

Specifications for Immediate Works for Erase the Possibility of Further Damage the Church of Ayios Charalambos in Neochorio Kythreas

Before any works on site, protection of iconostasis, floors, women's gallery, arches, capitals and decorative stone corners of the 'North Entrance' shall be protected.

Protection to be done with timber boards and metal pipes covered with nylon heavy sheets to avoid any damage during the actual works

Floors of the Church will be covered with nylon to protect them from damage. Wooden boards shall be placed under the scaffoldings and under any machinery that shall be introduced in the church.

Women's gallery shall be protected with heavy nylon sheets all along the works.

1. Analysis of the works included in this phase of the project

1.1 General cleaning of the site and the building

Before doing any other work, the contractor must clean the whole site thoroughly. That will include:

- a) All the outside area from vegetation and particles that do not belong to the building.
- b) Clean all the vegetation and materials from the roof of the structure, that will include any soil existing on the roof and all the tiles that exist on the roof and clean the roof with pressure water so all the structural surface of the roof is visible and completely clean.
- c) Clean all the walls inside the church with pressure water in order to have a proper picture of the surfaces.
- d) Clean the floor of the church thoroughly so we can see properly the existing situation of the floor.
- e) The grave alserly with the surrounding area will be cleaned and minimum repaired will be done to the masonry of the grave stones.
- f) Inappropriate shed structure will be demolished at the south part of the Church site.

1.2 Fencing around the church area

The contractor has to put a fence around the church building according to the drawings, extending to the fence that already exists on the south part of the church and the wall that exists on the west part of the church. A metal structure gate needs to be placed for access on the site where the contractor is working, in a proper size so it can be suitable for the trucks and other machinery to enter and work on the site.

Except south and west border, all wire fence will be new at the perimeter borders. South facade existing fencing will be repaired. West façade already has brick wall. In two points, access to the neighbors will be closed with brick wall. Please see Architectural Drawing A- Pr 01 and A.Pr 16&17).

1.3 Supporting the wooden part floor structure of the women's gallery in the church.

The women's gallery in the church since is not going to be repaired and completely restored at this stage of the works the following stages of works need to be carried out.

The support of the structure has to be done by the use of metal scaffoldings.

A tower with 4 poles must be placed for every two square meters.

All the materials that are going to be used, shall be in good condition, straight, free from wear, damage or cracks.

Adjustable poles and heads shall have the appropriate sizes according to the original design of their manufacturer and the joints must be clamped together with all the appropriate from the manufactured parts.

The poles are positioned vertically. The deviation from the vertical position must not exceed 10mm to 1m.

The wooden beams on the level of the surface of the wooden part of the gallery shall be nailed to the towers.

The towers shall be connected to each other by horizontal and diagonal elements in both directions

The transverse beams shall be at least 75mm x 125mm in size and shall be placed according to the sizes (length and width) of the gallery at the distances of 50 - 70cm

The wooden beams must extent at all times at least 10cm past the head of the tower where are resting.

The screw of the head or base of the tower shall not protrude more than 250 [mm] further out of the pole.

The posts must have a flat solid metal base resting on wooden flat plates in order to avoid damaging the existing floor. Because of the height of the structure from the floor of the church, the contractor might have to joint scaffoldings vertically and have to use the screws needed for getting the wood beams up to the level of the wooden slap and attach it firmly to it.

After the placing of the scaffoldings the contractor will have to nail carefully all of existing wooden elements which are not safely connected to the body of the structure of the gallery.

The contractor has to have in mind that all the materials that are going to be used for permanent support of the structure will remain as a property of UNDP.

1.4 Repairing works on the walls inside the Church

1.4.1 Removal of Plaster (Optional item - Supervision of Conservator is required)

Up to the level of about 2m height, the plaster on the wall is a cement-based plaster. Above that, the plaster that exists is the mixed with gypsum and cement based. If needed and upon instructions by the Engineer the contractor will need to remove the cement plaster up to the level of 2m. Cement plaster will have to be removed from the walls very carefully in order not to make any damage on the stone walls of the church.

