



FONDAZZJONI GHALL-PATRIMONJU KULTURALI
TAL-ARĊIDJOĊESI TA' MALTA

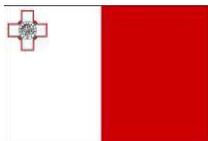
REFERENCE NUMBER: PA5/0103/6.1

**Tender for two lots - Lot 1 Restoration of Ta' Zellieqa Chapel
in Gharghur including Mechanical and Electrical Works and Lot
2 Restoration of Ta' Bernarda Chapel in Gharghur including
Mechanical and Electrical Works**

Date Published: 27th September 2019

Deadline for Submission: 15th November 2019 at 09:30am CEST

Tender Opening: 15th November 2019 at 10:00am CEST



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 Development Fund
Co-financing rate: 80% European Union; 20% National Funds



Bid Bond requirements for this tender: *Not Applicable*

Fondazzjoni għall-Patrimonju Kulturali ta' l-Arcidiocesi ta' Malta

Archbishop's Curia
St Calcedonius Square
Floriana FRN 1535
MALTA

Tel.: (356) 21245350 Email: fond.pkam@gmail.com
Website www.church.mt/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 Conditions of Contract for NGOs.

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 Fondazzjoni għall-Patrimonju Kulturali ta' l-Arcidiocesi ta' Malta, Archbishop's Curia, St Calcedonius Square, Floriana FRN 1535 MALTA. Any references in the tender document or tender forms to uploading of tender documentation and forms is to be ignored. Tenderers must submit one original tender offer as well as a soft copy on a USB (soft copies of the tender offers submitted on CD are strictly not acceptable). Furthermore in the soft copy of the tender offer, Tenderers must submit the Bill of Quantities duly filled in in excel format apart from a scanned copy. 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 Lot 1 the Restoration of the Chapel of Ta'Zellieqa in Gharghur including mechanical and electrical works and Lot 2 the Restoration of the Chapel of Ta Bernarda in Gharghur including mechanical and electrical works.
- 1.3 The place of acceptance of the works shall be Lot 1 - the Ta'Zellieqa Chapel in Gharghur and Lot 2 - the Ta' Bernarda Chapel in Gharghur. The time-limits for the execution of the contract shall be 26 weeks for each one of the two lots from the Order to Start Works issued for the respective lot, and the INCOTERM²⁰¹⁰ 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 **Fondazzjoni għall-Patrimonju Kulturali ta' l-Arcidiocesi ta' Malta**.
- 1.7 This tender is not a reserved contract.

2. Timetable

	DATE	TIME
Clarification Meeting/Site Visit (Refer to Clause 6.1)	N/A	N/A
<p>Deadline for request for any additional information from the NGO</p> <p>Clarification requests should be addressed to: NGOs e-mail address fond.pkam@gmail.com</p>	17/10/2019	17.00CEST
Last date on which additional information can be issued by the NGO	31/10/2019	20.00CET
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)	15/11/2019	09.30CET
* All times Central European Time (CET) / Central European Summer Time (CEST) as applicable		

3. Lots

3.1 This tender is divided into two lots, and tenderers must bid for both lots. Tenderers must bid for the whole of quantities indicated for both lots. Tenders will not be accepted for incomplete quantities.

3.2 The Contracting Authority reserves the right to assign one or more lots to the winning bidder. The winning bidder shall have no right to claim in case the Contracting Authority does not award any one of the lots.

4. Variant Solutions

4. Variant solutions are not permissible.

5. Financing

5.1 The project is *co-financed* by the European Union/Government of Malta, in accordance with the rules of *Operational Programme I - European Structural and Investment Funds 2014-2020* programme

- 5.2 The Contracting Authority of this tender is **Fondazzjoni għall-Patrimonju Kulturali ta' l-Arcidiocesi ta' Malta**.

6. Clarification Meeting/Site Visit/Workshop

6. No clarification meeting/site visit is planned.

No meetings between economic operators and the NGO are permitted during the tendering period.

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' costs involving the provision of the employees' services. ^(Note 2A)
- (iii) Power of Attorney (if applicable) ^(Note 2A)
- (iv) Information re Joint Venture/Consortium (where applicable) ^(Note 2A)
- (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 (if applicable) ^(Note 2A) Applicable.

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

- (i) Declaration concerning exclusion grounds ^(Note 2A)
- (ii) Declaration concerning *Selection Criteria* ^(Note 2A)

(C) Technical Specifications

- (i) Tenderer's Technical Offer in response to specifications.

The Technical Offer shall constitute the following:

1. Key Personnel: ^(Note 2A)
 - i. A **Warranted 'Perit'** who will assume all the responsibility in terms of the legal obligations as arising under Maltese law (Warrant Number to be declared;
 - ii. Restoration Technician (*MQF level 4 qualification in a related area of study*);
 - iii. Mason holding a Mason's licence;
 - iv. Accredited Occupational Health and Safety Officer; and
 - v. Electrician holding a Wireman Licence A;

Bidders are to fill in and submit the Key Experts Form and if applicable the Self-declaration form for Key Experts (relating to public employees, where applicable) ^(Note 2A)

2. **Method Statement** ^(Note 3) which is to include the following:

- i. Preliminary Method Statement: A detailed restoration method statement including information on proposed products and materials (such as structural strengthening, cleaning solutions, preservatives, consolidants, etc.) which is to clearly illustrate how the tenderer expects to achieve the requirements set in the tender specifications and related bill of quantities.
- ii. Construction Management Plan: A site management plan clearly outlining hoarding and protection, site storage, the use of machinery and equipment, and the human resources that the tenderer envisages to deploy on each one of the two sites for the completion of the works in question. The plan may include drawings or sketches illustrating site dynamics and logistics.
- iii. Risk Assessment: A preliminary risk assessment and outline of the health and safety procedures that the tenderer intends to implement for the duration of the works. These documents shall act as a basis for more detailed reports prior to commencement of works by the winning bidder.

Tenderers are to ensure that all of the above requested information is addressed in the Method Statement to be submitted in the tender offer.

3. Gantt chart^(Note 3): A graphic works schedule (programme of works) illustrating detailed work phasing and interim milestones. Tenderers must submit a separate graphic works schedule for each one of the two Lots (i.e.

two graphic works schedules must be submitted). This tool shall clearly show how the tenderer expects to complete the works of the respective Chapel within the timeframes set in this tender document. A timeframe of 26 weeks is allocated for each Chapel (i.e. 26 weeks for Zellieqa Chapel and 26 weeks for Ta Bernarda Chapel). Tenderers are to note that the works may run concurrently as directed by the Contracting Authority.

- (ii) Literature as per Form marked 'Literature List' to be submitted with the Technical offer at tendering stage ^(Note 2B) - Not applicable at tender stage however, once the contract is awarded, prior to ordering and/or purchasing materials or equipment, the contractor is obliged to submit literature that the Contracting Authority will request for the Contracting Authority to approve. No materials and or equipment may be ordered and/or purchased without the prior approval of the Contracting Authority.

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). - Not applicable at tender stage however, once the contract is awarded, prior to ordering and/or purchasing, should the Contracting Authority so request, the contractor is obliged to submit a sample of any item/s within the Bill of Quantities and tender specifications that the Contracting Authority may request, for its approval.

The above may not be ordered and/or purchased without the prior approval of the Contracting Authority.

Bidders are to sign the technical offer form whereby the bidder confirms that all material and equipment purchased will be in accordance to the technical specifications outlined in Section 4 of the tender document and to the Bill of Quantities.

(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 the **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. Tenderers will be requested to clarify/rectify, within five (5) working days from notification, the tender guarantee only in the following four circumstances: incorrect validity date, and/or incorrect value, and/or incorrect addressee and incorrect name of the bidder. Rectification in respect of the Tender Guarantee (Bid Bond) is free of charge.

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 (cumulatively adding the price of both Lot 1 & Lot 2) satisfying the administrative and technical criteria. However, should the Contracting Authority award only one of the two lots, the contract will be awarded to the tenderer submitting the cheapest priced offer satisfying the administrative and technical criteria for that Lot that the Contracting Authority decides to award.

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 may be 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.

For the purposes of contracts issued by NGOs, the term 'approval from the Central Government Authority' shall be substituted by the term 'approval by the Head responsible for that NGO'; Furthermore, any references to the Contracting Authority throughout the General Conditions shall be deemed to be referring to the NGO responsible for that procurement.

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

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/financial bid (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

Further to the contents in the General Conditions, the communication details of the Contracting Authority are:

Fondazzjoni għall-Patrimonju Kulturali ta' l-Arcidiocesi ta' Malta
The Archbishop's Curia, Saint Calcedonious Square, Floriana
FRN 1535
Tel: 2590 6400
Email Address: fond.pkam@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

- 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** 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.

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.

- 9.5** The contractor is to note that access to the public/private buildings 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 the place.

Article 10: Assistance with Local Regulations

- 10.3** The contractor is responsible for complying with local regulations at his expense to ensure the project is compliant with all the relevant local regulations.

Article 11: The Contractor's Obligations

- 11.9** As per article 15.4 of the Special Conditions
- 11.11** The contractor shall draw up and submit any drawings as well as any literature, documents or items required for the execution of the works and submit them for approval to the Contracting Authority and Supervisor, the procedure being agreed to between the parties as indicated in Clause 4 of the Special Conditions.
- 11.17** The Contracting Authority and the Supervisor shall make available the tender drawings (and any subsequent revisions to such drawings) to the Contractor at the latter's request and well as any drawings required to carry out the works as the need arises. Any such drawings will remain the property of the Contracting Authority and the Contractor may not reproduce or communicate

them to third parties except with the Contracting Authority's agreement.

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.

11.21 Furthermore, the contractor shall be expected to be co-operative and allow the use of his scaffolding or other elevation equipment 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

11.22 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.

11.23 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.

11.24 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 Legal Notice 88 of 2018 (or subsequent amendments)

11.25 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.

11.26 The Contractor shall not dismantle the scaffolding or other elevation equipment 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

11.27 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.

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.

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

- 11.29** The contractor binds himself to adhere to the conditions imposed in the Planning Permit, that is, the approved drawings, document and conditions imposed in Planning Permit PA NO/6092/16 as approved by the Planning Authority. He also binds himself to follow all instructions given to him by the Superintendence of Cultural Heritage.
- 11.30**

Article 13: Performance Guarantee

13.1 The Contractor shall, within 15 calendar days of receipt of the contract, sign and date the contract and return it together with an original copy of the Performance Guarantee to the Contracting Authority. The amount of the guarantee shall be 4% where the amount of the total contract value is between €10,000 and €500,000 exclusive of VAT. If the same Contractor has more than one contract with the Contracting Authority, then the Contractor will be allowed to submit a single bid bond in accordance with the schedule stipulated in the Tender Form.

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 not affect any payment to the Contractor until the performance guarantee has been submitted.

13.8 The performance guarantee shall be released within 30 days of the signing of the Provisional Acceptance Certificate including any snag lists.

Article 14: Insurance

14.1.a 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.

14.2 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.

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

Article 15: Performance Programme (Timetable)

15.1 The Contractor shall provide a detailed Programme of Works.

15.4 The Programme of Works shall be updated whenever required by the Supervisor, to be in line with the progress of the actual Works. The Programme of Works shall be

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accompanied by sufficient data and information. 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 The Contractor shall submit to the Supervisor for approval any drawings, documents, programme of works, technical literature, samples and /or models that the Supervisor may reasonably require for the performance of the contract within 5 working days from written request by the Supervisor or from date when meeting where minutes are taken.

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 2% of the contract value.

Article 18: Tender Prices

18.2 The contractor will ascertain that all the respective rates have included double handling, carting away and dumping fees

18.3 The Contractor shall be deemed to have taken into account in his tender price all works, material, fees and costs that are necessary to complete the project and to fully hand over in operational condition.

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 contractor 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

21.1 Further to clause 21.1 of the General Conditions, the contractor shall liaise and co-

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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

22.3 The Contractor is responsible to obtain necessary permits that may be required if the works impact of traffic.

Article 23: Cables and Conduits

23.3 The contractor shall be responsible for locating existing drains and services, and underground cables and pipes where applicable, 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 Demolition material unless indicated otherwise in the bills of quantities and by the supervisor in charge, shall become the property of the Contractor and the carting away and dumping charges are at the expense of the Contractor.

25.4 Further to article 25.4 of the General conditions, the contractor shall also take care to dispose of the waste material fully at his expenses and in an environmentally friendly manner.

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 As per General Conditions of the Contract

Article 30: Patents and Licences

30.1 As per Article 30 of the 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 performance of the contract is to commence on 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.

No works however will be allowed to commence on site unless the Contractor has furnished the Contracting Authority with a certified true copy of the Insurance Policy together with all documentation related to Health and Safety and the performance guarantee. Delay in submitting the documentation following the elapse of the 1 month period from the last date of signature of the contract, will result in daily penalties of €50 a day up to a maximum 2% of the contract value.

Article 32: Period of Execution of Tasks

32.1 The period of performance of this contract shall be **26 weeks** for each one of the two lots from the Commencement indicated in the Order to Start Works which will be issued for the respective Lot.

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

33.4 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

34.1 Any delay in performance from the approved programme of works for this contract, will be charged 0.1% of the contract value per calendar day of delay up to a maximum of 20% of the contract value.

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 scaffolding or other elevation equipment is erected and close inspections can be carried out and/or interventions have commenced such as the repetition of cleaning interventions, the repetition of the application of materials, the consolidation, repair, stone replacement and re-pointing of areas of the stone fabric, additional quantities of the mechanical and electrical works identified in the BOQ which may be required as a result of the site conditions discovered on site. Such works would be resulting from close inspection of works accessible only upon erection of scaffolding or elevation equipment or exposed during the course of works.

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 upon erection of scaffolding or other elevation equipment or exposed during the course of works. These inter alia include works evident only once the interventions have commenced such as the alternative cleaning interventions, the application of alternative treatment and utilization of other materials and mechanical and electrical works other than those envisaged in the tender specifications.

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 and no claims may be submitted by the Contractor in this regard.

35.13 The provisions provided for in Article 35.13 of the General Conditions shall not be applicable to this contract and no claims may be submitted by the Contractor in this regard.

Article 37: Work Register

37.1 The Contractor shall maintain a Work Register (Work Diary) on the site, containing detailed daily reports in the template specified and/or approved by the Contractor's representative (either the Construction/Project Manager or the Site Manager) and approved by the Supervisor, including at least the following information:

- (a) weather conditions, interruptions of work owing to inclement weather, hours of work, number and type of workmen employed on the site, materials supplied, equipment in use, equipment not in working order, tests carried out in situ, samples dispatched, unforeseen circumstances, safety, health and welfare of persons and damage to property, progress of the Works, as well as progress of the Works orders given to the Contractor;
- (b) detailed statements of all the quantitative and qualitative elements of the work done and the supplies delivered and used, capable of being checked on the site and relevant in calculating payments to be made to the Contractor.
- (c) photographic records of the interventions as well as the state of the structures to be restored through this tender prior to the commencement of works. The photographs shall include records of any archaeological, historical, etc evidence discovered during the course of works; detailed mapping of all interventions carried out. The interventions shall be carefully mapped out in conformity to approved standards and conventions as agreed with and approved by the Supervisor in charge on drawings provided by the Supervisor in charge as per convention detailed by the Architect and Civil Engineer in charge. This mapping shall be submitted to the Supervisor in digital format (Version ACAD 2009 or compliant) and 2 colour printed copies; copies of method statement reports, construction management plans and updated programmes of works as specified in this document and approved by the Supervisor.

This Work Register shall be made on daily basis and take the form of a bound document with an original and two copies for each day. The original shall be filled out by the Contractor, who shall sign it, then reviewed by the supervisor, who shall add his comments, if necessary, and countersign it. One copy shall be kept by the supervisor for its own record.

Article 38: Origin

38.1 No derogation to the rules of origin is authorised.

Article 39: Quality of Works and Materials

39.2 All designs, components, materials, and restoration interventions/methodologies shall be submitted to the Supervisor for written preliminary technical approval, prior to their implementation or procurement. All requests and documentation must be submitted with 15 calendar days prior to execution of works on site.

Article 40: Inspection and Testing

40.2 As specified in the General Conditions.

Article 42: Ownership of Plants and Materials

42.2 All equipment, temporary works, plant and materials on site owned by the Contractor or by any company in which the Contractor has a controlling interest shall, for the duration of the execution of the works be:

- a) Vested in the Contracting Authority.

Article 43: Payments: General Principles

43.1 Payments will be made in Euro.

Payments shall be 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

43.3 As per General Conditions.

Article 44: Pre-financing

44.1 Pre-financing to the Contractor of 20% of the contract value shall be obligatory.

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:

(a) Advance payment equivalent to 20% of the contract value:

- 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 amortisation 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 amortised, the Contracting Authority shall authorize the relevant financial institution to 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 Tender prices are fixed and not subject to revision with the exception of that resulting from causes listed under Article 46.3 of the General Conditions.

46.3 As per General Conditions

Article 47: Measurement

47.2 The works shall be measured as detailed in the Bill of Quantities, and as specified in the appropriate clauses in the Technical Specifications - Section 4. The appointed contractor shall satisfy the Supervisor that the materials are such as specified or

equivalent.

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 if 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

The contract will be co-financed through the European Regional Development Fund 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 each one of the two lots of the contract and not upon completion of works on parts of the structure envisioned within each one of the two lots of

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 of each one of the two lots, are appropriately addressed by the Contractor and to the satisfaction of the Supervisor and the necessary retention guarantee is submitted by the Contractor in accordance with Article 45.2. Provisional Acceptance will be issued separately for each Lot.

Article 58: Maintenance Obligations

58.6 Further to the provisions of Article 58 of the General Conditions, the contractor shall guarantee that works carried out at the respective Chapel through works specified in this tender document are adequately maintained for a period of 24 months from issuing of the Provisional Acceptance Certificate for the respective Chapel. The Contractor shall be responsible for remedying, at his expense, defects and damages during this period as specified in the General Conditions.

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

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

Not applicable.

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

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.

RESTORATION WORKS

General Site Management Practice

Liaison

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.

Co-ordination of Services

The contractor shall be responsible for locating existing drains and services, and underground cables and pipes, for seeking instructions 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 Authority.

Access

The contractor shall take all the necessary steps to ensure that the external areas and access roads are left clean and tidy during all stages of the work, to the satisfaction of the Contracting Authority's Architect in Charge.

Method Statement and Programme of Works The Method Statement forms part of the technical offer to be submitted by the bidder. If so requested by the Contracting Authority's Architect in Charge, prior to commencement of work, the Contractor shall be required to submit an updated detailed Method Statement including Risk Assessment together with an updated Programme of Works. The Method Statement shall include a Risk Assessment, as referred to in this document. It shall also detail site logistics and plant locations. The Contractor shall take into account the problems of access into the site, and in particular the needs to maintain access open to the sites for both visitors as well as other contractors.

The detailed Programme of Works, (Gantt chart) shall identify each activity, indicating the dates when works in their various phases would be undertaken, for approval of the Contracting Authority's Architect in Charge.

The Programme of Works, shall be updated whenever required by the Contracting Authority's Architect in Charge, 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. Should the Contracting Authority's Architect in Charge consider any alteration in or addition to the Programme of Works as submitted, the Contractor shall conform therewith without additional cost to the Contracting Authority.

The submission to and approval by the Contracting Authority's Architect in Charge of such Programme of Works or the furnishing of such particulars shall not relieve the Contractor of any of his/her duties or responsibilities under the Contract.

Housekeeping

Storage areas for materials, plant and construction waste shall be enclosed with secure hoarding; the different areas for materials, waste and staff facilities will also be fenced in for

security, for the protection of the public, as well as to reduce, visual impact. Construction waste shall not be allowed to accumulate on site and should be removed periodically. Rainwater run-off shall be channelled to setting ponds that will allow the separation of the silt from the clear water. Sludge will be collected regularly using mobile suction pumps, and will be deposited at an approved dumping site.

The disposal of hazardous waste shall be carried out in accordance with procedures approved by the Environment Protection Department and the Planning Authority. Any hazardous material shall be notified to the Environment Protection Department, and shall be transported in accordance with the relevant Maltese Legislation. Relevant hazardous wastes include, but are not limited to, petroleum tank bottom sludges, waste acidic or alkaline solutions, wastes containing metals, waste hydraulic, engine, or bilge oils, degreasing agents or solvents, discarded equipment containing PCBs or asbestos. Waste explosives, batteries and accumulators, soil, stone or construction and demolition waste containing dangerous substances, and insulation material containing asbestos.

Sanitary waste during the construction phase shall be disposed of chemically.

Burning of waste plastics, wood or any other material on site shall not be allowed.

