# **TECHNICAL SPECIFICATIONS**

# **1.0 PRELIMINARY WORKS**

### 1.1 ACCESS

Access to the site will be from the existing south entrance. The materials will be carried to the construction area through this gateway. A temporary double lockable gate must be installed. All the accessible borders of the site must be secured during and after the working hours.

## **1.2 TEMPORARY WORK BARRIERS**

1.2.1 Site must be secured before the start of the works with temporary work barriers and all of the other health and safety measures. This will include installation of mobile work barriers (min. 2m) covered with safety net along the inside of the perimeter walls of the site. A double lockable gate will be installed to the entrance at the south and will be kept closed at all times. In case of any unauthorized entry to the site observed it must be reported to the engineer of the contract immediately.

## 1.3 SCAFFOLDING

The set-up, erection and dismantling of internal and external scaffoldings must be designed and executed by the health & safety office of the contractor. Fabricated tube and coupler system must be used for all scaffolds and the Contractor should follow all health and safety regulations in force. Scaffolding costs must be factored in the unit rates of the works items for which scaffolding are required.

- 1.3.1 The base poles of the scaffolding must be levelled and secured on rigid ground and wooden planks.
- 1.3.2 Before erection of the internal scaffolding the floor must be covered with nylon and the feet of the scaffolding must sit on wooden planks.
- 1.3.3 Scaffold platforms must be minimum 80cm wide and fully planked.
- 1.3.4 There will be no direct contact or use of any types of ties between the scaffolding and the monument.
- 1.3.5 Wooden planks will be used at the joints between the scaffolds and the masonry.
- 1.3.6 Two guardrails will be installed at 45cm and 90cm
- 1.3.7 All horizontal openings larger than 20cm must be protected
- 1.3.8 The working space between the monument and the scaffolding must not exceed 30cm. In case of larger gaps is not avoidable guardrails should be provided as indicated above.
- 1.3.9 Scaffolds with a height to base width ratio of more than 4:1 must be externally supported.
- 1.3.10 Cross braces should be used where necessary.
- 1.3.11 Toe boards should be installed at the all edges.
- 1.3.12 The scaffold and all parts related must not be over loaded more than its capacity.
- 1.3.13 The scaffold platforms must be kept clean at all times.

### 1.4 TEMPORARY SUPPORTING OF ROOF AND BUTTRESSES

Two different types of temporary supporting system will be executed in order to support the ceiling of the church and the buttresses where necessary. Proper scaffolding should be constructed to protect the whole structure during barrel vaults repairing works and the consolidation of the flying buttresses.

Before the implementation of the temporary scaffold, the floor must be protected using nylon.

- 1.4.1 Contractor must ensure that the design of the temporary supports will bear the load of the designated structure.
- 1.4.2 Cracks on the church's roof: Temporary supporting system is required to be set up prior to the conduction of any repairing works. This should be of a total width of 4m; 2m of the left and 2m on the right side of the crack, along with the whole span length. The constructor shall submit calculations and construction materials capable to carry a load of 12kN/m2 surface. This shall be approved by the engineer.
- 1.4.3 Wooden planks must be used for padding to protect the surfaces of the masonry.
- 1.4.4 The supporting scaffolding at the ceiling must be constructed under all adjacent to arches and vaults.
- 1.4.5 Buttresses: For the support of the buttresses the supporting system should be designed to carry a load of 15kN/m2 surface. This shall be approved by the engineer.
- 1.4.6 All health and safety measures must be applied to ensure the safety of the public and the workers

#### 1.5 TEMPORARY BIRD CONTROL MEASURES

- 1.5.1 All holes and windows must be covered with temporary bird control measures without any disturbance to the masonry.
- 1.5.2 Where doors, windows, will be removed for maintenance or reconstruction, or on existing openings of windows where the frames or glazing is missing, a PVC mesh 8X8mm, supported on a wooden frame will be used. The frame must fit exactly to the opening or gaps. Those frames must be supported to the walls or windows frames with removable plastic clips. Those frames will be removed at the end of works or when doors or windows have been replaced.
- 1.5.3 Temporary bird control measures must be taken for construction openings or gaps. PVC mesh or green PVC cloth can be used accordingly.
- 1.5.4 The use of gypsum or mortar or any other plaster material is not allowed for temporary support of bird control measures.

#### **1.6 TEMPORARY PROTECTION OF ICONOSTASIS**

It is very important to protect existing iconostasis inside the church due to its historical value. Special attention must be shown during the protection works so as not to damage any part of iconostasis.

- 1.6.1 Before starting any works inside the church the existing iconostasis must be protected by a wooden frame structure covered with OSB sheets. Do not support OSB sheets from iconostasis.
- 1.6.2 All parts on both iconostasis will be tightly covered of latex foam, 5cm thick, stabilized with a durable adhesive tape. The tape must not attach to the wooden areas but only around the latex foam. A second layer of polythene sheets must cover externally all parts of iconostasis to protect foam from humidity.
- 1.6.3 Removal of the protection is only allowed when all the internal works are completed.
- 1.6.4 Removal of the protection works will be carried out under the supervision of the Conservator of the Contractor.

### 1.7 COLLECTION, MAINTENANCE AND STORAGE OF FRAGMENTS

- 1.7.1 A qualified archaeologist must be hired by the Contractor to perform the works described in the chapters below. The Archaeologist will be referred to as the "Archaeologist of the Contractor".
- 1.7.2 A qualified Conservator must be hired by the Contractor to perform the works described in the chapters below. The Conservator will be referred to as the "Conservator of the Contractor".
- 1.7.3 There are many scattered items with possible archaeological and or architectural values around the site. These items must be gathered under the supervision of the Archaeologist of the Contractor. ;

Gathering of fragments will be done with accordance to the Engineer instructions. Only removable pieces will be gathered. In built fragments will be protected during the works and will be will be evaluated of the Archaeologist of the Contractor and maintained on the spot under the supervision of the Conservator of the Contractor.

- 1.7.4 Fragments found have been recorded as following:
  - a. Drawing A-Ex 03 Picture 12. Candles table
  - b. Drawing A-Ex 03 Picture 13. Two stones with dedicative inscription
  - c. Drawing A-Ex 03 Picture 48. Corinthian capital (south side yard)
  - d. Drawing A-Ex 03 Picture 49. Corinthian capital (north side yard)
  - e. Drawing A-Ex 03 Picture 50. Marble column and marble piece (east side yard)
  - f. Drawing A-Ex 03 Picture 51. Doric capital and fountain decoration capital (south entrance)
  - g. Drawing A-Ex 03 Picture 52. Doric fountain decoration capital (south entrance)
  - h. Drawing A-Ex 06 Picture 192. Corinthian capital (east yard)
  - i. Drawing A-Ex 06 Picture 193. North Sanctuary Holly altar table (inside church)
- 1.7.5 All fragments should be preserved and maintained under the responsibility of the Contractor, and placed inside the church after the end of the works.
- 1.7.6 There is a number of built-in fragments inside the church. Revelation, cleaning, maintenance, and restoration if needed, must be done exclusively by the contractor's Conservator under the supervision of the Engineer.
- 1.7.7 There is a number of built-in decorative elements outside the church and also on the roof. Cleaning, maintenance, and restoration if needed, must be done exclusively by the contractor's Conservator under the supervision of the Engineer.
- 1.7.8 During the works new items can be revealed and these must be rreported to the Engineer immediately. Those items must be documented by the Archaeologist of the Contractor and maintained under the supervision of the Conservator of the Contractor.
- 1.7.9 Inside the church there are wooden parts of the ridge of Despotic tire. Special care must be given for those parts, protection and storage will be only under the instructions of the Conservator of the Contractor. (Conservation proposals pictures 51 and 52)
- 1.7.10 The floor area of the left sanctuary including the fragments found in this area, was covered by a wooden stage. It was not possible for this area as also the fragments found to be evaluated. Those items must be documented by the Archaeologist of the Contractor and maintained under the supervision of the Conservator of the Contractor.

# 2.0 SITE CLEANING/CLEARING

### 2.1 GENERAL CLEANING

The areas to be cleared and cleaned consist of a courtyard and interior of the church. Cleaning of the courtyard includes all small plants, rubbish, and debris with the protection of all existing trees. Before starting cleaning works it must be ensured that the archaeological and/or architectural items are secured.

- 2.1.1 All the works will be carried out by small hand tools.
- 2.1.2 All waste material and unwanted items must be removed and disposed off-site.
- 2.1.3 All vegetation around the courtyard including small plants and scrubs must be cut and removed. Herbicide must be used for the complete removal where is needed.
- 2.1.4 The cement slabs around the courtyard will be cleaned and protected during the works.
- 2.1.5 Interior of the church must be cleaned and cleared from the dirt and bird faeces.
- 2.1.6 There are some pieces of the wooden stage inside the church. These pieces must be collected and disposed.
- 2.1.7 The disposed debris must be cleared off-site continuously.
- 2.1.8 The site and the adjacent area must be kept clean at all times during the progress of the works.

