

**TECHNICAL SPECIFICATION
FOR THE
ELECTRICAL SERVICES INSTALLATION**



**REFURBISHMENT OF THE GALLOWGLASS COMMUNITY CENTRE
MILFORD
CO. DONEGAL**

**PROJECT No. 2361
APRIL 2026**

PREPARED BY:

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A1.0 GENERAL CLAUSES

This section is to be read in conjunction with the main contract preliminaries, any conflict between the two documents must be confirmed in writing to the designated Project Administrator, and a definitive ruling confirmed back to the contractor in writing, prior to acceptance of a tender. Claims based on conflicts between these preliminaries and the main contract preliminaries will not be reimbursed.

Please note Section B of this specification details the scope of works and Section C details of Standards of Materials and Workmanship.

A1.1 PROJECT PARTICULARS

THE PROJECT

Name: Refurbishment Of Gallowglass Community Centre

Location: Milford, Co. Donegal.

Programme: Town & Village Renewal Scheme

EMPLOYER

Name: Milford & District Resource Centre

Address: Milford Co. Donegal

ARCHITECT

Name: Dedalus Architecture

Address: Bath Terrace, Main St, Ballynally, Moville, Co. Donegal, F93 FT72, Ireland

QUANTITY SURVEYOR

Name:

Address:

CIVIL & STRUCTURAL ENGINEER

Name:

Address:

BUILDING SERVICES CONSULTANT

Name: DMAC Consulting Engineers Ltd

Address: Glenturas House, Skeoge Ind Est, 18 Beraghmore Road, Derry BT48 8SE

PRINCIPAL CONTRACTOR

Name: TBC

Address:

MECHANICAL CONTRACTOR

Name: NOT YET SELECTED

Address:

ELECTRICAL CONTRACTOR

Name: NOT YET SELECTED

Address:

A1.2 TENDER

Tender prices shall be submitted on the tender pricing schedules appended to this specification.

Tenders must be returned by the specified date and time, tenders received after the stated time may be rejected.

Unless specifically confirmed by the employer's representative, no payment will be made for tenders.

The scope of works detailed within this tender is for the design development (where required), detailing, manufacturing, installation, works testing, supply, delivery and handing over of the complete installation in working order. The tender must be for the complete installation as detailed within the tender documentation including all incidental sundry components necessary for the complete execution of the work. Supply and installation of all steelwork required to support the services within this works package unless specifically detailed as the responsibility of the others. The subcontractor is to allow for liaison and coordination with the main contractor to ensure all necessary supports are provided.

The subcontractor must clearly describe any works excluded, which he requires to be executed and paid for by others. Any such work not noted is deemed to be included within this tender.

Schedule of Rates

If requested by the employer's representative, the tenderer shall forward within 7 days of when required, a fully priced out schedule of rates with each item priced and totalled to agree with the sub-totals and final total of the tender. These prices shall be the basis for the valuation of any variance of the subcontract works.

The priced schedule of rates is to include all elements of the works. Items not shown separately in the schedule will be assumed to be included in the general rates noted. Detailed rates are also required for all sub-traders' work included in the subcontract.

Warranty to be given by the Subcontractor Employed by the Contractor

Prior to appointment, the tenderer shall provide the employer with the warranties as detailed in the main contract preliminaries. Failure to comply with this clause will invalidate the tender.

A1.3 CONTRACT PRELIMINARIES

Refer to the Main Contract Preliminaries and also contract preliminaries attached to these documents for the information with respect to:

- Contract Conditions/Appendices
- Statutory/General Obligations
- Management/Administration Procedures
- Resources/Temporary Work and Services
- Protecting/Cleaning/Drying/Completing
- Nominated Firms

Note the obligations imposed upon the main contractor and, where applicable, co-operate with him in his compliance with the said obligations, including provision of all necessary information in respect of the subcontract works to enable the main contractor to carry out his obligations in respect of the entire works.

A1.4 DISCREPANCIES IN TENDER DOCUMENTS

In the event of discrepancies within any of the tender information, queries must be sent in writing to the employer's representative, who will circulate the questions and answers to all firms tendering.

A1.5 VISIT TO SITE

The subcontractor is deemed to have visited the site during the tendering period to satisfy himself that he is aware of all local conditions relative to his contract. Claims with regards to lack of knowledge will not be paid.

A1.6 PATENTED ARTICLES

The subcontractor is solely responsible for any expenditure incurred through the employment of patented articles or devices, including all royalties and other such charges. The employer and employer's representative undertake no responsibility whatsoever in this matter.

A1.7 RESOURCES, TEMPORARY WORKS AND SERVICES TO BE PROVIDED BY THE SUB-CONTRACTOR IN CONSTRUCTING THE SUBCONTRACT WORKS

Staff

The subcontractor shall supply all the necessary skilled and unskilled labour required to carry out the works. During the execution of the contract observe the conditions of employment which have been agreed between the Employer's Federation and the Trade Unions relevant to the place and circumstances in which these works are to be carried out.

Additional net overtime costs shall only be permitted as extra when specifically authorised by the employer's representative in writing. Overtime working for any purpose necessary for normal contract works, such as that necessary to keep on programme etc., is deemed to be included within the tender sum.

Work Area

The subcontractor shall take all precautions necessary to restrict the area of his works to the immediate vicinity of the work involved under his subcontract and shall prevent his workmen from straying beyond the boundaries of such works.

Planning

The subcontractor shall co-operate with the main contractor and plan the subcontract works before the work commences to ensure the efficient implication of the works.

The subcontractor shall prepare a schedule detailing all items of plant and equipment and true delivery periods.

The subcontractor shall liaise with the employer's representative and main contractor, providing them with a detailed programme confirming when Client supply items are required for installation.

The subcontractor shall advise the main contractor in sufficient time to allow access to be provided for the installation of large items of plant and equipment or long lengths of pipework, ductwork or cable, etc.

Statutory Undertakings

The subcontractor is responsible for programming, co-coordinating and progressing the involvement of the statutory undertakings and other authorities.

The subcontractor shall provide all necessary information required by the main contractor in respect of the statutory undertakings and other authorities.

The subcontractor shall, in addition to the above, allow for full attendance on the Statutory undertaking and other authorities and shall assist their engineers on site to the full.

Buildings and Security Measures

The subcontractor is to provide, as necessary, temporary sheds, offices, other temporary buildings and security measures for your own exclusive use and clear away everything on completion.

The subcontractor shall allow for moving the site accommodation from time to time as may be requested by the main contractor, subject to the confines of the site. Storage areas for the subcontractor's materials and plant, etc. shall be provided free by the main contractor. Suitable mess rooms and sanitary accommodation will be provided, free of charge, by the main contractor for all persons employed on the works all in compliance with the current statutory regulations and the Code of Welfare conditions of the National Joint Council for the Building Industry.

Telephones/Facsimile/Computer

The subcontractor is to provide and pay for all telephone, facsimile and computer facilities for your own exclusive use.

Local Authorities Requirements

The subcontractor shall comply with and give all notices required by any Act of Parliament, regulations or by-laws of any local authority, public services, company or authority who may have any jurisdiction with regard to the work or whose systems, the same, are or will be connected, and he shall pay and indemnify the employer against any fees or charges legally demandable under such an Act of Parliament, regulations or by-laws in respect of the works. No extra charge will be allowed due to failure to allow for this requirement.

Where the requirements of any water or electricity authority call for the submission to them of any component part of the works for approval, testing, stamping or certifying, the subcontractor shall, at his own expense, submit and deliver any such component part to the place required by such authority. After such component part has been satisfactorily approved, tested, stamped or certified, the subcontractor shall return it to the site for incorporation into the works. Expenses incurred shall be paid by the subcontractor.

Inspection and Testing at Works

The subcontractor shall provide and allow in his tender sum for all costs in this regard, all assistance, labour, materials, power, fuel, stores, apparatus and properly calibrated and certified instruments for carrying out the necessary works.

The employer's representative shall be entitled, during the manufacture, to inspect, examine and test on the subcontractor's premises the material and workmanship of all plant to be supplied under the subcontract. If part of the said plant is being manufactured on other premises, the subcontractor shall obtain from the employer's representative permission to inspect, examine and test as if the plant were being manufactured on the subcontractor's premises.

Such inspection, examination or testing, if made, shall not release the subcontractor from any obligation under the subcontract.

The subcontractor shall give the employer's representative two weeks written notice of the date and the place when plant will be ready for testing and unless the employer's representative attends within ten days of this date, the subcontractor may proceed with the tests which shall be deemed to have been made in the employer's representative's presence and shall forthwith forward to the employer's representative, duly certified, copies of the test reading.

In the event of the plant failing the tests, the employer shall be at liberty to deduct from the subcontract price all reasonable expenses incurred by him or the main contractor in repeating the tests.

Operation of Plant, etc.

Prior to practical completion the subcontractor must ensure that plant is working correctly and provide skilled personnel to attend the plant etc., while working including specialist personnel as necessary.

Damage Due to Inclement Weather

The subcontractor must take all measures for the protection of their works, and make good, free of charge, damage, defects or faults which appear during the works due to inclement weather.

Practical Completion

Before the subcontract works are included in a Certificate of Practical Completion, the subcontract works, or such part as is referred to in the certificate, shall be complete. The completion shall include setting to work, testing and commissioning, including proving the performance is in accordance with the specification, of all items included in the certificate, and full adjustment and balancing, in as far as is possible without the building being occupied or the system being subject to a full climatic cycle, subject to the approval of the employer's representative.

Unless otherwise agreed, the whole or any part of the subcontract works will only be included in a Certificate of Practical Completion when the employer's representative has been given the required number of sets of operating manuals and record drawings as detailed later in this document.

After the installation has been shown to meet the commissioning requirements, the employer's representative may call for further operation of the plant to evaluate the performance of the installation. Be prepared to operate the plant, the cost of which will be reimbursed. Include in the tender for all additional works and expenditure necessary as a consequence of phased completion and handover.

Training of Employer's Personnel

The subcontractor shall provide experienced personnel to instruct the employer's personnel in the operation, maintenance and servicing of all the installation.

The subcontractor shall, at a time to be agreed prior to completion or sectional completion as defined in the main contract preliminaries, instruct the employer's representative in the use and correct operation of the contract works and shall satisfy himself that such staff is capable of taking over the installation. During this period of instruction, the subcontractor shall be responsible for the correct operation and maintenance of the installation.

The training shall take place prior to completion and during the system reliability trial with all systems fully operational. The subcontractor shall allow for a minimum of five days training for two representatives. Both representatives will attend each day of training. The subcontractor shall provide training handout notes and background information to the employer's representative prior to the training period.

Training shall be structured to suit all the relevant building elements (building and its services) and shall include theory, demonstration and hands-on experience in the operation and maintenance of the building. Each training day shall allow for relevant instruction on an elemental basis.

Theoretical training shall be carried out in a suitable quiet room with all necessary visual aids and facilities. A register shall be kept of attendance at each of the training sessions and a certificate shall be issued to all attendees at the end of each training session.

Obligations after Practical Completion

Between the issue of a Certificate of Practical Completion and the Certificate of Making Good Defects relating to the whole or part of the subcontract works, provide the following:

- A prompt callback service, available at all times, to attend to any faults.
- A record of any failure or malfunction of any part of the subcontract, the remedial action taken, subsequent re-testing and the results thereof.
- Notify the main contractor of any malfunction in, or damage to, the subcontract that the subcontractor can demonstrate had been caused by incorrect operation of the system, vandalism or action of a third party.
- Inform the main contractor in writing when all defects are finally rectified so that an inspection may be carried out prior to the issue of the final certificate.
- Carry out a final test at the end of the defects liability period to demonstrate to the employer's representative that the subcontract works are operating efficiently and that all components are functioning correctly.
- Carry out all work using competent, trained personnel and except where made necessary by abuse, misuse or negligence by other than the subcontractor, make no charge to the employer.

Notwithstanding the foregoing paragraph, charge to the employer the net cost of replacement for life expired disposable parts.

A1.8 PROGRAMME OF WORK

As soon as possible after Contract costs have been accepted, the contractor shall, on receipt of instruction from the Project Manager, agree a programme of work.

The Contractor shall give consideration to the various electrical and mechanical services involved when ascertaining priority of installation of materials and first fix of the services in the various sections of works.

All materials, equipment, etc. shall be ordered as soon as instruction is received and delivery shall be arranged to suit the proposed programme of works.

A1.9 ALTERNATIVE MANUFACTURERS

The Contractor is advised that the costs included in the tender submission must be based on the equipment and material as detailed in the specification. The equipment and materials have been detailed to indicate the quality and standard considered acceptable for this project.

The Contractor is at liberty to offer alternatives to those items specified which can be demonstrated to be equivalent, or better, in all aspects. Written approval for the use of alternatives must be obtained before orders are placed.

A1.10 INFORMATION REQUIRED FROM THE SUBCONTRACTOR

The subcontractor shall select materials and products capable of the performances specified in the schedules and ensure that the various components of the systems can be coupled together in a proper manner to provide a workmanlike installation.

Provide installation drawings to demonstrate your solutions to the employer's representative and provide builderswork drawings to illustrate your requirements in this respect to the main contractor and employer's representative.

Respond in good time to the directions of the employer's representative and assist in integrating the subcontract works into the design of the works as a whole.

Ensure you obtain through the main contractor, up-to-date copies of architectural, structural and working drawings for the other trades where they affect the subcontractor's drawings. Site dimensions should be used wherever possible in preference to drawings.

The employer's representative will be advised of the cost of the subcontract works by the quantity surveyor. Carry out the services with strict regard to the Employer's budget for the project.

Perform your duties in accordance with a programme to be agreed with the main contractor and/or employer's representative.

The subcontractor shall provide for agreement by the employer's representative fully documented Quality Assurance Procedure (QAP) to International or British Standards, prior to commencement of draughting, procurement or installation.

The subcontractors QAP must be provided in accordance with the main contract procedures.

The QAP must detail specific procedures related to the tendered project.

The QAP shall be provided by the subcontractor at tender, its content is subject to the employer's representative and main contractors comment.