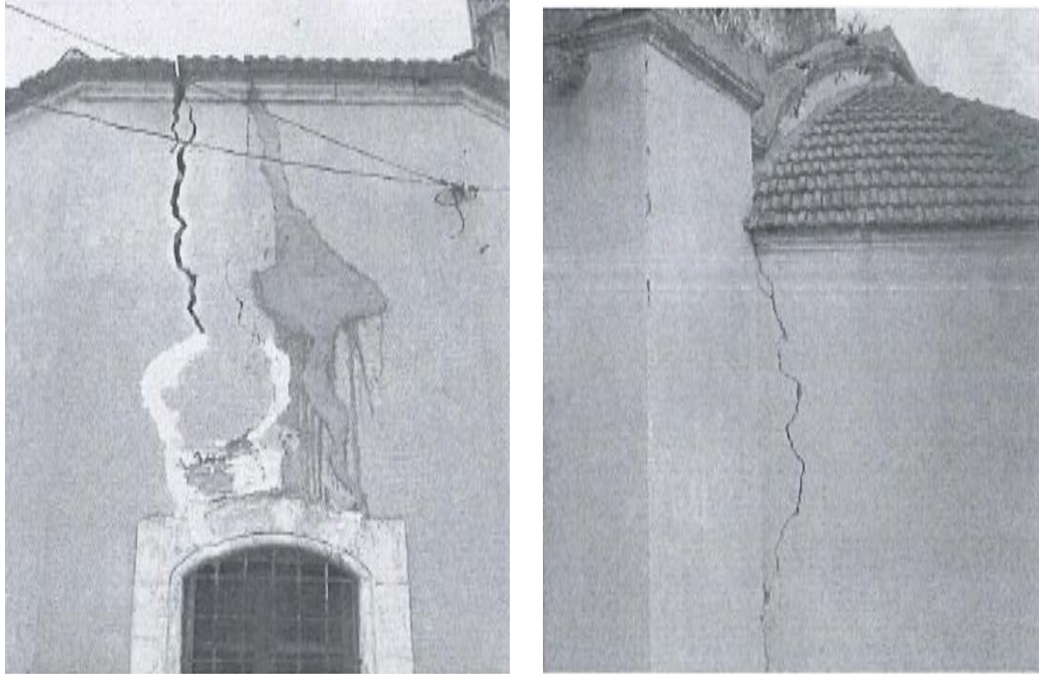
1.4.2 Repairing of the big cracks on the east wall of the church.

In order to repair these huge cracks on the wall that exists on the east wall, the contractor, ~~after the cleaning of the plaster and~~ with the guidance of the engineer of the work, will have to carefully start taking off the stones next to the crack in order to rebuild them in such a way that in every other row of the stone built a tie stone has to cross the crack for a proper stitching of the wall using tie-stones.

The tie-stones must be of the same type of stone and they must be built the same way as the whole wall (same technique).

To do this, the contractor has to follow the steps of the work as follow:

- The crack is carefully widened and cleaned by brushing and washing using low abrasive tools and water. It is recommended that a brush and sand paper be used, while high pressure sand blasting and extreme mechanical cleaning must be avoided in order to prevent damage to the stone.
- Stones are removed from the edges of the crack every 0.50m along its length after careful cleaning and tie-stones are built-in at these positions.
- Pointing is removed along the length of the crack at 0.30m on both its sides. Pointing is retained if it is very well preserved.
- After the tie-stones are in place, gallets and/or pointing takes place using lime mortar. Pointing should be recessed at about 0.5-1.0 cm from the exterior face of the stones and be placed neither deeper than the exterior surface of the wall nor protruding from it. During these processes care should be taken in order to maintain the exterior surface of the stones clean.
- If considered necessary, and upon instructions by the Engineer support might need to be installed under the apse ceiling during the works in order to avoid any risks.
- After completion of the works the wall should be brushed down and cleaned with water if necessary.



1.4.3 Repairing of cracks that exist on the vault on the east side of the church above the sanctuary

On this particular vault there are a few linear cracks that need to be grouted. After the cleaning of the plaster from the surface of the vault inside and the removal of the tiles from the roof of this vault, the cracks that exist are going to be revealed. After shutting with gypsum the cracks on the face of the vault below, the grouting, as described on the grouting process, shall be placed along with the hydraulic lime that it has to be used from this particular work.

