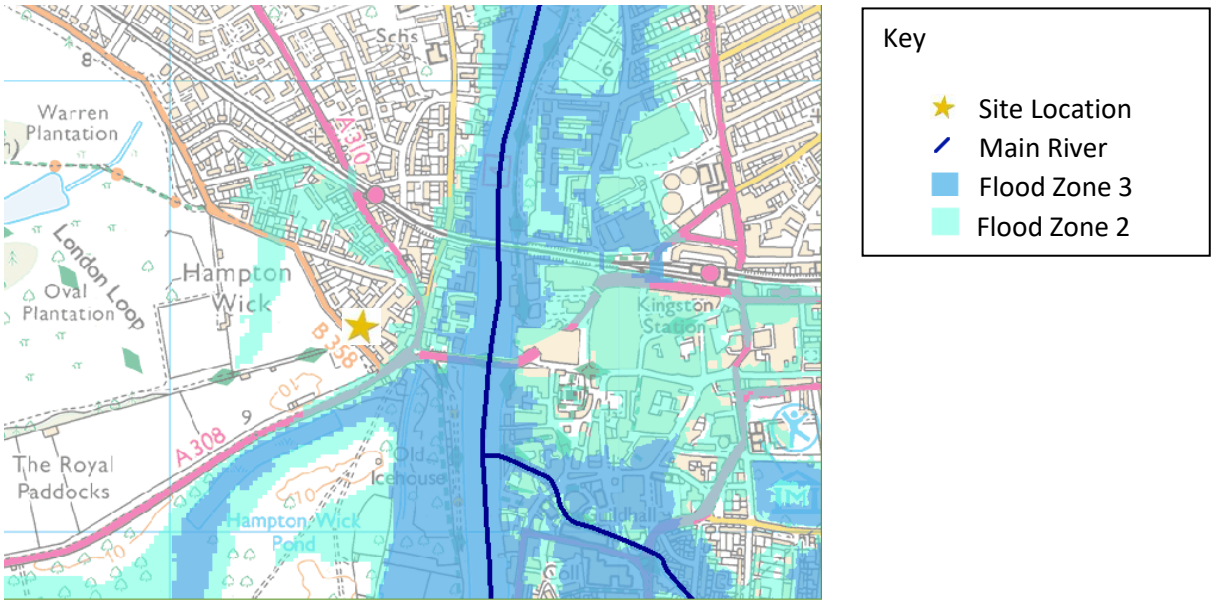

Figure 1 – Environment Agency flood risk map

2.0 GROUND CONDITIONS

2.1 A desk study has been undertaken using BGS Geology Viewer which indicates that the site is founded on superficial deposits of Kempton Park Gravel with London Clay Formation founded at depth.

2.2 A full geotechnical investigation and interpretive report has been prepared by RSK. Two boreholes were carried out on the site within the footprint of the proposed basement to a depth of 20m. The two boreholes found that the strata below the proposed development is made ground to 0.8 m below ground level (bgl), Kempton Park Gravel 0.8 - 8 m bgl and London Clay 8 - > 20 m bgl. The basement slab shall bear onto Kempton Park Gravel and RSK has recommended a net safe bearing pressure in the order of 150 kN/m^2 (factor of safety 3).

2.3 The report from RSK highlights that ground water was struck at 4.49m bgl and 4.37m bgl within the Kempton Park Gravel. Given the depth of the proposed basement, RSK consider that dewatering will likely be required to facilitate the excavation. If the water table is struck during excavation localised de-watering will be used. Pumping from open sumps in non-cohesive soils should be avoided as this can result in piping and lead to instability and general loosening of the soils at the base of the excavation. See section 5 for a potential method of dewatering. The substructure is to be designed as a fully sealed structure in accordance with BS 8007 to inhibit any groundwater ingress.

3.0 PROPOSED DEVELOPMENT

3.1 The proposed works include demolishing the existing residential dwelling and constructing a three/four storey building containing 6 x 1 bed flats and 3 x 2 bed flats with full height basement for use as an underground car park. The basement car park extends beyond the rear of the proposed building.

3.2 The sub-structure shall be formed using RC contiguous piled wall construction with RC basement and ground floor slab. The slabs will prop the piles horizontally in the permanent condition. The superstructure shall be suited to a framed construction with infill panels to match the Architectural intentions.

3.3 The RC contiguous piled wall and the basement slab will be designed to ensure lateral loads due to earth pressures can be transferred from one side of the sub structure to the other, where equal and opposite pressures will provide resistance to movement.