Subcontractor to State Objections

In the event of anything described in the specification, relevant documents, or shown on the drawings being, in the opinion of the subcontractor, unsuitable, undesirable or inconsistent with his guarantee and responsibilities under the subcontract, he shall draw the employer's representative's attention to such matters at the time of tendering or, in the case of matters arising out of documents, or in the case of instructions issued after the time of tendering, immediately on receipt of such documents or instructions and prior to the commencement of any part of works affected.

Integration

The subcontractor is to co-operate with the main contractor in planning the installation before the work commences.

The services routes and approximate position of the equipment and the apparatus are shown on the tender drawings. Attend such meetings as are necessary to enable you to provide the installation drawings which the employer's representative requires to process. The object of the meetings will be, to establish the inter-relationship of services in confined spaces such as ceiling voids, ducts and plantrooms, establishing adequate space for maintenance and access purposes and to assist in the proper provision of builder's work drawings.

Installation Drawings

Please note: DXF format CAD Building Services drawings will not be provided to the subcontractor, electronic PDF format drawings will be provided if required. Architectural general arrangement drawings may be provided, but this will be arrangement with the employer's representative.

The subcontractor is to prepare and supply in good time all detailed installation drawings (including wiring diagrams and builders work drawings) required to enable the subcontract works to be integrated into the design of the works prior to installation.

The drawings provided shall be drawn to recognised scales on A1 sheets. In addition to the project title, the architect's and consulting engineer's name and address, unique drawing number, drawing title, scale and date shall be entered in the title block, together with full cross-reference details of related drawings.

All drawings shall be produced and presented in print form and on computer disk with files in DXF format (unless agreed otherwise).

All drawings shall have independent layers of information in accordance with International or British Standards.

All layers shall be displayed 'on screen' in different colours.

The subcontractor shall verify the accuracy of all dimensions abstracted from the drawings, including verifying the accuracy by taking dimensions on site.

Drawings, schedules and other information provided by manufacturers, suppliers or approved specialist subcontractors shall be checked by the subcontractor to ensure all requirements of the design installation and working drawings/documents have been incorporated prior to submission.

The subcontractor is to inform the employer's representative prior to changing components or detail of installation shown on the tender drawings or described elsewhere in these documents.

The subcontractor is to notify the employer's representative of the total effect of these changes, including the design parameters of the system and effects on power requirements, cable sizes, performance and ductwork or pipework resistance, etc.

The installation drawings must clearly show withdrawal and access requirements.

Builders work drawings shall form part of the installation drawings and shall show the sizes and locations of all foundations, bases, plinths, sumps, chases, holes, etc, required and shall be based on certified manufacturer's drawings.

The scale of these drawings shall be 1:50 or, where necessary 1:20.

Ductwork shop fabrication drawings shall be to a scale of not less than 1:50 and in congested areas, not less than 1:20. They shall indicate the length of each duct section, the internal dimensions of the bare sheet steel, dimensions of bends and fittings, location of stiffeners and supports and shall be dimensionally locate the ducts in relation to the supporting or any adjacent structure.

In addition, the location and size of all equipment, grilles, diffusers, access panels, dampers, test points, penetrations and associated fittings for automatic controls and instrumentation, etc., shall be shown.

Switchgear, starter control and instrument panel drawings shall show the construction, external and internal layout of panels, and wiring diagrams comprising internal wiring diagrams, for the complete systems in the panels. The drawing shall also show all pipework and capillary connections from the panels to external equipment.

Manufacturer's equipment drawings shall show the precise details of each and every item they will be providing and shall highlight all dimensions and particular requirements necessary for the correct installation and maintenance of their equipment.

Specific installation drawings may, with written permission of the employer's representative, omit minor details such as conduit provided that a method statement rigorously covers the installation intent. This permission will not be unreasonably withheld but will not be given where either Client operation or visual appearance is affected or where details are needed for following trades.

The subcontractor shall submit such drawings as the employer's representative may reasonably require at any stage of the subcontract.

Supply four copies of each drawing for inspection by the employer's representative and, if required, four copies of each subsequent amendment. When agreement has been reached, issue further copies of the drawings as follows:

For the employer's representative

4 Copies *

- For the main contractor, which includes one copy by the means of which the main contractor will instruct the subcontractor

6 Copies *

*Unless agreed otherwise

Issue copies of drawings to those of your suppliers and subcontractors affected by the drawings.

Allow in your programme for the preparation and obtaining approval of drawings, plus time to make any necessary amendments.

Understand that whenever you submit information to the employer's representative for approval, such approval will be approval in principle only and will not, in any way invalidate your responsibility for ensuring the accuracy and suitability of the information in accordance with requirements specified elsewhere.

The employer's representative will approve the overall layout of plant and equipment, ducting, pipework, cabling, trunking, conduit, etc., shown on the installation drawings, and their general location, as well as the type and size of these items, in so far as they conform to the tender drawings.

The exact position in the works relative to grid lines, floors, beams, ceilings, walls and other structural/finishes items, and any other services is the responsibility of the subcontractor and the employer's representative's approval does not absolve you from the necessity of checking these items with the main contractor and other subcontractors.

When submitting drawings the subcontractor shall advise the employer's representative if, in order to avoid delay in the completion of the works, early approval is necessary.

A coordinating consultant will be identified by the employer's representative for each specialist subcontractor. In addition to the coordinating consultant, fabrication drawings will be commented on by other consultants as considered appropriate by the employer's representative.

The coordinating consultant will arrange receipt of other consultant's comments and transfer these to a single set of subcontractor's drawings to be returned to the main contractor within 10 working days (or less by special arrangement).

Drawings may be returned direct to the specialist subcontractor's by agreement in writing with the subcontractor and main contractor. Copies of correspondence covering the return of drawings will be copied to the main contractor or subcontractor in either case.

Installation drawings will be returned under one of three following categories.

- **CATEGORY 'A'** - Installation, manufacture or construction may proceed in accordance with the drawings submitted. Unless indicated to the contrary on such drawings, the works shall comply with the contract documents.
- **CATEGORY 'B'** - Installation, manufacture or construction may proceed in accordance with the drawings submitted subject to the subcontractor taking necessary action based on the employer's representative's comments and all annotations added to the returned drawings. Unless indicated to the contrary on such drawings, the work shall comply with the contract documents. The required number of copies of the amended drawings shall be sent to the employer's representative.

- **CATEGORY 'C'** - No work shall be installed, manufactured or constructed. The subcontractor shall re-submit new shop drawings to the employer's representative for review until re-submission is not required. Any submission marked 'C' is not permitted on site.

For coordinated responses, the most onerous classification awarded by any consultant making comment will take precedent.

During the subcontract works the subcontractor is to, keep on the site a complete set of up-to-date prints and schedules marked with "As Installed" details and make these prints available at any time to the employer's representative or his representative.

If, in the event, upon completion of the works, of it being discovered that, the subcontractor have failed to comply with this requirement and it becomes necessary for the employer's representative to examine or trace through installed services in order to update the "As Installed" drawings, the cost of this work will be time charged and debited to the retention monies being held on the contract.

"As Installed" Drawings and Diagrams

Unless otherwise agreed, the subcontract works, or any part thereof, will only be included in a Certificate of Practical Completion when the final "As Installed" Drawings and Diagrams have been issued to the employer's representative.

These shall consist of two paper copies and two DXF format copies on USB drive.

The subcontractor may purchase copy negatives or DXF computer disks where appropriate of the tender drawings from the consultant and amend these to bring them into line with the works as fixed and then submit them to the employer's representative.

"As Installed" drawings are to detail: -

- The location, including level if buried, of public authority supplies provided within the subcontract, whether carried out by the subcontractor or by the appropriate authority together with the points of origin and termination, size and materials of pipes, line pressure and/or other relevant information.
- The layout, location and extent of all piped services showing pipe sizes throughout, together with all valves for regulation, isolation and other purposes, shown numbered in accordance with the actual installation.
- The layout, location and extent of all air ducts, including those formed in builders work or otherwise outside this Subcontract but forming part of the system, showing all dampers and other equipment, acoustic attenuators, grilles, diffusers or other terminal components. Each duct and each terminal component shall be marked with its size and the airflow rate, as actually measured after approved regulation of the system or as computed by the addition of such measured quantities.
- Single line and schematic wiring diagrams for the whole of the subcontract works showing all terminal references and cable sizes.
- The layout, location and extent of all electrical plant, cable, cable tray, cable trunking, conduit, distribution boards, switches, outlets and lighting fittings which form part of the subcontract works, including dimensioned layouts of all concealed work. Where components are grouped or housed in a cubicle or on a common panel, an exploded arrangement must be incorporated.

- The layout, location and extent of all electrical plant, cable, cable tray, cable trunking, conduit, switches, outlets, terminals and indicators and alarms of all ancillary communication, detection, alarm and control installations which form part of the subcontract works, including dimensioned layouts of all concealed work.
- The location and identity of each room of space housing plant, machinery, distribution boards, draw-in boxes or apparatus.
- The detailed general arrangements, to 1:20 scale (minimum), of all boiler rooms, machinery spaces, air handling plant, refrigeration plant, tank rooms, switch rooms, meter rooms and other plant spaces, including the location, identity, size, colour coding and details of each piece of plant and equipment.
- The detailed general arrangements, to 1:20 scale of service subways, ducts, meter rooms or other special sections of the work where, in the opinion of the employer's representative, the small scale drawings cannot provide an adequate record.
- Manufacturer's drawings showing the general arrangement and assembly of component parts of all machines and any pieces of equipment which may require servicing. Flow diagrams indicating the principles of the arrangements and operation of each of the services related to central plant, principal components and zoning of distribution etc.
- Diagrams illustrating the principles of automatic controls and of instruments, presented in combination with the foregoing or separately, as agreed with the employer's representative.
- Location of all earth tapes, earth electrodes and test points.

Comprehensive electrical diagrams or sets of diagrams which shall show:

- Size, type and length (to within one meter) of each main and sub-main cable, together with the measured conductor and earth continuity resistance of each. Manufacturer's internal wiring diagrams for each piece of electrical equipment supplied under the subcontract, together with physical arrangement drawings to locate and identify the component parts.
- Comprehensive diagrams showing in detail all power wiring and all control wiring and/or pneumatic of other control piping executed within the subcontract by others in accordance with detail provided by the subcontractor, including size and type of conductor or piping used and identifying the terminal points of each.

Before the above-mentioned final issue, send two proofed copies of the manuals to the employer's representative for approval of format and general content. Allow 14 days for approval. Include the following information in the operating manuals.

Operating Manuals

Preparation of operating and maintenance manuals shall be based on the following documents:-

- BSRIA Technical Note TN 1/84; Guidelines for building services operating and maintenance manuals
- BSRIA Application Guide 1/87; Operating and maintenance manuals for building services installations
- BSRIA Technical Note TN 12/86; Fault finding procedures in the building services industry

The arrangement of the manual shall be as follows:

Section One	Index
Section Two	Description of the Design Intent
Section Three	Description of the operational routes. The description must include step by step instructions on starting and stopping each plant or system and a fault diagnosis procedure in diagrammatic and tabular form to show the action necessary to correctly identify defective pieces of equipment and the steps to be taken to rectify faults.
Section Four	Planned maintenance instruction. This section must include step-by-step instruction on the maintenance of all items of plant. Data shall also be provided for ordering replacements. Full sets of manufacturer's maintenance instructions including wiring diagrams, cable schedules, and circuit chart. Protection and overload relay settings shall be recorded and calibration charts shall be Incorporated. This section shall include a set of drawings of the installation upon which is recorded all plant settings, water flow rates, pump heads and noise level readings as adjusted and measured during the testing commissioning period.
Section Five	A set of record drawings and Test Certificates. If necessary due to the number of drawings which have to be included in the manual, each drawing shall be photographically reduced to size to suit the manual.
Section Six	Emergency measures including telephone numbers of the subcontractor's emergency staff, names, addresses and telephone numbers of all manufacturers.

Index

- General description of the installation, equipment used and method of operation of the installation.
- Handbooks, maintenance instructions, drawings and spare parts list for all components, plant and equipment used in the subcontract works.
- Line diagrams indicating the main features of the plant, drawing attention to the method of setting the controls, switchgear, safety precautions etc.
- Schedule of routine maintenance, complete with list of normal consumables, routine oil and grease points and recommended lubricants.
- Schedule of periodic and preventative maintenance for specialised equipment.
- Schedules of methods of adjustments, typical faultfinding routines.
- Schedule of operation and maintenance risk assessment sheets in accordance with the Construction (Design and Management) Regulations 2016.
- Wiring diagrams of plant etc.
- Service manual for all specialised plant, giving all details as listed above.
- Schedule for obtaining and ordering replacement parts.
- Schedules of equipment valves and motors related to the "As Installed" drawings and giving names, addresses, telephone and facsimile numbers of manufacturer, serial number of plant, kilowatt-power electrical supply, performance duties and location within the building.
- Description of emergency action which should be taken in the event of a breakdown of equipment. Telephone numbers of essential contacts shall be included.

- Outline design data of plant.
- Test and performance data.
- Test Certificates.
- Schedule of "As Installed" Drawings.
- Legend for colour - coded services.
- Copies of all manufacture guarantees.

In addition, and separate from the Operating Manuals, supply four sets of manufacturer's catalogues relating to specialised plant and equipment.

The requirements and obligations of manufacturers to provide literature as part of the installation record shall form part of plant and equipment orders and such orders shall be considered unfulfilled until literature requirements have been met.

Preparation of Manuals

The manuals shall be encased in A4 size, plastic-covered, loose leaf, four ring binders, with hard covers, each indexed, divided and appropriately cover titled. Drawings larger than A4 shall be folded and accommodated in the binder so that they may be unfolded without being in any way detached from the rings.

Prepare the Operation and Maintenance Manuals in draft as soon as the installation drawings are in hand.

Make two temporary manuals with provisional record drawings and preliminary performance data available at commencement of commissioning to enable employers staff to familiarise themselves with the installation. These should be of the same format as the final manuals with temporary insertions for items which cannot be finalised until the subcontract is commissioned and performance tested.

The cover shall be printed with the following information:

"Operating and Maintenance Instruction Manual" (Project Name and Service).

Where more than one volume is required, the cover shall also be printed with volume number.

Each section of the manual must be segregated by a stiff divider of the same size as the holder. The divider shall be labelled as to the section of the manual.

