MECHANICAL SERVICES
DETAIL DESIGN SPECIFICATION

for

HELLESDON COMMUNITY CENTRE
WOOD VIEW ROAD
HELLESDON, NORWICH
NR6 5QB

Revision T1 : 02/08/2021

Building Services Design Ltd

Green Ridge
Littlefields
Dereham
Norfolk
NR19 1BQ
Tel: 01362 652704
Mob:07789 815485
www.alhdesign.co.uk

Hellesdon Community Centre, Hellesdon, Norwich NR6 5QB

Mechanical Services Specification

Revision T1

Building Services Design Ltd

Revision Summary

Ref:	Date:	Clause Ref:	Description:
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SECTION 1 – GENERAL NOTES

1.0 THE PROJECT

The project comprises the refurbishment of the existing community hall.

The building is a single story. The building is of traditional construction of its time and partial internal demolition will be completed for the refurbished development - refer to architectural and structural plans for further details. Please note that the roof will be completely renovated.

The site is located at Wood view Road, Hellesdon NR6 5QB, Norwich.

The accuracy and sufficiency of this information is not guaranteed by the Employer or the EA and the Subcontractor must –

- Ascertain for himself any information he may require to ensure the safety of all persons and the Works.
- Comply with the requirements of the CDM Regulations by compiling risk assessments for the sub-contract works.
- Provide information on the sub-contract works, which might affect the health or safety of any person.
- Provide appropriate input to the health and safety plan and file for the works.

Ascertain the nature of the site and all local conditions and restrictions likely to affect the execution of the Works.

Contractor must familiarise themselves with the ACM register prior any survey work or construction work commencing.

Before commencing work, carry out a survey and examination of buildings, structure and engineering services affected by the works.

Examine all available drawings of the engineering services and report any discrepancies to the EA.

Before tendering, ascertain the nature of the site, access thereto and all local conditions and restrictions likely to affect the execution of the Subcontract Works.

Site visit shall be made by the subcontractor in liaison with the main contractor.

Where reference is made to ‘contractor’, ‘sub-contractor’, or any derivative within this tender specification, for the purposes of the contract, this means the main contractor i.e. all contractual responsibility for the instructed works is retained with the main contractor. Where specific action is identified between M&E services sub-contractor

and main contractor this is intended to aid coordination and delivery of the project and ensure the required actions are clearly set out.

1.1 INTRODUCTION

The following specification represents performance requirements for the technical services to be provided. This specification outlines the requirements for construction and should be read in conjunction with the mechanical drawings.

Supply, install, balance, test and commission the building services installations defined in the following sections of this specification.

Works are as depicted on the following tender drawings;

21027 ML 50-01	Mechanical Heating Layout T1
21027 ML 50-02	Mechanical Domestic Layout T1
21027 ML 50-03	Mechanical Ventilation & FCU Layout T1
21027 ML 50-04	Mechanical Plant Room Layout T1
21027 ML 50-05	Mechanical Plant Schematic T1
21027 ML 50-06	Mechanical Enabling WorkT1
21027 ML 50-07	Mechanical Drainage Layout T1

The contract shall be responsible for taking the proposals herein, completing the detailed design, developing them to installation standard proposals including drawings and technical submissions on final selected plant and ancillaries. The contractor shall provide method statements for the works including enabling, installations, testing, commissioning, operation demonstration, training and handover.

There is an amount of demolition works required and associated services modifications. All works necessary to facilitate the proposed development are required to be included and this generally includes but is not limited to;

- Removal and disposal of redundant ventilation and domestic services.
- Removal and disposal of the LTHW heating systems and associated boilers
- Removal and disposal of the Gas Service
- Removal, disposal and modification to above ground drainage to suit the above and to suit the proposed works moving forward.

The design and installation shall be completed in accordance with all relevant documentation including but not limited to;

- CIBSE Technical Memoranda, Building Energy/Commissioning Codes, Lighting Guides.
- BSRIA & BRE Technical Publications.
- Institute of Plumbers Design Guide.

- British Standards and Codes of Practice.
- Health and Safety at Work Act 1974
- BS7671:2008(2011) Wiring Regulations.
- Electricity at Work Regulations.
- Local Fire Officer/Building Control requirements.
- Local Authority Bylaws and Regulations.
- Construction (Design & Management) Regulation.
- Water Authority Regulations
- ACop L8 - Control of Legionnaires Disease
- Local Statutory Authority requirements.
- HVAC specifications for mechanical ventilation systems.
- COSHH Regulations.
- Gas Safety Regulations and Installation Codes.
- Building Regulations.
- Supply Authority requirements.
- The Standard Specifications and Codes of Practice, issued by BSI wherever applicable
- Clean Air Act.
- EYFS Standards for nursery facilities

Notify all authorities in accordance with their regulations and obtain any required approvals for the installation.

Ensure all equipment and systems are designed and installed in accordance with the relevant standards and that operational compatibility exists between the systems and any other system installed at the same location.

Supply plant and equipment to achieve the specified design conditions and to provide stable control.

Named manufacturers, suppliers, specialists and equipment.

The sub contract price shall be based on the names detailed in this specification and shown on the design drawings.
The sub contractor may offer, at the time of tender, alternatives to those named for consideration by the design team at a later date. The alternative costs must not be included in the priced works.

Ensure all plant items are suitable for operation in the environment in which they are to be located.

Ensure all plant, motors, starters and ancillary equipment etc. are suitable for operation at full capacity under the following conditions:

Height above sea level not exceeding 1000m.

Air cooling at an average temperature over 24 hours not exceeding 35oC dry bulb.

Maximum conditions of 40oC dry bulb and 50 per cent relative humidity.

Supply voltage approximately sinusoidal

Provide equipment for operation in the following areas as shown on the drawings with the environment as specified below:

Internal temperature 0 to 40^{o}C
External temperature -20 to 50^{o}C
Protect equipment to BS EN 60529 as specified.

The positions of all components, connection points, accessories, apparatus, equipment and other room terminals shown on the tender drawings are approximate and for guidance in the preparation of the tender.

Agree, with the EA, which components are subject to final positioning on site.

Allow for the movement of all such terminals up to a radius of 5.0m from the positions shown on the drawings.

Mounting heights and locations indicated in tender documents are for tender purposes only. Confirm mounting heights and locations with the EA before commencing work on site.

1.2 MATERIALS & PROCUREMENT

The contract shall submit or confirm in writing all details of the materials and equipment to be used in accordance with this specification. Review of the proposals by the consultant all not relent the contractor of his responsibility to ensure the materials perform satisfactorily throughout the life of the installation.

All materials are to comply with the latest current appropriate standard issued by the British Standards Institution.

All equipment and materials to be installed shall be new unless otherwise indicated and fully tested at the manufacturers works prior to issue to site.

1.3 EQUIPMENT SELECTION

Equipment must be currently available within the scope of the contract programme, be installed as new, being delivered from manufacturers or stockists. No refurbished or second hand items of equipment will be accepted unless specifically required by the Client in writing and specified in this document.

The Contractor shall ensure that any spares or replacement parts will be readily available throughout the equipment's expected life.

1.4 WORKMANSHIP

All materials, plant, equipment, and workmanship shall be of the best quality and carried out as detailed in the specification and drawings.

All equipment and materials to be installed shall be new unless otherwise indicated and fully tested at the manufacturers works prior to issue to site.

All equipment shall be installed in accordance with the manufacturer's written instructions and recommendations.

All materials or standard of works considered by the Employers Agent to be unsound or not in accordance with the specification shall immediately be removed and replaced to the satisfaction of the EA at no additional cost to the contract.

1.5 WORKING DRAWINGS

The Contractor shall be responsible for providing fully detailed and dimensioned working drawings of each service, supports, steelwork, and fixings to be installed prior to commencing work on site. The location of all plant, equipment and services shall be fully dimensioned including invert levels from each other, from other work and from the building structure.

Co-ordination of the Engineering Services Installations will be carried out by the Contractor. Agree principles of co-ordination with all parties concerned.

Incorporate details provided by others into the Co-ordination Drawings.

Provide all necessary details/drawings/schedules etc, required to enable the co-ordination drawings to be prepared by others.

Ensure the installation drawings make due allowance for all building elements, structure and other services.

Prior to submission check and approve all drawings, schedules and any other information provided by manufacturers, nominated suppliers or specialist sub-subcontractors to ensure that all the requirements of the contract documentation have been incorporated. Accompany all documents submitted with a certificate indicating that they have been checked by the Subcontractor.

The drawings shall be updated at regular intervals and the Contractor shall be responsible for ensuring compliance with current architectural, structural, and services requirements.

The Contractor shall where appropriate take site dimensions during the preparation of the drawings and be responsible for their accuracy. Setting out of the works on

site shall be carried out by the Contractor and any errors arising from inaccuracies in setting out shall be the Contractor's responsibility.

The Contractor shall be responsible for the accuracy of the drawings and for ensuring all equipment shown is suitable for the intended purpose in accordance with the design drawings and Specifications.

1.6 BUILDERS WORK DRAWINGS & BUILDERS WORK

The Contractor shall produce builders work drawings and schedules in order to indicate the requirements for architectural or structural provisions necessary for the execution of the works.

These drawings shall provide full details of any necessary bases, foundations, lifting/support structures for plant and/or equipment, openings in walls, floors and false ceilings, services requirements in ceiling voids and below floors. For external services the layouts shall indicate trench/trough details, ducting routes for Statutory Authority supplies, external lighting ducts penetrations through external walls with details of any backfilling required.

Where comments on Builders Work information are given, this is only with respect to the general principles of the installation requirements. Whilst the Employers Agent will use his best endeavours to check the details, it shall nevertheless remain the Contractor's responsibility to ensure that he accurately details all necessary builders work requirements and that he obtains the Employers Agent acceptance to his proposals prior to construction.

1.7 DEFECTS INSPECTIONS

Prior to requesting that the Consultant attends site to carry out a defects inspection the Contractor shall ensure that all tests indicated in Section 2 have been carried out. This should include all visual inspections which should be carried out by a competent supervisor and any items requiring attention should be resolved.

When the Contractor is satisfied that the respective installations and systems have been fully tested and inspected by their Sub-contractors the building shall be offered to the Consultant for inspection. Sufficient notice (one week minimum) shall be given in writing so that appropriate arrangements can be made.

