REFERENCE NUMBER: **PA5/0102/1**

Tender for Finishing and Related Mechanical and Electrical Works for the Enhancement of the Gozo Cathedral Museum, Victoria, Gozo

Date Published:	**15th October 2018**	
Deadline for Submission:	**15th November 2018**	**at 10:30am CET**
Tender Opening:	**15th November 2018**	**At 11:00am CET**

Operational Programme I – European Structural and Investment Funds 2014-2020
"*Fostering a competitive and sustainable economy to meet our challenges*"
Project part-financed by the European Regional and Development Fund
Co-financing rate: 76.61% European Union; 23.39% National Funds

<u>No Bid Bond is required for this tender</u>

KURA Association

c/o Gozo Diocese Bishop's Chancery Republic Street, Victoria Gozo VCT 1000 Tel: 356 21551211
Email: kura.diocese.gozo@gmail.com, http://gozodiocese.org/tenders/

SECTION 1 – INSTRUCTIONS TO TENDERERS

1. General Instructions

1.1 In submitting a tender, the tenderer accepts in full and in its entirety, the content of this tender document, including subsequent Clarifications issued by the Non Governmental Organisation (NGO), whatever the economic operator's own corresponding conditions may be, which through the submission of the tender is waived. Tenderers are expected to examine carefully and comply with all instructions, forms, contract provisions and specifications contained in this tender document. These Instructions to Tenderers complement the General Rules Governing Tenders for NGOs Version 1.0.

No account can be taken of any reservation in the tender in respect of the procurement documents; any disagreement, contradiction, alteration or deviation shall lead to the tender offer not being considered any further.

Prospective tenderers must submit their offer by depositing it in the tender box, located at KURA Association c/o Gozo Diocese, Bishop's Chancery, Republic Street, Victoria Gozo VCT 1000. Tenderers must submit one original tender offer as well as a soft copy on a USB. Tender reference number and tender title must be clearly indicated on the sealed bid. Prospective tenders take full responsible to submit their offer by the set tender submission deadline.

Note:
Where in this tender document a standard is quoted, it is to be understood that the Contracting Authority will accept equivalent standards. However, it will be the responsibility of the respective bidders to prove that the standards they quoted are equivalent to the standards requested by the Contracting Authority.

1.2 The subject of this tender is the Finishing and related Mechanical and Electrical Works of the following: :

- Civil Works
- Gypsum Work
- Tiling
- Low Voltage Electrical System
- Light Fittings
- Fire detection and alarm system
- CCTV System
- Plumbing
- AC & Ventilation System
- Low Pit Lift
- Related Ancillary Works

at the Gozo Cathedral Museum, Victoria, Gozo.

1.3 The place of acceptance of the works shall be the Gozo Cathedral Museum, Victoria, Gozo and the time-limits for the execution of the contract shall be **sixty weeks** from the date of order to start works and the INCOTERM[2010] applicable shall be **Delivery Duty Paid (DDP).**

1.4 This is a unit-price/bill of quantities contract.

1.5 This call for tenders is being issued under an open procedure.

1.6 The beneficiary of this tender is *Kura Association*.

1.7 This tender is not a reserved contract.

2. Timetable

2.

	DATE	TIME
Clarification Meeting/Site Visit (Refer to Clause 6.1)	N/A	N/A
Deadline for request for any additional information from the NGO **Clarification requests should be addressed to: *NGOs e-mail address***	29th October 2018	17.00 (CET)
Last date on which additional information can be issued by the NGO	5th November 2018	20.00 (CET)
Deadline for submission of tenders/Tender opening session (unless otherwise modified in terms of Clause 10.1 of the General Rules Governing Tendering for NGOs)	15th November 2018	10.30(CET)
* All times Central European Time (CET) / Central European Summer Time (CEST) as applicable		

3. Lots

3.1 This tender is not divided into lots, and tenders must be for the whole of quantities indicated. Tenders will not be accepted for incomplete quantities.

4. Variant Solutions

4.1 Variant solutions are not permissible.

5. Financing

5.1 The project is *co-financed* by the European Union, in accordance with the rules of *Operational Programme I – European Structural and Investment Funds 2014-2020 "Fostering a competitive and sustainable economy to meet our challenges"*.

5.2 The Contracting Authority of this tender is *Kura Association*.

6. Clarification Meeting/Site Visit/Workshop

6.1 No clarification meeting will be held.

Meetings between economic operators and the NGO during the tendering period are not permitted.

7. Selection and Award Requirements

In order to be considered eligible for the award of the contract, economic operators must provide evidence that they meet or exceed certain minimum criteria described hereunder.

(A) Eligibility Criteria

(i) No Bid Bond is required.(Note 1)

(ii) Declare agreement, conformity and compliance with the provisions of the Statement on Conditions of Employment by completing and submitting the form with title Statement on Conditions of Employment

Please also attach the minimum hourly workers' form involving the provision of the employees' services – Form 1 (Note 2)

(iii) Power of Attorney - Form 2 (if applicable) (Note 2)

(iv) Information re Joint Venture/Consortium – Form 3 (if applicable) (Note 2)

(v) Submission of the declaration form that stipulates that following signature of contract, the successful bidder, will provide evidence in respect of the requirements stipulated regarding Energy Efficiency through the Energy Efficiency Form (Note 2)

(B) Exclusion (including Blacklisting) and Selection Criteria – information to be submitted through the completion of the following declaration forms:

(i) Declaration concerning exclusion grounds; and
(ii) Declaration concerning *Selection Criteria*.

(C) Technical Specifications

(i) Tenderer's Technical Offer in response to specifications as outlined in the Form Technical Offer. (Note 3)

(ii) Key Experts Form (Note 2A)

The following are the key experts required for this tender:

1 Warranted Architect (Perit);
1 Warranted Electrical Engineer;
1 Electrician is in possession of the required Wireman License;
1 Site Supervisor (having MQF Level 4 qualification in related area of study); and
1 Health and Safety Officer.

The Evaluation Committee reserves the right to request the tenderers to substantiate their claims in respect to the staff proposed by requesting CVs of key staff and signed Self-Declaration (relating to conflict of interest) forms during the evaluation stage.

The Self-declaration form for Key Experts (relating to public employees) must be filled in where applicable. (Note 2A)

(iii) **Literature** as per Form marked 'Literature List' to be submitted with the Technical offer at tendering stage.

No changes to the information provided in the Literature submitted will be allowed. Literature submitted shall be rectifiable only in respect of any missing information. (Note 2B)

Samples as per Form marked 'Samples List' may be requested during the adjudication stage to supplement the technical offer submitted. If requested, the Samples must be submitted within 5 working days of being notified to do so(Note 3). If Samples are not submitted within the specified timeframe offer will not be considered further.

(D) Financial Offer

(i) The Tender Form and Tenderer's Declaration are to be completed and submitted with the offer (Note 3).

(ii) A financial offer is to be submitted by filling in Bill of Quantities, and is to be calculated on the basis of **Delivered Duty Paid (DDP)[2010] (Grand Total)** for the works tendered. (Note 3)

Notes to Clause 7:

1. Not applicable for departmental tenders.

2. A) Tenderers will be requested to either clarify/rectify any incorrect and/or incomplete documentation, and/or submit any missing documents within five (5) working days from notification.
   B) Tenderers will be requested to rectify/submit only missing documents within five (5) working days from notification. No changes to the information provided in the Literature submitted will be allowed. Literature submitted shall be rectifiable only in respect of any missing information.

   All Rectifications are free of charge.

3. No rectification shall be allowed. Only clarifications on the submitted information may be requested.

8. Tender Guarantee (Bid bond)

8.1 No tender guarantee (bid bond) is required.

9. Criteria for Award

9.1 The sole award criterion will be the price. The contract will be awarded to the tenderer submitting the cheapest priced offer satisfying the administrative and technical criteria.

SECTION 2 – EXTRACTS FROM THE PUBLIC PROCUREMENT REGULATIONS

Part **X** of the Public Procurement Regulations

270. Any tenderer or candidate concerned, or any person, having or having had an interest or who has been harmed or risks being harmed by an alleged infringement or by any decision taken including a proposed award in obtaining a contract, a rejection of a tender or a cancellation of a call for tender after the lapse of the publication period, may file an appeal by means of an objection before the Review Board, which shall contain in a very clear manner the reasons for their complaints.

271. The objection shall be filed within ten calendar days following the date on which the NGO has by fax or other electronic means sent its proposed award decision or the rejection of a tender or the cancellation of the call for tenders after the lapse of the publication period.

272. The communication to each tenderer or candidate concerned of the proposed award or of the cancellation of the call for tenders shall be accompanied by a summary of the relevant reasons relating to the rejection of the tender as set out in regulation 242 or the reasons why the call for tenders is being cancelled after the lapse of the publication period, and by a precise statement of the exact standstill period.

273. The objection shall only be valid if accompanied by a deposit equivalent to 0.50 per cent of the estimated value set by the NGO of the whole tender or if the tender is divided into lots according to the estimated value of the tender set by the NGO for each lot submitted by the tenderer, provided that in no case shall the deposit be less than four hundred euro (€400) or more than fifty thousand euro (€50,000) which may be refunded as the Public Contracts Review Board may decide in its decision.

274. The Secretary of the Review Board shall immediately notify the Director and/or the NGO as the case maybe that an objection had been filed with his authority thereby immediately suspending the award procedure.

275. The NGO involved, as the case may be, shall be precluded from concluding the contract during the period of ten calendar days allowed for the submission of appeals. The award process shall be completely suspended if an appeal is eventually submitted.

276. The procedure to be followed in submitting and determining appeals as well as the conditions under which such appeals may be filed shall be the following:

(a) any decision by the General Contracts Committee or the Special Contracts Committee or by the NGO shall be made public by affixing it to the notice-board of the same NGO as the case may be or by uploading it on Government's e-procurement platform prior to the award of the contract if the call for tenders is administered by the NGO;
(b) the appeal of the complainant shall also be affixed to the notice-board of the Review Board and shall be communicated by fax or by other electronic means to all participating tenderers;

(c) the NGO and any interested party may, within ten calendar days from the day on which the appeal is affixed to the notice-board of the NGO and uploaded where applicable on the Government's e-procurement platform, file a written reply to the appeal. These replies shall also be affixed to the notice-board of the Review Board and where applicable it shall also be uploaded on the Government's e-procurement platform;

(d) within three working days of the publication of the replies, the Secretary of the Review Board shall prepare a report (the Analysis Report) analysing the appeal and any reply to it. This report shall be circulated to the persons who file an appeal and to all parties who submitted a reply to the appeal;

(e) after the preparatory process is duly completed, the Director or the Head of the NGO shall forward to the Chairman of the Review Board all documentation pertaining to the call for tenders in question including files, tenders submitted, copies of deposit receipts and any motivated letter;

(f) The secretary of the board shall inform all the participants of the call for tenders, the NGO of the date or dates as the case maybe when the appeal will be heard;

(g) When the oral hearing is concluded, the Public Contracts Review Board, if it does not deliver the decision on the same day, shall reserve decision for the earliest possible date to be fixed for the purpose, but not later than six weeks from the day of the oral hearing:
Provided that for serious and justified reasons expressed in writing by means of an order notified to all the parties, the Public Contracts Review board may postpone the judgment for a later period.

(h) The secretary of the board shall keep a record of the grounds of each adjournment and of everything done in each sitting;

(i) After evaluating all the evidence and after considering all submissions put forward by the parties, the Review Board shall decide whether to accede or reject the appeal.

SECTION 3 – SPECIAL CONDITIONS

These conditions amplify and supplement, if necessary, the General Conditions governing the contract. Unless the Special Conditions provide otherwise, those General Conditions remain fully applicable. The numbering of the Articles of the Special Conditions is not consecutive but follows the numbering of the Articles of the General Conditions. Other Special Conditions should be indicated afterwards.

Article 2: Law and language of the Contract

2.1 The Laws of Malta shall apply in all matters not covered by the provisions of the contract.

2.2 The language used shall be English.

Article 3: Order of Precedence of Contract Documents

3.1 The contract is made up of the following documents, in order of precedence:

(a) the Contract;
(b) the Special Conditions;
(c) the General Conditions;
(d) the Contracting Authority's technical specifications and design documentation;
(e) the Contractor's technical offer, and the design documentation (drawings);
(f) the bill of quantities (after arithmetical corrections)/breakdown;
(g) the tender declarations in the Tender Response Format;
(h) any other documents forming part of the contract.

Addenda have the order of precedence of the document they are modifying.

Article 4: Communications

4.1 The Project Leader, KURA Association c/o Gozo Diocese Bishop's Chancery Republic Street, Victoria Gozo VCT 1000 Tel: 356 21551211, Email: kura.diocese.gozo@gmail.com

Communications between the Contracting Authority and/or the Supervisor on one hand, and the Contractor on the other, shall be exclusively in writing and in the English language. Specific and standard procedures of communication (templates of request for information, contract submittal, site instructions, time of communication and for replies, frequency of meetings) shall be agreed among the Contracting Authority and the winning bidder within fifteen (15) days from the Commencement Date of the Contract, unless otherwise specified in these Special Conditions and in Section 4 – Technical Specifications.

Article 5: Supervisor and Supervisor's Representative

The contractor shall inform the Contracting Authority & its appointed Supervisor about all stages of progress of the project. Any unauthorized halting of works will not be allowed and no extension in the implementation timeframe will be granted in such instances. The Contractor shall seek prior approval from the Supervisor to halt works on site.

5.6 **The Contractor shall be responsible to provide all access necessary for verifying and inspecting the works carried out and the items being provided.**

Article 6: Assignment

Requests from the contractor for a change in assignment will not be allowed except in the case of force majeure which results in the Contractor being unable to carry out the tasks assigned in the contract.

Article 8: Supply of Documents

8.4 The contractor shall follow closely all instructions specified in the documents and drawings submitted with this tender and any other drawings provided to him by the Supervisor during the course of the works. Any documents and drawings prepared by the Contractor are to be submitted for approval to the Contracting Authority and the Supervisor, the procedure being agreed to between the parties as indicated in Clause 4 of the Special Conditions. The Contractor shall allow a minimum of seven (7) calendar days for the Supervisor to comment.

All documentation is to be submitted to the Supervisor who will ascertain compliance with the original tender specifications prior submitting for approval of the Contracting Authority.

Article 9: Access to Site

9.1 In addition to sub clause 9.1 of the General Conditions, contractors may be required to suspend all or part of the works being carried out in order not to disturb any official function or activity held as indicated by the Contracting Authority. The contractor will be notified of such suspension of works at least 48 hours in advance and will not be eligible for compensation, apart from an extension of time.

The contractor is to note that access to the public/private buildings surrounding the Cathedral Museum shall be maintained at all times and shall maintain pedestrian and vehicular access (where applicable) at all times. To this effect, the contractor and his employees shall be required to abide by the instructions issued from time to time by personnel responsible for the security of the underlying/adjoining properties and shall ensure that all works are carried out without jeopardizing the security of such places.

Article 10: Assistance with Local Regulations

10.3 Further to the requirements of Clause 10 of the General conditions, the Contractor is solely responsible to obtain all necessary permits, visas, authorizations or licences to ascertain smooth running of the works as outlined in the Contract.

The Supervisor, in collaboration with the Contracting Authority, is responsible to make sure that all necessary permits, authorizations or licences are in place for works to start

Article 11: The Contractor's Obligations

11.1 The Contractor shall be responsible for the adequacy, stability and safety of all Site operations and of all methods of construction. The Contractor shall be responsible for all Contractors' documents, Temporary Works, and such Design of each item of Plant and Materials as is

required for the item to be in accordance with the Contract.

The Contractor shall whenever required by the Supervisor, submit details of the arrangements and methods that the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Supervisor.

The Contractor shall prepare detailed construction drawings required for the Permanent works. The Contractor shall;

a) submit to the Supervisor the Contractor's Documents for this part in accordance with the procedures specified in the Contract;

b) the Contractor shall be responsible for this part which shall, when the works are completed, be fit for such purposes for which the part is intended as specified in the Contract; and

c) On completion, the Contractor shall submit to the Supervisor the "as built" documents and operation and maintenance manuals, in accordance with the Specification and in sufficient detail for the Supervisor to operate, maintain, dismantle, reassemble, adjust and repair this part of the works. Such part shall not be considered to be completed for the purposes of taking over until these documents and manuals have been submitted to the Supervisor.

The Contractor shall, as specified in the contract or as instructed by the Supervisor allow appropriate opportunities for carrying out work to:

a) Employer's Personnel,
b) Any other sub-contractors employed by the employer and,
c) The personnel of any legally constituted public authorities and,
d) The personnel of service utility companies,

who may be employed in the execution on or near the Site of any work not included in the contract.

Any such instruction shall only constitute a variation if and to the extent that it causes the Contractor to incur **Unforeseeable Cost**. Services for these personnel and other contractors may include the Contractor's Equipment, Temporary Works or access arrangements which are the responsibility of the Contractor.

The Contractor shall;

a) Comply with all applicable safety regulations,
b) Take care of the safety of all persons entitled to be on the Site,
c) Use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons,
d) Provide fencing, lighting, guarding, and watching of the Works until completion and taking over under the Employer's Taking over, and
e) Provide any Temporary Works (including roadways, footways, guards, and fences) which may be necessary, because of the execution of the Works for the use and protection of the public and of owners and occupiers of adjacent land.

11.20 Further to Article 11.2 in the General Conditions, the contractor shall deploy the necessary resources so as to maintain a good progress of work on the site and shall also, where necessary, undertake to perform works outside normal working hours, and on public holidays and weekends at no additional cost to the Contracting Authority, so as to ensure the completion of the Works within the required time-frame, in accordance with the Technical Requirements and with the Period of Execution.

Furthermore, the contractor shall be expected to be co-operative and allow the use of his scaffolding and/ or other facilities available on site for the efficient execution of the above-mentioned works. Same contractor will not be entitled to any compensation (financial or

otherwise) for these services, etc

11.21 The Contractor shall be obliged to follow any and all instructions issued by the Supervisor in relation to the Works in so far as these fall within the overall scope of the Contract.

11.22 The Contractor shall be obliged to ensure avoidance of disruption and inconvenience to the day to day business on and around the site, including the co-ordination with other contractors that may be engaged on or in the vicinity of the site, the free movement of traffic and pedestrians, except where this is absolutely unavoidable. In particular, the Contractor shall take all such precautions as may become necessary so as to avoid causing any damage to adjacent buildings or property, including public spaces, during the execution of the Works.

11.23 The Contractor shall also, in addition to the above, take any necessary action to ensure and maintain the health and safety of his employees, together with those of the employees of any other contractor engaged on or in the vicinity of the site, together with the general public and shall follow any relevant instructions and /or recommendations of the contractor's Health and Safety Offices and the Contracting Authority Project Supervisor to fulfil the obligations set out in the Legal Notice 281/2004 (SL 424.29)

11.24 In addition to other obligations arising under the Contract pertinent to the execution of the Works, the Contractor shall, following completion of same, fulfill all obligations during the Defects Liability Period as outlined in Article 58.6 of these Special conditions.

11.25 The Contractor shall not dismantle the scaffolding prior to the approval of the Contracting Authority's architect and civil engineer in charge. The contractor shall give the Contracting Authority's architect and civil engineer in charge at least one week notice to allow for a final inspection and the measurement of works

11.26 All lifting equipment used on site shall be certified by a warranted Mechanical Engineer every six (6) months, in accordance with the regulations issued by the Occupational Health and Safety Authority.

11.27 Copies of the certificates shall be sent to the Contracting Authority's Architect and civil engineer in charge/Project Manager before commencement of work and as necessary should the six (6) month certification period elapse.

11.28 A suitable "housekeeping" programme shall be established before commencement of the project, and be continuously implemented on the Site.

11.29 The Contractor will be available to attend regular site, management and progress meetings.

Article 13: Performance Guarantee

13.1 The Contractor shall, within 15 days of receipt of the contract for signature, furnish the Contracting Authority with the original guarantee for the full and proper performance of the contract. It shall not exceed 4% where the amount of the total contract value is between €10,000 and €500,000 ex VAT.

13.3 The performance guarantee shall be in the format given in Section 5 and shall be provided in the form of a bank guarantee. It shall be issued by a bank in accordance with the eligibility criteria applicable for the award of the contract.

Furthermore, the Contracting Authority will affect not any payment to the Contractor until the performance guarantee has been submitted.

13.9 The Performance Guarantee shall be released within 30 calendar days of the issue of the Provisional Acceptance Certificate.

Article 14: Insurance

14.1 Without any prejudice to Article 14.1 a, b, c of the General Conditions, the contractor is required to insure for the whole duration of the contract against risk of damage to the historic fabric of the building being restored through this contract for the amount of €235,000 per accident with the number of occurrences unlimited.

Without any prejudice to 14.1 a, b, c of the General Conditions, the contractor is required to insure for the whole duration of the contract for the amount of €1,500,000 per accident with the number of occurrences unlimited against each party's liability for any loss, damage, death or bodily harm, that may be caused to third parties, or to any person that is authorized to be on site at any given time, or any damages to property belonging to third parties, including loss of profits that may be sustained by third parties.

Amount per personal injury and unlimited occurrences as specified in Article 14.2 of the Special Conditions.

14.2 All the insurance referred to in this Article shall be taken out within 30 days of the notification of the award of the contract, and shall be subject to approval by the Contracting Authority. Such insurance shall take effect from the commencement of the works and remain in force until final acceptance of the works. On being asked to do so by the Contracting Authority or the Supervisor, the Contractor shall promptly present the Contracting Authority with the insurance policy and proof that premiums have been duly paid.

14.3 If the Contractor fails to comply with his obligation under this article the Contracting Authority shall be authorised to take out the policies itself at the expense of the Contractor. Any expense incurred by the Contracting Authority may be set-off against any amounts due to the Contractor without the need of a judicial authorisation.

14.4 Notwithstanding the Contractor's insurance obligations under Article 14, the Contractor shall bear sole liability for, and indemnify the Central Government Authority, the Contracting Authority and the Supervisor, against any claims by third parties for damage to property or personal injuries arising from the execution of the works by the Contractor, his subcontractors and employee.

14.5 If and so far as the Contractor fails to effect and keep in force any of the insurance policies referred to in the Special and General Conditions of the Contract, then the Contracting Authority may affect and keep in force any such instances and pay any premium as may be necessary for that purpose and deduct the amount so paid to any monies due to the Contractor.

Article 15: Performance Programme (Timetable)

15.1 The Contractor shall submit a revised Gantt Chart (Plan of Works) to cover the entire Period of Performance stipulated in Article 32 of these conditions.

15.4 The Programme of Works shall be updated monthly or whenever required by the Supervisor, to be in line with the progress of the actual Works. The Programme of Works shall be accompanied by sufficient data and information together with all the necessary details of constructional plant, required labour force, etc. The Supervisor shall approve the Programme of Works within ten (10) working days from submission by the Contractor to the Supervisor. Should the Supervisor consider any alteration in or addition to the Programme of Works as submitted, the Contractor shall conform therewith without additional cost. Any changes to the Programme of Works shall be approved by the Contracting Authority.

Article 17: Contractor's Drawings/Diagrams

17.1 All drawings and other submittals such as manuals shall be to the satisfaction of the Supervisor who will approve in 10 working days from submittal. Drawings and other documentation submitted but not accepted from the Supervisor shall be deemed as not submitted for the purpose of this contract hence any penalties associated with late completion of works shall still be applicable

17.7 Further to the provisions of Article 17.7 of the General Conditions, the Contractor must submit a full set of the final drawings upon completion of the project and must do so within 50 days from issuing of the Partial Provisional Acceptance Certificate. Failure to do so will result in a daily penalty of fifty (50) euro up to a maximum of 1% of the contract value.