All written instructions within the manual shall be typewritten with a margin on the left hand side.

Submission of Operation and Maintenance Manuals

The final draft of the Operation and Maintenance Manuals shall be submitted in due time, and in any case not less than four weeks prior to practical completion, so that at least one copy of the complete final version is in the possession of the employer at practical completion in order to comply with the Health & Safety at Work Act.

If partial possession is required by the employer then the documentation shall also be phased accordingly and so arranged to finally form one comprehensive document.

It shall be the subcontractors responsibility, whenever a successive phase of subcontract is handed over, to amend and update the previously issued version of the Operation and Maintenance Manuals, bring it to the appropriate stage of completion and submit same to the main contractor in due time to comply with the Health & Safety at Work Act.

Maintenance Contract

The subcontractor must provide a separate quotation for the maintenance of all equipment and systems (pipework, ductwork, cabling, etc.) within his scope of works for a full 12 months period from the date of completion or completion of section as defined in the main contract preliminaries.

The maintenance to be carried out shall be strictly in accordance with the various manufacturers' recommendations and shall be sufficient to ensure that the services operate at optimum efficiency and that the life expectancy of the various items of equipment and system components are in no way compromised.

Spare Parts and Tools

The subcontractor shall submit a Schedule of additional spare parts and tools that he recommends should be supplied over and above those consumable spares required up to practical completion and for routine maintenance.

A1.11 RESPONSIBILITIES (SERVICES COORDINATION)

The subcontractor is responsible for the full coordination and proper execution and completion of the installations. The positions of equipment, pipework, cables, etc., indicated on the drawings are given for tendering purposes only and the exact coordinated positions shall be proposed by the subcontractor for approval by the employer's representative. The subcontractor's tender price shall include for any modifications that may be necessary to provide fully coordinated and installed engineering services.

The mechanical subcontractor must make allowances within his tender price for taking responsibility as the lead subcontractor organising the coordination of all services drawings with the other trades. The successful mechanical subcontractor will be requested to provide a method statement showing how this will be carried out with coordination meetings etc.

The subcontractor is responsible for ensuring liaison with all trades to ensure that all engineering services are accommodated satisfactorily in the building, particularly in ducts, voids, cavities, and other potentially congested areas. The subcontractor shall, without cost to the employer, make any alterations that may be found necessary due to non-compliance with this clause.

The subcontractor shall acquaint himself with the general arrangement of all services and ensure that in fixing any work it will not obstruct the fixing or future maintenance of any other services. He shall also coordinate the engineering services with other trades and take all necessary precautions to ensure that the progress of any trade does not impede the

progress of any other trade and that all engineering services are accommodated satisfactorily.

The subcontractor shall allow for obtaining and coordinating the submission of fully coordinated engineering services installation drawings and shop drawings from all his subcontractors and suppliers and all related builders work drawings. The drawings are to be compatible, correctly annotated and cross-referenced at their interfaces.

The subcontractor is responsible for the coordination of all his subcontractors and suppliers equipment.

The subcontractor is responsible for taking dimensions on site, checking runs and levels and marking out for the builders work and shall allow for such work in his tender. The subcontractor shall ensure that the setting out of plant and equipment, pipes and ducts, etc. fit into the space allocated and allows access for maintenance and replacement purposes.

The subcontractor shall allow for arranging and attending any necessary meetings with the relevant subcontractor's and/or suppliers in order to agree such priorities as are necessary and in order to monitor progress, obtaining the necessary data for and preparing coordinated drawings of all the work involved in the engineering services installation together with its associated builders work and giving all necessary instructions to overcome any potential conflicts. Where such coordination requires any amendment to the drawings or specifications prepared by the employer's consultants, the matter shall be referred to the employer's representative in the first instance.

The subcontractor shall allow for the cost of all amendments or revisions required to provide a properly coordinated engineering services installation.

A1.12 DEFECTS LIABILITY

It shall be deemed that the Warranty on the plant shall be for one year, commencing from the issue of the Certificate of Practical Completion, not upon delivery.

A1.13 VALUATION OF THE SUBCONTRACT WORKS

Sub-letting

The subcontractor shall state in his tender the names of all firms to whom you propose to sub-let portions of the work.

No section of the work shall be assigned or transferred to another company without the prior consent of the employer's representative.

Alternative Makes/Delivery Periods

If particular manufacturers are specified, alternative makes of equal quality will be considered by the employer's representative only if they appear on the preferred manufacturers list within this specification.

Important Note to Tenderers

Contractors must list within their tender return the manufacturers, suppliers and subcontractors on which the tender sum is based. Changes from this list will not be allowed unless there are mitigating circumstances. The employer's representative will make the final decision with regard to the any proposed changes and his word will be final. Failure to comply with this clause will render the tender return void.

The subcontractor shall ensure that the dates of deliveries covered by orders placed with manufacturers, suppliers or other subcontractors are confirmed at regular periods between the placing of the orders and the date of delivery. A delivery schedule of all major items must be submitted to the employer's representative within 60 days of acceptance of the subcontractor's tender.

Builder's Work

The formation of brick or concrete bases for engineering plant, boilers, calorifiers, pumps, switchgear, etc., the building-in of radiator, pipe and cable brackets, the formation of cable trenches, the provision of riddled earth in the trench, both before and after laying, and trench back-filling, the cutting of holes, chasing making good will be carried out free-of-charge by the main contractor.

Adjustments to the Subcontract Sum

No addition will be made to the subcontract sum if you have failed to ascertain, before tendering, all the requirements for carrying out the works, which inspection of the site or of the specification and tender drawings would have disclosed.

No change will be made to the subcontract sum unless the variation is authorised by an instruction from the employer's representative.

Within 14 days of the date of issue by the employer's representative of an instruction varying the content of the subcontract works, agree with the quantity surveyor the order of value of the variation, submitting documentary support where necessary.

Thereafter, proceed diligently, with the quantity surveyor to agree the final price for the variation. Variations shall be valued in accordance with the appropriate clause of the contract.

If you require work to be valued on a daywork basis, the employer's representative's permission must be obtained before work commences. Submit two copies of daywork sheets to the employer's representative for examination and signature during the week following the week in which the work is done.

Include on the daywork sheet the instruction number, details of other documentation, and the location of the work and the full details of the labour, plant and materials employed.

Include in your tender for all additional payments for overtime necessary to carry out the subcontract works in accordance with these documents. Where further overtime becomes

necessary to overcome problems, seek the employer's representative's approval in each specific case to the inclusion of these overtime payments in the final subcontract sum. Keep detailed records of the labour involved. Submit to the employer's representative for approval and signature during the week following that in which the work is done.

At the time of the settlement of account, and as one of the documents referred to in the contract conditions, the main contractor will obtain a statement from each of the subcontractors that the sum and/or credits to be included in respect of such subcontractors are accepted in full and final settlement of their subcontracts.

Valuations for Interim Certificates

At the time of every valuation of the works for interim certificates, submit via the main contractor, to the Quantity Surveyor a statement showing:

The gross amount (including cash discount and retention) claimed supported by a detailed approximate priced statement of work executed and materials supplied.

The net amount received from the contractor to date excluding contract charge.

Revision and Variations

If schemes are subject to revision or instruction, the installation/working drawings, and record drawings, must show the full effect of such revision. Where revisions involve change to the architectural or structural details, immediate notice must be given to the employer's representative. Where scheme revisions are required in the main contract works or other subcontract works due to the subcontractor's variation or revision then all cost for such revision will be the subcontractor's responsibility including the design team consultants' costs.

Where drawings are revised and updated during construction these shall be issued to the employer's representative for comments on the revision only.

The subcontractor must substantiate that changes from the intent of the tender drawings have been necessary for a variation to be recorded. This will not include normal detail design development relating to inclusion of or development of, factors within the subcontractors design responsibility.

A1.14 INSURANCE AND INDEMNIFICATION

The subcontractor must include for all insurance other than those for which the main contractor is responsible.

The subcontractor is responsible for any damage caused to the main contract or other subcontract works by the execution of this subcontract and the cost of making good any such damage.

A1.15 COMMENCEMENT AND COMPLETION

The subcontractor shall execute his works within the dates described for the main contract.

The subcontract may require several visits to the site. Claims for the number of visits to the site or discontinuity of the work will not be paid, the subcontractor shall allow in his rates for all costs incurred due to this method of working.

The installation programme is to be agreed with the main contractor before materials are delivered to site.

The subcontractor, in conjunction with the main contractor, will be required to submit a programme to the employer's representative. The times must comply with the dates noted by the main contractor.

A1.16 DRYING OUT

The main contractor may, by arrangement with the subcontractor, wish to run the heating system for drying out the building. The subcontractor shall make due allowance in the sequence of his work to provide this in accordance with the main contractor's programme. This event will not relieve the subcontractor of his obligation to hand over the installation in good order, nor shall the interim period from the time of commencement of use for drying out to the handover, be considered as constituting any part of the maintenance guarantee period hereinafter specified.

However if the system is complete and signed off by the employer's representative or building services consultant, the warranties may be activated.

The system is not to be operated whilst any 'rubbing down' activities are being carried out.

A1.17 REGULATIONS

General

Materials, products and completed systems in this subcontract shall comply with the following:-

- This Specification.
- All local authority regulations.
- All national and European regulations.
- All Health and Safety regulations.

The subcontractor shall notify the employer's representative of any revisions or addition to the foregoing as they are published during the installation of the works. The employer's representative will give appropriate instructions in each case.

The subcontractor shall pay all charges made by an authority approving any part of the subcontract works.

A1.18 SUITABILITY OF MATERIALS AND PRODUCTS

Materials and products shall be supplied to suit the pressures, temperatures, voltage and other conditions of use normally expected to apply after the installation is completed and also to withstand the tests specified herein or in any documents referred to herein.

A1.19 ORDERING MATERIALS AND PRODUCTS

The subcontractor shall order the necessary materials and products immediately upon the employer's representative instruction to proceed. The subcontractor must not delay practical completion, or completion of any part of the works, due to late delivery of materials and products.

A1.20 HANDLING AND STORAGE OF MATERIALS AND PRODUCTS

The subcontractor shall: -

- Deliver, off-load, store and transport about the works all materials and products in the manner recommended by their manufacturer.
- Provide adequate safe, covered storage and protection for all materials and products in accordance with good practice.

A1.21 SAMPLES OF MATERIALS AND PRODUCTS

At the request of the employer's representative, the subcontractor shall submit, samples of materials and products proposed for use in the subcontract works.

Samples shall include but not be limited to labelling, luminaires, radiators, valves, grilles, room sensors, socket outlets, switches and like items, particularly where the aesthetic appearance is of prime importance. Samples shall also be required to demonstrate standard of finish and colour. Approximate or 'similar' colour samples will not be accepted.

A1.22 PROTECTION TO FIXED AND UNFIXED ITEMS OF PLANT

The subcontractor is to take all measures necessary to screen and protect all plant, equipment and accessories, whether in storage, in course of erection or erected, from the ingress of dust, moisture or foreign bodies, or from damage or marking by other trades to practical completion of the subcontract works. Failure to arrange for such protection will make the subcontractor liable for all consequent reinstatement.

All parts of the installation liable to corrosion are to be properly cleaned and painted with heat resistant and/or corrosion resistant paint at works and a further coat immediately after erection.

Any plant, equipment and accessories found to be unduly marked by tools or damaged, corroded or distorted by any cause will be rejected by the employer's representative and must be replaced by the subcontractor at his own expense.

When final finishes are provided to equipment at manufacturer's works, all such finishes are to be of an approved material, process and colour and the subcontractor shall ensure adequate provision for the protection during transit, storage during and after erection to avoid damage to the finishes.

The subcontractor shall inspect all plant and equipment immediately on delivery and shall not accept any that are damaged. The employer's representative must be notified and the damaged works subject to inspection before remedial work commences.

The subcontractor shall be responsible for the protection of his work during execution, but the main contractor shall be responsible for necessary casing and protection after the subcontractor's work has been executed.

A1.23 DELETERIOUS MATERIALS

Refer to main contract preliminaries.

A1.24 HOUSEKEEPING AND SITE CLEANLINESS

It is the subcontractor's responsibility to always keep his working area clean and tidy and remove all rubbish to a dump or other place on the site on an agreed regular basis.

A1.25 CONDITION OF SITE ON COMPLETION

On completion of the contract, the subcontractor shall remove from the site all tools and plant used for the execution of the works together with all rubbish, packing cases and redundant material or equipment, and he shall make good or reimburse for making good any damage to buildings, roads or other parts of the site, where in the opinion of the main contractor such damage has been caused by or is the responsibility of the subcontractor.

A1.26 TENDER DRAWINGS AND DOCUMENTS

The subcontractor shall treat the details of this specification and attached documents as confidential and return them to the employer's representative after he has prepared his tender.

A1.27 DISAGREEMENT

In the event of any disagreement between the parties of the contract as to the requirements of the specification, definition of terms or value of works done, the matter shall, in the first place, be decided by the employer's representative, and, if such decision be challenged by either of the parties shall be referred to arbitration under the provisions of the signed contract.

A1.28 DESIGN RESPONSIBILITY

The installer shall be responsible for the detailed design activities listed below, in addition to those activities normally undertaken through the custom and practice of the industry, all of which shall be subject to the comment of the contract administrator.

The installer shall be responsible for ensuring that the detailed design which he undertakes is fully co-ordinated and compatible with the remainder of the project design.

All costs shall be allowed by the installer for the complete junction of his works and the remainder of the project. Specifically all supports will be provided by the installer up to and including the final attachment to primary structure. Similarly the installer shall provide all flashings, kerbs and stopping up or sealing required.

Comments by the contract administrator shall not relieve the installer of his responsibility for the suitability and correctness of the installer's designs and his other obligations within the contract documentation.