If it is found that the above has not been carried out the Contractor may become liable for payment for any abortive visits by the Services Engineers.

1.8 INSTRUCTING CLIENTS STAFF

The Contractor shall include for a minimum period of not less than two working days. This period shall be mutually agreed between the Services Engineers, Client and Contractor and must be confirmed in writing with an agenda. This period shall

be for the instruction of the Client's representative/employees as to the full workings and function of all aspects of the installed systems. The Contractor shall clearly explain the controls and functions of all components including standard running programmes and emergency shutdown/fail safe features and the reinstatement proceedings following the system going to a fail condition.

The above period shall only commence once the system has been fully proven in performance during acceptance tests and shall under no circumstances be carried out prior to or during commissioning.

Such instruction shall not release the Contractor from his obligation to provide operation and maintenance documentation.

1.9 RECORD DRAWINGS, MAINTENANCE MANUALS & BUILDING LOG BOOK

The Contractor shall be responsible for the preparation and issue of all record documents required to facilitate the subsequent maintenance of, or the future modification to, the services. These documents must be available in approved form prior to practical completion of the works being established.

During the course of the contract works the Contractor shall maintain and retain a complete record of all modifications and changes to the drawings to facilitate the easy and accurate preparation of the Record drawings and shall ensure that these are in all respects a true record of the installation.

The Contractor shall provide one copy of the Record drawings, stamped 'DRAFT', subject to approval, these being submitted to the Services Engineer prior to handover of the building. When accepted by the Services Engineer, the Contractor shall then produce two sets of folded paper prints and an appropriate number of discs in AutoCAD format. These shall be handed to the Services Engineer for submitting to the Client.

During the course of the contract works the Contractor shall build up and prepare an operation and maintenance manual. This shall be based on the installation and systems pertinent to this project being sectionalised to represent each system installed as part of the mechanical and electrical works.

The manual(s) shall incorporate those items relevant to Mechanical or Electrical services as follows:

i) Index.
ii) Description of Installation.
iii) Description of Services.
iv) Description of systems installed together with all manufacturers literature and routine test procedures/frequency. (Separate section for each system.)
v) List of equipment.
vi) Installation, commissioning, and test certificates for all sections of work.
vii) All relevant schedules including:

Schedule of Materials and Suppliers.
Schedule of Plant and Major Items of Equipment.
Schedule of Start-up, Operation, Close Down and Emergency Shut Down and Fault Finding Procedures.
Schedule of Routine Maintenance including COSHH and Health and Safety Warning Notices/Procedures.
Schedule of Manufacturers Recommended Spares.
Full and Comprehensive Set of all Design Calculations and notes and commissioning results in a typed format.
Schedule of Addresses and Telephone numbers of all Parties. Schedule of Valves, Distribution Boards, Fuses and MCBs.
Schedule of Drawings.

The Contractor shall submit one copy of the manual in draft prior to PC, for approval in writing by the Services Engineer, prior to submission of the final copies of the manuals.

The final operation and maintenance manuals shall be submitted for approval within twenty working days.

Building Log Book: Included within Part 'L' of the Building Regulations (Approved Document ' L2') is a requirement to provide a 'building log book' in non-domestic buildings. This is intended to supplement the record drawings and operation/maintenance manuals to provide reference to installed services, controls, methods of operation and maintenance and allow energy usage to be evaluated against anticipated assumed consumption. The log book shall comply to the CIBSE document TM31:'Building Log Books and Standard Templates'.

Should the Contractor fail to issue within the specified time any documentation indicated in this Specification, the Employer reserves the right to have such documentation prepared by a third party at the entire expense of the Contractor.

1.10 MANAGEMENT OF THE WORKS

Co-operate with the Main Contractor, other subcontractors, suppliers, local authorities and statutory undertakings in the execution of their work.

In particular, the following works carried out by others will require close and careful liaison and co-operation -

- Electrical
- Structural
- BWIC

Record progress of the Works weekly on a copy of the programme kept on site.

Update or redraft programme without delay if any circumstances arise which affect the progress of the Works.

Mark up "As Installed" details weekly and before any work is hidden from view.

Provide all necessary assistance to enable EA to examine or measure the Works.

Ensure no section of the Works are covered, concealed or insulated until completion of a witnessed satisfactory test.

Give notice when Works, which are to be covered or concealed are ready for examination and/or measurement, not less than 3 working days' notice. Give notice to EA and other staff as required.

Appoint a foreman-in-charge and/or site agent to ensure constant management and supervision of the Subcontract Works.

Give maximum possible notice to the Contractor and EA before changing the foreman-in-charge or site agent.

Where installations are dependent upon site dimensions ensure that these are available before proceeding with the Works.

Do not take dimensions by scaling from the drawings.

Where dimensions are indicated on drawings check these on site, as appropriate, to ensure building construction and manufacturing tolerances can be accommodated.

Do not order or manufacture equipment using dimensions indicated on the drawings, in the specification or schedules.

Where setting out is done by the Main Contractor check its accuracy and obtain his approval before proceeding with the work.

1.11 TESTING AND COMMISSIONING OF SERVICES

Agree with the Contractor a programme for pre-commissioning checks, setting to work, commissioning and performance testing, and allow for all costs incurred.

Where required, provide formal method statements supported by risk assessments detailing all commissioning procedures.

Give notice to the Contractor and EA and state any requirements for the attendance and co-operation of others -

Give 5 days notice.

Provide all necessary facilities to enable tests to be witnessed and inspections carried out either on site or at manufacturer's works.

The EA will only witness test proceedings, confirm recorded results and determine if the specified requirements have been satisfied. If following test or inspection any plant or part thereof is shown to be defective or not conforming to the specification the EA will reject such defective parts by written notice, within reasonable time, indicating area of dispute.

Appoint an "approved" Services Engineer, to supervise the whole of the testing, commissioning, performance testing and instruction of client's staff.

Provide all specialised personnel (including manufacturer's representatives) and co-ordinate their activities.

Test all equipment, material and systems as detailed in Work Sections. If an inspection or test fails, repeat the procedure, until satisfactory results are obtained.

Complete all tests before any paint, cladding or similar materials are applied or before services are concealed.

Ensure all requirements such as cleanliness, protection from harmful external and internal elements etc. are provided prior to commencement of commissioning.

Following satisfactory completion of testing and when the installations are in a safe and satisfactory condition, set to work, regulate and adjust, as necessary, to meet the specified design requirements.

Provide all necessary instruments and recorders to monitor systems during commissioning and performance testing.

Provide test equipment subject to a quality assurance procedure complying with BS 5781.

Do not start performance testing, including system demonstration, system proving or environmental and capacity testing, until commissioning of the system is completed to the satisfaction of the EA.

Maintain on site full records of all commissioning and performance testing, cross referenced to system components and on completion of the Works include a copy in each Operating and Maintenance Manual.

Provide all certification documents for approval by the EA before any system is offered for final acceptance.

1.12 PRACTICAL COMPLETION

Systems may not, without the prior written approval of the EA be used before Practical Completion.

Systems to be used before practical completion for the benefit of the Contractor and/or Subcontractor must have all defective consumable replaced by new not more than seven days prior to Practical Completion.

No system shall be put into use prior to handover to the employer, except for testing and commissioning, unless in accordance with the following procedure.

Following the receipt of written instructions, the Subcontractor shall operate designated parts of the Subcontract Works, provided that such operation is practicable and does not prejudice the Subcontractor's responsibilities and obligations under the Subcontract.

This clause does not relate to the proposed works which shall be completed as detailed in the main contract preliminaries for partial possession of each phase.

Practical Completion will not be granted unless as a minimum the services installations noted below are fully operational, satisfactorily tested and certification provided to the satisfaction of the Employers Agent:

- Gas Systems installations
- Heating installations.
- Domestic water installations
- MVHR Ventilation Systems installations
- Above Ground drainage installations
- Controls installations

SECTION 2 – GENERAL TECHNICAL

2.1 GENERAL DESIGN, QUALITY OF MATERIAL AND WORKMANSHIP

The whole of the works shall be in accordance with good engineering practice and to the approval of the Services Engineer throughout and shall be left in working order to his satisfaction. Approval by the Services Engineer shall in no way relieve the Contractor of his obligations under the Contract.

The works shall be arranged and installed to facilitate access, inspection, testing, cleaning, replacement and repair. The plant shall be capable of maintaining the required performance with the minimum of adjustment. Operating satisfactorily and continuously without supervision.

The Contractor shall ensure all equipment shall operate at any load or speed up to its specified limits and shall in respect of noise and vibration comply with current standards and shall be satisfactory to the Services Engineer. Notwithstanding the Contractor's responsibilities as defined in other clauses of this document.

Except where indicated otherwise, all materials and equipment supplied shall be new, of the best quality and of the class most suitable for the purpose.

Noise levels shall be kept to within recognised legal limits or below and the Contractor shall provide and fix sound and vibration insulation equipment and attenuation as necessary to ensure that such sound levels are not exceeded. The external noise levels shall be assessed and all designs progressed to ensure no new noise source is generated from the new installations.

All exposed moving parts of machines including parts fixed at high level to which there is not permanent means of access shall be fitted with guards. The guards shall be so designed and installed that they can be removed without disturbing other parts for maintenance without removal of the complete guard. The guards must comply with the requirements of the Factory Inspectorate and the Health and Safety at Work Act.

The whole of the equipment supplied shall operate under all normally expected conditions without causing unnecessary interference with any part of the power supply system or with any apparatus connected to it.

The Contractor shall use every endeavour to standardise in the selection of the plant. Corresponding parts throughout the system shall be interchangeable wherever possible.

If required, samples of material to be used in the construction of the plant shall be submitted for approval.

All instrument gauges and all major items of plant shall be clearly labelled and mounted in an approved manner. Current calibration certificates shall be submitted for all such equipment.

Each plant item shall be supplied with all necessary holding down bolts together with base frames and anti-vibration equipment.

All heavy parts of plant shall be provided with convenient arrangements for slinging and handling during erection and overhaul. Items of plant normally stripped or lifted during maintenance operations and which are greater than 20kg weight shall be marked with their weight.