# **3.0 REMOVAL OF INAPPROPRIATE ADDITIONS**

This section covers the removal of selected items around the site. Before the start of any removal or demolition instruction and approval of the Engineer is required.

### 3.1 REMOVAL OF ELECTRIC CABLES AND FITTINGS

There are many electrical cables, sockets and light fittings on the interior and the exterior walls of the church. All these electrical fittings must be removed from the monument except the distribution board and main electric supply cable located on the left corner of the south façade. The frame of the distribution board will be repaired and maintained as covered on the drawing A-Pr 11 detail 4.

- 3.1.1 All electric cables and fitting must be removed by an electrician under the supervision of the Conservator of the Contractor, so as to avoid damages on stones and plasters.
- 3.1.2 Utmost care must be taken during removals in order to protect the monument.
- 3.1.3 All removed items will be collected as per the Engineer's instructions.
- 3.1.4 The holes must be treated where necessary with hydraulic lime mortar as specified on section 4.13 to prevent water penetration.
- 3.1.5 The coper pipes system to support for cabling is only indicative and not on the scope of the works.
- 3.1.6 There is an existing D/B on the wall under the portico. This must be replaced with a new one of the same dimensions and materials. A new door must be constructed and installed. See drawing A-Pr 11, detail 4.

### 3.2 REMOVAL OF METAL FIXTURES

There are various types of non-historical metal fixtures attached to the external and internal masonry. These items must be observed and marked by the Engineer and the Conservator before starting to the removal works.

- 3.2.1 The holes must be treated where necessary with hydraulic lime mortar as specified on section 4.12, to prevent water penetration.
- 3.2.2 The wooden box attached on the upper level of the West façade will be removed. Any holes or damages that caused from metal fixtures must be treated according to section 3.2.1
- 3.2.3 All removed metal items will be collected as per the Engineer's instructions and should be evaluated by the Conservator of the Contractor.
- 3.2.3.1 The nails on the North internal wall which previously supported the painting of Agios Sergios and Vakchos, must be treated and conserved in place, under the supervision of the Conservator of the Contractor.

#### 3.3 REMOVAL OF CEMENT MORTAR

Cement mortar has been used at several areas on the exterior masonry. These areas must be identified with the Engineer and carefully removed.

- 3.3.1 Only small hand tools must be used during removal works.
- 3.3.2 Special care must be taken so as not to harm surrounding stones.
- 3.3.3 If it is observed that this process may damage the surrounding structure, the Engineer should be informed for further instructions.
- 3.3.4 Loose material must be cleaned thoroughly, and the revealed joints must be repointed as specified on section 4.5.

## 4.0 MASONRY

### 4.1 REMOVAL OF VEGETATION

All organic growth on the roof, buttresses, internal and external walls must be treated with Glyphosate based herbicide or equivalent, that is suitable for vegetation removal on masonry monuments.

- 4.1.1 The vegetation should not be cut before the application of herbicide. The leaves of the plants must be remained as the herbicide acts through photosynthesis.
- 4.1.2 Herbicide should not be applied on windy and/or rainy weather conditions.
- 4.1.3 It must be taken into consideration that the application of herbicide cannot be effective if the area gets wet subsequent the 48 hours after the application. In this case the application process must be repeated.
- 4.1.4 Before herbicide application the area must be cleaned and brushed carefully. The application area must be checked to be free from excess dust and soil.
- 4.1.5 After at least 15 days from the application of herbicide the vegetation expected to be dried. The application area must be monitored carefully and after 15 days if the organic growth is not fully dried, the herbicide treatment should be repeated with the same sequence until the vegetation is fully dry.
- 4.1.6 Once the vegetation is dried Engineer's approval required for cut and/or remove the organic growth.
- 4.1.7 As the procedure takes longer time for big plants with hard roots and thick stem, herbicide should be injected into several points on the stem. After 15 days roots must be checked and if the root is still difficult to come out, herbicide treatment should be repeated. After it has been ensured that organic growth is fully dry, the complete roots of the vegetation should be removed.
- 4.1.8 If the roots are deeply penetrated into masonry, removal of some stones might be necessary. All stones that obligatory for removal should be marked for inspection and approval of the Engineer.

- 4.1.9 Algae, mosses and lichen on the masonry should be checked carefully after 15 days of from the biocide application and should be removed with brush if the organic growth is fully dry.
- 4.1.10 After the successful completion of the herbicide treatment and vegetation removal all areas must be cleaned with Bristle brushes with spraying low-pressure water with angle. The water that will be used must have low sodium chloride level.
- 4.1.11 Utmost care must be taken during the application of herbicide and all precautions for the health and safety must be followed as per the manufacturer instructions.

#### 4.2 PLASTER REMOVAL FROM THE INTERNAL WALLS

The complete surface of the internal walls of the church is covered with gypsum plaster. Due to cracking and defect, renders must be removed where completely deteriorated. Removal of renders will allow a better and close check of the masonry and vaults status (cracks, defected stones etc.). Appropriate methods for the observation of the current status of the plaster should be proposed to the Engineer by the Conservator. All works should be supervised by the Conservator of the Contractor.

- 4.2.1 The area marked as Stage 1 at drawing no A-EX 02 is the oldest part of the monument. Indications for the existence of historical plaster have been found in those areas. In order to determine which surfaces are coated with a historical plaster, careful removal of the paint layers with which it is covered should be done. The cleaning should be done under the supervision of the Contractor's Conservator. Surfaces that are found to be historic coatings should be marked. A documentation about the importance and the historicity of the plaster must be given from the Contractor's Archaeologist. Depending on the significance of the findings, it will be decided by the Engineer whether the destroyed or detached coatings will be replaced or stabilized. Where the historical plaster needs to be removed and replaced, that needs to be analysed with XRD or and XRF analysis and then where re-plastering works must be done, this will be carried out according to the Engineer's instructions.
- 4.2.2 Work must be done by hand only (chisels, hand hammers) without any use of heavy machinery.
- 4.2.3 The work must be done with care so as stones below will not be affected. Sample work must be done first in order to identify mortars hardness. After the removal of the mortar, wall must be cleaned thoroughly.
- 4.2.4 There is a possibility of existence of wall paintings under the layers of plaster which may be revealed during the removal works. In any indication of such situation, works must be stopped and the Engineer must be informed immediately for further instructions.
- 4.2.5 Cleaning must be carried out with soft brushes and pressured air to remove all dust and small particles at the areas where plaster removal has been conducted.
- 4.2.6 10 to 15cm along each side of crack will be removed for stabilization and blending of new plaster.

#### 4.3 PLASTER REMOVAL FROM THE EXTERNAL WALLS

The cement plaster on the arcade of the south portico must be removed due to evident harm of cement to the structure. The cement plaster should be carefully removed from all surfaces of the arches and columns.

- 4.3.1 Work must be done by hand only (chisels, hand hammers) without any use of heavy machinery.
- 4.3.2 The work must be done with care so as stones below will not be affected. Sample work must be done first in order to identify mortars hardness. After the removal of the mortar, wall must be cleaned thoroughly.
- 4.3.3 Cleaning must be carried out with soft brushes and pressured air to remove all dust and small particles at the areas where plaster removal has been conducted.

- 4.3.4 After all surfaces are fully cleaned stonework will be checked again at this stage and further instructions will be issued regarding possible stone replacement and other repairs (see below).
- 4.3.5 According to the revealed surface, walls will then be repointed with lime mortar (dressed stone areas) or plastered (irregular stone areas) (as described below).

### 4.4 STONE CLEANING AND REMOVAL OF LOOSE DEPOSITS

This section covers general cleaning of the existing sand stones and other surfaces from dust, dirt, loose deposits and other stains. Extended areas of the church external walls are either lime-washed or present natural weathering, staining, biological growth and dirt.

- 4.4.1 No chemicals are allowed for the cleaning works
- 4.4.2 Only hand tools and soft fibre brushes will be used.
- 4.4.3 After brushing surfaces will be cleaned with low pressured, sodium chloride free water.
- 4.4.4 The method for cleaning is related with the type of dirt or stains. Cleaning should be carried out on a trial area to observe the effectiveness of the method used. The method to be used must not harm the existing stone surfaces.
- 4.4.5 The work of cleaning must be carried out by the use of soft brushes. No cleaning by means of low-pressure clean water spraying shall be accepted. In case of soft stone material, work must be done with maximum care in order to prevent crumbling of the stone surface.

