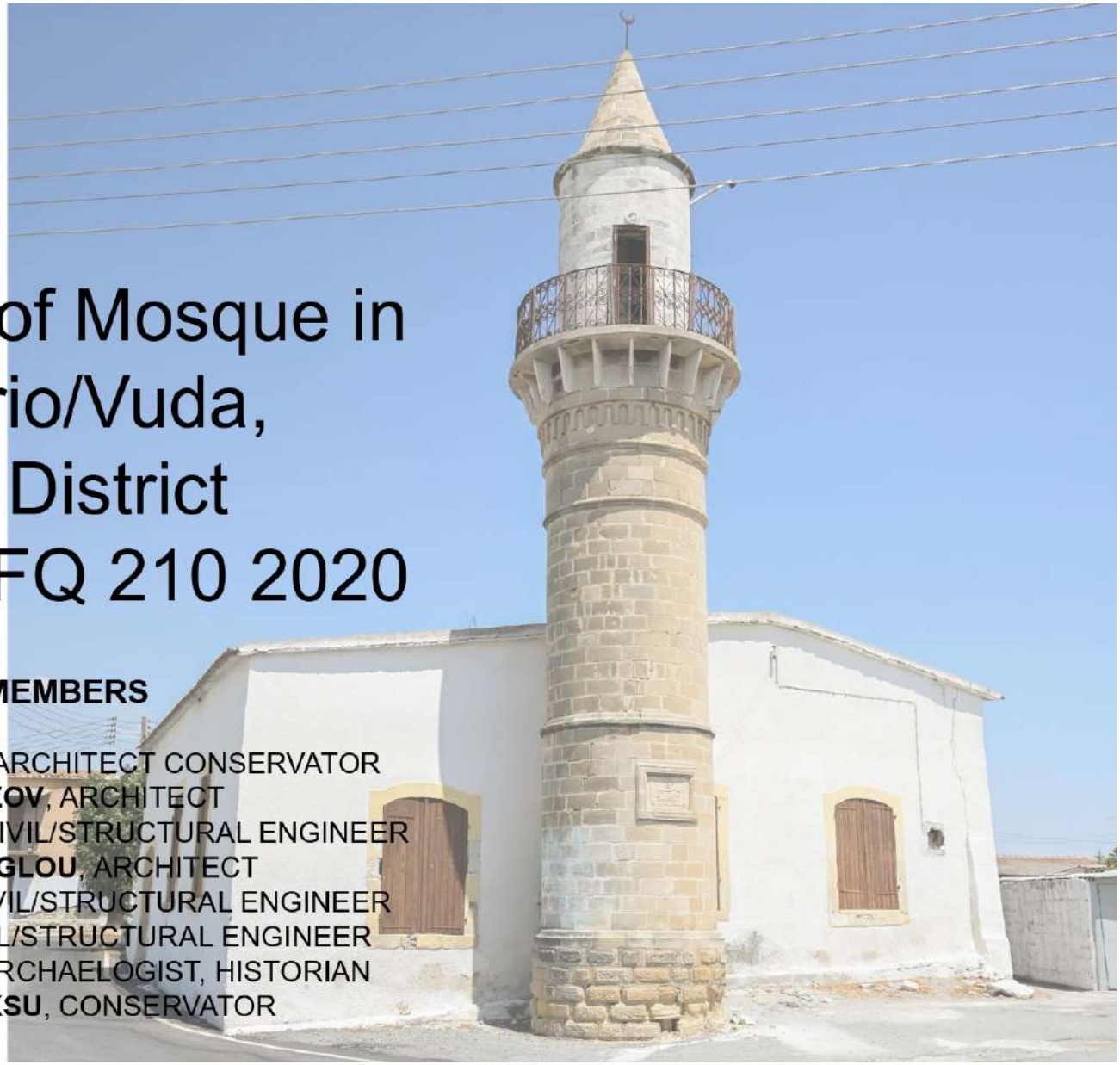
Conservation of Mosque in Kalo Chorio/Vuda, Larnaca District UNDP CYP RFQ 210 2020



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All the projects are funded by the European Union