3.4 In the event that the ground water table were to rise above the level of the basement, the displaced water will exert an uplift force to the structure. The number of piles provided have the tension capacity to resist the uplift (factored up) ensuring global stability requirements. It has been assumed that the worst-case uplift will occur when the ground water table rises to 0m bgl.

3.5 The overburden relief has been calculated to be approximately 25 kN/m^2. An initial heave of 50% is expected during the construction works, the remaining 50% will be resisted by the weight of the structure and the piles in tension, which is less than the uplift due to displaced water. Therefore, the design is adequate if the global uplift stability check has been satisfied as it has been above.

3.6 The new development shall not adjoin neighbouring properties to either side.

4.0 PROPOSED DRAINAGE

4.1 Proposals will be subject to a CCTV drainage survey which will establish the locations, condition, levels and sizes of the existing onsite surface and foul water drainage systems.

4.2 Foul waste will be pumped from basement level to ground level with a sump pump to an inspection chamber, depressurised, and then run under gravity to an existing manhole to join the existing sewer.

4.3 Drainage on the site will be handled by the existing drainage systems. New external hard standing areas are required to be permeable. If this is not possible, infiltration trenches will be installed in accordance with BS 8582.

5.0 SEQUENCE OF WORKS

Contiguous Pile Construction
Prior to the piling platform being installed the ground surface must be prepared subject to the specific requirements of the piling rig. All underground obstructions must be removed and services diverted. Any soft spots found in the subgrade must be excavated and backfilled in a compacted layer using granular fill.

Piles are bored in a sequence so as not to damage any already constructed piles. Due to the presence of groundwater within the Kempton Park Gravel, as well as perched water with the London Clay Formation, bored piles are likely to require temporary casing throughout their depth. Alternatively the use of CFA injected bored piles will overcome this issue. All borings shall have water and loose material removed before depositing concrete. On completion of the borehole the reinforcement cage is to be installed and the concreting is to take place as soon as practicably possible. No boreholes are to be left open overnight.

The head of each pile shall be cut back to the specified cut off level as specified on the structural drawings. Pile reinforcement is to be left clean and straight or bent as the drawings dictates.

The shuttering for the pile caps should be formed and the reinforcement installed ready for the pile caps to be cast prior to excavation. Initial excavation should be just below the pile cap where high level propping can be installed.

The ground is to be excavated to the required substructure level in preparation for the installation of the basement slab. Care is to be taken to avoid damage to the piles during the excavation. The basement slab is then to be cast as specified by Blue Engineering followed by the liner wall. After curing of the liner wall the basement can be considered waterproof.

All contiguous piling work is to be carried out in accordance with the ICE Specification for Piling and Embedded Retaining Walls (SPERW).

Drawing 3230-200 shows a plan of the basement and gives the likely number of piles to be installed by the contractor. Drawings 3230-201/202/203/204 indicates typical section types for the proposed basement. Drawing 3230-205 gives a typical sequence in which the basement is to be constructed.

Dewatering during construction
In the event ground water is encountered during the proposed works it is proposed that a localised excavated sump is formed at a lower level then the proposed founding level of the new subterranean structure. The sump would be 1m x 1m x 1m.

A timber perforated plywood shell is to be constructed to support the perimeter of the temporary working sump and placed with the excavated zone. Ground water will naturally pool within the sump area. A water

pump with 50mm diameter inlet and discharge hose is to be introduced. The discharge hose is to be routed to the nearest adjacent manhole for discharge. Dewatering should only be undertaken prior to casting of concrete to minimise the potential of Piping.

6.0 IMPACTS ON SURROUNDING STRUCTURES

The proposed method of construction is well tested and a proven form of a retaining structure. The contractor undertaking the works will have suitable experience and all necessary insurances and will follow current standards and good building guides. Providing the works are carried out correctly, movement to the surrounding structures should be no greater than described as 'very slight' under CIRIA C580 Category 1. Procedures, should any movement occur, will be covered by party wall agreements between the relevant parties. No visible change to the adjacent pavement or road is expected. Given the founding depth and bearing strata anticipated, any settlement would be considered immediate and no long term movement is expected.

7.0 PILING SPECIFICATION

Introduction

The sub-contract comprises of the design and all that is necessary to complete the installation of the foundation piles required to safely support the foundation loads specified by the Engineer, together with the installations and satisfactory testing of both working and non-working piles.