#### 4.5 REPLACEMENT OF HEAVILY DECAYED STONES

4.5.1 Broken (cracked) or heavily weathered stones (mainly ashlars but not only) must be replaced in several positions according to drawings, table 1 and table 2. Final determination to leave or replace ashlar stone will be done by the Engineer. The number of stones to be replaced will be specified by the engineer after plaster removal. The new stones must match the original ones as much as possible in terms of chemical composition, density, porosity, mechanical characteristics, colour, texture and size. In case of irregular stone wall which will be plastered, hardness of new stone is of priority; other characteristics are not. Stone tests must be carried out by an accredited laboratory. Following specifications only indicates the general approach for the method to be followed.

DETERMINATION OF STONE REPLACEMENT		
STONES THAT LOST ITS MASS MORE THAN >65%	<ul> <li>THE STONES IN THIS CATEGORY MUST BE REPLACED WITH NEW STONES</li> <li>NEW STONES MUST HAVE THE SAME CHARACTERISTICS, COLOUR, TEXTURE AND SIZE.</li> </ul>	
STONES THAT LOST ITS MASS MORE THAN >65%-<40%	• THE STONES IN THIS CATEGORY MUST BE CUT OUT MINIMUM 15cm AND NEW STONE WITH SAME CHARACTERISTICS, COLOUR, TEXTURE AND SIZE FIXED IN FRONT OF THE STONE.	
STONES THAT LOST ITS MASS MORE THAN <40%	NO REPLACEMENT WILL BE CARRIED OUT UNLESS THE ENGINEER INSTRUCTS OTHERWISE.	

Table 1: DETERMINATION OF STONE REPLACEMENT

#### Table 2: CHARACTERISTICS OF NEW STONES

CHARACTERISTICS OF NEW STONES		
COMPRESSIVE STRENGTH	> 13 N/mm²	
TOTAL POROSITY	< 34%	
COEFFICIENT OF WATER ABSORPTION DUE TO CAPILLARY ACTION	< 400	
DENSITY	> 1850 kg/m <sup>3</sup>	

- 4.5.2 Prior any works regarding to stone replacement a sample application will be implemented at a location chosen by the Engineer for approval.
- 4.5.3 For the bedding mortar MasterEmaco A265 or equivalent will be used.
- 4.5.4 Stones to be replaced must be carefully removed and the area should be cleaned thoroughly from dirt and debris.
- 4.5.5 Suitable temporary supports must be provided at structurally critical areas.
- 4.5.6 After the removal of the stone, cavity must be washed with sodium chloride free water to remove dust, to obtain suitable surface for bedding mortar.
- 4.5.7 Fix the new stone with evenly filled bedding mortar and make sure the mortar is tightly filled and levelled.
- 4.5.8 The replaced stone must be horizontally and vertically levelled with the surrounding stones.
- 4.5.9 Bedding mortar must be cleaned from the stone surface immediately.
- 4.5.10 The bedding mortar must be cleaned from the joints recessed 1cm from the stone surface.
- 4.5.11 After making sure all the joints are properly filled with mortar, bedding mortar should be kept wet until the material is secured.
- 4.5.12 Pointing will be applied 0.5cm recessed from the surface of the stone.

#### 4.6 STONE WALL DISMANTLING AND REBUILDING

- 4.6.1 The work will be carried out in specific areas where an extended damage, distortion or failure of wall is observed. It is expected to be carried out in areas where roots of plants penetrated wall or vaults and possibly in other areas which might be revealed after renders removal.
- 4.6.2 Same stone material can be reused after removal or material of same nature (irregular stone, dressed stone) must be used. Reconstructing will be done with lime mortar and small stones to fill gaps and voids.
- 4.6.3 Proper supporting with scaffolding, of adjacent areas must precede the work, if needed.
- 4.6.4 Existing loose or detached stones and mortar must be removed and the wall cavity must be cleaned from dust and loose material. The wall must be rebuilt with the same, if in good condition, stone material with same technique.

#### 4.7 CRACKS ABOVE WINDOW ON THE WEST ELEVATION

- 4.7.1 Extensive cracking on the walls above the existing window is observed, due to absence of a lintel. These should be treated by grouting injections and grouting in order to strengthen and improve the mechanical properties of the area.
- 4.7.2 Part of the wall above the existing window shall be removed and a lintel made of key stones will be constructed. (See drawing A-Pr 10)

- 4.7.3 Once the surrounding area is cleaned; pointing removal will proceed, reviling any additional cracks. These will also be treated by grouting and repointing will then follow. Pointing removal and repointing will be according to paragraph 4.2.
- 4.7.4 All cracks will be treated by grouting and grout injections according to paragraph 4.13 Grouting, and to paragraph 4.14 Grout injections.

### 4.8 CRACKS ON VAULTS

- 4.8.1 Cracks on vaults should be repaired according to drawing Pr 04 and Pr 05 The procedure to follow is according to paragraph 4.13. Grouting, points 4.13.3 & 4.13.4. and 4.5
- 4.8.2 Prior to conducting any repair work, proper scaffolding should be constructed to protect the whole structure during operation. The supporting scaffolding must be constructed under all adjacent arches and vaults (see section 5.3)

### 4.9 BUTTRESSES

- 4.9.1 Cleaning of dressed stones surface
- 4.9.2 The church has three buttresses (north, south and middle). All three of them present weathering, staining, biological and plant growth. Additional damage on each one varies in extend.
- 4.9.3 The work of cleaning must be carried out by means of low pressure clean water spraying and soft brushes. In case of soft stone material, work must be done with maximum care in order to prevent crumbling of the stone surface. Cleaning of joints must go as deep as possible but no less than 3 cm.

#### 4.10 BUTTRESSES STONE REPLACEMENT

- 4.10.1 All three buttresses have some broken (cracked) or heavily weathered stones.
- 4.10.2 New stones should be of similar characteristics as the stone to be replaced (colour, texture, hardness, size etc.) in case of dressed stone which stays visible.
- 4.10.3 The number of stones to be replaced will be specified by the engineer after plaster removal.
- 4.10.4 The overall work to be carried out for the buttresses must be executed as the following steps:

a) Cleaning of dressed stones surface

b) Pointing removal. The work must be carried out on all three buttresses where original mortar has been lost or present failure (soft or crumbling).

c) Removal of displaced stones (top layer(s))

d) Replacement of heavily weathered or cracked stones with new stones of similar characteristics as the stone to be replaced (colour, texture, hardness, size etc.) (According to the lab tests)

e) Rebuild part of buttress that was removed (stage 4.5)

f) Repointing. The new pointing material should be lime-based mortar (Albaria Allettamento or other equivalent) and must match existing one in colour and hardness. The mortar must be applied in layers and each one must be thoroughly compacted.

g) Application of mortar in layers. Mortar must be slightly recessed from stone surface and not be spread on stone surface. Excess mortar must be cleaned before dried.

h) Mortar must be protected by rapid drying with damp cloth during summer period and must be regularly sprayed with water to be kept humid and to dry slowly.

i) Grout injections

j) The work must be applied to a small test area to be approved by the engineer.

4.10.5 For the support of the buttresses the supporting system should be designed to carry a load of 15kN/m2 surface.

### 4.11 PILASTERS REPAIR WORKS

- 4.11.1 There are seven (7) pilasters, four (4) on the south elevation and three (3) on the west elevation.
- 4.11.2 The pilaster closest to the south-west corner presents extensive cracking. As indicated in the drawings, a stone footing of dimensions 120x120x35cm will be constructed and on top a new stone base wall. This pilaster presents extensive cracking, stones displacement and joint widening and because of the extended damage, it is proposed that this area should be dismantled and rebuilt.
- 4.11.3 All three (3) pilasters on the west elevation present cracking to a smaller extend. These shall be treated by grouting according to paragraph 4.13. Grouting, 4.14 Grout Injections.

### 4.12 POINTING/RE-POINTING WORKS

Pointing and re-pointing works will be carried around the replaced stones, at the lost joints of masonry and at the joints with inappropriate interventions. Pointing refers to the areas with lost joints while re-pointing is removal and replacing of joints with new mortar. Before execution of any pointing or repointing works, samples must be provided for the approval of the Engineer. Areas to be pointed and re-pointed are marked on the drawings.

In general, the work must be carried out on all external walls where original mortar has been lost or present failure (soft or crumbling). The work will be carried out on all types of stonewalls (irregular masonry, ashlar etc.) that will be un-plastered.