Article 18: Tender Prices

As per General Conditions of Works contract.

Tenderers must quote all components of the price inclusive of taxes, customs and import duties and any discounts. All items must be priced in Euro but exclusive of VAT. Except as may otherwise be provided for in the contract, no payment will be made for items which have not been costed.

If the tenderer offers a discount, the discount must be absorbed in the rates of the Bill of Quantities/Financial Statement.

The prices for the contract must include all of the works to be provided. The prices quoted are fixed and not subject to revision or escalation in costs, unless otherwise provided for.

Article 19: Exceptional Risks

19.5 Further to the provisions of Article 19.5 of the General Conditions, if the Contractor is granted an extension of time in the implementation of the works, the Contractor cannot make a request for financial compensation for extension of time.

Article 20: Safety on Site

20.2 Further to the provisions of the General Conditions, it is the obligation of contractors to carry out a suitable, sufficient and systematic assessment of all the occupational health and safety hazards which may be present at the place of work and the resultant risks involved concerning all aspects of the work activity.

20.3 Further to the provisions of the General Conditions, it is also the duty of a contractor to cooperate with other employers, contractors and, or self-employed persons who share a common work place, on the implementation of Health and Safety provisions. The contractor or his designate shall co-ordinate necessary actions in matters which concern protective and preventive measures, and shall inform all on site as well as the Health and Safety Project Supervisor regarding any potential risks.

Article 21: Safeguarding Adjacent Properties

Further to clause 21.1 of the General Conditions, the contractor shall liaise and co-operate with the appropriate Authorities and occupiers of adjoining land and buildings likely to be affected by the works, for all matters regarding access, monitoring, third party rights, and similar.

Article 22: Interference With Traffic

Further to the provisions of Article 22 of the General Conditions, the roads surrounding the site shall remain open at all times. However, the Contractor is to liaise with the Contracting Authority with respect to any traffic arrangements while the works are being carried out. The Contractor is responsible to obtain necessary permits that may be required if the works impact of traffic.

Article 23: Cables and Conduits

The contractor shall be responsible for locating existing drains and services, and underground cables and pipes, for seeking instruction from the appropriate authorities as to how to deal with such services, and for carrying out any necessary work relating to deviations or protection, or any other works deemed necessary by the respective Utility or authority.

Article 25: Demolished Materials

25.1 Further to the provisons of Article 25 of the General Conditions, the contractor must carefully dismantle, load, transport, unload, store and protect items that the Contracting Authority retains ownership to onsite stores.

25.2 Demolition and excavated material unless indicated otherwise in the bills of quantities and by the supervisor in charge, become the property of the Contractor and the carting away and dumping charges are at the expense of the Contractor.

Article 26: Discoveries

26.2 Further to provisions of Article 26.2 of the General Conditions, the Contractor shall observe the provisions set out in the Cultural Heritage Act 2002 (CAP 445) at all times

26.3 Further to the provisions of Article 26.3 of the General Conditions, any in filled fissures, caverns, reservoirs/cisterns, hollows, Quaternary deposits, or other features of geological, geomorphological, hydrological, palaeontological interest which are discovered must be reported immediately to the Superintendence of Cultural Heritage and to the Archaeological Monitor. The contractor shall halt the works and follow all instructions given by the Supervisor and Site Archaeologist to protect or to investigate further the discovery.

The Contractor shall co-ordinate and co-operate with the archaeologist appointed by the Contracting Authority with the Local Authorities at all times.

Article 28: Soil Studies

28.1 Not Applicable for this tender

Article 30: Patents and Licences

30.1 As per General Conditions

Article 31: Commencement Date

31.1 The Commencement Date for this contract shall be 1 week from the Order to Start Works. The

order to start works will not be issued later than two (2) months from the last date of signature shown on contract. The performance of the contract is to commence on order to start works. The Contractor must furnish the Contracting Authority with a certified true copy of the Insurance Policy together with all documentation related to Health and Safety prior to commencing works.

Article 32: Period of Execution of Tasks

32.1 The period of execution of task for the projects covered by this contract shall be 60 weeks.

The contractor will be expected to commit sufficient resources to carry out works on more than one area at the same time, to guarantee the on time completion of all the Works as specified in this tender.

Article 33: Extension of the Period of Execution of Tasks

Further to the provisions of Article 33 of the General Conditions, should the Contractor be granted an extension of the period of execution of the tasks that are the subject of this contract, the Contractor cannot make a claim for financial compensation for such extension in the period of execution of the tasks of the contract.

Article 34: Delays in Execution

The Contractor shall be liable to a deduction of 0.1% of the contract price per calendar day's delay up to a limit of 20% of the total contract price.

Upon reaching the maximum penalty, the Contracting Authority reserves the right to terminate the contract and seek the services of a third party for the completion of works.

Article 35: Modification to the Contract

35.8 The Contracting Authority has a right to increase or reduce works of a similar nature by a maximum of 15% of the contract value which have become necessary for the purpose of achieving the scope of the contract. These inter alia include the detection of unidentified works evident only once the interventions have commenced such as the repetition of civil works and mechanical and electrical work related to the installation of the passenger lift.

35.9 The Contracting Authority will have the right to instruct additional works up to a maximum of 15% of the contract value which have become necessary for the purpose of achieving the scope of the contract. Such works would be resulting from close inspection of works accessible only after excavation works commence on site. These inter alia include works evident only once the interventions have commenced such as alternative structural intervention and alternative finishing material resulting from the conditions identified on site only after works commenced on site.

35.11 The provisions provided for in Article 35.11 of the General Conditions shall not be applicable to this contract.

35.12 The provisions provided for in Article 35.12 of the General Conditions shall not be applicable to

this contract.

35.13 The provisions provided for in Article 35.13 of the General Conditions shall not be applicable to this contract.

Article 37: Work Register

37.1 A work register is to be kept giving daily information on the works carried out and the number of workmen present on site.

37.2 Statements shall be prepared in the form of detailed measurements and quantities which correspond to the items specified in the financial offer bill of quantities.

37.3 Statements shall be drawn up within one week of completion of the works.

Article 38: Origin

38.1 There is no authorized derogation to the rules of origin.

Article 39: Quality of Works and Materials

39.2 Work shall be completed in all its parts and finished to its every necessary detail and fitting notwithstanding any omission or inconsistency in the Drawings and/ or Specifications. The Contractor shall be primarily responsible for all quality assurance operations related to all work undertaken under this contract. The Contracting Authority may make separate arrangements for verification testing and quality control and assurance. Such arrangements and operations shall not be construed as providing a service to Contractor on this Contract but will be separate services rendered to the Contracting Authority by an independent testing organization to confirm conformity of materials and works to Specification.

The Contractor cannot utilise the services of persons or organisations rendering this service to the Contracting Authority for his own testing and certification requirements under this contract. The Contracting Authority shall retain the right that, if it should have reasonable doubts about the soundness of testing results and quality assurance certificates produced for completed works by Contractor, it will be empowered to seek recourse to further arbitration testing as it shall deem appropriate.

Article 40: Inspection and Testing

40.2 The Contractor shall appoint at his own expense an independent Quality Assurance and Quality Control company which will be responsible for testing the materials used and ensuring that the work methods employed are according to the relevant European Standards and the rules of trade. The Contractor is obliged to provide a declaration by this company at tendering stage that it going to be in charge of this aspect of the contract.

Article 42: Ownership of Plants and Materials

42.2 If required and instructed from the Supervisor, all serviceable equipment in particular but not limited to the old light fittings, shall be transported to the site indicated. Interim storage and

double handling of any equipment shall be deemed to be included in the contract price and no additional payments shall be due to the contractor in this regard. All other non-serviceable material shall be disposed of from the contractor following all local legislative requirements at his expense. Determination of what is and what is not serviceable, shall be at the sole discretion of the Supervisor.

Article 43: Payments: General Principles

43.1 Payments will be made in Euro.

Payments shall be paid and authorized by the Contracting Authority and paid by the Treasury Department.

Payment Schedule		
Pre-financing Payment	As per 44.1 of Special Conditions	20% of contract value
Interim Payments	As per measured works	75% of contract value
Retention Monies	As per payment schedule in Clause 45.2 of the Special Conditions	5% of contract value

Following certification by Supervisor as in 43.1 above, the Contracting Authority will process the relative payment order. Sums due shall be paid within no more than 60 calendar days from the date on which an admissible payment request is registered by the Contracting Authority. The date of payment shall be the date on which the institution's account is debited. The payment request shall not be admissible if one or more essential requirements are not met.

The 60-day period may be suspended by notifying the Contractor that the payment request cannot be fulfilled because the sum is not due, because appropriate substantiating documents have not been provided or because there is evidence that the expenditure might not be eligible. In the latter case, an inspection may be carried out on the spot for the purpose of further checks. The Contractor shall provide clarifications, modifications or further information within 30 days of being asked to do so. The payment period shall continue to run from the date on which a properly drawn-up payment request is registered.

Article 44: Pre-financing

44.1 Pre-financing to the Contractor shall be obligatory up to a maximum of 20% of the contract value

44.2 Pre-financing amounting to 20 % of the contract value shall be granted to the Contractor against the provision of a bank guarantee by Contractor in favour of the Contracting Authority of the equivalent amount.

44.3 Further to Article 44.3 of the General Conditions, the Contractor shall present to the Contracting Authority, within forty five (45) days of the signing of the contract, a bank guarantee of the amount equivalent to 20% of the contract value for the Contracting Authority to release the pre-financing payment of the same amount.

44.8 The pre-financing payment shall be repaid through percentage deductions in payment certificates as follows:

- Deductions shall commence in the payment Certificate in which the total of all

certified interim payments (excluding, the advance payment and deductions and repayments of retention) exceeds 10% of the Accepted Contract Amount less Provisional Sums; and

- Deductions shall be made at the amortization rate of 20% of the cumulative amount of each payment certificate (excluding advance payment and deductions and repayments for retention) in the currency and proportions of the advance payment, until such time as the advance payment has been repaid in full; and
- With every 25% of the pre-financing amount being amortized, the Contracting Authority shall release the equivalent 25% from the pre-financing guarantee granted in terms of Article 44.3 of these Special Conditions. Thus, the pre-financing guarantee shall decrease proportionately throughout execution of the contract.

Article 45: Retention Monies

45.2 The sum of money retained from the interim payments shall be of 5%. This sum shall be paid upon submission of an equivalent retention bank guarantee (issued in the form provided in this tender document) by the Contractor to the Contracting Authority when issuing the Provisional Acceptance Certificate as specified in Article 57. The bank guarantee will be released upon issuing of the final acceptance of the works as per Article 58. The said retention guarantee shall be released only after the conditions requested under Art 58 are satisfied. The retention guarantee will be released within 45 days from when the Final Acceptance Certificate is issued.

Article 46: Price Revision

46.1 Further to the General Conditions, price revisions are not envisaged for this contract with the exception of that resulting from causes listed under Article 46.3 of the General Conditions.

46.3 As per General Conditions.

46.4 At the end of the period of performance, revised as necessary in accordance with the contract, the Contractor cannot claim for further revision of prices within the submission of the final report.

Article 47: Measurement

47.2 The works shall be measured by the Supervisor appointed by the Contracting Authority. The contractor will be notified and is to be present during the measurement of the works. However, if the contractor is notified and he is not present, measurement of the works by the Supervisor will still be carried out. The works shall be measured according to the rules of trade used by architects and civil, electrical, mechanical engineers and quantity surveyors for the measurement of works. If the contractor appoints his own quantity surveyor for the measurement of the works, the expenses of this surveyor will be borne fully by the contractor and the resulting measurements by the contractor's representative are not in any way binding on the contracting authority. In this aspect, the Contracting Authority is represented by the Supervisor.

Article 48: Interim Payments

48.1 Interim Payments of sums due for the executed and provisionally accepted works shall be authorized by the Contracting Authority and payment will be issued by the Treasury Department within the Ministry of Finance paid against a valid invoice after works in accordance to quality and progress of works. The retention shall be released in accordance to Clause 45.2 of these special conditions. The Contractor shall submit his claim for progress payments to the Contracting Authority in writing. Such claims are to be supported by evaluation of the works executed and materials installed on site and show the value of the permanent works executed by him up to the end of the month. All claims shall be evaluated by the Contracting Authority in relation to the Bills of Quantities and Contract Rates and documentation produced by the Contractor and on the basis that such works have been executed in accordance with the Contract Documents and to the satisfaction of the Contracting Authority. Provided the Contracting Authority agrees with the statement, the relevant Payment Certificate will be issued.

Article 50: Delayed Payments

50.1 The Contracting Authority shall pay the contractor sums due within 60 days of the date on which an admissible payment is registered, in accordance with Article 43 of these Special Conditions. This period shall begin to run from the approval of these documents by the competent department referred to in Article 43.1 of these Special Conditions. These documents shall be approved either expressly or tacitly, in the absence of any written reaction in the 30 days following their receipt accompanied by the requisite documents.

50.2 Once the deadline laid down in Article 50.1 has expired, the Contractor may, within two months of late payment, claim late-payment interest:

- at the rediscount rate applied by the issuing institution of the country of the Contracting Authority;

on the first day of the month in which the deadline expired, plus two percentage points (2%). The late-payment interest shall apply to the time which elapses between the date of the payment deadline (exclusive) and the date on which the Contracting Authority's account is debited (inclusive).

Article 53: End Date

This contract will be co-financed through Operational Programme I – European Structural and Investment Funds 2014-2020 therefore the payment obligations of this contract will be concluded by end December 2020

Article 56: Partial Acceptance

56.2 The supervisor will issue partial provisional acceptance upon completion of full works on the structure envisioned within the contract and not upon completion of works on parts of the structure envisioned within the contract.

56.3 The maintenance period shall run from the date of the Provisional Acceptance Certificate issued as per Article 57.

Article 57: Provisional Acceptance

57.6 Further to the provisions of Article 57 of the General Conditions, the Provisional Acceptance Certificate can only be issued once all pending snags included in the relevant snag list are appropriately addressed by the Contractor and to the satisfaction of the Supervisor.

Article 58: Maintenance Obligations

58.1 Further to the provision of Article 58 of the General Condition, the maintenance obligations during the Defects Notification Period are stipulated in Article and the duration of this period shall be of **two (2) years**. The Defects Notification Period shall commence on the date of provisional acceptance under Article 57 of the General and Special Conditions and may recommence, in accordance with Article 58.2 of the General Conditions.

58.9 Without any prejudice to the liability at law of the Contractor for any Works performed under this Contract, all Works carried out shall be subject to a Retention Guarantee of 5% of the contract value for a two **(2) year period** of the Defects Notification Period starting from the issue of the Provisional Acceptance Certificate, within which no diversion from specifications shall occur.

The Retention Guarantee shall be made with a recognised bank. At the sole request of the Contracting Authority, payments are immediately made to the Contracting Authority without need of any further form of authorisation by any others. This, even whilst action is proceeding independently for establishing the cause of such resulting diversions.

58.10 If any damage occurs, during the Guarantee Period, the Contracting Authority or the Supervisor shall notify the Contractor. If the Contractor cannot be reached, or is unable to take the measure required or fails to remedy a defect or damage within the time limit stipulated in the notification, the Contracting Authority may carry out the works itself or employ someone else to carry them out at the Contractor's risk and cost, in which case the costs incurred by the Contracting Authority will be deducted from monies due to, or from guarantees held against, the Contractor, or from both.

58.11 Any remedial works performed during the guarantee period (until 24 months after completion of ALL works described in this contract) shall be carried out as specified in this document and approved by the Supervisor. The contractor shall be responsible for providing all suitable means, for obtaining all permissions, and making all the necessary arrangements with all authorities concerned to carry out all the remedial works at any height levels at no extra cost to the Contracting Authority.

Article 66: Dispute Settlement by Litigation

66.1 If no settlement is reached within 120 days of the start of the amicable dispute-settlement procedure, each Party may seek:

a) either a ruling from a national court, or

b) an arbitration ruling, in the case where the parties, i.e. the Contracting Authority and the Contractor, by agreement decide to refer the matter to arbitration.

Article 70: Further Additional Clauses

The Contractor shall be responsible for compliance with all prevailing legislation, including but not limited to OHSA, BRO, TM, Local Council. Rate shall include for the provision of all

relevant permits, compliance with site safety regulations, use of local wardens, traffic management measures etc. as and when required. It shall be the responsibility of the contractor to ensure that the site is adequately sealed off during the execution of works using barriers and fencing.

SECTION 4 –SPECIFICATIONS/TERMS OF REFERENCE (Note 3)

Section A – Technical Specifications for Construction and Finishing Works

Preamble

The contractor will be responsible for obtaining and incurring all expenses related to any permits that might be required by the local council and for any other fees that might become due. Arrange for access to the site by workmen of the contractor and ensure that vehicular and pedestrian traffic near the site is not impeded. Comply with the requirements of duly constituted authorities in respect of the above.

Obtain all temporary wayleaves for operating cranes over the air space of third party property or for access therefrom. Allow for temporary works or other measures necessary to safeguard third party property and for costs for protecting or supporting existing third party property adjacent to site.
Provide and erect as when necessary barriers, hazard lights, signage and such like for the safety of the public and in accordance with Health and Safety instructions.

Provide and erect temporary hoarding for safety, dust control and security along unsafe areas. It will be the contractor's responsibility to maintain the hoarding in a good condition. Provide and erect any screens, planked footways, guard rails, etc. as may be required to ensure safety of the public. Allow for moving and adapting all the above as when required during the progress of the works and for removal when no longer needed.

Daily clean the access way to building and streets near the site from any debris or material which may be intentionally or accidentally deposited during the course of works and during the transportation of material.

To prepare and submit to the relative authority a health and safety plan for all required works, and to comply to the requirements of the health and safety plan during the execution of the works, and to comply with all relevant OHSA requirements for the works in question.

The contractor will be responsible for the setting out onsite of all works, and to confirm the setting out with the architect in charge prior to proceeding with the works.

The contractor shall submit a certificate by a warranted Perit to certify the stability of the suspended ceiling system following installation.

1.0 Civil works - Gypsum Works

Gypsum Plasterboard - General
Gypsum plasterboard shall comply with EU Directive 89/106/EEC as implemented by the relevant decision. General requirements, characteristics and test methods for gypsum plasterboard shall comply with EN 520.

The gypsum plasterboards shall be installed in accordance with the recommendations of the Manufacturer.

The Contractor shall abide fully with the manufacturer's installation guidelines and recommendations. A copy, in English, of these guidelines shall be submitted to the Architect in charge before the commencement of the installation.

Gypsum Plasterboard – Metal Frame Support Sub-Structure
The support frame and channels shall be installed in accordance with the recommendations of the Manufacturer.

The Contractor shall abide fully with the manufacturer's installation guidelines and recommendations. A copy, in English, of these guidelines shall be submitted to the Architect in charge before the commencement of the installation.

The support frame shall comply with BS EN 10142 and BS EN 10143, Specification for continuously hot-dip metal coated steel sheet and strip.

Sealing
The boards shall be sealed to using a proprietary sealant recommended by the manufacturer.

Fire Protection
The plasterboard surfaces shall be rated as Class Euro class A1 (EN 135011)

Deflection Limit
The limiting deflection of the system shall be as indicated by the Manufacturer.

Preformed Cornices (Where Indicated)
Preformed plasterboard cornices shall comply with EN 14209

2.0 Non-Loadbearing Gypsum Plasterboard Walls (Partitions)

Gypsum Plasterboard Walls - General

Workmanship shall be in accordance with the prevailing standards and works shall be carried out as directed by the architect in charge. More over tenderers shall ensure compliance with the following:

Execution
Prior to all work described in this section carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

The suspended ceiling/gypsum plasterboard walls are to be installed in strict accordance with all pertinent codes and regulations, the selected design, specifications, manufacturer's recommendations and the referenced standards.

In the event of discrepancy, immediately notify the architect in writing. Do not proceed with the installation in areas of discrepancy until all such discrepancies have been resolved.

Ensure that the soffits and other backgrounds are clean and fit to receive suspension systems and perimeter work. Check that any pre-fixed suspension points are secure and correctly positioned.

Set out work with the following objectives:

i. to establish the correct ceiling level.
ii. to establish the layout at obstructions and in irregular areas.
iii. to agree the position of luminaires and other service equipment and everything else that effects setting out.
iv. to establish the location of all battens and other fixing points.

Protect the works during installation and as portions reach completion, against any form of damage or deterioration. Such protection shall include coverings, guard rails, or other appropriate methods.

Wall Grades – Category of Duty
The category of duty rating, as defined in accordance with the recommendations of BS 5234, Parts 1 and 2, Code of practice for Internal Non-Loadbearing Partitions, shall be Grade "Heavy Duty".

Gypsum Plasterboard – Metal Frame Support Sub-Structure
The support frame and channels shall be installed in accordance with the recommendations of BS 5234, Parts 1 and 2, Code of practice for Internal Non-Loadbearing Partitions and with the manufacturer's installation guidelines and recommendations.

The metal framing components shall comply with EN 14195 and shall have a thickness of 6mm.

The support frame shall comply with BS EN 10142 and BS EN 10143, Specification for continuously hot-dip metal coated steel sheet and strip.

The frame channels and studs shall comply with BS 7364, Specification for galvanized steel studs and channels for stud and sheet partitions and linings using screw-fixed gypsum wallboards.

A timber sole plate may be required on uneven floors.

A damp proof membrane shall be installed along the full partition floor channel length.

For heights in excess of 8.5m extra deep flange channels shall be used at the base and head.

The system to be installed must consist of a seamless gypsum plaster monolithic ceiling.

The material to be used shall be non-combustible in accordance with BS 476 Part 4: 1970, provide easy access to lighting and other services, are vermin proof and are not prone to dust accumulation. Ceilings should be easy to clean and have a smooth and attractive finish.

Suspended ceiling must not exhibit any defects or any signs of damage or warp with the effect of steam and water vapour if any.

3.0 Civil works - Tiling

Compliance with Regulations

The types of flooring that ought to be used within this development should meet the requirements in relevant Class B or better stated in EN 13501-1:2002 and represented in Table 2 of the same standard.

Ceramic tiles and their performance shall comply with BS 1286 and BS 6431

Execution

Set out the work with the following objectives:

- To establish the correct floor datum level
- To control the finished floor level by a series of 'spot levels'
- To avoid or minimize unsightly cutting.
- To ensure cut units present a balanced appearance when laid and are kept as large as possible.
- To ensure joint locations and flooring patterns meet with approval.
- To establish the position of movement joints if any.
- The tiles shall be laid with their edges forming straight unbroken lines in each direction and carefully topped to a uniform even surface without ridges or corrugations.
- The ceramic tiles are to be laid on a bedding of mortar 16mm thick consisting of one part of cement to two parts of sand with sufficient water to make the mixture workable. A slurry of neat cement, mixed with enough water to make it flow shall be poured over the mortar immediately before laying the tiles.
- Skirting shall be fixed in accordance with good trade practice. Slabs shall be bedded solid in cement/lime/sand mortar mix (1:2:6) 13mm thick. Joints shall not exceed 1mm thick.
- After the tiles and skirting are firmly fixed, but before any dirt or contamination can enter the joints, all joints shall be grouted by sweeping and rubbing over a tinted cement slurry to match the tile colour.
- Superfluous grout shall be washed clean off the finished surface after the cement has nearly set and the tiling is to be left clean for inspection. All excess material is to be removed.