The installer's design obligations shall include:

- Fabrication drawings and the co-ordinated installation/working drawings and record drawings.
- Drain and vent point locations and pipework gradients in accordance with BSRIA documents Application Guide 1/89 Flushing and cleaning of Water Systems.
- Bracket and support detailed design and locations. (All types, loads and locations must be declared to the contract administrator prior to installation for comment (10 working days)).
- Details of electrical wiring diagrams of all equipment supplied by the installer showing all interconnections between equipment to enable the necessary wiring to be undertaken.
- Details of all equipment component design and selection necessary insofar as such items have been selected by the installer for that item of equipment to meet the engineering specification and performance indicated.
- Automatic controls detailed design insofar as it is required to meet with full physical and operational requirements of the engineering specification. The installer shall be responsible for ensuring the full compatibility of the plant and equipment with specified function. Where interfaces (relays or other devices or modifications to hardware or software) are required the design and incorporation shall be the installer's responsibility.
- Dimensioning of, and final installation details of, the automatic control panels to suit the detailed requirement of the particular agreed manufacturer's of controls equipment and cable entry/exit accommodation such that:-
 - Cable entry is possible in the selected location.
 - Doors are not fouled by other plant, equipment, services or structural elements.
 - Safe operating and maintenance clearances are provided in all access positions when installed on site.
- Fire alarm system, component and cabling requirements to meet with particular manufacturer's and the engineering specification's requirements.

- Lightning protection system, component, cabling and network to meet the Irish Standards IS EN 62305 and ET 101.
- Security/CCTV system, component and cabling requirements to meet with particular manufacturer's and the engineering specification's requirements.
- Attenuator design and selection to satisfy the particular and performance requirements of the specification, including spatial allowances made within tender drawings.
- Design of the diesel generator flue system to meet with the generator manufacturer, environmental health officer and requirement of discharging the flue gas at the required velocity and altitude. A copy of the Clean Air Act application will be made available on request.
- Design of elements of the scheme provided by the installer for self weight and other applied forces/loadings in reasonable use. In particular any buried tanks or pipework will require designed anchorage encasement or foundations.
- Thermal expansion accommodation and anchorage, including provision of bellows or bends.
- Acoustic design or modification of equipment to meet with the noise levels specified. All levels to be achieved with all plant operating at full load.
- Valve, damper and access locations.
- System water capacities, and chemical additives – and arranging of the facilities required by BSRIA Application Guide 8/91 pre-commission cleaning of water system.
- Selection of all anti-vibration mountings to suit the particular application of the mounts.
- Final exact locations of control sensors detectors and thermostats.
- Capacity, location and design of electrical conduit system, similarly trunking where used in lieu of multi-conduit installation.
- Duct platforms, access covers and gratings, ladders and additional structural steelwork where required and detailed in the sub-contract documentation.
- Selection of regulation devices to comply with CIBSE Technical Memorandum TM8.
- Sizing of cable terminations on items of equipment provided under the sub-contract where cable sizes are specified.
- Ensuring cable sizing selections as specified are not invalidated by subcontractor selection of alternative routes during installation.
- Detailed design of earthing and bonding requirements for electrical engineering services, mechanical engineering services, architectural and structural elements requiring earthing and bonding.
- Design of cable or cable trunking terminations on to electrical equipment provided under the sub-contract and dimensioning of and final installation details of electrical switchgear to ensure that:
 - Fuse sizes installed in plug tops and fuse connection units are appropriate for the rating of connected equipment.
 - Sizing and detailed design of refrigerant pipework between items of equipment provided under contract works.
- Lift sub-contract design obligations shall additionally include:
 - Detailed design of all specialist and proprietary equipment associated with the lift installation to allow the installation to function in accordance with the performance requirements of the specification.

- Final location of all lift equipment within the lift motor rooms and lift shafts to ensure safe and efficient operation and to suit the detailed requirements of the lift installation.
- Production of design loadings/reactions on support structure within the installation.

A1.29 BUILDING LOG BOOK

On completion of the work, the owner of the building shall be provided with a Building Logbook containing sufficient information about the building and its services to allow them to be operated in such a manner as to use no more fuel and power than is reasonable under the circumstances.

Compliance may be demonstrated by provision of a Building Logbook produced to the format indicated in CIBSE TM31 Building Logbook Toolkit, or the updating of an existing logbook to the same standard.

The new logbook shall provide details of:

- any newly provided, renovated or upgraded thermal elements,
- any newly provided fixed building services, their method of operation and maintenance,
- any newly installed energy meters
- and any other details that collectively enable energy consumption to be monitored and controlled.

The information and supplementary data enabling the logging of energy use and plant maintenance and upgrades should be provided in summary form, suitable for day-to-day use by a non-technical building manager

This summary could draw on or refer to information available as part of other documentation, such as the Operation and Maintenance Manuals and the Health and Safety file required by the CDM Regulations.

A1.30 SAFETY, HEALTH AND WELFARE AT WORK (CONSTRUCTION) REGULATIONS 2013 (AS AMENDED)

The Safety, Health and Welfare at Work (Construction) Regulations 2013 (as amended) shall apply to this project, and failure to comply with these regulations may constitute an offence under Irish law. The Project Supervisor for the Design Process (PSDP) shall be as stated in the Preliminaries of the Main Contract.

The main responsibilities of the Contractor will be to provide all necessary Health and Safety information to enable completion of the Construction Stage Safety and Health Plan. In addition, the Contractor shall provide any further information requested by the Project Supervisor for the Construction Stage (PSCS).

The Contractor will be required to provide a detailed Method Statement for the works, demonstrating his approach to safe working practices and confirming that his competency, management systems and resources are adequate for a project of this nature.

SECTION B – SCOPE OF WORKS AND PARTICULAR SPECIFICATION

CONTENTS

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B1.0 GENERAL

B1.1 Standards

The complete electrical services installation shall be carried out in strict accordance with the current Edition of National rules for Electrical Installations Irish Standard I.S. 10101:2020

Works to be carried out by a Safe Electric Ireland Approved contractor.

The contract works shall be carried out with the best quality plant, equipment, materials and workmanship in the manner specified and shall be installed, connected up and left in complete operational order to the Engineers satisfaction in accordance with the true meaning of the specification and contract drawings taken together.

Any equipment, appliance or material not shown on the drawings but mentioned in the specification or vice versa or any minor details or accessories not shown or specified, but necessary for the proper installation and operation of the contract works shall be delivered, supplied and installed by the contractor without additional expense to the Client. Detailed drawings showing sections of the building and building details are available from the office of the Project Architect.

Unless stated elsewhere in the specification or on the drawings the electrical contractor shall not deviate from the specification in respect of fixtures and fittings without the written consent of the Engineers.

Details of all sinks and other sanitary ware shall be obtained from the architect's plans and contractors shall make adequate provision for cross bonding. Variations shall not be approved due to lack of knowledge of locations of sinks, basins etc.

All goods, products and materials shall be in accordance with the latest revision of EU Standards.

The Electrical Contractor shall carefully read the notes on the drawings and include for all associated costs in his tender.

The complete installation shall comply with the latest codes of practice and any other legal requirements applicable to any element of materials, equipment and services provided under this contract, even if an applicable code or legal requirement is not specifically referenced in the contract documents.

B1.2 Regulations & Notices

The Contract works shall comply in all respects with the following standards, regulations, requirements and guides:

- (i) Health & Safety at Work Order.
- (ii) Management of Health & Safety at Work Regulations
- (iii) Construction (Design and Management)
- (iv) Relevant Irish and European Standards
- (v) CPR Regulations (Fire properties of materials and cable sheaths)
- (vi) Electricity at Work Regulations
- (vii) The latest edition of I.S. 10101 National rules for Electrical Installations.

- (viii) Republic of Ireland Building Regulations
- (ix) I.S. 3218 Fire Detection & Alarm System Fire
- (x) Eir and other Telecoms Installation Guides
- (xi) Environmental Design Guidelines
- (xii) IS 3217 Emergency Lighting

The Contractor shall be responsible for the serving of any required notices and paying all relative fees.

B1.3 Equipment Mounting Heights

Consumer Unit	1400mm AFFL *
Socket Outlets	1000mm AFFL
Telephone Outlets	1000mm AFFL
Data point for TV outlets	1000mm AFFL
Switches/Outlets above Worktops	150mm AWT
Kitchen outlets below Worktops	450mm AFFL
Light Switches	1000mm AFFL
Room Thermostat	1000mm AFFL

***Wall mounted distribution board shall be mounted at a height not greater than 2150mm measured from the floor to the top of the highest protective device, where a wall mounted board is mounted less than 1400mm AFFL to the bottom surface of the board it shall be accessible only a responsible person.**

B1.4 Wiring Systems and Accessories

Unless indicated elsewhere in this specification or on the drawings, the following wiring systems shall be adopted.

- All conduit shall be galvanised steel.
- All conduit shall be concealed except for the following areas where surface conduit shall be installed.
- plant rooms
- switch rooms

Accessories shall be from MK Albany Plus range to all areas where concealed conduit is to be employed. Alternatively, the equivalent MEM or Crabtree accessories may be used.

To areas where surface conduit is used, accessories shall be MK Metal clad Plus or equivalent from MEM or Crabtree.

All cable tray and trunking to be medium duty galvanised steel. Steel wire cable tray may be used in place of conventional cable tray.

Flanged couplings shall be used for all conduit connections to accessory boxes.

Socket outlets to have outboard rockers with indicator.

Socket outlets to be mounted as follows:

350mm from corners.

300mm from sinks.

450mm A.F.F.L.

150mm above worktops.

1200mm for T.V. positions. **TBC**

RCBOs with 30mA trips shall be used for all circuits

The following wiring types are to be used:

- Armoured cabling to be XLPE insulated LSF sheathed. In all cases, LSF insulated copper circuit protective conductors shall be provided. These shall be full rated for phase and neutral conductors up to 25 mm² CSA and half rated for all other cables.
- General wiring for lighting and power drawn through the conduit and trunking systems shall be LSF insulated copper single core cables.
- Fire alarm and system cabling shall be Pirelli FP 200 Gold with red outer sheath, or equal and approved.
- Dado trunking to be MK Prestige 3D 175 x50mm or equal and approved.

B1.5 Materials

All products, materials and equipment shall comply with the project specification, as well as referenced standards and all applicable regulatory requirements.

Similar items of equipment and individual materials shall be selected from one manufacturer's range to standardise appearance, compatibility, maintenance and replacement.

All Electrical cables shall comply with the current regulations minimum Class For all buildings, cables shall as a minimum meet the requirements of Class Dca-s2,d2,a2 - s2,d2,a2 or higher in accordance with I.S. EN 50575.

MK Logic Plus or equal and approved, back boxes to be steel.

All electrical wiring accessories within the landlord areas shall be metal type as MK Metalclad Plus or equal and approved.

All materials, products and equipment are to be transported, handled, lifted, hoisted and stored in accordance with the manufacturer's guidelines to prevent damage to equipment and injury to persons.

The manufacturer's installation recommendations shall be followed and adhered to in full including any requirements for additional or ancillary components not explicitly specified but recommended to complete the installations ensuring suitability for purpose.

B1.6 Co-ordination and Liaison with other Trades

The Electrical Contractor shall be responsible for co-ordination of his works with other Contractors and sub-Contractors and determine and advise of necessary builder's work and attendances by the Main Contractor.

The Contractor shall include for the production at an early stage of coordinated services layout drawings including sectional details of all primary services routes. These drawings shall be fully coordinated between mechanical and electrical Contractors and shall be issued to the Main Contractor and Engineer for approval before the installation of any works proceeds.

The Mechanical Contractor shall act as lead coordinator and be responsible for presenting agreed coordinated mechanical and electrical layouts to the design team. These should include for detailed plans and sections, indicating how all potential clashes with structure, architectural finishes and other services (whether responsibility of Mechanical Contractor or not) have been overcome accordingly. The Mechanical Contractor shall be responsible for obtaining and collating all requisite information from the Electrical Contractor, or any other relevant Sub-Contractor (i.e. natural ventilation / rainwater etc.)

The Electrical Contractor shall be responsible for detailing all primary electrical services and producing specific installation details and drawings which shall be provided to the mechanical contractor for inclusion in the final coordination drawings.

Any works undertaken resulting in critical dimensions not being achieved (for example ceiling voids) or requiring alterations of architectural finishes where coordinated drawings have not been produced and agreed with the design team will be removed and reinstated to design team satisfaction at the Contractor's expense.

Any installations undertaken by the Contractor resulting in less than satisfactory appearance or improper works in the opinion of the Engineer where insufficient coordination has taken place shall be fully removed and rectified at the Contractors expense. (e.g. pipework crossing or in proximity to electrical distribution or comms equipment etc.)

B1.7 Production of Information - Procurement Details

The Contractor shall refer to individual sections of the specification and where requested, the Contractor shall provide full shop drawings and complete technical submittal documentation at an early stage to allow appropriate time for review and consideration of the information provided. The Engineer will endeavour to return comment or acceptance of proposals within 10 days of receipt of full submittals. The Contractor shall note that the programme implications of inadequate notice or late provision of information regarding submittals cannot be accepted by the Engineer.

The Contractor shall in advance of ordering any equipment submit a full and complete procurement schedule listing all items being procured providing the following information to the Engineer.

- Plant Item including specific Reference Name or identification.
- Returned relevant section of DMAC Consulting Engineer's specification, with each line item marked 'compliant' or 'non-compliant' by supplier/manufacturer.
- Manufacturer / Supplier Information.

- Lead time for delivery.

On receipt of the above information the Engineer reserves the right to request further information including technical data sheets or shop drawings in order to be fully satisfied of the Contractor's intent.

B1.8 Quality Control and Workmanship

The Contractor shall be responsible for on-site installation quality control. As such the Contractor will implement and maintain high standards of quality control governing materials and equipment, project management, site conditions and workmanship to provide a complete working installation to the highest standards that can be reasonably expected or attained.

Evidence of quality control procedures being in place must be demonstrated in this regard.

Only persons suitably trained with the necessary qualifications and experience appropriate to the task shall carry out installation works.

In recognition of the requirement to effectively train apprentices in the trade skill, workmanship and experience and to ensure the highest standards of installations reasonably attainable, the Contractor shall ensure that a ratio of two apprentices to each qualified trades-person is not exceeded on site.

Evidence will be requested to demonstrate compliance in this regard.

The Contractor shall execute his works in accordance with industry standards and any relevant guidelines offered by codes of practice or applicable regulations.

The Contractor shall establish and implement manufacturers' installation instructions and procedures in full.