All equipment selected must comply with all applicable Standards and Codes of Practice of the British Standards Institution. All reference to the British Standard Specification and Codes of Practice shall be deemed to be the latest edition.

All equipment and materials supplied and all work carried out must comply with statutory requirements and Local Authority regulations.
All work shall be carried out by competent and experienced workmen and in such a manner accepted as standards of good engineering practice. Particular attention shall be paid to the general appearance of the complete installation.

2.2 CLEANING AND PROTECTION OF MATERIALS

The Contractor shall be responsible for all cleaning and protection of all materials, plant and equipment installed under this Contract.

All reasonable precautions shall be taken to prevent the ingress of dirt into the installation. All pipework and ductwork shall be stored clear of the ground on suitable racks.

All electrical equipment shall be protected before and after installation with thick plastic covers or similar protection to prevent the entry of dust and debris. Panels shall be protected with hardboard covers to prevent damage to the panel finish. The covers shall be removed to the minimum extent necessary to facilitate connection to the site wiring and shall be replaced at the end of each day's work.

Externally mounted equipment and installations shall be of weatherproof construction and properly protected against adverse weather conditions that could arise from driving rain, dust, exposure to full sun, settled snow and ice as may be applicable whilst in normal operation and when not in use.

All equipment shall be adequately protected during transit, storage and after installation to prevent damage and corrosion.

2.3 PIPEWORK SYSTEMS GENERAL

The following shall be taken as a general specification relating to all pipework unless otherwise indicated:

All pipework shall be installed in such a manner as to provide a neat appearance. The Services Engineer reserves the right to instruct to Contractor to dismantle and re-erect pipework which does not conform to reasonable appearance and standards.

Pipes shall be thoroughly cleaned before erection and shall be free from burrs and other defects. All pipe ends shall be suitably prepared.

All jointing shall be carried out in accordance with the manufacturer's instructions and all joints shall be cleaned after completion.

The Services Engineer reserves the right to instruct the Contractor to remove sections of pipework in order to demonstrate that burrs have been removed and joints have been correctly prepared. Sections of pipework found to be unsatisfactory shall require removal of additional section of pipe until they are found to be in order. The Contractor shall fit new pipework at his own expense.

All pipework and fittings left temporarily open during erection shall be closed off, by metal or plastic plugs, to prevent ingress of dirt. Paper covers or similar shall not be used.

Joints shall not be permitted within the thickness of walls, floors or ceiling structures.

Sleeves shall be provided for each pipe passing through a wall or floor. The sleeves shall terminate proud of the floor or wall finish and the space between the pipe and the sleeve shall be adequately caulked with mineral wool to reduce noise transmission. Where necessary the sleeves shall be of an approved fire resistant pattern. Sleeves shall not be used as supports and in all cases pipes shall be clear of the sleeves.

Reduction in line sizes shall be made by reducing fittings. Eccentric fittings shall be used where necessary to facilitate venting and draining. Branches shall not be fitted to reducers.
Reductions at pumps shall be concentric in vertical lines or top flat in horizontal lines.

Appropriate adapter fittings shall be used for connections between different pipework materials.
Pipework within trenches, ducts, false ceilings elsewhere, where not easily accessible, shall be welded throughout.

Flanges, unions, or other suitable and approved joints shall only be provided for each item of the plant, unless otherwise indicated.

Pipe fittings shall be of one manufacture throughout, a mixture of types shall not be accepted under any circumstances.

Socket weld flanges shall not be permitted, flanges should be slip-on or welded neck types.
Slip-on flanges shall not be welded direct onto but welded fittings.

Finish to flange faces shall be suitable for use with either Walkers Sentinel asbestos free or spiral wound gaskets. Joints between flanges shall normally be made with full face asbestos free jointing or Taylors rings, purpose made, not cut from sheets on site. Joint rings shall be fixed concentric with pipe bore and the Contractor shall ensure they do not obstruct the pipe bore.

Pipework layouts shall be planned for ease of removal of equipment for inspection, servicing and isolation.

Pipework shall not impede access to plant equipment or valves.

To permit access for the removal or maintenance of a pipe fitting, valve, or appliance without the necessity to disturb adjacent pipework, a minimum clearance of 25mm shall be provided between parallel lines, outside of insulation or between flange and pipe insulation.

Flanges and unions used for the connections to plant and fittings shall not be used as supports for that plant etc. No pipework movement either horizontally or vertically shall take place once the fittings are dismantled.

Clearance shall be allowed so as to provide maintenance access to internal pipes located in multiple pipe racks.

<u>Heavy Grade Steel Pipework (Gas)</u>

a) Pipework up to and including 50mm nominal bore shall have screwed joints to BS EN 10226-1 : 2004 external taper threads into fittings with BS EN 10226-1 : 2004 internal taper or BS EN 10226-1 : 2004 internal parallel threads. Pipework 65mm nominal bore and above shall have welded or flanged joints.

b) Pipework shall be arranged so as to allow ease when dismantling. Dismantling points, shall be in straight runs at intervals not exceeding 10m, at main branches, or where pipework is connected to appliances, flanges and/or unions shall be used. Ground in, spherical seated unions shall be used for pipework up to 50mm nominal bore and flanges for pipework above 50mm bore. Screwed joints shall be made with unsintered PTFE tape to BS 7786 or with approved jointing compound to BS EN 751 Parts 1, 2 and 3. Hemp and paste joints are not to be used. Welding joints shall be butt welded with tube ends suitably

prepared.

c) All pipework installed concealed in trenches, ducts, ceiling and roof spaces, wall chases and floor ducts shall be WELDED. Welding fittings shall be heavyweight quality seamless to BS EN 10253.

d) The ends of the pipework and fitting shall be adequately bevelled before welding which shall be carried out by the oxygen acetylene to BS 2971 Class II or electric process, the latter being by metallic arc with covered electrodes which shall be in accordance with BS 2633 Class I.

e) Where welding is employed branch welds shall be as follows:
   i. Where the size of the branch is equal to or one size below that of the main, purpose made welding tees shall be used.
   ii. Where the size of the branch is two sizes or more below the size of the main, a purpose made branch bend 'shoe' shall be used.

f) Flanges shall be manufactured from mild steel, faced and drilled to British Standard table 'E' or BS 4504 PN10.
g) Flange joints shall be made with corrugated brass Taylor rings with approved jointing compound and secured by the correct size and number of nuts, bolts and washers as required by the British Standard Specification.

h) Unless otherwise approved by the Services Engineer all bends in steel pipework shall be of the long radius type and tees shall be of the easy sweep or twin elbow pattern.

i) Bushes, longscrew connectors, backnuts and plain malleable iron fittings shall not be used without the explicit approval of the Services Engineer.

<u>Copper Pipework (LTHW & Domestic Services)</u>

a) Copper pipework installations shall be in light gauge copper tube to BS EN 1057 Table 1. Where formed bends or offsets are employed, a correctly sized bending spring or former shall be used. No pipe shall be permitted where any kinking, rippling, or distortion of the bore has occurred.

b) Formed 90° bends shall not be permitted where pipework is installed on view in rooms.

c) All pipework shall be crimped copper throughout

The Contractor shall provide and fix all necessary supports for pipework services in accordance with manufacturers requirements.

No structural concrete or steelwork shall be cut or drilled for fixing supports without the explicit permission of the Structural Engineer. Where fixings shall be permitted

to existing structural concrete they shall be by means of ‘Redhead’ bolts or similar type fixings supplied and fixed by the Contractor. Shot type fixing may not be used.

Multiple pipe runs shall be carried on proprietary systems eg. Unistrut or purpose made angles or channel iron framework securely fixed to the walls, floor or ceiling as necessary. The pipes shall either rest on special purpose skid assemblies or shall be supported from the framework by rod hangers and flat iron beds.

Hanger rods on pipework subject to thermal expansion shall have double nuts and bevelled washers to allow the hanger rods to swing.

All U bends except where used as anchors shall have a pair of nuts and washers on each leg with the supporting steel flange clamped tight between the pair of nuts to form a rigid guide and allowing pipe to slide axially. U bolts shall be provided as an alternative pipe bracket except where otherwise specified.

Pipework at valves and mechanical equipment, eg. Pumps etc. requiring periodic maintenance shall be supported so that the valves and equipment can be removed without the need for temporary pipe supports.

Small pipework running along skirtings or at low level shall be supported by standard build-in or screw-on type clips. Plastic push type clips shall not be permitted.

On copper pipework, brass munsen rings shall be provided between the pipework and steel supports.

All pipework supports shall be arranged so as to allow free movement of pipework in the desired direction due to expansion and contraction and shall be adjusted to give the correct levels for drainage and air venting.

All pipework shall be individually supported. Pipes hung from other pipes shall not be permitted without the approval of the Services Engineer.

All supports shall be connected to the building structure in an approved manner.

Drawings of all major types of support shall be submitted for approval, in such time so as not to cause delays to the contract works.

The Contractor shall make all necessary provision in pipework services to allow for thermal expansion. Details of expansion points and equipment used shall be submitted to the Services Engineer for approval in line with the contract works and shall be indicated upon the installation drawings.
The temperature used for calculation of thermal expansion shall be the maximum operating temperature.

The Contractor shall provide and fix sufficient air release and drain points to ensure that no air locks can occur and that each section of system can be completely drained. All pipework shall be graded to suit air release and drain points.

Automatic air vents where deemed necessary, shall have gunmetal or brass bodies, stainless steel floats and guides, non-corrodable valves and seats. Each automatic air vent shall be fitted with a lockshield valve and union.

Steelwork used for brackets, drop rods, supports, sleeves etc. shall be wire brushed and painted two coats red oxide paint or similar, one coat to be applied before erection and one coat after. Steelwork brackets, etc. in boiler rooms and plant rooms shall in edition to the two coats of red oxide be painted two coats of black heat resistant paint. This included all pipework flanges, steel valves etc. which are not to be insulated.

The Contractor shall provide and fix all necessary screwed bosses, thermometer pockets etc. to pipework and ductwork for thermostats, instruments and associated equipment.

Where pockets are to be installed in pipework of 15mm to 80mm nominal bore, every effort shall be made to install the pockets in normal bends and in each case the bend shall be replaced by a tee so that the pocket may be installed in the third leg of the tee.