Tiles

a. Light Grey Gres Porcelain Ceramic Tiling 1200mm X 600mm X 12mm +/- 10% allowance (Boq Item 24)
b. Light Grey Gres Porcelain Ceramic Skirting 1200mm X 80mm X 12mm +/- 10% allowance (Boq Item 25)
c. Bathroom floor tiles, white, 300mm X 600mm X 10mm +/- 10% allowance (Boq Item 26)
d. Bathroom wall tiles, white, 300mm X 600mm X 10mm +/- 10% allowance (Boq Item 27)

4.0 Masonry Works

Stonework

- Only new stonework, machine cut to a true shape (ikkartabunat) and hand finished shall be used unless otherwise directed by the Supervisor.
- Care shall be taken to ensure that new stonework is not chipped or otherwise damaged.
- The Contractor shall ensure to provide, erect and maintain for as long as necessary all struts, timber planks etc, required for the support of all new and old masonry.
- All newly replaced stonework shall have a minimum bedding of 150mm unless otherwise specified by the Supervisor.
- Non-hydraulic mortar shall be used unless otherwise specified by the Supervisor.
- The mortar bed shall not be less than 12mm thick.

Laying of Replacement Masonry

- Joint surfaces shall be dampened to control suction as necessary. The units shall be laid on a full bed of mortar and all joints filled. Care shall be taken to ensure that no mortar/grout encroaches upon exposed the faces.
- The new stone shall be dampened to avoid risk of de-watering mortar.

- All faces, angles and features shall be carefully aligned and set out to ensure satisfactory joint widths and relative positioning with existing masonry. The exposed faces of new material shall be kept to the face lines as agreed with the Supervisor.

Grouting Joints

- Grout mix shall be based on lime, fine coralline and globigerina limestone sand (xahx).
- Joints around replacement masonry units shall be thoroughly grouted wherever joints cannot be fully filled with bedding mortar.
- The grout shall be kept back from the exposed face to allow for the depth of pointing specified; this shall be achieved using an approved temporary sealing material. The Contractor will ensure that the grout does not stain the exposed face.
- The Contractor shall not point replacement masonry until all the work has settled-in. The pointing of the outer 25mm (as a minimum) shall be left until all bedding work has settled.

Jointing of Masonry Works

- Replacement stone shall be cut and shaped with such a manner as to ensure the minimum loss of the original material, yet provide a firm seating for the replacement.
- The new stone work shall be left proud of the original to ensure adequate finishing on site.
- All existing joint widths shall be respected and bridging of joints will not be permitted.
- The pockets to receive inserts shall be accurately cut with small, sharp chisels and small saw blades to a neat, square profile. The sides of pockets shall be undercut, where necessary, to provide space for specified bonding material.
- Where so directed by the Supervisor, the contractor shall dovetail the new insert with the original to ensure adequate bonding.
- New shoulders shall be formed to receive any replacement cramps.
- The pocket shall be cleaned out thoroughly and the inserts installed accurately and securely. The Contractor shall ensure that no bonding material encroaches upon the exposed faces.
- Piecing-in may also be carried out in larger areas, in which a piece of stone is added to fill in a missing area or replace a part of a deteriorated stone by the insertion of an appropriately cut stone piece, attached using structural adhesives (e.g. epoxy or polyester adhesives), as approved by the Supervisor.

5.0 CONCRETE

CONCRETE – CONSTITUENT MATERIALS

Cement

Cement shall comply with BS 12 (Ordinary and rapid hardening Portland cement).

Aggregate

Unless otherwise specified or agreed by the Engineer, aggregates shall comply with BS 882 (Aggregates from natural sources for concrete).

The shell content of the aggregate included as calcium carbonate as determined by the method in BS 812: Part 106 shall not exceed the following amounts:

Normal size (mm)	%
40	2
20	5

10	15
fine	30

The flakiness index (when determined by the sieve method described in BS 812) of the coarse aggregate shall not exceed 35% except when natural, uncrushed aggregates are used for concrete of grades lower than 40, when the flakines index shall not exceed 50%. No limits relevant to grade 15 concrete or below.

Chloride levels shall be determined daily in accordance with BS 812 or as otherwise agreed by the Engineer.

Water

If water for the works is not available from a Public Utility Undertaking supply the Engineer's approval shall be obtained regarding the source of supply and manner of its use. When required by the Engineer the Contractor shall arrange for tests of the water to be carried out in accordance with BS 3148. Water from the sea shall not be used.

Admixtures

General. The quantity and method of using admixtures shall be in accordance with the manufacturer's recommendations and in all cases shall be subject to the approval of the Engineer.

In all cases the Contractor shall provide the following information for the Engineer's approval:-

- the quantity to be used, in kilograms per kilogram of cement and in kilograms per cubic metre of concrete;
- the detrimental effects caused by adding a greater or lesser quantity in kilogrmas per cubic metre of concrete;
- the chemical name(s) of the main active ingredients(s);
- Whether or not the admixture leads to the entrainment of air.

Calcium chloride.
The use of calcium chloride in any form is prohibited.

CONCRETE REQUIREMENTS

Concrete Grade and Class

For each grade of concrete the specified characteristic strength in N/mm^2 shall be as given in Table 1. The class of concrete shall be defined by its grade followed by the maximum size of aggregate allowed.

TABLE 1: Grades of Concrete

Grade	Characteristic strength
	N/mm^2
15	15.0
20	20.0
25	25.0
30	30.0

Ready-mixed Concrete

Ready-mixed concrete shall comply with this specification. The concrete shall be carried in purpose-made agitators, operating continuously, or truck mixers. The concrete shall be compacted and in its final position within 2 hours of the introduction of cement to the aggregate, unless a longer time is agreed by the Engineer.

When truck-mixed concrete is used, water shall be added under supervision either at the Site or at the central batching plant as agreed by the Engineer, but in no circumstances shall water be added in transit.

Unless otherwise agreed by the Engineer, truck mixer units and their mixing and discharge performance shall comply with BS 4251.

CONCRETE COMPLIANCE

General

All sampling and testing of constituent materials shall be carried out in accordance with the appropriate British Standard. In particular, sampling and testing of fresh and of hardened concrete shall comply with BS 1881 unless this is at variance with the Specification.

Strength

The concrete in each grade will be considered acceptable if the average of any four consecutive 28 day test results exceeds the specified grade by 3 N/sq mm and if no individual 28 day test result is less than the specified grade by 3 N/sq mm.

Workability

The workability of the fresh concrete shall be such that the concrete is suitable for the conditions of handling and placing so that after compaction it surrounds all ducts and completely fills the formwork. Workability shall be measured for each batch or at such times as directed by the Engineer using one of the following tests in accordance with BS 1881, and shall be within the following limits of the required values:-

Slump	±25 mm of ± one-third of the required value, whichever is the greater
Compacting factor	+ 0.03, where the required value is 0.90 more ± 0.04 where the required value is between 0.80 and 0.90 ± 0.05, where the required value is 0.80 or less

Transporting, Placing and Compacting

Concrete shall be so transported and placed in such a way that contamination, segregation or loss of the constituent materials does not occur.

Concrete, when deposited, shall have a temperature of not less than 5^0 C and not more than 30^0 C.

There shall be no excess water on the top surface on completion of compaction.

Hot Weather Work

During hot weather the Contractor shall ensure that the constituent material of the concrete are sufficiently cool to prevent the concrete from stiffening in the interval between its discharge from the mixer and compaction in its final position.

Cement shall not be allowed to come into contact with water at a temperature greater than 60^0 C.

Reinforcement - Materials

Steel Fabric

Steel fabric reinforcement shall comply with BS 4483 and shall be delivered to the site in flat mats.

Reinforcement - Surface Condition

Immediately before concrete is placed around it, reinforcement shall be clean, free from mud, oil, paint, retarder, release agent, loose rust, loose mill scale, grease or any other substance that can be shown to affect adversely the steel or concrete chemically, or to reduce the bond.

Section B - TECHNICAL SPECIFICATIONS FOR ELECTRICAL LOW VOLTAGE INSTALLATION

Preamble

1. Workmanship
Except where otherwise stated, workmanship is to the relevant MSA EN or BS, EN or IEC standards. Workmanship shall be of a high standard throughout. The contractor shall ensure that the standard of finish demanded by this contract is achieved. Branded materials shall be assembled, constructed and joined in accordance with the manufacturer's instructions and recommendations.

2. Fixing to the Building Structure
Light fixings to brick, concrete or other masonry materials shall be by means of correctly sized screws fitted into plastic or metal expanding plugs located in correctly sized holes drilled in the structure. Light fittings to cavity constructions shall be by gravity or spring toggles, or expanding rubber sleeve fitted on to screws.

Slow speed rotary drills as recommended by the manufacturer of fixing device shall be used to carefully drill all holes. The Engineer shall not use percussion type boring devices and shot fired fixings without approval in writing.

In all cases the particular type and size of fixing device used shall be in accordance with the manufacturer’s recommendations having regard to the application and the load to be carried by the fixing device.

3. Testing and commissioning
All the works provided as part of the contract shall be inspected and commissioned in accordance with the relevant MSA EN or BS, EN or IEC standards to the satisfaction of the Engineer. All installations shall be inspected and tested in sections as the work proceeds and on completion as complete systems and it shall be noted that the Engineer may require inspecting or testing any equipment during erection.

All tests shall be arranged in co-operation with the Engineer and he shall be given prior notice of the time, location and nature of the test. No test shall be considered valid unless the Engineer is present. All necessary skilled and unskilled labour shall be provided for attendance duties before, during and after the test.

Defects occurring at any time during the test shall be made good and a complete re-test shall be carried out, all at no extra cost. Where failure during a test, inspection or commissioning process results in

damage to the building fabric and/or services not provided as part of this contract, or requires subsequent builders' work then these items shall be made good at no extra cost.

No section of the works shall be in any way concealed prior to testing and inspection and subsequent concealment where applicable shall only take place following written authority from the Engineer.
All necessary facilities, measuring and recording instruments for inspection/testing and commissioning are to be calibrated as necessary before use. The Engineer reserves the right to call for a demonstration of the accuracy of any instrument used.

All systems shall be commissioned only after inspection and testing procedures have demonstrated the integrity of the system.

4. Instruction of Employers Staff
The employer's staff will be instructed in the operation and maintenance of the installations by qualified personnel, who shall be fully conversant with the operations and maintenance procedures required for all systems, and where necessary specialist sub-contractor staff shall be made available to enable complete instructions to be given.

All installations shall be demonstrated in full working order together with the procedures to be adopted in the event of system malfunction and the manner in which plant outputs or control settings can be adjusted.

The contractor shall organize a training programme involving the nominated employer's staff. Such a program shall be carried out during the installation phase (where applicable), the commissioning phase, and the ramp up phase to full production. The cost of the training shall be deemed to have been included in the tendered rates.

5. Maintenance and Record Drawings
The contractor shall provide a thorough and easily understandable operation and maintenance manual which should enable non-technical staff top operate the system on a day to day basis and the management staff to plan for and execute routine maintenance.

The contractor shall provide drawings to the scales not less than those used for tendering purposes. These drawings shall show plans and schematics as the engineer may consider necessary to show all required information clearly.

The contractor shall prepare and submit As Fitted Drawings consisting of three sets of prints and one copy on CD ROM.

1.0 TECHNICAL SPECIFICATIONS FOR ELECTRICAL LOW VOLTAGE SYSTEMS

1.1 Scope of works

The work comprises the electrical LV installation at the refurbished Cathedral Museum at the Cittadella in Victoria, Gozo. The installation shall supply power, and lighting to all areas and shall include all necessary switchgear, enclosures, wiring, accessories and all necessary equipment and labour to make complete and functional systems.

1.2 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- Cables
- Switchboards and corresponding switchgear
- Distribution boards / consumer units and switchgear
- Moulded accessories
- PVC conduit
- Metalclad accessories
- Light fittings
- DALI Control Panel and equipment
- Other accessories

1.3 Regulations and standards

The installation shall conform to the following regulations and standards:

- Electricity Supply Regulations issued by Enemalta Corporation including amendments.
- IEE Wiring Regulations "Requirements for Electrical Installations" – 18th Edition including amendments.
- BS EN Standards as specified or their equivalent.

1.4 Electrical supply

The electrical supply shall be 400/230V ±10%, 50 Hz, three phase, four wire earthed neutral (TT) system.

1.5 Wiring system

Mains wiring from the main switchboard panel in the electrical switchroom at basement level to the distribution boards shall be carried out in:

- FG70R cables on cable tray from the switch room to the respective distribution board on cable tray.

Wiring for final circuits shall be carried out either:

- in single core, PVC insulated cables drawn into PVC conduit in chase or in surface run galvanized steel conduit or trunking
- or in XLPE/SWA/PVC cables on cable tray
- or in CAT CWZ cable.

as indicated in drawings, schematics and distribution board schedules.
Cable sizing shall be as indicated in the schematic drawings and in the distribution board schedules.

Cables with single strand conductors or with an overall conductor c.s.a. of less than 1.5sqmm shall NOT be used.

Loop connections shall only be made in accessible boxes or accessories.

Continuous cable runs only shall be used. Jointing of cables is not allowed.

Rates quoted shall include terminations, glands and bushes etc. as required.

Wiring insulation shall have the following colour coding:

Single phase circuits:

- Phase: brown
- Neutral: blue
- Protective conductor: green and yellow

Three phase circuits:

- L1: brown
- L2: black
- L3: grey
- Neutral: blue
- Protective Conductor: green and yellow

1.6 Cables

1.6.1 Single core cables

Single core cables shall conform to BS 6004:2012 and shall have plain annealed and stranded copper conductor and PVC insulation, 300/500V grade.

1.6.2 Armoured cable

Armoured cable shall comply with the provisions of BS6346:1997 and BS5467:2016 and shall be 600/1000V grade.

Armoured cable shall have the following construction: stranded copper conductors, XLPE insulated, PVC bedding, SWA, PVC sheathed.

Termination of cables shall be by appropriate manufacturer's recommended glands with brass earth tags. Compression type terminals are to be used for termination of the conductors.

Installation of armoured cables shall include the supply and installation of glands, terminals, cleats and cable ties as required including earth connections. No joints shall be allowed in the cable.

1.6.3 Multicore, PVC insulated, PVC sheathed cable

Multicore PVC sheathed, PVC insulated cable shall comply with BS60228:2005. Appropriate adaptors shall be used wherever the cable enters or exits a metal or plastic enclosure.

1.6.4 Multicore CAT CWZ cable

Multicore CAT CWZ cable shall comply with the requirements of BS6387. The cable shall be LPC approved for use in fire resisting wiring systems.

1.7 Cable Management.

Refer to specific section in technical specifications for cable management systems.

1.8 Electrical Distribution Boards

1.8.1 <u>Specifications for Distribution Boards</u>

The main distribution board supplying electrical services shall be TPN, surface mounting and of sheet steel construction complete with a hinged door which can be locked. They shall have DIN rails for the mounting of switchgear. Earth and neutral busbars of sufficient capacity to accommodate each individual circuit separately shall be included.

The distribution board enclosure shall be adequately sized to house an integrated DIN rail mounted automatic and motorized changeover as specified in section 1.8.1.3.

Distribution boards shall have a minimum protection rating of IP41.

RCD’s where installed, shall conform to BS IEC 1008-2-2:1990.

Miniature circuit breakers are to comply with BS EN 60898-1:2003+A13:2012 and are to provide short circuit and overcurrent protection.

RCBO's where installed, shall conform to BS EN 61009.

Short circuit rating for incoming MCB's shall be 10kA minimum.

Short circuit rating for outgoing MCB's shall be 6kA minimum.

MCB's for lighting and small power shall have a type C tripping characteristic.

MCB's for lift motor circuits shall have a tripping characteristic suitable for high starting motor currents.

Unused ways shall be blanked off.

1.8.1.1 Transient over-voltage protection module

A transient over-voltage protection module shall be installed in the switch board in order to protect the incoming mains supply in the following modes:

- Phase to earth
- Phase to neutral
- Neutral to earth

The module shall have a status indicator in the form of LED's or similar for:

- Full protection
- Reduced protection indicating that module needs to be replaced
- No protection indicating that the module is no longer effective in protecting against
- Transient over-voltages

The module shall conform to the following specifications:

- Leakage current : <1mA
- Peak discharge current: >10kA for an 8/20 microsecond waveform.
- Peak let through voltage: < 600V for a 6kV 1.2/50 microsecond waveform.
- Type I / II / III

Installation of module shall be carried out in strict accordance with manufacturer's instructions. For this reason the contractor shall provide manufacturer's installation instructions to the Engineer prior to installation.

1.8.1.2 Transient over-voltage protection module

A transient over-voltage protection module shall be installed in the switch board in order to protect the incoming mains supply in the following modes:

- Phase to earth
- Phase to neutral
- Neutral to earth

The module shall have a status indicator in the form of LED's or similar for:

- Full protection
- Reduced protection indicating that module needs to be replaced
- No protection indicating that the module is no longer effective in protecting against
- Transient over-voltages

The module shall conform to the following specifications:

- Leakage current : <1mA
- Peak discharge current: >10kA for an 8/20 microsecond waveform.
- Peak let through voltage: < 600V for a 6kV 1.2/50 microsecond waveform.
- Type I / II

1.9 Earthing and bonding

The main earthing terminal shall consist of a copper bar mounted near the main distribution board. Minimum dimensions shall be 3mm x 25mm. The earth bar shall be supported with appropriate brackets fixed to the wall.

1.10Moulded accessories

1.10.1 General

Moulded accessories shall be uniform throughout the installation, suitable for surface mounting over recessed boxes, and ivory white in colour.

Boxes shall be installed in recess with the front edge of the box at approximately 2mm behind the finished wall surface. Boxes used for wiring terminations and to hold moulded accessories shall be secured with a minimum of one roundhead screw.

Boxes shall be fitted with manufacturer supplied adaptors to connect to PVC conduit. Direct conduit entry into box knockouts shall not be accepted.

1.10.2 Lighting Switches

Single pole plate switches shall conform to BS EN 60669-1:1999+A2:2008 and are to be rated at 16A. For one way lighting circuits, switches shall be wired such that the rocker is facing down when the switch is ON.

1.10.3 Ceiling rose

Ceiling roses shall have terminals for live, neutral and earth 1.5mm cables. Ceiling roses shall be suitable for mounting over standard recessed mounted, plastic, round boxes. They are to comply with the provisions of BS 67:1987.

1.10.4 Socket Outlets

Socket outlets shall conform to BS 1363-2:2016+A1:2018 and are to be of the double pole switched type, shuttered, and rated at 13A. Socket outlets for external use shall be rated to IP65, and shall be complete with a spring loaded cover with sealing gasket in order to maintain the IP rating even when in use.

1.10.5 Fused spur outlets

Fused Spur Outlets 13A are to comply to BS 5733:2010+A1:2014 and are to be double pole switched with pilot lamp and cartridge fuse in removable fuse holder.

1.10.6 Cord outlets

Cord outlets are to be unfused when fed from a fused spur outlet and shall include a terminal block for proper termination of cables and a cord grip for the outgoing cable. Cord outlets shall be used to supply accessories such as water heaters, strip heaters etc.

1.10.7 Metalclad Accessories

Accessories for galvanised conduit and trunking installations shall be metalclad.

1.11Intelligent Lighting System

The intelligent lighting control panel shall provide control to the lighting in viewing areas of basement, ground and first floors. The lighting control panel shall provide:

- ON/OFF signaling to the contactors on specific lighting circuits,
- Dimming control to the dimmable electronic ballast on specific luminaires (all light circuits on track lighting system, downlights, rope lights and showcase lighting).

Power to these lighting circuits shall be provided from distribution board DB 1.0. The lighting control panel shall be installed in the ELV room at basement level.

1.11.1 Lighting Controller

Lighting controller shall consist of a microprocessor based controller, configured to provide switching and dimming functions on a number of circuits as described above (and associated BOQ's and drawings). The lighting controller shall be complete with an enclosure and the rates quoted shall include all necessary additional equipment and wiring to make a complete and functional system.

The inputs to each of this controller shall be:

- System on board timer;
- Respective lighting control keypad in each floor;
- Lighting control keypad
    - This keypad shall be installed in the reception area and shall offer control over the lighting circuits in areas described above and will include:
- AUTO / MANUAL mode switch
    - When in AUTO mode, the lighting shall be under the control of the lighting control panel software.
    - When in MANUAL mode, the lighting shall have dimming control of each individual circuit as described above.
    - In Manual mode, it shall also be possible to select from a number of pre programmed lighting scenes according to which switch is pressed. The keypad shall provide a minimum of 4 scene selections when Manual mode is selected.
    - The Keypad shall include an engraved label to describe the function of each switch.
    - The overall aim is to achieve a user friendly system which is simple to operate, yet offers flexibility during its day to day use.

DALI protocol shall be used for the direct control of lighting drivers, allowing for multiple drivers to be daisy-chained using low-voltage wiring for powering ON or OFF and dimming control. A single DALI loop shall be capable of communicating with 64 independently operating drivers which can offer granular control of each light fixture.

Each DALI driver shall have its own unique address on the system; therefore, the system shall be able to communicate with each driver, independently of the others.

One DALI loop shall be capable of handling up to 64 addresses with unlimited number of loops that can be connected with a complete DALI networked system.

DALI system shall allow for grouping with drivers being assigned to 1–16 groups on a loop, without the need for rewiring.

DALI drivers shall offer bidirectional Communication where drivers are able to receive information as well as transmit any failure (lamp or driver) to the central DALI system.

The controlled outputs from the lighting controller shall be:

- Dimming control to dimmable electronic ballast for lighting in basement floor level – 6 channels minimum. Dimming shall controlled by the panel using the DALI protocol. The maximum load per channel shall not exceed 10A.
- Dimming control to dimmable electronic ballast for lighting in first floor level – 8 channels minimum. Dimming shall controlled by the panel using the DALI protocol. The maximum load per channel shall not exceed 10A.
- Dimming control to dimmable electronic ballast for lighting in second floor level – 6 channels minimum. Dimming shall controlled by the panel using the DALI protocol. The maximum load per channel shall not exceed 10A.

- ON/OFF control to contactors in the respective areas for lighting circuits – 4 channels minimum. The maximum load per channel shall not exceed 10A.

DALI drivers shall provide common voltage (115 to 300 V), 50 to 60 Hz, high-power factor, low harmonics, and transient surge protection. When supply voltage is applied, the LED lighting shall switch on to full or to a preset level.

DALI drivers shall be capable of receiving information and report this information back to the central DALI system with regards to any lamp or driver failures.

DALI protocol shall be of precise logarithmic dimming curve of 254 steps (2.8 % increase per step) to ensure that all drivers dim the same: 0 to 100% for incandescent and fluorescent, 3 to 100% for compact fluorescent, and 0 to 100% for LED.

The DALI protocol requirements include the intent and electrical requirements of the protocol, bits and bytes requirements, collision detection, and the type of wire to be used for the DALI system.

1.11.2 Wall mount controller

The wall controller shall have a clean, low profile design that will blend into any environment. The controller shall have programmable buttons to control various lighting circuits. Each button can also be programmed with scenes via software. The controller shall have a minimum of 6 programmable buttons.

1.11.3 Other Accessories

1.11.4 Switch disconnectors

Switch disconnectors for outdoor use shall be of thermoplastic construction and rated to at least IP65. For indoor use, switch disconnectors shall be metal clad.

Switch disconnectors shall comply with the requirements of BS EN 60947-3 and shall be capable of disconnecting on load. Two pole devices shall be utilised for single phase circuits, four pole for three phase circuits. Disconnection shall be simultaneous on all poles. All switch disconnectors shall have the facility to be padlocked in the ON or OFF position.

Where indicated the switch disconnector shall be supplied with a residual current device and shall include an appropriately IP rated enclosure.