The Site

The location of the site is enclosed within the technical information provided by the design team. The Piling Contractor is not to enter upon or commence any work in areas which are not part of the contract site. The Piling Contractor shall visit and inspect the site and surroundings acquainting himself with the nature of the site, means of access, accommodation for the materials, amount of haulage and any other matters that may affect the execution of the work prior to submitting his tender. Any inconvenience sustained or difficulties encountered shall be the entire responsibility of the Piling Contractor and shall in no way relieve the Piling Contractor from fulfilling the terms of his contract. Requirements regarding access to the site should be cleared with the Local Authority prior to submission of the tender.

Site Investigation Report

A site investigation has been carried out and reports made upon the soil conditions found, together with details of their engineering properties. The full reports are contained within the tender documents.

The Piling Contractor should examine the site reports fully as no claim will be entertained which is based on lack of appreciation of any of the facts or opinions contained in the site investigation reports.

The Piling Contractor shall report immediately to the Engineer any circumstances which indicates that in his opinion the ground conditions encountered differ from those expected by him from his interpretation of the site investigation report.

Neither the Employer or Engineer accept responsibility for the accuracy of the information given in the report and the Piling Contractor is responsible for any conclusions which he draws from the information given.

Sequence of Works

The Piling Contractor shall commence piling in such order and sequences as the Main Contractor shall direct.

Piles shall be installed in such a sequence that their construction does not damage any piles already constructed.

Site Supervision

The Piling Contractor shall employ full time on site a competent and experienced engineer to supervise all aspects of the piling work. This person needs to be able to set out, level and plum piles, control the quality of the concrete, and recognise and assess unexpected variations in ground conditions.

The Piling Contractor shall keep at the site of the Works, copies of all drawings, specifications, instructions and a complete log and record of all piles formed and the actual length of each completed pile. These are to be available to the Architect or Engineer for inspection at all times. The Sub Contractor shall give every assistance to the Engineer to enable him to keep a similar record.

The Piling Contractors log shall record details of the concrete length, empty bore, obstruction, delays, ground strata for each pile.

The Main Contractor will be responsible for the setting out of main base lines and for providing a temporary bench mark adjacent to the work. The Piling Contractor will be responsible for his own setting out from the main base lines, and forming all piles to within the tolerances specified below.

Adjacent Building and Services

It is the responsibility of the Piling Contractor to ensure that the execution of his works does not damage or otherwise interfere with existing buildings, or cause nuisance to their occupants, affect drains, roads, services, boundary walls, any of which may be sited around or in close proximity to the site.

Attention is drawn to the special character of the neighbourhood in which the site is situated and that excessive noise and vibration is likely to prove objectionable to the public and local residents. The Piling contractor is to comply with all relevant clauses of BS 5228: Parts 1 & 2: 2009 in his attempts to reduce noise and vibration to a minimum.

Any damage or inference which is traceable or attributable to the Piling Contractor must be put right at the contractors own expense.

Pile Type

The pile type shall be such that the installation, including the effects of noise or vibration, does not cause disturbance or nuisance. End driven piles are not acceptable. In the event that a change in the piling technique, howsoever effected, becomes necessary due to unacceptable levels of disturbance or nuisance, then any increased costs shall be borne by the Piling Contractor.

Pile Design

The design of the piles is to be the full responsibility of the Piling Contractor and will be subject to the following:

i. The general design of piles shall be in accordance with British Standard Code of Practice for Foundations BS 8004: 1986.

ii. The Piling Contractor shall include with his tender a drawing showing his proposals in sufficient detail to enable the Engineer to agree the viability of the Contractors proposed design, including the Contractors proposed arrangement of piles.

Where an arrangement of piles is shown on the Engineers drawings, such an arrangement shall be considered as representing the Engineers assessment of a possible layout for the piles.

The pile lengths are to be determined by calculations based upon the findings of the soil investigation report and copies of the calculations are to be returned with the tender. The factor of safety shall be 2.5 minimum. The Piling contractor must however agree the value for his particular scheme with the district Surveyor or Borough Engineer before submitting his tender and to confirm that he has done so when tendering.

The Piling Contractor shall have full responsibility for determining the actual lengths necessary to give the required guaranteed loading capacity. A description of the method of forming the piles and a calculation by which the Piling Contractor proposes to assess the bearing capacity of each pile should also be included in the tender.

iii. The piles shall be designed to carry loads indicated and, if necessary, in addition, allowance shall be made for downdrag or uplift load. The maximum load determined from all these considerations is the design load.

iv. The axial compressive stress in concrete piles under design load shall not exceed 25% of the specified cube strength at 28 days.