All activities producing dust shall be controlled, and measures such as spraying with water shall be used to ensure that the emitted dust is minimised. Dust-laden materials shall be removed from the site, and transported through public thoroughfares, only after thorough watering before leaving the site. Dust covers, of appropriate material, properly secured along all sides, shall be used on all open-topped vehicles used for the transportation of rubbish or debris from the site.

The Contractor shall comply with and fulfil all obligations imposed by Article 19 of the Police Laws and shall give all notices, obtain all permits; pay all fees that may be lawfully demanded by Public Officers in respect of works and comply with all requirements of the Law and any Lawful Authority.

Notice to authorities

The contractor shall give all necessary notices to authorities concerned and shall allow them facilities for removing any fixtures, fittings, or services, which may belong to them.

Heavy vehicles

The use of heavy construction vehicles accessing the site in connection with this project shall be limited to the minimum and confined to specific routes, agreed upon beforehand with respective Authorities.

Materials

All materials and methods of construction shall be in the form and nature specified herein and/or as indicated in the drawings, to the satisfaction of the Architect in Charge. All materials and methods (except where otherwise stated) shall conform to the relevant British or European Standard Specification or its equivalent.

Samples and tests

During the course of works, the Architect in Charge reserves the right to take samples or carry out specialised tests (including but not limited to determination of salt levels, executing colour sections on renders/ paints, taking of old and new mortar, plaster and/ or paint samples and determination of composition etc.) on or off site. The expenses of such tests shall be borne by the Contractor. In specific cases, analysis/tests on samples elevated may take significant time to be completed, in which case, the Contracting Authority's Architect in Charge may request suspension of all or part of the activities being carried out by the contractor. Unless such tests/ analysis are being carried out due to any negligence, bad workmanship, etc. from the contractor's side, the Contracting Authority may opt to prolong the completion period as

detailed in tender document. All such tests shall be carried out at the Contractor's expense. In the Period of Execution of the work and in his submitted rates the Contractor will have to factor in such tests.

Works to be carried out by other entities and/ or contractors

During the course of works, the Contracting Authority may: a. Assign other contractors/ personnel to contemporarily carry out works on other areas of the building not included in this tender document and/ or within the same area of the building included in this tender document. b. Appoint personnel to carry out trials, tests, etc. on cleaning methods, consolidation, etc. as so deemed necessary by the Contracting Authority's Architect in Charge, on sections of the building covered by this tender document. In all cases, the contractor will 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 abovementioned works. The Contractor will not be entitled to any compensation (financial or otherwise) for these services, etc.

Clearance of site

Each trade is to make good after itself and provision for such work shall be made in respective rates.

During the execution of the works, the Contractor shall keep the site reasonably free from all unnecessary obstruction, and shall store or dispose of any Contractor's equipment and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. On completion of the Works, the Contractor shall clear away and remove from site all Contractor's equipment, surplus material, rubbish and temporary works of every kind, and leave such part of the site and works clean and in a workmanlike condition to the satisfaction of the Contracting Authority's Architect in Charge.

Health and Safety Officer/s

The Contractor shall appoint a Project Supervisor as per Legal Notice 88 of 2018 (or subsequent amendments)

The Project Supervisor shall amongst other things implement all regulations and directions given in order to achieve the objectives of the Health and Safety Plan, as well as ensure the certification of scaffolding, hoists and any other equipment/machinery to be used on the site of works as fit for the intended works and immediately submit them to the Contracting Authority. The Contractor shall moreover be obliged to immediately carry out any actions recommended by the Contracting Authority's Project Supervisor for the Design Stage and Contracting Authority's Project Supervisor for the Construction Stage to be appointed by the Contracting Authority as per Legal Notice 88 of 2018 (or subsequent amendments). The Contractor's Project Supervisor shall be bound to liaise with the Contracting Authority's Project Supervisor for the Design Stage and Contracting Authority's Project Supervisor for the Construction Stage accordingly.

The Contracting Authority reserves the right to request the Contractor to substitute the appointed health and safety officer if in the opinion of the Contracting Authority he/she is not fulfilling his/her role properly.

General Hazards - The following hazards have been identified:

1. Electrocution from buried/overhead electricity services and by electrically powered equipment/ machinery used on site of works;
2. Workers falling from scaffolding, or from heights on existing buildings;
3. Noise and dust production as a result of the works outlined in this document;
4. Workers crushed by collapse of structures and/ or scaffolding;
5. Inhalation of fumes resulting from restoration processes.
6. Full or partial collapse of scaffolding by vehicular traffic hitting scaffolding.
7. Pedestrians injured by material falling from scaffolding.

The above list is not to be considered as exhaustive and it does not relieve the Contractor of any of his/her duties or responsibilities under the Contract. The Contractor shall be held fully responsible to identify all possible hazards and take necessary mitigation measures.

Risk Mitigation Measures

The following measures are recommended to minimise risks on site:

1. Clear delineation of plant movement areas;
2. Double checks on possible existence of buried services - clear delineation of known services;
3. Provision of sturdy work platforms/ scaffolding, and guide rails at unprotected edges of existing buildings;
4. Use of plant with limited noise emission;
5. Periodic wetting of demolition area to reduce dust emission;
6. Establishing clear procedural rules during overhead material handling to;
7. Enforcement of hard hats.

The above list is not to be considered as exhaustive and it does not relieve the Contractor of any of his/her duties or responsibilities under the Contract. The Contractor shall be held fully responsible to take all necessary mitigation measures.

Provisions for safe practice

The following provisions shall be made, without limiting, in any way, other provisions that the Contractor may deem necessary in order to render the Site and the Works safe:

1. Where there is an imminent danger to the safety of workers, the Contractor shall take immediate steps to stop the operation and evacuate workers as appropriate;
2. Secure fencing, to prevent unauthorised access to the active work areas;
3. A Notice, giving information on the specific hazards, and on the availability of emergency assistance, shall be clearly displayed in a position such that those working on site can read it as well as those affected by the Site;
4. Routes for the movement of vehicular traffic around the place of work shall be clearly delineated. These routes shall be separated from the areas subject to overhead movements;
5. Escape routes and means of escape shall be kept clear at all times;
6. Existing services, both overhead and underground, within the work site and immediately surrounding the work site, shall be identified, the respective utility companies contacted for information and disconnected/made safe;
7. Special attention shall be given to lifting, slewing and overhead handling operations to avoid public access areas;
8. The Contractor shall take appropriate measures, or shall use the appropriate means, in particular mechanical equipment, in order to avoid the need for the manual handling of loads by workers;
9. All openings through which workers are liable to fall shall be kept effectively covered or fenced and marked in the most appropriate manner;
10. Where natural lighting is not adequate to ensure safe working conditions, the Contractor shall provide adequate and suitable lighting, including portable lighting when appropriate, at the Site of work;
11. Guard-rails and toe-boards shall be provided to protect workers from falling from elevated workplaces; alternatively, adequate safety nets or safety sheets shall be erected, made fast and maintained, or adequate safety harnesses shall be provided and used;
12. Hoist shafts shall be enclosed with rigid panels or adequate fencing at ground level on all sides;
13. The contractor shall be responsible for ensuring that all persons on the Site, whether the Contractor's employees or otherwise, wear the necessary personal protective clothing at all stages;
14. At no time during the execution of the Contract shall the minimum number of Contractor's employees present on site be less than two (2).

15. The Contracting Authority's Architect in Charge shall have the right to send away any of the Contractor's employees, or of his Sub-Contractors, or otherwise doing work on the site, if they do not comply with these requirements.

Fire Outbreak

The Contractor shall take all appropriate measures to: a) Avoid the risk of fire; b) Control quickly and efficiently any outbreak of fire; c) Bring about a quick and safe evacuation of persons.

Protective Clothing and Equipment

The Contractor shall ensure that his employees are supplied with the following protective clothing and equipment and any other protective clothing and equipment deemed necessary:

- a) Safety helmets or hard hats to protect the head from injury resulting from falling or flying objects, or from striking against objects or structures.
- b) Goggles, a screen, a face shield or other suitable device when likely to be exposed to eye or face injury from airborne dusts or flying particles, dangerous substances, harmful heat, light or other radiation, and in particular during welding, flame cutting, or other hazardous work;
- c) Protective gloves and suitable protective clothing to protect hands or the whole body when exposed to heat radiation or while handling hot, hazardous or other substances such as poultice packs which might cause injury to the skin;
- d) Footwear of an appropriate type when employed at places where there is the likelihood of exposure to adverse conditions, or of injury from falling or crushing objects, hot or hazardous substances, sharp-edged tools or nails
- e) Respiratory protective equipment, suitable for the particular environment when workers cannot be protected against airborne dust, vapours or gases by ventilation or other means;
- f) Safety harnesses with independently secured lifelines where protection against falls cannot be provided by other appropriate means.
- g) Waterproof clothing and head coverings when working in adverse weather conditions;

Storage of Materials

- a) The Contractor shall provide safe, sufficient and suitable storage for flammable liquids, solids and gases such as ethyl silicates and/ or fuels.
- b) Storage areas for flammable liquids, solids and gases shall be rendered secure against trespassers.
- c) Smoking shall be prohibited and "No Smoking" notices or appropriate design and shape shall be prominently displayed in all spaces containing readily combustible or flammable materials.
- d) Combustible material such as scrap wood or plastics, oily/greasy waste, sawdust or packing material shall not be allowed to accumulate in places of work, but should be kept in closed metal containers in a safe place.

Lifting Equipment

- a) Any lifting gear or equipment intended for lifting shall not be loaded beyond its safe working load or loads as specified by the manufacturer.
- b) No person shall be raised, lowered or carried by a lifting appliance unless it is constructed, installed and used for that purpose, except in an emergency situation.
- c) Every platform or receptacle used for hoisting any loose material shall be so enclosed as to prevent the fall of any of the material.
- d) Any equipment with wheels, placed directly on a platform for raising or lowering, shall be so secured so that they cannot move, and the platform shall be enclosed as necessary to prevent the fall of the contents.

Machinery and Equipment

All manual tools, pneumatic tools, electrical tools, etc. shall be suitable for the work to be carried out, shall conform to approved standards and regulations, shall be safe and such that they can be operated without risk to health. They shall be provided with protective guards, shields or other devices as appropriate, which shall be maintained regularly, which shall be equipped, where applicable, with an extraction system which shall be as close as possible to any source of the dust, and which sucks away from the breathing zone, not through it, shall be fitted with shock absorbing materials, and be fitted with noise control protection devices at source to

reduce as much as possible noise exposure. Only insulated or non-conducting tools shall be used on or near live electrical installations if there is any risk of electrical shock. Only non-sparking tools shall be used near or in the presence of flammable or explosive dust or vapour. Operating triggers on portable pneumatic tools shall be so placed as to minimize the risk of accidental starting of the machine, and so arranged as to close the air inlet valve automatically when the pressure of the operator's hand is removed. Hose and hose connections for compressed-air supply to portable pneumatic tools shall be designed for the pressure and service for which they are intended, fastened securely to the pipe outlet, and equipped with a safety chain, as appropriate. Pneumatic shock tools shall be equipped with safety clips or retainers to prevent dies and tools from being accidentally expelled from the barrel. Pneumatic tools shall be disconnected from power and the pressure in hose lines released before any adjustments or repairs are made.

Portable electric tools shall generally be used on reduced voltage to avoid as far as possible the risk of lethal shock. All electrical tools shall be earthed, unless they are "all insulated" or "double insulated" tools which do not require an earth. Earthing shall be incorporated in metallic cases, and as a safeguard against damaged cables, where wires enter the tool. Electric tools shall be fitted with protection guards that are regularly maintained for their effectiveness. Power cables to electrical tools shall be armoured and/or covered in thick flexible rubber, and socket outlets shall be of special design for outdoor use, and protected by a residual current circuit breaker. All electrical tools shall receive inspection and maintenance on a regular basis by a competent electrician, and complete records kept. The cables of portable electrical lighting equipment shall be of adequate size and characteristics for the power requirements and of adequate mechanical strength to withstand severe conditions in construction operations. All vehicles shall be of good design and construction, taking into account established ergonomic principles, particularly with reference to the seat; they shall be maintained in good working order, shall be used with due regard to health and safety, by workers who have received appropriate training. Where appropriate, earth-moving or materials-handling equipment shall be fitted with structures designed to protect the operator from being crushed should the machine overturn, and from falling material. All vehicles and earth-moving or materials-handling equipment shall be fitted with a plate indicating the gross laden weight; the maximum axle weight or, in the case of caterpillar equipment, ground pressure. Plant, machinery and equipment shall be switched off when not in use and isolated before any major adjustment, cleaning or maintenance is performed. Where trailing cables or hose pipes are used they shall be kept as short as practicable, be mechanically protected and not be allowed to create a safety hazard. Mobile high pressure compressor plants and equipment shall be examined, tested and certified annually by a mechanical Engineer having a warrant to practice his profession. Portable compressors shall be fitted with a double adjustable tow-bar and jockey wheel. When the plant/equipment is in operation, wheel chocks shall be installed. The wheels must be fitted with brakes that are operated automatically via a handbrake for parking purposes. Only competent persons shall operate and maintain such plant and equipment.

Personnel

a) The Contractor shall assign workers only to employment for which they are suited by level of training, age, state of health and skill, and having ensured that the workers are fully aware of any risks to health or hazards connected with the work, and that they are trained in the precautions necessary to avoid accidents or injury to health. Such training shall be given in a language that is understandable to the workers. The training shall be sustained periodically and shall take into account any new or changed risks to the health and safety of the employees concerned.

b) When the use of equipment is likely to involve a specific risk to the health or safety of workers, the Contractor shall take the measures necessary to ensure that: (i) the use of equipment is restricted to those persons given the task of using it, and who have been adequately trained for the specific task; (ii) in the case of repairs, modifications, maintenance or servicing, only competent workers are specifically designated to carry out such work; (iii) all operators of construction equipment shall receive basic training as per Code of Practice

provisions; (iv) drivers of heavy machinery shall have followed an approved course in relation to the equipment to be used or driven and be in possession of a valid license.

Maintenance

All equipment/plant shall be certified to be in a proper working order, and shall be operated by trained personnel.

Noise Emissions

- a) Noise emission levels from the plant/ equipment must conform to approved local standards, and in particular EN ISO 11690.
- b) The exhaust system from any engine used on site must be fitted with a residual silencer.

Cranes

- a) 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.
- b) Copies of the certificates shall be sent to the Health and Safety Officer appointed under Cl.2.13 and to the Contracting Authority's Architect in Charge. .
- c) Further measures shall be taken to protect cranes against the effects of bad weather and lighting.

Temporary Water Supply and Electrical Installation

- a) Unless otherwise agreed with the Contracting Authority the whole of the water required for the works must be provided by the Contractor who executes any temporary plumbing required at his own expense and pays all fees and charges. Any temporary electricity supply and lighting required, including safety lights on any hoarding or gantries etc. are likewise to be provided by the Contractor at his own expense.
- b) Any temporary electrical installation on the Site shall meet the requirements of Enemalta and/ or local legislation and in particular legal notices/ regulations issued by the Malta Resources Authority.
- c) Any temporary electrical installation shall be certified by an independent warranted electrical Engineer, every three (3) months, and the certificate shall be affixed in a prominent position next to the Main Temporary Switchboard.

Additional Conditions

a) Professional Support and On-Site Project Management

The Contractor shall have at his disposal the services of:

- 1) a warranted architect & civil engineer;
- 2) A Restoration Technician having at least an MQF level 4 qualification or equivalent in restoration works of a similar nature;
- 3) Stone Mason holding a valid stone mason's licence;
- 4) Accredited Health & Safety Officer; and
- 5) Electrician holding Wireman Licence A.

b) Contractor's Responsibilities

The Contractor shall provide all the required materials, tools, instruments and equipment necessary to carry out the works on site including cherry picker or lifter if required. The Contractor shall be responsible for his employees and his equipment and will be held responsible for damages, structural or otherwise, caused as a consequence of the works in progress to the surroundings (both public and private property). During the progress of the works, the Contractor shall, at his own expense, properly dispose of any debris and surplus materials to an authorised waste disposal site, possibly at the end of each working day and shall cause the least

possible inconvenience to the surrounding environment. The work shall not be considered to be complete until cleaning of site is carried out.

The Contractor shall comply with the latest regulations as issued by Transport Malta with regards to the provision and fixing of warning signs at the approach to the works. It is the Contractor's sole responsibility to ensure that the signs are in place before any road works commence. The Contractor is also responsible to ensure that the signs are not removed during the progress of work. Should an accident occur as a result of non-compliance with the above, the Contractor shall be held responsible for all consequences and damages. The Contractor shall apply and pay for the necessary permits with the respective Local Council to use the cherry picker or lifter on the road and to close off the road if and when required. Rates for permits, road closure, traffic wardens, etc. shall be factored and included in the BOQ items.

MAINTENANCE PERIOD

All works shall be guaranteed for a minimum period of 24 months (unless otherwise specified in the technical specifications below).

The Contractor will repair, correct, or replace any defect of any nature that may occur for a period of 24 months (unless specified in the technical specifications below) from the date of issuing of the Provisional Acceptance Certificate. The defect will be corrected without undue delay.

PROTECTION OF WORKS

The Contractor shall protect all equipment, material and works until taken over by the Engineer in charge and shall remain his sole responsibility until official handing over. The warranty period for all works and equipment shall commence at the official handing over of the project (project commissioning stage).

QUANTITIES/VARIATIONS

The Engineer may supply any additional drawings or directions as may be necessary for the proper execution of the work. If the work shown on any such drawings or directions is, in the opinion of the Contractor, extra to that comprised in the technical specifications and BOQ, he shall give notice in writing to this effect and await approval by the Contracting Authority before proceeding with such work. If this condition is not adhered to and subject to the General Conditions, the Contractor shall have no right for any additional claim at a later stage.

WORKING DRAWINGS

The Contractor shall be responsible for the preparation for all working drawings, diagrams, schedules of materials, schedule of works, etc., necessary to be submitted to the Engineer for approval before proceeding with the works. The Contractor shall present samples of any equipment to be installed or used for installation, if and when requested, to the Engineer in charge for approval and confirmation prior to installation.

1. SPECIFICATIONS FOR RESTORATION WORKS

1. General Outline of works

The deterioration processes experienced on the two chapels (Ta Bernarda and Ta Zellieqa, both located in Gharghur) are the result of a number of factors such as, exposure and orientation, salt contamination (sea spray, rising damp, nitrates and incompatible materials), biological attack, material properties of the stone, neglect, lack of maintenance, human intervention, structural defects, installation of superfluous accretions, pollution caused by the burning of fossil fuels etc. The various causes of deterioration have amongst other things given rise to loss of pointing, deterioration of mortars and masonry, old repairs, later and contemporary additions, mechanical damage and loss of structural integrity, soiling, graffiti and biological infestation.

This contract for works seeks to address the damage and alterations sustained by the structures and the damage and deterioration being exhibited by the external and internal stone fabric of the chapels through the interventions being identified under this section. Work shall thus include the restoration of the internal and external building fabric. Where applicable reference is to be made to the drawings being reproduced as part of this Tender Document. It is to be clearly understood that the amount of deterioration being identified in such drawings is to be taken as being indicative and is based on visual inspections carried out from street/ finished floor level.

Unless otherwise instructed by the Architect in Charge it is to be clearly understood that specifications relating to restoration interventions to be executed on the stone fabric of the chapels apply to both the external and internal fabric.

The general outline of the works will be as follows

- 1.1 Erect scaffolding to all areas and elevations to be restored through this contract, and, for external areas, neatly cover such scaffolding with a white tarpaulin.
- 1.2 Given the nature of works, scaffolding is to be erected in such a manner as to cover concurrently the entire width and the full height of the façades. Different arrangements will only be considered if prior approval is sought from the Architect in Charge. However, in any case, if scaffolding is erected in sections, it is always to overlap at least 3.0 (three) metres over the already restored sections of the facades.
- 1.3 Enclose the entire area of works with fencing to prevent unauthorised entry into the site after obtaining all necessary permits vis-a-vis possibly necessary traffic arrangements.
- 1.4 Using methods approved by the Architect and Civil Engineer in charge, remove all vegetation and redundant cables, rain water pipes and all other ferrous and non-ferrous objects nailed/ fixed to structure. Given the friable nature of the deteriorated stone in particular areas, it is important that works be carried out sensitively such as not to dislodge any of the delaminated stone. Small corroding metal fixings are to be carefully removed, using small hand held drills, so as to cause the least possible disturbance to the surrounding masonry; the associated rust debris is also be carefully removed. Resulting holes will be filled-in using a suitable lime-based mortar when the break is small or by piecing-in stone, if the gap is large as directed by the Architect in Charge. Needed metallic inserts shall be replaced with galvanised/ stainless steel equivalent to prevent corrosion.
- 1.5 Carefully and using only hand tools (no power tools shall be used, unless specifically requested by Architect and Civil Engineer in charge), remove loose pointing, superficial layers of whitewash identified by the Architect and Civil Engineer in charge as to be removed, and any cement mortar from all joints. Weak or deteriorated pointing is to be raked out to a suitable depth using adequately-sized chisels. No power tools will be used for the raking of the joints and care is to be taken to ensure that no damage is inflicted in the surrounding stone fabric. All joints are to be cleaned and pre-wetted using water

which has a conductivity not exceeding 60 μ S/cm. The joints are to be pointed with lime-mortar as specified in this document.