The Consulting Engineers reserve the right to observe ongoing and completed work and comment there on, without prejudice, to the Contractor's responsibility for quality control.

Defective or sub-standard installations or workmanship shall be rectified at the expense of the Contractor.

B1.9 Testing & Inspections

The Contractor shall be responsible for carrying out all commissioning, testing and inspections as required by the specification or by any governing regulations or codes of practice not specifically referenced in the documentation.

The Contractor shall maintain an accurate documented record of all commissioning and test results to include the type of test carried out, listing all observations and findings including defects and failures. The documentation shall also give details of proposed or instructed remedial actions taken to correct any defects or failures. A retest of all failures shall be documented.

The Contractor shall prepare a written schedule giving a **minimum 10-day** notice period of proposed test dates for witnessing by the Engineer and Client's representative.

The Contractor shall provide the original Test and Compliance Certificates for inclusion in the O&M Manual. These certificates must be presented prior to Practical Completion Stage, as failure to do so will delay practical completion and all costs for delays attributable will be borne by the Contractor.

Where required by the Specification the Contractor will be obliged to engage third party testing and commissioning specialists. The proposed third party details together with the scope of their engagement shall be submitted to Engineer for comment or approval by the Contractor no less than 1 calendar month before the programmed pre-commissioning dates.

The Contractor shall prepare a detailed schedule and commissioning programme identifying tasks, durations and sequence together with key dates for co-ordination with the Main Contract Programme. The Contractor shall ensure that sufficient time is allocated within the Main Contract programme for successful and complete testing commissioning and witness testing.

B1.10 Site Facilities

The Contractor will provide secure covered storage facilities for all materials and equipment necessary for the proper execution of the contract. The Contractor shall allow for deliveries of materials and equipment commensurate to the space available. All costs associated with site storage will be deemed to be included within the tender return. The Contractor shall co-ordinate site facility requirements in line with the main contractor's compound

The Engineer may reject materials or equipment where it is considered that these materials are not being stored adequately and protected from damage and these will be replaced at the Contractor's own expense.

B1.11 Site Supervision

The Contractor shall include for the provision of a full time, on site, suitably experienced Foreman whose time and responsibility will be dedicated solely to the project for the supervision of trades-persons under his control.

B2.0 SCOPE OF WORKS

B2.1 Description of the Main Contract Works

The main contract works comprise the Refurbishment of Gallowglass Community Centre, Milford, Co. Donegal.

The scheme will comprise the following accommodation:

The works shall include the disconnection and removal of all existing electrical services within the Main Hall G.09, Minor Hall G.07 and the first-floor office. Electrical services within the existing extension are to remain in place and unaffected.

A complete new electrical installation shall be provided throughout the areas indicated on the contract drawings and as specified herein.

The main contractor shall also allow for protecting existing floor surfaces and wall surfaces. Any damaged surfaces due to the contractor not providing protection shall be replaced and made good by the contractor.

The main contractor shall include for builders' plastic to cover all existing furniture, carpet and electrical equipment.

The main contractor shall also allow for builders work that includes making good surfaces upon removal of existing containment and fire stopping.

The Contractor is recommended to inspect the drawings and other documents and to visit the site before tendering and satisfy themselves as to its accessibility, the full extent and character of the site. The availability of water supplies and electricity for temporary lighting and power and for other services required in the execution of the works, the nature of the ground, storage space for materials and temporary buildings as no claim on the grounds of want of knowledge in such respect will be entertained.

B2.2 Electrical Contract Works

The Electrical Services Installation shall include the supply, delivery, off-loading, erection, connection, setting to work, testing and commissioning of all plant and materials as described in this Specification, as shown on the Drawings and as necessary for a complete, safe and satisfactory Electrical Installation.

The electrical works shall comprise the following:

- (a) Utility Connections & Supplies
- (b) Cable Containment & Wiring Systems
- (c) Earthing Arrangement and Protective Conductors
- (d) General & Emergency Lighting Installation
- (e) General Power Distribution
- (f) Mechanical Plant Wiring Installation
- (g) Fire Detection & Alarm System
- (h) CCTV System

- (i) Disabled WC Alarm System
- (j) Induction Loop System
- (k) Audio Sound System
- (l) Operating and Maintenance
- (m) Disconnection and Removals
- (n) Builders' Work

All services shall be provided in accordance with the relevant Codes of Practice and also with the requirements of the local Authorities and Statutory Bodies.

The works described shall be complete in all respects and shall be carried out in accordance with the true meaning and intent of this specification and accompanying drawings and shall include everything required for a complete installation whether described in the specification or indicated on the drawings or not.

B3.0 UTILITY CONNECTIONS & SUPPLIES

B3.1 Electricity Supply

The main electricity supply will be provided by ESB Networks via low tension underground cable terminating in the cupboard at the front entrance of the property, where the existing consumer unit is located.

The cable will be at a potential of 400/230 volts 50 Hz AC and it will be the responsibility of the electrical contractor to ensure all equipment and materials supplied are suitable for operation on this system.

Refer to electrical drawings for the location of the existing consumer unit.

The Electrical Contractor shall allow for liaising with ESB Networks regarding any required disconnection, alteration, or diversion of the existing supply cable, as indicated on the drawings.

B3.2 Incoming Telecommunications

Telecommunications services to the building shall generally be obtained by the client. The Contractor shall provide adequate infrastructure including 2 No. 100mm diameter cable ducts for the procurement of the telecommunication services. The Contractor shall agree all underground ducts, containment routes, etc with provider.

The incoming telecommunications service shall enter the building at the front entrance via easy sweep bends. A Mains Frame shall be surface mounted on the wall of beside the consumer unit to enable the Engineers to terminate their cables. From this location the Contractor shall provide sufficient cable tray or trunking to install copper and fibre cables to the remote patch panels and outlets located in the first-floor office store.

B4.0 CABLE CONTAINMENT & WIRING SYSTEMS

B4.1 General

The Contractor shall supply and install all cables, cable trays, trunking, conduits and accessories to provide a complete and working distribution and wiring system.

All cabling and containment shall be installed in compliance with I.S. 10101 (National Rules for Electrical Installations – Current Edition).

The major cable routes are detailed on the General Arrangement drawings.

Wiring throughout the installation shall be carried out utilising the following types for the systems listed:-

1. Wiring system is to be T&E cables installed in ceiling voids; vertical drops to be in high-impact PVC conduit, as previously noted, for all lighting and power circuits.
2. XLPE insulated, steel wire armoured (SWA), LSZH sheathed cables for Sub Distribution Cabling, external lighting, external power circuits etc.
3. Cat-6 FTP LSZH Cable for Voice, Data, Wi-Fi, CCTV etc.
4. 25pr and 50pr Multi core telephone cables laid on cable tray/basket interconnecting communication cabinets for voice.
5. FP200 LSZH Fire Enhanced for Fire Alarm System / EVCS
6. Beldon Alarm cable for intruder alarm systems.
7. Beldon screened 8761 + 9729 cables for mechanical controls
8. Fire Alarm cables shall be FP200 Gold (Enhanced) Fire Resistant and contained on dedicated cable tray and galvanised steel conduit. All vertical runs/drops to break glasses/manual call points, sounders, etc. shall be enclosed in concealed galvanised steel conduit. Segregate all fire detection cables from other cables and each other. The cable specifications for these specialist services shall be as detailed on the drawings and in the respective clauses of this specification.

B4.2 Cable Trunking

Cable trunking shall be heavy duty galvanised steel trunking.

Where cable trunking is installed in ceiling voids etc. it shall be independently supported by 10mm, minimum, galvanised threaded rod & 'unistrut' pattern brackets with spring loaded securing nuts, galvanised penny washers, etc. suspended from under the floor soffit/structure of the building. Where cable trunking is installed within floor voids it shall be set-off the floor using 'unistrut' pattern brackets with spring loaded securing nuts, galvanised penny washers, etc.

Metalclad cable trunking shall be erected only in the positions shown on the drawing or detailed in this specification:-

1. constructed of not less than 1.2 mm galvanised sheet steel with "Formed" overlapping covers; in sections of not less than 3 m. lengths. Size shall be in accordance with the regulations and not less than detailed on drawings.
2. Complete in every respect with all necessary tees, angles, off-sets, reducers, cable supports and cable separators, supplied and fitted as made by the manufacturer of the trunking; such fittings shall be die cast type with radial bends;
3. Terminated in blank end pieces, conduits shall not be attached to these ends;
4. Designed so that all joints are moisture and dustproof;
5. Provided with 'cutter' type locking washers on at least two of the securing screws and copper earth links strap between each coupling piece and the trunking or trunking joints;
6. Finished galvanised;
7. Manufactured by Walsall conduits "or Equivalent".
8. Secured in position with brass round head screws, brass washers and raw plugs of adequate size and length fixed into solid brickwork or angles. Where required 32 mm x 32 mm angle irons shall be supplied and installed to support trunking. Any such angle iron shall also be galvanised after cutting and drilling.
9. And be provided with an approved fire stopping system where the trunking passes through a fire protection wall.

Attention is also drawn to the requirements for segregation of circuits.

B4.3 Cable Trays

Cable trays shall be heavy duty returned flange perforated type mild steel, galvanised after manufacture. Cable tray up to 600mm shall be a minimum of 1.5mm/16 gauge, and 750mm to 900mm a minimum of 2.0/12mm gauge. Where cable trays are installed and do not meet the minimum gauge they shall be immediately replaced at no cost to the Employer.

Cable trays shall be independently supported by 10mm minimum, galvanised threaded rod & 'unistrut' pattern brackets with spring loaded securing nuts, galvanised penny washers, etc. suspended from under the floor soffit/structure of the building. The suspension brackets shall be installed below the tray and all other brackets shall be provided in accordance with the requirements of BS EN 61537:2007. Where cable tray is installed within floor voids it shall be set-off the floor using 'unistrut' pattern brackets with spring loaded securing nuts, galvanised penny washers, etc.

All cables on cable tray shall be clipped individually using suitable metal cleats. Cable ties, tub tape, all round band, etc. shall not be permitted.

B4.4 Supports & Brackets

The Contractor shall supply and install all brackets and supports necessary for the satisfactory fixing of all trunkings and cable tray.

Where possible cable tray and trunking should be fixed to steel trusses above ceiling level or directly to the building structure using suitable angle iron supports.

After fabrication all ferrous supports shall be galvanised.

All cut or damaged supports shall be treated with a cold galvanised solution after dirt, scale and rust is removed.

B4.5 Galvanised Conduit

All conduit shall be solid drawn, screwed, heavy gauge, class 4. Galvanised conduit shall be manufactured in accordance with I.S. 10101 free from rust patches or other defects and not less than 20 mm external diameter for conduits carrying mains voltage circuits and be:-

1. Protected from mechanical damage and weather when stored on site.
2. Carefully reamed to remove all sharp edges and burrs. Oil and filings to be completely removed before erection and already cut threads cleaned by running dies over them and then wiping clean.
3. Fully protected to prevent ingress of plaster etc. into boxes and fittings during building works and swabbed dry before wiring is commenced;
4. Coated with red or white lead on cut threads and shall have joints
5. Screwed tightly using pipe wrenches and spanners and made watertight and after erection have all exposed threads painted with red or white lead;
6. Arrange to butt-in solidly boxes, couplers, accessories etc., using looping-in or standard boxes as required by the S.O.
7. Where installed on the surface runs shall be in keeping with the architectural features of the premises, fixed by spacer bar saddles using x No.8 brass screws and raw plugs at not more than 1200 mm intervals;
8. Where concealed, fixed into the solid concrete or brickwork by means of crampets at 1200 mm intervals;
9. In accordance with I.S. 10101 in respect of sizes.
10. Fitted with locknuts on all running couplings and only couplings and locknuts having smooth even bearing faces shall be used;
11. Set on site to form all bends, using bending machine, all sets shall be neatly made and shall not constrict the bore;

12. Held in an efficient vice for screwing; badly marked conduit or poorly cut threads shall not be accepted;
13. Coupled to adaptable, looping-in, switch and socket outlet boxes and made watertight by brass hexagon smooth bore brass bushes inside with flanged couplings outside;
- 14. Provided with an inspection box where a run exceeds 8 m. or has more than two right angle bends using only circular or adaptable type boxes. Inspection of solid tees or elbows shall not be permitted;**
15. Not be concealed before inspection and not be dismantled for wiring;
16. Not be installed with 150 mm of gas, water, L.P.H.W. or steam pipes or any associated work and where this is not possible, approved insulation spacers shall be used and the pipes concerned shall be bonded using strips and brass bolts and washers.
17. Have 35 mm minimum depth of cover where buried in concrete. Where buried in plaster, conduit shall have at least 5 mm depth of cover over its entire length.
18. Where buried in the carcase of a building, all open ends shall be temporarily plugged to prevent the ingress of foreign matter, moisture or water.
19. Wrapped with waterproof building paper for a distance of 300 mm each side where conduit buried in concrete crosses air expansion joint in the concrete.

B4.6 Flexible Conduit

Flexible conduit shall be used for final connection of cables to plant, machines, motor equipment etc. where there is vibration or movement and be:-

1. Liquid tight pattern, manufactured from galvanised steel strips. Continuously wound to form a strong flexible core which is then protected by a smooth liquid tight thermoplastic cover.
2. Terminated in brass nickel plated flexible conduit purpose made glands to match system.
3. Lengths not to exceed 1 m except in agreed circumstances where additional support shall be required.
4. Bonded by copper continuity conductor of c.s.a. not less than the layout phase conductor included in the conduit from the terminal in the feed conduit to the machine or equipment or motor terminals.
5. Be selected in type to suit the prevailing ambient and environmental conditions eg. High and low temperatures - 40 degrees centigrade - 100 degrees centigrade in heat resisting application or capable of resisting oil in machine applications.

6. Where installation requirements call for all non-metallic conduit systems the material of the flexible conduit may be nylon (black) tough with resistance to crushing and abrasion, capable of operating in temperatures in the range - 25 degrees centigrade to 120 degrees centigrade. Nylon adaptor and lockings shall be used to terminate conduit in this case.
7. Manufactured in accordance with I.S. EN standards for screws and fasteners appropriate to the application.
8. Of Anaconda "Sealtite" manufacture types EF, HC, HCX, OR, OR-H, and Adaptoflex Ltd type SPL for standard applications or Critchley Ltd "Betaflex" for non-metallic installations.