Piles shall normally be designed to carry all comprehensive loads in the concrete on the effective cross sectional area of the pile.

In the case of piles required to act on tension or bending, the stresses on the reinforcement shall be in accordance with BS 8110.

The ultimate bearing capacity of a pile shall be taken as defined in BS 8004: 1986.

The factor of Safety shall be taken as defined in BS 8004:1986 as ratio of the ultimate bearing capacity to the design load.

v. The adequacy of the Contractors design shall be confirmed by testing 2 non-working test piles before the foundation piles are installed. (In accordance with clause 7.2 of this specification).

vi. The Piling Contractor is to submit the pile design to the Structural Engineer and the District Surveyor, at a suitable time, for approval prior to starting on site.

vii. A written guarantee of design and construction is to be provided by the Piling Contractor.

viii. A schedule of each designed pile length should be returned with any tender quotes.

Materials

All workmanship and materials shall be of a high standard and shall comply with all relevant clauses of BS 8110.

Unless stated otherwise all materials shall comply with the appropriate British Standard Specifications.

Cement

The cements shall meet the requirements of class 3 sulphate resistance and shall comply in all respects with the requirements of BS4027.

All cement shall be certified by the manufacturer as complying with the requirements of this specification, and the Piling Contractor shall, when required by the Engineer, obtain the manufacturers test certificate for any consignment as soon as possible after delivery. High alumna cement will not be permitted to be used.

Fine and Coarse Aggregate

The fine and coarse aggregate shall comply with BS822:1983 and shall be of 20mm maximum size. The aggregate shall be stored on site in such a manner that intermingling of materials in separate stockpiles is not possible, and to prevent contamination of the stockpiles from the ground or rubbish or windblown dust.

The use of marine aggregates shall not be permitted.

Water

The water shall comply with the requirements of BS3148 in respect of its suitability for making concrete.

Reinforcement

All reinforcement shall be designed to permit its placing to the depth specified through the concrete or grout of the pile at the completion of the casting. Suitable spacers shall be provided to maintain the specified cover.

The transverse reinforcement of any reinforcement cage may consist either of helical bar or steel bands.

Longitudinal reinforcement shall be provided for the full depth of the pile and all laps are full tension laps (or 40 times diameter of the bar). A minimum of 6no. bars are to be used in any reinforcing cage.

Reinforcement shall be supported at such level that it will provide the required projection above the cut-off level.

All reinforcement in the piles shall be provided with a minimum concrete cover of 40mm which shall be maintained with the aid of an adequate number of concrete spacing rings fixed to the main steel.

Concrete Quality

The concrete shall have a minimum crushing strength of 30N/mm^2 at 28 days with a minimum cement content of 330kg/m^3 (or 290kg/m^3 for sulphate resisting cement. The Piling Contractor shall design the mix to comply with these requirements and should note that compliance with the minimum cement content does not necessarily guarantee the minimum strength required. The concrete shall be of such consistency that it can be readily placed in the pile without segregation of the materials or bleeding of free water at the surface. The concrete shall be of such consistency that it can be readily placed in the pile without segregation of the materials but with sufficient workability to slump into any voids. Before commencing the work the Piling Contractor shall supply full details of the mix he proposes to use to the Engineer.

Concrete: Ready Mix

Ready mix concrete is to be used unless otherwise allowed by the Structural Engineer. This must be obtained from a plant which holds a current Certificate of Accreditation under the Quality Scheme for Ready Mix Concrete. The ready-mixed concrete shall conform to the relevant clauses of BS5328:1981. Details of cement type, aggregate grading and sources, with chloride and sulphate content of mixes to be submitted to the Structural Engineer for their approval prior to ordering any concrete.

Concrete for reinforced concrete structures, including ground bearing slabs, is to be designated mix RC35 to BS 5328, unless noted otherwise on the drawings.

Do not place concrete when the ambient air temperature is less than 5°C.

Pile Installation

Programme

The Piling Contractor is to state at the time of tendering the time required for installing the piled foundations.

Concreting

Concreting must follow boring as closely as possible and boreholes must not be left open overnight. Any hole which is left open shall be concreted and a replacement pile bored at a position to be agreed with the Engineer. This, together with any ground beams required shall be at the Piling Contractors own expense.