1.11.5 Passive Infra Red (PIR) Detector

PIR detectors shall be utilised in toilets to control a number of individual lighting circuits systems as shown on the drawings. The PIR sensor switch shall be mounted on an adjustable wall bracket or soffit mounted and shall have the following specifications:

Detection angle:	as shown on drawings
Range:	15m minimum
IP Rating:	IP44 or better
Photocell:	integrated, adjustable

The PIR detectors shall be installed as shown on the drawing and after consultation with the Engineer.

The PIR detectors shall have an aesthetic and compact external design.

1.12Labels and Charts

The Contractor shall provide a printed chart giving details of each circuit, in all distribution boards. The chart shall be enclosed in a transparent plastic envelope attached to the inside of the door of the consumer unit or distribution board.

Labels shall be made of white plastic, with 5mm high engraved letters and figures coloured red for warning labels and black where informative. Labels are to be fixed by means of screws and not adhesives.

Consumer units and distribution boards are to be marked with clear engraved letters and figures coloured black. The marking shall consist of the DB number for the distribution boards.

A plastic label with clear engraved letters and coloured red shall also be installed at the main earth terminal and shall read:

"SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE"

1.13Inspection and testing.
The Contractor shall be responsible for the testing of the electrical installation as recommended in the IEE Wiring Regulations "Requirements for Electrical Installations" – 18th Edition including amendments. In this regard, the Contractor shall furnish test certificates to the Engineer, on request.

The Contractor shall also be responsible for submitting the application to ARMs for the provision of the electricity service to the premises. The ARMs application fee shall not be included in the tendered rates.

1.14Commissioning and testing
On completion of the works, the Contractor shall carry out full scale testing and commissioning of all installations to demonstrate their performance to the satisfaction of the Engineer.

1.15Operating and maintenance instructions
On completion of all works and prior to handing over, the Contractor shall provide two copies of the complete set of operating and maintenance manual comprising of the following (where applicable):

- General description of the installation, indicating the manner of working of each system, forming part of the works.
- Full instructions for starting up, operating and shutting down each individual assembly
- Instructions as to the frequency and full requirements of routine and regular preventive
- Maintenance necessary to maintain the equipment in a good working condition. This information is to be supplemented by the Manufacturer's Maintenance Instructions for all of equipment.
- A recommended spare parts list including current price of each part, the
- Manufacturer's address and local stockist /agent.
- Wiring diagram of the system and equipment.
- Three sets of "as fitted" drawings and one soft copy on CD-ROM / USB storage.

2.0 TECHNICAL SPECIFICATIONS FOR LIGHT FITTINGS

2.1 Scope of works
The work comprises the supply and delivery to site only of luminaires and light fittings for the refurbished Cathedral Museum at the Cittadella in Victoria, Gozo.

2.2 Submittals
Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- Luminaires and light fittings

2.3 General
Luminaires for fluorescent or discharge lamps or tubes shall include electronic control gear.

Uniformity of luminaire colour and design is essential and samples of different makes and colours shall be submitted to the Architect or Engineer for approval.

Rates quoted shall include connection cables to light points if required.

For outdoor installations, wall mounted luminaires shall be fixed with stainless steel screws and shall be of durable material as specified below. In case of metallic assemblies or components, a guarantee against corrosion shall be provided. Moreover luminaires for outdoor installations shall include the following features:

- Anti glare optics
- Polycarbonate body
- Polished aluminium reflector
- UV stabilized polycarbonate or glass diffuser
- Degree of protection IP55 or better
- Continuity of earthing for whole assembly (in case of insulation Class I)
- Insulation Class I or Class II

2.3.1 Luminaire types

The luminaire types described below shall be supplied and delivered to site by the contractor.

Type A

Circular luminaire for flush mounting in false ceiling, aluminium housing with a powder coating finish, opal PMMA cover and 24W LED. Lamp colour temperature 3000K, Colour rendering index ≥ 80, luminous efficacy ≥ 70lm/W. Beam width of luminaires shall be between 45° and 55°. Luminaires shall be controlled via a DALI signal.

Type A1

Same as Type A but complete with emergency conversion kit.

Type B

Circular luminaire for flush mounting in false ceiling, aluminium housing with a brushed finish, clear reflector and 7-8W LED. Lamp colour temperature 4000K, Colour rendering index ≥ 80, luminous efficacy ≥ 80lm/W.

Type C

Suspended single circuit track lighting system for 28W LED spotlights. Layout of track system is to be as shown on drawing. The system shall include luminaires. Luminaires shall be adjustable in two axes. The track lighting system shall be suspended from the ceiling and shall be controlled via a DALI signal.

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Type C1

The luminaires for track lighting shall have an aluminium housing to fit the track. The luminaire shall have a modern aesthetic design and supported from the track allowing for minimum 300° rotation and 180° tilt. Lamp shall be 28W COB LED type, 4000K colour temperature, colour rendering index ≥ 80. Beam width shall be 25°. Luminaires shall be controlled via a DALI signal.

Type C2

The luminaire shall be similar, if not identical to Type C1 luminaires. It shall have aluminium housing and shall be of the surface ceiling mounted type. The luminaire shall have a modern aesthetic design allowing for minimum 300° rotation and 180° tilt. Lamp shall be 28W COB LED type, 4000K colour temperature, colour rendering index ≥ 80. Beam width shall be 25°. Luminaires shall be controlled via a DALI signal.

Type D

LED rope light complete with power supply suitable for installation in false ceiling. Average lifetime – 50,000 hrs or better. It shall have a with colour temperature 2000K – 3000K, colour rendering index > 80, luminous efficacy > 60 lm/W. Luminaires shall be controlled via a DALI signal.

Type E
Wall mounted luminaire with double beam suitable for wall surface mounting in stainless steel finish. Lamp shall be 12W LED type with lumen output of 40 lm/W per beam. Lamp colour temperature shall be 3000 with colour rendering index ≥ 80. Beam width shall be 35°.

Type E1
Same as Type E but for external installation. Luminaire shall have an ingress protection of IP66 and impact resistance IK08.

Type F
Luminaire 600x600mm for recessed soffit mounting, in sheet steel housing, matt white, anti-glare aluminium reflector. The luminaire shall include 40W LED lamp and associated integral control gear. Lamp colour temperature 4000K, colour rendering index > 80, luminous efficacy > 70 lm/W.

Type G
Self-contained maintained emergency light fitting, suitable for soffit recessed mounting complete with LED's to illuminate exit direction pictogram in European Signs Directive Format, engraved in transparent perspex plate. Luminaire shall have an aesthetic and compact external design. The luminaire shall be powered from the existing centralized emergency battery pack located in the electrical room at ground level.

Type H
Decorative, soffit recessed self-contained emergency light fitting, 3W LED lamp, NON-MAINTAINED, single side. Luminaire shall have a low profile, aesthetic and compact external design. The luminaire shall be powered from the existing centralized emergency battery pack located in the electrical room at ground level.

EMERGENCY CONVERSION KIT

The kit shall be suitable to convert a standard 8W LED into a MAINTAINED emergency light. The kit shall include Nickel Cadmium battery and charger, bright LED indicator and electronic module. Battery autonomy is to be of three hours when supplying a 1 x 8W LED.

3.0 TECHNICAL SPECIFICATIONS FOR CABLE MANAGEMENT

3.1 Scope of works
The works comprise the supply and installation of a cable management system for LV and ELV systems at the refurbished Cathedral Museum at the Cittadella in Victoria, Gozo.

3.2 Submittals
Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- Galvanised steel cable tray
- Galvanised steel cable basket
- Galvanised steel trunking
- PVC conduit and fittings

3.3 General

For conduit installations, adequate draw in boxes shall be installed to ensure that cables can be replaced with ease. The price of such boxes shall be deemed to have been included in the price of the relevant power or lighting points.

Any off-sets, bends, routing around beams, etc of the cable management systems shall be deemed to have been included in the tendered rate and no claims for extra cost to this effect will be accepted.

Chases for conduits are to be neatly cut and holes neatly drilled by mechanical means. Chases are to be made in horizontal or vertical runs only. Horizontal chases are to be kept to a minimum.

Vertical chases of conduit adjacent to doors or other openings shall not be nearer than 200mm from these openings.

Special attention shall be given by the Contractor to the number of cables installed in conduit or trunking in order ensure that conduit and trunking space factors shall not be exceeded. In any case conduit with a diameter less than 20mm shall NOT be used.

Cables for LV and ELV installations shall be kept separate and under no circumstances shall they be drawn through the same conduit.

During the course of the works, the Contractor shall blank off all the installed recessed boxes and conduit ends in order to minimize the ingress of debris and dirt.

3.4 Galvanised steel cable tray

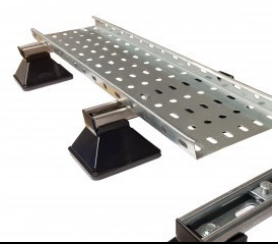
Cable tray shall be of perforated **1.5mm** sheet steel construction with a flanged height of 50mm and width as indicated on drawings. Cable tray shall be hot-dipped galvanised after forming and shall be adequately supported to avoid sagging. Brackets and fixtures are to be included in the tendered rates for cable tray.

Tees, bends, reducers and any other fittings shall be supplied by manufacturers. Contractor manufactured fittings shall NOT be accepted.

Only manufacturer supplied galvanised brackets / fixtures shall be used. Offsets, tees, bends, reducers and any other fitting required shall also be supplied by manufacturer and shall be proprietary. Contractor produced fittings shall not be accepted. Proprietary brackets and fittings shall be deemed to have been included in the tendered rates.

Examples of ceiling mounted galvanized steel bracket for cable trays	OR

For runs across the roof, the cable tray shall be installed in the horizontal position. In the latter case, the cable tray shall be installed on proprietary galvanised steel u channel bolted to solid rubber mounting with a minimum height of 50mm.

Example of cable tray floor mount	

The engineer may request that for certain sections of cable tray, the proprietary U channel is anchored to pre-cast solid concrete slabs having a thickness of 60mm instead of the rubber mountings. The supply of bricks/stone slabs shall be included in the tendered rate for cable tray.

The tray shall be electrically continuous and bonded to the main earth terminal however it cannot be used as a means of earthing for any circuit.

All cables installed on cable trays shall be secured to the tray using cable ties.

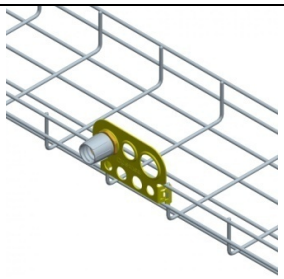
3.5 Galvanised steel cable trunking

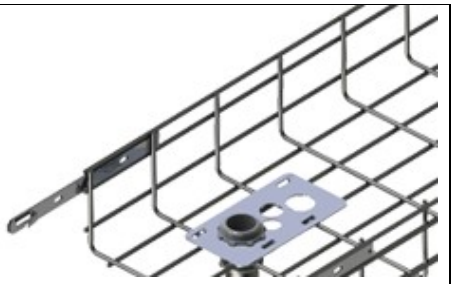
Trunking shall be of 20swg, 2 compartment, galvanised sheet steel construction. The cover shall be secured with self tapping screws. Earth bonding shall be carried out between all sections of trunking to ensure electrical continuity using 12x2mm copper sections fixed by adequate screws. The trunking shall be bonded to the main earth terminal but cannot be utilised as an earthing conductor.

Trunking shall be supported using galvanised brackets at regular intervals to avoid sagging. Bolting the trunking directly to the wall shall NOT be accepted. Proprietary brackets and fixtures are to be included in the tendered rates for trunking.

3.6 Cable Basket

Cable basket shall be used to accommodate the structured cabling system for voice/data networks. The cable basket shall electro galvanized and shall be adequately supported to avoid sagging. Brackets and fixtures are to be included in the tendered rates for cable basket. Conduit take offs form the cable basket shall be via proprietary adaptors.

Example of cable basket conduit tap offs	 OR

Proprietary brackets and fixtures are to be included in the tendered rates for cable basket.

The basket shall be electrically continuous and bonded to the main earth terminal however it cannot be used as a means of earthing for any circuit.

3.7 Dado Trunking
NOT APPLICABLE.

3.8 PVC conduit and fittings
PVC conduit and fittings shall conform to BS 4607-1:1984+A2:2010 and shall be of medium gauge. Conduit shall be jointed and terminated utilising the appropriate components as supplied by the conduit manufacturer. No contractor manufactured fittings or joints shall be utilised. Surface run conduit shall be adequately supported with allowance for expansion and contraction under normal working temperature variations. Saddle supports (where required) are to be at 1 metre intervals.

3.9 Galvanised steel conduit and fittings
Galvanised steel conduit and fittings shall conform to BS 61386-1:2008 and shall be heavy duty. Conduit will be jointed and terminated using appropriate components as supplied by the conduit manufacturer. Saddle supports are to be at 1.5m intervals and outdoor installations shall be rendered watertight. Conduit lengths shall be electrically continuous and bonded to the main earth terminal. However, conduit cannot serve as a means of earthing for any circuit.

3.10 Builder's work
The Tenderer is to include in his rates for chasing, holes in reinforced concrete or structural members etc. required for the proper execution of the works. Holes in reinforced concrete or structural members shall only be made after approval by the Engineer or Architect in charge.

All holes shall be made good with appropriate material in order to ensure that the integrity of the fire barrier is maintained. Such making good shall be deemed to have been included in the tendered rate

4.0 TECHNICAL SPECIFICATION FOR FIRE DETECTION AND ALARM SYSTEM AND FIRE FIGHTING SYSTEMS

4.1 Scope of works

This specification details the supply, installation and commissioning of a fire detection and alarm system at the refurbished Cathedral Museum at the Cittadella in Victoria, Gozo for the protection of life (L1) and property (P1) by providing protection of all areas within the building. The system, apart from providing visual and audible warning in time for occupants to escape, shall also provide fire conditions signalling to other systems which may require shutting down or a change of operating parameters in case of fire.

4.2 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- Fire Alarm Panel
- Addressable detectors
- Addressable manual call point
- Remote LED indicator
- Addressable alarm interface unit
- Addressable external sounders
- Addressable external beacon
- Auto dialler
- Fire rate cable
- Fire extinguishers
- Any other equipment, material, sundries and associated labour required to make a complete and functional system

4.3 Regulations and standards

The installation shall conform to the following regulations and standards:

- BS EN 54 – Fire Detection and Alarm Systems
- BS 7974: 2001 Application of fire safety engineering principles to the design of buildings Code of practice
- BS 5345 – Certification of hazardous areas (those parts not superseded by BS EN 54)
- BS 5839: 2002 – Fire Detection and Fire Alarm Systems for Buildings.
- MSA EN 54.
- BS 7671:1992 (IEE Wiring Regulations Seventeenth Edition) “Requirements for Electrical Installations” including amendments.
- Electricity Supply Regulations issued by Enemalta Corporation.
- Civil Protection Department regulations where applicable.
- National Building Regulations
- Standards and mandatory orders issues by the Malta Standards Authority (MCCAA)

All equipment making up the Fire Detection and Alarm System shall be from the same manufacturer and certified to relevant standards and certifications.

The system is to be supplied complete with operating instructions printed on the front panel, system logbook, installation notes, maintenance manual, spare fuses and spare glasses (call points).

4.4 Supply characteristics

The electrical supply shall be 400/230 Volt, 50 Hz, three phase, four wire earthed neutral system. The supply to the fire alarm panel (FAP) shall be via a dedicated circuit fed from a separate MCB in the main electrical panel. Switching shall be by means of a switch disconnector reserved solely for this purpose. The switch disconnector shall have a red coloured cover and labelled ‘FIRE ALARM – DO NOT SWITCH OFF’.

4.5 Zones

For the purpose of fire detection and alarm, the building shall be divided into zones so as to meet the requirements of BS 5839. There shall be a minimum of one zone per floor. Loop wiring shall be protected by short circuit isolators when crossing from one zone to another.

4.6 Fire Alarm Panel

The fire alarm panel (FAP) shall be an analogue addressable control system with sufficient number of loops to provide unique addressing and power to each loop connected device in the building. In any case, the requirements for the FAP shall monitor the status of the detectors and process any alarm condition in order to activate the alarm system. The FAP shall be a microprocessor based unit with in-built algorithms designed to maximize detector sensitivity while at the same time providing discrimination between false alarms and real fire conditions.

The system shall be activated into the pre alarm or full alarm mode when the threshold level from one or more fire detectors is exceeded. Alarm signals shall be directed to pre-programmed areas of the building in both pre alarm and full alarm modes. The system shall remain in alarm mode until the detector and the fire alarm control panel are reset and restored to normal. The system software shall allow the setting of the threshold level of each individual detector for pre/full alarm and for day/night modes.

The FAP shall automatically monitor and record output signals from each detecting device in such a way that any drift over a prolonged period of time due to say, the accumulation of dirt is taken into consideration and shall not be the cause of undue false alarms. In this respect, the FAP shall give a detector dirty warning once a pre programmed threshold is reached. The FAP shall also provide a record (or plot) of the output signal from each addressable device on the system over time.
The FAP shall also carry out comprehensive monitoring for the following:

- Device output signal drift
- Device (detector or sounder) fault
- Backup battery and mains failure
- Short and open circuit on both detector and alarm sounder circuits
- Earth faults on all system wiring
- Contaminated device
- System fault
- Removal of devices

Any abnormal event detected by the FAP shall be indicated on the panel by means of a buzzer and a message on the LCD.
The FAP shall isolate sections of the loop containing either faulty detectors and/or cable, thereby maintaining the integrity of the rest of the loop. Such isolation shall be indicated on the panel by means of a buzzer and a message on the LCD.

Addresses assigned to devices on any loop shall be totally independent of the actual physical location of the device within the building. Any changes in the system configuration, such as the addition or removal of detectors, would therefore require programming for those detectors only, and not for the whole system.

The FAP shall have the facility of assigning individual device addresses to specific zones within the building.

The FAP shall be capable of interfacing with one or more repeater panels connected to a detection loop or directly to main panel.

The FAP shall be programmable via an integral key pad and /or by means of dedicated software running on a PC. The cost of the software shall be deemed to have been included in the price of the FAP. The software shall be a multi level dedicated package with password protection for the various levels.

The FAP shall include an LCD display and an integral printer to provide a hardcopy of events.

The FAP shall also include:

- Sufficient memory to perform the tasks as specified for an addressable system.

- Individual identity of each addressable device for the following conditions: alarm; trouble; open; short; and detector failed
- Capability of each addressable device being individually disabled or enabled from the panel.
- Battery back-up (24hrs stand-by mode followed by 30 minutes alarm mode) through use of rechargeable, sealed-type batteries and automatic battery charger.
- Capability to provide a unique address to all loop connected devices in the building.
- Visual indication of system status including an LCD
- Internal buzzer for audible indication of fault on system (intermittent operation) and fire detection (continuous operation).
- Alarm silence facility with reactivation in case of any further fire detection signals from other detectors.
- Internal buzzer with quiet/muting facility.
- Test facility including one man walk test.
- Lamp test.
- No volt relays output for signaling of fire conditions to other systems.

The FAP shall provide monitoring and alarm signaling, by means of volt free relay contacts, for control or monitoring of mechanical systems in the event of fire.

4.7 Addressable optical smoke detector

Addressable smoke detectors shall be of the photoelectric type. The detector shall provide reliability against false alarms caused by high humidity, insects, air draughts and dust. The detector shall be provided with a dust cover during the course of the installation to prevent any ingress of dirt or other material. The cover shall only be removed prior to the commissioning of the system. Detectors shall have features to compensate for build-up of contamination within the housing and, once the detector has reached its maximum compensation level, a signal shall be sent to the control panel to indicate the need for maintenance.

The detector shall include a visible red LED that shall turn ON when the detector is triggered. The detector shall also include the facility to connect a remote LED for remote indication of a triggered status. The detector shall incorporate a short circuit isolator when required.

Each detector is to be supplied with a mounting base suitable for two wire circuits. The detector is to be fitted on to a separable base and shall include addressing capabilities. Detectors shall be suitable for installation both above and below soffits. All detectors below raised flooring and above soffits are to be fitted with remote indicator units.

4.8 Addressable rate of rise heat detector to 58 degrees Centigrade

Heat detectors shall be of the analogue addressable type that includes dual sensing elements. The heat detector shall be capable of being configured as a medium to fast response or as a fixed temperature device by the FAP.

The detector shall provide reliability against false alarms caused by high humidity, insects, air draughts and dust. The detector shall be provided with a dust during the course of the installation to prevent any ingress of dirt or other material. The cover shall only be removed prior to the commissioning of the system.

The detector shall include a visible red LED that shall turn ON when the detector is triggered. The detector shall also include the facility to connect a remote LED for remote indication of a triggered status.

Detectors shall be suitable for installation both above and below soffits. All detectors below raised flooring and above soffits are to be fitted with remote indicator units.

4.9 Remote LED indicator

Remote LED indicators shall be used to indicate the status of a detector where the latter is not normally visible, example: at top of lift shafts, above false ceilings etc. The remote indicator shall consist of a plate mounted LED specifically designed for connection to the detector.

4.10 Addressable manual call point

Break glass detectors (or manual call points) shall comply with BS5839 Part 2. The case shall be of fire resistant red thermosetting plastic construction.

The case is to be red fire resistant plastic. Contacts are to close on break of glass and are to be rated at 10A 12/24Vdc. The break glass element shall consist of a square glass blank that breaks clearly by using finger or thumb pressure only and shall include a laminating plastic layer to prevent fragmentation and possible operator injury. The glass shall break by pressure from the thumb and no hammer shall be required to affect this operation.

The break glass detector shall have the facility of testing with a test key (to be supplied with each unit). The key shall simulate an alarm by moving the glass panel backwards and closing the contacts of the detector.

Break glass detectors are to be installed at 1.4m above FFL (finished floor level)

4.11 Addressable Alarm sounders

Alarm sounders shall be of the addressable type and shall be wired on the same loop as the detectors.

Alarm sounders shall be capable of producing different levels and tones of sound outputs to signal pre alarm and full alarm modes depending on the status of the FAP.

Sounders in common areas shall be capable of producing a sound output of at least 90dB(A) at 1m.

Stand alone sounder units shall be housed in a robust, polycarbonate enclosure. Colour of unit shall be red. Otherwise, sounders shall be of the detector base mounting type or integrated in the detector itself.

4.12 Addressable beacon units

Flashing beacons shall be installed in main concourse and corridors, for persons with limited hearing capacity. Alarm beacon units shall be of the addressable type and shall be wired on the same loop as the detectors. Flashing rate of all units on the loop shall be synchronized by the FAP. The source shall either be a xenon lamp or LED's.

Stand alone sounder units shall be housed in a robust, polycarbonate enclosure. Colour of unit shall be red. Otherwise, sounders shall be of the detector base mounting type or integrated in the detector itself.

4.13 Short Circuit isolators

These shall be installed at intervals of no greater than 20 devices on a particular fire alarm route. They shall also be installed at the boundary of fire compartments. Short circuit isolators shall provide protection to the loop in case of faults and shall be installed to the requirements of BS 5839 Part 1: 2002. Where applicable the short circuit isolator shall be incorporated in the detector housing.

4.14 Automatic speech dialler

An automatic speech dialler with at least two specific recorded messages capable of calling at least three numbers shall be activated by a signal from the alarm panel. The dialler shall be a solid state device complete with keypad, display, speaker and microphone. The dialler shall be fully compatible with the FAP and shall also be connected to the latter's battery backup system.