Notwithstanding the installation of permanent dial type temperature and pressure gauges, if deemed necessary/appropriate the Contractor shall provide and install in all locations dictated by site conditions, temperature and pressure test points of the self-sealing insertion type as manufactured by Binder Engineering Ltd or equal and approved.

The Contractor shall supply and install a minimum of the following gauges. These shall be in addition to any other pockets required for the controls system and test points for balancing during commissioning:

a) Temperature gauges at the hot water production
b) Temperature gauges to each sub-circuit flow and return, within the plant room area.

All gauges shall have 100mm diameter faces and shall be calibrated to fully display the temperature and pressure of the line in which the gauge is located. Due regard shall be given to the type of gauge used with respect to the fluid within the line and the exposure to weather of the gauge.

Each valve shall be fitted with a label valve identification number manufactured from suitably engraved ‘Traffolyte’. The labels shall be attached to the valves by means of brass chains and key rings so as to remain visible at all time.

A pipe identification chart mounted in a framed and painted glass fronted board shall be supplied and installed in the boiler room or other location as dictated by the Services Engineer.

The chart (or charts) shall show all pipework diagrammatically and identify the purpose and location of each valve.

All pipework insulation shall be fitted with colour coded identification bands having lettered symbols designating the service, pipe size and direction of flow at all valves, junctions, where pipes enter or leave rooms and 2m intervals throughout the installation. All pipe sizes shall be indicated in mm.

When preparing the work drawings and carrying out the installation work, the Contractor shall ensure that adequate clearances are available for man access, maintenance, removal and replacement of plant and equipment, operation of valves and dampers, reading of instruments, inspection, changing filters and similar activities.

Horizontal and vertical clear access ways shall be 0.8m and 2.1m respectively. Any deviations from these principals and dimensions shall be brought to the notice of the Services Engineer at the time of preparation of the working drawings.

The Contractor shall supply all relevant information, including dimensioned sketches, manufacturer's certified drawings and options available to assist in making decisions with regard to arrangements.

2.4 LTHW HEATING INSTALLATION PIPEWORK AND FITTINGS

All LTHW heating pipework shall be crimped copper throughout.

Horizontal pipework shall have a gradient to permit draining at low points and venting at vent points, or at radiators, of not less than 1 in 250. Where fixed along walls or floors the pipe surfaces (or if lagged, the lagging) shall have a clearance of 25mm from wall and 50mm from floors at the lowest points. All reductions in size of horizontal pipework shall be made with eccentric fittings. Careful observance of parallels and symmetry of arrangements is required throughout, always providing that the air gradients are maintained. Pipework in plant rooms shall be arranged so that a minimum of 25mm shall remain between the lagging on any two pipes.

All pipes shall be fixed with sufficient clearance from walls, floors, joists, or other obstructions capable of resisting length-wise expansion. In the interests of neatness and to avoid the necessity of pipe joints occurring within the thickness of a wall short radius elbows on heating circuits shall not be used.

Efficient watertight plugs shall be inserted in all pipe ends left disconnected during the progress of the works; plugs of shavings, paper etc. shall not be used.

The Contractor shall include for setting and bending of all pipes. Sets shall be formed on the flow and return branches of all radiators, vertical pipes where the walls reduce in thickness, pipes which pass over floor joists or mouldings, and around window recesses.

Radiators throughout the project are to be new. Radiators to be Low Surface Temperature (LST) panel radiators (as manufactured by Stelrad LST Plus). All radiators shall be complete with **Pre-Settable TRV's** on the flow connection and lockshield on the return connection. All pipework drops to serve radiators shall be boxed in or run inside partitions to avoid risk of scolding from hot surface.

Valves shall be fitted to the manufacturer's requirements (in line with good practice) as identified on the design drawings. Up to 65mm all valves shall be of bronze construction, with a pressure rating of PN20 as manufactured by BOSS. Above 65mm all valves shall be of bronze construction, with a pressure rating of PN16 as manufactured by Hattersley.

Valves incorporating orifice flow measuring devices shall be fitted in heating circuit return pipework. Up to 65mm orifice flow measuring devices shall be of bronze construction, with screwed connections to a pressure rating of PN20, complete with 2 No self sealing pressure tappings. Above 65mm orifice plates shall be of stainless steel construction, with flanged connections to BS 1092, PN16, complete with 2 No self-sealing pressure tappings.

Up to 65mm double regulating valves shall be of the bronze oblique pattern type manufactured in accordance with BS 5154, with screwed connections, complete with positions indicator, lockable adjustable setting position and characterised regulating plug, with a pressure rating of PN20. 65mm and above double regulating valves shall be of the cast iron oblique pattern type manufactured in accordance with BS EN 13789, with flanged connections to BS 1092, complete with position indictor, lockable adjustable setting position and characterised regulating plug, with a pressure rating of PN16.

Drain cocks in Plantrooms and in concealed positions shall be bronze to BS EN 1982 and shall be Crane Fig No D3441/2 or equal and approved.

Drain cocks at low point elsewhere in the system shall be bronze to BS EN 1982 and shall be Crane Fig No D349 or equal and approved.

All valves shall be suitable for the working pressure and temperature of the pipeline to which they are fitted except that no valve shall have a working pressure of less than 3.5 bar.g (50 psig).

Isolating valves shall close with clockwise rotation of the hand wheel which shall be clearly marked with the works 'open' and 'shut' with adjacent direction arrows and be fitted with a clear position indictor.

The location of valves shall be arranged to facilitate ease of access.

2.5 HWS & CWS INSTALLATION PIPEWORK AND FITTINGS

The Contractor shall install the water services in accordance with the 'Water Supply (water fitting) Regulations 1999.

The Contractor shall either confirm in writing that they are an WIAPS approved plumber or provide a copy of the notification documentation required under Regulation 5 prior to commencing any work on the water services.

All hot and cold water service pipework located internally shall be carried out using light gauge copper tube to BS EN 1057. All copper pipework shall be crimped.

Where formed bends or offsets are employed, a correctly sized bending spring or former shall be used. No pipework shall be permitted where any kinking, rippling or distortion of the bore has occurred. Formed 90° bends shall not be permitted in exposed pipework.

All mains cold water service pipework carried underground externally shall be medium density polyethylene (blue) tubing.

Stopcocks shall be fitted to each appliance having a float operated ball valve. Gate valves shall be fitted to the DHW and MCW.

Stopcocks or gate valves shall be fitted to each draw off or range to draw off points as applicable.

All meters on the mains cold water supplied shall be approved by the appropriate Water Authority and shall be valved both sides.
When existing service are reconnected the pipework must be adequately flushed, pressure tested and be part of the chlorination.

2.6 VENTILATION AND DUCTWORK INSTALLATION

All ductwork shall be galvanised steel round sprial and square installed in accordance with DW144 in all aspects. Appropraiet access hatches shall be providd for the furture inspection and cleaning of the installation. All ductwork shall be insulated.

Dampers shall be provided to enable system balancing and these shall be the single blade type.

All ductwork sizes shall be selected to ensure there is no nuisance noise in the system and the following limiting velocities will apply;

Main run – 6 m/s
Branch duct – 4.5 m/s
Final connection – 2.5 m/s
Discharge velocity from grille/diffuser – 2 m/s

All grilles and diffusers shall be selected to achieve their design velocity without nuisance draughts or noise. All grilles to be approved by the architect but at this tie assume swirl diffusers with a plenum box on the rear for both supply and extract.

2.7 FLUSHING OUT OF THE DOMESTIC HOT AND COLD WATER SYSTEMS & CHLORINATION AND CLEANSING

The hot and cold water service systems shall be thoroughly flushed out before commissioning and handover of the installation in accordance with current Water Authority regulations. This includes the reconnected services.

All water services pipes and tanks are to have suitable chlorination treatment (in conjunction with the supplying Authority) and flushing out followed by confirmatory tests to ensure that bacteriological contamination is not present. The Contractor shall provide Certification to the Consulting Services Engineers detailing the results of these tests.

Provide water treatment throughout development on completion of each respective phase to ensure all systems are free from contamination. Provide at each phase commissioning, treatment and sampling results such that the client can maintain a record of safe operation of the building domestic services throughout the construction activities.

2.8 WATER TREATMENT OF HEATING SYSTEM

Unless otherwise stated the whole of the heating system shall be treated with Fernox C.H. anti-corrosion liquid. The liquid shall be applied to the manufacturer's recommended concentration of 1 in 20.

The correct content of the heating installation must be calculated by the Contractor.

Water treatment is not regarded as essential for water used for small purposes of pressure testing and it is assumed that small sections or the whole of the work may be pressure tested using raw mains water.

If the system or any part of the system is drained (eg. for repair of leakages and removal of radiators for painting), then raw water added to the installation must be treated as above.

On completion of the treatment a sample of the water is to be taken in the presence of the Consulting Services Engineer or his representative forwarded to a certified laboratory for analysis and comments.

2.9 FIRE STOPPING

All pipework or ductwork when passing through a fire compartment wall shall be fire stopped by packing the gap between the pipe and its sleeve with an approved asbestos free fire stopping material. All ductwork to have fusible link fire dampers with ring pulls to aid resetting and appropriately positioned access hatches for regular testing. All making good around the installed fire damper shall reflect the rating of the compartment line being penetrated.

In all instances the fore protection elements and components shall be strictly installed in line with the manufacturers details.

2.10 THERMAL INSULATION

The following specification refers to the requirements for heating, domestic hot water and cold water services and the Contractor shall apply the appropriate clauses in conjunction with the respective materials and systems specified.

No insulation shall be applied until completion of pressure and circulation tests.

All pipework etc. shall be installed so that there is adequate space between pipes, walls, floors and ceilings for the insulation to be correctly fitted. No insulation shall touch a wall, floor or ceiling or the insulation of another pipe. If this occurs, the pipework shall be removed and re-fixed to give the necessary clearance, at the Contractor's own expense.

A neat appearance must be maintained throughout the installation and the Contractor shall be held responsible for setting out of pipe runs so that insulation may be properly applied.

Each pipe shall be individually insulated.