Boring

All borings shall be carried out without the use of water other than natural ground water, unless written permission is given by the Engineer.

All borings shall have water and loose material removed before depositing concrete and all piles shall be concreted immediately an approved depth has been reached.

The plant used for boring shall be such as to ensure that the piles shall remain to their full specified diameter throughout their length and within the tolerances specified. Care should be taken to avoid subsidence or heaving of the ground surface surrounding the area to be piled, and to avoid any form of damage to piles already cast.

Lining Tubes

All borings shall be lined with steel tubing until a depth is reached where no material or water from the sides of the boring will fall into the boring either during boring or placing of the reinforcement or concrete.

Spoil

All surplus spoil from the borings is to be deposited at locations to be agreed with the General Contractor, at a distance not exceeding 15m from the borehole.

Tolerances

Plan Position

For a pile cut off at or above ground level the maximum permitted deviation of the pile centre from point shown on the setting out drawings shall be 75mm in any direction.

Any additional costs involved in the strengthening of or enlarging pile caps or foundation beams, etc, to offset the incorrect positioning of piles will be borne by the Piling Contractor. Remedial measures are to be to the satisfaction of the Engineer.

Vertically

The maximum permitted deviation of the finished pile from the vertical shall be 1 in 75. All piles shall have straight shafts.

All piles will be checked by the Clerk of Works or the Engineer or his representative and any found out of vertical in excess of the accepted limit will be condemned and must be replaced by an additional pile or piles at the Piling Contractors expense.

Any additional costs involved in strengthening or enlarging pile caps or foundation beams, etc, to encompass the additional pile or piles will be borne by the Piling Contractor.

Placing Concrete

The process of concreting shall be carried out in such a manner and with adequate safeguards to prevent soil or other deleterious matter falling into the borehole. Unnecessary disturbance of the ground adjacent to the pile head is to be avoided.

The method of placing and the workability of the concrete shall be such that a continuous monolithic concrete shaft of the full cross section is formed. The concrete shall be placed without such interruption as would allow the previously placed batch to have hardened. The method of placing shall be to the Engineers approval.
The Piling Contractor shall take all precautions in the design of the mix and placing of the concrete to avoid arching of the concrete in the bore. No spoil liquid or other foreign matter shall be allowed to contaminate the concrete.

In the event of water forming at the bottom of the borehole the Piling Contractor shall place the concrete in the pile and tremie pile to ensure sound, densely compacted concrete at the pile toe.

Withdrawal of the casing is to receive particular attention to ensure that “necking” (reduced pile section) or cavities in the concrete do not occur. A sufficient head of wet concrete is to be maintained above the bottom of the casting tube as it is withdrawn to prevent the shaft sides below the tube falling into the wet concrete.

Concreting Plant

The concreting plant shall be suitable in type, capacity and design for its purpose.

Cut Off Level

The cut off level is the final trimmed down level of the top of the concrete and is level the stated on the Engineers piling drawing.

Where the finished level of the top of the pile is required to be below the existing ground level from which boring is made, all reinforcement protruding for the cast piling is to be resin coated to prevent corrosion. The empty bore is to be back filled with spoil up to ground level.

To avoid concrete that has been contaminated by earth fall, ground waters, etc, occurring at the cut off level the top level of the concrete of any pile must not be less than 150mm above the stated cut off level.

Permitted tolerances above the cut off level are:

- 300mm Where the cut off is 1m below platform level.
- 400mm Where the cut off level is 1.5m below piling platform level.
- 1000mm Where the cut off level is 2.5m below piling platform level or more.

Where the nature of the pile type is such that the concrete shaft be brought up to the level of the piling platform then the Piling Contractor must clearly indicate this at the time of tender.

The expense any cutting down additional to this shall be borne by the Piling Contractor.

A minus tolerance is not acceptable and if this occurs, then the cost of rectifications must be borne by the Piling Contractor.

All empty bores shall be backfilled with spoil up to ground level.

Trimming Pile Heads

The head of each pile shall be trimmed to the specified cut off level, (by a Main Contractor) as shown on the drawings. Care shall be taken to avoid damage to the pile during the excavation in the immediate vicinity.

A clean and sound connection must be provided between the piles and the structural member which they support. Pile reinforcement shall be left clean and straight or bent over into the structural member as the drawings dictate.