4.15 Alarm Interface Units

Loop alarm interface units shall be installed to individually control or monitor the systems as specified in relevant standards and legislations. Loop powered alarm interface units shall provide an input/output interface between the Fire Alarm Panel and other systems to control and monitor the following systems:

- Shutdown of ventilation and HVAC equipment
- Shutdown of lift

4.16 Wiring system

Wiring related to the fire detection system shall be carried out in fire resistant cable conforming to BS6387 Cat.CWZ. The cable shall be manufactured to BS 5839 and be of red outer sheath and of the low smoke, zero halogen type (LSF – low smoke and fume). All cables associated with the fire alarm system shall be of this type.

Fire alarm cable shall conform to BS 6387:2013 PH 120 minutes, able to maintain circuit integrity under fire conditions throughout the installation. The cable shall comply with IEC 331 flame test and BS 4066 part 1, be moisture resistant, fully screened against electrical interference, negligible acid gas emission, low smoke emission, 300/500 volts R.M.S. rating, red in colour.

The fire proof cable shall be clipped using the appropriate fire proof clips directly to the wall / ceiling where installed above soffits. In staircases cable shall be drawn in PVC conduit under floor tiles or underneath the roof screed (as applicable). Drops/risers to the FAP shall be through chased PVC conduit or surface PVC trunking as applicable. Propriety cable clips shall be installed at intervals of not greater than 300mm. Wiring over 3m in height from the floor level can be clipped directly to the wall or slab, whilst, other cable should have additional adequate mechanical protection. Wiring through shafts shall either be secured to dedicated mesh tray or pulled through conduits. External surface wiring shall be pulled through metal galvanised conduit and terminations sealed to IP67.

In all cases fire alarm cable shall be adequately segregated from all other LV and ELV system wiring.

Proprietary accessories shall be used when installing the cable and devices, such as terminations, clips, and other required cable installation materials. Each device shall be labelled by a unique address number and clearly visible.

The contractor shall guarantee full technical assistance; maintenance of the system as and when requested and shall have off-the shelf spare parts for all items installed.

- All workmanship shall be of a high standard and shall be fully compliant with the relevant British Codes of Practice, Local Standards and Regulations, or equally approved standards. In addition to compliance with the relevant standards, this Contract shall also satisfy the Consultant's requirements as regards to the finish and general appearance.

- The Contractor shall comply fully with Health and Safety Rules and Regulations, shall be held responsible for the safety of his employees, any other employees as well as the general public. The contractor shall be held responsible for any damage incurred to Third Parties, caused by him or his employees. All works shall be carried out by competent and licensed tradesman.

4.17 Labelling

Fire alarm devices shall be labelled by a unique device address and interfaces shall have details of devices being controlled or monitored. All wiring inside panels shall be duly labelled.

4.18 Fire extinguishers - General

Fire extinguishers shall be of the portable, stored pressure, controllable discharge type with a lever above the handle for operation. The lever shall include a tamper evident safety pin which must be pulled out before the lever can be depressed.
Fire extinguishers shall be complete with a pressure gauge which shall clearly indicate whether the extinguisher is fully charged, discharged or overcharged.

The fire extinguisher nameplate shall include clearly legible operating instructions. When installed, the nameplate on the extinguisher shall be facing outwards.

The fire extinguisher shall be mounted on an appropriate manufacturer supplied bracket, inside the fire point cabinet.

Fire extinguishers shall display the BS kite mark and shall conform to the requirements of BS EN 3 standards.

4.18.1 Dry powder Fire Extinguishers

Dry powder fire extinguishers shall contain a class A, B and C fire fighting medium. The body shell of the extinguisher shall be of high grade steel. The fire extinguisher shall be finished in red epoxy powder coating with a blue coloured band.

Dry powder extinguishers shall have a capacity as shown on the drawings. Discharge time shall not exceed 20s. Discharge range shall be at least 6m.

4.18.2 Carbon Dioxide Fire Extinguishers

Carbon Dioxide fire extinguishers shall be suitable for use on Class B fires. The body shell of the extinguisher shall be of high grade steel. The fire extinguisher shall be finished in red epoxy powder coating with a black coloured band.

Carbon Dioxide extinguishers shall have a capacity as shown on the drawings. These extinguishers shall be equipped with either a swivel horn or a hose and horn.

4.18.3 Fire Blanket

Fire blankets shall conform to the requirements of BS476:Part 4 and shall be tested to BS 7944:1999. Blanket dimensions shall be a minimum of 1200mm x 1200mm. The blanket shall be of a non deteriorating material and shall be enclosed in a sleeve with clearly legible instructions on its use.

4.19 Programming, Testing and commissioning

On completion of the installation the Contractor shall carry out programming of the system followed by a full test and commissioning in line with the relevant standards. A test report shall be completed giving all relevant details as called for in the relevant standards. Programming shall be carried out after consultation with the project Engineer. The contractor shall also give one week notice of the commissioning and testing to the Engineer. The test report shall be endorsed by the Contractor's warranted electrical engineer and/or the contractor's fire engineer who shall both demonstrate that the system operates fully in accordance with the relevant standards and legislation. On completion, the Contractor shall submit a detailed test and commissioning report to the Engineer.

- All the works provided as part of the contract shall be inspected and commissioned in accordance with the relevant European Standard Specifications to the satisfaction of the Consultant.

- All installations shall be inspected and tested in sections as the works proceeds and on completion as a complete system. It shall be noted that the Consultant may require inspecting and/or testing any equipment during installations. All tests shall be arranged in co-operation with the Engineer and shall be given prior notice of the time, location and nature of the test. No test shall be considered valid unless the Consultant or his approved representative is present for the tests.

- Any defects that emerge and found at any time during the test duration shall be amended and a complete re-test shall be carried out, all at no cost to the client but costs shall be fully borne by the contractor.

- No section of the works shall be in any way concealed prior to testing and inspection and written and documented approval by the Consultant or his approved representative.

- The services rendered under this contract exclude:

- Any labour cost or parts required as a result of damages caused by accidents, fire, flood, lightning strikes and any other acts of God, neglect, misuse, malicious act, act of violence, environmental conditions outside those specified for or caused by the contracted equipment, electrical current fluctuations not caused by the contracted equipment.

- Any maintenance work required due to the use of supplies not approved by the contractor or equipment manufacturer.

- Replacement of consumable items.

- The client shall be informed at least one week before any wire testing, safety testing, function testing, or commissioning is carried out. The contractor's engineer holding a warrant shall approve the test certificates and final commissioning certificates and invite the consultant/client to witness such tests; however, the latter has the right to request further tests as deemed necessary.

  Tests include but not limited to the following:
  - Continuity
  - Insulation resistance between all conductors
  - Function/Operation
  - Coordinated witness tests

The Contractor shall also submit:
- A set of two operating and maintenance manuals for all equipment in the alarm system including wiring and circuit diagrams, list of spares, commissioning records and test results.
- As fitted drawings consisting of three sets of prints and one copy on CD ROM.

4.20 Training

The Contractor shall also provide extensive training to the Client or his nominated personnel on the operation and maintenance of the fire detection and alarm system. Training shall be conducted in the building where the system is installed.

The training period for systems operation shall consist of at least two separate sessions and shall start after the system is functionally completed but prior to final acceptance tests.

The training period for systems maintenance shall consist of at least another two separate sessions over and above the system operations sessions and shall be carried out after the system is functionally completed but prior to final acceptance tests.

5.0 TECHNICAL SPECIFICATION FOR CLOSED CIRCUIT TELEVISION SYSTEM

5.1 Scope of works

The scope of works for the CCTV system is the supply, installation, testing and commissioning of high quality fast-acting IP CCTV surveillance system along with power supply, power distribution and required accessories.

The CCTV system shall provide continuous monitoring of all designated areas and recording of activities from all cameras in the system. In addition the CCTV system shall:

- enable clear identification of persons or objects within the range of the cameras
- provide a deterrent to unauthorized entry
- detect unauthorized entry and alert security personnel or other security systems
- provide independent viewing of any camera from a remote site
- provide general surveillance of the site
- provide an organized and reliable archive of digitally recorded images

A colour IP CCTV system shall be supplied and installed to view, monitor and record the activities in the main common areas such as, waiting areas, lobbies, reception desks and circulation areas, entrance/exits from the building, the areas around the perimeter of the building, server rooms and electrical rooms, and other areas deemed to require security surveillance.

The work shall comprise the supply, installation and commissioning of a complete CCTV system consisting of:

- daytime / night time dual mode cameras complete with power supplies, lenses, mounting brackets etc
- network video recorder
- monitors/ keyboard and other peripheral equipment
- cabling and cable management

The system shall provide continuous programmable twenty four hour surveillance of the designated areas and shall produce recorded images for use as identification and evidence in court as may be required.

These specifications aim to summarise the main contents of the system and by no means is it intended to be exhaustive. The contractor shall be responsible for ensuring that a complete working system is provided.

The equipment making up the system shall be located as indicated in the drawings.

The system shall be designed in a way that provides flexibility to allow for addition or removal of any component/s and/or functions or in the event where the system operating requirements need to be changed or for future expansions of the system. The contractor shall ensure that the normal operation of the system will not be affected by the addition of new components or future expansion of the system.

5.2 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- Dome Type IP Cameras (Internal)
- Dome Type IP Cameras (External)
- Network Video Recorder server
- Remote Monitoring Station
- Passive equipment
- Software
- Cabling
- Data Cabinet
- Any other equipment, material, sundries and associated labour required to make a complete and functional system.

5.3 Regulations and standards

The CCTV system shall conform to the following regulations and standards:

- IEE Wiring Regulations "Requirements for Electrical Installations" – 18th Edition including amendments.
- MSA EN 50132-7:2001 Alarm systems - CCTV surveillance systems for use in security applications--Part 7: Application guidelines.
- Electrical Installations Regulations SL545.24
- National Building Regulations.
- Standards and Mandatory Orders issued by the Malta Standards Authority.
- Data Protection Act

Equipment shall be installed according to the related standards, specifications and manufacturer's instructions. Equipment shall also comply with the requirements of electromagnetic compatibility of the EMC Directive (EC Directive 89/336/EEC) and all amendments. The system shall be manufactured to such a standard that it shall not be unduly affected by magnetic interference and that it shall not cause excessive electromagnetic emissions.

5.4 Electrical supply characteristics

The electrical supply shall be 400/230 Volt, 50 Hz, three phase, four wire earthed neutral system.

5.5 CCTV Cameras

CCTV cameras shall meet the following operating requirements:

5.5.1 Dome Type CCTV Cameras (Indoor use)

The cameras shall be colour, day/night, of the IP (network) type with built in 802.3af Compliant POE and encrypted data transmission, housed in suitable vandal proof enclosures and suitable for indoor environment. The cameras shall be soffit mountable.

Imaging

- 4.0 megapixel sensor dome type IP camera
- 2688(H) x 1520(V) pixel array
- Progressive scan CMOS sensor
- Lens aperture, F2.0
- Minimum illumination of: 0.03 -1.0 lux (at F2.0) in colour mode
- H.265+/H.265/H.264+/H.264 image compression
- 85° - 110° horizontal field of view

Data Transmission

- Network Type: 10/100BASE-TX
- Connector: RJ-45
- ONVIF compliant
- Protocol: IPv4/v6, HTTP, HTTPS, SOAP, DNS, DDNS, NTP, RTSP, RTCP, RTP, TCP, UDP, IGMP, ICMP, DHCP, Zeroconf, ARP, SMTP, FTP, PPPOE
- Streaming Protocols: RTP/UDP, RTP/UDP, Unicast, Multicast, RTP/RTSP/TCP, RTP/RTSP/HTTP/TCP, RTP/RTSP/HTTPS/TCP, HTTP
- Security: Password protection, HTTPS encryption, digest authentication, WS authentication, user access log, 802.11x port based authentication.

Electrical

- Power over Ethernet (PoE): PoE 802.3af

Regulatory Approvals

- FCC, Class A
- CE and RoHS compliant
- UL compliant

Environmental

- Operating temperature 0°C to +60°C
- Relative humidity: <95%

Mechanical

- Plastic body
- Surface mount
- Tamper resistant
- Vandal proof
- Adjustment range 0-360° pan, 0-90° tilt, 360° rotation

5.5.2 Dome Type CCTV Cameras (Outdoor use)

The cameras shall be colour, day/night, of the IP (network) type with built in 802.3af Compliant POE and encrypted data transmission, housed in suitable vandal proof enclosures and suitable for the outdoor environment. External cameras shall be installed complete with a weather-proof IP67 rated housing and mounting bracket with cable management for protected installation.

Imaging

- 4.0 megapixel sensor dome type IP camera
- 2688(H) x 1520(V) pixel array
- Progressive scan CMOS sensor
- Lens aperture, F1.4
- Minimum illumination of: 0.03 – 0.5 lux (at F1.4) in colour mode
0 lux -0.1 (at F1.4) in monochrome
- High-power IR LEDs with 30M IR illumination range at 0 lux
- IR On/Off Control: Auto/Manual
- H.265+/H.265/H.264+/H.264 image compression
- IP65 rated

Data Transmission

- Network Type: 10/100BASE-TX
- Connector: RJ-45
- ONVIF/PSIA/CGI compliant
- Protocol: HTTP, HTTPs, TCP, ARP, RTSP, RTP, UDP, SMTP, FTP, DHCP, DNS, DDNS, PPPOE, IPv4/v6, QoS, UPnP,NTP, Bonjour, 802.1x, Multicast, ICMP, IGMP, SNMP
- Streaming Protocols: RTP/UDP, RTP/UDP, Unicast, Multicast, RTP/RTSP/TCP, RTP/RTSP/HTTP/TCP, RTP/RTSP/HTTPS/TCP, HTTP
- Security: Password protection, HTTPS encryption, digest authentication, WS authentication, user access log, 802.11x port based authentication.

Electrical

- Power over Ethernet (PoE): PoE 802.3af (Class 0)

Regulatory Approvals

- FCC, Class A
- CE and RoHS compliant
- UL compliant

Environmental

- IP66 rating or higher
- Operating temperature 0°C to +60°C

Mechanical

- Metal body
- Surface mount
- Tamper resistant
- Vandal resistant
- Adjustment range: 0-360° pan, 0-90° tilt, 360° rotation

5.5.3 CCTV System Facilities

The system shall allow for an adjustable image size, quality and bit rate, time stamp, text overlay, configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, wide dynamic range and backlight compensation. Cameras lenses shall be suitable for the location of the respective camera and the coverage area being monitored. The cameras shall be suitable for operation at zero lux lighting levels. They shall have in built movement detection such that a camera can be set to trigger an alert when the camera detects movement.

The CCTV system shall support the following functions:

- Simultaneous viewing of live video from multiple cameras including split view (to view a number of cameras at the same time), full screen or camera sequence (where views from different cameras are displayed automatically, one after the other)
- Viewing of CCTV footage from spot/viewing monitors including split views, full screen or camera sequence configurations;
- Recording of video from all the cameras, video can be recorded manually, continuously and on trigger and continuous and triggered recordings can be scheduled to run at selected times during each day of the week
- Search for recorded video
- View recorded video: the camera outputs are recorded on the NVR, which can be accessed from any authorized PC on a dedicated data network or internet.
- Event management functions including intelligent video such as video motion detection;
- Camera administration and management;
- Search options and playback;
- User access control and activity (audit) logging;
- Conduct the above functionalities from a remote computer;

5.6 Cabling and Cable Management

Cabling from the cameras to the Computer shall be done using CAT 6 cable. Cameras shall be powered using Power over Ethernet (PoE) facility. In this regard the contractor shall install a data point for each camera and network switches installed in data cabinet shall have the PoE feature.

In general, cables shall be installed via steel cable baskets as shown on the drawings. Elsewhere cabling shall be through surface galvanized steel conduit or chased 25mm PVC conduit which is to conform to the specifications of the electrical installation. Adequate draw in boxes shall be installed to ensure that cables can be replaced with ease. The price of such boxes shall be deemed to have been included in the price of the camera points.

Particular attention shall be given to avoid signal interference from LV cables. In this respect video cables shall be kept at an adequate distance from LV cables in particular when they are running in parallel to each other.

5.7 Network Video Recorder (NVR) Server

5.7.1 General Characteristics

The NVR server shall include multiplexing functions and shall consist of a digital rack mount stand-alone unit. The unit shall be capable of handling up to 16 camera channels. Storage of images shall be by way of internal hot swappable hard disc drives or other external storage devices. The NVR shall be suitable for mounting in a standard 19”rack data cabinet.

The NVR shall be capable to connect additional internal hard drives and shall include a network data storage drive and an external hard drive for an increase in archiving capacity. It shall also be complete with a DVD-RW drive. The NVR shall record and transmit video and audio via an IP network, shall meet or exceed industrial and surveillance applications requiring a long-term storage and retrieval solution. The NVR shall provide a TCP/IP protocol video output via an RJ-45 Ethernet connection. User and administrator password protection levels shall be provided. Playback shall allow all images recorded to be viewed forward or backward in time. The NVR shall also provide built-in motion detection, pre-event and post-event recording and time –date search functionalities. Language shall be in English.

5.7.2 Technical specifications and features

The NVR server shall conform to the following minimum technical specifications and characteristics:

System

- Dula/Quad-core embedded processor
- Up to 130Mbps recording rate;
- Microsoft Windows 7 or 10 or Server 2012
- Minimum 2 x SATA III hard disk drives, hot-swappable, RAID 1 for operating system
- At least 2 in number Gigabit Ethernet ports
- Minimum of 16GB RAM DDR4
- x2 VGA video output
- x1 HDMI output
- Multiscreen display (1/4/8/9/16)
- Remote access enable

Electrical

- 230V, 50Hz

Mechanical

- 1U or 2U rack mount chassis

Environmental

- Operating Temperature 0°C to 35°C
- Relative Humidity 0% to 80%

Certifications
Safety

- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
- EN 62311:2008
- IEC 60950-1:2005

Electromagnetic Emissions

- EN 55022:2006 + A1:2007
- CISPR22:2005 + A1:2005
- EN 61000-3-2:2006
- IEC 61000-3-2:2005 (Class D)
- EN 61000-3-3:1995 + A1:2001 + A2:2005
- IEC 61000-3-3:1994 + A1:2001 + A2:2005

Electromagnetic Immunity

- EN 55024:1998 + A1:2001 + A2:2003
- CISPR 24:1997(modified) + A1:2001 + A2:2002

5.8 Patch Panel

The patch panels shall be rack mounted Category 6 with printed-circuited board technology. Cable termination must be LSA or 110 Insulation Displacement Connectors. Front connectors to be RJ45 style conforming to ANSI/TIA-568-C Category 6 Specification. Electrical performance to be Category 6. The panel shall be standard 19” rack mountable and with a standard U height depending on the number of ports. The patch panel for CCTV system shall include Power over Ethernet facility.

5.9 Cabinet

CCTV active/passive components shall be installed within the data cabinet for the structured cabling system. Refer to technical specifications for structured cabling system.

5.10 Workstation & Monitors

Workstations at the reception desk shall have these minimum requirements:

Intel Core i7, minimum 8/16GB RAM, Windows 10 Professional Version, or of the latest technology available on the date of material submittal, however should there be more than one upgrade to the technology until the time of project completion, then the PC shall be upgraded accordingly.

Workstation monitors shall be 22" full HD, LED monitors. The viewing monitors shall be sized such that all cameras can be viewed properly at one glance.

5.11 Testing and commissioning

On completion of the installation the Contractor shall carry out a full test and commissioning of the system according to the manufacturer's instructions as well as the relevant MSA EN and BS EN standards. The contractor shall give one week notice of the commissioning to the Engineer and shall not carry out this exercise unless the Engineer is present. On completion, the Contractor shall submit a detailed test and commissioning report to the Engineer.

The Contractor shall also submit:

- A set of two operating and maintenance manuals for all equipment in the CCTV system including wiring and circuit diagrams, list of spares, commissioning records and test results.
- As fitted drawings consisting three sets of prints and one copy on CD ROM.

5.12 Training

The Contractor shall also provide extensive training to the Client or his nominated personnel on the operation and maintenance of the CCTV system.

6.0 TECHNICAL SPECIFICATION FOR INTRUDER ALARM SYSTEM

6.1 Scope of works

The scope of the intruder alarm system is to provide continuous monitoring of all designated areas via a system of zoned detectors and provide a visible and audible alarm on unlawful entry. An auto dialer shall alert up to four telephone numbers when system is triggered. The system shall be designed to avoid false alarms.

The contractor shall be responsible for ensuring that a complete working system is provided. The equipment making up the system shall be located as indicated in the drawings.

6.2 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- Intruder alarm panel
- Speech dialer
- Remote keypad
- Detector

6.3 Electrical supply characteristics

The electrical supply shall be 400/230 Volt, 50 Hz, three phase, four wire earthed neutral system.

6.4 Intruder alarm panel

The Intruder Alarm Panel (IAP) shall monitor the status of the detectors and process any alarm condition in order to activate the signaling system. The IAP shall be a microprocessor based unit. The IAP shall include the following features:

- Battery back-up with at least eight hours capacity,
- Integral and remote keypad for controlling the various Control Panel functions such as entering the alarm set/unset code, sounder cut-off timer, zone functions,
- Minimum of 8 detection zones - which will include (or can be programmed to include) final exit, common tamper loop (24 hour monitoring) and Fire (24 hour monitoring) zones,
- Duress code,
- Speech dialer with at least two specific recorded messages capable of calling at least four telephone numbers,
- Auxiliary programmable relay output,
- Connection for a minimum of five remote keypads,
- Outputs for four sounders,
- Anti tamper features,
- Visual indication of system status.

The panel shall have the option to be able to interface with existing CCTV systems within the same building.

6.5 Detectors

The detectors shall include the following features:

- Passive infrared, active infrared and microwave detection technologies to minimize false alarms,
- Masking protected, by active infrared beams,
- Selectable microwave detection sensitivity,
- Selectable PIR detection sensitivity,
- Memory latched input,

- LED indicator,
- Selectable detection combination type (AND/OR),
- High level of RFI/EMI immunity.

Moreover detectors for external use shall be housed in a robust weatherproof housing and shall include features to minimize alarms caused by detection of small fauna.

Lenses used shall be selected according to the location of the detector and the area to be protected.

6.6 Remote Keypad

Remote keypads shall be supplied and installed at each of the locations as indicated in the drawings. The remote keypads shall interface with the intruder alarm system and shall provide convenient access to the intruder alarm system. Security functions able to be performed via the remote keypad include, but not limited to:

a) system set-up or servicing programming,
b) user set/unset of areas,
c) display of alarm conditions by “area” and by input, and
d) user acknowledging of alarms by “area” or by input.

Remote keypads shall visually display information, such as the current set or unset status of any of the areas, via an LED or LCD display and shall allow the display of the sealed/unsealed status of any of the inputs.

The remote keypad shall have in-built diagnostic to ensure continuous operation of the system. The units shall have the facility for remote system management allowing the management of multiple sites from a single location.

6.7 Sounders

6.7.1 Internal Sounder

The internal sounder shall produce a sound level of 110 dBA at 1 meter. The sound shall be generated by an electronic siren. The sounder shall be wired in the common tamper loop.

6.7.2 External Sounder Strobe

This shall be a self contained unit with one hour battery autonomy. The unit shall be housed in a robust, weatherproof polycarbonate enclosure. The unit shall comprise one or more sounders (130dBA at 1 metre), strobe light, anti tamper switch and rechargeable battery. The unit shall incorporate a sounder cut-off timer. The sounder shall be wired in the common tamper loop.

6.8 Zones

Detectors shall be divided into the following zones as follows:

Zone 1 : Basement level
Zone 2 : Ground Floor
Zone 2 : First Floor

6.9 Testing and commissioning

On completion of the installation the Contractor shall carry out a full test and commissioning of the system. The contractor shall give one week notice of the commissioning and testing to the Engineer and shall not carry out this exercise without the Engineer’s presence. On completion, the Contractor shall submit a detailed test and commissioning report to the Engineer.