- 1.6 Carefully, and using only hand tools (no power tools shall be used unless specifically requested by Architect and Civil Engineer in charge), remove cement based renders applied to areas of the structure. The stone fabric underlying such cement based plasters shall be examined on a stone-to-stone basis together with the Architect in Charge with the intent of determining areas which require replacement as per methodology outlined in this document.
- 1.7 Using methods and materials approved by the Architect in Charge, document and number existing unstable/ unsound areas of the chapels as identified by the Architect in Charge. Copies of drawings and photographic records shall be handed to Architect in Charge as part of the documentation to be compiled by the contractor for this project as detailed in this document.
- 1.8 Using methods and materials approved by the Architect in Charge protect works against damage by rainwater ingress, and other possible natural causes of damage. The Contractor is to ensure that, following all partial/ temporary dismantling works, no water whatsoever is allowed into the structure at any time.
- 1.9 Carefully take up cracked/ damaged/ inadequate sections of external roofing screed (deffun and/ or cement based screed) as identified by the Architect in Charge, including where applicable underlying stone dust/ chippings (torba) taking all necessary measures to ensure that no damage is caused to the surrounding building fabric and no water ingress occurs into the structure. Resulting debris shall be loaded and carted away to an approved dumpsite.
- 1.10 Dismantle or chisel away identified, individual deteriorated ashlar stone blocks and/ or moulded stonework requiring replacement to a depth as specified in this document or as directed by the Architect in Charge, paying particular attention not to damage surrounding sound stone in the process. Only hand held tools or small power tools (jiggers) which do not cause damage to the structure and/ or immediate stone blocks shall be used. Care shall also be taken to adequately prop surrounding stonework if so deemed necessary by the Architect in Charge. Unserviceable stonework and resulting debris shall be loaded and carted away to an approved dumpsite.
- 1.11 Reinstall dismantled/ chiselled away areas of stone fabric with first quality new stone having the same composition and physical properties, dimensions and configuration as the stone it is replacing. All re-instated stone shall be of varying thickness and in no case less than 230mm in thickness such as to ensure a good interlocking effect with the adjacent area of wall. All replaced stonework shall be identical in geological composition and physical properties, size and configuration to the original, and shall strictly match the existing course heights. Where applicable, all new stonework shall be worked to templates to match the original and all exposed surfaces shall be finished by traditional mason's hand tools to achieve a surface texture similar to that exhibited by the original stone fabric.
- 1.12 Tie stone blocks together by forming joints as detailed by Architect in Charge, and grout using a suitable hydraulic lime-based mix, or otherwise, as directed by Architect in Charge.
- 1.13 Where applicable grout, using a hydraulic lime-based grout, any interstices resulting between newly re-instated leaf and original fabric. Grouting shall be carried out at course height intervals.
- 1.14 Using first quality stone, identical in geological composition and physical properties to the original stone fabric, lay roofing stone slabs (xorok) to span across the arches. The size of the individual roofing stone slabs shall be similar to that of other original roofing stone slabs present on site. Stone wedges shall be gently hammered in between the roofing stone slabs (ingulmat). All exposed surfaces shall be finished by traditional mason's hand tools to achieve a surface texture similar to that exhibited by the original stone fabric.
- 1.15 Lay to falls and manually compact graded stone chippings/dust (torba) over existing/ new roofing stone slabs. Subsequently coat the compacted torba with three layers of a lime-based mortar containing graded aggregate and reddish terracotta chippings (deffun); the

maximum size of the aggregate/ terracotta chippings must not exceed 5mm. The mix proportions of this mortar are to be as dictated by the Architect in Charge. The first two layers must be left with a rough textured finish to ensure good adhesion and bonding with the subsequent layer; each layer must moreover be adequately cured as per methodology stated hereunder.

- 1.16 Adequately cure the 'deffun' layer by periodically wetting it (minimum 3 times daily) with a fine mist of clean potable water and subsequently covering it, for the whole duration of the curing process, with polyethene sheets for a minimum period of two weeks. The uppermost finishing coat of the 'deffun' layer must be sponged prior to curing to achieve a compact, smooth finish.
- 1.17 Using first quality special sized stones, identical in geological composition and physical properties to the original stone fabric, carefully work and install in place specific stone elements (such as for example door lintels, water spouts, roofing/ paving stone slabs (xorok/ čangatura) etc.) to replace missing/ damaged/ recently inserted concrete equivalents. The size, shape and configuration of these elements shall be as dictated by the Architect in Charge. Take up existing tiles and/ or cracked/ damaged limestone flagstones (čangatura) as directed by the Architect in Charge, taking care not to damage the surrounding sound building fabric. Unserviceable stone elements and other debris shall be loaded and carted away to an approved dumpsite. Lay and compact wherever necessary graded sand/ stone chippings (žrar) to receive new flagstones. Lay new flagstones, identical in size and configuration to original sound flagstones present on site, as identified by the Architect in Charge, using a hydraulic lime/cement/ sand based mortar as directed by the Architect in Charge.
- 1.18 Using mineral/nylon fibre brushes (no wire/steel brushes or power tools shall be used unless specifically requested by Architect and Civil Engineer in charge), carefully dry brush, one section at a time, dirt from all areas of stonework (plain and/ or moulded) and, if applicable, lime renders to be retained;. Care should be taken to ensure that no damage is caused to friable, delaminated stonework. If so deemed necessary, such areas shall be pre-consolidated adopting procedures outlined hereunder.
- 1.19 Using mineral/nylon fibre brushes (no wire/steel brushes or power tools shall be used unless specifically specified by the Architect and Civil Engineer in charge), and clean DI water free from salts having a conductivity inferior to 60µS, clean one section at a time, dirt from all areas of stonework and lime renders to be retained,. Care should be taken to ensure that no damage is caused to mortar joints and original plaster to be retained. Furthermore no damage should be caused to friable, delaminated stonework. If so deemed necessary, such areas shall be pre-consolidated adopting procedures outlined hereunder.
- 1.20 Carefully, apply biocides (to treat superficial biological growth) and/ or herbicides (to treat invasive vegetation) as specified in this document, and in concentrations suggested by manufacturer and approved by the Architect in Charge, to all areas affected by biological growth and/ or invasive vegetation. Biocides/ herbicides will be applied to areas of the facades, ceiling and roofs and other areas affected by biological growth. Treated areas will be brushed with a suitable nylon brush after a period of seven (7) days, or as recommended by the manufacturer, following the application of the biocide to remove the dead growth. Procedure will be repeated to affected areas until biological growth has been removed. For payment reasons, this repeated exercise will be considered an intrinsic part of the cleaning through biocide application exercise, and in no case will the contractor be allowed to make claims for extra costs in relation to workmanship, and/ or material. Where so deemed necessary, thick layers of biological growth will be carefully removed using delicate manual methods and hand tools, primarily scalpels, prior to the application of specified biocides.
- 1.21 Carefully, and using only delicate manual methods and appropriate hand tools, primarily scalpels, remove as much as is technically possible, layers of black crust (gypsum) from any areas of the stone fabric. Care should be taken to ensure that no damage is caused to friable, delaminated stonework. If so deemed necessary, such areas shall be pre-consolidated adopting procedures outlined hereunder.

- 1.22 Using methods as directed by Architect and Civil Engineer in charge carry out poulticing to areas of stone work and lime renders to be retained, still affected by black crust (gypsum) formation. Poulticing shall be applied to specifications listed in this document. The procedure shall be repeated for as many times as so deemed necessary until the black crust formation has been removed, and a satisfactory level of cleaning is obtained. For payment reasons, this exercise will be considered an intrinsic part of the poulticing exercise, and in no case will the contractor be allowed to make claims for extra costs in relation to workmanship, and/ or material.
- 1.23 Carefully, and using only delicate manual methods and appropriate hand tools, primarily micro scalpels, remove, where and as directed by the Architect and Civil Engineer in charge, layers of lime wash renders and water-based paints. Care should be taken to ensure that no damage is caused to friable, delaminated stonework. If so deemed necessary, such areas shall be pre-consolidated adopting procedures outlined hereunder.
- 1.24 Carefully, and using only delicate manual methods and appropriate hand tools, primarily micro scalpels, and, where approved by the Architect and Civil Engineer in charge, a neutral paint remover as specified in this document, clean stonework from any layers of oil based, acrylic and any other types of paint. Care should be taken to ensure that no damage is caused to friable, delaminated stonework. If so deemed necessary, such areas shall be pre-consolidated adopting procedures outlined hereunder.
- 1.25 Carry out under the direct supervision of the Architect in Charge close, detailed analysis of the stonework to identify those areas which need to be consolidated, and carry out tests to identify and quantify the salts present in the building fabric. Where levels of salt are considered by the Architect in Charge to exceed acceptable levels, poulticing of the stone shall be carried out to reduce the salt content of the fabric to acceptable levels ready to receive consolidant if so requested by Architect and Civil Engineer in charge. The poulticing procedure shall be repeated for as many times as so deemed necessary until the level of salts within the structure is considered acceptable. For payment reasons, this repeated exercise will be considered an intrinsic part of the poulticing exercise, and in no case will the contractor be allowed to make claims for extra costs in relation to workmanship, and/ or material.
- 1.26 Using either ammonium oxalate solution poulticing or ethyl silicate consolidants as specified in this tender document consolidate sections of deteriorated masonry work, certified to contain acceptable salts level, and situated away from any rising damp or source of continuous water absorption, from any areas of the chapels. Consolidants used shall be as specified in this document. In cases where the extent of delamination is such that the layers of stone have become detached, the space resulting between the layers shall be suitably cleaned prior to the application of the consolidant. Cleaning shall be carried out by low pressure air, conveyed through pipes adequately sized to reach within the interstices, followed by the liberal application of an approved volatile solvent, such as acetone. Using suitable methods designed to ensure a deep penetration, apply consolidant within the interstices and cure for a minimum of thirty (30) days, ready to receive lime injection. The consolidant shall be applied generously and uniformly to the stone surface, until the stone surface is saturated. If so considered necessary, the Architect and Civil Engineer in charge may request that this exercise be repeated for as many times as so deemed necessary. For payment reasons, this exercise will be considered as an intrinsic part of the consolidation exercise, and in no case will the contractor be allowed to make claims for extra costs in relation to workmanship, and/ or material.
- 1.27 Using a fluid lime based mortar, suitably prepared to specifications listed in this document, inject in interstices previously consolidated. When injecting, care shall be taken to ensure pressure exerted on delaminated stone sections does not cause the shearing of the same material. In cases where the detached material is of considerate dimension, carbon fibre rods, bridging the weaker layers with the stronger fabric, and grouted with the same fluid lime-based mortar shall be introduced. Glass reinforced polyester resin and/or carbon fibre rods shall be inserted such as to be least obtrusive.

- 1.28 Using epoxy resins as specified hereunder, having suitable characteristics and viscosity, inject, under pressure, cracked masonry sections previously consolidated. Epoxy injection will be resorted to only for areas where injected fluid lime mortar would be inadequate.
- 1.29 Point all open joints located in any area with a hydraulic lime based mortar. The mix proportions shall be as directed by the Architect in Charge following the execution of trial areas using different mix constituents and proportions. Gauging with low sulphate cement shall only be permitted if so specifically requested by the Architect in Charge. All pointing is to be left slightly shy from the surface; however, all pointing is to be such as to inhibit any water used during the cleaning process and from any other source from lodging into the structure.
- 1.30 Using clean, potable soft water free from salts having a conductivity inferior to 60 μ S, and an approved controlled nebulous pulsating water spray as specified in this tender document, and as approved by Architect and Civil Engineer in charge, clean dirt from plain or moulded stone surfaces on the structure, or as directed by Architect and Civil Engineer in charge. The aim of this exercise should be to remove the dirt (soot, etc) from the limestone etc. rather than alter the original patina of the stonework. Any remaining dirt should be removed using approved micro-blasting techniques to be operated at low pressures as dictated by the Architect in Charge.
- 1.31 Using methods and materials as specified in this document carry out plastic repair to sections of deteriorated/ damaged masonry work on any part of the structure, including moulded elements, sculptural elements etc. The material used for the plastic repair shall be as specified in this document.
- 1.32 Using methods and materials as specified in this document carry out plastic repair to fill any alveoli formed on any part of the masonry structure, including mouldings, coat-of-arms, marble plaques, sculptural elements etc. The material used for the plastic repair shall be as specified in this document, and care shall be taken to ensure that each alveolus is filled in individually, taking care to keep the surface of the masonry clean and free from any mortar. The extent of filling of the alveoli shall be determined on site by the Architect and Civil Engineer in charge and shall vary to reflect the physiognomy of the deteriorated masonry fabric.
- 1.33 Using methods and materials as specified in this document and as directed by the Architect and Civil Engineer in charge, reinstate using plastic repair techniques, the deteriorated sections of old plastic repair/ renders, on any area of the masonry structure, to include both plain and moulded sections. All plastic repair shall be formed such as to match adjoining stonework and previous plastic repair, in colour, texture and final profile. Rate is to include for the addition of any admixture, additive or fibre strands etc. specified in the tender document and/or recommended by the Architect and Civil Engineer in charge. Rate is to include for the removal of loose, damaged or unsound areas of the original plastic repair as directed by Architect and Civil Engineer in charge. The areas of the original repair removed, shall be kept to a strict minimum necessary to provide a sound base for the new plastic repair.
- 1.34 Where re-construction using plastic repair cannot be done, the decayed stone is to be cut back to a depth of not less than 240mm and replaced by the best quality stone from selected quarries. The dimensions and configuration of the new stone is to be identical to those of the stone being replaced and in no case shall the thickness be less than 230mm. All newly reinstated masonry shall be grouted to the original wall with an appropriate lime based grout.
- 1.35 Using hand tools, carefully remove all pointing loosened during the cleaning process, and re-point, together with all joints left shy. All pointing shall be carried out as neat as possible. The width of the pointing, should, as far as possible, be kept to the minimum possible. All pointing shall be carried out flush with the surface of the masonry, directing water away from facade.
- 1.36 Using appropriate waterproofing materials as specified in this document protect horizontal surfaces of projecting elements to direct rain water away from the structure and minimize water penetration into the masonry fabric.
- 1.37 Apply a transparent finishing coat (velatura) to restored masonry. The main aim of the velatura shall primarily be that of giving a unified appearance to the restored fabric. The

mix of the velatura shall be prepared to the approval of the Architect and Civil Engineer in charge.

- 1.38 The Architect in Charge shall have the right to give further directions as may be deemed necessary to the Contractor during the progress of work. Such directions shall in no way invalidate the contract. The Contractor shall moreover carry out at his expense all the temporary works, of whatever nature, necessary to enable the works to be carried out such as the mounting of temporary scaffolding, winches, shutters, re-routing of services etc. The Contractor shall also be expected to liaise with other contractors and/ or entities employed by the Contracting Authority to work on the project during the period of performance of this contract.

2. Scaffolding

2.1 Scaffolding and Lifting Equipment

During the restoration works suitable scaffolding shall be erected to cover all of the area to be restored under this tender. It is to be clearly understood that the proposed erection setup must be to the satisfaction of the Contracting Authority's Architect in Charge and that, if progressive mounting of the scaffolding is being proposed such progressive mounting is to always allow an overlap at least 3.0 (three) metres over the already restored sections.

It is furthermore being assumed that the tarpaulin to be provided to cover the scaffolding shall be white in colour; the Contractor shall be bound to seek the approval of the Contracting Authority's Architect in Charge should he intend to use a differently coloured tarpaulin. Once erected the scaffolding shall be certified as safe and suitable for the works by a competent engineer, this certificate is moreover to be endorsed by the Health and Safety Officer appointed by the Contractor. No works shall be allowed to commence prior to the presentation of this certificate to the Architect in Charge. Prior to the initiation of the works the scaffolding is also to be used to allow a more detailed examination together with the Contracting Authority Architect in Charge, on a stone-to-stone basis, of the physical characteristics of the stone fabric and of the deterioration mechanisms affecting it. Only then shall the actual extent of works be calculated.

The following provisions shall be adhered to, without limiting, in any way, other provisions that the Contractor or his architect or his appointed Health and Safety Officer/s may deem necessary in order to ensure maximum safety to the Contractor's employees or of his Sub-Contractors, or others doing work on the site and to the general public:

All work shall be carried out in accordance with local Occupational Health and Safety Regulations and the statutory MSA EN regulations (in particular MSA EN 39, MSA EN 74, MSA EN 1139, MSA EN 12810 and MSA EN 12811) and BS 2482. Adequate precautions shall be taken to protect persons from injury by the fall of materials, tools or equipment being raised or lowered. Such precautions will include fencing, barriers and the like. Safety nets or sheets should be tied at every intersection of the scaffolding tubing and able to withstand rupture from the above mentioned loads; otherwise barriers (in the form of inclined overhangs) will be introduced at a distance of 4 to 6m above ground level followed by ones at 12m intervals. Fencing, barriers, or the appropriate utilization of lookout men.

The contractor shall provide competent supervision to ensure that all scaffolds are used appropriately, and only for the purpose for which they are designed or erected. It shall be erected and maintained in accordance with the local Occupational Health and Safety Regulations and certified by a competent and recognised person. No personnel are to be allowed on the scaffolding until such certification has been deemed compliant by the Contracting Authority Architect in Charge.

Where work at the face of a building or other structure is done from a working platform, the space between such face and the working platform shall be as small as practicable, provided that, where workmen sit at the edge of the platform to work, such space may be up to a maximum of 300mm.

In transferring heavy loads on to a scaffold, a sudden shock not be transmitted to the scaffold. When hoisting loads on to scaffolds, the loads shall be controlled by a hand rope (tag line), so that they cannot strike against the scaffold. The load on the scaffold shall be evenly distributed, as far as practicable, and in any case shall be so distributed as to avoid disturbance of the stability of the scaffold. Scaffolds shall not be used for the storage of material except that required for immediate use.

Workers shall not be employed on external scaffolds in weather conditions that threaten their safety.

Guys, stays or supports shall be used where required to prevent danger; alternatively other effective precautions shall be taken to prevent the collapse of structures or parts of structures that are being erected, maintained, repaired, dismantled or demolished.

No scaffold shall be partly dismantled and left so that it is capable of being used, unless it continues to be safe for use.

Working platforms, gangways and stairways of the scaffolds shall be provided with overhead screens of adequate strength and dimensions to prevent danger from falling objects. Materials shall not be thrown from scaffolds; exceptions shall be made only where the landing area has been designated, protected, appropriate notices displayed and are under supervision of a person at landing level.

Scaffolding materials shall not be thrown from scaffolds or from heights. Other materials shall only be thrown from scaffolds or heights where the landing area has been designated, protected, appropriate notices displayed and is under the supervision of a person on a landing level.

Openings between the scaffolding and the structure, which exceed 20cm, should be adequately protected by the installation of handrails. Wherever the above hinders operations to be carried out, workers shall be provided with safety harnesses with independently secured lifelines.

Any timber used in the construction of scaffolds shall be straight-grained, sound and free from large knots, dry rot, worm holes and other defects likely to affect its strength. Where necessary, boards and planks used for scaffolds shall be protected against splitting. Ladders, boards and planks used in scaffolds shall not be painted, so that any defects remain visible. All tubes, couplers and fittings used in metal scaffolding shall be free from damage and distortion, and shall be maintained in a lubricated condition. Couplers shall not cause deformation in tubes. Couplers shall be made of drop forged steel or equivalent material. Tubes shall be cut cleanly square with the tube axis. Alloy and steel tubing shall not be intermixed on the same scaffold.

2.2 Methodology: Lifting equipment

Tower scaffolds shall be designed and built in such a manner that the ratio of height to the base width is not more than 3.5:1, in the case of static towers used outdoors, and in a ratio of 4:1, in the case of static towers used indoors; in any case, the height of free-standing static towers should not exceed 12m. Mobile towers shall not be moved while persons or materials are on the top platform. The ratio of height to base width in the case of mobile towers used outdoors shall be of 3:1, but should not in any case exceed 9.6m in the case of free-standing mobile towers.