Cold Weather Work

When concrete is placed at or near freezing temperatures precautions shall be taken to ensure that it has a temperature of at least 4°C (40°f) and that its temperature is maintained at or above this temperature until it has hardened. When necessary the concrete materials (except the cement) shall be heated before being mixed and shall be carefully protected after being placed. No frozen materials or materials containing ice shall be used. The Engineer may suspend concreting operations if in his opinion, the above requirements are not being obtained. The Piling Contractor shall at his own expense, be bound to replace any concrete which does not comply with this specification.

Concrete Test Cubes

The Piling Contractor shall make, cure and arrange for testing at a Laboratory approved by the Engineer, standard 150mm cubes in moulds to be provided by the Piling contractor all in accordance with BS1881. He shall include in his tender for all expenses connected with the tests including transport and shall arrange for results of the tests to be sent to the Engineer.

Minimum concrete cube strengths for works tests shall be as follows:

28 days test	30.00 N/mm²
7 days test	20.00 N/mm²

Initially one set of three cubes are to be taken for each 3 piles or 20m³ of concrete whichever is the lesser. Subject to the 7 day results being acceptable the sampling rate may be reduced, with the permission of the Engineer to 3 cubes per 5 piles of 30m³ of concrete whichever is the lesser. Concrete cube results shall be analysed in accordance with BS8110.

No cubes are to be removed from site in a wet state for subsequent testing and analysis.

Safety

The safety precautions described in the latest revision of BS5573:1978 must be observed at all times during the execution of the works together with any statutory regulations and conditions of the main contract that may be relevant.

Statutory Requirements and Working Rules

The Piling Contractor is to allow for all cost arising in connection with statutory requirements in respect of all his employees including those arising from the National Insurance Acts, Redundancy Payments and the Graduated Pensions Scheme and for complying with the requirements of the National and Local working Rule Agreements including those in respect of the Buildings and Civil Engineering Annual and Public Holiday Agreement and the Sick Pay Scheme.

Extra Works

No variation either as an addition or as a deviation from contract is to be put in hand without the written authorisation of the Engineer.

Testing of Piles

Integrity Testing

All working piles shall be tested for the integrity of their shafts.

Testing shall be by means of simple seismic or echo test method, and the Piling Contractor shall produce a photographic record of all oscilloscope plotting's and a written confirmation that the findings are satisfactory except in any cases where remedial measures to the piles are proposed.

The preparation of pile surface for integrity testing shall be the responsibility of the Piling Contractor and shall be deemed to be included in the rates for integrity testing.

The Piling Contractor shall supply the Engineer with a full set of test results

Tests on Non-Working Piles

Before the installation of the foundation piles commences, preliminary non-working test piles shall be constructed and satisfactorily tested at a location to be agreed with the Engineer. Continuity of work is not to be assumed between the non-working test pile programme and the installation of the foundation piles.

The test piles shall be designed by the Piling Contractor and the soil properties employed shall be identical to those used in the design of the main foundation piling. Where practicable the test piles shall be of the same diameter and length as the foundation piles.

In the event that a test pile fails to carry the designed load or the calculated ultimate load determined by the design criteria adopted by the Piling Contractor then the Piling Contractor shall install and test an additional test pile of greater length than the original test pile all at his own expense. Any increases in

length if the piles over and above that given in the tender documents resulting from the failure of a test pile shall be paid for by the Piling Contractor.

The Piling Contractor will be responsible for handling his plant and materials onto and away from the site, and for the protection and watching of his plant and materials, during the period of the tests. He is to provide all plant, materials, kentledge and gauges, etc, for the proper examination of the tests.

Setting Up

The Piling Contractor shall submit to the Engineer and Local Authority for comment, details of test pile, including its estimated load capacity, testing rig and method of applying the load to the pile, The design of the test rig, including any tension piles, shall allow for the ultimate load of the test pile to be not less than three times the working load of the test pile.

The Piling Contractor shall also furnish the Engineer and other parties with calibration certificates from an independent laboratory in respect of all hydraulic load gauges and proving rings used in the test.

When boring for the test piles the Contractor shall obtain U4 samples where appropriate and shall have them tested. Two copies of the results of these tests, together with details of the ground strata encountered shall be sent to the Engineer.

The piles are to be constructed to a depth designed by the Piling Contractor and shall be representative of the working piles. Should the formation of the test pile indicate that the ground encountered materially differs from the Site Investigation and will affect the design of the pile, then a revised length must be agreed with the Engineer at the time if formation of the pile.