To ensure that the correct thickness has been applied the Contractor shall remove one section of each type of insulation specified, the cost of cutting out or removing a section of each type shall be included in the Contract. If defects are revealed the Contractor shall at his own expense remove the whole of the covering and provide and fix new installation to the satisfaction of the Services Engineer.

Where roller supports are specified the insulation shall terminate to allow for the expansion of the pipe such that the insulation remains clear of the roller support.

All pipework in plant rooms, roof void, ducts, false ceilings, vertical ducts or boxed out must be insulated. All exposed metal work components within the plantrooms shall be complete with muff wraps made to fit the specific component and fitted by manufacturer.

Cold Water, Domestic Hot Water and Low Temperature Hot Water heating pipework, vessels, tanks and equipment shall be insulated with : Kooltherm non HCFC Phenolic Foam, bore-coated pre-formed sections or slabs with factory applied Bright Class O reinforced aluminium foil facing. As manufactured by Kingspan Industrial Insulation or equal and approved.

DHW and MCW shall have a minimum insulation thickness of 20mm for mains services and 15mm for small bore local services. LTHW heating shall have a minimum insulation thickness of 25mm for mains services and 15mm for small bore local services.

2.11 GAS INSTALLATION PIPEWORK AND FITTINGS

The gas installation must be installed in accordance with the requirements of the Gas Safety (Installation and Uses) Regulations 1998. The installation must be carried out by a gas safe registered installer.

All gas service pipework internal to the building shall be heavy quality mild steel tube to BS 1387 or copper tube to BS EN 1057 Table 1 as specified in Section 3.

The pipework shall be erected as described for heating pipework. Square tees shall be used throughout.

Gas cocks shall be fitted to all outlet points, these shall be Crane type D191/TPN25 ball valves complete with ‘T’ handle capable of being locked in the fully open or closed position.

Unions shall be fitted on gas pipework to allow for dismantling the pipework and on the downstream side of each cock and at the connection to each item of equipment. The unions shall be Navy type with spherical brass seats.

All gas service pipework buried underground externally shall be medium density polyethylene (yellow) tube. All gas pipework entries to buildings shall rise from the ground and be complete with emergency ECV on the outside of the building (within tamper proof boxing).

Connection to existing services in kitchen to be tested.

2.12 TESTING BALANCING AND COMMISSIONING

The Contractor shall include in his Contract Sum for the testing, balancing and commissioning of the mechanical services plant installed under this Contract.

Where required or detailed in the Specification, specialist equipment shall be tested and commissioned by the manufacturer of the equipment and the cost of this shall be included in the contract sum. The Contractor shall be responsible for ensuring that this work is carried out to coincide with the contract programme. Test

Certificates shall be provided by the Contractor showing results of each test. The Contractor shall be responsible for ensuring that when a test or commissioning procedure has been satisfactorily carried out, two copies of the Test Certificate are signed by the Services Engineer or his representative. One copy shall be retained by the Contractor and the other shall be returned to the Services Engineer.

The Contractor shall include in his contract sum for attendance during the testing, commissioning and acceptance of all plant and equipment included in the contract.

Prior to a test taking place on a system or a section of a system, a general inspection of the work to be tested shall be made by the Contractor and the Services Engineer or his representative.
In the course of these inspections, the following points shall be checked :-

a) That all components comprising the system or section of a system, as described in the Specification and drawings have been installed.
b) That these components conform exactly to the requirements of the Specification and drawings, and have been installed correctly.
c) That all manufacturer's test data for plant or components necessary for testing, balancing and commissioning have been provided and are available for reference.

Any plant supplied by the Contractor or any work carried out by him which is found to be unsatisfactory by the Services Engineer or as a result of a test, shall be replaced by new plant or the fault corrected after which the test shall be repeated to the satisfaction of the Services Engineer at the Contractor's own expense.

On completion of sections of the system, that system shall be flushed and thoroughly cleaned out to remove any foreign matter and shall be cleaned externally to remove any paper labels, dirt and grease etc.

Prior to any tests, the plant and all equipment shall be thoroughly cleaned out by the Contractor.

The systems shall be tested in sections following completion of the work to a static pressure equivalent to 1.5 times the normal operating pressure of the system for not less than 2 hours.

After the heating installation has been set to work and operating at normal pressure and temperature conditions, it shall be inspected for leaks by the Contractor and the Services Engineer or his representative. The minimum duration of the test shall be 24 hours.

The Contractor shall demonstrate to the satisfaction of the Services Engineer or his representative that each item of plant or equipment performs to the specified duty. In establishing the performance of a plant item, the Contractor shall measure and record motor and plant speeds, voltages, currents, pressures, air quantities, water quantities and temperature etc.

The system shall be balanced as described in the CIBSE Commissioning Codes and BSRIA Commissioning Codes.

The balancing shall be carried out in two stages, preliminary balancing and final balancing and shall last a total of not more than two weeks, which may be split into separate and discontinuous periods. The balancing may have to be carried out outside normal working hours and the Contractor shall be required to allow for this.

The preliminary balancing shall be carried out as a final stage in the completion of the building.
The final balancing shall be carried out when the system is ready to be handed over, the records, certificates etc. of the systems duties shall be supplied to the Services Engineer. During the balancing the Contractor shall operate the installation under normal working conditions and he shall account for this in his Contract Sum.

Prior to balancing each installation, the Contractor shall carry out all necessary plant proving tests relating to the mechanical equipment.

These tests shall include verification that all equipment has been correctly wired, rotating parts move in the correct direction and are correctly balanced dynamically etc.

The Contractor shall ensure prior to the operation of any item of plant or equipment that all moving parts are correctly lubricated and shall be responsible for any fault arising from failure caused due to his negligence regarding his procedure and shall replace all damaged parts of equipment.

On a date to be decided by the Services Engineer, after the completion of all the installations, building works and all systems have been balanced, the Contractor shall carry out commissioning of each of the installations described in the Specification.

During the commissioning the Contractor shall set all the installations to work, demonstrate and explain the operation and maintenance procedures for each system, for each item of plant to the Employer’s Representative and in the and in the presence of the Services Engineer or his representative.

Should any part or component of the installation be found to be unsatisfactory, in the opinion of the Services Engineer, the fault shall be rectified and new components fitted and commissioned by the Contractor at his own expense. Any system, or part thereof, affected by the replacement shall then be re-balanced and commissioned at the Contractor’s own expense.

2.13 EXISTING UNDERGROUND SERVICES

It will be the Main Contractor's responsibility to establish whether any existing underground services require diverting and in this respect shall arrange for the statutory undertakings to attend site prior to any excavations taking place. Should any site scans be necessary these shall be arranged by the Main Contractor.

The contractor shall allow for the works associated with the relocation of the internal gas meter to an external location as depicted. All utility applications, liaison and management of the works shall be the responsibility of the contractor.

SECTION 3 – PARTICULAR SPECIFICATION

3.1 CONSULTANTS ROLES AND RESPONSIBILITIES

ALH have been appointed to carry out a Detailed Design Duties as part of their appointment to the Main Contractor and this Specification has been prepared based upon outline discussions with all parties.

ALH will also be responsible for vetting Contractor design development proposals to ensure adherence with this Specification.

ALH may undertake periodic inspections on site to review installation methods and standards of workmanship (scope TBC). The Contractor shall provide a Construction Programme indicating key milestone dates for the mechanical services installation to allow programming of these inspections on behalf of the Client.

3.2 SCOPE OF WORKS

The Contractor shall be responsible for the manufacture, fabrication, supply, delivery to site, offloading, storage, installation, connecting up, testing, commissioning and setting to work all mechanical services, either installed by them or a sub-contractor/supplier in the scheme.

This shall be all as necessary to form a complete and working installation in accordance with the requirements of this Specification, layout drawings, schematic drawings, Building Regulations, Building Control, Good Engineering Practice plus all applicable standards including but not limited to EYFS and to the satisfaction of the Services Engineer/Client.

Supply, design, installation, testing and commissioning of all mechanical systems itemised in this specification and the general technical requirements as outlined in sections 1&2 of this specification.

Commissioning of all systems in accordance with good engineering practice, relevant British Standards, BSRIA commissioning codes, CIBSE Commissioning Guidelines and Approved Codes of Practice.

Co-operation and liaison with the statutory supply authority and other statutory bodies to ensure a complete and acceptable installation to allow connection of appropriate supplies and meters.

Co-ordination with Sub-Contractors to ensure a fully co-ordinated design/installation is provided.

Provision of test results, commissioning data, record drawings and operation and maintenance manuals in accordance with the requirements of Section 1 of this

Performance Specification and CIBSE commissioning guidelines.

Adherence to a programme of works agreed with the Client, including any phasing of the works.

The Contractor shall be responsible for the production of the Part L compliance report as necessary to meet the requirement of the building regulations.

The Contractor shall provide evidence of adequate insurance cover in respect of Professional Indemnity, Third Party Liability and Employers Liability.
Copies of the above should be forwarded to the Client and Consulting Services Engineer.

The mechanical works include the following equipment and systems but not limited to:-

a) Decommissioning existing services as describe in the Enabling work
b) Incoming Mains cold water services to be rerouted
c) Low temperature hot water heating installation
d) Radiator Heating Installation
e) Domestic hot and cold water service installation
f) Fan coil installation for cooling and heating services (Split System)
g) Above ground drainage installation
h) Ventilation systems installation
i) Automatic controls to the mechanical plants

The Contractor shall provide Building Control with sufficient documentation to prove compliance as requested.

Documentation shall include but not be limited to the following:
All items included on the Building Regulations Compliance Checklists including ‘As Designed’ and ‘As Built’.

3.3 BUILDERS WORK IN CONNECTION WITH MECHANICAL SERVICES

All builders work (unless stated) shall be carried out by the Main Contractor.

The Contractor shall provide a schedule of builders work requirements including specific details and drawings (where required) to the Main Contractor for completion.

The Contractor shall be responsible for marking-out (on site) the correct position of all holes, chases, trenches, plant bases/supports, etc required by him. The Main Contractor shall be responsible for all making good.

3.4 ELECTRICAL WORK IN CONNECTION WITH MECHANICAL SERVICES

All electrical work (unless stated) shall be carried out by the Contractor. Claims arising from lack of knowledge shall not be considered.