In the case of prefabricated scaffold systems, the manufacturers' instructions shall be strictly adhered to. Prefabricated scaffolds shall have adequate arrangements for fixing bracing. Frames of different types shall not be intermingled in a single scaffold.

In addition to the requirements for scaffolds in general as regards soundness, stability and protection against the risk of falls, suspended scaffolds shall have a safe cabin, with full protection from weather and adverse climatic conditions, and designed and constructed in accordance with ergonomic principles, a clear and unrestricted view of the area of operation; safe access to, and egress, from the cabin, including for situations where the operator is taken ill.

The scaffolding shall be tied to the building at suitable vertical and horizontal distances without causing irreversible damage/ alterations to the fabric of the building being restored. Preferably, scaffolding shall be secured by utilising existing openings/ holes. If not possible, a predetermined minimum number of perforations for tying the scaffolding to the historic structures will be allowed. The latter will make use of a bolting system inserted in the joints between the blocks for minimum damage possible to the masonry.

Prior to the dismantling of any scaffolding, the Contractor shall give the Contracting Authority's Architect in Charge sufficient time (at least 48 hours) to inspect the works. Any lifting gear or equipment intended for lifting shall not be loaded beyond its safe working load or loads as specified by the manufacturer. It shall be erected in accordance with the local Occupational Health and Safety Regulations and certified by a competent and recognised person appointed by the Contractor. Regular inspections are to be carried out in accordance with the local regulations.

No person shall be raised, lowered or carried by a lifting appliance unless it is constructed, installed and used for that purpose.

Any lifting gear shall be erected and maintained in accordance with the local Occupational Health and Safety Regulations and certified by a competent and recognised person appointed by the Contractor. No personnel are to be allowed on such gear until such certification has been deemed compliant by the Contracting Authority's Architect in Charge.

Every platform or receptacle used for hoisting any loose material shall be so enclosed as to prevent the fall of any of the material.

Any equipment with wheels, placed directly on a platform for raising or lowering, shall be so secured so that they cannot move, and the platform shall be enclosed as necessary to prevent the fall of the contents.

3. Restoration Works

3.1 Extent of Works

Prior to the commencement of works, the building shall be inspected by the contractor together with the Contracting Authority's Architect in Charge to confirm the extent of work and the restoration methodology to be employed.

3.2 Materials: Water

The water to be used shall have conductivity inferior to 60µS/cm. The use of chlorinated water shall not be permitted. It shall comply with MSA EN 1008. It shall be pH neutral.

3.3 Materials: Paper pulp

The paper pulp used in the work shall be chemically stable, having a cellulose content of 99 +/- 1% and a calcium content of 0.025 +/- 0.005%. Average fibre diameter should be 20 microns, while the average fibre length shall be of 300 microns.

3.4 Materials: Sepiolite clay

The sepiolite clay used shall be natural having a water absorption superior to 148% and an apparent density of around 555g/l. The sepiolite clay used shall be asbestos free with a specific surface area of 218 to 222sq.m./g. The pH value shall be 8.0 +/- 0.5.

3.5 Materials: Biocide

The application of mild biocides that have a long-term inhibiting effect on re-colonisation shall follow the initial removal of organic growth.

Products to be used shall be neutral products belonging to the chemical class of compounds methoxy triazine, acting by being absorbed both through the roots and the leaves and have a wide spectrum of action; other products include quaternary-ammonium compounds, or as approved by the Architect in Charge.

3.6 Materials: Herbicide

The product to be used should result in the desiccation of the plant after it has been absorbed. The dead parts will then be easily removed by hand, without risking re-growth.

The following factors shall determine which chemicals will be used: (a) chemicals which do not cause damage to the stone; (b) chemicals which do not create any risk to man or other life forms, apart from the ones treated, taking into account their toxicity with respect to humans, earth fauna and sea fauna; (c) their activity period and residual effects; (d) do not contain harmful salts or other substance which can instigate or accelerate the deterioration of the stone.

3.7 Materials: Consolidants

Stone consolidants are applied to the stone fabric as liquids, depositing a solid material within the pore structure of the material.

The main function of a stone consolidant should be that of restoring the cohesion, physical properties and appearance of the deteriorated stone. It is thus important that the choice of a suitable consolidant should be based on the following parameters: (a) Consolidating value, whereby the treated deteriorated stone recovers its original properties, mainly strength, surface hardness and abrasion resistance; (b) Durability; (c) Depth of penetration, affected mainly by the viscosity and surface tension, rate of gel or precipitation formation, method and conditions of application, and rate of evaporation; (d) Stone porosity. As the proportion of fine pores increases, the stone becomes more susceptible to salt attack. The consolidant should, ideally not alter the pore size distribution of the original material; (e) Moisture transfer; (f) Compatibility. Treated stone should have three-dimensional properties similar to that of the original stone. Consolidants should not form by-products containing harmful salts that can cause further damage to the stone; (g) Appearance of the consolidated stone.

Ethyl silicate consolidants to be used shall be non-toxic and of a one component system, having a silicium organic compound base (70 to 80%). They shall be thin, and have a low viscosity of 3.3c ST at 25oC or better, certified to penetrate deep into fine capillaries. They shall not impair the breathability of the stone structure, be durable and resistant to local weather. The consolidant used shall be colourless, have a density in the region of 0.96 to 0.98 g/cm³, or better, and cure without any salt formation and shall be catalysed by atmospheric humidity.

5.7.4 Ammonium oxalate consolidants to be used shall be ammonium oxalate monohydrate (NH₄)₂C₂O₄.H₂O 99% pure. It shall be mixed with deionised water in the ratio of 50g of oxalate and 950ml of water. It shall be thin, and have a low viscosity, be certified to penetrate deep into fine capillaries, shall not impair the breathability of the stone structure and be durable and resistant to local weather. The consolidant used shall be colourless, able to cure without any deleterious salt formation and shall be catalysed by atmospheric humidity.

3.8 Materials: Quicklime (airlime)

Unslaked Lime (quicklime - gir mhux imtaffi) shall be prepared from suitable, good quality upper coralline limestone. The quicklime should preferably be prepared in a wood-fired kiln in a temperature not exceeding 900oC. The stone matter should be suitably cooked to prevent under burning, over burning, or sintering of the stone, keeping the contents of any inert residue to the minimum as permitted by established International standards.

The quicklime shall be crushed to a fine powder, sieved, packed, and delivered to site in dry conditions, and soon after baking. When testing samples of lime using hydrochloric acid, the CO2 content of lime supplied shall be in the region of 3%. All lime shall conform to the statutory EN regulations and in particular MSA EN 459.

3.9 Materials: Slaked lime

Quicklime (unslaked lime) shall be slaked soon after it has been produced.

The slaking shall be carried out in a container of suitable shape and material which will not permit the material to overheat during the slaking process.

Soon after slaking, the lime shall be sieved through a 5mm gauge sieve to remove any unreactive material.

The slaked lime putty shall be allowed to mature under water for a minimum period of 4 weeks before being used.

The slaked putty shall then be mixed with the aggregate specified above in ratio of 1 part lime to 3 parts sand or as indicated by the Contracting Authority's Architect in Charge.

3.10 Materials: Natural hydraulic lime

The natural hydraulic lime should be natural, free from any additions such as Portland cement, etc. or any other material which contains any quantity of deleterious salts such as sulphates, chlorides, nitrates, etc.

It is to conform to MSA EN 459 Part 1: 2010 Building Limes Definitions, Specifications and Conformity Criteria.

Unless otherwise indicated, the hydraulic lime used shall have a stone colour, and shall be certified to have been produced at a temperature inferior to 1100oC. The free water content shall be less than 2% and it shall be ground to a fine powder such that more than 85% passes through a 90µm sieve and more than 98% passes a 200µm sieve as indicated in Table 18 of MSA EN 459 Part 1: 2010. Penetration shall be greater than 10mm but less than 50mm and the air content 5% as indicated in Table 18 of MSA EN 459 Part 1: 2010.

If feebly hydraulic lime NHL 2 is specified, then the compressive strength at 28 days shall be more than 2.0MPa but less than 7.0MPa as indicated in Table 17 of MSA EN459 Part 1: 2010. The composition shall be such that the proportion of Ca(OH)2 shall be greater than 35 while the SO3 less than 2 (mass fraction in percent as indicated in Table 16 of MSA EN 459 Part 1: 2010).

If moderately hydraulic lime NHL 3.5 is specified, then the compressive strength at 28 days shall be more than 3.5MPa but less than 10.0MPa as indicated in Table 17 of MSA EN 459 Part 1: 2010. The composition shall be such that the proportion of Ca(OH)2 shall be greater than 25 while the SO3 less than 2 (mass fraction in percent as indicated in Table 16 of MSA EN 459 Part 1: 2010).

The initial setting time shall be more than 60 minutes. Final setting time within 40 hours.

The composition shall be such that the proportion of CaO and MgO shall be over 45%, while SiO2, Al2O3, and Fe2O3 shall amount to approximately 12%-30%.

Unless otherwise indicated, the hydraulic lime used shall have a stone colour, and shall be certified to have been produced at a temperature inferior to 1100oC. It shall be ground to a fine powder such that more than 85% passes through a 90µm sieve and more than 98% through a 0.2mm sieve.

3.11 Materials: Sand for lime mortars

Fine aggregate (sand) for mortars shall be crushed Lower Coralline Limestone. It shall be clean, sharp and gritted and free from loamy matter and other deleterious substance. The sand is to be washed and screened when so directed by the Architect in Charge at the expense of the contractor.

It is to comply with MSA EN 13139 Grade 0/2 or 0/4 (as specified) Category 1 (less than 3% to pass the 0.063µm sieve) for repair and grouting mortars and Grade 0/2 or 0/4 (as specified) Category 2 (less than 5% to pass the 0.063µm sieve) for plasters.

Fine aggregate (sand) is to be well graded and conforming to the methods of sampling and testing and quality requirements of statutory EN regulations and in particular MSA EN 932 and MSA EN 933, unless specified otherwise.

3.12 Materials: Repair and pointing mortar

Portland cement mixes will not be permitted, unless otherwise instructed by the Architect in Charge.

All mixes shall be lime-based (the air or hydraulic lime being in conformity with these specifications) and compatible with the stonework in colour, strength and permeability. They will also be as close as possible in colour, composition and properties to the original mortars.

Lime mortars shall be free from cement and produced in conformity to standards set out in the statutory EN regulation and in particular MSA EN 998 and MSA EN 1015. Natural hydraulic lime mortars shall be in conformity with the relative section of these specifications.

The density of the lime putty shall range between 1.3 and 1.4kg/l and shall not contain any salts (nitrates, chlorides, sulphates, etc) which contribute towards the deterioration of the stone.

Pozzolanic or similar additives shall be preferred alternatives to give strength and durability to a lime-based mix, unless instructed otherwise. Any pozzolanic additive shall be added to the mortar just before use.

The properties of the mix shall be improved if hydraulic lime is used instead of both hydrated lime and pozzolana. In such cases, only aggregate shall be added. No cement or other pozzolanic additives shall be necessary, although additives to match the colour may be required as instructed by the Architect in Charge.

Unless otherwise instructed the mix shall be 1:3 binder aggregate by volume with water just enough to achieve workability.

The use of pozzolanic additives (such as brick dust, pozzolana etc.) to enable air limes to set hydraulically will be permitted. However care shall be taken to ensure that pozzolanic additives (natural or artificial) added are not toxic and do not contribute towards the deterioration of stone. The use of pozzolanic additives such as pulverised fuel ash or others which contain salts detrimental to the stone will not be allowed.

The permeability of the mortar mix/es might be compared with that of the stone before their approval for application on the monument. The permeability of the mortar will be compared with that of the stone by placing samples in a dish with a few millimetres of water to compare the rate of water uptake.

In all cases the minimum amount of water just enough to enable adequate workability shall be used in the mixes.

The Architect in Charge shall have the right to request the Contractor to use a specific hydraulic lime and/ or aggregates and/ or mix composition and/ or pre-mixed lime based mortar to ensure full compatibility between the areas to be restored under this tender and other areas of the church which have already been restored.

3.13 Materials: Lime injection grouts

The premixed, proprietary injection mortars used shall be suitably prepared from good quality and chemically stable hydraulic lime, free from salts, pozzolana and other inert additives, mixed into a consistent thixotropic, injectable putty. The granulometry of the mortar's constituents shall be chosen in accordance with the depth and width of the cracks/ voids which need to be filled up, i.e. granulometry shall be such as to ensure adequate penetration and flow within the cracks/ voids.

The injection grout should be free from any additions such as Portland cement, etc. or any other material which contains any quantity of deleterious salts such as sulphates, chlorides, nitrates, etc. Unless otherwise agreed upon with the Contracting Authority's Architect in Charge, the injection grout used shall have a stone colour, and shall be certified to have been produced at a temperature inferior to 1100oC.

Mortar shall be injectable into the crevices using suitably sized syringes. Unless otherwise indicated, the hydraulic lime used shall have a stone colour, and shall be certified to have been produced at a temperature inferior to 1100oC. The free water content shall be less than 2% and it shall be ground to a fine powder such that more than 85% passes through a 90µm sieve and more than 98% passes a 200µm sieve as indicated in Table 18 of MSA EN 459 Part 1: 2010.

It is to conform to MSA EN 459 Part 1: 2010 Building Limes Definitions, Specifications and Conformity Criteria.

The compressive strength at 28 days shall be more than 5MPa but less than 15.0MPa when tested to MSA EN 1015 Part 11: 1999 Methods of test for mortar for masonry, Determination of flexural and compressive strength of hardened mortar.

The composition shall be such that the proportion of Ca(OH)₂ shall be greater than 15 while the SO₃ less than 2 (mass fraction in percent as indicated in Table 16 of MSA EN 459 Part 1: 2010).

The initial setting time shall be more than 60 minutes. Final setting time within 15 hours.

Testing for their permeability might be carried out before their approval for application on the monument. The permeability of the grout will be compared with that of the stone by placing samples in a dish with a few millimetres of water to compare the rate of water uptake.

3.14 Materials: Epoxy resin injection grouts

The epoxy resin used shall be a solvent-free resin-based product supplied in two packs (resin and hardener), having a low viscosity, and certified by manufacturer to suitably fill cracks in the region of 1mm.

The resin shall be certified by manufacturer to have a suitable bonding to masonry, be colourless (or have a stone colour), be resistant to chemicals, and have an effective adhesion even on moist masonry surfaces.

The material shall be easily injected into the crack structure using proprietary methods and tools, including suitably sized non-return injection valves. It shall have a compressive strength greater than 60N/mm² and a flexural tensile strength of more than 30N/mm².

3.15 Materials: Filling mortar (grout) for large voids

Portland cement mixes will not be permitted, unless otherwise instructed by the Contracting Authority's Architect in Charge.

All mixes shall be lime-based (the air or hydraulic lime being in conformity with these specifications) and compatible with the stonework in colour, strength and permeability. They will also be as close as possible in colour, composition and properties to the original mortars.

Lime mortars shall be free from cement and produced in conformity to standards set out in the statutory EN regulation and in particular EN 998 and EN 1015. Natural hydraulic lime mortars shall be in conformity with the relative section of these specifications.

The density of the lime putty shall range between 1.3 and 1.4kg/l and shall not contain any salts (nitrates, chlorides, sulphates, etc) which contribute towards the deterioration of the stone.

Pozzolanic or similar additives shall be preferred alternatives to give strength and durability to a lime-based mix, unless instructed otherwise.

The properties of the mix shall be improved if hydraulic lime is used instead of both hydrated lime and pozzolana. In such cases, only aggregate shall be added. No cement or other pozzolanic additives shall be necessary.

Unless otherwise instructed the mix shall be 1:3 binder to aggregate by volume with water just enough to achieve workability.

Unless otherwise indicated by the Architect in Charge, the use of larger size stone spalls is acceptable in voids in which the smallest dimension exceeds 150mm. The proposed mix is to remain be approved by the Architect in Charge.

The use of pozzolanic additives (such as brick dust, pozzolana etc.) to enable air limes to set hydraulically will be permitted. However care shall be taken to ensure that pozzolanic additives (natural or artificial) added are not toxic and do not contribute towards the deterioration of stone. The use of pozzolanic additives such as pulverised fuel ash or others which contain salts detrimental to the stone will not be allowed.

Any pozzolanic additive shall be added to the mortar just before use.

3.16 Materials: Globigerina Limestone

Unless otherwise specified by the Architect in Charge, limestone used in the works shall be of the globigerina limestone (franka) type supplied from an approved source. The Contractor shall submit the name, location and licence number of the supply quarry from where the stone is being cut. The quarry shall be approved by the Contracting Authority's Architect in Charge and cannot be changed without prior approval.

Unless otherwise indicated stone to match the existing will be requested. The new stone work shall be worked carefully, and true to shape (ikkartabunat).

All stone blocks (unless otherwise requested) shall be cut as smooth as possible before delivery to site. All arises shall be true and all surfaces plane and truly perpendicular to each other and to a finished uniform height. The stone blocks shall be delivered to site on pallets, clearly marked as to the type. All stone blocks shall be unloaded carefully to prevent damage and wastage.

Only best quality "franka" stone from approved sources, free from all defects, shall be used. The stone shall have good and consistent aesthetic qualities, good durability and uniformity in appearance. It shall not have excessive quantities of red stains or hard shell fragments, but shall be fine-grained and free from spits and clay material. Any stone showing 'soll' traces or blue markings (swaba) and/or any other defects on the exposed face, or whose edges or corners have been chipped, shall be rejected.

Should any such stones be used, the Contracting Authority's Architect in Charge shall have the power to remove and replace such work at the contractor's expense. The Contractor shall also be bound to replace any defective materials in all or parts of the existing works by proper materials and/or workmanship as directed by the Architect in Charge.

The limestone blocks shall be faced and trimmed in a way that no chipped edges are visible, unless the Architect in Charge has requested the use of recycled masonry originating from the original construction itself.

The blocks shall be transported to site on pallets and handled in such a way as to minimise damage and waste.

3.17 Materials: Lower Coralline Limestone

Unless otherwise specified by the Contracting Authority's Architect in Charge, any Lower Coralline limestone used shall be of first quality material without any blemishes and faults.

The colour of the limestone shall be uniform and shall be as free as possible from defects. The limestone is to be of a compact nature and shall be free from defects and large pores throughout.

3.18 Materials: Fibre strands

Fibre strands used to reinforce mortars shall be polymer-based, certified by the manufacturer as suitable for the nature of the works described. They shall be such as to prevent shrinkage crack formation, withstand corrosion and be resistant to alkalis and acids.

Fibre diameter shall be in the range of 17 to 20 microns, and having a specific density ranging between 870 and 930kg/cu.m.

They shall have a tensile strength in the region of 390 to 500Mpa.

Max elongation at break point shall not exceed 14%.

When specified, a minimum of 0.85kg of these fibre strands or as recommended by manufacturer shall be mixed with one cu.m. of mortar mixed.

3.19 Materials: Stainless steel

All stainless steel used for this project shall, unless otherwise instructed by the Contracting Authority Architect in Charge, be Grade 316 or better certified for use in marine environments as specified in EN 10088-1:2005 or its updated version.

3.20 Materials: Brick dust

Brick dust used shall be prepared from good quality red (terracotta) clay baked to a temperature between 850°C and 900°C. Clay baked at higher or lower temperatures shall not be used for the production of brick dust.

The brick dust used shall be clean and free from deleterious substances etc. The baked clay shall be crushed and adequately graded for use as specified in this document.
The use of glazed ware for the production of brick dust will not be permitted.

3.21 Materials: Anti-roosting bird spikes

Pigeon repelling systems adopted should be such as not to necessitate any irreversible intervention on the fabric of the building.

The dimensions of the system shall be suitable for the specific architectural elements, shall have an ultra-violet resistant polycarbonate base, and spikes fashioned from good quality stainless steel.

The system shall be resistant to UV (Ultra Violet) rays, salts, and the acidic nature of the pigeon droppings.

System shall preferably be fixed with a neutral silicone having suitable bonding properties.

Mechanical fixing shall be with suitably sized stainless steel screws and shall only be used to the approval of the Architect in Charge.

3.22 Methodology: General

The contractor is to ensure that all the necessary measures are taken to ensure that masonry elements are not damaged, chipped, soiled stained or contaminated by salts and/or other deleterious substances during the works.

The contractor shall ensure that the stability of all of the structure is maintained throughout the work. Any defects, including signs of movement that develop or become apparent during the course of works shall be immediately reported to the Contracting Authority's Architect in Charge.

The contractor shall protect works against damage by rain.

Necessary precautions shall be taken by the contractor to prevent the masonry bedding from drying out too rapidly in hot conditions and in drying winds.

All rejected work shall be removed and replaced using new materials at the contractor's expense. The contractor shall also be bound to replace any defective materials in all or parts of the existing works by proper materials and/or workmanship as directed by the Architect in Charge.