B4.7 Conduit Boxes

Conduit Boxes shall be manufactured in accordance with the appropriate Irish Standard and shall be:-

1. Fitted with cover lids of similar material, secured in position with substantial brass screws;
2. Used to facilitate wiring up to 6 mm² cross sectional area, (For wiring of cables of greater cross section area, through boxes shall be used;)
3. Of weatherproof type and packed with an approved waterproof plastic compound after wiring where erected in positions exposed to the weather and external to buildings. (IP 65)
4. Of the multiple adaptable type, where two or more conduits run parallel.

NOTE: Conduit boxes for lighting switches, sockets, etc. shall be manufactured to suit the particular accessories, complete with earthing terminal and adjustable lugs

B4.8 XLPE/LSF/SWA/LSF Distribution Cables

XLPE is a material which burns readily in air. For this reason it shall not be installed so that insulation is exposed outside of Equipment where it may cause a fire hazard.

XLPE/LSF/SWA/LSF copper conductor cables shall be used to supply Sub-switch boards, sub-distribution boards, items of control equipment and the external site lighting - all as indicated on the drawings and as sized in the schedules associated with this document. The external site lighting cables shall be buried direct in the ground or in ducts at road crossings etc.

All sub-mains and distribution cables shall be provided with a separate circuit protective conductor (CPC), sized in accordance with the requirements of I.S. 10101 (National Rules for Electrical Installations – Current Edition) and as detailed in the Schedules of Circuit Data

XLPE/LSF/SWA/LSF cables shall be:

- 600/1000 volt grade of the sizes detailed in the schedules/drawings with high conductivity plain copper wires.
- Insulated with extruded XLPE
- Cores shaped, numbered or coloured for identification and sheathed with LSF.
- Armoured with a single layer of galvanised steel wires, sheathed overall with LSF.
- In accordance with I.S. EN 60502-1 / 60502-2

B4.9 MICS Cables

Where mineral insulated copper sheathed (MICC) cables are specified, they shall be:

- Rated at 750/1000 V heavy-duty grade, comprising high-conductivity annealed copper conductors embedded in compressed magnesium oxide insulation and enclosed within a seamless copper sheath, complete with an overall Low Smoke Zero Halogen (LSZH) oversheath where required.
- Manufactured and tested in accordance with I.S. EN 60702-1 (Mineral insulated cables with a rated voltage not exceeding 750 V) and I.S. EN 60702-2 (Terminations and joints).
- Installed in accordance with I.S. 10101 (National Rules for Electrical Installations – Current Edition) and manufacturer's recommendations.

B4.10 FP200 Gold (Enhanced) Fire Resistant Cable

FP200 Gold (Enhanced) cable shall be:-

- In accordance with BS 7629 Part 1.
- BASEL Approved.
- High Impact and Moisture resistant insulation.
- 300/500 volt rated.
- 2 core + E (1.5mm) Red.
- LSZH Sheath Type LTS3.
- Fire Resistant to IEC 60331.
- 70oC Temp. Rated.
- Vertically enclosed in conduit and horizontally clipped direct using metal clips.

B4.11 Cat-6 UTP Cable

Cat-6 F/UTP low smoke zero halogen cabling shall be used for all wi-fi, voice and data points.

Cat-6 UTP LSF cabling can be used for CCTV and door access. Cat-6 UTP external grade shall be used when cabling externally.

A single Cat-6 cable shall run as a radial circuit to each single Cat-6 point, where twin outlets are installed 'two' Cat-6 cables shall be installed.

Cat-6 cables shall be LSF sheathed to IEC 332-1 and installed in conduit and trunking for its entire length. Cat-6 F/UTP cables shall be manufactured by BICC Braid-Rex, Krone "or equivalent".

B5.0 EARTHING ARRANGEMENT AND PROTECTIVE CONDUCTORS

B5.1 General

Earthing shall be in accordance with I.S. 10101: National Rules for Electrical Installations

B5.2 Circuit Protective Conductors

Circuit protective conductors shall interconnect the main earthing terminal or bar with all exposed conductive parts of all items of equipment forming the electrical systems installation. Circuit protective conductors shall comprise a cable in its own right or core of a multi-cored cable. The armour or metal sheaths of a cables or parts of enclosures shall be earthed but not relied upon for provision of circuit protective conductors.

Circuit protective conductors which take the form of an insulated core of a multi-cored cable shall be suitable identified by LSF sleeving coloured green/yellow at all terminations.

B5.3 Supplementary Bonding

Within the zone formed by the main equipotential local supplementary bonding connections shall be made to metal parts to maintain the equipotential zone, where those parts comply with the requirements of I.S. 10101

In each shower and bathroom area, supplementary bonding shall be provided. For the purpose of tendering, it is assumed that all joints in pipework and ductwork services are permanent, reliable, metal-to-metal joints of negligible impedance.

Include for the testing of all such joints and the informing of the Engineers of all cases where the impedance is not negligible.

B6.0 GENERAL & EMERGENCY LIGHTING SERVICES

B6.1 General

The Contractor shall provide and install a complete general and emergency lighting Fittings to be used shall be as specified in the Schedule of Luminaires forming part of this Specification.

All luminaries, equipment and installations shall comply with the current provisions of the following standards;

- European Union (EU)
- EMC Directive 89/336/EEC
- Electromagnetic Compatibility Requirements
- CENELEC

All electronic equipment and devices must have the CE mark of compliance.

Any items without certification or compliance in this respect shall not be permitted and shall be removed and replaced at the electrical contractor's expense.

The system installation shall be in accordance with the requirements of the current I.S10101 Wiring Regulations.

The contractor shall include for the commissioning and demonstration of all lighting systems.

B6.2 Light Fittings

The contractors shall include for all costs associated with the provision of all samples within his tender return for each fitting.

B6.3 Lighting Switches and Controls

Local lighting switches throughout the installation shall have insulated wide rocker operated switches, finished in brushed chrome c/w white inserts, and be manufactured by MK, Crabtree, MEM "or equivalent". All light switches shall be at a height of approximately 1100mm to the top of the light switch above finished floor level and 150mm distance from the edge of the architrave.

Lighting switches to have surrounds to differentiate between wall finish and switch plate in accordance with building control requirements.

Absence sensors, daylight sensors and combined sensors shall be installed in all areas with switch over-ride facility to permit luminaires to be switched off should this be desired for maintenance, operational and or presentation purposes.

Where required to comply with I.S. 10101:2008 complete earth bonding of the ceilings as soon as possible after completion of each independent area of suspension system. Testing after completion of the ceiling system and associated luminaires etc. is required to confirm that the system shall carry the earth fault current. Further details can be found in the Architectural Specification section of the Employer's Requirements.

B6.4 Installation

The Contractor shall instruct the Main Contractor with regard to the supply and installation of grounds or supports behind all wall and ceiling mounted luminaires and any builder's work cast in boxes or openings in ceilings which may be required to accommodate fittings.

The Contractor shall also instruct the main contractor on the casting in of recessed wall or ground mounted luminaires within the structure of the building and ground. The contractor shall include for the early delivery of proprietary casting in boxes to facilitate the installation of luminaires later in the programme.

The Contractor shall include for the early delivery of any trimless luminaires, which are required to be installed prior to erection of ceilings. The contractor must coordinate this with the Main Contractors programme.

All cables are to be installed in such a manner as they are fully accessible and suitable for additional wiring and re-wiring without the need to dismantle other services or building architectural items. Any items failing to comply shall be rectified and relocated on site at the expense of the electrical contractor.

Wiring associated with internal lighting shall unless otherwise stated be circuited in such a way as to maximise opportunities for daylight savings.

Luminaires along fenestration shall be controllable separately from luminaires positioned further away from glazing.

The internal wiring in all general circulation areas, shall be carried out in 2.5 sq. mm. LSF insulated cables, enclosed in galvanised steel trunking and conduit from 10amp type C MCB. Circuit loading shall not exceed 1200 Watts.

Circuit references and arrangements are as indicated on the drawings and shall be agreed with the Engineer before commencing work on site. The contractor's final circuits must be such as to ensure that the load is evenly balanced across all phases.

Final connections to all wall or ceiling mounted luminaires where no void space is available shall be in flexible conduit and porcelain connectors fixed within to round conduit box. This termination arrangement shall be located directly behind the luminaire and shall finish flush with the wall or ceiling finish. Plug and socket connectors with flex shall not be accepted for surface mounted fittings. Where cables enter through the metal structure of a luminaire, the cable shall be protected by rubber grommet.

Luminaires mounted within a suspended ceiling shall have a dedicated "click" type connector to be located no more than 500mm from the luminaire. The connection between the "click" and the luminaire shall be in 2.5mm PVC/LSF Flex.

Lighting in store rooms, plant rooms etc shall be conventionally switched via local wall mounted switches. All store room switches shall be mounted outside the room and the switch shall be fitted with a red LED/neon indicator to provide indication when the light is left on. The contractor shall therefore ensure that the neutral is broken through the light switch to provide power to the indicator light.

All wall mounted light switches shall be positioned at a height of 1,100mm AFFL to top of switch unless otherwise indicated.

In the event that the luminaires are used to provide site temporary lighting prior to handover, the electrical contractor shall include for the re-lamping of all luminaires immediately prior to practical completion.

Final connection to all luminaries mounted in or on suspended ceilings shall be via 6 Amp 4 terminal plug-in type ceiling rose with sufficient flex connection minimum 2500mm to permit movement of the luminaire and allow alignment within the confines of the ceiling grid.

B6.5 Control of Lighting

The control of the internal lighting shall consist of standalone manual switching and occupancy sensors and mains voltage occupancy sensors where appropriate to maximise potentials for energy savings.

Control of Lighting within the corridor areas shall be by standalone 230V rated Ultrasonic Presence detection sensors. The contractor shall select PIR sensors specific for lighting applications and shall be capable of switching the circuit load.
The following is the control methodology:

- Main Hall – Dimmer Switches.
- Stores, WC'S – controlled via occupancy detectors on presence detection. i.e. lighting shall activate when room is occupied and switch off after a preset time when room is unoccupied.
- Plant Areas. – Plant areas to be manually switched.
- Multipurpose Hall – Kitchen to be switched
- Glazed Link – switched.

B6.6 Fixing of Luminaires in suspended Ceilings

In areas with suspended ceilings, luminaries shall be suspended using steel rods or suspension chains, supported from the steel structure or floor slabs. At no time shall the ceiling grid support the weight of the luminaire.

B6.7 Final Connections

Where luminaries are installed in suspended ceilings the conduit shall terminate in a deep pattern circular conduit box with plug-in type ceiling rose. The Final connection shall be carried out using 1.5mm² heat resistant flex.

B6.8 External Lighting

Supply and install an exit door light as detailed on the drawings. External luminaires shall be mounted in such a manner as to prevent the ingress of moisture.

B6.9 Testing & Commissioning

On completion of system installation full testing and commissioning shall be carried out in line with manufacturer's guidelines and as defined under current I.S. 10101 Regulations.

The contractor shall include for the commissioning, demonstration and programming of all lighting installations outside normal working hours i.e. (after dark) the contractor shall ensure the full operation of all lighting installations and verify all achieved levels of illuminance. The contractor shall ensure that all lux levels taken are verified using a calibrated lux meter. Details of calibration must be included in the O&M files. Once satisfied the Contractor shall invite the Engineer to witness test the system and carry out random lux level readings to demonstrate same to the Engineer.

On completion of system installation full testing and commissioning of the detection sensors shall be carried out in line with manufacturer's guidelines by an approved manufacturer's representative.

B6.10 Documentation

Upon project completion the contractor shall provide complete Operation and Maintenance instructions including a complete set of 'As-Installed' drawings.

The contractor shall print and board mount a full set of lighting plan layout drawings for display in relevant maintenance areas. The lighting plan layout drawings shall be printed at a minimum of 'A2' size and shall be screw fixed adjacent to respective lighting distribution centre.

The O & M manuals shall include copies of lighting circuit schedules which shall provide details of every lighting circuit, location, phase, device rating, board reference etc. The lighting circuit references shall also be indicated on every circuit on the lighting installation drawings.

The 'As Installed' drawings shall be marked up with the recorded lighting levels.

B6.11 Samples

In advance of orders being placed for any luminaires the Contractor shall allow for the assembly, erection and electrical connection of sample luminaires as requested. 1 No. sample of each type luminaire specified shall be presented for review by the design team comments or final approval.

The Contractor shall include for all costs associated with the provision of all samples within his tender return.

B6.12 Spare Materials

Upon project completion and at handover the contractor shall provide to the client 1 No. replacement lamps of each type used on this project and additional luminaires as noted on drawings.

B7.0 POWER DISTRIBUTION SERVICES

B7.1 General

The Contractor shall provide and install throughout the building the general-purpose socket and fixed power installation as detailed on the drawings. The general power installations shall be installed, tested, commissioned and certified to ensure the installation and its respective components are in strict accordance with the current I.S. 10101 I.S10101 Wiring Regulations.

The Contractor shall provide header trunking systems in the corridors with conduit systems as necessary to service socket outlets or items of fixed power. Dado trunking shall also be used where indicated on the drawings to serve socket outlets, computer outlets, telephones and other items of general power.

All devices and components shall be compliant with the following and shall bare the CE mark of conformity. Any devices found to be non-compliant shall be replaced at the contractor's expense.

- European Union (EU)
- EMC Directive 89/336/EEC
- Electromagnetic Compatibility Requirements
- CENELEC

General Services socket outlets shall conform to I.S. EN 60309

Connection units shall conform to I.S. EN 60309

Electrical accessories throughout i.e., switched socket outlets 20amp D.P. switches, spur units etc. shall be MK Logic Plus Range.

B7.2 General Purpose Socket Outlets

All socket outlets shall be 13A Double Pole Socket outlets shall conform to I.S. EN 60309 and shall have 3-pin child resistant shutter system and be manufactured from an antimicrobial material.

Cabled in 4mm² T&E DCA-S2,D2,A2 rated cables extending in a ring from the 25A RCBO in the distribution board and dropping vertically into in High Impact PVC conduit as indicated.