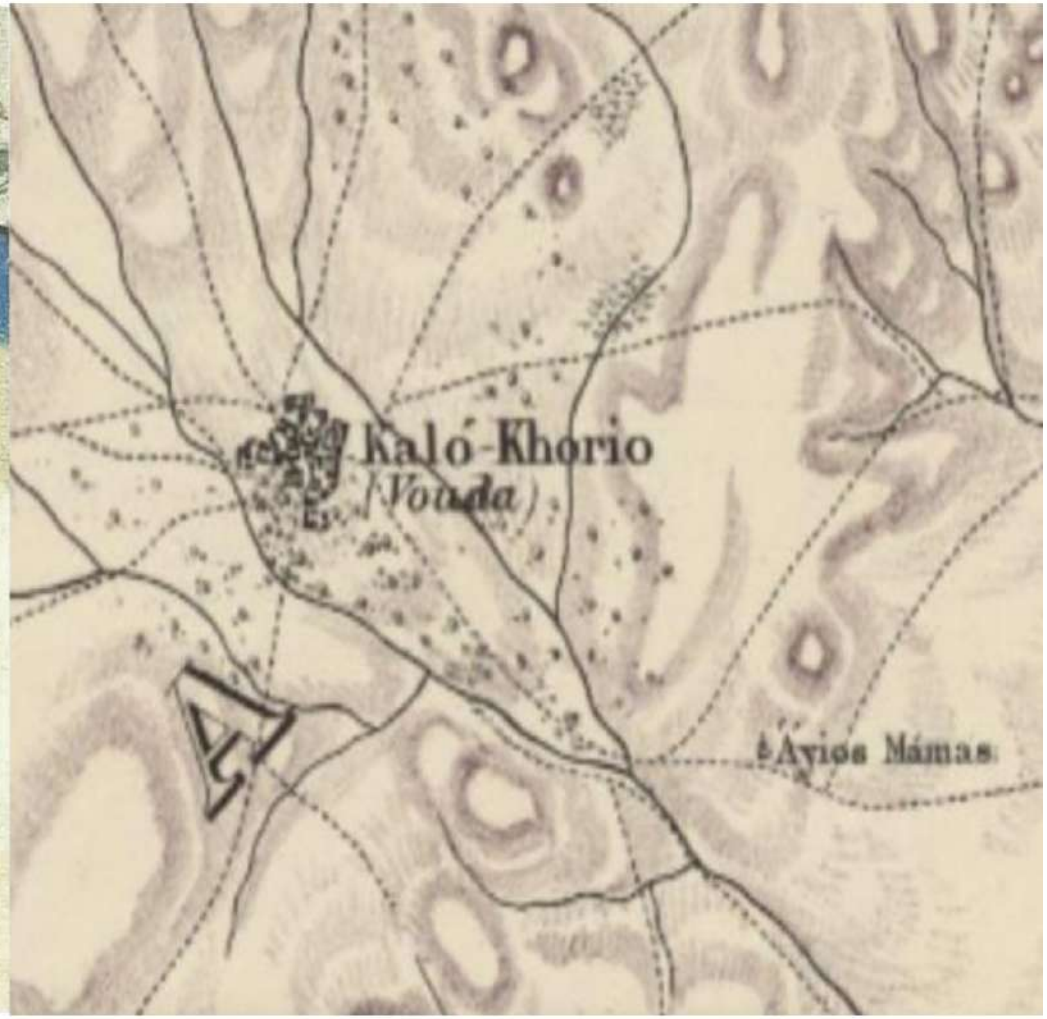
Dating of the village. As attested by historic maps of the 16th century, the village was in existence then.

Top maps by Giovan Francesco (1552-1575) « Cyprus Insula nobilissima », Venice 1566. Detail on top right shows village of Kalo Chorio/Vuda marked as "Vda"

Bottom map by Kaartje Van't Eiland Cyprus, 1747, showing Kalo Chorio/Vuda as Nuda.