3.23 Methodology: Removal of vegetation

Every effort shall be made to remove all parts of plant including roots and stubs. Where growth cannot be removed completely without disturbing the masonry, the contractor shall seek instructions from the Contracting Authority's Architect in Charge.

Plants/weeds shall not be removed by cutting the plant at the base of the stem and then by the use of a biocide to kill off the remaining part of the plant unless explicitly told to do so by the Contracting Authority's Architect in Charge and if the contractor certifies that the herbicide/biocide being used is effective if applied in this manner.

The product to be used should result in the desiccation of the plant after it has been absorbed. The dead parts will then be easily removed by hand, without risking re-growth.

3.24 Methodology: Removal of higher forms of vegetation

The Contractor shall cut out a metre section of the main stem, around 300mm to 1m above ground level; care must be taken not to damage the adjacent masonry.

After the removal of almost all aerial parts of bushes and trees, chemical spot spraying shall be carried out on cut ends of stems and branches for perennial woody plants and on new buds and leaves in deciduous trees.

Systemic herbicides will be used with absorption through leaves or barks.

A procedure combining mechanical and cleaning means will follow to remove the plants completely.

3.25 Methodology: Removal of metal inserts etc.

The contractor shall ensure the careful removal of redundant cables and wires, light fixtures, and other accretions from the facades of the building. The methodology employed for this removal shall be approved by the Architect in Charge prior to commencement of works.

Care shall be taken to remove all metallic inserts, (especially iron and steel fixings) from the stonework.

Corroding metal fixings shall be carefully cut by coring around them using small diameter bits so as to cause the least possible disturbance to the surrounding masonry. The associated rust debris shall also be carefully removed.

Resulting holes shall be filled-in using a suitable lime-based mortar when the break is small or by piecing-in stone, if the gap is large, as per specifications.

3.26 Methodology: Opening of joints

The existing mortar shall be carefully removed without damaging the adjacent masonry or widening the joints using a bent spike or small hand-held chisels to a depth twice the width of the joint. Joints are to be opened to a minimum depth of 25mm and never to a depth less than their width.

Impact tools shall not be used. Power tools such as rotary discs (chasers) will not be allowed. No chipping hammers shall be used.

Care is to be taken to avoid damages to the adjacent stone surfaces. If the jointing material proves to be very hard to remove, then the contractor is to seek instructions from the Contracting Authority's Architect in Charge. Any change in the methodology employed shall be approved by the Contracting Authority's Architect in Charge.

If mortar has failed to such an extent that the joints are largely empty, then the joints will be deep tamped and, if necessary, hand grouted to fill the voids up to the distance required for pointing.

Power tools may not be used for the removal of renders, mortars and opening of joints unless explicitly requested by the Architect in Charge.

No filling/grouting/pointing shall be carried out before inspected by the Architect in Charge.

3.27 Methodology: Removal of plasters and cement renders

Where identified by the Contracting Authority's Architect in Charge, concrete/cement renders shall be carefully removed by hand tools using manual methods so as to contain damages to the underlying masonry work. Cement pointing and facing shall be removed manually taking care not damage the surrounding weakened stone. Chipping hammers shall not be used unless explicitly permitted by the Architect in Charge.

Old plasters and similar coatings should be removed by hand tools using manual methods and constant supervision so as not to damage the stone surface. 5.29.3 Electrical tools as well as tipped metallic instruments with sharp edges or corners, power tools (such as rotating disk cleaners) and sand blasting (dry or wet) shall not be permitted, unless instructed otherwise by the Contracting Authority's Architect in Charge.

3.28 Methodology: Removal of paints

Oil-based paints may be removed by a neutral paint-remover certified to contain no salts or any other deleterious agent. Repeated applications in paste form may be necessary to remove persistent stains.

Mechanical means, especially involving the use of power tools (such as rotating-disc cleaners and dry or wet sand-blasters) or tipped metallic tools will not be permitted unless instructed otherwise by the Architect in Charge.

3.29 Methodology: Preservation of original masonry

The contractor shall ensure that original masonry work that shall be retained will be protected and left undisturbed during the course of works.

The contractor shall seek the approval of the Contracting Authority's Architect in Charge whenever existing masonry to be preserved will need to be cut or modified to accommodate new or reused units.

The contractor shall ensure that structure to be retained is adequately propped to prevent damage caused by movement or any other means as a result of the works.

The contractor shall ensure that retained masonry in the vicinity of repair works is disturbed as little as possible.

3.30 Methodology for Cleaning: General Considerations

The cleaning methods adopted should, as far as possible: (a) Be effective in removing the deleterious substances from the stone surface; (b) Not produce any substances which will encourage any future deterioration of the stone; (c) Be slow enough such as to allow good control by the operator; (d) Must not cause any micro-fractures or any other discontinuities of the stone surface, as these may initiate or encourage new deterioration processes.

Abrasives, chemicals or high pressure water jetting will not be permitted. A controlled nebulous pulsating water spray system should preferably be used. The process must ensure that no over saturation and softening of the stone occurs. In those areas where this system is not sufficient to reach the required level of cleanliness, controlled micro-blasting on plain, non-decorative areas may be considered. Systems adopting sand, gravel, or water blasting techniques will not be considered.

Micro-blasting systems used shall be such as to function effectively at low pressure and use low quantities of water. The abrasive material used shall be calcium carbonate having size and configuration which will not damage the surface texture of the stone fabric.

It is important that any water used throughout the cleaning operation be free from salts. No chemical agents will be permitted. The use of tap water will NOT be permitted. The water to be used shall have conductivity inferior to 60 μ S.

The contractor shall test the pH value of clean water used for rinsing, the wetted surface and all chemical agents to be used in the cleaning processes before application.

All solutions shall be thoroughly mixed before taking a sample for pH measurement.

All readings shall be carried out at the same temperature, or compensated for if taken at different temperatures. All data shall be submitted in writing to the Architect in Charge.

The aim of the cleaning exercise shall primarily be that of cleaning the face of the stone and removing all accumulation of carbon, sulphurous compounds, and other contaminants, whilst retaining at all times the patina of time. On completion of works, the stone is to be brought to its natural patina, texture and profile. All discoloration is to be removed from the face of the stone. No original carved relief arises or surface textures are to be damaged or altered.

The contractor shall ensure that all electrical supplies serving external equipment have been disconnected and that, unless specified otherwise, fittings and associated cable have been removed.

The contractor shall take all measures to prevent: (a) Ingress of water, cleaning agents, debris and dust into the building via windows, doors, vents and other permanent and/ or temporary openings. (b) Protection of ventilation grilles, airbricks, or other ventilation openings without sealing them. (c) Damage to all components and finishes that can reasonably be protected during cleaning procedures, including lightning conductors, roof coverings, flashings, rainwater goods, glass, metal works, services equipment, signage and paving. (d) Staining of surfaces from ferrous or other reactive metals. (e) The contractor shall use approved protective boards, sheeting, films, sealants and sealing tapes that do not stain protected materials and that can be readily removed after cleaning without damaging or staining the protected material. (f) The contractor shall seek approval from the Contracting Authority's Architect in Charge should it be necessary to take additional measures for cleaning.

3.31 Methodology for Cleaning: Tests to be conducted during the cleaning procedure

The contractor shall be responsible to carry out tests as outlined with this document to determine the extent of salts within the masonry fabric. These tests shall be carried out prior and repeated during and after the cleaning process has been completed. The contractor shall furnish the Architect in Charge with the results of the tests.

Putty moulds of stone surfaces indicated by the Contracting Authority's Architect in Charge shall be prepared prior to the commencement of the cleaning works and repeated after final cleaning.

3.32 Methodology for Cleaning: Trial cleaning

The Contractor is to prepare trial samples for all cleaning methods in locations agreed with the Contracting Authority's Architect in Charge.

The Contractor shall inform the Architect in Charge before carrying out each trial cleaning method to enable the Architect in Charge to approve the selected testing area and be present during the preparation and execution of trial samples. The period of notice shall be agreed with the Contracting Authority's Architect in Charge.

The time, date, location, details of all the products and procedures for each sample area shall be submitted in writing to the Contracting Authority's Architect in Charge.

The contractor shall provide the Contracting Authority's Architect in Charge with a copy of all the trial sample records when so requested by the Architect in Charge. Such records are also to be included in the Weekly Reports to be drawn up by the Contractor and submitted to the Contracting Authority's Architect in Charge.

3.33 Methodology for Cleaning: Monitoring

The contractor shall regularly monitor effects of each cleaning procedure against the degree of cleaning established by approved trial sample/s.

The contractor shall seek instructions immediately wherever: (a) Disruption to the surface occurs; (b) Discoloration or stains are revealed by cleaning; (c) Anticipated level of surface cleaning is not being achieved.

3.34 Methodology: Dry Brushing of surface

Prior to commencing any cleaning method, the contractor shall remove loosely adhered deposits and growths using suitable corrosion resistant brushes that do not damage the stone surface.

The use of brushes with steel bristles shall not be permitted. Nylon brushes will be preferred.

3.35 Methodology: Wet brushing of surface

General cleaning shall be carried out by means of low pressure washing (less than 2 bar) using water with a conductivity inferior to 60µS/cm and hand held mineral/nylon fibre brushes as directed and approved by the Architect in Charge. Garden type manual pump sprayers are to be used.

The spray shall be atomised from fine nozzles situated at least 300mm away from the masonry. Stubborn deposits shall be removed first. Softened deposits shall be removed with suitable nylon brushes that do not damage the surface. Any debris shall be thoroughly rinsed.

The flows shall be directed from the top downwards so that the trickling of water softens the lower areas of dirt build-up.

In the process, care shall be taken to ensure no damage is caused to mortar joints and original plasters.

The water spray technique shall not be allowed in severely deteriorated areas.

3.36 Methodology: Water spray cleaning and paper pulp poulticing using de-ionised water

Water spray cleaning with mounted nozzles shall be used in areas which require a prolonged period of wetting, as approved by the Contracting Authority's Architect in Charge. The wetting shall last for a period sufficient to produce the swelling of the layer of dirt, shall be used in combination with small brushes to cut down the saturation period and shall be attached to a length of pipe connected to the approved water supply. Chlorinated mains water and water having a conductivity of more than 60µS/cm will not be allowed.

The spray shall be atomised from fine nozzles situated at least 300mm away from the masonry. Enough water pressure and small enough orifices shall be required to atomise the water.

The equipment shall be of a type which allows the position and direction of nozzles to be readily adjusted relative to existent surfaces and profiles.

For each surface, the nozzle positions and spraying cycles that enable deposits to be removed/softened whilst keeping the water running off the surface to a minimum shall be established.

The flows will be directed from the top downwards so that the trickling of water softens the lower areas of the dirt build up.

Regular monitoring and adjustment of the washing cycle and nozzle positions shall be ensured by the contractor as work proceeds. In addition, the water spray/mist shall be controlled by

adequate sheeting which shall reduce the effect of draughts of air blowing away the water from the building, since the effectiveness depends on how successfully the mist can be contained. The heaviest deposits shall be removed first. Softened deposits shall be removed with suitable nylon brushes that do not abrade the surfaces. Any debris shall be thoroughly rinsed. The water spray technique shall not be allowed in severely damaged areas. Deionised water paper pulp poultices are to be prepared by mixing together into a uniform consistency paper pulp and deionised water. The poultice shall then be suitably ironed to a thickness of 4 to 5mm on the pre-brushed (dry/wet brushing) soiled surface, and covered with a polyethylene film to prevent the poultice from drying up. The poultice shall be left in place for a contact period as considered necessary by the Contracting Authority's Architect in Charge, after which it shall be gently removed and the treated area rinsed once again with de-ionised water and brushed with a suitable nylon brush.

3.37 Methodology: Use of Mora Pack

The principle behind poultice treatment is that once soiling is dissolved, dirt is held in contact with the pack, rather than dissolved and permitted to fill the pores. The intimate and extended contact of the cleaning materials means that smaller quantities and lower concentrations of chemicals need be used.

Unless otherwise instructed by the Contracting Authority's Architect in Charge, ammonia shall be used in the poultice to soften the crust.

The AB57 (Mora Pack) with paper pulp/cellulose and/or sepiolite clay is to be used only where specifically requested.

The Mora Pack is a mild chemical pack containing agents which facilitate the dissolution of calcium salts. The poultice shall be prepared by mixing into a consistent sticky paste the following: (a) 60g sodium bicarbonate; (b) 60g ammonium bicarbonate; (c) 25g ethylene diamine tetra acetic acid (EDTA); (d) 10g surfactant disinfectant (neutral); (e) 60g sepiolite clay/ paper pulp/carboxymethylcellulose (CMC); (f) De-ionised/distilled water as required (tap water or water containing salts will not be permitted);

The above-mentioned ratios may be revised/adapted by the Contracting Authority's Architect in Charge as so deemed necessary. In such eventuality, the contractor may not demand any adjustment to the rates submitted for this tender document.

The mix shall then be suitably ironed to a thickness of 4 to 5mm on the pre-wetted soiled surface, and covered with a polyethylene film to prevent the poultice from drying up. The poultice shall be left in place for a contact period as considered necessary by the Architect in Charge, after which it shall be gently removed and the treated area rinsed with de-ionised water and brushed with a suitable nylon brush.

Depending on the nature of the crust, this process shall be repeated for as many times as so deemed necessary, until the black crust formation has been removed and a satisfactory level of cleaning is obtained. For payment reasons, this exercise will be considered as an intrinsic part of the poulticing exercise, and in no case will the contractor be allowed to make claims for extra costs in relation to workmanship and/ or material.

3.38 Methodology: Chemical cleaning for the removal of iron stains

The clay pack for iron stains shall consist of sepiolite clay and/or paper pulp added to a solution of glycerine, generally sodium citrate. The paste shall then be applied to the stain surface and left to dry.

The paste shall then be removed with wooden or other non-metallic spatula.

Several coatings might be necessary to lighten the stain. For stubborn stains, the surfaces shall be wetted. When lifted off, the surface is washed with copious amounts of water.

Given the nature of the stain, this process shall be repeated for as many times as so deemed necessary, until the stain has been removed, and a satisfactory level of cleaning is obtained. For payment reasons, this exercise will be considered as an intrinsic part of the poulticing exercise, and in no case will the contractor be allowed to make claims.

3.39 Methodology: Use of surgical knives

Prior to commencing any cleaning method, the contractor shall remove loosely adhered deposits and growths using suitable corrosion resistant brushes and then use surgical knives should any dirt remain.

Surgical knives are to be such and are to be used in a way as not to cause scratches or damage the stone surface. They are to be used where indicated by the Architect in Charge.

3.40 Methodology: Micro-blasting

Low pressure micro blasting cleaning is to be used where explicitly indicated by the Architect in Charge with pressures not exceeding 3bar. Any water used shall be free of salts and having a conductivity not exceeding 60µS/cm.

High pressure blasting or washing using pressures in excess of 3 Bar will not be allowed.

The contractor shall ensure that any water resulting from this cleaning process is not allowed to flow in the streets.

The contractor shall take all the masonry measures to ensure that any cleaning agent or residues are not allowed to stray onto adjacent or protected surfaces.

The contractor shall ensure that the grit used in the cleaning process is weaker than the stone being cleaning. No cleaning shall commence prior to the approval of the Architect in Charge.

The contractor shall clean, collect and safely dispose of all debris from scaffolding, ledges, etc at the end of each day.

The contractor shall prevent the marking of cleaned areas from dirt and debris splashing up from scaffold boards.

All cleaning shall commence at the uppermost section of the structure to avoid washing dirt onto previously cleaned surfaces.

Approved cleaning procedures or materials shall not be modified without the approval of the Architect in Charge.

The contractor shall seek approval from the Contracting Authority's Architect in Charge should it be necessary to take additional measures for cleaning.

3.41 Methodology: Application of biocide

Surface soiling by organic growth shall be initially removed by simple dry bristle brushes, surgical knife blades and spatulas, provided that the substrate is sound enough, without damaging or abrading the surface and as approved by the Architect in Charge. If the surface below the growth is delicate or liable to be marked or scoured in any way, this preparation will be limited/modified as approved by the Architect in Charge.

The biocides shall be applied in strict accordance with the manufacturer's recommendations for the safety and protection of the workers and the environment.

The general removal of organic growth such as fungi, lichens and the like will be limited to places where these are possibly causing harm and as indicated by the Contracting Authority's Architect in Charge.

In an exceptionally dry period, and in areas where it is recommended to remove the organic growth, dormant dry lichens shall be revived with light water spraying prior to the application of the biocide. Application of biocidal treatments will not be undertaken during wet weather or when windy conditions lead to the excessive drift of spray.

The contractor shall protect all surfaces that are excluded from chemical cleaning. All chemical agents shall be contained within each treatment area.

Process shall be repeated until the growth has been removed or until instructed to stop by the Contracting Authority's Architect in Charge. For payment reasons, repeated applications to achieve this will be considered an intrinsic part of the exercise, and in no case will the contractor be allowed to make claims.

3.42 Methodology: Determination of Salt Levels

Salt levels, as well as the types of salts shall be determined before, during and after treatment.

Samples shall be taken at depths of 0-25mm, 50-75mm and 75-100mm within the deteriorated zone as established by the Architect in Charge.

Surface salt levels shall be determined using stone dust scraped off the surface to determine its conductivity.

3.43 Methodology: Desalination by poulticing

Where salt desalinisation is considered necessary, paper pulp and/or sepiolite clay packs will need to be adopted.

Both clay and paper pulps should be free from soluble salts and any staining additive.

The poultice shall be worked with de-ionised/distilled water into a thick, sticky cream, and carefully ironed onto the surface with suitable spatulas, and permitted to dry slowly, attracting salts away from the stone fabric. Chlorinated mains water and water having a conductivity of more than 60µS/cm will not be allowed.

The dried material is to be disposed of away from the structure being restored and shall not be reused.

This process may have to be repeated for as many times as so deemed necessary, until the level of salts within the stone fabric has been brought down to an acceptable level. For payment reasons, this exercise will be considered as an intrinsic part of the poulticing exercise, and in no case will the contractor be allowed to make claims for extra costs in relation to workmanship and/or material.

3.44 Methodology: Consolidation using ethyl silicates

The consolidant shall be applied to the specifications detailed by the manufacturer. It shall not be applied to stone subjected to high moisture content or characterised by an elevated salt content. The surface to be consolidated is to be cleaned from loose dirt and dust by dry brushing. Ideally, the stone is to be consolidated by flooding either by a coarse-droplet, or preferably by a long-bristled brush.

The consolidant shall be applied generously and uniformly to the stone surface until the stone surface is saturated. If so considered necessary, the Contracting Authority's Architect in Charge may request that this exercise be repeated for as many times as deemed necessary. For payment reasons, this exercise will be considered as an intrinsic part of the consolidation exercise, and in no case will the contractor be allowed to make claims for extra costs in relation to workmanship and/ or material.

The consolidant shall not be applied in windy or elevated climatic temperature conditions which would impair the penetration of the same material. Consolidated areas should be protected from water, wind, and other natural/ man-invoked adverse conditions for a minimum of 30 days, or more if so specified by manufacturer.

3.45 Methodology: Consolidation using ammonium oxalate solution applied through a paper pulp poultice

The consolidant shall be applied to specifications detailed by the manufacturer, as well as adopting all the necessary safety provisions. The surface to be consolidated is to be cleaned from loose dirt and dust by dry brushing. It shall not be applied to stone subjected to high moisture content and shall be applied using a poultice. It is to be covered with cellophane for at least 24 hours.

The consolidant shall be applied generously and uniformly to the stone surface, until the stone surface is saturated. If so considered necessary, the Architect in Charge may request that this exercise be repeated for as many times as deemed necessary. For payment reasons, this exercise will be considered as an intrinsic part of the consolidation exercise, and in no case will the contractor be allowed to make claims for extra costs in relation to workmanship and/ or material.

The consolidant shall not be applied in windy or elevated climatic temperature conditions which would impair the penetration of the same material. Consolidated areas should be protected from water, wind, and other natural/ man-invoked adverse conditions for a minimum of period specified by manufacturer.

3.46 Methodology: Lime injection

Mortar injection of cracks shall be carried out with proprietary fluid lime based mortar as specified in this document.

Prior to injection, all stone surfaces should be desalinated, adequately consolidated, cleaned from any accumulated dirt/dust and suitably wetted with de-ionised water. Cracks shall be first flushed using alcohol.

Mortar shall be injected into the crevices using suitably sized syringes. Application should not be permitted in ambient temperatures exceeding 30oC.

When injecting, care shall be taken to ensure pressure exerted on delaminated stone sections does not cause the shearing of the same material.