3.5 SERVICES DISTRIBUTION STRATEGY

The gas service will be installed to suit the new layout as depicted on the drawing. New gas services from the meter to all appliance will be undertaken. Contractor must modify the existing service in the kitchen as detailed in the plant schematic. Contractor to ensure the fire Alarm is interlinked with gas safety shut off.

The existing water supply will be re-routed from the point of entry to the new break tank. Contractor shall renew all the services as detailed on the tender drawings. Some part of the installation will be retained, Contractor to ensure that existing pipework is flushed, pressure tested and chlorinated.

All mains incoming services shall have valves at point of entry to the buildings

New heat generation plant shall be provided within the space as depicted to offset the steady state heat loss (without beneficial gains). No diversity shall be applied to the boiler selection. The installed boiler plant shall be selected to deliver heat to the all the LST's and contractor must add a connection for future extension.

Hot and Cold water shall be distributed internally as shown and service valves provided to each point of connection. TMV's shall be provided to each hot water outlet that can be accessed by a child or vulnerable adult.
All domestic services must be insulated

Generally, all LTHW piped services shall emanate from the boiler and will be distributed through ceiling voids or roof space as depicted on the tender drawings. Every pipe causing a risk a scalding shall be protected or be installed into the wall. All services to be insulated

Ventilation systems shall be installed as detailed. New MVHR unit providing supply and extract shall be provided to each area. Timeclock control and fault signals shall be provided back to the central controller.

FCU heating and cooling shall be provided to specific areas as depicted. Timeclock control and fault signals shall be provided back to the central controller.

3.6 DESIGN PERFORMANCE CRITERIA

In order to understand the mechanical engineering services installation, the Contractor must familiarise himself with the Architect's drawings, the construction and layout of the building. It shall be deemed that the Contractor shall have thoroughly examined and allow for all elements of the construction within his tender

and shall undertake a full site survey during the tender period to ascertain the modifications necessary to the existing infrastructure to facilitate a fully functioning system. No claims arising from lack of survey will be entertained.

All systems shall be designed on the following basis;

External Winter Temperature:	-5 ºC
External Summer Temperature:	28 ºC dB 20 ºC wB
Internal space (Nursery):	23 ºC
Internal space (Circulation):	21 ºC
Internal Space (Utility):	18 ºC
Internal Space (Café & Softplay):	21 ºC Winter NA ºC Summer
Internal Space (Kitchen,):	16 ºC
Internal Space (Toilets,):	18 ºC
Internal Space (Meeting Room, Office):	21 ºC Winter NA ºC Summer
Internal Space (Staff Room):	21 ºC Winter NA ºC Summer

Internal noise levels shall not exceed NR35 in occupied spaces and NR45 in circulation and ancillary areas. Plantroom shall not exceed NR50.

All calculation shall be undertaken in accordance with CIBSE Guide A and submitted to the EA for review and comment.

All ventilation rates to be provided are as per the drawings. Contractor to review occupancy with Client during detail design.

3.7 EXISTING UNDERGROUND SERVICES

Prior to commencement of the works the exact positions and depths of services must be obtained from all the utility companies.

The contractor shall allow to undertake intrusive investigation as required to locate the existing underground services.

3.8 INCOMING SITE SERVICES

The contractor shall allow for the design, supply, installation, setting to work, commissioning of all incoming utility supplies.

The exiting gas systems is at full capacity, it will be the responsibility of the Contractor when appointed to submit the exact load details to the appropriate gas authorities during the construction process.

Modification of the existing water does not need to be coordinated with water authority and can be undertaken on the internal service only.

3.9 GAS INSTALLATION

The Contractor shall make allowance for the installation of the modified gas supply as detailed on the tender drawings.

The Contractor shall be responsible for the installation of all distribution pipework from the existing meter as depicted which shall terminate at the connections to the boiler and appliances as detailed. The existing Kisten is the only part of the installation that will be retained (modification of the Gas solenoid will be required)

The gas service installation shall include all necessary safety devices, gas solenoid shut off valves, thermal links, knock off buttons and links to the fire alarm system, valves, check meters and purge points to make a complete working system.

The gas service installation shall comply with the requirements of the Institution of Gas Engineers Utilisation Procedures IGE/UP/2. Testing and purging of the gas service installation shall comply with the requirements of the Institution of Gas Engineers Utilisation Procedures IGE/UP/1.

Immediately on entry to the plantroom there shall be a fully labelled ECV. The gas pipework shall route within the building and connect to the new installation. Each connection shall be fully equipped with purge points and isolation valves to allow soundness testing of the system during routine maintenance. A separate gas line shall be routed through the building to the new gas water heater.

The Contractor shall include for liaising with the Gas Authority and the nominated Gas Shipper on all aspects relating to the gas installation and gas meter provision to ensure availability in accordance with the Main Contractors programme of works.

3.10 LOW TEMPERATURE HOT WATER HEATING INSTALLATION

The contractor shall provide new boiler plant within the plantroom as shown on the tender drawings served by the new gas installation.

The boiler shall be fully condensing commercial boiler suitable to offset the steady state heat loss. The boiler shall connect to the system through a proprietary pipe header kit as per those manufactured by Ideal. The boiler shall serve a LST radiators and future provision.

Controls shall be provided for all heating installations providing time clock control of each unit with weather compensated controls for temperature management.

Heating boiler shall be natural gas fired wall mounted boiler. The boiler shall be atmospheric type and shall be high efficiency fully condensing and low NOx specification.

Heating boiler shall be suitable for a maximum operating temperature of 95°C and a maximum working pressure of 4 bar. Boiler shall be tested to at least 1.5 times the maximum system operating pressure. The heating boiler shall be provided fully assembled and works tested packaged units.

The heating boiler shall be provided with the following mountings/fittings :

- Temperature gauges on the flow and return connections
- Pressure gauges on the flow and return connection
- Flue gas temperature test points and pressure test points on the flow and return connections
- Enclosed high lift spring safety valve to comply with the requirements of BS EN ISO 4126
- Isolation valves on the flow and return

Commissioning of the heating boiler shall be carried out by the manufacturer's Specialist Engineer and approved testing and commissioning certificates shall be provided. Commissioning will be witnessed by the Consulting Services Engineer.

The heating boiler shall be provided with a balanced flue system from the boiler outlet to atmosphere. Proprietary flue kits shall be used to suit the boiler selection installed to fall as per the manufacturers requirements complete with condensate traps and drain connection.

The boiler flue system shall be designed and installed by a Specialist in accordance with the requirements of BS 5440, BS 5854, BS 6644 and the boiler manufacturer's recommendations. Contractor to coordinate with roofing contractor to replace existing flue penetration.

Air for combustion shall be provided by natural means in accordance with the requirements of BS 6644. Suitable high and low level air vents within the plantroom doors shall be provided – refer to architects information for details. The contractor shall liaise with the architect to ensure sufficient air for combustion is provided and additional ventilation to prevent temperatures in the plantroom becoming excessive.

Frost protection shall be provided to the plantroom by means of an electric panel heater.

Water shall be circulated around the building using suitably sized circulation pumps, located adjacent to the boiler and shall connect the boiler plant to the heating circuits serving the building.

The pumps shall be variable volume and shall have infinitely variable speed adjustment suitable for proportional pressure control and shall include pipeline mounted sensors and wiring to achieve correct control. The units shall control through integral control on constant pressure setting.

No noise or vibration must be transmitted from circulating pumps to the building. Care must be taken to ensure pumps and associated pipework are properly isolated from the structure.

The LTHW system shall be maintained at pressure by automatic pressurization unit operated as required.

Initial filling of the LTHW system shall be in accordance with the requirements of the Water Supply Regulations and to the approval of the Water Authority.

The LTHW system shall include all necessary safety devices valves, commissioning stations, differential pressure valves, temperature/pressure gauges, heat meters, all vents, drain points, chemical dosing test points etc. to make a complete and working system.

All installations shall have Pre-Settable TRV's at each radiator maintaining temperature control at each emitter.

The heating boiler commissioning tests shall include :
- Boiler output related to the required boiler performance
- Boiler efficiency tests at full load, 50% load and 30% load
- Flue gas analysis including CO2 and NOx emissions analysis of flue gases in accordance with BS 1756.

Burner shall be fully automatic units matched to the heating boiler. Burner shall have electronic ignition, flame failure protection and fully modulating control.

3.11 VENTILATION SYSTEMS

The new MVHR systems based on units as supplied by S&P shall be provided as depicted on the tender drawings. The new plants shall be Installed in the roof void using the access to be coordinated with Main Contractor. A specialist lifting contractor must be consulted to ensure the safe installation and locating the units.

Controlled centrally from a specifically design panel. The installation shall provide tempered and filtered air to all areas as detailed. The system shall be selected to limit the production of nuisance noise and ensure all items of equipment are accessible for maintenance. Please refer to the control section.

The MVHR units shall be installed in the roof void as depicted on the drawing. Contractor must include for sufficient antivibration to limit noise transmission.

Localised MVHR units shall be provided as depicted on the tender drawings linked to internal spaces and external intake and discharge locations.Roof penetration must be coordinated with Main Contractor.

No supply air grille shall have a terminal velocity over 2m/s and no extract over 2.5 m/s.

Volume control devices to be provided to all systems to ensure system balancing can be achieved without adverse noise generation.

Acoustic transfer grilles shall be provided to enable air transfer to meet the air management as depicted on the tender drawings. The transfer grilles shall be selected to meet the same level of performance as that of the wall they are penetrating. Refer to the tender drawings for free area requirements of the transfer grilles.

Extract shall be provided from toilet areas as depicted on the tender drawings controlled from the main control panel.

All extract to be removed via grilles. Each valve shall be selected to ensure no nuisance noise is generated at the required volume as depicted on the tender drawings.

All supply and extract ductwork for the MVHR systems must be insulated with the final connections to the supply and extract plenums complete with no less than 600mm of RIGADUCT to provide cross talk attenuation. Where main duct runs pass through acoustic separation the duct shall be treated accordingly to ensure no adverse transfer of noise. This can be either through the use of Cross Talk Attenuators (CTA) or acoustic cladding around the circular ducts. Acoustic specialist to be engaged by the main contractor shall advise.