The Contractor shall also submit:

- a set of two operating and maintenance manuals for all equipment in the intruder alarm system including wiring and circuit diagrams, list of spares, commissioning records and test results.
- as fitted drawings consisting two sets of prints and one copy on CD ROM.

6.10 Training

The Contractor shall also provide extensive training to the Client or his nominated personnel on the operation and maintenance of the intruder alarm system.

7.0 TECHNICAL SPECIFICATIONS FOR STRUCTURED CABLING SYSTEM FOR VOICE / DATA NETWORKS

7.1 Scope of works

A structured cabling system shall be installed for both voice and data networks. The system shall conform to the following standards:

- ISO/IEC 11801-1:2017
- IEEE Std 802.3-2015 - IEEE Standard for Ethernet
- EN 50173: Information technology - Generic cabling systems
- ANSI/TIA-568 – Telecommunications standards

7.2 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- UTP CAT6 cable
- Patch panel
- Wall outlets
- Data points
- WiFi Access Points
- Connectors
- Uninterrupted Power Supply

7.3 System configuration

The system shall be configured in a star topology with individual CAT 6, UTP cables from a cabinet containing patch panels, feeding various data points in the specified locations. Twin voice and data wall outlets shall be fed by two separate cable runs.

7.4 Horizontal cabling system

7.4.1 Cable UTP Category 6

The cable used to implement the system shall be a high performance 4 pair CAT 6, 100 ohms, 24 AWG Shielded Twisted Pair (STP) with solid conductors, polyolefin insulated PVC sheath and colour coded pairs. Cable runs shall be limited to 100m.

7.4.2 Patch panel

The patch panels shall be rack mounted Category 6 with printed-circuited board technology. Cable termination must be LSA or 110 Insulation Displacement Connectors. Front connectors to be RJ45 style conforming to ANSI/TIA-568-C Category 6 Specification. Electrical performance to be Category 6. The panel shall be standard 19” rack mountable and with a standard U height depending on the number of ports.

7.4.3 Wall / Ceiling outlets

Voice and data outlets in the specified areas shall consist of single or double outlets as indicated on the drawings. Outlets shall include an integrated spring loaded shutter. Snap in Jack to be 8 wire, unkeyed and unscreened type RJ45. Cable termination shall be LSA or 110 IDC.

7.4.4 Connectors

Cable termination must be LSA or 110 IDC.
Connectors to be RJ45 style IEC 60603-7-2/3 568B wired (‘A’ may be wired as an option).
Electrical performance to be Category 6.

7.4.5 Patch cords

The UTP Patch cable shall be a high performance factory crimped 4 pair stranded Category 6 assembly. Cable type shall be 24 AWG (STP) stranded. Connectors must be RJ45 style IEC 60603-7-2/3. Electrical performance to be Category 6.

7.4.6 Network switch

7.4.6.1 General Characteristics

The network switch shall provide advanced switching technology with a high non-blocking throughput data rate. The switch shall have a management system which allows network administrators to configure and monitor the switch in a graphical user interface as well as an industry-standard Command Line Interface. It shall also be able to provide Power Over Ethernet in order to power POE compliant devices. Moreover the unit shall have a rack mount form factor.

7.4.6.2 Technical specifications and features

The network switch shall conform to the following minimum technical specifications and characteristics:

i. General Characteristics

The network switch shall provide advanced switching technology with a high non-blocking throughput data rate. The switch shall have a management system which allows network administrators to configure and monitor the switch in a graphical user interface as well as an industry-standard Command Line Interface. It shall also be able to provide Power Over Ethernet in order to power POE compliant devices. Moreover the unit shall have a rack mount form factor.

ii. Technical specifications and features

The network switch shall conform to the following minimum technical specifications and characteristics:

Hardware/Performance Features

- 24/48 in No. 10/100/1000Mbps RJ45 ports (PoE)
- 2 in No. 100/1000 Mbps SFP ports (optional)
- Switching capacity of 52-104Gbps
- Max forwarding rate 38.7-77.5 Mpps
- 8/16K MAC addresses minimum
- 100BASE-T/TX/1000Base-T:UTP Category 6 cable
- 802.3at/af compliant RJ45 POE Ports
- Minimum 1 built-in fan
- 1U/2U rack mount unit
- LEDs: Link, speed, activity, and PoE indicators

Electrical Requirements

- 100-240V, 50-60Hz

Performance Requirements

- 100-240V, 50-60Hz

System Requirements

- Microsoft® Windows® 98SE, NT, 2000, XP, Vista™, Windows 7, Windows 8 or Windows 10, MAC® OS, NetWare®, UNIX® or Linux.

Environment

- Operating Temperature: 0°C - 40°C
- Operating Humidity: 10% - 90% non-condensing

Certifications

- **CE, FCC, RoHS**

Software features

- Layer 2 switch functions

- VLANs (Static, Voice, Video)
- 802.1 Quality of Service
- SSL Security and access control
- Web based GUI management
- Power saving technologies

Standards

- EEE 802.3i,IEEE 802.3u,IEEE 802.3ab,IEEE802.3z,IEEE 802.3ad, IEEE 802.3x,IEEE 802.1d,IEEE 802.1s,IEEE 802.1w,IEEE 802.1q, IEEE 802.1p

7.5 Installation

Cables shall be run in pairs to each double wall outlet; for single outlets, one cable shall be installed. Cables are to be installed in 25mm diameter PVC conduit which is to conform to the specifications of the electrical installation. Conduit is to be installed surface above false ceilings where ELV cable basket is not available and in surface galvanised conduit drops where visible. Under raised floors, cables shall be run on dedicated cable management system. Adequate pull boxes shall be installed to ensure that cables can be replaced with ease.

The price of such pull boxes shall be deemed to have been included in the price of the voice/data points. Particular attention shall be given to avoid signal interference from LV cables. In this respect UTP cables shall be kept at an adequate distance from LV cables in particular when they are running in parallel to each other.

Separation of power and data cables must be according to EN 50174 part 2.The manufacturers' instructions shall be strictly followed during the installation of the various components forming up the cabling system.

7.6 Wireless Access Point

7.6.1 General Characteristics

The wireless access point shall provide a wireless internet connection to the occupants within the premises. The wireless access point shall have a management system which allows network administrators to configure and monitor the access point in a graphical user. It shall also be able to operate over PoE.

7.6.2 Technical specifications and features

The wireless access point shall conform to the following minimum technical specifications and characteristics:

Hardware

Networking Interface:	Two in number 10/100/1000 Ethernet Ports
Antennas:	2.4 GHz – Integrated 5 dBi Omni (Supports 3x3 MIMO with Spatial Diversity)
Wi-Fi Standards:	802.11 a/b/g/n
Power:	Passive Power over Ethernet (48V), 802.3at Supported (Supported Voltage Range: 39 to 57VDC)
Wireless Security:	WEP, WPA-PSK, WPA-TKIP, WPA2 AES, 802.11i
Certifications:	CE, FCC, IC
Operating Temperature:	-10 to 55° C (14 to 131° F)
Operating Humidity:	5 - 80% Non-Condensing

7.7 1 kVA Uninterrupted Power Supply

The Contractor shall supply, install and commission one number 1 kVA UPS rack-mountable in data cabinet.

- Capacity : 1 kVA
- Technology : PWM-IGBT
- Input Voltage : 230 V +/-10% AC, 50Hz+/-1%

- Output Voltage : 230 V +/- 1% AC
- Output Frequency : 50 Hz +/- 1%
- Output waveform : Pure Sine wave
- Nature of cooling : Air cooling
- Load power factor : 0.8 lag to unity
- Type of battery : Sealed Maintenance free battery
- Operating Voltage : 120 Volts D.C.(10 Nos. 12Volts, 65AH(min))
- Front panel : LCD Display for input, output and DC Voltmeter
- Protection :
    i. Over voltage, Short Circuit and overload at UPS output terminal
    ii. Under voltage at Battery terminal.
- Indicators :
    i. Mains Presence
    ii. Battery charging
    iii. Output Overload
    iv. Low battery voltage

7.8 Data cabinet

The cabinet shall be of the free standing type and capable of housing 19" racks. The cabinet shall be dust proof, glass fronted, complete with fan unit. The cabinet shall be supplied with all internal cable management and power facilities (minimum of 6-way switched power strip) for active equipment. The cabinet shall be able to accommodate all the necessary hardware.

The cabinet shall be able to accommodate all the necessary hardware including but not limited to:

- Network Video Recorder
- Network switch
- Patch Panels
- Power strip
- UPS/battery back-up
- VOIP
- Any other active/passive components required for a complete functional system

7.9 Labeling

A labeling and administration system must be employed into the cable system in line with EN 50174 or ISO 14763-2 or TIA/EIA-606.

7.10 Testing and commissioning

On completion of the installation the Contractor shall carry out a full test of the system. Particular attention shall be given to the testing of the UTP cabling where a detailed test certificate according to industry standards is required. All cables shall be tested in both directions. The system shall be tested to IEC 61935 with a Level III cable tester set to Cat 6. The test is to include the patch panels and the snap in jacks at the wall outlets that is the complete Permanent Link as described the referenced standards.

The contractor shall give one week notice of the commissioning and testing to the Engineer. On completion, the Contractor shall submit a detailed test and commissioning report to the Engineer. This shall include:

Minimum tests for CAT 6 namely:

- Insertion Loss (IL)
- NEXT Loss (pair-to-pair)
- PS-NEXT
- ELFEXT
- PS-ELFEXT
- Return Loss (RL)
- Propagation Delay (PD)
- Longitudinal Conversion Loss (LCL)

- Longitudinal Conversion Transmission Loss (LCTL)
- Attenuation
- Length
- Wire map
- DC resistance

7.11 As fitted drawings

The Contractor shall also submit as fitted drawings consisting of two sets of prints and one copy on CD ROM.

TECHNICAL SPECIFICATIONS FOR MECHANICAL SYSTEMS INSTALLATION

1 Workmanship

Except where otherwise stated, workmanship is to comply with the relevant MSA EN or BS, EN or IEC standards . The contractor shall ensure that the standard of finish demanded by this contract is achieved. Branded materials shall be assembled, constructed and joined in accordance with the manufacturer's instructions and recommendations.

2. Outdoor Unit/s

The outdoor unit/s shall be installed, supported and adequately isolated, so that no vibration transmission shall occur between it and the structure. Suppliers' recommended working clearances shall be strictly adhered to. The contractor shall include any civil works in connection with the outdoor unit and any related equipment such as plinths or the inclusion of RSJ's to support the equipment. The exact location shall be as instructed by the client.

3. Refrigerant Pipes

When installing copper pipes, proper measures shall be taken to prevent the tubes from getting contaminated or moistened. During brazing, nitrogen gas must be passed to prevent oxidation. The end of each length of pipe shall be covered. Special care shall be taken to avoid the ingress of dirt when passing copper pipes through a hole. Before carrying out a thorough vacuum operation the copper pipe system shall be flushed systematically as recommended by the manufacturer with nitrogen. This operation shall be carried out on both liquid and gas pipes. Also, before the vacuum operation an 'airtight test' shall be carried out. This should be done in steps in order to eliminate major leaks. Pressure should be increased up to a maximum value as indicated by the manufacturer and kept for 24 hours.

Pipes shall be securely bracketed at intervals according to the manufacturer's instructions. All pipe work shall be supported by means of split-type galvanized steel brackets, incorporating a rubber insertion around the whole of the circumference. The bracket itself shall be supported by a single stud, bolted to a proprietary galvanized steel U channel which shall allow the stud to slide sideways during installation, and thereby achieve a neat finish. For horizontal runs at roof level, the U channel sections shall be anchored down to specifically made concrete slabs laid on the roof. The cost of slabs and U channel brackets shall be deemed to have been included in the tendered rate for the pipes.

4. Drains

Drain pipes shall be properly joined in accordance with the manufacturer's recommendations and slope downstream at a gradient of 1:100 and not less than 1:250. Access through screw caps shall be installed at strategic points in case of pipe blocking. Hanging bars/supports shall be installed every 1 to 1.5m so that drain pipes will be adequately supported without kinks. After the completing the drain system, this shall be checked for any leaks and that water flows freely. Also, the drain pump of each indoor unit shall be checked to see that it functions properly.
Under no circumstances shall joints in pipes (PVC and copper) be made in the thickness of walls, floors or ceilings. Pipes shall not be embedded in walls or floors unless specifically directed.

5. Pipe Insulation

Insulation shall be applied in such a manner that air circulation between it and the pipe shall be avoided. It shall only be applied after the pipes have been pressure tested to the satisfaction of the Engineer.

6. Civil Works

Civil works connected with the installation mainly include the preparation of holes through walls. These shall be carried out by the civil contractor. Holes shall be neatly prepared and to the size suitable for the

fan, duct or pipe being fitted. Oversize holes shall be neatly finished following the equipment installation. Other minor civil works may include chasing and the support of the items of equipment.

7. Painting

All rusted metal surfaces shall be wire-brushed down to bare metal and shall not be painted prior to the approval of the Engineer. All painted surfaces which are meant to remain exposed, shall be given a coat of primer and two final coats of high gloss enamel paint of approved colour. All galvanised metal surfaces shall be given adequate coats of etching primer and two final coats of high gloss enamel paint of an approved colour.

8. Electrical Works

Electrical works carried out in connection with the above detailed works shall be strictly in accordance with the latest edition of the I.E.E. and Enemalta regulations. This shall include power factor correction where necessary.

The electrical supply to the various equipment shall be provided near each unit but the contractor shall be responsible for connecting up the equipment to this available supply which shall be suitably terminated. The contractor shall also connect up the fans to their controllers which shall be positioned as indicated on drawings. This may require chasing and installation of conduit and any necessary fittings.

4. Fixing to the Building Structure

Light fixings to brick, concrete or other masonry materials shall be by correctly sized screws fitted into plastic or metal expanding plugs located in correctly sized holes drilled in the structure. Light fittings to cavity constructions shall be gravity or spring toggles, or expanding rubber sleeve fitted on to screws.

All holes shall be carefully drilled by slow speed rotary drills as recommended by the manufacturer of the fixing devices. Percussion type boring devices and shot fired fixings shall not be used without prior approval in writing by the Site Project Manager.

Where fittings to steelworks are required, they shall be by the use of metal clamps/hook bolts or similar devices where the method of fixing does not require any drilling or cutting of the steelworks. Under no circumstances should structural steelworks be cut or drilled.

In all cases, the particular type and size of fixing devise used shall be in accordance with the manufacturers' recommendations having regard to the application and the load to be carried by the fixing device.

Any drilling and making of screwed or bolted fixings to the structure shall be included in the tender. Proposals for fixings shall be discussed with and approved by the Engineer and any possible restrictions shall be ascertained before submission of the tender.

5. Pipe Installation

All pipes shall be arranged to set round piers and other obstructions and minor modifications shall be made as required by the Engineer to circumvent site difficulties.

All bends shall be of the long radius pattern except where the use of these fittings would stand pipes too far from wall surfaces and make for unsightly appearance in which short sweep tees and elbows may be used.

Expansion allowances shall be made for surface installed pipes. Manufacturer's recommendations for the distances between expansion arms etc. shall be followed. When pipe runs pass through walls, slabs or ceilings, sleeves must be used. These shall be in PVC and shall be of such size as to allow free expansion to the pipe. Space between pipe and sleeve shall be caulked with an intumescent material. No joints in pipes shall be allowed in walls, slabs, floors etc.

6 Disconnection of Equipment

All items of equipment shall be capable of being disconnected from connecting pipes by means of unions, union valves, flanges or flanged valves. Pipes shall be so arranged to allow the item to be removed.

7. Valves

. Valves shall be provided and installed as necessary for the purpose of circulation control, isolation and draining. They shall be of full-bore size to suit the mains onto which they are installed. Installation shall be such that the valves are in accessible positions with their stem horizontal or inclined above horizontal.

8. Painting and Identification

Paint shall be applied to all pipe work and associated components, valves, fittings, etc., equipment, plant, supports of any kind, insulation, plain mild steel, copper or cast iron surfaces, and in addition painting shall be applied to any other items which have been specified elsewhere to be painted.

All surfaces to be painted shall be prepared by thoroughly cleaning and removing all rusts, grease, oil, dirt and surface corrosion using wire brush or emery paper and/or degreasing media as required. Absorbent surfaces shall be suitably primed.

All paint shall be manufactured by an approved maker. PVC tape identifying bands will not be accepted.

Stencilling on pipes as detailed above shall be located adjacent to all valves, at all changes of direction, at all inlets and exits to ducts and buildings, and at either side of walls and floors. Warning labels shall be fixed on insulation on electric trade heated pipe lines, stating the voltage involved.

Wherever insulation is to be painted to Table 1 of BS 1710 or to the equivalent EU standard, the paint used shall comply with all the fire resistance requirements specified for the insulation finish, and shall be carried out by the contractor as part of the contract.

All insulated or un-insulated pipe work in concealed positions shall be identified by means of 77 mm wide identification bands, painted neatly on, at right angles to the pipe axis at intervals not greater than 3 m.

In addition the name of the service and pipe diameter shall be stencilled on in a visible position with 50 mm high black capital letters with an arrow indicating the direction of flow. Flow and returns shall have the letter “F” and “R” added to the identifying name.

The identifying band colours and the finished colour of services to be painted shall be in accordance with colours and procedures given in BS 1710 or to the equivalent EU standard.

9. TESTING AND COMMISSIONING

9.1 General

All commissioning and testing shall be carried out in accordance with CIBSE commissioning Code Series A to the full satisfaction of the site Engineer.

All tests shall be arranged in co-operation with the Engineer and he shall be given prior notice of the time, location and nature of the test. No test shall be considered valid unless the Engineer is present. All necessary skilled and unskilled labour shall be provided for attendance duties before, during and after the test and the test media shall be provided and subsequently disposed of except where otherwise specified.

Defects occurring at any time during the test shall be made good and a complete re-test shall be carried out, all at no extra cost. Where failure during a test, inspection or commissioning process results in damage to the building fabric and/or services not provided as part of this contract, or requires subsequent builders' work then these items shall be made good at no extra cost.

All test points shall be provided which are necessary to carry out the specified tests and commissioning requirements. Such points shall be fitted with removable plugs, flanges or other approved devices. No section

of the works shall be in any way concealed prior to testing and inspection and subsequent concealment where applicable shall only take place following written authority from the Engineer.

All necessary facilities, measuring and recording instruments including test pumps and gauges for inspection/testing and commissioning are to be calibrated as necessary before use. The Engineer reserves the right to call for a demonstration of the accuracy of any instrument used.

9.2 Tanks

On completion of the installation, the tanks shall be filled and tested for a minimum period of 2 hours for a satisfactory test, all joints shall remain watertight, no leaks shall be detected and no visible bulging of the tank walls shall occur. Should the tank not prove satisfactory, all defects shall be repaired and the tank re-tested at no cost to the contract.

9.3 Cleaning and Flushing out of Systems

Prior to setting up the systems, these shall be thoroughly cleaned up and pipes shall be flushed out. Water installations shall be flushed out using cold water at maximum mains pressure. During the cleaning process, the flow shall be interrupted occasionally to dislodge debris and pipe walls rapped. Items that are prone to damage during the cleaning operations shall be isolated or removed and subsequently re-fitted.

9.4 Commissioning

All systems shall be filled with the working fluid, vented and brought to operating conditions and the flows then regulated to the design values. Following regulation and balancing procedures all plant and systems shall be put into operation and examined to ensure that the installations are operating correctly.

10. Instruction of Employers Staff

The employer's staff will be instructed in the operation and maintenance of the installations by qualified personnel, who shall be fully conversant with the operations and maintenance procedures required for all items of plant and the composite systems, and where necessary specialist sub-contractor staff shall be made available to enable complete instructions to be given.

All installations shall be demonstrated in full working order together with the procedures to be adopted in the event of plant or system malfunction and the manner in which plant outputs or control settings can be adjusted.

The contractor shall organize a training programme involving the nominated employer's staff. Such a program shall be carried out during the installation phase (where applicable), the commissioning phase, and the ramp up phase to full production. The cost of the training shall be deemed to have been included in the tendered rates.

11. Maintenance and Record Drawings

The contractor shall provide a thorough and easily understandable operation and maintenance manual which should enable non-technical staff to operate the plant on a day to day basis and the management staff to plan for and execute routing maintenance.

The tender shall include **full and comprehensive maintenance** of the new variable refrigerant volume/flow system for the duration of the guarantee period or 24 months from commissioning. A detailed maintenance agreement shall be submitted with the offer. A log book shall also be kept by the client listing critical values of readings taken during each maintenance visit. Detailed maintenance procedures shall be listed in the agreement.

The contractor shall provide drawings to the scales not less than those used for tendering purposes. These drawings shall show plans and such sections and schematics as the engineer may consider necessary to show all required information clearly.

The contractor shall prepare and submit As Fitted Drawings consisting of three sets of prints and one copy on CD ROM.

8.0 TECHNICAL SPECIFICATIONS FOR HOT AND COLD WATER SUPPLY

8.1 Scope of Works

Works detailed in the specification include the following works:

- Provision of a supply of mains water to the water storage tank at roof level
- Provision of a supply of water from the storage tank up to the restrooms at first floor and second floor levels.
- Supply and installation of all items pertaining to the system such as valves, and other fittings.
- Testing and commissioning of the complete system to the satisfaction of the engineer.
- Provision of as fitted drawings for the complete installation.

8.2 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- PP-R Pipework
- Drain pipes
- Pipe Work Accessories
- Bronze Ball Valves
- Electric Water Heater
- Isolation Valves
- Thermal Insulation

8.3 General system overview

The plumbing system shall include the distribution and supply of hot and cold water to the bathroom at basement level, including installation of sanitary ware.

Contractor must coordinate all services in such way that all pipes run neatly in parallel and possibly using the same routing. Adequate supporting channels, and pipe brackets must be laid out taking account of the small bore diameters and plastic material pipe work (which need more frequent supports).

Pipe supports and installation MUST follow closely the manufacturer’s recommendations. Allowance must be made for hot water pipe work expansion loops.

All pipe work running at roof level, exposed to weather conditions MUST be protected through thermal insulation, *plysolyene* and anti-UV, white or silver paint. Such pipe work shall be neatly installed on pipe trays, slightly elevated from the floor roof membrane.

All pipe work must be pressure tested to 1.5 times the operating pressure (see further below) for a duration period of 2 hours. Pipe work must be identified with colour coded bands and labelling, including direction of flow ‘arrows’ stickers fixed to the pipe work

8.4 Pipe work

All domestic cold and hot water piping shall be in fusion weld PP-R 80 PN10 pipe work, suitable for potable water at 65 deg C, and at 4-5 Bar pressure.

All hot water pipe work shall include closed cell insulation 19mm thickness. Insulation shall be professionally installed, with neat glued joints and all fittings and accessories insulated throughout. Note : pressure test before joints are insulated (covered on).

Cold water pipe work which runs exposed on the roof shall also be insulated.

Allow for supports and expansion joints as prescribed by the manufacturer.

All pipes shall have an identifying mark when delivered and shall be supplied in the manufacturer's standard lengths. The ends of all pipes shall be protected against the ingress of foreign objects and against mechanical damage during transit. All external pipework shall be protected against UV rays by plysolene and anti UV paint coat. The supply and application of paint shall be deemed to have been included in the tendered rate.

The pipe system used shall be a safe system so that all materials should be non-toxic, do not support microbiological growth and should not be affected by rust or pitting. Pipe materials shall be suitable for potable water. The system shall be compatible with other materials and fittings shall be available so that the system may be joined to copper, galvanized steel or other plastic pipe systems.