In cases where the detached material is of considerate dimension, pins bridging the weaker layers with the stronger fabric, and grouted with the same fluid lime-based mortar shall be introduced. The carbon fibre/glass fibre rods shall be inserted such as to be least obtrusive. The inner ends of the rods shall be fixed using either a lime based or an epoxy resin based mortar, as indicated by the Contracting Authority's Architect in Charge. The diameter and spacing of the rods shall be as directed by the Contracting Authority's Architect in Charge.

3.47 Methodology: Epoxy resin injection

Epoxy resins as specified in this document, having suitable characteristics and viscosity, shall be used for the injection, under pressure, of cracked masonry sections previously consolidated.

Epoxy injection will be resorted to only for areas where injected fluid lime mortar would be inadequate.

All masonry surfaces to be treated with epoxy resins shall be clean, free from any loose material, greasy substances, etc. Cracks should be superficially sealed and proprietary injection nozzles fixed.

Prior to injection, all stone surfaces should be desalinated, adequately consolidated, cleaned from any accumulated dirt/dust and suitably wetted with de-ionised water. Cracks shall be first flushed using alcohol.

No resin is to stain the adjacent stonework.

Following the injection of the epoxy resin, and after allowing sufficient time to ensure that the structural stability of the delaminated or otherwise masonry structure is restored, the masonry is carefully cleaned from the superficial mortar applied previously to seal cracks.

If so directed by the Architect in Charge, pins shall be used to bridge over structural cracks and in cases where the detached material is of considerate dimension, bridge between the weaker layers and the stronger fabric. Such pins shall be grouted with the same epoxy resin or lime based grout as directed by the Contracting Authority's Architect in Charge. The carbon fibre/glass fibre rods shall be inserted such as to be least obtrusive. The inner ends of the rods shall be fixed using either a lime based or an epoxy resin based mortar, as indicated by the Architect in Charge. The diameter and spacing of the rods shall be as directed by the Contracting Authority's Architect in Charge.

3.48 Methodology: Pinning of masonry

The contractor shall carefully drill holes in the fabric of the stone surface sloping downwards.

The holes shall be thoroughly cleaned to remove all drilling dust and debris and kept dry. The correct lengths of dowels shall be cut prior to the filling the holes with resin. The pins shall be cut to size prior to the injection of the resin and shall not be closer than 6mm to the surface for small diameters and 12mm for large diameters.

The holes shall be filled with sufficient resin so that, when the dowel is inserted, the resin is dispersed to achieve an effective bonding.

The ends of the ties and the resin shall be kept back from the face of masonry and exposed faces shall be kept clean and free from resin stains. Temporary plugging material and/or isolating membranes shall be used as necessary.

3.49 Methodology: Pointing

The work shall commence at the top of the wall moving downwards.

If joints exhibit biological soiling, a biocide should be applied prior to flushing out. Any vegetation shall be removed in accordance with these specifications.

The contractor shall clean the joints. Dust and loose debris shall be removed. The joints shall then be dampened with clean de-ionised water as necessary to control suction.

Lime mixes shall be used for the pointing. Mixes shall approximate a 1:2½ to 1:3 binder to aggregate ratio, unless otherwise agreed with the Contracting Authority's Architect in Charge. The inert materials to be used shall be as directed by the Architect in Charge and may vary to include stone dust, sand, coloured marble dust/ chippings, terracotta dust/ chippings etc.

Ready-mixed lime mortar shall only be used if approved by the Architect in Charge.

All pointing shall be carried out in moist, warm conditions. The contractor shall ensure that all pointing is built up in layers not exceeding 10mm in thickness or as recommended by the manufacturer in cases where the use of ready-mixed lime mortars is permitted.

If mortar has failed to such an extent that the joints are largely empty, then the joints will be deep tamped and, if necessary, hand grouted to fill the voids up to the depth required for pointing.

The mortar shall be built up and firmly applied in layers until the specified thickness is reached. The contractor shall ensure good adhesion with no voids. A mechanical key shall be formed to the undercoat/s by combing or scratching so as to produce evenly spaced lines.

Each layer shall be allowed to achieve an initial set prior to the application of subsequent coats. The fresh mortar shall be protected from excessive heat and adequately cured and kept as humid as long as possible to slow down the setting rate and hence avoid cracking.

After the initial set has taken place, the contractor shall stipple the joints with a stiff brush to remove laitance/excess fines and achieve a coarse texture.

It shall be prevented from drying out too rapidly by dampening intermittently with clean water and covered immediately with damp hessian and plastic sheeting. Areas being pointed shall moreover at all times be shaded with a suitable tarpaulin.

The contractor shall provide adequate protection from adverse weather until the mortar repairs have fully set.

The required finish shall be as per original surviving pointing and as approved by the Contracting Authority's Architect in Charge.

If the stones have retained their sharp edges, the joints shall be filled flush unless the original joint face was profiled in some other way.

In the case of weathered edges, or where the stone has spalled off, the face of the new mortar shall be kept back such that the apparent joint width does not increase. The mortar face shall be kept as far back as required to achieve the original joint width.

The Architect in Charge shall have the right to request the Contractor to use a specific hydraulic lime and/ or aggregates and/ or mix composition and/ or pre-mixed lime based mortar to ensure full compatibility between the areas to be restored under this tender and other areas of the church which have already been restored.

3.50 Methodology: Removal of deteriorated stone

Every effort shall be made to retain as much as possible of the original masonry structure. To this effect no stone shall be replaced without the prior approval of the Contracting Authority's Architect in Charge.

Stone replacement will be limited to individual badly deteriorated stone blocks and the total area of stone replaced shall be kept to the minimum possible.

The masonry areas earmarked for replacement shall be clearly marked with a mason's pencil for the prior approval of the Contracting Authority's Architect in Charge. Marking by spray or other indelible markers prior to approval will not be permitted.

The contractor shall take measurements from existing masonry units, identified by the Contracting Authority's Architect in Charge, to allow replacements to be matched accurately.

Profile gauges shall ideally be used to record existing profiles with site. Alternatively the contractor may opt to record profiles on site by tracing the existing profile on cardboard or any other suitable material. Where inserts are required to record profiles in-situ, but there are no suitable joints, the contractor shall seek instructions from the architect on the method to carry out such operation.

The contractor shall prepare accurate drawings and templates as necessary, clearly and indelibly marked to identify their use and location.

The methodology employed for the cutting away of the deteriorated masonry sections may vary depending on the particularities of every individual case. Nonetheless, care shall be taken to ensure that only hand held tools and small power tools (jiggers) which do not cause damage to the structure and/or immediate stone blocks will be used. The methodology employed shall be discussed with and approved by the Architect in Charge prior to the commencement of works.

The cutting of perimeter joints may be carried out with a masonry saw. If the stone is to be retained, the cut shall be made by a purpose-made fine saw blade or with a plugging chisel in the case of a wide joint. Where the stone is to be replaced, the stone shall be chiselled away starting from the centre and moving towards the edges.

3.51 Methodology: Preparation of replacement stone

Only new stonework, machine cut to a true shape (ikkartabunat) and hand finished shall be used unless otherwise directed by the Contracting Authority's Architect in Charge.

All new stone work used shall be similar or identical as so directed by the Contracting Authority's Architect in Charge in material colour, size and configuration to the original and shall match with the existing course height.

The Architect in Charge may request copies of templates produced by the contractor.

The stone shall be cut and dressed so that the natural bed is horizontal in plain walling, vertical at right angles to wall face in projecting stones and copings, and at right angles to line of thrust in arches.

Care shall be taken to ensure that new stonework is not chipped or otherwise damaged.

Each block/dressing is to be clearly marked on a concealed face to indicate the natural bed and its position in the finished work.

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.

The contractor shall be responsible to prepare all necessary formwork required for the replacement (in section or in whole), or the reconstruction, of arched elements such as arched windows, vaults, arches etc. The formwork shall be faithful to the original profile or that specified by the Contracting Authority's Architect in Charge.

All newly replaced stonework shall have a minimum bedding of 230mm unless otherwise specified by the Contracting Authority's Architect in Charge. The contractor shall ensure that suitable allowances are made for any final finishing carried out in-situ.

3.52 Methodology: Laying of replacement stone

Joint surfaces shall be dampened to control suction as necessary. When laying new stonework, all vertical and horizontal joints shall be adequately buttered with mortar. 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 the exposed faces.

The new stone shall be dampened to avoid risk of de-watering the mortar. Existing joint widths are to be maintained. Care should be taken to ensure that sinkings for fixings and joggles are accurately aligned and positioned in relation with the existing masonry.

Non-hydraulic mortar shall be used unless otherwise specified by the Architect in Charge. The mortar bed shall not be less than 12mm thick.

All faces, angles and features shall be carefully aligned and set out to ensure satisfactory joint widths and relative positioning with the existing masonry. The exposed faces of new material shall be kept to the face lines as agreed with the Contracting Authority's Architect in Charge.

Joints around replacement masonry units shall be thoroughly grouted wherever joints cannot be fully filled with bedding mortar. Grout mix shall be based on lime, fine coralline and globigerina limestone sand (xahx).

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.

The pointing of the top joint is to be carried out using a stiff mortar mix, deep tamped and cures so as to minimise shrinkage.

3.53 Methodology: Bonding dowels for replacement stone

Suitably sized holes shall be drilled in the background and rear of the replacement/insert to receive dowels and adhesive. The contractor shall ensure that the holes are aligned to allow accurate positioning of the replacement/insert and that enough depth is allowed for sound anchorage.

The holes shall be cleaned, all dust removed and adequately flushed with water. Adequate drying time shall be allowed. Smaller holes may also be cleaned by blowing out with a small tube.

The dowels shall be secured into clean, dry holes with adhesive. No adhesive shall be used to bond stones at joints unless agreed otherwise with Contracting Authority's architect and civil engineer.

The pins shall be cut to size prior to the injection of the resin and shall not be closer than 6mm to the surface for small diameters and 12mm for large diameters.

The resulting holes shall then be filled with matching mortar.

3.54 Methodology: Jointing of masonry works (piecing in)

Replacement stone shall be cut and shaped in 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 the pockets shall be undercut, where necessary, to provide space for specified bonding material.

Where so directed by the Architect in Charge, the contractor shall dove-tail 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 Contracting Authority's Architect in Charge.

3.55 Methodology: Grouting

The Architect in Charge may request grouting of voids resulting between new and old masonry, displaced masonry, etc with an inorganic material such as hydrated or hydraulic lime mortar.

The lime grout shall be prepared with or without filler depending on the size of the gap.

Glass reinforced polyester or carbon fibre ties shall be used as and where directed by the Architect in Charge.

Grouting holes shall be formed in joints at suitable horizontal and vertical centres to suit coursing and achieve an effective distribution of grout and fill all voids as per Architect in Charge's approval.

The maximum length of each lift between pours shall be established to prevent any disturbance of the masonry.

Unless re-pointing precedes grouting, the joint shall be sealed as necessary on either side of the grouting holes with an approved temporary material to prevent leaking of grout. The temporary seal shall be kept back from the face work to allow for specified re-pointing.

Before grouting, the delivery holes shall be thoroughly flushed with clean water.

Site trials, in all areas indicated by the Contracting Authority's Architect in Charge, shall be carried out for the different methods of grouting so as to establish the parameters required to achieve uniform grouting.

If done by hand, the grout material shall be poured under gravity into the interstices formed by the masonry structure.

If done by gravity injection, then: (a) the approved equipment shall include a control of grout flow at the head of the hose (plug) and at the delivery nozzle (stop valve). (b) the height of the pan above delivery nozzle (subject to site trials) shall be sufficient to ensure an adequate flow, usually around 4.50m.

If done by pumped gravity injection, then the delivery pressure shall be established after site trials.

3.56 Inspection of masonry units

All completed units shall be carefully inspected and checked by the manufacturer/supplier against the approved sample/s and compliance with drawings and the specification before dispatching to site. The contractor shall inform the Contracting Authority's Architect in Charge at appropriate stages during production to allow inspection of masonry units prior to delivery on site.

3.57 Methodology: Plastic repairs

Plastic repairs as specified in this document shall be used in areas indicated by the Contracting Authority's Architect in Charge.

The work shall commence at the top of the wall moving downwards.

If the surfaces exhibit biological soiling, a biocide should be applied prior to flushing out. Any vegetation shall be removed in accordance with these specifications.

Any deteriorated, flaking, powdering etc masonry shall be carefully removed to expose a sound background. In the process care shall be taken not to weaken the structure or damage the adjacent masonry.

The top and vertical edges of the repair area shall be undercut to provide sufficient bonding and reduce the formation of visible shrinkage joints.

All mortar repairs shall be varied out in moist, warm conditions. The contractor shall ensure that all repairs are built up in layers not exceeding 10mm in thickness or as recommended in cases where the use of ready-mixed lime mortars is permitted.

Unless otherwise agreed upon with the Contracting Authority's Architect in Charge, suitable non-ferrous reinforcement approved by the Architect in Charge shall be used for all plastic repair interventions which have a projection of more than 40mm from the stone surface or an area which exceeds 50mm by 50mm.

Pre-fabricated glass reinforced polyester or epoxy rods having a diameter of not less than 6mm shall be used. Holes shall be drilled with the background to form a grid of dowels fixed not more than 40mm apart. Dowels shall have a minimum anchorage in the stone of 60mm, and the Architect in Charge may request that this bedding depth be increased. All dowels shall be adequately bonded to the masonry fabric with an approved epoxy resin.

Adequately gauged stainless steel or nylon wire shall be used to form a mesh between the dowels. This mesh shall be secured to the resin dowels. This mesh shall be secured to the resin dowels by an approved epoxy resin.

When preparing the reinforcement, allowances shall be made to ensure a minimum cover of 20mm.

The plastic repair mortar shall be based on a lime binder with the addition of approved admixtures and micro fibre strands as specified in this document to enhance bonding and limit cracking.

Aggregates used shall vary from coralline sand, to marble and globigerina limestone sand (xahx) and to pozzolanic additives, as agreed with the Architect in Charge.

The mixes shall approximate a 1:3 binder to aggregate ratio, unless otherwise agreed with the Architect in Charge.

The contractor shall ensure that repair mortar is not stronger than the adjacent fabric.

In the mortar preparation, the contractor shall ensure that the grains of sand and stone dust are adequately coated with the binder paste.

Slaked lime may be used as a binder, with the putty mixed wet with the aggregate and stored in an airtight container as far in advance as possible.

In demanding exposure conditions, hydraulic additives (such as hydraulic lime, terracotta dust) may be added to the coarse stuff immediately before use.

Hydraulic lime may be used to substitute completely the slaked lime, as per architect's instructions.

Cement gauged mixes shall only be used if directed by the Contracting Authority's Architect in Charge.

The mortar shall be built up in layers where necessary, each layer not exceeding 12mm.

The contractor shall ensure good adhesion with no voids. A mechanical key shall be formed to the undercoat/s by combing or scratching so as to produce evenly spaced lines.

Each layer shall be allowed to achieve an initial set prior to the application of subsequent coats. The fresh mortar shall be kept as humid as long as possible to slow down the setting rate and hence avoid cracking.

After the initial set has taken place, the contractor shall stipple the joints with a stiff brush to remove laitance/excess fines and achieve a coarse texture.

It shall be prevented from drying out too rapidly by dampening intermittently with clean water and covering immediately with damp hessian and plastic sheeting.

The contractor shall provide adequate protection from adverse weather until the mortar repairs have fully set.

The required finish shall match the stone surface (in colour, texture, profile etc.) and as approved by the Architect in Charge.

3.58 Methodology: Application of a copertina

The Contractor shall be responsible for the laying of a lime based copertina on projecting ledges (eg. cornices etc.) with the intent of shedding rainwater away and preventing it from ponding over the same ledges. For this intent proprietary, fibre reinforced lime based pre-mixed mortars, as approved by the Architect in Charge, shall be used. The copertina shall be laid to a gradient to the satisfaction of the Architect in Charge. Expansion joints shall also be formed at intervals to be decided upon with the Architect in Charge so as to prevent the formation of shrinkage cracks. The formation of expansion joints shall be considered as intrinsic to the laying of the copertina and the Contractor shall not be entitled to extra claims.

3.59 Methodology: Finishing (limewash and velatura)

Prior to the application of the limewash, the contractor shall wash the background to remove dust and grime, then allow it to dry to a damp state. Any organic growth shall be treated with a suitable biocide as directed by Contracting Authority's Architect in Charge and dead material brushed off before applying limewash.

Limewash shall be produced from mature lime putty mixed with water to a suitable consistency. The contractor shall sieve the mix into a bucket, working through any lumps, but leaving any grit in the sieve. Colour is added as directed by the Contracting Authority's Architect in Charge, mixed in well and sieved again prior to use. As it is difficult to match lime colour batches, it is thus ideal that all lime wash provision required be prepared in one batch.

The contractor shall apply the limewash to the substrate with long-haired bristle brushes, using horizontal, vertical, and diagonal strokes, ensuring the lime wash is applied as thinly and evenly as possible and is burnished into the surface. Overly heavy coats will craze and crack when they harden and dry. If this occurs, the contractor is to wash off with hot water and a stiff bristle brush and ensure that the new covering is properly applied.

The contractor is to ensure even distribution of lime and pigment by constantly stirring the containers of limewash during application. He is to allow the first to dry fully before applying the second coat, and so on, lightly dampening the background before applying the next coat. Damping shall ideally be carried out by spraying water on an area of approximately 2sq.m. at a time. Protection from strong winds and direct sunlight during the drying out period shall be required.

If so instructed by the Contracting Authority's Architect in Charge the contractor shall apply a velatura to new stonework or all the stone fabric as directed by the Contracting Authority's Architect in Charge. The velatura shall be applied to give a unified appearance to the restored facade. The mix of the velatura shall be prepared to the approval of the Architect in Charge and shall be composed of natural (powder) pigments dissolved in clean soft water free from salts having a conductivity inferior to 60µS as approved by the Contracting Authority's Architect in Charge. The Architect in Charge may instruct the Contractor to add a small approved quantity of fixative/ admixture in the form of an aqueous emulsion of acrylic polymer to the solution with the intent of improving adhesion of the velatura to the stone surface. The colour of the velatura shall be as approved by the Architect in Charge following the execution of trials. Unless otherwise agreed upon with the Architect in Charge the velatura shall be applied by a bottle spray.

3.60 Methodology: Completion of works

No part of the scaffolding shall be dismantled prior to the approval of the Contracting Authority's Architect in Charge. The contractor shall give the Contracting Authority's Architect in Charge at least one week notice to allow for a final inspection and the measurement of works. The contractor shall be responsible for the cleaning of all apertures, glazing, ledges, window sills etc from any material resulting from any of the processes outlined in this document. The contractor shall ensure that all gutters, down pipes, gullies etc are clean and in a condition to function effectively.

4. Documentation

4.1 Methodology: Documentation (drawings)

The contractor shall, on completion of works on each section, and prior to the certification of works, submit to the Contracting Authority's Architect in Charge a drawing accurately indicating all interventions carried out. This documentation shall form part of the building file to be submitted to the Architect in Charge on completion of works.

A digital copy of the photogrammetric survey as per tender drawings will be provided by the Contracting Authority's Architect in Charge in AUTOCAD 2009 compatible versions to the contractor.

The contractor shall be responsible to map every intervention carried out so as to provide a detailed record of works for posterity. Distinct interventions (stone replacement, consolidation, desalination, etc) shall be mapped on a separate layer allowing the user to view each intervention separately. The mapping shall be carried on a stone-by-stone basis and the exact demarcation of each intervention shall be denoted by a closed polygon and hatched as detailed by the Architect in Charge.

Prior to the certification of works the contractor shall submit to the architect civil engineer in charge two printed copies (in colour) in scale 1:100 or as requested by the Contracting Authority's Architect in Charge and a digital copy (AUTOCAD 2009 compatible). The drawings and mapping indicated shall be certified by a warranted architect and civil engineer as exactly representing the works (type and extent) carried out.

4.2 Methodology: Documentation (photographic record)

The contractor shall, on completion of works on each section, and prior to certification of works, submit to the Contracting Authority's Architect in Charge a set of photographs indicating all interventions carried out. This documentation shall form part of the building file to be submitted to the Contracting Authority's Architect in Charge on completion of works.

The photographs shall clearly illustrate the interventions carried out as well as the state of the structures to be restored through this tender prior to the commencement of works. Any archaeological, historical or similar evidence such as masons marks, particular construction details, etc discovered on site during the progress of works shall also be documented.

The photographs shall be submitted to the Contracting Authority's Architect in Charge prior to the certification of works. The photographs shall be submitted in digital format saved on a CD (Compact Disk) or DVD as directed and approved by the Contracting Authority's Architect in Charge.