- 4.12.1 The cleaning work must be carried out by means of basic mason's tools and brushes. Cleaning of joints must go as deep as possible but no less than 3 cm.
- 4.12.2 The new pointing material should be lime-based mortar (Albaria Allettamento or other equivalent) and must match existing one in colour and hardness. The mortar must be applied in layers and each one must be thoroughly compacted.
- 4.12.3 The work must be applied to a small test area to be approved by the engineer.
- 4.12.4 Weather conditions to apply mortar: Mortar pointing works should not be carried out during rainy weather.
- 4.12.5 Ingredients should be mixed with electric hand mixer under the shade.
- 4.12.6 Ingredients must be measured accurately with a suitable method.
- 4.12.7 Dry ingredients must be mixed first before adding salt free water.
- 4.12.8 Water should be added to the mixture in small portions until the targeted consistency is achieved.
- 4.12.9 Mortar should be used within half an hour after final mixing.
- 4.12.10 Before applying pointing the area must be wetted spraying salt free water.
- 4.12.11 Application of mortar in layers. Mortar must be slightly recessed from stone surface and not be spread on stone surface. Excess mortar must be cleaned before dried. Clean the edges and surface of the stone from the excess mortar with spatula and fibre brushes. Special care must be taken not to overspill the mortar on the surface of the stones. Pointing will be applied using small spatulas, well pressed to avoid any gaps.
- 4.12.12 Wait until mortar reaches its desirable consistency.
- 4.12.13 Mortar must be protected by rapid drying with damp cloth during summer period and must be regularly sprayed with water to be kept humid and to dry slowly.

- 4.12.14 Treat the final surface with wet sponge to obtain a smooth finish.
- 4.12.15 Pointed and repointed areas must be blended into the surrounding area.
- 4.12.16 At deep joints pointing will be applied well compacted in several layers not exceeding 4-5 cm. New layer should be applied after the curing of previous layer.
- 4.12.17 All pointed areas must be 0.5cm recessed form the stone surface.
- 4.12.18 Newly pointed areas should be wetted in intervals

### 4.13 GROUTING

- 4.13.1 Extensive cracking on the walls, arches and vaults is observed. Some of those are considered as affecting the structural ability of the structure and some not. Also, due to mortar failure and wash, in addition to plant roots growth, voids in the walls and vaults were created. All of them must be treated by grouting in order to strengthen and improve the mechanical properties of the structure.
- 4.13.2 Areas in need of grouting can only be specified after plastering and plants removal (walls) as well as after vaults and dome cleaning. Areas in need of grouting might be anywhere (walls, vaults, dome etc.).
- 4.13.3 Grouting must be of fine hydraulic lime mortar. Materials to be used are Masterinject 222 or equivalent. Other materials necessary for the work execution are: mixing and injection machinery, plastic tubes 10 mm in diameter (to be penetrated 30 cm in to the wall).
- 4.13.4 The work must be executed as the following steps:
  - a) Cleaning of crack or area to be treated,
  - b) Insertion of plastic injection tubes at a distance of about 50 cm,
  - c) Sealing of crack/joints with lime mortar,
  - d) Injection with fluid mortar starting from bottom of wall,
  - e) Sealing of first point of injection when material comes out of the second etc.
  - f) If the work is applied to an extended area, the work must be done from bottom to top in rows of about 1m each. Material of first row must be dry before going to the upper one.
  - g) Cleaning of stone surface, removal of plastic tubes and sealing of holes.

### 4.14 GROUT INJECTIONS

4.14.1 The injection technique will be used for all three (3) buttresses to homogenize the mass, as also the crack over the window of the west elevation.This involves the injection a fluid with precise mechanical, chemical and physical characteristics (MasterInject 222 or equivalent) into the masonry, to consolidate the wall

facade and restore its original mechanical characteristics, thus improving the fragile performance of the unconsolidated wall.

- 4.14.2 The work must be executed as the following steps:
  - a) Cleaning of crack or area to be treated,
    - b) Drilling of holes into the masonry (horizontally and vertically) and insertion of plastic injection tubes at a distance of about 50 cm,
    - c) Sealing of crack/joints with lime mortar,
    - d) Injection with fluid mortar starting from bottom of wall,
    - e) Sealing of first point of injection when material comes out of the second etc.
    - f) If the work is applied to an extended area, the work must be done from bottom to top in rows of about 1m each. Material of first row must be dry before going to the upper one.

g) Cleaning of stone surface, removal of plastic tubes and sealing of holes.

- 4.14.3 The overall work to be carried out for the buttresses must be executed as the following steps:
  - a) Cleaning of dressed stones surface
  - b) Pointing removal
  - c) Removal of displaced stones (top layer(s))
  - d) Replacement of heavily weathered or cracked stones with new stones of similar characteristics as the stone to be replaced (colour, texture, hardness, size etc.) (According to the lab tests)
  - e) Rebuild part of buttress that was removed (stage 4.6.2)
  - f) Repointing
  - g) Grout injections

#### 4.15 REPLASTERING OF INTERNAL WALLS

Same gypsum plaster will be applied to the areas where existing plaster removed. Removal of the plasters will be conducted as specified in Section 4.2.

- 4.15.1 After the removal of the existing plaster, if any loose particles or stones observed these should be fixed and stabilized before application of new plaster.
- 4.15.2 It is possible that during the removal of the existing plaster, that historical characteristics can be found (like historical plaster, paintings or inscriptions). In that case any new finding must be reported to the Engineer immediately. Those items must be documented by the Archaeologist of the Contractor and maintained under the supervision of the Conservator of the Contractor.
- 4.15.3 Removal and re-plastering of historical plasters will be carried out only after the works as described on the section 4.2.1. Where re-plastering is required in historical coatings, they will be made with the same composition of material as that of existing.
- 4.15.4 Stabilization of historical plasters will be carried out only where is needed and after the works as described on the section 4.2.1. The process to be followed will be determined by the Engineer.
- 4.15.5 Before the application of new plaster, it should be ensured that the surface is firm, dry and clean.
- 4.15.6 Material with same mechanical and chemical properties must be used for re-plastering.
- 4.15.7 Ready mix bags should be used and mixed as per the manufacturer's instructions.
- 4.15.8 The new application of the gypsum plaster must be blended with the existing and not exceed the existing thickness.
- 4.15.9 Layers of the new plaster will be decided by the Engineer depending on the existing plaster thickness of the area.
- 4.15.10 The surface must be progressively trowelled until a smooth finish.
- 4.15.11 All the surfaces have to be checked to ensure smooth finish and to conform to the original shapes of the vaults and arches.
- 4.15.12 All surfaces should be sand papered (not with emery paper) and prepared for painting.
- 4.15.13 Gypsum plaster to use will be the "PELETICO PROJECTION PLASTER ACCORDING TO EN 132791"
- 4.15.14 It is possible that certain areas might not be re-plastered, but just be pointed. This will be decided after plastering removal and re-examination of the walls and possible findings. The engineer will instruct accordingly.
- 4.15.15 Existing and new applied plaster will be painted.

- 4.15.16 Painting should only be applied after the plaster is completely dry.
- 4.15.17 For painting of the wall materials to be used are:
- 4.15.18 One layer of undercoat: Sherwin Williams Ecoprimer
- 4.15.19 2 layers of coatings : Sherwin Williams ProMar 700

### 4.16 REPLASTERING OF EXTERNAL WALLS (PORTICO)

The internal wall of the portico which is a lime based plaster at the south external wall of the church will be repaired and repainted. This section is valid for the outer wall of the portico which consists of arches and columns upon the engineer's decision. Condition of the existing masonry will be inspected by the engineer after the complete removal of plaster. If the existing condition is unsatisfactory and the engineer decides to re-plastering, take this section into consideration.

- 4.16.1 The existing plaster must be checked and loose parts must be removed.
- 4.16.2 After removal has been completed the area must be cleaned from debris and dust.
- 4.16.3 It is possible that certain areas might not be re-plastered, but just be pointed. This will be decided after plastering removal and re-examination of the walls and possible findings. The engineer will instruct accordingly.
- 4.16.4 Before application of plaster, wall must be wet. Plastering must be in layers according to manufacturer's instructions. The surface of each layer should remain rough for better application of next one. The final layer should be worked with wood float, trowels and floating rule. The surface must be progressively trowelled until a smooth finish. Plaster should be sprayed regularly for 15 days for gradual drying. Externally should be also protected with PVC membrane or damp cloth to prevent rapid drying.
- 4.16.5 Bonding the existing plaster and the new must be ensured.
- 4.16.6 Existing and new applied plaster will be painted.
- 4.16.7 Painting should only be applied after the plaster is completely dry.
- 4.16.8 Hydraulic mortar MasterEmaco A265 type CS II according to EN 998/1 with compressive strength ranging from 1.5 to 5 MPa or other equivalent will be used. The colour will be white(ish) (subject to engineer's decision). The thickness of the new plaster should not exceed the existing one.
- 4.16.9 For painting of the wall materials to be used are:
- 4.16.10 One layer of undercoat: Sherwin Williams Ecoprimer
- 4.16.11 2 layers of coatings : Sherwin Williams ProMar 200

### 4.17 HISTORICAL GAPS

There are many historical gaps on the external walls with different sizes and shapes. Since these gaps have a high risk of rain water penetration and causing further decay to the structure it is important to consolidate these areas. The historical gaps are specified on the drawings A-Pr 09 and A-Pr 10. The approach to consolidate these gaps is as follows.