8.5 Water heater

The water heater shall be of the pressure type, electrically operated and thermostatically controlled. They shall be supplied from the cold-water storage tank installed on the roof. Water heater shall be provided with good polyurethane thermal insulation for minimum heat loss.

Internal vessels of water heater shall be constructed of hot dipped galvanised steel with porcelain lining. A replaceable magnesium anode shall be incorporated in the water heater body. The water heater vessel shall be suitable for a working pressure of 4 bar. External casing shall be finished in white epoxy. Water heater shall be supplied complete with appropriate safety valve, adjustable thermostat, water inlet and outlet connections, 240V single phase heating element, temperature indicator, internal wiring, connections, neon indicator lamp and fixing brackets as to be ready for use.

8.6 Valves

Isolating valves shall be manufactured to high quality standards conforming to BS 5750 Part 1. They should be depended upon to close efficiently even after long periods of fully open service. Each valve must permit straight through flow with minimum disturbance to the fluid.

Isolating valves shall have a polished ball and smooth seats to give 100% bubble-tight sealing. The valve body shall be made of bronze to BS 1400 LGZ. The ball shall be made of dezincification resistant brass to BS 2872 CZ 132.

The ball seat shall be made of P.T.F.E. The valve stem shall be made of dezincification resistant brass to BS 2874 CZ 132. The valve lever shall be made of zinc plated mild steel covered in PVC.

Isolating valves in shaft shall be installed in a way to be easily accessible from the nearest window.

8.7 Pipe Terminations

All pipe runs shall be terminated at the angle valve or tap and shall include all the required compatible fittings for the respective angle valves and taps.

8.8 Drains

PPR pipes shall be used for all drains and these shall run from the sanitary fittings to the main foul water pipework in trench. They shall conform to the following specification:

- They shall be medium gauge pipes.
- Size of drains for wash hand basins and floor drains shall be 50mm diameter.
- The system shall include adequate inspection tees, caps and shall be adequately supported so that no eventual sagging occurs.
- The pipes used shall resist attack by chemical substances, details of which must be supplied with the offer.

8.9 Thermal Insulation

All hot water pipes shall be insulated. This shall be applied in a smooth, clean and workmanlike manner with all joints tightly finished. Sizes and performance of thermal insulation shall comply with BS 6700. Adequate space shall be allowed around the tube fittings for the required thickness of insulation to be added after installation.

Insulation shall consist of pre-formed sectional mineral wool or glass fiber moulded sections to conform to the pipes. It shall be suitable for a temperature range of between 5 and 150 deg. C. It shall withstand a continuous operating temperature of 100 deg. C. The material shall be non-combustible, water resistant, rot-proof, odorless, non-hygroscopic, does not cause corrosion, does not sustain vermin and will not encourage the growth of fungi, mould or bacteria.

8.10 Installation

8.10.1 Workmanship

Except where otherwise stated, workmanship is to comply with British Standard Codes of Practice, where applicable. Workmanship shall be of a high standard throughout. The contractor shall ensure that the standard of finish demanded by this contract is achieved. Branded materials shall be assembled, constructed and joined in accordance with the manufacturer's instructions and recommendations.

8.10.2 Fixing to the Building Structure

Light fixings to brick, concrete or other masonry materials shall be by means of correctly sized screws fitted into plastic or metal expanding plugs located in correctly sized holes drilled in the structure. Light fittings to cavity constructions shall be by gravity or spring toggles, or expanding rubber sleeve fitted on to screws.

Slow speed rotary drills as recommended by the manufacturer of fixing device shall be used to carefully drill all holes. The use of percussion type boring devices and shot fired fixings shall not be acceptable without approval in writing by the Engineer.

In all cases the particular type and size of fixing device used shall be in accordance with the manufacturer’s recommendations having regard to the application and the load to be carried by the fixing device.

Any drilling and making of screwed or bolted fixings to the structure shall be included in the offer. Proposals for fixings shall be discussed with and approved by the Engineer and any possible restrictions shall be ascertained before submission of the offer.

8.10.3 Pipe Installation

All pipes shall be arranged to set round piers and other obstructions and minor modifications shall be made as required by the Engineer to circumvent site difficulties. Details of modification required due to particular site conditions shall be forwarded to the Engineer for approval.

All bends shall be of the long radius pattern except where the use of these fittings would stand pipes too far from wall surfaces and make for unsightly appearance in which short sweep tees and elbows may be used provided the Engineer's approval is obtained beforehand.

Pipes shall be run as detailed in drawings or as directed by the engineer. A cement/sand mix to prevent damage to them by other trades shall cover any pipes run under the floor. Supports and brackets shall be used at the base and top of risers, at each change in direction and at all dismounting points.

8.10.4 Disconnection of Equipment

All items of equipment shall be capable of being disconnected from connecting pipes by means of unions, union valves or compression joints. Pipes shall be so arranged to allow the item to be removed.

8.10.5 Valves

. Valves shall be provided and installed as necessary for the purpose isolation. They shall be of full-bore size to suit the mains onto which they are installed. Installation shall be such that the valves are in accessible positions with their stem horizontal or inclined above horizontal.

8.11 Testing and commissioning

8.11.1 General

All the works provided as part of the contract shall be inspected and commissioned in accordance with all relevant British Standard Specifications and Codes of Practice to the satisfaction of the Engineer. All installations shall be inspected and tested in sections as the work proceeds and on completion as complete systems and it shall be noted that the Engineer may require inspecting or testing any equipment during erection.

All tests shall be arranged in co-operation with the Engineer and he shall be given prior notice of the time, location and nature of the test. No test shall be considered valid unless the Engineer is present. All necessary skilled and unskilled labor shall be provided for attendance duties before, during and after the test and the test media shall be provided and subsequently disposed of except where otherwise specified.

Defects occurring at any time during the test shall be made good and a complete re-test shall be carried out, all at no extra cost. Where failure during a test, inspection or commissioning process results in damage to the building fabric and/or services not provided as part of this contract, or requires subsequent builders' work then these items shall be made good at no extra cost.

All test points shall be provided which are necessary to carry out the specified tests and commissioning requirements. Such points shall be fitted with removable plugs, flanges or other approved devices. No section of the works shall be in any way concealed prior to testing and inspection and subsequent concealment where applicable shall only take place following written authority from the Engineer.

All necessary facilities, measuring and recording instruments including test pumps and gauges for inspection/testing and commissioning are to be calibrated as necessary before use. The Engineer reserves the right to call for a demonstration of the accuracy of any instrument used.

8.11.3 Sanitary ware and associated Chrome Fittings

The contractor shall install all the sanitary ware and associated chrome fittings which will be supplied by the Client. These will include sanitary ware, chrome mixers, shower hoses, flush-valves for water closets, flexible connections pipes, angle valves, bottle traps etc. The contractor shall also connect all the sanitary ware to waste water systems. All connections to waste water systems shall be properly tested and certified.

8.1.4 Cleaning and Flushing out of Systems

Prior to setting up the systems, these shall be thoroughly cleaned up and pipes shall be flushed out. Water installations shall be flushed out using cold water at maximum mains pressure. During the cleaning process, the flow shall be interrupted occasionally to dislodge debris and pipe walls rapped. Items that

are prone to damage during the cleaning operations shall be isolated or removed and subsequently re-fitted.

8.14.5 Commissioning

All systems shall be filled with the working fluid, vented and brought to operating conditions and the flows then regulated to the design values. Following regulation and balancing procedures all plant and systems shall be put into operation and examined to ensure that the installations are operating correctly.

8.14.6 Record Drawings

The Contractor shall provide drawings to a scale not less than 1:100. These shall show plans and such sections, as the Engineer may consider necessary. Final copies shall consist of two prints. The final copies of the `As fitted' drawings shall be submitted to the Engineer within **three weeks** of the completion of the contract.

9.0 TECHNICAL SPECIFICATIONS FOR FOUL WATER PIPEWORK

9.1 General

The following specifications refer to the wastewater discharge and conveyance systems (soil water systems) which shall be supplied, installed and tested by the contractor.

The contractor shall install vertical stacks, and connections to existing systems for foul water. The systems shall include all the necessary waste pipes, fittings, rodding eyes, inspection ports, anti-siphon devices, vents and traps from all sanitary ware, sinks, equipment, etc. to drain points. Installation procedures shall comply with the recommendations of MSA and/or European Standards. The Contractor shall ensure that access plugs are fitted as necessary to facilitate cleaning of the system.

The specifications must be read in conjunction with the drawings and the bills of quantities, enclosed with this document.

9.2 Scope of works

The works shall comprise the supply and installation of foul water drainage system for bathroom at basement level.

The waste water systems include:

- Foul water system to carry away all drainage from bathroom.

9.3 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- Drain pipes
- Fittings
- Floor drains

9.4 Pipe construction

All pipe work and fittings shall be of rigid polypropylene construction, with a clean smooth internal and external finish, of thickness not less than 3.1mm, uniform throughout the length of the pipe and the fittings.

Pipe work jointing shall be of the rubber ring push-fit system.

All traces of grease, oil, dust or other contaminants shall be thoroughly cleaned prior to installation. Both the pipe spigot and the fitting shall be treated with petroleum jelly for ease of fitting without damaging the sealing rubber ring. All jointing shall be carried out as recommended by the manufacturer of the piping system offered.

The push-fit pipe end shall be inserted into the fitting firmly and steadily without rotation of the components relative to each other.

9.5 Pipe installation

Pipework to collect water from roof shall be laid in chase along the entire vertical riser. The cost of chasing shall be deemed to have been included in the quoted rates.

All other pipework shall be supported by means of pipe rings, incorporating a rubber insertion around the whole of the circumference. The ring shall be supported by a steel stud, fixed into the building structure by means of expanding steel bolts. The length of the stud shall be such that the necessary gradient is achieved. Brackets to support drain pipes shall be deemed to have been included in the quoted rates.

The maximum distance between brackets shall be according to the following table:

Nominal Size (mm)	*Horizontal Runs (m)*	*Vertical Runs (m)*
63	1.0	1.5
80	1.0	1.5
110	1.2	1.5
125	1.2	1.5

Any pipe work running buried must be leak / pressure tested using a 1m head of water at the higher end, and appropriate plug at the other end (inflatable boat fenders may be used for this exercise).

Backfilling of buried pipe work must be carried out using fine well compacted sand. A top protective layer of concrete should be placed in order to protect pipe work from mechanical damage.

All equipment, fittings and floor drains MUST include bottle or u-trap. No open gullies shall be allowed. The system MUST be of the closed type, with sealed joints and connections. Prevention of formation of vacuum is done by the venting system, which is always led to the outside of the building, at roof level, away from any fresh air intakes.

The contractor shall add any vents, traps, fixtures as deemed necessary

All wash hand basins shall be connected to 50mm diameter drain pipe.

The general gradients to be used are as follows:

40mm dia. pipe > 1:30
50mm dia. pipe > 1:50
80mm dia. pipe > 1:70
100mm dia. pipe > 1:80
150mm dia. pipe > 1:100

9.6 Rodding points

Rodding points shall be installed in appropriate locations along the pipework to facilitate access in case of blockages. The cost of rodding points shall be deemed to have been included in the quoted rates.

9.7 Air venting and drainage

Openings for natural air vents shall be installed on all shaft risers and down-comers at the highest point. Air vents shall be located at 3m above roof surface level. Support vents shall be fixed to ensure a rigid structure.

Facilities for system cleaning shall be provided at the foot of all shaft risers and major diversion in pipe work diversions.

9.8 Man holes / inspection chambers

These are to be built in accordance to the sanitary regulations governing such works. Such are to be internally plastered and finished in black cement. Joints between horizontal and vertical faces are to be neatly plastered and a triangular fillet is to be formed. The man hole and or inspection chamber ground slabs are to be finished internally with sloping gradient, to guarantee a complete self draining in the event of their overflowing.

9.9 Sanitary ware

All sanitary ware, including chrome-ware angle valves and bottle traps are to be supplied by the Client. The contractor is, however, to include for the following:

- Installation only of sanitary ware and connection to drains.
- Supply and installation of all flexible connectors and angle valves as necessary.
- Water closets will require installation of the whole assembly.

All items must be neatly installed strictly, following architects/interior designer instructions. The systems must include 'silicone' on all boundaries to avoid water penetration. They shall be mounted on appropriate bases using cement and sand mortar where applicable. Cost for all the above, allowing also for material and labour, must be included in the quoted rates.

9.10 Floor drains

These shall be installed where shown on the drawings. They shall be manufactured from heavy gauge PVC having a stainless steel, removable grille on top. System shall include a built-in trap with an outlet size of 80mm diameter.

9.11 Testing of drains pipework

After completion, all drain pipework shall be cleaned, sealing off service openings and filled with clean water. The pipework shall be filled to the very top and left as such for a period of one hour. The top level of the water shall be monitored and if found to have decreased, pipework shall be inspected for any leaks. The test shall be repeated until no decrease in water level is experienced.

After successful testing the pipework shall be flushed out and all outlets temporary sealed until the time of usage.

10.0 TECHNICAL SPECIFICATIONS FOR VENTILATION SYSTEMS

10.1 Scope of Works

This specification details the supply, installation and commissioning of a mechanical ventilation system for the all the premises.

The ventilation system shall include:

- Mechanical Ventilation fresh air and extract are in-line axial fans
- Distribution ducting
- Ancillary equipment such as sound attenuators, dampers, supply and return grilles etc.
- Ventilation control panel

10.2 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- In-line axial flow fans
- Phenolic Ducting
- Supply grilles
- Extraction grilles
- Extractor fans for restrooms
- Circular air valves/grilles
- Volume control dampers
- Ventilation control panel

10.3 System overview

The ventilation system is designed to introduce fresh air to achieve an adequate circulation of air in the building by means of a mechanical in-line fans installed at roof level.

The ventilation system shall be controlled by a control panel as described in the following sections.

Amongst other functions the control panel shall switch off the fans in the event that the fire alarm panel signals the presence of a fire. In such a case a manual reset would be required to resume normal operation.

10.4 In-line axial flow fans

These fans shall be of the axial flow type, suitable for in-line duct mounting. The in-line axial fans are intended to extract / introduce fresh air from / to the building via ducting. Fans shall be weather proof and suitable for external installation.

They shall be factory assembled ready for installation and shall be supplied complete with suitable vibration isolated mounting brackets, made of galvanised steel and finished in stove enamelled paint. Fans shall be factory tested to BS7346 Part2. The fan motors shall be of the totally enclosed squirrel cage type. The grades of motor insulation shall be selected to meet the high temperature and time requirements stated above.

The impeller shall have an aerofoil section. It shall be die cast in aluminium alloy and X-ray inspected to ensure a stable casting. These shall be suitable for operating in the stated conditions. Impellers shall be factory tested for flaws which may cause failure in service. They shall also be statically and dynamically balanced at speeds of up to 2500 r.p.m.

The fan casing shall be constructed from galvanised steel having integral spun flanges to provide a rigid structure. These shall be hot dip galvanised after manufacture to BS729 to prevent corrosion and

maximise service life. A terminal box shall be fitted to the outside of the fan casing and shall be suitable for the specified conditions.

The following ancillary equipment shall be provided for each fan:

- Anti-vibration mountings or vibration isolators shall be used in connection with the mounting flanges/plates when installing the fans to isolate them from the building structure and avoid transmission of vibrations.
- Silencers or sound attenuators having the same dimensions as the fan casing. These shall be of the straight through type without a pod. They shall also be capable of operation at the stated conditions.
- Flexible couplings to connect the fan/silencer arrangement to the rest of the ducting.

Other materials for the fan construction may be accepted if equivalent or superior to those specified. Technical details should be submitted. Fans and ancillary equipment shall be suitable for external installation.

10.4.1 Fan Schedule

Reference	Location	Max Airflow	E.S.P
		m3/hr	*Pa*
FA 1.0	Roof Level	1,250	250
RA 1.0	Roof Level	1,250	250
EXT1.0	Bathroom	36	50

10.5 Attenuators

These shall be located before and after the extraction fan and before and after the supply fan. Indoor unit noise shall not exceed 40 dBA at 1m from the first outlet diffuser with the fan running at medium speed. Sound absorbing material shall be inert, fireproof, inorganic, vermin proof, non-hygroscopic material. Casing shall be suitable for outdoor use. Details to be supplied with the offer.

10.6 Weather Louvers and Screens

Louvers shall withstand extreme wind loads and prevent the ingress of rain. Louver frames and aerodynamically profiled louver blades shall be made from galvanized mild steel. The inlet shall have weatherproof louvers with fixed blades and with rain lip. The blade spacing should be about 25mm. A wire mesh guard shall be fitted on the backside of the louvers. The grille should be complete with mounting frame made of roll formed sheet steel with mounting taps. Alternative materials will be considered. These grilles shall be fitted with removable, washable dust filters which shall be replaced without removing the grille.

Bird screens shall be fitted with 13mm square mesh across the face of the louvers. Wire gauge shall not be less than 1mm and finish shall be plastic coated steel

Ventilation Control Panel

One control panel shall be installed at basement level within the ELV room.

The panel shall provide the power and control requirements to both in-line fans. The control panel shall include local override facilities which shall transfer individual control of the system from Auto mode to

Manual. In manual mode, the switching of the system shall be carried out manually by means of switches located on the control panel. It shall also be possible to switch off individual systems from the control panel. For this purpose, the control panel shall include an individual Manual / Auto / OFF selector switch for each of the system under control.

Over and above the power distribution section, the control panel shall include associated control switchgear including but not limited to, switching contactors, ELV transformers and/ or power supply for the various input sensors, timing devices, variable speed drive for the fan motors etc.

The control panel shall also include an audio/ visual alarm system (with manual alarm silent switch) to signal faulty equipment.

The control panel shall be configured such that a fire alarm activated signal from the FAP shall take priority over all other control inputs for those systems whose operation is dependent on the status of the FAP (for example the ventilation system must be switched OFF on activation of the FAP irrespective of the input from any other source). The system shall be controlled via the nearest distribution board /control panel.

The inputs to the control panel shall be:

- On board weekly timer
- Fire Alarm Panel
- Motor fault signal from the variable speed drive of the fan motors

The control panel shall provide the following functions:

- Individual selector switch for each fan for Manual / Auto / Off control
- Individual speed control for the supply and extraction fan (low/medium/high speed) when in Manual mode
- Individual switching on/off of fan when in Manual Mode
- Pre-programmed timed operation when in Auto Mode
- Switching off of the fans when signalled by the Fire Alarm Panel.

10.7 Ducting

Phenolic ducting

Fresh air supply ducting shall be of the solid type and shall be manufactured from factory produced pre insulated aluminum panels. Density shall be greater than 40 kg/sq.m. and the thickness shall be at least 20mm. Thermal conductivity shall be at least 0.024 W/sq.m.K. The material shall be capable of withstanding pressures of 300kPa. Panels shall be certified class 'O' for fire rating and against toxic gas emissions in case of fire.

Fabrication of ductwork shall be carried out in accordance with DW144. All ductwork shall be appropriately sealed, glued and taped during manufacture to keep air loss at a minimum. It shall be arranged in a manner to drain any entrapped moisture and to ensure that the lapping of joints prevents moisture leakage. The whole ducting system shall be air tested for leaks as per recommended CIBSE ratings.

Ducts running on the outside of the building shall be made from panels that are meant for external use. The aluminum thickness for these panels shall be thicker than the normal internal aluminum thickness. Also, the panel overall thickness shall be greater than 20mm with a greater stiffness class than that used indoors. Outside ductwork shall be supported by galvanized brackets or proprietary brand, be protected with waterproofing resin and shall be guaranteed weather proof.
Bends and offsets shall have a minimum throat radius equal to the width of the duct at that section. Supports and hangers shall comply with DW 144. All supports and hangers shall be suitably treated for corrosion. Protruding ends from hanger rods and bolts shall be cut off close to the nuts. Supports and drop rods shall be clear of ducts and must not be enclosed in thermal insulation, as DW 144.

Flexible circular ducting may be used in the branch-off to the grilles. These shall be used with manufacturer's tap-in collar connections installed at the branches. This shall however be able to operate at temperatures of between -20 to 120 degrees centigrade and withstand a working pressure of 2.45kPa. The material used shall have zero surface spread of flame and shall be rated at class 1.

Materials of accessories shall be compatible with ductwork and that finishes of accessories comply with any special requirements for ductwork. Proprietary hangers and supports shall be provided throughout in accordance with DW 144. Return ductwork shall be of the same standard as the supply ductwork. The sizes shown on the drawings shall be internal dimensions. The airflow shall be delivered through a number of diffusers with control dampers. Test holes shall be provided in ductwork to allow for complete testing and balancing of the system in accordance with CIBSE Commissioning Code Series.

10.8 Ductwork Sleeves

Wherever ducts penetrate through the building envelope (walls, floors, partitions), that part of the duct shall have a fire rating of at least 60 minutes and shall be directly connected to the fire damper. The latter shall be installed on the supply side of the duct. The space between the duct and the wall opening shall be packed with non flammable material to form a fire/smoke stop for at least one hour rating and prevent the movement of noise and air.

10.9 Air distribution Devices

All air distribution devices shall be supplied from good quality anodized light color aluminum material. These devices shall be selected to ensure that the velocity in the occupied spaces does not exceed 0.25 m/s. Diffusers shall be constructed in a way to ensure correct aerodynamic performance and minimal noise generation. The sizes indicated in the BOQ are 'Nominal'. Each item shall have a provision for electrical bonding suitable for a maximum of 6 sq.mm conductor.

Diffusers shall be of robust construction and mounting flanges on square and rectangular terminals shall have mitred corners. The face of the diffuser outer cone or frame shall be completely smooth. Supply air diffusers shall be equipped with an airtight gasket and shall be easily removed for cleaning.

Diffusers shall be supplied with balance and tension operating mechanisms to give positive setting for blade positions from fully open to fully closed. The adjustment shall be easily made from the fascia of the diffusers and grilles without the need to dismantle any part of the diffuser. If air valve type spherical diffusers are used, these shall be supplied with 'plug in' fixing frame giving easy access for cleaning and adjustment.

Color of air devices will be decided by client's representative at a later stage. Contractor is to make sure he has allowed for any color option in his offer.

10.10 Volume Control Dampers

The contractor shall provide plain opposed control dampers in accordance with DW144. The blades shall be of the airfoil aluminum type with end caps. Circular volume control dampers shall be of the single leaf type. When in the fully closed position air leakage of circular dampers shall be less than 5% of the design air flow. All dampers shall be provided with locking device and position indicator.

10.11 Extractor fans for bathrooms and lavatories

The ventilation system is designed to extract exhaust air from the bathrooms at 10 air changes per hour.

The type of fan to be used shall be as follows:

- In-line axial flow type suitable for duct installation. The maximum sound level shall be 40dB(A) @ 1m. These shall be installed in the male and female lavatories.

The outlet openings shall be equipped with a gravity grille. This shall be made of a weatherproof material. The blades shall open when the extractor fan is being used and they shall shut automatically

when this is stopped. Blade opening and closing shall only be affected by the fan and shall not be electrically dependent.

10.12 Civil works

Civil works connected with the installation mainly include the preparation of holes through walls, some of which may be made from concrete blocks. The contractor shall carry these out. Holes shall be neatly prepared and to the size suitable for the fans and ducting being fitted. These shall be made good and rendered weather proof if located on the outer walls of the building or leading to a shaft exposed to the outside. Other civil works include chasing and the support of the equipment.