Loadings

After curing, the piles are to be loaded in conformity with the following:

Cycle 1.	The test pile is to be loaded in 4 equal increments up to the estimated working load. After each increment of load applied, the loading is to be sustained until settlement at the rate of less than 0.1mm in 60 minutes occur. After the last increment the applied load is to be sustained for at least 24 hours. The pile is then to be off loaded at a rate of one tonne per minute and the recovery noted.
Cycle 2.	The test pile is to be loaded in 6 equal increments up to 1.5 times the estimated working load. The maximum load sustained for 12 hours and then off loaded and allowed to recover all as described under Cycle 1. The recovery is again to be noted.
Cycle 3.	The test pile is to be loaded in 8 equal increments up to 2 times the estimated working load. The maximum load sustained for 12 hours and then off-loaded and allowed to recover all as described in cycle 1.
Cycle 4.	The test pile is to be loaded to produce a constant rate of penetration of 1mm per minute until failure occurs. The load applied is to be recorded at 0.25 minute intervals. Or up to say 3.5 x working load.

During the testing, settlement reading averaged from two defectometers are to be recorded as follows:

In Cycles 1-3	Immediately before and after each increment of load.
In Cycles 1-3	Every 5 minutes during the sustained load period that follows each increment of load.

In Cycles 1-3	Every hour during the 12 hour sustained load.
In Cycles 1-3	Every 5 minutes during the off loading, then every 15 minutes until pile had recovered.
In Cycles 4	Immediately before the constant rate of penetration is commenced.

Should the Piling Contractor wish to adopt his own testing cycles then he should set out his proposal in writing to the Engineer for the Engineers approval.

Completion

On completion of the testing cycles, the Piling Contractor shall submit for approval, details of all settlements and loads recorded, together with load/settlement graphs, to the Local Authority and Engineer. The Piling Contractor shall allow in his programme sufficient time for such details to be evaluated and approvals given. No working piles are to be installed until the final pile lengths have been agreed with the Local Authority and the Engineer.

Tests on Working Piles

A maximum of 2% of the total number of working piles may be subjected to load testing at the Engineers discretion.

Where tests on working piles are called for, such tests will be selected and tested concurrently with the main piling work and shall not constitute a delay to the overall piling programme.

The testing procedure and records of settlement are to be carried out in accordance with the testing procedure for non-working piles (as set out in clause 7.2 of this specification), but shall only be taken to 1.5 times working load.

In the event that the tests on a working pile indicate that the pile does not comply with the design criteria set out by the Piling Contractor, Then all corrective measures shall be at his expense. Any corrective measures necessary are to be designed by the Piling Contractor and submitted to the Engineer for his approval. The Engineer may also call a further working pile to be tested at the Piling Contractors expense.

Records

The Piling Contractor shall prepare in triplicate records of the following details of each pile cast and shall agree then with the Clerk of Works of the Engineer. After the latter's signature of the record sheet, one copy shall be sent to the Engineers and one retained by the Piling Contractor. These piling records will be used for measurements on which payments will be made.

i	Pile reference number.
ii	Data of installation of pile.
iii	Ground level (to ordnance datum) at pile position.
iv	Reduced level (to ordnance datum) at bottom of pile.
v	Depth bored.
vi	Depth concreted.
vii	Details of man made obstructions encountered and natural obstruction with delay time.
Viii	Volume of concrete actually in borehole.

8.0 CONTROL OF NOISE, DUST AND VIBRATION

In compliance with criterion (l) of Policy CL7; the mitigation of noise, vibration and dust has been considered as so they are '*kept to acceptable levels for the duration of the works*'. Criterion (l) is concerned with the demolition, excavation and construction process, and in part with the movement of vehicles on and off the site, however this is covered in far greater depth in the Construction Traffic Management Plan (CTMP) in compliance with criterion (k).

The primary receptors have been identified as local residents and pedestrians. The site is in a residential area, existing ambient noise and vibration levels are considered to be relatively low.

Noise and Vibration

1. Works will be carried out according to a stated schedule, production of which is the responsibility of the contractor, and conducted between the hours of 8am and 6pm Monday to Friday, or as agreed with the local council.

2. Contractor will develop a Liaison and Consultation Strategy involving the following:
   a) Identifying all stakeholders, and consulting with them **before** commencing works.

   b) Maintaining a dialogue and information exchange with all interested parties throughout the proposed works.

   c) Responding to complaints and resolving where practical.

   d) Ensuring neighbours and interested parties are kept informed of works as they progress and are consulted where necessary.