B7.3 Projectors

The Electrical Contractor will provide, install, wire and connect a projector as indicated on the drawing. Wiring shall be carried out in 2.5mm² LSF cables and 2.5 mm² CPC in conduit from local distribution board. Cables will be installed from 10 amp SP&N MCB/RCD to terminate in a 13 amp SP&N switched indicating double pole switch at worktop level engraved 'Projector'. From this point cables will be installed within conduit to a 13 amp unswitched socket outlet located at High Level adjacent the projector.

The projector shall also have a Cat6a outlet wire adjacent each projector from the comms cabinet and a HDMI and USB link to work in tandem from this position.

All cables to be in separate conduits for each service.

See projector/audio section for details on projectors.

B7.4 Spur Units

The Electrical Contractor will wire and connect Spur Units apartments as indicated on the drawings. Wiring shall be carried out in 4.0 mm² LSF cables and 4.0 mm² CPC in conduit from local distribution board. Cables will be installed from 20 amp SP&N MCB/RCD to terminate in a 13 amp SP&N switched indicating double adjacent each item of equipment.

Final connection shall be from spur unit to connection point on equipment. Refer to drawings E201 for notes on all other services.

B7.5 Hand Dryers

Hand Dryers are to be ATC Cub High Speed Stainless Steel.

B8.0 MECHANICAL PLANT WIRING INSTALLATION

B8.1 General

The Electrical Contractor will wire and electrically connect all fans, motorised valves, control stats, sensors, etc as shown on the drawings necessary for the complete and proper running of the ventilation and heating systems.

All control panels associated with mechanical plant will be supplied and fixed in position by the mechanical contractor but all wiring to and from the panels will be carried out by the electrical sub-contractor.

All power circuits associated with services for mechanical engineers will be wired as shown on the drawings enclosed in a totally continuous galvanised conduit system. All control circuits will be wired utilising cable sizes and types, as shown on accompanying drawings, enclosed in a totally continuous galvanised conduit system.

The mechanical services specialist contractor will be responsible for the supply and erection of all mechanical services control panels, plant and equipment and for the timely provision of all necessary wiring diagrams for use by the Electrical Contractor. The Electrical Contractor should allow for the supply and installation of all necessary containment, cabling and local isolating devices and for final connections to all equipment.

Mains voltage circuits should generally be wired using LSHF insulated single core cables drawn into galvanised steel cable trunking and/or conduits with separate, equally-sized circuit protective conductors provided for each circuit. The fixed wiring should terminate into a local metal clad rotary isolator and final connections should be made using LSHF insulated single core cables in PVC coated metallic flexible conduit.

Extra low voltage circuits associated with control elements (thermostats, sensors, valve actuators etc) should generally be wired using LSHF insulated single core cables drawn into galvanised steel cable trunking and/or conduits kept entirely separate from mains voltage circuits.

To facilitate ease of maintenance, where mains voltage equipment or control elements are located within suspended ceiling voids the fixed wiring should terminate into suitably rated and poled local socket arrangements and final connections should be made using PVC insulated and sheathed flexible cable and a compatible plug.

Where communications grade cabling is required for control elements associated with the building management system this should be drawn into galvanised steel cable trunking and/or conduits completely segregated from both the mains voltage circuits and any ELV circuits. The cabling may be screened or unscreened and should be strictly as specified by the supplier of the BMS equipment.

In the plant rooms all conduits should be fixed to the surface of the building and should be painted by the Main Contractor on completion. In all other areas concealed installations should be provided.

Every local isolator in the installation should be provided with a permanent engraved label to indicate function and the control panel that the equipment is supplied from.

B8.2 Local Isolators

The Electrical Contractor will supply and install isolators adjacent to all valves, pumps, fans, etc as shown on drawings.

Local isolators will be of the mini rotary type sealed to IP 65 pad lockable in the OFF position and will be die-cast aluminium enclosure and of suitable rating.

B8.3 Fans

The Electrical Contractor will electrically connect all fans as supplied and installed by others and provide suitably rated local isolators to the fans and fan controllers as necessary. Wiring will be from adjacent lighting circuit via triple pole isolator, over-run timer and controlled by PIR unless otherwise indicated.

B8.4 Final Connections

The Electrical Contractor's responsibilities will include:

- Wiring between outstations and control panels. Including final termination. All cables to be properly labelled and identified.
- Wiring and termination of all fans, solenoid valves, water heaters, thermostats, room sensors, fan controllers, etc.
- Mains wiring to air handling plant and control wiring to panels to be terminated and installed under electrical services contract.
- Provision of isolators, switches etc for items of plant as identified on the HVAC wiring schematic.
- All final terminations to control panels will be carried under the electrical services contract.
- See Mechanical Wiring Schedule of all mechanical Wiring requirements.

B8.5 Wiring Schematics

It will be the Electrical Contractor's responsibility to obtain actual mechanical wiring schematics from the appointed specialists. The drawings provided by DMAC are indicative only.

All external power, control and sensing cabling will be terminated using "IP65" rated terminations.

B9.0 FIRE DETECTION & ALARM SYSTEM

B9.1.1 General

The Electrical Contractor shall employ the existing incumbent specialist fire alarm company to upgrade and extend the existing fire alarm system into the existing building.

The entire fire alarm system shall comply fully with I.S 3218 designed to provide automatic detection on escape routes and in rooms opening onto escape routes, unless otherwise required by the Fire Safety Certificate.”

The Contractor shall provide a dedicated, integrated fire detection and alarm system.

The whole product must be from a single source supplier who is competent to provide all planning, commissioning and maintenance services.

The system shall be wired utilising loops as recommended by the Specialist Installer and through the multiplexing of signals the detectors and call points shall be grouped into the zones as detailed hereafter and indicated on the accompanying drawings.

Alarms shall be located and displayed in plain English via an alphanumeric display and recorded on an integral printer.

The Main Fire Alarm Panel shall be located at Main Entrance.

The fire detection system specified as follows shall fully comply with the following standards:

- EN54 Part 2
- I.S. 3218 Fire detection and alarm systems for Category L1 system

B9.1.2 Fire Alarm System

The fire alarm system shall be an Addressable system and shall comply fully with I.S. 3218. The Existing main addressable fire alarm panel shall be located on the ground floor entrance lobby, location marked on drawings.

All fire alarm cabling shall be FP200 Gold concealed in steel conduit.

The electrical contractor shall appoint suitably qualified Fire Alarm specialist to supply, install, test and commission the fire alarm system. The fire alarm specialist shall be a member of the Fire Industry Association

The contractor shall allow in his tender for bringing his specialist Fire Alarm specialist to site to mark out exact locations of all devices to avoid clashes with lighting fittings, walls, mechanical plant and to position all devices in correct positions within each space.

A system wiring diagram shall be obtained from the manufacturer prior to commencement of work and a full set, in duplicate of all relevant maintenance manuals and systems wiring diagrams are to be provided and handed over the Engineers on completion of the work. The complete fire/alarm system shall be tested and commissioned by the manufacturers on

completion and a typed certificate issued to this effect. Any part of the system which becomes defective within one year of the handover will be replaced/repared at no expense to the Client.

A further site visit shall be included for in order to instruct the users of the building in the operation of the system.

B9.1.3 Main Control Panel

The new fire alarm system main control panel shall be of an open protocol Analogue Addressable type operating at 24V dc.

The Main Control Panel shall come complete with 2 loop control card. To enhance the integrity of the system the control panel shall be equipped with the following features.

The main control panel shall have the facility, via the alpha numerical key board, to isolate devices as follows: -

(i) Any device individually. (ii) Any group or zone of devices. (iii) Any loop or devices.

The control panel shall also be capable of electrically isolating the loop. Isolating devices in any of the above formats must result in the illumination of the device isolate LED's and the operation of the internal panel sounder. The printer must also record this event and the system retains the event in the non-volatile memory.

Each fire alarm panel shall be fed via flame resistant cabling in conduit from a 16 amp SP/N lockable switch in the Main Switchboard. The switch shall be connected direct to the main busbars (same phase for each panel) and shall be painted red and labelled 'FIRE ALARM - DO NOT SWITCH OFF' and locked on.

The main isolator on the switchboard shall also be labelled 'ISOLATION DISCONNECT FIRE ALARM'.

The Main Fire Alarm Panel shall be linked by its own communicator to ring out via the intruder alarm panel to the monitoring station after hours.

Local isolation shall be provided by means of a DP key switch located adjacent to the fire alarm panel.

A system wiring diagram shall be obtained from the manufacturer prior to commencement of work and a full set, in duplicate of all relevant maintenance manuals and systems wiring diagrams are to be provided and handed over the Engineers on completion of the work. The complete fire/alarm system shall be tested and commissioned by the manufacturers on completion and a typed certificate issued to this effect. Any part of the system which becomes defective within one year of the handover will be replaced/repared at no expense to the Client.

A further site visit shall be included for in order to instruct the users of the building in the operation of the system.

B9.1.5 Co-Ordination

The contractor shall allow in his tender for bringing his specialist fire alarm installer to site to mark out exact locations of all devices to avoid clashes with lighting fittings, walls, mechanical plant and to position all devices in correct positions within each space.

B9.1.6 Internal/External Power Supply

Each control panel shall be equipped with an internal power supply unit, which shall be fully monitored by the control panel. This unit shall have the capacity to provide as a minimum, a "No Break" change over to a redundant path in the event of a cable failure, short circuit, or earth fault, on the main supply path. Generally, the panels power supply shall fully comply with the requirements of EN 54, and all its associated requirements and shall have capacity for 72 hours.

B9.1.7 Detection Loops

Each detection loop shall have the capacity to support actuating devices. For the design purpose of this project however, the initial number shall not exceed the detector/sounder module devices per loop, as spare capacity must be provided to accommodate any future expansion. Each loop controller should be capable of supporting a loop cable length of 2000 metres per individual detector loop.

B9.1.8 Loop Control Cards

The control panel shall incorporate four number loop control cards. These units shall contain full onboard diagnostics, and be monitored at all times for malfunction. These cards shall incorporate a level of redundancy and integrity to ensure that, "In the event of a loop control card failure, the panel shall revert to monitoring the loop of detectors as a conventional zone, and shall be capable of detecting a fire call on that loop and operating the sounders".

B9.1.9 Device Addressing

The control panel shall be equipped with the necessary software to automatically address the field devices. In addition, the software shall allow and automatically reorganise the addressing, relocation of device text reference and commands to auxiliary equipment for additional or redundant devices.

B9.1.10 Isolators

Each individual device connected on the sensor loop shall incorporate a line isolator as an integral part of the device. The device shall, in the event of a short circuit or earth fault, isolate the sections of cable affected.

B9.1.11 Bells/Sounders

It is intended that alarm for the most part shall be provided via detector/sounder modules except for Kitchen and plant rooms where sounders and flashing beacons will also be used.

The control panel will also be equipped with a minimum of from any actuating device on any loop. In the event of an open or short circuit, on any or all of the detector two fully monitored bell circuits (expandable to 4), which shall be programmable loops, or a malfunction of any or all of the loop control cards, the bell circuits must be capable of being operated in:

- a) The normal manner as programmed from any functioning loop, or
- b) For evacuation from the control panel upon manual activation.

B9.1.12 Ancillary Outputs

The control panel shall be equipped with a minimum of eight auxiliary relay outputs which shall be programmable from any actuating device on any loop.

B9.1.13 Programming

The system shall be fully site programmable via the alpha numerical key board, however the system shall also be capable of being programmed via a standard IBM compatible PC to ensure a back-up of the system software can readily be attained. The control panel shall be equipped with the necessary interface card to enable the up-loading and down-loading of software to and from the control panel and the PC. It shall also be possible to activate, enable, disable or modify time zone-controlled functions via this interface.

B9.1.14 Controls

The control panel shall be equipped with the following minimum clearly defined control features: -

Control Function:

- Mute Sounders Silence alarm sounders
- Evacuation Operate alarm sounders continuously
- Alert Operate alarm sounders pulsing
- Reset Restore the system to normal
- Day/Night Operation Switch the system between day and night mode Previous Message Select previous message
- Next Message Select next message
- Paper Take-up Manually operate paper take-up
- Paper Advance Manually operate paper advance
- Function Keys Provide additional information
- Enable Manually enable the above controls
- Disable Manually disable the above controls

B9.1.15 Field Devices

All devices used as part of the total system configuration shall be fully compatible with the control panel detailed previously. The level of compatibility shall be as detailed in EN 54.

B9.1.16 Wiring

Landlords Area Fire alarm and system cabling shall be Pirelli FP 200 Gold with red outer sheath, or equal and approved.

Circuits shall be wired using 1.5 mm² two-core and earth cables. Cables shall be screened, Low Smoke Zero Halogen (LSZH), flame retardant, and compliant with I.S. EN 50575 (CPR). Where used for fire detection and alarm systems, cables shall be fire-resistant (enhanced grade) and shall maintain circuit integrity in accordance with relevant I.S. EN standards (e.g. I.S. EN 50200 and I.S. EN 60331), suitable for life safety applications. Cabling shall be installed generally fixed on cable tray and within galvanised conduit system to low level outlets. The Contractor shall confirm the wiring details as acceptable from the specialist installer at time of costing and make due allowance in his tender for any specialist wiring requirements for the chosen Fire Alarm System. The automatic and manual devices together with interface units shall be wired in a loop, starting and finishing at the control panel in accordance with the drawings.

Methods of cable support should be non-combustible and such that circuit integrity will not be reduced below that afforded by the cable used, and should withstand a similar temperature and duration to that of the cable while maintaining adequate support. The use of plastic cable clips, cable ties or plastic conduit/ trunking/ cableways, where these products are the sole means of cable support is prohibited. Compliant installation of the cable and means of support can be achieved by direct fixing to the structure using manufacturers' approved method of fixings. However, where this is not practical, it may be necessary to run fire alarm system cables within or on appropriate cable carrying systems. Where this method is adopted, the highest practical level of cable system integrity shall be achieved. For example: Installation of cables within properly secured screwed steel conduit, Mounting on upper side of steel cable carrier (tray), using non-combustible fasteners, The use of girder clips (non-combustible).