- 4.17.1 Deep historical gaps which are on the west façade must be monitored by the Archaeologist of the Contractor and necessary assessment must be prepared before starting any consolidation works.
- 4.17.2 The gaps should be cleaned from loose particles and debris, using small hand tools, fibre brushes and low pressure water.
- 4.17.3 Historical gaps on the west façade must be filled with replacement stone of similar properties.
- 4.17.4 Replacement stone will be applied 5cm in recess from the masonry surface for the historical gaps deeper than 15 cm.

- 4.17.5 Fix the replacement stone with evenly filled bedding mortar and make sure the mortar is tightly filled and levelled. Keep the joints to a minimum width and point with hydraulic lime mortar.
- 4.17.6 The replacement stones must match the existing stones physio-mechanical properties or be of slightly lower properties (still maintaining a strong structural role) so as not to push decay on existing material.
- 4.17.7 Historical gaps that replacement stones cannot be used, must be sealed with hydraulic lime mortar at the bottom to prevent water penetration.

### 4.18 CERAMIC PIPE ON THE EAST FAÇADE

4.18.1 On the East façade of the church, there is a hole made of ceramic, extruding outside from diaconicon of the left side sanctuary. This hole must cleaned, maintained and be consolidated so as to prevent insects and birds to insert. For the maintenance and consolidation hydraulic mortar must be used of the same properties as described in paragraph 4.12

#### 4.19 STONE CONSOLIDATION

There are missing parts at the existing masonry.

- 4.19.1 The gaps should be cleaned from loose particles and debris, using small hand tools, fibre brushes and low pressure water.
- 4.19.2 Missing parts will be filled and consolidated with rubble stones or ashlar stones according to the shape of the gaps and with the use of lime bedding mortar as in paragraph 4.5
- 4.19.3 Fix the stone with evenly filled bedding mortar and make sure the mortar is tightly filled and levelled. Keep the joints to a minimum width and point with hydraulic lime mortar.
- 4.19.4 The stones must match the surrounding stones as much as possible in terms of chemical composition, density, porosity, mechanical characteristics, colour, texture and size of the gap.

# **5.0 ROOF WORKS**

The roof has a complex structure that consist of cross-vault with a dome on top as well as two-barrel vaults and of multiple flat surfaces. This section covers all the work related with the main roof and the roof of the portico. Before execution of any works related to the consolidation of the roof, temporary supporting scaffold must be completed according to paragraphs 1.3 and 1.4. Approval must be provided from the Engineer.

#### 5.1 REMOVAL OF VEGETATION FROM THE ROOF AND VAULTS

Herbicide and biocide treatment must be completed before execution of the removal works. Herbicide as also biocide treatment is covered on section 4.0.

After it has been ensured that the existing vegetation is fully dried, the removal of the surrounding mortar will be carried out for roots penetrating into the vaults.

- 5.1.1 The removal of the mortar must carried out with only small hand tools.
- 5.1.2 If necessary some stones can be removed to extract the roots that penetrated into masonry. The stones removed must be marked and preferably reused if not damaged. Damaged stones will be replaced with new ones as indicated in section 4.5
- 5.1.3 Removed area will be re-plastered with hydraulic lime mortar after placing the stones.
- 5.1.4 Small vegetation must be removed with small hand tools or manually.

### 5.2 DRY CLEANING OF ROOF

Dry cleaning of the roof will be carried out after the complete removal of vegetation. The roof will be cleared from loose deposits, dirt and dust using fibre brushes and small hand tools.

### 5.3 DRY CLEANING OF CORNICES AND SPOUTS

To ensure an efficient rain water flow from the roof, the existing spouts and cornices must be cleaned from any dirt and debris.

- 5.3.1 Dry cleaning of the spouts and cornices must be carried out using small hand tools and brushes.
- 5.3.2 The spouts water holes must be cleared from any time of vegetation or debris to allow an efficient rain water flow.
- 5.3.3 The cornices on the roof must be cleared form any type of dirt, stains and bird excrement.
- 5.3.4 After brushing surfaces will be cleaned with low pressured, sodium chloride free water.
- 5.3.5 Some of the cornices on the North façade must be removed carefully and the area must be cleaned & repaired. The removed cornices must be maintained and repositioned if possible. If further consolidation is necessary, Engineer's approval must provided.
- 5.3.6 In case of extremely damaged cornices found, this must be immediately reported to the Engineer. In case that there is a need for replacement, exact copies will be constructed from the same type of stones and the same colour.

### 5.4 CONSTRUCTION OF LIME CONCRETE

After completing repairing and dry cleaning works, hydraulic lime concrete will be applied on the roof.

- 5.4.1 The surface of the roof must be pre-wetted before the application of lime concrete.
- 5.4.2 The thickness of the lime concrete will vary from 6-10 cm depending on the application points.
- 5.4.3 Prepare the hydraulic lime concrete mixture with sand, aggregates and Fiberglass mesh net MAPENET 150 according to ETAG 004 as per the instructions of the Engineer.
- 5.4.4 Keep the surface wet until the material matures
- 5.4.5 The application must not be carried out if the temperature is below 5°C or above 35° C
- 5.4.6 Lime concrete finish must be 5cm recessed from the edges and chamfered.
- 5.4.7 Where roof slabs meet with the roof walls, lime concrete must be chamfered 10cm towards the wall.
- 5.4.8 Lime concrete must be applied according to the drawing A Pr 04.
- 5.4.9 Inspect the application regularly to refill any occurring cracks and voids.
- 5.4.10 The surface must be rubbed by a wet sponge trowel until smooth.
- 5.4.11 The surface must be tested for effective water drainage.

### 5.5 REPLACING SPOUTS

There are numerous carved limestone spouts on the East, North, South and West parts of the roof. Only two of the spouts have the same style of carving, the rest differs in shape and carvings. The one on the West side of the roof is broken and one on the North side is missing.

- 5.5.1 The broken and missing spouts must be replaced with new ones.
- 5.5.2 The broken spout must be carved same as the existing spout located on the West side of the roof.

- 5.5.3 The missing spout must be carved same as the existing spout located on the East side of the roof.
- 5.5.4 The new stones must match the surrounding stones as much as possible in terms of chemical composition, density, porosity, mechanical characteristics, colour and texture.
- 5.5.5 The removal of the broken spout must be done with utmost care to avoid any damage to the surrounding stones.
- 5.5.6 Small hand tools must be used during removal.
- 5.5.7 After the stone has been removed the area must be cleaned from debris and dust.
- 5.5.8 Cleaning must be carried out using fibre brushes and low pressure water.
- 5.5.9 Bedding mortar will be placed
- 5.5.10 For the bedding mortar MasterEmaco A265 or equivalent will be used.
- 5.5.11 Fix the new spout with evenly filled bedding mortar and make sure the mortar is tightly filled and levelled.
- 5.5.12 The replaced spout must be horizontally and vertically levelled with the surrounding stones.
- 5.5.13 Bedding mortar must be cleaned from the stone surface immediately.
- 5.5.14 The bedding mortar must be cleaned from the joints recessed 1cm from the stone surface.
- 5.5.15 After making sure all the joints are properly filled with mortar, bedding mortar should be kept wet until the material is secured.
- 5.5.16 Pointing will be applied 0.5cm recessed from the surface of the stones.

### 5.6 WATER INSULATION OF THE ROOF

Due to the complex structure of the roof, rain water remains in cavities, causing extended moisture accumulation and vegetation growth. After the lime concrete application water insulation must be applied accordingly.

- 5.6.1 Make sure that lime concrete has no cracks and is fully dried.
- 5.6.2 Humidity of lime concrete MUST NOT EXCEED the 4% per mass before insulation application.
- 5.6.3 Use MasterSeal 390 according to EN 1504-2 or equivalent 3 coats with mesh.
- 5.6.4 Lay the mesh after the first coat. Use Fiberglass mesh net MAPENET 150 according to ETAG 004 or equivalent.
- 5.6.5 Make sure that insulation material totally covers the mesh.
- 5.6.6 Wait at least 24 hours before applying each coat.
- 5.6.7 The insulation must be applied into the spouts and should finish 5 cm recessed from the edges where lime concrete ends.
- 5.6.8 Where roof slabs meet with the roof walls, insulation must be applied 10cm towards the wall.