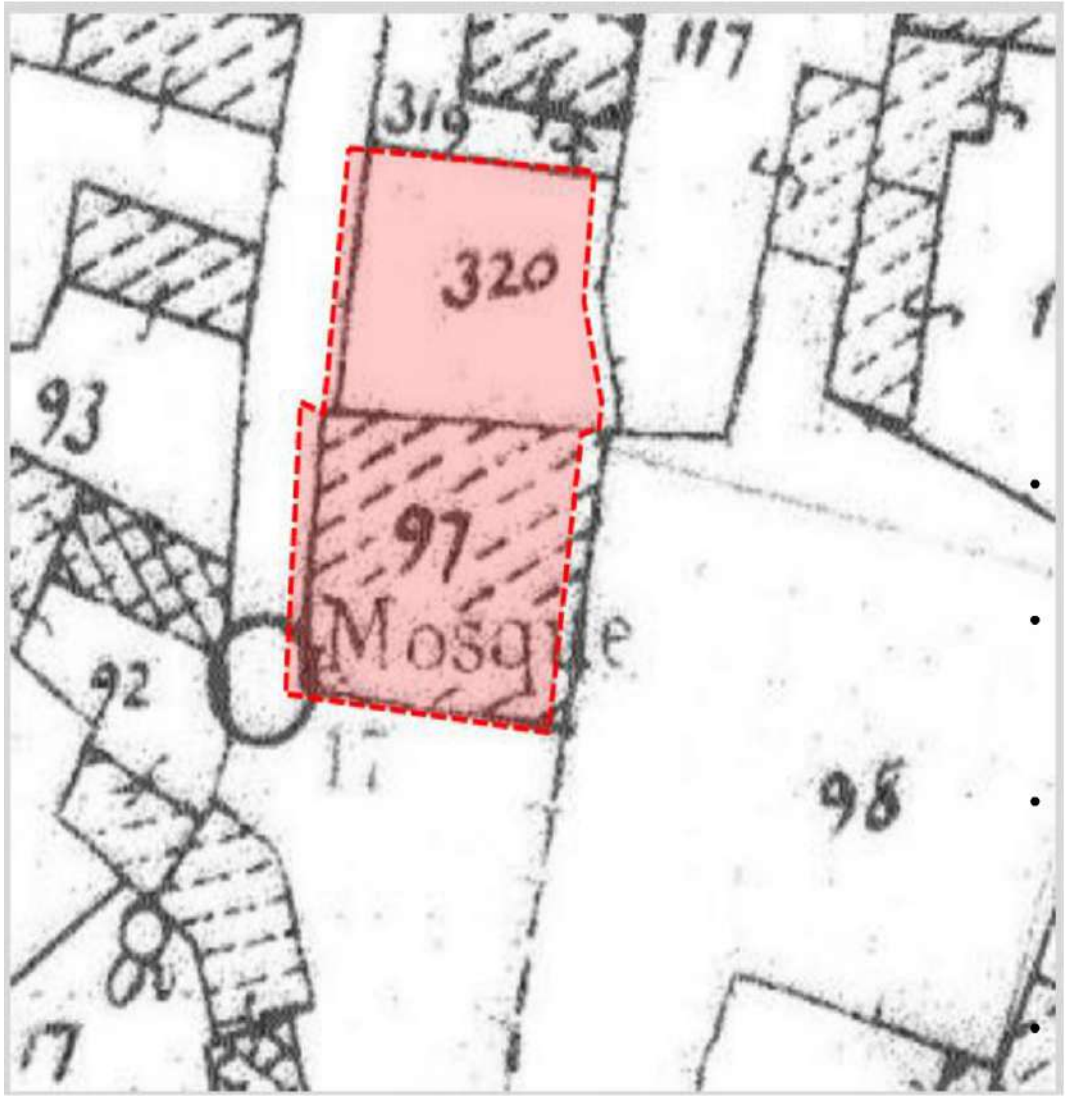
The village continued to be in existence in the 19th c. Goodwin mentions that the estate of Vouda was still owned by one person, "The Efendi", up until the year 1850. In 1836 in his diaries, Lorenzo Warrner Pease, mentions the neighbouring village of Klavdia, as part of the feudal estate of Vouda (now Kalochorio)".

Map of Leonidas Attar 1542



Map of 1882 published in 1885 by Kitchener showing Kalo Khorio (Vouda) (detail of Map of Cyprus by Kitchener 1882-85, Sheet 10).

Historical Analysis



The mosque Kalo Chorio/Vuda lays on the geographical references of:
GPS Identification: Y: 34.927944, X: 33.537028 (34 Degree 55'40.6"N 33 Degree32'13.3"E);: Sheet 40, Plan 4210V01, Plot 97, 320 (Fig. 6).

- The first historical account of the mosque appears in an Evgaf documents of 1882. The information pertains to a dysfunctional house with a collapsed roof (it notes that Forty pounds were needed to repair the structure).It was possibly bought and restored as a mosque after the year 1882. Emir Ali Haci Mustafa is noted as the mosque's trustee and Ahmet Efendi the Imam. Their mentions makes us speculate whether there was another mosque being used before the building under study was bought and restored as a mosque.

- The Minber and Mihrab must have been added when the building changed use.