Grouting Process/ Material Preparation and Application:

Total grouting shall be used based on natural hydraulic lime. Materials like Kimia Limepor 100, Mapei Antique I, Albaria calce Alletamento, BASF or equivalent can be used. The characteristics of the materials that comprise the masonry have to be taken into account so that the gaps are filled successfully and the performance of the wall is improved after its consolidation. The grout is inserted -through thin transparent tubes (15mm diam.) placed on a 50 to 70 cm diagonal grid or along the length of the cracks- externally with a controllable coefficient and the least required pressure for its promotion in the cracked area. This is always below the tension limit of the crack and in any case it must fluctuate between 0.5 to 1 Atm at the insertion point of the masonry. The application should take place in areas that are indicated by the architects or civil engineers and that will be agreed with the supervisors of the project before the beginning of the works. A detailed grout report will be kept for each tube.

For the preparation of the grout a high-speed mixer with a rate of at least 1,500-2,500 r/min is required. The mixer must allow the production of a stable and homogenous mix without the segregation of the materials with thin particles and of the cement. The time of mixing for the grout preparation will be defined on site by the supervisors as it depends on the materials that will finally be used for its composition. Between the mixer and the pump a waiting container equipped with a slow-stirring system (150-300 r/min) is needed. The application of the grouting will be executed by a specialized work group, which shall use a pump of preferably continuous flow, with the capability of suction and grounding of material to a grain of 5mm. Both the pump and the nozzle will have compulsory integrated pressure gauges in operation, with the capacity of measuring pressure from 0.1atm. Moreover, the pump that will be used ought to have a special valve integrated in its system, which will obstruct the rising of pressure over a specific limit.

This limit will be defined according to the position in which the pump is located every time in relation to the position of the wall, where the works are taking place, taking also into account the fact that the acceptable pressure of the nozzle is 0.5-1.00atm. The tubes must be blocked after the completion of the grouting in such a way so that the grout is retained under pressure inside the masonry.

The stability and the viscosity of the mixture must be often checked on the worksite, according to the instructions of the supervisors and every time the grouting procedure begins the results of the measurements must be registered in the diary.

The phenomenon of segregation (settlement - stratification) must be avoided and the perspiration should be less than 3%.

1.4.4 Minor cracks on the walls that are less than 2cm and all the cracks on the domes/vaults

All the cracks that are less than 2cm width on the walls and any cracks on the domes/vaults will be filled up with grouting with the same process that is been described on the previous paragraphs.

1.5 Treatment of the walls of the church externally

(Supervision of Conservator is required)

1.5.1 Removal of Plaster (Optional item - Supervision of Conservator is required)

The plaster on the wall is cement-based plaster. If needed and upon instructions by the Engineer the contractor will need to remove the cement plaster up to the level of 2m. Cement plaster will have to be removed from the walls very carefully in order not to make any damage on the stone walls of the church.

~~1.6. Restoration of the damaged stones and replacement of the missing carved stones of cornices, lintels, shelves, keystones, decorations~~

1.7. ROOF

At the moment, the roof of the Church is covered with soil and vegetation and, in some parts of the roof, there are leftovers of the French tiles and in some spots of the roof we can see leftovers from the original Byzantine type tiles which give us the testimony that originally the roof was covered by Byzantine type tiles.

The roof must be cleaned completely from all the loose materials and vegetation and tiles and then the architects/engineers must be called on site in order to inspect the roof and see if there are any particular points which witness points from the original roof cover of the roof. All the cement patches will be cleaned too.

The roof must be cleaned completely from tiles and all the mortars and leftovers so we can have the structure surface of the roof completely clean.

After this, the roof must be cleaned by the use of slidely pressured water jet and when is completely dry, cleaned by the use of air pressure so all the dust can be removed from the surface, before the next step, which is the plastering of the rough surface of the roof. The plastering of the roof must be done with lime mortar with 2 parts of sand and 1 part lime with the addition of polypropylene fibers (600gr per m³ of plaster). The plaster must not have thickness more than 2cm and it will have to follow the slopes and shape of the roof.

The waterproof isolation will be done with two-component, elastic, salt-resistant, cement-free, lime and eco-pozzolan based coating for waterproofing and protecting material (Mape-Antique Ecolastic or equivalent) placed on the roof along with a fiberglass mesh.

All the old channels for rainwater will be find and repaired. Existing gauzes will be cleaned and repaired.

Special care must be given on the insulation of the corners between the roof and walls, where the insulation must be strengthened with the addition of 30cm width fiber mesh (20cm on the roof and 10cm on the wall) and the insulation covering correctly the surfaces of it.