### 5.7 REPAIR WORKS OF THE PORTICO ROOF

The wooden ceiling boards of the south portico are in a poor condition due to failure of the insulation. The roof and the ceiling of the portico will be repaired accordingly.

- 5.7.1 Roof :
- 5.7.1.1 See sections 4.1, 5.2, 5.4 for vegetation removal, dry cleaning of the roof surface and cleaning of spouts.
- 5.7.1.2 Water insulation must be applied as specified in section 5.6
- 5.7.1.3 Where portico's roof slab meets with the roof walls and parapets, the water insulation must be chamfered 10cm towards the wall.
- 5.7.1.4 The parapet must be cleaned and repainted with MasterEmaco S 1120 TIX according to EN 1504-3 or equivalent.
- 5.7.2 Ceiling :

- 5.7.2.1 All wooden parts of the roof will be treated on place.
- 5.7.2.2 Only rotten beams will be removed and replaced according to drawing A-Pr-02 & A-Pr-12.
- 5.7.2.3 The existing paint and varnish must be removed using sand paper 80 for the first layer and 180 to give a smooth finish.
- 5.7.2.4 Metal frame on the ceiling will be removed and replaced with galvanised 50x4mm, according to drawing A-Pr-11 Detail 5. Fix the frame to place, using stainless steel screws. A rainwater construction must be constructed around the metal frame on the top side of the slab.
- 5.7.2.5 Protection of the wooden parts of the ceiling must be done with a water-based varnish (Ronseal Total Wood Preserver) or equivalent.
- 5.7.2.6 Finally, the wood will be painted with (Ronseal Woodstain) or equivalent, colour to be decided on site and approved by the Engineer.

#### 5.8 CONSOLIDATION OF DECORATIVE STONES

There are two decorative stones on the North nave wall facing West façade. These stones will be exclusively consolidated by the Conservator of the Contractor.

#### 5.9 NEW CROSS

- 5.9.1 A new cross will be constructed on the main dome of the church according to drawing A Pr 11.
- 5.9.2 The new cross will be carved from Limasol stone.

#### 5.10. REPLACING MISSING CERAMIC POTS (Provisional)

There are four gaps two on each side of the lower part of the barrel vault of the north nave. There were ceramic pots that were used as resonators.

The cavity of the ceramic pots must be cleaned thoroughly from debris and bird excrements.

- 5.10.1 Appropriate new ceramic pots must be placed in cavity with rubble stones and hydraulic lime bedding mortar as in drawing A-Pr 12, detail Y5
- 5.10.2 The works must be completed by plastering the area with gypsum plaster as specified in section 4.7

### 6.0 WINDOWS

There will be three types of different approaches for consolidation of the church windows. Some of the windows will be treated in-situ, some of them will be reconstructed and the rest will be removed, treated and re-fixed. Interventions for the windows are specified on drawing A-Pr 11. All original windows that will not be re-used must be stored and recorded according to the Engineer's instructions. On some of the windows sills there are cement based mortar. All cement mortar must be removed and replaced with hydraulic lime mortar

#### 6.1 MANUFACTURING OF NEW WINDOWS

New windows to be manufactured are stated on the drawings A-Pr 02 and A-Pr 11 .

- 6.1.1 All removal works of the windows and metal grids must be done with great care.
- 6.1.2 Glazing of new manufactured windows will be crystal clear 3mm thick.

- 6.1.3 New metal accessories of the new windows should be manufactured if the existing ones have been destroyed, as per the existing ones and should be coated with cover them with incralac metal varnish 10% 2 coat colour or equivalent approved by the Engineer.
- 6.1.4 Existing metal grids of the window, must be removed and cleaned with hand tools and if necessary with solvent according to the instructions of the Engineer. In some cases, existing metal grids will be treated in-situ as per drawing A-Pr 11.
- 6.1.5 After successful cleaning, existing metal grids will be conserved and coated with HAMMERITE DIRECT TO RUST or equivalent approved by the Engineer.
- 6.1.6 The rotten wooden board at the upper part of the opening of window Pr-W-02 must be treated in-situ. Remove all the layers of paint that have been put on over the years with paint remover & brushes and wash them with acetone. In case of original colour under the new paints, the authentic colour must remain. In order to avoid the disinfection from insects, they have to be covered by relevant chemicals (e.g Rentokill, Chemopel termites & fungi, 3V3).
- 6.1.7 Varnishing with a water-based varnish such as: Bull extra durable, Viostik hfs 73 mat or equivalent approved by the Engineer, with brush or varnishing pistol.

### 6.2 TREATMENT OF WINDOWS IN-SITU

This section refers to the windows that will be treated in-situ.

- 6.2.1 New glazing of windows will be crystal clear 3mm thick.
- 6.2.2 New metal accessories should be manufactured as per the existing ones where missing or destroyed & cover them with incralac metal varnish 10% or equivalent approved by the Engineer.
- 6.2.3 Clean all reusable metal accessories & cover them with incralac metal varnish 10% or equivalent approved by the Engineer.
- 6.2.4 The metal decorative part will be cleaned in-situ with hand tools and if necessary with solvent & cover them with incralac metal varnish 10% or equivalent approved by the Engineer.
- 6.2.5 A 1.5x1.5cm galvanised net will be installed attached on galvanized metal wires from the interior of the decorative part.
- 6.2.6 Existing metal grids of the window will be cleaned with hand tools and if necessary with solvent in-situ.
- 6.2.7 After successful cleaning, existing metal grids will be conserved and coated with HAMMERITE DIRECT TO RUST or equivalent.
- 6.2.8 All wooden parts will be consolidated according to the Conservator's specifications. Remove all the layers of paint that have been put on over the years with paint remover & brushes and wash them with acetone. In case of original colour under the new paints, the authentic colour must remain.
- 6.2.9 Replace defected wooden parts with new pieces of wood and in some cases, pasta from wood dust and acrylic white glue can be used especially for the gaps.
- 6.2.10 Windows EX-W07, EX-W08, EX-W09: These windows will be maintained and cleaned. New metal deep hot galvanized grid will be constructed and fixed from the inside of the church. The position of the new grid will be at the centre.

#### 6.3 TREATMENT AND RE-FIXING OF WINDOWS

This section refers to the windows that will be removed, conserved and re-fixed to the original position.

- 6.3.1 Remove very carefully the windows from its place and especially pay attention on all the metal items such as hinges, locks and rotation mechanisms. Transport them to a workshop for conservation.
- 6.3.2 Remove all the layers of paint that have been put on over the years with paint remover & brushes and wash them with acetone. In case of original colour under the new paints, the authentic colour must remain.
- 6.3.3 Replace defected wooden parts with new pieces of wood and in some cases, pasta from wood dust and acrylic white glue can be used especially for the gaps.
- 6.3.4 Clean all metal accessories & cover them with incralac metal varnish 10% or equivalent approved by the Engineer.
- 6.3.5 After conservation metal accessories will be repositioned.
- 6.3.6 New glazing of windows will be crystal clear 3mm thick.
- 6.3.7 Varnishing with a water based varnish such as: Bull extra durable, Viostik hfs 73 mat or equivalent approved by the Engineer, with brush or varnishing pistol.
- 6.3.8 Existing metal grids of the window will be cleaned with hand tools and if necessary with solvent in-situ according to the instructions of the Engineer and the Conservator.
- 6.3.9 Metal grids should be coated with HAMMERITE DIRECT TO RUST or equivalent approved by the Engineer.

## 6.4 RECONSTRUCTION OF NEW DOME WINDOWS

All dome windows will be reconstructed as per the drawing A-Pr-11.

- 6.4.1 Windows will be reconstructed using Limassol Stone or equivalent.
- 6.4.2 Each window will be constructed as two separate frame and glazing will be in-between the two frames.
- 6.4.3 Windows will be fixed on the original position with hydraulic lime mortar, MasterEmaco 265A or equivalent.
- 6.4.4 For the fixing of the two parts of the stone frames the ADESILEX P9 with strength according to EN 12004 or equivalent will be used.

# 7.0 DOORS

### 7.1 CONSOLIDATION OF DOORS

All doors will be removed and consolidated according to the Conservator's specifications.