4.3 Methodology: Documentation (report)

Prior to the issuing of the provisional acceptance certificate the Contractor shall submit to the Contracting Authority's Architect in Charge a detailed report outlining all the works carried out. This report shall be accompanied with thorough photographic record and drawings, as defined under Cls.6.1 and 6.2, of all the phases of the works carried out. The report and photographic documentation are to be submitted in two (2) hard and two soft copies.

4.4 Works Guarantee

The contractor shall guarantee the works carried out on the chapels and shall guarantee that the chapels are adequately maintained in their restored state for a period of 24 months from date of completion and certification of all works. In particular, he shall guarantee that:

- a) Any water pipes, culverts, canals, etc and all other structures intended for the passage of rain and/or surface water are kept clean and functional at all times;
- b) No rain and/ or other surface water find its way into, or otherwise percolate, the structure;
- c) Mortar joints do not fail;
- d) No vegetation grows from/ on any part of the restored structure;
- e) No black crust or other deleterious superficial deposits form on the restored building.
- f) Plastic repair works show no signs of damage, particularly in the form of detachment from the masonry fabric or cracking;
- g) Any lime renders applied show no signs of damage in the form of detachment from the underlying masonry fabric, staining, powdering or otherwise;
- h) The paint on new or restored timber apertures does not crack, peel or is otherwise damaged;
- i) Treated/ painted metal work does not rust.

Any remedial works performed during the guarantee period (from completion of works until 24 months after completion of ALL works in this contract) shall be carried out as specified in this document and approved by the Architect and Civil Engineer in charge. 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.

5 HARDSTONE WORKS

5.1 Compliance – Colour, Texture and Quality

- 5.1.1 The proposed hardstone slabs for parvis shall be of the first quality naturally occurring hard stone, colour (yellowish/ reddish/ brownish white) and as approved by the Architect in charge. The natural stone is to be of a compact nature, tightly grained, hard, without blemishes, durable and free from defects and horizontal or vertical fissures and layers. The natural stone shall not have a pitted or cracked surface and shall be of consistent texture. There should be no flaws or weaknesses, either natural or induced by inappropriate methods of extraction. The surface finish must be applied evenly throughout the surface of the hardstone element and it should be carried to the edges. The hardstone elements must be brought to the site already finished and ready to be laid. No surface finishes shall be applied on site. All natural stone elements shall be approved by the architect-in-charge and any material which is in his /her opinion is defective or not in line with specifications and properties outlined in the tender document shall be replaced with material of approved quality at the contractor's expense. The Architect in charge or his representative shall have access to contractor's workshop to inspect material being manufactured and before being delivered to site.
- 5.1.2 The paving slabs shall be 400mm x 400mm or as otherwise directed by Architect in charge and/or as per Bill of Quantities and to the approval of the Architect in charge.

5.2 Compliance – Minimum Material Requirements

- 5.2.1 All proposed hardstone material shall meet the following minimum material requirements:
 - Compressive Strength (greater or equal to) > 40 MPa
 - Bending Strength (greater or equal to) > 4 MPa
 - Density (greater or equal to) > 2400kg/m³
 - Water absorption (less or equal to) < 5%

5.3 Authentic Test Certification

- 5.3.1 Tenderer's attention is drawn to the fact that submitted test certificates must comply with the following criteria to be accepted as authentic Test Certificates:

5.3.1.1 Compressive Strength Testing in accordance with **MSA EN 1926:2006** (Natural Stone Test Method: Determination of uniaxial compressive strength).

5.3.1.2 Bending Strength Testing in accordance with **MSA EN 13161:2008** (Natural Stone Testing Methods: Determination of flexural strength under constant moment).

5.3.1.3 Density and Water Absorption to be determined in accordance with the relative Euro Norms.

5.4 Tolerances

5.4.1 Maximum allowable tolerances shall be +/- 2mm on the width, length and thickness of the slabs.

5.5 Storage and Transport

5.5.1 All hardstone material is to be stacked, before and during delivery on site, in such a manner that it is not damaged in any way due to excessive stresses, atmospheric deterioration or otherwise. All components of the works are to be prepared and packaged for transportation to site in such a way as to ensure that no undue stresses or damage are caused due to shipment by sea or transport overland. All corners, edges and finished surfaces are to be protected to avoid damage until placed into position. Inspection of all paving slabs and components delivered to the site shall be undertaken by the Contractor.

5.6 Bedding Mortar

5.6.1 The bedding mortar, shall be either a pre-manufactured proprietary mix or specifically designed and mixed so as to achieve the following minimum requirements (mean values):

4.6.1.1 Compressive Strength > 30N/mm²

4.6.1.2 Minimum adhesive strength c.a. 1N/mm² and c.a. 2N/mm² when used with bonding mortar.

4.6.1.3 Flexural strength c.a. 3N/mm² All testing shall be carried out in accordance with the relative Euro Norms.

The contractor may be requested to carry out tests prior and during the progress of works such as to ensure consistent quality.

5.7 Bonding Mortar/Primer

5.7.1 Prior to laying, all the hardstone elements shall be applied with a layer of 1mm to 2mm thick high performance, naturally pure hydraulic bonding mortar to enhance the adhesion bond between bedding mortars and both paving/ cladding elements and supporting layers/ structures. The bonding agent shall be designed for natural stone and precast concrete/ stone paving elements and setts.

5.7.1.1 The adhesion strength ca 2.0N/mm² (used together with bedding mortars);

5.7.1.2 Applied as per manufacturer's recommendations.

5.8 Laying

5.8.1 The slabs shall be laid to finish with true and even surface. The joints in slabs and other hardstone elements shall be of uniform thickness.

Appearance: Smooth and even with regular joints and accurate to line, level and profile.

Falls: To prevent ponding.

Bedding of paving units: Firm so that rocking or subsidence does not occur or develop.

Bedding/ laying course: Consistently and accurately graded, spread and compacted to produce uniform thickness and support for paving units.

Slopes: Lay paving units upwards from the bottom of slopes.

Cutting: Cut units cleanly and accurately, without spalling, to give neat junctions with edgings and adjoining finishes.

5.9 Grouting of joints

- 5.9.1 The jointing grout shall be made using hydraulic lime based grout, colour to match stone. Pigments may be added, as necessary, to achieve the right tones. No staining of the hard stone slabs with grouting material shall be allowed. The grouting of joints shall be carried out such that the surface of the hard stone slab is completely exposed. The Contractor may be asked to lay a sample paved area for viewing before he proceeds with further works.

5.10 Workmanship

- 5.10.1 The standard of workmanship for the entire contract work shall be the best standard produced by experienced workforce. The complete paving system is to present true and accurate lines, plumb corners and flat planes with joints in continuous lines, where applicable. No steps, ridges, bumps or ripples will be acceptable either within or between components. Works and rates shall include for working around curved edges. Works shall allow for raking and for straight and circular cutting and for cutting at angles, as necessary. Works shall allow also for the supply and placement of compressible rubber or plastics joint filler for movement joints and for sealing with a two-part polysulfide with colour to match hardstone slabs at location of joints. Cutting shall be carried out with a suitable machine such as to provide clean cuts without spalling and to provide an edge similar to that produced by the manufacturer or quarry. Improvised unprofessional work will not be allowed. Faulty workmanship will not be allowed and rectification has to be carried out by Contractor at his own expense, while maintaining the stipulated timeframes.
- 5.10.2 The contractor shall not cut or drill or otherwise alter the work of other trades or his own work to accommodate other trades, unless such work is clearly specified on the drawings. Whenever such alteration is required, the contractor shall obtain the architect's approval.

2.0 SPECIFICATION FOR THE INSTALLATION OF ELECTRICAL SERVICES

2.1 PREAMBLE TO THE SPECIFICATION

- 2.1.1 The work covers the installation of all Electrical Services within Ta' Bernarda and Taz-Zellieqa Chapels in Gharghur and includes for the supply and installation of all switchgear, cables, conduit, trunking and wiring accessories, complete with all materials and labour necessary for a complete installation.
- 2.1.2 This specification shall be read in conjunction with the General Conditions of Contract, the Drawings issued to date and any others which may become necessary from time to time at the discretion of the Engineer in charge, and also with the Schedule of Prices, which all together form the Contract Documents.
- 2.1.3 The work shall be completed by the contractor to the full satisfaction of the Engineer in charge and the contractor shall be responsible for the satisfactory performance of the service in accordance with the spirit of the design and specifications.
- 2.1.4 The contractor shall prepare working drawings and such installation diagrams, wiring drawings and schematics as may be necessary in the Engineer's opinion. These shall be submitted to the engineer for approval before execution of the work.
- 2.1.5 The contractor shall keep such records as are necessary for the Engineer to be able to complete the as-fitted drawings upon completion of the works.
- 2.1.6 The contractor shall bind himself to co-ordinate his works with those of other contractors, the whole works being scheduled according to the overall works programme prepared by and monitored by the Engineer in charge.

2.2 WORKMANSHIP

- 2.2.1 THE WORKS SHALL COMPLY WITH THE LATEST EDITION OF THE REGULATIONS OF THE BRITISH INSTITUTION OF ELECTRICAL ENGINEERS, including all amendments to date, and the ENEMALTA ELECTRICITY SUPPLY REGULATIONS, Codes of Practice, and normal safety regulations and to the satisfaction of the Engineer.
- 2.2.2 All workmanship shall be of best quality and in accordance with the above. Alternative DIN standards shall be allowed, however mixing of standards shall not be allowed. The Contractor shall guarantee that spare parts for any Equivalent supplied are obtainable in Malta.
- 2.2.3 The electricity supply at terminals shall be 3-Phase 4 wire, 400/230 Volts, 50 cycles earthed neutral.

2.2.4 Installation

The installation shall be carried out in heavy gauge PVC conduit with white plastic wiring accessories. Heavy gauge galvanised trunking, manufactured to high standards shall be used as indicated in drawings. All these shall conform to MSA –EN 50085: 2001 and MSA EN 50086: 2001.

All conduit and fittings shall be installed in chase where applicable, before plastering works and flooring. The contractor shall be required to phase his work with that of the structural and other contractors to ensure timely insertion of conduits, etc.

All conduit installed in the hanger area shall be galvanized conduit surface mounted with metal clad accessories.

All conduits shall be securely fixed to the base material by an approved method and at not more than 1.5 m spacing, unless otherwise allowed by the Engineer.

Conduit boxes carrying accessories shall be independently fixed.

All draw-in boxes shall be easily accessible for wiring and shall be spaced so that there are not more than two 90 deg. solid bends between two boxes or more than 10 m run between them.

A separate Earth Conductor shall be used inside the conduit for Earthing of fittings, accessories (including lighting switches since the client may opt to install decorative metal clad fittings in all areas) and socket outlets etc.

All conduits shall be complete and thoroughly swabbed before draw-in of wires and cables.

The smallest size of conduit allowed shall be 20mm. Conduit shall be sized according to the quantity and size of cables being carried through. Standard accessories shall be used with conduit to terminate at boxes, distribution boards, switchgear, outlets etc., in order to give a completely closed and mechanically secure system.

All conduit and trunking routes shall be approved by the Engineer prior to taking works in hand.

The existing installation shall be dismantled, and existing chases should be traced and recorded. Where possible, existing chases should be reused. New chases should be discussed with the architect and engineer in charge and approval should be handed in writing.

2.2.5 Builder's Work

The tenderer is to allow in the rates quoted, for all chasing, holes in RC or structural members, (all holes shall be made only under approval of the Engineer in charge and by means of circular diamond tipped tools), pipe sleeves (made to approval) etc. necessary for the proper execution of the works. All structural openings shall be approved by the architect in charge.

2.2.6 Wiring

The installation shall be wired with cables having conductors not less than 1.5 sq. mm. Single strand conductors shall not be allowed.

With the exception of final sub-circuits, all cable terminations shall be of the soldered or crimped socket type terminal. Ferrules shall be used to terminate multi strand cables

Loop connections shall only be made at the terminals of accessories or fittings. No joints in cables shall be made except with the written authority of the Engineer. No exposed single core cables shall be acceptable.

The number of cables in any conduit shall conform to the limit set by the above-mentioned IEE Regulations.

All cables shall be colour coded throughout for identification: Brown, Black, Grey for the Phase conductors, Blue for Neutral, and Green/Yellow for Earth.

The contractor shall terminate the wiring in the fitting, accessory and/or equipment as specified in the drawings, etc.

Cables for individual circuits inside trunking shall be grouped together, and marked with circuit number at terminations.

All Cables shall be of the LSZH type.

2.2.7 Earthing

All Earthing installation shall be carried out in accordance with the IEE Regulations.

The main Earth conductor shall be earthed with the Earth Mat and if supplied, with the Earth termination supplied by ENEMALTA in the metering room.

The maximum earth loop impedance of the earth mat shall be 0.10 Ohms.

Separate Earth conductor shall be passed from all conduit and trunking and all fittings for the earth connections of socket outlets, equipment etc.

All trunking is to be separately earthed and earth clips shall be used to bridge different sections of the trunking.

2.2.8 Positioning

All fixture items shall be positioned as per drawings or as instructed by the Engineer.

2.2.9 Markings

All switchgear and distribution boards shall be permanently marked with the voltage and current rating.

Labels indicating the services controlled by the switchgear and distribution boards shall be prepared and fixed on the outside of the appliances as directed.

In addition to the above each distribution board shall have a list of all the equipment names and locations supplied.

2.2.10 Origin of Installation

The installation shall originate from the Main Circuit Breaker located near the main electrical meter. This shall then supply electricity to the main panel and the rest of the chapel. All connections shall be the responsibility of the contractor and shall be duly allowed for.

2.2.11 Uniformity

All materials used under this contract shall be of uniform design throughout. Samples shall be presented at tendering stage for approval.

2.2.12 Testing

The contractor shall provide all the necessary labour and testing instruments for the tests prescribed in the above-mentioned regulations. Approval of works shall only be granted following satisfactory passing of these tests.

The test results shall be recorded in triplicate and signed by the contractor's Engineer and shall be handed over to the Engineer in charge.

2.2.13 Deviations

Any deviations shall be regulated by the General Conditions of Contract.

2.2.14 Measurement

The works shall be measured as specified in the Bill of Quantities and certified by the Engineer in charge.

2.2.15 General Conditions

The General Conditions of Contract shall apply in so far as they are not inconsistent with the above.

2.3 MATERIALS SPECIFICATIONS ~ Electrical Installation

2.3.1 General

All materials to be used in this project are subject to approval by the Engineer in charge, upon presentation of samples.

2.3.2 Miniature Circuit Breakers

Miniature Circuit Breakers shall provide overcurrent and short circuit protection and shall comply with ISO 2924. The MCBs shall be type 3 and shall be capable of dealing with fault currents of 6KA for MCBs up to 30Amp rating and 10KA for higher rated MCBs. They shall be Single Pole or Triple Pole as indicated on the schematic. They shall be easily mounted on DIN rail. The Voltage rating shall be 230/400 V, 50 Hz. The input terminals shall be suitable for 25 sq. mm cable and the output terminals for 16 sq. mm cable.

2.3.3 RCBOs

RCBOs shall have the same specification, where applicable for MCBs, shall be of the single pole type except where otherwise indicated and shall have differential current protection apart from over current protection to the sensitivity as indicated on the drawings and shall comply to BS EN1009.

2.3.4 Switch fuses

All switch fuses shall be according to BS/EN 3185 heavy duty composite units of air break switches and fuses. All fuses are to be of the HRC type and complying with EN 60269-1:1994. The rating of the switchgear shall be clearly marked. They shall have an inner locking mechanism for prevention of pulling out when switch is on.

The enclosure of the switchgear shall be fabricated sheet metal, finished in stove enamel or of epoxy resin of an approved quality.

2.3.5 Glands

Glands for PVC SWA PVC / XLPE SWA PVC cable shall be heavy duty indoor /outdoor type, in brass or gunmetal with suitable armour clamps and earthing provision.

2.3.6 Distribution Boxes

All distribution boards shall be TPN and of the specified rating and shall have sheet steel construction with hinged doors. They shall be suited to take the cables specified and the necessary conduits. Miniature Circuit Breakers are to be fitted to all boards, arranged so as to facilitate wiring. RCBOs shall be used where indicated.

The boards shall allow for the positive isolation of the final sub-circuits. The MCB's shall be of the screwed contact on busbar type.

Before ordering the equipment and switchgear, the contractor is to check with the Engineer as to whether flush or surface mounting is to be used

The operating characteristics of the boards shall be such that the breaker will operate after not less than two minutes with sustained 25% overload. Tripping shall also occur in less than half minute in case of 200% overload, and in less than one second with 800% overload. Operation shall be of the flip-on type.

The distribution shall have factory prepared punch-outs for both the main incomer isolator as well as the RCD's. Dist boards with punch out effected locally shall not be acceptable. RCDs shall comply with BS EN 1008.

Where applicable, the distribution box shall be supplied c/w contactor extension box as well as all contactors as indicated in the drawings.

All main incomer distribution boards shall be furnished with digital multi function meters

2.3.7 Conduit and Fittings

Conduit and outlet fittings, etc., shall be as specified above and subject to approval of samples, which shall be submitted on request.

2.3.8 Cable

XLPE, SWA, LSZH Cable

Armoured cables are to be with shaped or round copper conductors and XLPE insulated, (PVC for 10 sq. mm and smaller), PVC sheathed, single wire armoured and PVC sheathed overall complying to BS/EN 5467. All cables shall be of the LSZH type.

LSZH Cable

The PVC cable shall consist of high conductivity stranded copper wires insulated with PVC 230/400 V type, to BS/EN 7211. All cables shall be of the LSZH type.

2.3.9 Contactors

Contactors shall be capable of switching a three-phase supply four wire (or as indicated in the drawings), and shall be rated to handle the required indicated load.

The retaining coil of the contactors shall be suitable for operation on 240 V / 24 V. In the latter case the contactors shall be such that they can be controlled directly by the BMS

All contactors shall be enclosed in a sheet steel dust proof case.

2.3.10 Time Switches

Time switches shall be of the electronic type, providing adjustable switching periods at any time of the day and for a minimum of 20 changes of operation in every twenty-four hours, and capable of switching an inductive load of 15 A continuous, with a current breaking capacity of 30 A. They shall have a 100-hour backup in case of power failure.

2.3.11 Ceiling Roses

All ceiling roses shall comply with BS/EN 67 and shall be suitable for fixing to standard conduit, round terminal boxes. They shall have the facility for fixing $\frac{3}{4}$ in. connections, including Earth. They shall be of white moulded plastic.

2.3.12 Switched Socket Outlets

These shall be of seven different types:

- 13 Amp 2P+E switched socket outlet, shuttered and shall be in accordance with BS/EN 1363.
- 5 Amp 2P+E switched socket outlet, shuttered and shall be in accordance with BS/EN 546
- Non UK standard type with rectangular phase / neutral terminals and round earth connection. These shall be used for the UPS power.

They shall be suitable for flush mounting, unless otherwise instructed and shall be white moulded plastic. Samples shall be presented at time of tendering for approval.

2.3.13 Fused Spurs

These shall be suitable for connecting a fixed appliance to a ring main socket outlet circuit as prescribed in IEE Regulations.

The unit shall consist of rectangular metal box complete with metal overlapping plates and removable fuse carrier, fitted with cartridge type fuses.

They shall be of the switch type and of approved finish.

2.3.14 Flex Outlets

The flex outlets shall be supplied with three pairs of terminals suitable for 2 x 2.5 sq. mm conductors.

2.3.15 Tumbler Switches

These shall be of the "quick make and break" type, suitable for AC operation. They shall be wired "on" when the knob is down and shall be to BS/EN 1291 Part 1 for 5 Amp type and BS/EN 816 for 15 Amp type.

2.3.16 PVC Trunking

The Cable Trunking shall be manufactured from heavy gauge U PVC material complying with BS/EN. The Thickness of the PVC shall be such that there is no sagging of the trunking with the load of the cables. If in the opinion of the Engineer the trunking deforms with the weight of the cable the contractor shall be requested to remove the said trunking and replace it. The trunking shall be supplied complete with a clip on cover of the same material quality and thickness of the main trunking. Standard manufacturer supplied TEEs, Angles, Reducers, and Multiway Junctions are to be used where required; no contractor manufactured accessories shall be accepted.

2.3.17 ELV Systems Conduit and Trunking

The Fire Detection and Alarm and other ELV systems are to be installed through a distribution of PVC pipes and galvanised trunking network supplied by the contractor as indicated in the drawings.

The main distribution shall be carried out in galvanised trunking as per drawing, with 20mm PVC conduit tapping. Conduit shall be chased in the walls or buried in screed under the tiles.

In general, points shall terminate in a 3 x 3 (6 x 3 for the data) PVC box heavy duty but the size of the data back outlet shall be subject to the recommendations of the data equipment supplier. All wall mounted A/C thermostats are to be finished in a 20mm conduit cut flush to the wall without any back box.