10.13 Ducting Identification

Ducts shall be clearly identified together with the direction of flow of their contents. These shall be marked with colour coded self-adhesive tapes complying with ductwork triangles to DW 144. The basic identification colour and code identification shall be placed at junctions, wall penetrations and at any other place where identification is necessary. For ductwork installed externally, special tape for exterior use shall be used. The tape shall be UV protected with a temperature range of 0 deg.C. to 50 deg.C. with high tack adhesive.

10.14 Noise generation

The contractor shall give particular attention to the noise generated by the ventilation systems. **Indoor noise levels generated by the heat recovery units shall not exceed 40 dB(A) at 1m away.**

The contractor must ensure that the above criteria are met and any additional sound attenuation measures required shall be deemed to have been included in the tendered rates.

Moreover, any vibration transmission from the system to the building structure shall be eliminated by means of appropriate anti vibration mountings.

10.15 Documentation

The Contractor shall submit:

- a set of two operating and maintenance manuals for all equipment in the ventilation system including wiring and circuit diagrams, list of spares, commissioning records and test results.
- as fitted drawings consisting three sets of prints and one copy on CD ROM

11.0 TECHNICAL SPECIFICATIONS FOR LOW-PIT LIFT

11.1 Scope of works

The work comprises the supply, installation, testing and commissioning of low-pit passenger lift suitable for disabled persons at the refurbished Cathedral museum at the Cittadella, Victoria, Gozo. The lifts shall be of the MRL gearless traction type.

11.2 Characteristics for passenger lift

GENERAL INFORMATION

Type of lift	:	Passenger suitable for disabled persons
Standards	:	EN81-20 + EN81-70 Accessibility
Drive	:	Gearless Traction – V.V.V.F speed regulation
Pump/Motor	:	Electric drive motor
Rated load	:	1000 kg (13 passenger)
Rated speed	:	0.15 m/s
Control system	:	Simplex, full collective, selective
No. of stops	:	4 (Level -1 to Level 2) including 2 stops in Ground Floor (at 550mm)
No. of car entrances	:	1 at basement level and first floor level and 2 adjacent at ground floor level
No. of landings' entrances	:	4
Travel	:	Approximately 7,250 mm

MACHINE

Location of machine	:	In shaft (machine-room-less)
Motor starts per hour	:	min. 60

SHAFT SPECIFICATIONS

Lift well dimensions **(W x D)**	:	Approximately 1,800 x 2,200mm
Pit depth	:	330 mm
Overhead height	:	3,600 mm

LANDING DOORS

Door type	:	Automatic telescopic side opening
Clear door opening	:	900 mm (width) x 2200 mm (height)

CAR

Type	:	Single entrance at basement and first floor level Double adjacent entrance at ground floor level
Minimum car area	:	1400 mm (W) x 2200 mm (D) x 2300 mm (H)

TECHNICAL SPECIFICATIONS FOR LOW-PIT GEARLESS TRACTION LIFTS

11.3 Compliance with Regulations and Standards

The supply and installation shall be carried out in accordance with the latest versions of, but not limited to the following regulations and standards:

- **MSA EN 81-1:2000 - European Standard for the construction and installation of electric lifts.**
- **BS EN 81-20:2014 - Safety rules for the construction and installation of lifts. Lifts for the transport of persons and goods. Passenger and goods passenger lifts**
- **BS EN 81-70:2003 - Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts. Accessibility to lifts for persons including persons with disability**
- **Lifts Regulations, 2016**
- **Low Voltage Directive (2014/35/EU)**
- **I.E.E. Wiring Regulations**
- **Electricity Supply Regulations as issued by the Malta Resources Authority (formerly by Enemalta Corporation).**

It is the contractor's responsibility to ensure that the above regulations are followed. **Any part of the installation or piece of equipment not specifically referred to below but necessary to satisfy the above regulations shall be included in the offer.**

The manufacturer's literature supplied with the offer shall indicate clearly that the equipment and installation fully comply with the standards listed above.

11.4 Compliance/Test Certificate

An initial compliance certificate shall be forwarded to the Client when the lift is commissioned and the guarantee period falls into effect as from the date of the test. A six-monthly test certificate shall then be submitted to the Client until the guarantee period expires.

11.5 Load

The Contractor may state larger loads to those rated above as long as the relevant standards and regulations used are submitted to support the selection.

11.6 Hoist Machine

The hoisting machine shall be a worm geared traction type with motor, brake gearing and driving sheave mounted in a proper alignment on a steel bedplate designed for elevator services. Sound insulation pads shall be installed to reduce vibration and noise transmission to the building structure.

An electric drive motor especially designed for elevator service, capable to develop high starting torque with low staring current shall be used. Motor to have Class F insulation. Motor armature shall be dynamically balanced and supported by ball bearings of ample capacity.

The drive shall be V.V.V.F speed regulated. The drive system shall provide a maximum levelling tolerance of +/- 5mm. The lift shall be equipped with automatic relevelling with doors open when it is at a designated floor.

The brakes shall be of the spring applied electric type, held open by an electro magnet actuated by the controller and designed to make smooth, positive tops. Brake shall be designed to automatically apply in event of interruption of power supply from any use.

The traction steel hoist ropes shall be of size and number to ensure proper wearing qualities, consisting of at least six strands wound around a hemp core centre, shall comply with the factor of safety

requirements. Governor ropes shall be iron or steel. Furnish adequate compensation for weight of hoist ropes when required to maintain proper counterbalance ratio.

The safety system shall stop the car whenever excessive speed is achieved. The safety gear shall be mounted beneath the car on the bottom members of the frame and shall be able to operate in both direction of travel. It shall act simultaneously on both sides of the car guides and will be operated by an independent steel wire governor rope. The over speed governor provided with each lift shall be adjusted and sealed for the adequate tripping speed. When the car reaches the tripping speed or in case of breakage or slackening of the governor rope, the safety gear system stops the car, operating at the same time an electrical switch that cuts the power to the lift motor.

The counter weight shall counter balance each elevator for smooth and economical operation by a cast iron or steel plate weights contained in a structural frame. The counterweight shall equal a complete elevator car and a percentage of the capacity load. The counterweight guard of the appropriate design and size shall be provided in place at the bottom of the hoist way.

Automatic Terminal Limits shall be place in the hoist way near the terminal landings. Limit switches shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.

The lift shall be provided with an overload device. An electro-mechanical weigher shall be installed on the lift. The car control station shall incorporate an audio-visual indicator to inform passengers in case of overload. The lift shall not move until the correct load is present inside the car.

In the event of any interruption of lift power supply, the drive system of the lift shall incorporate an automatic emergency passenger evacuation device **enabling the car to be automatically lowered to level 0 <u>and opening the car and landing doors.</u>**

Contractor shall guarantee in writing that the lift, when in operation, will not be subject to undue oscillations on starting and stopping due to the considerable travel distances involved.

<u>GENERAL SPECIFICATIONS</u>

11.7 Lift Controls and Indicators

The control system shall be of the **Simplex, Full Collective, Selective Type**. The controller shall operate on extra low voltage. A readily accessible **vandal proof** control station shall be provided on the car roof as specified in EN 81. Up/down, close/open and emergency stop buttons shall form part of the maintenance control box. Phase failure and overload protection shall be provided. An emergency lift control cut-out circuit shall also be provided in the pit. **Lift controls shall be capable of interfacing with the fire detection and alarm system.** In the event of a fire, when the fireman's switch and / or the fire detection alarm system are activated, all calls are cancelled and the designated car returns immediately to a specified floor. To facilitate rescue, the car shall respond only to car buttons once the key switch inside the car is activated.

Control devices in the car shall consist of:

a) One call button for each floor,
b) One alarm button,
c) One door re-open push button,
d) One door close push button.

Call buttons shall be of the **vandal proof** raised type having a diameter of at least 15mm and shall project at least 3mm. Raised digits shall be incorporated into the lift buttons. The buttons shall be illuminated and activated by a detectable mechanical motion. Sensor touch type or flat type pushes shall not be accepted. All information on the buttons shall be repeated in Braille. The controls shall preferably be mounted on a horizontal panel located on a sidewall adjacent to the short doorjamb. It shall be installed with its horizontal centre line at a height of 1.1m from the cabin floor. If the panel is vertical, all controls shall be within easy reach of a wheelchair bound person with the centreline for the control push buttons being 1.1m from the floor. The alarm button in the car shall activate two alarm bells powered by a live charged battery. The bells shall be situated in prominent locations as instructed by the Engineer/client. One of the bells shall be audible from the car.

Indicators in the car shall consist of an LCD display and it shall include an illuminated sign to indicate that the car call has been registered, and an illuminated position indicator. An audio-visual indicator showing the weight present in the car shall also be included on the car control panel.

Control devices on landings shall consist of:

a) two call push buttons on each intermediate landing
b) one single push button at the terminal landings.

These shall comply with the specifications for the car push buttons and controls as in clause 6.3 above. The control device panel shall also be located at a height of 1.1m from the floor.

Car floor position indicators and signals shall be separately mounted either above the control buttons, on the door jamb face or over the door opening. Their location must be such that they are readily visible from the hall. Indicators shall consist of a digital position indicator and direction of travel indicators. The latter shall preferably be arrow shapes having a minimum dimension of 60mm.

Devices shall be provided for stopping and maintaining the lift out of service, including the automatically operated doors:

a) on the car roof at 1m maximum from the entry point for inspection by servicing personnel.
b) in the machine and control cabinet.
c) in the pit.

11.8 Doors

Car and landing doors shall be finished in scratchproof stainless steel. Door sill shall be finished in scratchproof stainless steel. Doors shall incorporate both electrical and mechanical locking devices and shall have a minimum clear height of 2m. Landing doors shall be provided with external opening devices. Car-door locking mechanism shall prevent the doors from being opened from the inside when the car is outside the unlocking zone i.e. when it is not in close proximity to the landing doors. This shall prevent entrapped passengers from accidentally falling into the lift shaft if they attempt to escape from the lift that has stopped outside the unlocking zone.

Car doors shall be fitted with a 2D infrared curtain running the height of the door. This shall automatically initiate re-opening of the door in the event of a person or object entering or leaving the lift during the door closing movement. The timing device should permit the doors to remain open for at least 5 seconds for safety reasons. Closing speed for the door shall not be greater than 0.3m/s.

Every landing entrance shall incorporate a sill of sufficient strength to withstand the passage of loads being introduced into the car. Landing doors shall have a minimum clear height of 2m. They shall be designed to avoid, during normal operation, derailment, jamming, or displacement at the extremities of their travel. Doors shall be horizontally guided at the top and the bottom. The doors and their surrounds shall be designed in such a way as to minimise risk of damage or injury due to jamming of a part of the person, clothing or other object.

Doors should give a **clear opening of at least 900 mm**. When closed, the clearance between panels or between panels and uprights, lintels or sills shall not exceed 6mm when measured from the back of recesses, if any.

11.9 Lift Car and Finishes

The cabin internal walls shall be finished scratchproof stainless steel. Rounded corners and trim shall be in scratchproof stainless steel. Half length mirror shall be fitted on the rear side of the cabin and this shall run the whole width of the cabin. The cabin floor shall be finished in non-slip rubber. This shall be firmly fixed and shall resist damage by wheelchairs. The Contractor shall submit details of available types and colours for the flooring, which shall be approved by the Client. Details of the cabin layout and trim shall also be supplied with the offer. A scratchproof stainless steel kick plate shall be installed at ground level on all sides of the cabin.

The car ceiling shall have a neat appearance. Lighting shall be LEDs. The Contractor shall supply full details of his proposal, preferably explained by descriptive literature.

Handrails should have a round or oval profile with a minimum outside diameter of 35mm and a maximum outside diameter of 50mm. Oval profile handrails should be 50mm wide and 40mm deep, with rounded edges with a radius of at least 15mm. Installation height of handrail shall not exceed 800mm from the cabin floor.

The lift car shall be fitted with an auto dialler incorporating a scrambler system. It must be programmable with a minimum of three lines. The auto dialler shall incorporate a feature in that the system recognises if the call is received by an answering machine, so that it would then ignore this connection and continue dialling until a live connection is obtained. In the car operating panel, the system shall be hands free and shall be activated by pressing the alarm bell continuously for more than 5 seconds. An appropriate instruction shall be included on the same control panel.

An air extractor fan shall be installed flush with the car ceiling. It shall be activated by automatic relay when passengers enter the car and shall continue to run as long as the car remains occupied. It shall have a very low noise rating.

There shall be a self-sustained emergency light fitting which shall operate automatically in the event of a mains failure and shall contain a light source of a minimum power of 7 watts for 3 hours continuous operation.

Intercom points shall be installed and connected together to form an operating system. Their respective locations shall be in the lift pit, on top of the lift car and in the lift machine room. Intercom sets shall be permanently installed.

The car roof shall be able to support two persons at any position without permanent deformation. A 13A socket outlet shall be provided on the car roof. A handrail 1,100mm high shall be installed on the car roof if the shaft walls are at a distance greater than 500mm from the handrail edge.

11.10 Cabin roof and pit refuge spaces

The volume requirements for the safety refuge spaces on the car roof and pit are as follows:

Upright position: 0.4 x 0.5m (horizontal), 2m (vertical)
Crouching position: 0.5 x 0.7m (horizontal), 1m (vertical)
Laying position: 0.7 x 1.0m (horizontal), 0.5m (vertical), for pit only.

EN 81-20:2014 requires that the landing door providing access to the pit shall be opened from that shaft so that engineers or technicians can exit the lift shaft, even if the relevant landing door would be closed.

Car roof balustrades shall be fitted on the cabin roof in order to reduce the risk of anyone falling into the shaft while working on the cabin roof. The height of the balustrade shall be:

- Minimum **700mm**, where the distance between the inner edge of the balustrade handrail and the shaft wall is up to 500mm
- Minimum **1100mm**, where the distance between the innerd edge of the balustrade handrail and the shaft wall exceeds 500mm.

11.11 Electrical Requirements

The following electrical works are to be included in the tender price:

i. Connection of lift electrical switchgear to lift switch disconnector supplied by other. Rate to include all necessary cables, plugs, cable management system, etc to make a complete functional system.
ii. A separate single-phase branch circuit fused lockable switch or lockable circuit breaker for each controller for cabin lighting and other single-phase elevator equipment.
iii. All 240 Volt, 13A single-phase receptacles installed in pit, machinery spaces and elevator-car tops shall be of RCD protected switch socket outlets type. All socket outlets will be labelled.

iv. Adequate lighting to maintain minimum 150-lux illumination at pit floor. Lights to be installed at 0.5m from the highest and lowest point in the shaft with intermediate lamps at maximum 3m intervals. A minimum of 200-lux illumination at machine floor, control floor and secondary machinery spacing. In the pit the light switch to be adjacent to the access ladder; in machine room, light switch located within 400mm of jamb side of the machine room door. All lighting fixtures and switches are to be labelled and be supplied by tenderer.

v. Electric power (single phase) for light, tools, hoist, etc.; during installation as well as electric current for starting, testing and adjusting the elevator.

Provision of a telephone line in the machine room area to be utilised for the hands free communication device.

All equipment offered should be power factor corrected to operate in accordance with Enemalta regulations and the latest edition of the I.E.E. regulations.

Electrical equipment must be so installed and connected that:

- There can be no possible confusion with circuits which do not have any direct connection with the lift
- The power supply can be switched while on load
- Movements of the lift are dependent on electrical safety devices in a separate electrical safety circuit
- A fault in the electrical installation does not give rise to a dangerous situation.

11.12 Machine and Control Cabinet

When the offers are evaluated, it shall be assumed that the respective tenderers are well aware of the site conditions. It is then the contractor's responsibility to put the lift machine and control cabinet in place without damaging the equipment, the surrounding areas or third party property.

11.13 Lift Well and Pit

The lift well dimensions lift travel distances and pit depths are given in Section 1. These are approximate and actual measurements should be taken on site.

As part of this contract, the lift shaft shall be provided with permanent electric lighting, which allows for servicing even when all doors are closed. As per EN81-20 and EN 81-50, there shall be a minimum of 50 lux at 1 meter above the car roof within its vertical position, minimum of 50 lux at 1 meter above the pit floor and everywhere a person can stand, work, and/or move between the working areas and a minimum of 20 lux outside the locations defined above, excluding shadows created by the car or components.

Lights shall be installed at 0.5m from the highest and lowest points in the shaft with intermediate lamps at maximum 5m intervals. The shaft lighting shall be activated from the machine room and the pit. Lights shall be bulkhead type fittings. Emergency lighting within the lift shaft above the car roof shall be of a minimum of 5 lux for 1 hour.

Any horizontal projection (ledge) from a wall into the shaft, or horizontal beam greater than 150mm wide shall be protected so that no person can stand on it. An exception can be made wherever access is prevented by a balustrade on the cabin roof, as per the requirements listed in Section 10.0.

Access or inspection doors shall be available to address safe and east access for any person working on the lift. The dimensions of the access doors are as follows:

Machine-room and shaft access doors: 2m (H) x 0.6m (W)
Pulley-room access door: 1.4m (H) x 0.6m (W)
Access trapdoor to machine and pulley rooms: 0.8 x 0.8m, counterbalanced.
Emergency doors: 1.8m (H) x 0.5m (W)
Inspection doors: 0.5m (H)

11.14 Lift Construction

The car must be designed and constructed in such a way that its structural features do not obstruct or impede access and use by disabled persons and so as to allow any appropriate adjustments intended to facilitate its use by them.

Energy absorbing buffers must be installed beneath the car. The type offered shall be specified and its details submitted at the time of tender. They shall maintain the car stationary at a distance not exceeding 0.12m below the level of the lowest landing, when carrying the rated load. When fully compressed, the ram shall not hit the base of the cylinder.

All wire rope used must be certified for the given working and braking load. Travelling cable shall be of the flat flexible type. A strain relief steel wire rope shall be attached at intervals to the electrical cable

The car shall be guided by rigid steel guides. These shall be of T-iron solid section. Channels will not be accepted. Guide rails shall be machined to ensure the smooth running of the car. They shall rest on the hoist way pit to avoid excessive loads on the walls and ceiling. Guide rails shall include all rail brackets and clamps. The strength of the guides, their attachments and joints shall be sufficient to withstand the forces imposed due to the operation of the safety gear and bending due to uneven loading of the car. The deflections in the latter case shall be limited to values that will not affect the normal operation of the lift. The fixing of the guides to their brackets and to the building shall permit compensation, either automatically or by simple adjustment, of effects due to normal settling of the building or shrinkage of concrete.

All exposed steel parts of machine, car, doors and other fittings in the shaft, including guide rail brackets shall be protected with factory applied rust protecting paint. They shall all be properly earthed.

Cars and landing doors must be tested to withstand an impact force equivalent to the impact of a person colliding with the door at running speed. The strength required by the car wall is such to withstand forces that are equivalent to an average person resting against them.

11.15 Fire Protection

The walls, floor and roof of the car shall not be made of materials likely to become dangerous through too great flammability or through the nature and volume of gas and fumes they may generate**. Landing doors and frames shall have a fire resistance rating of 1 hour.** The materials used for car floors, walls and ceiling shall meet stricter fire classification requirements to EN 14501-1 where the minimum classifications are as follows:

Flooring:	Cfl s2
Walls:	C s2, d1
Ceiling:	C s2, d0

Where ***C*** and ***Cfl*** refer to the 'reaction of fire' classification, ***s*** and ***d*** refer to the classification of materials with regards to smoke and the formation of flaming droplets/particles respectively.

11.16 Noise Reduction

Lift equipment shall be adequately damped and treated to avoid airborne noise transmission. All lift equipment, machines, pumps, etc. shall be isolated from the building structure by flexible mountings.

11.17 Unintended Car Movement (UCM)

The lift shall have protection mechanism against any risk of car moving away from the landing and protection against ascending car over speed.

11.18 Civil Works

The tender price shall include minor civil works required to complete the installation such as chasing to install the landing door frames, the preparation of holes between the machine room and the pit and any other minor modifications. **To this end it is stressed that a site visit should be carried out prior to tendering.**

11.19 Notices and Signs

All labels, notices and operating instructions shall be legible and readily understandable, if necessary aided by signs or symbols. They shall be of durable material and placed in a prominent position. All characters and/or symbols shall contrast highly with their background and the signs themselves shall in turn contrast with their surroundings.

The lift's rated load in kilograms and the number of persons shall be displayed in the lift car together with details of the supplier and the lift serial number. A notice showing the floor number shall be located on each side of the landing doorjamb at a height of 1.53m from the floor and visible from within the lift car. The information on the notice shall be repeated in Braille to the left of the number.

Safety and no entry signs shall be put up on the machine room door and inside as necessary and as specified in EN81.

11.20 Maintenance

The price shall include regular periodic maintenance for the duration of the guarantee period (24 months). **Payment for maintenance shall be effected at the end of every six months. No advance payments shall be made.** If the contractor shall not carry out the maintenance as per schedule supplied with the offer, payment shall not be effected.

11.21 Client's Obligations

During the maintenance period, the Client shall:

a) Not make any modifications or carry out any maintenance or adjustments to the equipment without the Supplier's written consent.
b) Not move the equipment from its location without the Supplier's written consent.
c) Make available free of charge all facilities and services reasonably required by the Supplier to perform the services required under this agreement.

The services rendered under this contract exclude:

a) Any labour cost or parts required as a result of damages caused by accidents, fire, flood, lightning and other acts of God, neglect, misuse, malicious act, act of violence, environmental conditions outside those specified by the equipment manufacturer, electrical current fluctuations.
b) Any maintenance work required due to the use of supplies not approved by the Supplier.
c) Replacement of consumable items.

11.22 Serviceability Standard

The definition of the standard shall be as follows:

The Standard of Serviceability shall not be less than 0.85 for any period of 4 consecutive weeks, and not less than 0.92 for any period of 26 consecutive weeks when calculated from the following formula:-

Serviceability = A/ A+B where

'A' is the Serviceable Time that is, the time in Maintenance Hours when the System is known or believed to be operating correctly and is available for use by the Client for operational purposes. In calculating the Serviceability Time, that is 'A' in the formula, the time during which the Equipment is not available for use by the Client as a result of events giving rise to the Exclusions under clause 14.2 above and the periods required for Preventive Maintenance shall be included in 'A' and the down time is to be disregarded.

'B' is the Repair time (including time awaiting repairs) that is, the time in Maintenance Hours during which the equipment is not available for use by the Client because it is being repaired or is awaiting repair, but shall not include lost time owing to the failure by the Client to comply with the obligations pursuant to clause 14.1 or owing to external causes (e.g. failure of public power supply).

11.23 Documentation

Full documentation as per Lifts Regulations 2002 shall be presented to the client on hand-over of the lift. This shall be in English and shall include but not be limited to the following:

- CE conformity declaration certificate.
- General specifications of the lift installed.
- Lift safety devices and circuits conformity declaration by individual manufacturers of respective components.
- Complete list of safety devices and circuits of the lift including respective part numbers/codes of the manufacturer.
- Complete lift electrical circuits.
- Basic characteristics of the cables installed.
- Complete maintenance manual.
- Complete maintenance manual of the safety components.
- User manual for the lift.
- Emergency procedures manual.
- Installation manual.
- Lift commissioning manual.
- Installation drawings.
- Declaration of conformity by installer to the manufacturer's recommended procedures.

SECTION 5 – SUPPLEMENTARY DOCUMENTATION

5.1 – Draft Contract Form

5.2 – Glossary

5.3 – Specimen Performance Guarantee

5.4 – Specimen Pre-financing Guarantee

5.5 – Specimen Retention Guarantee

5.6 – General Conditions of Contract

It is hereby construed that the tenderers have availed themselves of these general conditions, and have read and accepted in full and without reservation the conditions outlined therein, and are therefore waiving any standard terms and conditions which they may have.

These general conditions will form an integral part of the contract that will be signed with the successful tenderer/s.