- 7.1.1 Remove very carefully the doors from its place and especially pay attention on all the metal items such as hinges, locks and rotation mechanisms. Transport them to a workshop for conservation.
- 7.1.2 Remove all the new repairs and nails that have been put on.
- 7.1.3 Remove all the layers of paint that have been put on over the years with paint remover & brushes and wash them with acetone. In case of original colour under the new paints, the authentic colour must remain.
- 7.1.4 Replace defected wooden parts with new pieces of wood and in some cases, pasta from wood dust and acrylic white glue can be used especially for the gaps.
- 7.1.5 Clean all metal materials & cover them with incralac metal varnish 10% or equivalent. approved by the Engineer.
- 7.1.6 In order to avoid the disinfection from insects, they have to be covered by relevant chemicals (e.g Rentokill, Chemopel termites & fungi, 3V3).
- 7.1.7 Varnishing with a water based varnish such as: Bull extra durable, Viostik hfs 73 mat or

equivalent approved by the Engineer, with brush or varnishing pistol.

- 7.1.8 There are existing wooden board over the doors EX-D 03 EX-D 04 that needs treating.
- 7.1.9 The wooden boards at the upper part of the doors must be treated in-situ. The wooden board must be treated according to chapter 7.1.2, 7.1.3, 7.1.4, 7.1.6, 7.1.7.

# **8.0 TREATING METAL PARTS**

- 8.1 All metal parts except metal accessories of doors and windows will be treated accordingly.
- 8.1.1 All surfaces should be cleaned thoroughly before the application of coating.
- 8.1.2 A sample for treatment should be prepared for the Engineer's approval.
- 8.1.3 Hand tools, steam cleaning or solvent cleaning methods maybe used with utmost care to not contact with the adjacent stones.
- 8.1.4 All coats should be applied with appropriate brush.
- 8.1.5 HAMMERITE DIRECT TO RUST or equivalent approved by the Engineer, should be applied in two coats.
- 8.1.6 The time between the applications of coats should not exceed 24 hours.
- 8.1.7 It must be ensured that the finish surface is uniform in colour & texture, and free from runs and drops.
- 8.2 Cleaning of Galvanized tie rods on ceiling;
- 8.2.1 The galvanized tie rod on the ceiling must be rinse off with clean water.
- 8.2.2 Scrub with brush and detergent solution.
- 8.2.3 HAMMERITE DIRECT TO GALVANIZED should be applied in two coats.

### 9.0 CONSERVATION WORKS

#### 9.1 CONSOLIDATION AND CONSERVATION OF NORTH NAVE ICONOSTASIS

Iconostasis will be consolidated according to the drawing A-Pr 13.

- 9.1.1 Adjustment of new eight (8) wooden columns from pine wood, four at each side in order to secure the up part of the left nave iconostasis, protect it from further damage and to give an original perspective of the previous image. The columns should be (10 X 10 cm width) and can be placed with wooden edges on the floor. The opening in the centre show the place where the sanctuary doors were.
- 9.1.2 In order to avoid the disinfection from insects, the columns have to be covered by relevant chemicals (e.g Rentokill, Chemopel termites & fungi, 3V3). Then, they can be varnished with a water based varnish (Bull extra durable). No colour can be used, because the original parts have to be different from the additions.
- 9.1.3 The seven (7) parts that have been found behind the Holy Altar and belong to this area have to be integrated on the seven columns under the existing part of the iconostasis. In order to avoid the disinfection from insects, they have to be covered by relevant chemicals (e.g Rentokill, Chemopel termites & fungi, 3V3).
- 9.1.4 The cleaning has to be done with chemical solvents such as: acetone/white spirit 2/1, dimethylformamide / toluene 30/70 with cotton sticks or soft brushes. These solvents have to be used ONLY on wood areas where the varnish layers are oxidized and became faded.
- 9.1.5 At specified parts like gold –plated angels and flowers, the coloured surface must stabilized first with acrylic resin primal ac -33/water 5% and after cleaning with ethanol/white spirit 1/1 with cotton sticks. It is possible (if needed) the gold- plated areas to be retouched with acrylic or watercolours with the similar gold.

- 9.1.6 All the surfaces have to be covered with a reversible type varnish such as Soluble matt (DALER ROWNEY).
- 9.1.7 The existing up part of the north nave iconostasis first has to be cleaned mechanically with soft bristle brushes to remove the dust. After that in order to avoid the disinfection from insects, they have to be covered by relevant chemicals (e.g Rentokill, Chemopel termites & fungi, 3V3).
- 9.1.8 Stabilization and strengthening of the wood parts with acrylic resin Paraloid b.72/acetone 10%. Repair or replace the rotten parts.
- 9.1.9 The metal candleholders have to be cleaned with acetone, rubbing with a cloth and be covered by Incralac varnish for metals 10% or equivalent approved by the Engineer.

### 9.2 CONSOLIDATION AND CONSERVATION OF SOUTH NAVE ICONOSTASIS

Iconostasis will be consolidated according to the drawing A-Pr 13.

- 9.2.1 All the conversions that replace the originals like m.d.f type wood, glasses have to be removed and replaced with the same kind of pine wood. The wood will be covered with a reversible type varnish such as Soluble matt (DALER ROWNEY).
- 9.2.2 The south nave iconostasis first has to be cleaned mechanically both sides with soft bristle brushes to remove the dust. After that in order to avoid the disinfection from insects, they have to be covered by relevant chemicals (e.g Rentokill, Chemopel termites & fungi, 3V3).
- 9.2.3 Stabilization and strengthening of the wood parts with acrylic resin Paraloid b.72/acetone 10%. Repair or replace the rotten parts.
- 9.2.4 The cleaning has to be done with chemical solvents such as acetone/white spirit 2/1, dimethylformamide / toluene 30/70 with cotton sticks or soft brushes. These solvents have to be used ONLY on wood areas where the varnish layers are oxidized and become faded.
- 9.2.5 At specified parts like gold –plated angels the coloured surface must stabilized first with acrylic resin primal ac -33/water 5% and after cleaned with ethanol/white spirit 1/1 with cotton sticks. It is possible (if needed) the gold plated areas to be retouched with acrylic or watercolours with the similar gold.
- 9.2.6 All the surfaces have to be covered with a reversible type varnish such as Soluble matt (DALER ROWNEY). Then put Teak oil by brush for wood moisturizing or Wax polish (Liberon) with brush.
- 9.2.7 The metal candleholders have to be cleaned with acetone, rubbing with a cloth and covered by Incralac varnish for metals 10% or equivalent approved by the Engineer.

# **10.0 FLOORS**

### **10.1 REMOVAL OF CEMENT ADDITIONS**

All cement additions must be removed carefully from the existing floor. Removal must be conducted using hand tools only. Disposal of the debris must be done to a designated area on site. The area must be cleaned thoroughly.

#### **10.2 REPLACING NEW MARBLE TILE**

After removal of cement additions, new marble tiles will be installed to fill the gaps.

- 10.2.1 New marble tiles must have same colour, texture and size with existing ones.
- 10.2.2 New tiles must be levelled according to the existing ones.
- 10.2.3 Joints and pattern should match with the existing.
- 10.2.4 The marbles will be fixed using cement mortar.

### **10.3 MECHANICAL CLEANING OF FLOORS**

Before any cleaning is undertaken, careful assessment and recording should be carried out. As part of this initial process, an assessment of the surfaces to be cleaned must be made to get a better understanding of what might be removed by cleaning and what may be left. This must also take into consideration the residues that could be left on the surface from the cleaning process/material. A close examination of the surface should help to identify the material, assess its condition in terms of structure and surface, understand that condition and, if possible, determine what has caused it. Mechanical cleaning may include careful removal of poorly executed fills and repairs which are obscuring areas of original surface. Extreme care should be taken using hand tools such as scalpels and fine chisels, and abrasion of the marble surface should be avoided at all costs. A standard non-commercial formula that combines water and white spirit with a small amount of non-ionic detergent can be used. Mill brush machine can be used for mechanical cleaning of existing floors. Cleaning materials should be used with special care. No extensive or spreading water is allowed

### 10.4 REPAIRING OF THE CONCRETE FLOOR OF THE PORTICO

- 10.4.1 There are minor damages on the portico floor. The areas must be repaired accordingly.
- 10.4.2 Clean the floor surface thoroughly.
- 10.4.3 Repair any damaged areas MASTEREMACO S950 Structural Repair Mortar (EN 1504-3) or equivalent. Manufacturers 'instructions must be followed during repair works.
- 10.4.4 The drainage channel in front of the portico floor must be cleaned from debris and dirt.
- 10.4.5 The existing drainage pipes must be cleaned with a suitable method approved by the engineer.
- 10.4.6 Ensure that the existing drainage pipes are functioning to extract rain water from the area.
- 10.4.7 In case existing drainage is not functioning, this will be removed and a new one must be constructed on the same position and the same type of pipes. (Provision)

# **11.0 BELFRY**

#### 11.1 REPAIRING OF THE BELLS, BROKEN CROSS.

The existing belfry is currently in a good condition. If necessary partial repairs will be carried out at damaged areas as specifications.