1.8. STENGTHENING AND RESTORE OF BELFRY

(Supervision of Conservator is required)

Intervention on belfry include:

- Checking, brushing and cleaning of metal elements to remove remains of rusted parts. Thorough cleaning with alkaline rust converter; washing by deionized water (one hour after the cleaning and again after 24 hours), three coats alkyd base red oxide colored primer, two coats final preservative oil painting for the parts of the metal elements that are exposed.
- Removal of all the cement joints
- Filling of cracks with lime mortar.
- Removal of existing grouting and replacement with lime mortar

- In the places where there are metal plates and are not exposed, in order to prevent any further corrosion, the joints between the stones have to be sealed with rustic material same colour as the stones of the masonry and definitely 1-2 cm below the surface of the walls.

1.9. WINDOWS AND DOORS

- Refurbishing of the masonry doorways and window masonry frames + Removal of existing grouting and replacement of lime mortar (see detailed description below in *italic*)
- All door and windows will be cleaned and repaired on site.
- Grills embedded in the wall shall remain and repaired in situ, and missing grills will be new.
- All upper windows facing north and south can be shut with a metal net fixed to a wooden frame.

Removal of cement grouting and cement surfaces and replacement with grouting of lime mortar mixed with fine grain sandstone

Removal of cement mortars that cover the stone surface or the joints between two stones shall be made carefully in order not to damage the original stone. Masons must use small chisels and verify with architect the extension and depth of removal, eventually removing only parts that cause esthetical damage if cement mortar is too hard and deep to remove.

Grouting the joints will be done after removal of old ones. New grouting should be placed 0,5cm recessed from stone surface and made of two layers, well pressed with spatula, and treated with a sponge a few hours after being placed, to have a coarse surface. Treatment with a wet sponge should be repeated to help lime carbonation during the following 12 hours.

Refurbishing of masonry doorways or window masonry frames

In cases that only some parts from the carved stones that construct the masonry frames are missing, at that point the stones can be completed by the use of a mixture of sand from the same stones with the addition of a cohesive substance, trying matching correctly the colours.

Where the stones of the frames are severely damaged, then they have to be replaced with new masonry at any height or depth similar to existing one, in material and texture. The new masonry must be connected with tie stones (30%) to existing masonry in order to guarantee structural homogeneity and prevent future detachments.

1.10. Treatment of Existing Metal Rods

The metal rods that are helping the walls for moving, along with the metal parts holding them in place, need to be cleaned and painted the same way as the metal parts on the belfry.

1.11. Work on the iconostasis

(Supervision of Conservator is required)

The only work that needs to be done on the iconostasis at this stage is to restore the six wooden poles that are helping the iconostasis to be supported and are now missing.

The upper part of the iconostasis is supported by two beams extending from the north to the south wall, sitting in holes that exist on the stone walls of the church. The iconostasis had also 8 poles originally that were extending from the floor all the way up to the top part of it. The 6 of them are completely missing and they have to be replaced by hard wood 10x15cm shaped up as the two existing ones.

All the wood of the iconostasis has to be protected by the use of fungicide placed by brush after a thorough cleaning of the whole structure.

1.12. Provisional sum for the restoration of the damaged stones and replacement of the missing carved stones of cornices, lintels, shelves, keystones, decorations

Restoration work of carved stone elements will be finally decided after the removal of plants and other elements (lime mortar, etc). To be carried out as follows:

- Photo report prior to any intervention;
- Small stone scabblings shall be fixed using premixed cement-free hydraulic binder to be injected to fix scabblings. Edge of scabblings will be fixed with mortar made of premixed binder and “stone dust” in order to match the color of mortar with the color of the stone, pressing the mortar with a spatula.
- Big scabblings will be fixed with replacement of the stones in the phase of the full conservation of the Church. At this phase, even for big scabbling, will use the same method for repairing them as for the small ones and make sure that there will be NO penetration of water from the joints of the stones. Along borders lime mortar shall be placed as per small scabblings.
- Refill of small missing parts or holes will be done with hydraulic lime mixed with calcareous sandstone sand, well pressed by a spatula, matching the color and the texture of the stone.

In case that the severe damaged stones need to be replaced at this phase of the work, the Architect will decide the removal of decayed stones and replacement with new ones, carved in the same way and shape as the original ones were.

- New stones will be carved to reproduce the original stone molding or design, using calcareous sandstone matching in color and composition with the original one.
- Careful removal of decayed stones using metal chisel avoiding any damage to the neighboring stones.
- Cleaning and wetting of the area that will house the stone.
- Insertion of new stone, to be fixed with lime mortar