The central MVHR ventilation system shall be controlled via a central control system to provide variable speed drives (mounted locally to MVHR), time clock control (set by user interface), temperature control of supply air (set by user interface), optimised control for internal temperature management, filter dirty indicators, duct mounted temperature sensors (incoming air, discharge air, supply and extract.
The MVHR Electric heater to be controlled from the MVHR panel when required.

The local MVHR units shall be package units complete with all controls aligned to the above requirements and have a time clock and fault signal interface only to the central control system.

Outside Air to the Marjorie Lewis Room and Sylvia Watling Hall to be supplied to the back of the FCU as depicted on the drawings.

3.12 LOCALISED COOLING

The contractor shall provide split systems as detailed to serve the Marjorie Lewis Room and Sylvia Watling Hall.

The space shall have a dedicated wall mounted controller allowing local temperature control. The entire system shall be time clock controlled through the BMS.

All Systems shall be installed in accordance with BSRIA TN 10/97.

The contractor shall include for a specialist installer, approved by the manufacturer, to supply, deliver, offload, erect/install, test, commission and set to work all the items as described below and detailed herein to the areas as detailed on the drawings.

Locate the external condensing units as detailed and as approved by the architect.

All systems shall be installed by a Specialist Refrigeration Installer. The refrigerant pipework installation, charging, testing and commissioning should be carried out by REFCOM registered refrigeration engineers, who shall be fully trained in the safe handling of refrigerants and CITB trained in brazing techniques – Oxygen free dry nitrogen must be in the system during brazing (no cold brazing is allowed).

The installation of all internal and external units, refrigerant pipe work, inter-connecting controls and power wiring, commissioning and testing, shall be carried out by the manufacturers approved installers using employees fully trained in the commissioning procedures and the equipment method of operation.

The installation is to comprise all interconnecting refrigerant pipework, all condensate pipework, all associated pipework bracketing and insulation, and all associated power and control wiring between indoor and outdoor units.

Approved testing and commissioning certificates shall be provided. Commissioning will be witnessed by the Consulting Services Engineer.

3.13 DOMESTIC HOT AND COLD WATER SERVICE INSTALLATION

All systems, components, fixtures, fittings etc. used throughout the scheme shall be WRAS approved.

The existing mains cold water service shall be redirected to the new break tank.

The MCW pipework shall connect to break tank sized to accommodate the peak 10 minutes discharge of the booster sets if required – see above.

Supply and install a packaged cold water booster set in the plantroom (run-standby) to transfer cold water from plant to serve the services. Contractor to provide a capped off connection for future extension.

Size the booster set to accommodate the peak instantaneous flow rate when assessed using the methodology as stipulated by the BS EN 806 including a capacity margin of 10% on both the head pressure and volume.

All internal services shall be run in copper table X pipework with all fittings complying with the requirements of BS 1254-1-6.

Each connection shall have a main isolation valve and lever operated ball-o-fix valves located as close to each fitting as possible shall be provided. In addition to ballofix service valves on the sanitary ware. Where pipework is exposed, it will be run in a neat and tidy manner and is to be as unobtrusive as possible. Where pipework is concealed within void or duct it must be insulated with foil face insulation. Each secondary return leg shall be equipped with a thermostatic control valve ensuring a hot water return at no less than 55 ºC.

The pipework shall route around the buildings as noted on the tender drawings to serve the outlets as depicted. The pipework shall route in ceiling voids or roof space and shall be fully insulated in all locations.

The DHWS shall be generated via a new gas water heater as depicted on the tender drawings.

The hot water generation shall be installed strictly in accordance with the manufacturers recommendations.

All new service outlets shall be protected by thermostatic mixing valves (TMV3 compliant). Thermostatic mixing valves shall be installed to control the hot water outlet temperature at showers, sinks and wash hand basins.

Following cleansing and chlorination, thermostatic mixing valves shall be set to the following outlet temperatures :-

- Showers 41ºC
- Wash hand basins 41ºC
- Kitchen 55°C

All thermostatic mixing valves shall be checked for automatic shut down on loss of cold water supply.

The domestic hot and cold water systems shall include all necessary safety devices, valves, back-flow protection, gauges, heat meters, water meters, air vents, drain points, insulation and test points.

Water systems shall comply with HSE Approved Code of Practice L8, CIBSE publication TM13/1991, BS6700 and IOP Guide applying to the design and testing of hot and cold water services.

The Contractor shall provide a Legionella Risk Assessment supplemented by schematic drawings to include details of sentinel points for testing and other maintenance regimes including an asset register before Practical Completion.

Chlorination of the water systems shall take place at the completion of each phase on the entire section or any section affected by the construction works to ensure a safe and complaint installation. The contractor shall implement a scheme of precautions to maintain a safe system through to full handover of all sections. Water samples are to be taken to verify the safety of the system in the final week before handover is accepted.

3.14 ABOVE GROUND DRAINAGE INSTALLATION

The above ground drainage shall be new throughout and shall be connected to the new and existing below ground drainage provided by others. Where modified the Contractor shall supply, install, test and commission the above ground drainage installation in accordance with BS 5572, BS EN 12056 : 2000 and Building Regulations Approved Document H.

In all cases where modified or not the above ground drainage installation shall be designed and installed to ensure that all water supply points are provided with a drainage connection into an adjacent soil stack and furthermore that each appliance is provided with a trap with a depth seal of not less than 50mm to prevent escape of foul air into the building.

Generally, all concealed stack and branch pipework and fittings shall be solvent welded uPVC (PVC-U).

3.15 AUTOMATIC CONTROLS AND BUILDING MANAGEMENT SYSTEM (BMS)

A new automatic controls and monitoring installation shall be provided to serve the new mechanical services plant to provide audible and visual alarms in the event of a failure. The new system shall provide time clock control of all plant including boiler, booster set, MVHR, split systems, LTHW. The system shall control the operation of the boiler and booster set along with hardwired interlocks for water pressure. The system shall provide temperature monitoring of the LTHW and DHW systems and raise alarms if this is out of range for a predetermined period of time. Fault signals shall be presented using an audible alarm within the communal space within the building and a beacon which will flash.

The controls requirements for the development shall be considered a light touch to ensure the systems operate and can be monitored. The critical feature of the proposed BMS system is the ability for remote notification in the event of a system or component failure.

User interface shall be provided by plantroom mounted panel screen providing user interface to change set points, acknowledge alarms and control plant function/time clocks.

The system proposals would be acceptable as a Priva Blue or Easy IO System to provide automatic control of the development without a high spec requirement for extended monitoring and the associated cost.

3.16 COMMISSIONING/COMPLETION CERTIFICATION

Before a certificate of Practical Completion can be issued the Contractor must provide an O&M Manual and Commissioning Certificates in accordance with sections 1&2 of this Specification.

The O&M Manuals shall be submitted to the Services Engineer in draft format at least 4 weeks before Practical Completion to allow the draft O&M Manual to be reviewed for completeness and technical content on behalf of the Client.

Failure to provide the required completion documentation will delay issue of the practical completion certificate until all the documentation has been provided in acceptable format.

Appendix No 1 – MANUFACTURERS SCHEDULE

The schedule below represents the tendered requirements. Any alternative to be submitted in writing to the Contract Administrator for approval and shown as below the line in tender submission. Alternatives must be equivalent in all aspects.

ITEM	PLANT ITEM	MANUFACTURER(S)
1	Boiler	Ideal or Similar
2	Pump sets	Grundfos or Similar
3	Pressursation Unit	Mikrofill or Similar
4	Booster Set	Duty Point or Similar
5	DHW Generator	Lochinvar or Similar
6	Water Tanks	Duty Point or Similar
7	Valves	BOSS or Similar

8	Pipework (Heating and Domestic Services)	Copper Table X – Mapress crimped throughout or Similar
9	Above Ground Drainage	Geberit UPVC or Similar
10	Insulation	Kingspan or Similar
11	MVHR Unit	S&P or Similar
12	LST Radiators	Stelrad LST Plus or Similar
13	Split systems	Mitsubishi or Similar
14	Grilles Diffusers	Gilberts or Similar
15	Acoustic Transfer Grilles	Swegon

Appendix No 2 – MATERIAL SCHEDULES

Fan Schedule

Room	Fan Reference	Related Drawing	Unit Type	Manufacturer	Manufacturer Ref	Volume (l/s)	NOTE
Marjorie Lewis Room	MVHR17.1	50-03	MVHR	S&P	CADB-HE D 16 LH PRO-REG	250	
Sylvia Watling Hall	MVHR26.1	50-03	MVHR	S&P	CADB-HE D 16 LH PRO-REG	250	
Changing Rooms	MVHR1.1	50-03	MVHR	S&P	CADB-HE D 04 LH PRO-REG	90	With Electric Heater
Mens WC	MEV1.1	50-03	MEV	S&P	CAB-250 ECOWATT	105	

Diffuser Schedule 1-2

Room	Flow Rate l/s	Ventilation Type	Diffuser Type	Reference	Type	Manufacturer	Manufacturer Ref	Diameter (mm)	NOTE
Store Room	250	MVHR17.1	Bell Mouth	BM17.1	Supply	NA	NA	350	
Bush Room	250	MVHR26.1	Bell Mouth	BM26.1	Supply	NA	NA	350	
Changing Room 1	45	MVHR1.1	Air Valve	SG1.1	Supply	GILBERTS	SX-200	200	
Shower 1	45		Air Valve	EG1.1	Extract	GILBERTS	GXD-200	200	
Changing Room 2	45		Air Valve	SG2.1	Supply	GILBERTS	SX-200	200	
Shower 2	45		Air Valve	EG2.1	Extract	GILBERTS	GXD-200	200	
DDA WC ROOM	18		Air Valve	EG3.1	Extract	GILBERTS	GXD-125	125	
MANS WC	15	MEV1.1	Air Valve	EG12.1	Extract	GILBERTS	GXD-125	125	
	15		Air Valve	EG12.2	Extract	GILBERTS	GXD-125	125	
	15		Air Valve	EG12.3	Extract	GILBERTS	GXD-125	125	
	15		Air Valve	EG12.4	Extract	GILBERTS	GXD-125	125	
Ladies WC	15		Air Valve	EG11.1	Extract	GILBERTS	GXD-125	125	
	15		Air Valve	EG11.2	Extract	GILBERTS	GXD-125	125	
	15		Air Valve	EG11.3	Extract	GILBERTS	GXD-125	125	