3. Noise will be kept within the legal limits as defined in the Environmental Protection Act 1990.

4. All works will be carried out in accordance with BS 5228-1:2009 and BS 5228-2:2009. All works will employ Best Practicable Means as defined by Section 72 of the Control of Pollution Act 1972 to minimise the effects of noise and vibration. All means of managing and reducing noise and vibration, which can be practicably applied at reasonable cost, will been implemented.

5. The impact of vibrations on adjacent properties have been considered in compliance BS 7385-1:1990 and BS 7385-2:1993. Contractor to familiarise themselves with both documents.

6. The following general measures will be taken:
   a) The employment of only modern, quiet and well-maintained equipment complying with the EC Directives and UK Regulations set out in BS 5228-1:2009.

   b) Avoidance of unnecessary noise such as loud radios, shouting and engines idling between operations by effective site management.

   c) Careful handling of materials and waste such as lowering rather than dropping items.

   d) Operating the site as a closed site, that is:
   i. Having all windows and doors closed during noisy operations.
   ii. Retaining the building front façade and roof during construction.

iii. Installing insulation in the windows and other opening to reduce the amount of noise escaping the site.

7. The following specific measures will be taken during each stage of the construction:
   a) Demolition of corbels:
   i. Corbels will be cleanly disk cut back and carefully broken away from masonry. Percussive breaking techniques will not be used.

   b) Concrete demolition and removal:
   i. In compliance with the expectations of The Council, concrete is to be demolished using non-percussive breaking techniques (e.g. mechanical concrete pulverisers, hand-held concrete crunchers, diamond saw-cutters and drills and hydraulic bursting equipment).
   ii. Where practical, concrete will be levered from position and broken up off-site, or lowered to ground floor level and broken up when this is not possible.
   iii. Where appropriate, structural breaks will be cut between adjacent properties as soon as possible to reduce noise and vibration transfer.

   c) Excavation:
   i. The site will be excavated manually, causing minimal noise or vibration.
   ii. The conveyors will not be operated outside normal working hours and will be switched off when not in use. Conveyor will be well maintained with well-oiled rollers in good working order.
   iii. Lorries removing the spoil will only operate within normal working hours and will have their engines switched off while waiting. Further information regarding the movement of vehicles in and around the site is provided in the CTMP.

   d) Piling:
   i. If piling is required on site, fully silenced modern bored or hydraulically-jacked piling rigs will be used with careful operation of the rig so as to minimised disturbance.
   ii. Where practical, the transmission pathway will be cut by introducing a trench around the piling site.

   e) Concrete construction:
   i. Contractors will carefully plan and coordinate with concrete suppliers, subcontractors and any other parties involved in the pour to ensure the concrete pours can be done within normal working hours. Contractor is required to conduct an assessment of potential disruptions to the concrete pour and to form contingency plans.

   f) Steelwork and reinforcement:
   i. All fabrication and cutting of steelwork will be carried out off-site. Where not possible, contractor will erect a mobile acoustic screen or enclosure as appropriate.
   ii. Hydraulic or pneumatic tools will be used in preference to angle grinders when cutting reinforcement bars.

Dust and Emissions

1. As defined in the Mayor of London's Best Practice Guidance on The control of dust and emissions from construction and demolition, November 2006, section 4.1 the site is classified as a low risk site, fitting the following criteria:
   a) A development less than 1,000 square metres of land.
   b) A development of ten or less properties.
   c) There is potential for emissions and dust to have an infrequent impact on sensitive receptors.

2. Contractor will follow good housekeeping practices with site being regularly swept to avoid the build-up of dust, and where possible washed down with wet methods.

3. Dust will be minimised by effective site planning, including doing the following:
   a) Erecting effective barriers around dusty activities.
   b) Covering stockpiles of sand and other dust generating materials.
   c) Planning the site layout as so dust generating activities and/or machinery are located away from sensitive receptors.
4. In regard to construction traffic:
   a) Idle vehicles to switch off engines
   b) Vehicles to be effectively washed or cleaned before leaving site.
   c) Construction materials entering or leaving the site to be covered.
5. During demolition works:
   a) Equipment with dust suppression (i.e. water spray) or a dust collection facilities will be used.
   b) Covering of skips, chutes and conveyors, completely enclosing if necessary, and minimising drop heights.

Contractor will provide a method statement and temporary works design which is to be approved by the Engineer, taking into account noise, dust and vibration. Contractor to notify the Engineer of any deviation from the above processes or procedures.