Terminations within system components such as control and indicating equipment, manual call points, fire detectors and sounders should be constructed of materials that will withstand a similar temperature and duration to that of the cable. There shall be no joints other than component terminations within system components.

B9.1.17 Smoke Detectors

The smoke detectors shall comply to EN 54; they shall be of the analogue addressable type. They shall be of the optical type unless otherwise specified. These detectors shall be installed in accordance with the system drawings and I.S.3218 Part 1 1988. A common base shall be used to allow interchange with ionisation and heat detectors. This detector

shall be suitable for use in conjunction with the control panel specified and be complete with a line isolator. Sounder Modules shall be provided where shown.

B9.1.18 Detectors

Smoke and Heat detectors shall be by the same manufacturer as the fire alarm panel, they shall be ceiling mounted and positioned for ease of access for maintenance and testing. Bases shall allow for ease of changing detector type and for adding sounders and beacons as required.

The heat detectors shall comply to and EN 54; they shall be of the analogue addressable type. These detectors shall have a fixed temperature (75°C) type and shall be installed in accordance with the system drawings and I.S.3218 Part 1 1988. A common base shall be used to allow interchange with ionisation and optical detectors. This detector shall be suitable for use in conjunction with the control panel specified and be complete with a line isolator. The detector should be of the type that allows the main control panel to determine if the detector is a maximum (fixed) temperature detector, or a Rate of Rise detector. Sounder Modules shall be provided where shown.

B9.1.19 Manual Call Points

Manual call points shall be installed at 1000mm AFFL on each floor landings and at the main exits.

The call points shall comply with I.S. 3218 and EN 54. They shall be of the addressable type, thermoplastic, and operate via a resettable glass and hinged lid. A special key to test shall be supplied with each unit. The unit shall be suitable for flush or surface mounting. The call points shall be suitable for use in conjunction with the control panel specified. All call points should have the ability to be tested without generating an alarm condition.

B9.1.20 Sounders & Beacons

Combined Sounder & Beacon bases shall be used in this contract as shown in the drawings.

The sounders shall be of the electronic type and compatible with the detector/sounder devices in terms of sound and operating at 24V dc. They shall operate at a minimum volume level of 100 dB. They shall be suitable for besa box mounting. The sounders shall be suitable for use in conjunction with the control panel as specified. The sounders shall be mounted at approximately 2100mm above F.F.L. or 150mm to top from ceiling level.

B9.1.21 Common Base

All detectors shall use a common base which shall be suitable for besa box mounting. Bases should include on board electronics to protect against open circuits, short circuits, and earth faults. No separate components should be required to achieve this level of protection. Where mounted on suspended ceiling automatic detectors shall be provided with a recessed mounting kit.

B9.1.22 Provision of Zone Chart

The Contractor shall include for the provision of a Fire Alarm Zone Chart. This zone chart shall indicate the overall building floor plans and the location of all items of Fire detection as well as all stairs, corridors and escape routes. A chart shall be located adjacent the Fire Alarm Panel within a framed Perspex panel.

B9.1.23 Additional Switching Functions and Cabling Over and Above Fire Alarm Cabling where applicable

Additional switching functions shall be provided as described below in the event of automatic smoke or heat detectors operating in specific areas.

Function 1 - In the event of a fire being detected anywhere in the building, the interface units to the corridor doors shall release the P.S.U to the magnetic door holders.

Function 2 - In the event of a fire being detected anywhere in the building, the interface units shall activate power to Automatic Opening Vent (AOV)

Function 3 - Allow for 2no spare interface units to be confirmed on site.

Function 4 – Allow for Interface for Boilerhouse and gas detection

B9.1.24 Inspection, Testing & Commissioning

The whole of the installation shall be inspected, tested and commissioned in accordance with clause 26 of I.S. 3218: Part 1 and as further described.

Commissioning shall be carried out in accordance with Clause 26.5 of I.S.3218: Part 1, which shall include: -

A. An audibility test of alarm devices. Audibility level reading shall be taken in each room using an instrument complying with I.S. 3218. Any sound pressure levels found to be lower than that required by Clause 9.4.1 of I.S.3218: Part 1 shall be reported, in writing to the Engineer.

B. All trigger devices i.e., manual call points, heat detectors and smoke detectors shall be tested for correct operation.

C. A mains failure test shall be carried out to verify the standby battery systems complies with the requirements of this specification.

D. All items detailed in Function 1 to Function 7 activate and reset when fire alarm activates and is reset.

Prior to commissioning the contractor shall provide a certificate of installation and commissioning of the system (See appendix B and I.S.3218: Part 1) to the Engineer. It should be noted that a Practical Completion Certificate will not be issued until this installation and commissioning certificate has been received, and the installation and commissioning

certificate will not be accepted unless it is accompanied by the Record Drawings and User Manuals and the system log book (see appendix D of I.S.3218: Part 1).

The Electrical Sub-Contractor shall include for monitoring the installation and pay all costs for the first 12 months of operation, which shall include 24-hour response to system faults and free parts and labour warranty for the duration of this maintenance contract.

Additionally, regular servicing and maintaining of the installation shall be carried out at 6-month intervals during the maintenance period. During this period the Equipment supplier shall submit to the Engineer a full report in duplicate including details of tests carried out and any faults found with the system and corrective action taken.

The date of the Architects Practical Completion Certificate shall be taken as the handover date unless otherwise agreed in writing.

B9.1.25 Specialist Installer

North West Alarm System contact Chris Mc Brearty (074) 9721687 or 087 719 6910

B10.0 CCTV SYSTEM

B10.1 System Objectives

The contractor shall employ the Incumbent CCTV company to provide and install a new digital CCTV system as indicated on the drawings as indicated on the drawings.

The System will be a standalone package comprising of a full IP HD CCTV system. The system will incorporate 5.0-megapixel HD Day/Night cameras and IP software and recording equipment. The head end equipment will be located in the Comms Cupboard on First Floor to be provided by this specialist sub-contractor.

Cameras to be IP65 rated internally and externally.

The main recording equipment and master networking switch shall be located in the Mains Security cabinet and remote network switches located in the sub-Comm's cabinets around the building and site.

All IP cameras internally shall be wired back to the local network switch using Cat 6 cable on cable tray and conduit per camera), all external IP cameras shall be wired back to the nearest network switch using either external grade Cat 6 (using appropriate Ethernet extenders where the cable distance from the switch to the camera exceeds 90m).

It is the responsibility of the specialist NACOSS/SSAIB accredited sub-contractor to ensure that the proposed network infrastructure is sound in terms of data and video transmission. A full, project specific, wiring diagram shall be submitted for review along with the contractors' tender price and storage and bandwidth calculation.

Resolutions of each camera have been carefully considered and agreed upon pre-tender. Cameras proposed with lower resolution will not be considered.

The contractor shall supply and install a TCP/IP based Colour/Monochrome CCTV surveillance system to monitor the existing areas as indicated on the drawings.

Target Rotakin values are 120% within building (suitable for identification) and 50% (suitable for recognition) to public concourses, entrances and exits.

The cameras shall be of the colour format and are to be a mixture of dome fixed cameras

Cameras to be digital recording type cameras.

Cameras to be able to fulfil their design intent day or night.

Monitoring of the CCTV cameras is to be in the original location, on first floor store in office.

The system will also be suitable for remote monitoring.

B10.1.2 Conduit & Wiring

The wiring and infrastructure system for the CCTV shall be carried out by the Contractor. Wiring to Cameras shall be provided by the contractor for installation. Cameras shall be connected via a RJ45/Cat 6 patch lead arrangement to each CCTV camera.

B10.1.3 Specialist Installer

The system shall be supplied, commissioned, maintained and demonstrated by a specialist Subcontractor:

- North West Alarms

Chris Mc Brearty

074 9721687

087 719 6910

c.mcbreatry@nwasystems.ie

B11.0 DISABLED WC ALARM SYSTEM

B11.1 General

The Disabled WC Alarm referred to in this section is a single system providing the following:

- Assisted alarm call systems in Dis WC's.

B11.2 System Design

The contractor shall provide in each disabled toilet a call system as manufactured by CTEC Ltd.

Within Each Toilet:

- Call unit reference QD 321 with red re-assurance LED. This unit shall be mounted at 1 metre AFFL.

Outside Toilet Reset

- Reset unit reference QD324 with reassurance LED

Outside Overdoor Lamp/Tone Generator

- Overdoor unit as QD332

Ceiling Space Power Supply Unit

- In the ceiling space fix the power supply unit reference QD152

B12.0 INDUCTION LOOP SYSTEM

B12.1 General

Audio frequency induction loops systems shall be fitted in the main community centre building (Main Hall G.09 and Minor Hall G.07).

A perimeter loop shall be installed wired in 2.5mm² cable contained in PVC conduit in the ceiling void. Loop amplifiers shall be located in the adjacent store in the lobby. Induction systems shall be installed tested and commissioned in accordance with IEC60118-4: 2014.

- 2No - signet PDA7/SD amplifier + 1 x Signet APM boundary Microphone.

Deaf loop aid system to be wired in 2.5mm sq. cables in PVC conduit from a 16amp RCBO in the distribution Board terminating in a 13amp fused connection unit adjacent the Amplifier.

Final connection to be carried out from the fused connection unit to the amplifier.

Fused connection unit to be labelled Deaf Loop aid System and have indicator.

System specialist Meritcom Ltd 02871886776.

Or Absolute Technologies 02825632222

B13.0 AUDIO SOUND SYSTEM

B13.1 System Objectives

To supply and install a new Music/Sound system, covering the Main Hall and wall mounted speakers only. The system shall be designed in conjunction with this specification and the relevant drawings supplied with the tender package.

The proposed system shall be a professional grade Sound System and shall provide high quality, clear and intelligible audio. The system shall also provide high performance foreground music reproduction.

B13.2 System Description

The System will be a standalone package. All speakers will be newly installed. The system will incorporate professional speakers and Head End Equipment, located at the back of the Main Hall and partition wall of the Minor Hall as specified hereafter.

The Contractor shall employ the services of a specialist CAI plus member, CTS-D approved and CEDIA Approved contractor.

This same specialist sub-contractor will design, supply and install, test and commission the Induction Loop Systems for the Main Hall.

Meritcom or Absolute Technologies

B13.3 Conduit & Wiring

The wiring and infrastructure system for the Sound System shall be carried out by the Contractor. Wiring to loudspeakers shall be provided by the specialist contractor for installation. Ceiling speakers shall be connected via a round conduit box in a socket and plug arrangement. Each loudspeaker shall terminate in a 3 pin 15amp socket

Contractor to obtain wiring schematic and wiring details from specialist sub-contractor prior to submitting his tender.

B13.4 Equipment

The following is a list of equipment for the Main Hall but not limited to:

Item	Description
Projectors	- 1no projectors as BenQ LU930
Projector Screens	1no Thor TDZ400-W Thor Tab Tension Screens
P.A. Mixer	T172.752- Power Dynamics PDZM800 7CH installation mixer with 3 Zones
Touch Screen/tablet mixer	Studiomaster Hybrid DIGILIVE16

Hand Held Microphones	PD PD524 UHF Wireless Microphone System with 4x Handheld Mics
Speakers	Power Dynamics FCS6 Wall speakers 100V 6.5" -T952.548
Media Player/Recorder	Power Dynamics PDC75Media Player PDC75 Media player and recorder-T172.827

Quantities of each type of speaker to be clarified with Specialist Installer prior to submitting tender cost.

B14.0 OPERATING & MAINTENANCE MANUALS

B14.1 Operating and Maintenance Documents

The Contractor shall obtain, collate and hand over to the Engineer prior to the issue of the Certificate of Practical Completion the following documentation;

The Contractor shall ensure that all drawings and documents are brought up to date and accurately reflect the completed project.

The Manuals shall be presented in both hard copy and electronic format. Electronic copies shall be presented on USB drive with drawings in AutoCAD 2000 and PDF format and all other information in PDF format. Therefore, the tender shall allow for all costs associated with scanning all information onto PDF files.

Each manual shall contain the following information:

- 1 No. set of paper "As-Installed" drawings and 1 No. set of written instructions.
- 1 No. USB drive containing drawings in AutoCad and PDF format and written instructions in PDF format
- Manufacturers' literature pertaining to the items of plant and equipment installed. Where periodic maintenance is required, this shall be listed.
- All Testing and Commissioning Certificates relating to:
 - Heating and Plumbing pipework test certificates
 - Water treatment commissioning certificates
 - Mains water installation test certificate
 - Ventilation test certificate
 - Air-conditioning certificates
- Emergency contact references to include names, addresses and telephone numbers which may be needed during the Defects Liability Period.
- A detailed description of the scope, purpose and manner of working of each system of equipment and controls forming part of the Works.
- Data on general design parameters together with manufacturers' information concerning correct operation.
- Clear instructions on the operations and closing down of each system of equipment.
- Clear instructions for dealing with emergency conditions for each system of equipment.

- Instructions in respect of any precautionary measures.
- Instructions as to the nature, extent and frequency of servicing necessary properly to maintain the equipment in good condition.
- Names and addresses of Suppliers of all major components of the Works which may be required for spare parts or replacements. Copies of manufacturers' data to be supplied for individual items together with detailed maintenance instructions, including a list of recommended spares for all equipment installed under the Contract.
- All equipment guarantees provided by the Manufacturers.

B15.0 DISCONNECTION AND REMOVAL OF EXISTING SERVICES

The Contractor shall disconnect and remove from site the existing electrical services.

All lighting is to be disposed of to the W.E.E.E. regulations 2007.

Removal and disposal of redundant equipment shall be in accordance with a Site Management Waste Plan that includes appropriate recycling on materials.

Temporary connections will be required to ensure the specialist systems are maintained at all times throughout the contract works.

B16.0 BUILDERS WORK

The Main contractor will be responsible for builders work and employing properly trained personnel to carry out builders' work.

The contractor will be responsible for the following;

1. Floor protection
2. Furniture Protection
3. Storage containers
4. Setting up builders compound
5. Skips
6. Removal of redundant equipment and debris from site
7. Forming openings for passage of services and making good
8. Scaffolding for installations to high level
9. Forming trench 50mts long 600mm deep with 150mm duct for ESB and 100mm duct for external services, making good trench and grounds and for marker tape.