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Diffuser Schedule 2-2

Room	Flow Rate l/s	Ventilation Type	Diffuser Type	Reference	Type	Manufacturer	Manufacturer Ref	Diameter (mm)	NOTE
Marjorie Lewis Room	175	FCU17.1	Asjustable Swirl Diffuser	SG17.1	Supply	GILBERTS	GSR-B-500	350	With Plenum
	175		Asjustable Swirl Diffuser	SG17.2	Supply	GILBERTS	GSR-B-500	350	With Plenum
	175		Asjustable Swirl Diffuser	SG17.3	Supply	GILBERTS	GSR-B-500	350	With Plenum
	175		Asjustable Swirl Diffuser	SG17.4	Supply	GILBERTS	GSR-B-500	350	With Plenum
	175		Asjustable Swirl Diffuser	SG17.5	Supply	GILBERTS	GSR-B-500	350	With Plenum
	175		Asjustable Swirl Diffuser	SG17.6	Supply	GILBERTS	GSR-B-500	350	With Plenum
			Asjustable Swirl Diffuser	SG17.7	Supply	GILBERTS	GSR-B-500	350	With Plenum
	175		Asjustable Swirl Diffuser	SG17.8	Supply	GILBERTS	GSR-B-500	350	With Plenum
Sylvia Watling Room	200	Asjustable Swirl Diffuser	Asjustable Swirl Diffuser	SG26.1	Supply	GILBERTS	GSR-B-500	400	With Plenum
	200		Asjustable Swirl Diffuser	SG26.2	Supply	GILBERTS	GSR-B-500	400	With Plenum
	200		Asjustable Swirl Diffuser	SG26.3	Supply	GILBERTS	GSR-B-500	400	With Plenum
	200		Asjustable Swirl Diffuser	SG26.4	Supply	GILBERTS	GSR-B-500	400	With Plenum
			Asjustable Swirl Diffuser	SG26.5	Supply	GILBERTS	GSR-B-500	400	With Plenum
	200		Asjustable Swirl Diffuser	SG26.6	Supply	GILBERTS	GSR-B-500	400	With Plenum

FCU Schedule

Room	FCU Referenc	Manufacturer	Unit Type	Manufacturer Ref	NOTE
Marjorie Lewis RM	FCU17.1	Mitsubishi	Ceiling Concealed Ducted	PEA-RP250WKA	
Marjorie Lewis RM	FCU17.1	Mitsubishi	Condenser	PUHZ-ZRP250YKA3	
Marjorie Lewis RM	FCU26.1	Mitsubishi	Ceiling Concealed Ducted	PEA-RP250WKA	
Marjorie Lewis RM	FCU26.1	Mitsubishi	Condenser	PUHZ-ZRP250YKA3	

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Radiators (LST) Schedule 1-3

Room	*Room Ref*	*Heating Required (W)*	*Rad Reference*	*Manufacturer*	*Model*	*Type*	*Height (mm)*	*Length (mm)*	*Output (W)*	*Flow Rate*
Changing Room	1	2376	RAD1.1	Stelrad	LST Standard Range	K2	800	1760	2459	0.029
Changing Room	2	2376	RAD2.1	Stelrad	LST Standard Range	K2	800	1760	2459	0.029
DDA WC	3	517	RAD3.1	Stelrad	LST Standard Range	P+	800	760	751	0.009
Store	4	2686								
Spraggings Room	5	4133	RAD5.1	Stelrad	LST Standard Range	K2	800	1560	2152	0.026
			RAD5.2	Stelrad	LST Standard Range	K2	800	1560	2152	0.026
Caretaker Office	6	1343	RAD6.1	Stelrad	LST Standard Range	P+	800	1360	1502	0.018
Corridor	7	1137	RAD7.1	Stelrad	LST Standard Range	P+	800	1160	1252	0.015
Corridor	8	930	RAD8.1	Stelrad	LST Standard Range	P+	800	960	1002	0.012
Foyer	9	9609	RAD9.1	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
			RAD9.2	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
			RAD9.3	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
Store	10	723	RAD10.1	Stelrad	LST Standard Range	P+	800	760	750	0.009
Ladies WC	11	1033	RAD11.1	Stelrad	LST Standard Range	P+	800	1160	1252	0.015
Men's WC	12	1137	RAD12.1	Stelrad	LST Standard Range	P+	800	1160	1252	0.015
Store	13	310								
Store	14	827								
Corridor	15	620	RAD15.1	Stelrad	LST Standard Range	K1	800	960	730	0.009
Corridor	16	620	RAD16.1	Stelrad	LST Standard Range	K1	800	960	730	0.009

Radiators (LST) Schedule 2-3

Room	*Room Ref*	*Heating Required (W)*	*Rad Reference*	*Manufacturer*	*Model*	*Type*	*Height (mm)*	*Length (mm)*	*Output (W)*	*Flow Rate*
Marjorie Lewis Room	17	23868	RAD17.1	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
			RAD17.2	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
			RAD17.3	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
			RAD17.4	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
			RAD17.5	Stelrad	LST Standard Range	K2	500	1960	1566	0.019
			RAD17.6	Stelrad	LST Standard Range	K2	500	1960	1566	0.019
			RAD17.7	Stelrad	LST Standard Range	K2	500	1960	1566	0.019
Kitchen	18	2686								
Westwood Room	19	1447	RAD19.1	Stelrad	LST Standard Range	P+	800	1360	1502	0.018
Doctor's Room	20	1447	RAD20.1	Stelrad	LST Standard Range	P+	800	1360	1502	0.018
Ladies WC	21	620	RAD21.1	Stelrad	LST Standard Range	K1	800	960	730	0.009
Men's WC	22	620	RAD22.1	Stelrad	LST Standard Range	K1	800	960	730	0.009
DDA WC	23	827	RAD23.1	Stelrad	LST Standard Range	K1	800	1160	913	0.011
DDA WC	24	620	RAD23.2	Stelrad	LST Standard Range	K1	800	1160	913	0.011
Olive Haseltine Room	25	5166	RAD25.1	Stelrad	LST Standard Range	K2	800	1960	2776	0.033
			RAD25.2	Stelrad	LST Standard Range	K2	800	1960	2776	0.033
Sylvia Watling Hall	26	12502	RAD26.1	Stelrad	LST Standard Range	K2	800	1960	2776	0.033
			RAD26.2	Stelrad	LST Standard Range	K2	800	1960	2776	0.033
			RAD26.3	Stelrad	LST Standard Range	K2	800	1960	2776	0.033
			RAD26.4	Stelrad	LST Standard Range	K2	800	1960	2776	0.033

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Radiators (LST) Schedule 3-3

Room	*Room Ref*	*Heating Required (W)*	*Rad Reference*	*Manufacturer*	*Model*	*Type*	*Height (mm)*	*Length (mm)*	*Output (W)*	*Flow Rate*
Bush Room	27	5063	RAD27.1	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
			RAD27.2	Stelrad	LST Standard Range	K2	800	1960	2767	0.033
Boiler Room	28	1000	RAD28.1	DIMPLEX	PANEL HEATER					
Store	29	1653								
Store	30	723								
Store	31	310								
Bar Room	32	827								
Bottle Room	33	1343								
Corridor	34	2480	RAD34.1	Stelrad	LST Standard Range	P+	800	1760	2003	0.024
			RAD34.2	Stelrad	LST Standard Range	P+	800	1160	1252	0.015

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Plant Room Schedule

Reference	Main Activity	Related Drawing	Designation	Manufacturer	Model	Manufacturer Ref	NOTE
01	Plant Refurbishment	50-04	Gas Boiler	IDEAL	EVOMAX 2 100 kW		WITH FRAME SYSTEM
02	Plant Refurbishment	50-04	Low-Loss Header	IDEAL			TO MATCH BOILER
03	Plant Refurbishment	50-04	Circulation Pump	Grundfos	Magna 1 D 40-150 F		
04	Plant Refurbishment	50-04	EXPANSION VESSEL	FLAMCO	75 LITRES		RATED FOR 3 BAR
05	Plant Refurbishment	50-04	EXPANSION VESSEL	FLAMCO	75 LITRES		RATED FOR 3 BAR
06	Plant Refurbishment	50-04	Pressurisation Unit	Mikrofill	Mikrofill 3		
07	Plant Refurbishment	50-04	Magnetic Filtre	VEXO	XPOT6		
08	Plant Refurbishment	50-04	BMS panel	NA			
09	Plant Refurbishment	50-04	Secondary Return Pump	Grundfos	Magna 1 25-50 N		
10	Plant Refurbishment	50-04	Booster Set + BREAK TANK	DUTY POINT	SCUBA TANK	WX2-9060-1650	2.58 l/s @ 4.5 BAR
11	Plant Refurbishment	50-04	Water Conditioner	Hydrotec	HY_MAG DN50		2.58 l/s
12	Plant Refurbishment	50-04	Gas Fired Heater	Lochinvar	ECH87-480GCE	ECH87-9060-1250	

Appendix No 3 – MECHANICAL SERVICES TENDER SUMMARY

Hellesdon Community Centre, Hellesdon, Norwich NR6 5QB

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Refurbishment

Item	Description	Price
1.0	Preliminaries	£
2.0	Design	£
3.0	Demolition, strip out and disposal of existing	£
4.0	Gas Services	£
6.0	New Boiler	£
7.0	Heating installation (plantroom)	£
8.0	Heating installation (internal Inc LST)	£
9.0	Domestic hot and cold water service installation (plant)	£
10.0	Domestic hot and cold water service installation (internal)	£
11.0	Mechanical ventilation installation – central MVHR & MEV	£
12.0	Mechanical ventilation installation - distribution	£
13.0	Ducted Fan Coil	£
14.0	Above ground drainage installation	£
15.0	Automatic controls	£
16.0	Wiring associated with Mechanical services	£
17.0	Testing and commissioning	£
18.0	O&M manuals	£
19.0	Provisional Sum for additional unknown works	£ 5,000
	Total	£

Amount in words .....

Signature of Contractor .....

Printed name of Contractors signature .....

Name of Contractor .....

Address .....

.....

Telephone No.....