- 11.1.1 The bell and its mechanism must be consolidated. The consolidation works must be carried out in-situ by competent person.
- 11.1.2 Suitable scaffolding should be erected to the east and south part of the belfry from the ground to top level.
- 11.1.3 Damaged and missing parts will be checked with the Engineer and necessary repair works will be carried out according to the related specifications.

11.1.4 The cross on top will be fixed in place with using Master Emaco T1400 FR (EN 1504-3) or equivalent.

## **12.0 HOLY ALTAR**

#### 12.1 REPAIR WORKS FOR SOUTH SIDE HOLY ALTAR

Holly Altar will be consolidated according to the Conservators' specifications and the supervision of the Conservator of the Contractor

- 12.1.1 First, the Holy Altar has to be cleaned mechanically outside and at the back side where the hole ('crypt') is with soft bristle brushes to remove the dust. At this stage it is proposed to put a small wooden door in order to protect the inside from rodents, birds e.g.
- 12.1.2 Fix the small area of plaster at the left side of the base which was destroyed with similar materials such as: Gesso Bologna, China clay with acrylic resin, Gesso Champagne, marble dust. Be sure that the thickness of the new plaster should not exceed the existing one. The rest of the base can be cleaned with soft bristle brushes with a mixture of water and ethanol.
- 12.1.3 The front side of the base was covered with 2 -3 layers of blue oil paint and has to be cleaned either mechanically or with paint remover and saw the original surface of the limestone.

The same work has to be done and to the inside dome of the Alter by using the same material and clean it with acetone.

- 12.1.4 The four marble columns that are used to hold the top part, have to be cleaned from the two layers of plastic colour (grey & white) and point out the authentic light pink colour of the marbles. For the cleaning use paint remover, dimethilformamide with brush, wait a while and then clean again mechanically with acetone. Put a protective layer of CTS 111 (treatment of waterproofing stones).
- 12.1.5 For the cleaning of the top part of the engraved columns with 'bronzina' (gold imitation), Use paint remover with brush and clean after with acetone. Put a protective layer of CTS 111 (treatment of waterproofing stones).

# **13.0 EXTERNAL WORKS - FENCE WALLS**

#### **13.1 EAST & SOUTH FENCE WALLS**

The East & South fence walls are in a bad condition. Specially, East fence wall is in endanger of collapse. The walls of the East & South fence must be removed and re-built.

The existing reinforced concrete foundation beam of the south fence wall is in bad condition presenting spalling due to corrosion. It is proposed that the stone wall should be dismantled, the existing foundation beam to be removed, and a new foundation beam with dimensions 25x70cm (according to drawings - Detail of the new ground beam (fence wall)) to be constructed. Once it is completed, the stone wall will be rebuilt using the existing stones.

Along the east site stone wall there are voids below the reinforced concrete foundation. Part of the wall presents leaning towards the neighbouring property, whereas there is another part where lots of stones are missing.

The stone wall shall be dismantled and the existing foundation beam to be removed. A retaining wall 120cm height (including 35cm footing) will be constructed, according to drawings (Detail of the new retaining wall (fence wall)), for the length where the soil in the neighbouring plot is below 1m.

For the rest of the length a foundation beam will be constructed, as the one suggested for the south fence. The stone wall will then be rebuilt using the existing stones or ones of the same properties as the stones of the church (based on lab tests).

The following procedure must be carried out for both walls:

- 13.1.1 The stones will be disassembled with utmost care so as not to damage and stored at a designated area for re-use.
- 13.1.2 Existing ground beams must be demolished & the debris will be disposed as per the instructions of the Engineer.
- 13.1.3 The wall will be reconstructed with same height and pattern.
- 13.1.4 The stones will be fixed in place using hydraulic lime bedding mortar Master Emaco A265 or equivalent.
- 13.1.5 The wall will be pointed hydraulic lime Master Emaco A265 or equivalent.
- 13.1.6 7cm thick wall capping will be applied on top of the walls with hydraulic lime concrete.

### **13.2 NORTH FENCE WALL**

The North fence wall is the oldest part of the boundary walls. This part of the stone fence wall is also in relatively good condition. There is only one point where stone cracking is observed and a couple of points where the existing stones are loose or detached or there is absence of a small amount of stones. Once the plaster is removed, these should be removed and rebuild with the same, if in good condition, stone material or with new stones of similar characteristics. The wall will be re-plastered. Consolidation of the wall will be done as follows:

- 13.2.1 Vegetation removal will be carried out using small hand tools.
- 13.2.2 Loose deposits will be removed & cleaned and any loose stones will be re-used.
- 13.2.3 The wall must be washed with low pressure water.
- 13.2.4 Complete the areas with compatible rubble stones and fixed with Master Emaco A265 or equivalent.
- 13.2.5 The wall will be pointed with hydraulic lime mortar.
- 13.2.6 7cm thick wall capping will be applied on top of the walls with hydraulic lime concrete.

#### **13.3 WEST FENCE WALL**

The West fence walls is relatively in a better condition mainly presenting loose of pointing and missing stones. Consolidation of the wall will be done as follows:

- 13.3.1 Loose deposits will be removed & cleaned and any loose stones will be kept for re-use.
- 13.3.2 Complete the areas with compatible rubble stones and fixed with Master Emaco A265 or equivalent.
- 13.3.3 Match with the texture of the area.
- 13.3.4 The wall will be pointed with hydraulic lime mortar.
- 13.3.5 7cm thick wall capping will be applied on top of the walls with hydraulic lime concrete.

#### 13.4 NEW GATES

13.4.1 New gates will be constructed at the West and South side of the fence walls as per drawing A Pr-12 Detail Y3 and Y4. Position of the gates as per drawing A-Pr-01.

# **14.0 EXTERNAL WORKS – DRAINWATER MANAGEMENT WORKS**

### 14.1 CONSTRUCTION OF THE DRAINAGE SYSTEM AROUND THE PERIMETER OF THE CHURCH

Rainwater drainage and protection slab will be constructed around the perimeter of the church at the East, West and South.

- 14.1.1 The area to be will be excavated by 70x40cm along the perimeter walls. Geotextile with the following characteristics and also approved by the Engineer will be laid on the channel with gravel (1/2") and perforated PVC pipe (6"). The geotextile must consist of polyester yarn, with non-woven fibres, which must be exclusively machined without thermal or chemical interventions. The polyester filament network must be movable and variable in shape, making it elastic and flexible and so it can be attached to any surface. It must have high puncture resistance and withstand high stresses. It must be water-permeable and highly resistant to environmental effects for a long time. It should have a weight of 125 gr / m<sup>2</sup> and a thickness of 1.7 mm.
- 14.1.2 The geotextile must also have the following characteristic properties:
  - Tensile strength: 9KN / m
  - Elongation: 80%
  - Drilling strength: 1150N CX
  - Pore size: 0.09 mm
  - Permeability with 2 KN / m<sup>2</sup>: 219 x 10-<sup>3</sup> / sec along : 414 x 10-<sup>3</sup> m / sec width wise
  - Permeability with 200 KN / m<sup>2</sup>: 1.9 x 10-<sup>3</sup> / sec along : 419 x 10-<sup>3</sup> m / sec width wise
- 14.1.3 The trench will be backfilled with earth and on the top the trench 40x15cm concrete slab will be constructed.

Concrete: Grade 30 Steel : 3Y12 up + 3Y12 down

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- 14.1.4 A dimpled membrane Guttabeta Drainplus or equivalent will be used to separate the concrete slab from the earth and walls.
- 14.1.5 Install two PVC pipes 6" towards the west side wall. Guide them towards the street through the wall.
- 14.1.6 See drawing A-Pr-12 Detail Y1.

### 14.2 GRADE ADJUSTMENT

Soil around the courtyard must be adjusted to drain rainwater. This includes excavation of high areas and filling of low areas to provide a sufficient slope. Grade adjustment works should be carried out after completion of other works in order to protect the slope. Levels will be adjusted according to the drawing A-Pr-01.

### 14.3 REPAIRING OF THE CONCRETE SLABS AT THE COURTYARD

The procedure for repairing of the concrete slabs at the courtyard will be decided by the Engineer according to the findings. The top surface and missing parts will be treated with Master Emaco S950 - Structural Repair Mortar (EN 1504-3) or equivalent where necessary.

### 15.0 GENERAL CLEANING AND REMOVAL OF DISPOSALS AND MATERIALS

At the end of the works, the constructor must clean the internal and the external areas. Any remaining building materials must be removed and disposed. Recyclable materials must be recycled in recycling areas. Burning or to bury disposal materials is forbidden.