The exact location of points shall be indicated by the client / Engineer on site.

2.3.18 Watertight socket outlets

These shall be installed externally as indicated in the drawings. They shall be of robust, weatherproof construction and rated to IP55. The socket outlets shall be c/w spring-loaded polycarbonate lids. The s/o shall be such that they shall retain their water tightness even when being used.

2.3.19 Lighting Luminaries

Light Fittings shall be supplied by the client. However, the contractor shall be asked to quote for the installation of these light fittings. For this reason, this specification shall be used just to have an idea of what type of light fittings shall be installed on site.

<p><u>Type A: LED flood lights 20W</u></p> <p>(a) Floodlight fittings shall be manufactured of non-corrosive material of pleasing design and of a type that requires no repainting. It shall satisfy BS4533:102.5 and shall have an IP65 rating</p> <p>(b) The enclosure of the lanterns shall be by means of a polycarbonate vandal resistant prismatic front.</p> <p>(c) The control gear shall be supplied with starter, choke, and P.F. capacitor suitable to keep P.F. above 0.9 The fitting shall be complete with the lamp.</p> <p>(d) The fittings shall include a heavy duty robust bracket suitable for wall or floor fixing in the position indicated on the drawing.</p> <p>(e) Cable entry shall be via 20mm gland / cord grip in base of body. It shall incorporate a four-way terminal block suitable to take a 6mm cable per terminal.</p> <p>(f) The fittings shall be supplied c/w all purposely designed brackets etc. for a complete and secure installation.</p>	
<p><u>Type B: Surface mounted adjustable narrow angle LED Spot light c/w variable lens.</u></p> <p>The fitting shall be suitable for a 10W LED lamp. The fitting shall be made of die-cast aluminium body have an IP rating of a minimum of IP23, and shall be suitable to run on 230V, 50Hz. It shall be suitable to rotate the spotlight 360 degrees in the horizontal direction and 90 degrees in the vertical direction. The lamp shall provide a colour temperature of 3000K. The fitting shall be supplied c/w transformer, lead and any other connections required for a complete installation. The lens must be suitable to provide a diameter of 0.5m at a distance of 6m.</p>	

<p><u>Type C: Surface mounted adjustable narrow angle LED Spot light c/w variable lens for External Use.</u></p> <p>The fitting shall be similar to Type B however shall be suitable for an external environment.</p>	
<p><u>Type D: LED flood lights 70W</u></p> <p>Light fitting shall be similar to Type A however shall be rated at 70W. This shall be suitable for external use.</p>	

<p><u>Type E1: Non-maintained Emergency lights</u></p> <p>These shall operate upon failure of electrical supply and shall give illumination for a minimum period of three hours. They shall be supplied complete with dry rechargeable battery backup, charger, an indication when electrical supply is present, 15-watt fluorescent tube or 9-watt PL lamp; polycarbonate or anodised aluminium case. They shall also be complete with LED's showing charge state of the batteries. These emergency lights shall be complete with visual indications (luminous signs) giving directions to enable the employees to leave the premises in case of emergency. The units shall give a minimum light intensity of 200 lumens on standby after 100 burning hours.</p>	
<p><u>Type E2: Maintained Emergency lights</u></p> <p>These shall be similar to light fittings type E1 but shall remain lit all the time. These fittings shall generally be installed in the staircases and as indicated in the drawings.</p>	
<p><u>Type E3: Maintained emergency lights with exit indication</u></p> <p>These shall be similar in principle to light fittings type E2 but shall be suitable to have an exist sign clearly displayed in order to denote the exit routes. These fittings shall be suitable to install both parallel as well as perpendicular to the walls (Flag Type).</p>	
<p><u>Type H1: Wall mounted light fitting 18W PL c/w electronic ballast</u></p> <p>The fittings shall be such that they shall not protrude onto the staircase. They shall have a glass screen and shall be aesthetically pleasing. They shall be suitable to take 1 x 18W compact fluorescent lamps and shall be supplied complete with electronic control gear to obtain a minimum power factor of 0.9.</p>	

<p><u>Type H2: Ceiling Mounted light fitting 2 x 18W PL c/w electronic ballast</u></p> <p>They shall have a glass screen and shall be aesthetically pleasing. They shall be suitable to take 2 x 18W compact fluorescent lamps and shall be supplied complete with electronic control gear to obtain a minimum power factor of 0.9.</p>	
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General

In general, all fittings are to be supplied with lamps, control gear, PF capacitor etc. as may be required for the complete functioning of the light fitting. Samples of each type of light fitting offered are to be presented prior to ordering.

The lamps shall have a colour temperature of 4000k unless otherwise indicated.

All emergency lighting shall have factory fitted batteries and controllers. Fittings converted to emergency lights locally shall not be acceptable.

2.3.20 Brackets

All cable trays, cable trunking and the like, shall be supported at spacing of not more than 1.5 meters apart and at all changes in direction. Hangers, brackets and supports shall be of the pre-galvanised type with factory made fittings. No local manufactured brackets cut and welded on site shall be accepted.

2.3.21 IP65 Connection boxes

These boxes shall be used externally for looping of the armoured cable feeding the low - level lighting and any other lighting or general power circuits. These shall be of polycarbonate construction with an IP65 rating and shall be complete with a DIN rail and grip connectors.

2.4 MATERIALS SPECIFICATION Surge Protection Devices

2.4.1 General

Electrical AC power line surge protection devices shall be installed as indicated in the drawings. The surge protection equipment shall be as per BS EN 62305-4. The SPD shall provide:

- Surge Test Waveform – 10/350 μ s
- Peak Test Current – 25kA per phase, of surge protection
- Protection modes: L-N, L-G, L-L, and N-G
- One Power Present LED, one Protection reduced LED per phase on front panel, One site fault indicator LED
- The SPD shall also have a remote indication facility
- Volt-free contact to enable the protector to be used to warn of phase loss.
- Ten Year warranty on the SPD

- Three-way visual indication of protection status, with pre failure indication
- IP 65 housing
- Compact and robust material
- The SPD shall also have DIN rail mounting possibility

The SPD shall be able to provide protection against both the effects of direct lightning strikes (high- energy) and indirect lightning strikes. Direct lightning strikes shall be protected by lightning current or equipotential bonding SPD's, while indirect strikes and switching transients shall be protected by transient overvoltage.

The SPD shall not disrupt normal operation of mains power supply through the creation of follow current or high leakage currents. The SPD shall be able to withstand repeated transients. The SPD shall also have a low let through voltage between every pair of conductors. The SPD shall be suitable to handle partial lightning currents as well as allowing continual operation of protected equipment.

2.4.2 Standards

The specified surge suppression shall be designed, manufactured, tested and installed in compliance with BS EN 62305-4

2.4.3 Environmental Requirements

The surge suppressor shall be suitable to operate in a temperature range of -40 to $+70$ degrees C, and shall be suitable for a storage temperature of -40 to $+85$ degrees C. It shall be suitable to operate reliably in a relatively humid environment, and shall have a maximum continuous operating voltage of no less than 125% of the nominal rated line voltage, and have an operating frequency of 50Hz.

2.4.4 Electrical Requirements

The voltage rating shall be 415 V rms. The maximum surge current handling (10/350 μ s) shall be 25kA per phase. The SPD response time shall be less than 10ns and shall have a back up fuse of not more than 125 A rating.

The following shall be the operating voltage range:

L-N	200-300Vrms
L-L	350-450Vrms

The leakage current to earth shall be less than 250 μ A, while the indicator circuit current shall be less than 10mA.

The nominal discharge current 8/20 μ s per phase of the specified system, based on the standard BS EN 62305 shall be of approximately 20kA, while the let through voltage shall be less than 900V. The impulse discharge current 10/350 μ s per phase shall be approximately 4kA and the let through voltage shall be less than 750V.

The transient suppression capability shall be bi-directional and suppress both positive and negative impulses. The suppressor shall also contain a common mode noise filter.

The unit shall be installed in parallel with the protected equipment. No series connected protective elements shall be used.

2.4.5 Installation

The unit shall be installed in accordance with the manufacturer's printed instruction to maintain warranty. All local MRA / Enemalta regulations shall be adhered to and observed. The manufacturer shall also supply a warranty of at least 10 years. SPD's shall be installed as close as possible to the power supply being protected and enclosed in an IP65 enclosure. Connections between the SPD and supply lines (inc. phase, neutral and earth) shall be kept as short as possible (not more than 50cm). The phase/live connection leads shall also be suitably fused using MCB's/MCCB's for isolation purposes. The installations shall also be as close as possible to the system's earth cabling. Cables connecting the clean end cables shall not be installed or routed next to incoming lines (dirty lines) or the SPD's earth bond. The surge protection equipment shall be enclosed in an enclosure made from a robust and rigid material and shall be complete with mounting flanges or brackets as may be required.

3.0 SPECIFICATIONS FOR THE INSTALLATION OF MECHANICAL SERVICES

3.1 PREAMBLE TO SPECIFICATION

3.1.1 Scope of work

The work covers the installation and connecting up, testing and commissioning of the mechanical services and includes for the supply and installation of all equipment, piping and accessories.

The contractor shall:

- * Execute the work in a diligent and competent manner.
- * Complete the work in its entirety, to the Engineer's satisfaction and in accordance with the design and instructions of the responsible Engineer.

3.1.2 Discrepancies

Special attention has been given such that as far as possible, the drawings, specification and schedule of items, detail the whole of the requirements for this work. The tenderer shall however satisfy himself that these documents cover the complete systems, as regards materials, equipment and accessories, for the correct and proper operation of the installation as a whole.

3.1.3 Extent of Works

This part of the works includes for Plumbing Installation. All major pipelines and service type shall be identified according to BS 1710: 1984.

3.1.4 Complete System

The system shall be complete and working in all respects, and shall include all necessary accessories, fittings, ancillary equipment, pipes, vents strainers, dampers, valves, controlling equipment, insulation, drains etc., and all items not specifically mentioned according to the scope and spirit of this description.

3.1.5 Protection of works

The Contractor shall protect all equipment, material and works until taken over by the client and shall remain his sole responsibility until official handing over.

3.1.6 Completion

Completion dates agreed to in other sections of this contract shall be binding in so far as this section of the works is concerned.

3.1.7 Quantities / Variations

The consultants may supply any additional drawings or directions as may be necessary for the proper execution of the work. If the work shown on any such drawings or directions is, in the opinion of the contractor, extra to that comprised in the specifications and Bills of Quantities, he shall give notice in writing to this effect before proceeding with such

work; if this condition is not adhered to, the Contractor shall have no right for any additional claim at a later stage.

3.1.8 Working Drawings

The Contractor shall be responsible for the preparation of all-working drawings, diagrams, schedules of materials, etc., necessary, to be submitted to the Engineer for approval before proceeding with the works. The contractor shall prepare technical submittals for the main items of plant and equipment for approval prior to order.

3.1.9 Alternatives

The tenderer can offer items or systems, which are not according to the specification but that in his opinion shall give the desired overall effect. In this regard, he is requested to give a full detailed description of the offered system together with all necessary drawings, for the evaluation by the consultants. The consultants can refuse any changes to the design before and after the contract has been let and during the execution of the works. The tenderer however is NOT ALLOWED TO CHANGE ANY OF THE DESIGN PARAMETERS, PIPE SIZES, and SIZES OF DUCTS ETC.

IN THIS EVENT THE TENDER SHALL NOT BE CONSIDERED, AND THE TENDERER SHALL BE DISQUALIFIED.

3.1.10 The contractor shall prepare working drawings and such installation diagrams, wiring drawings and schematics as may be necessary in the Engineer's opinion. These shall be submitted to the engineer for approval before execution of the work.

3.1.11 The contractor shall keep such records as are necessary for the Engineer to be able to complete the as-fitted drawings upon completion of the works.

3.1.12 The contractor shall bind himself to co-ordinate his works with those of other contractors, the whole works being scheduled according to the overall works programme prepared by and monitored by the Engineer in charge.

3.2 WORKMANSHIP

3.2.1 Regulations

All work shall be carried out in accordance with the relevant safety regulations, British Standard Code of Practice CP. 352 and normal trade practice and to the entire satisfaction of the Consulting Engineer.

3.2.2 General Conditions

All work is to be executed according to the general workmanship specification found elsewhere, unless otherwise specified to the contrary hereunder.

3.2.3 Piping Installation

Main supply pipes for the various installations shall be as follows

Fresh water distribution:	Polyethylene PN 16 pipework and fittings tested to BS 6920 or Polybutylene PN16
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All pipe sizes shown shall be internal diameters. All pipework shall be colour coded with colour bands where installed above false ceilings and throughout the entire length of the pipe where this is exposed (e.g. in basement).

Any pipes, brackets, hangers, steelwork and the like, shall be protected by galvanizing. Pipes shall be finished with two-finish coats enamel paint in an approved colour so as to be colour coded. Flow direction shall be stencilled clearly on the pipe itself.

Horizontal pipes shall be supported at spacing of not more than two meters apart for galvanised pipes / copper pipes and 0.75m for polyethylene and polybutylene pipes and at all changes in direction.

Hangers and supports shall be secured with neat purposely made wrap around bolted brackets. The method and location of supports shall be as indicated by the Engineer.

Where threading is used, this shall be carried out for the total length of the joint or accessory with a good threading machine.

Any threads exposed after jointing shall be painted with a suitable rust preventer.

PTFE tape or hemp with a good threading compound shall be used throughout on all threaded joints.

All distribution pipe work shall be thoroughly cleaned before any tests are carried out. Pressure test shall be applied to the piping only excluding any parts of the equipment. The test pressure shall be one and a half times the operating pressure and shall be applied for duration of at least four hours. The tests shall be applied before any insulation is installed or pipes concealed.

Installation of hot and cold water in toilets shall be carried out using a Polybutylene or CPVC pipe system or any other similar and approved pipe system that carries an equivalent guarantee.

No pipe work is to pass from underneath floor tiles except where specifically approved.

Sizing of pipes shall be as indicated on drawings. In toilets the size of the PVC piping shall be as indicated in the drawings.

All pipe ends shall be blanked off during the works to prevent the ingress of dirt and other obstructions, which may cause blockages etc. The contractor shall take all precautions to comply with this measure. Drain pipes of rigid PVC, shall be properly jointed in accordance with the manufacturer's recommendations. Adequate blank Tees shall be inserted in all drain pipework to ensure easy cleaning and rodding in case of blockages in the future.

Pipe joints shall under no circumstances be allowed in the thickness of walls, floors, etc. Pipework shall be placed in chase within walls, only where specifically instructed by the Engineer.

Sleeves shall be provided wherever pipes cross-floors or walls in the structure. When these are required to cross Reinforced Concrete members, instructions are to be sought from the Architect as to the correct placement, and size of the holes, as also to the method of procedure in drilling. PVC sleeves shall be cemented into the wall thickness and the space between the pipe and the sleeve shall be caulked with approved flexible mastic or asbestos string etc.

Pipework shall be fixed at approved levels after co-ordination with the Engineer as to False Ceiling heights etc. They shall be properly hung using adequate brackets, hangers, support frames etc. Provision of loops, expansion bellows, or the use of changes in direction, shall be necessary to allow for pipe movement and expansion.

Quantities of pipework and valves are as accurate as possible, but the contractor is invited to check the runs for himself and satisfy himself as to their correctness.

Steel pipes, which are welded, shall have flanged joints where there are change in direction or when a straight run exceeds twelve meters.

3.2.4 Chrome and Sanitary Ware

Chrome finished stopcocks, taps, connectors, angle valves and all sanitary ware shall be supplied by the Client, but rates quoted shall include for the fixing by the Contractor.

3.2.5 Testing and Commissioning

All testing and commissioning shall be in accordance with IHVE and BS guides for test procedures, and to the satisfaction of the Engineer.

Although testing of individual sections is allowed, in the interest of speed, the testing shall be considered carried out only when the COMPLETE installation is tested and commissioned. The contractor shall remain responsible for individually tested sections and will cover them at his own risk.

The contractor shall provide all test points, equipment and facilities to carry out the tests, both on site and at remote locations. All manufacturers' items performance data and characteristics shall be collated together with test results, for future reference and maintenance.

All equipment shall be adequately labelled and marked. Schematic pathway and riser "as built" Drawings etc., shall be prepared by the contractor and presented to the Engineer on completion.

The following tests are to be carried out during or before commissioning:

Pipework testing - All pipework runs shall be tested, including bellows, joints, flexibles etc., and a test schedule shall be prepared by the contractor, for approval and used to clarify the tests carried out. This schedule shall be approved by the Engineer before adoption for use.

Hydraulic testing of pipe runs - This shall be to 1.5 times working pressure for FOUR hours duration, and shall exhibit no loss of pressure, and no visible leakages on inspection. Any parts or instrumentation not designed for such pressure shall be temporarily excluded from the test.

Notice of tests shall be given to the Engineer who shall be the only one to certify test approval. A minimum notice of 24 hours is to be given to the engineer by the contractor for the review of the tests.

3.2.6 Method statement

The contractor shall furnish the Client / Engineer with a detailed description of the method statement to be employed in the installation of the various services. This applies both for the internal installations as well as in the supply and installation of the main plant. This method statement is to be approved by the Client / Engineer prior to the works being taken in hand.

3.3 MATERIALS SPECIFICATION - Plumbing

3.3.1 Uniformity

All materials used under this contract shall be of uniform design throughout, similar parts being interchangeable.

3.3.2 Piping

All piping shall be as specified above and of the sizes indicated in the bills of quantities and on drawings.

3.3.3 Flexible pipe connectors

Flexible pipe connectors shall be installed in order to minimise noise and transmission of vibrations from the equipment to the pipework.

Flexible pipe connectors shall be included and installed on the inlet and outlet sides of pumps. They shall be sized equal to the adjacent pipework to which they are connected.

They shall be manufactured from approved materials; having flanged or screwed ends, and shall be designed to withstand the test pressures and system working temperatures without deterioration. Manufacturer's data is to be submitted for approval before quantities are obtained.

3.3.4 Valves

Valves shall be made of the same material as the pipework being used and shall be of the same brand and from the same manufacturer as the pipe on which it is installed.

Drain cocks are to be installed at the bottom of each run. Automatic air vents shall be inserted at the high points of each section.

Provision is to be made for the use as necessary of Automatic Air Vents, with copper or S/S steel floats and guides, and non-corroding ball needle valve and seats. A lock shield valve shall precede all air vents.

Valves, etc., shall be installed wherever in the system they are necessary so that this can be closed off without affecting the remaining sections. Some of the important nodes and positions are indicated in the drawings, but these are not exhaustive, and the consultants' recommendations shall be marked on the contract documents, in this respect, and shall serve as a basis for the works.

4.00 SPECIFICATION FOR EXTRA LOW VOLTAGE INSTALLATIONS

PREAMBLE TO THE SPECIFICATION

- a. The contractor shall prepare working drawings and such installation diagrams, wiring drawings and schematics as may be necessary in the Engineer's opinion. These shall be submitted to the engineer for approval before execution of the work.
- b. The contractor shall keep such records as are necessary for the Engineer to be able to complete the as-fitted drawings upon completion of the works.
- c. The contractor shall bind himself to co-ordinate his works with those of other contractors, the whole works being scheduled according to the overall works programme prepared by and monitored by the Engineer in charge.
- d. Installation of fire detection system to be carried out by contractor having international accreditation.

4.1 GENERAL

4.1.1 Regulations

The whole of the works shall be executed to the entire satisfaction of the Engineer and shall comply with the B.S.S. / Relevant European Norms.

4.1.2 Standard Specification

All the material used shall comply with the relevant B.S.S. / EN. Should the contractor quote for equipment of different specifications he shall give a full description of the standards to which the equipment conforms.

4.1.3 Electricity Supply

The electricity supply shall be 230V 50Hz earthed neutral.

4.1.4 Other Services

The following works are covered by other sections of the specification:

- (i) Provision of electrical supply points.
- (ii) Laying of all necessary conduit and trunking.

4.1.5 Uniformity

All materials used under this contract shall be of uniform design throughout. Similar parts and equipment being interchangeable.

4.1.6 Variations

In the event of additional work being required, the rates at which the work shall be paid for shall be the rates quoted in the Bills of Quantity. Any variations shall only be admissible if they are given in writing by the Engineer and the Client.

4.1.7 Testing and Commissioning

SECTION 5 - SUPPLEMENTARY DOCUMENTATION

5.1 - Draft Contract Form

5.2 - Glossary

5.3 - Specimen Performance Guarantee

5.4 - Specimen Prefinancing Guarantee

5.5- Specimen Retention Guarantee

5.6 - General Conditions of Contract

The full set of General Conditions for Works Contracts is attached with this tender.

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.