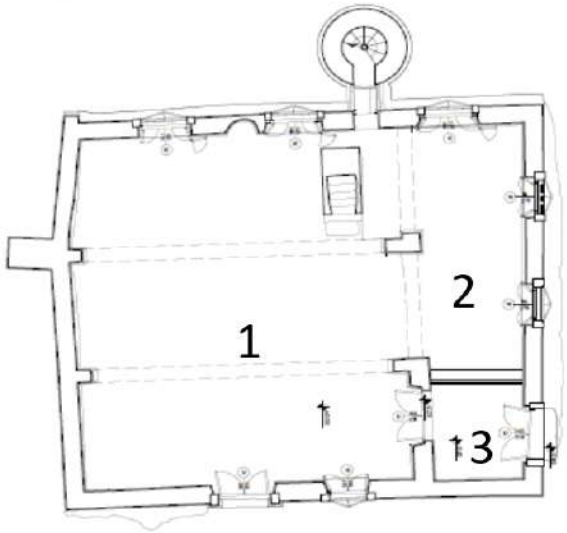
- November 1923, is the completion date of the minaret's construction, with donations from Silahtar Huseyin Hamid Aga

- The year 1928 is the date of the opening of the north door and the re-plastering of the walls. The donation for the works was made by the Muhtar of the time, Mustafa Huseyin Gazi

- By 1933 a boys' school was operational in the mosque as a fund was drawn up to pay for the books and other necessities of poor and orphaned children of the medrese.

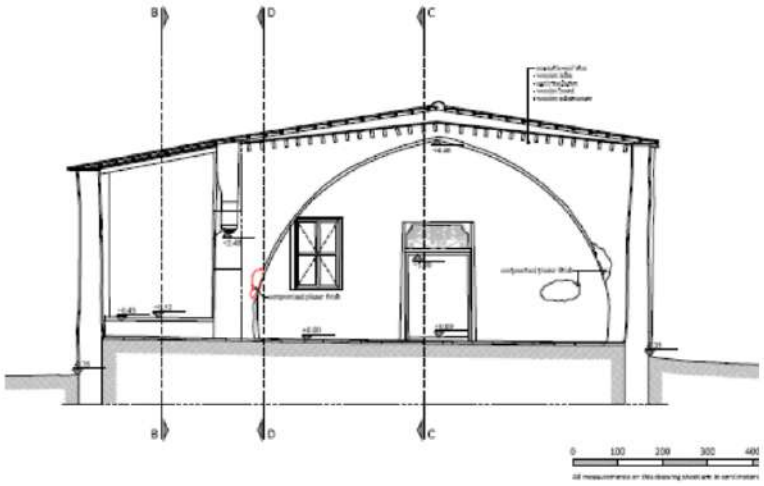
- In the 1950's the minaret collapsed down to its balcony possibly due to earthquake of 10th September 1953 and was rebuilt by Osman Huseyin Hocaoglu of Peristerona

Description of the spaces of the mosque



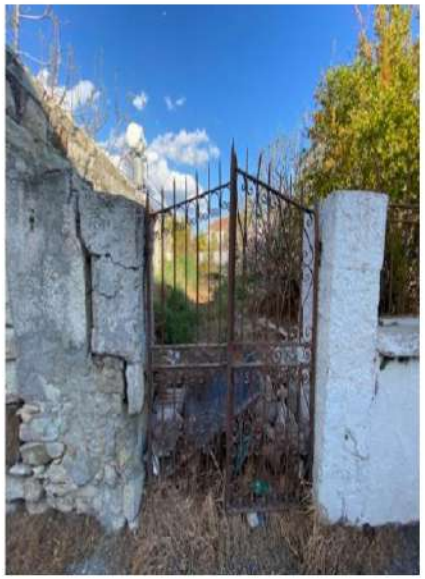
- **The building has a square plan with a yard to its north.**
- **The prayer room (1) is the large centre space with two arches**
- **The school (2) was connected at a later stage to the prayer room through openings of small arches.**
- **The space to the southwest the funerary room, (3) is lower and today divided by a small wall which in the past probably extended to the ceiling.**

Description of interior of mosque



- **The first entrance of the house was possibly the western one (red)**
- **The spaces to the south were only later connected to the main hall by arches (yellow)**
- **The doors and windows all probably belong to the 1928 phase**
- **The roof was possibly raised and retiled at the same time (1928).**
- **The floor was covered with gypsum flag stones (“Cyprus marble”)**

Description of exterior site of mosque



- **There is a garden to the north of the mosque with a low enclosure wall and fence which belong to the early decades of the 20th century. The low wall is constructed of local stone but capped with concrete and wrought iron railings**

- **Originally, an enclosure of a yard, especially one of a house would have been quite high with a wooden door as an entry point. The lower walls and the iron grills belong to the early decades of the 20th century when industrialized iron was imported to the island. It is possible that it was rebuilt in its current state in the year 1928, as it is similar to the iron decoration above the northern door, therefore contemporary to it.**

Extension of existing building into todays northern garden space

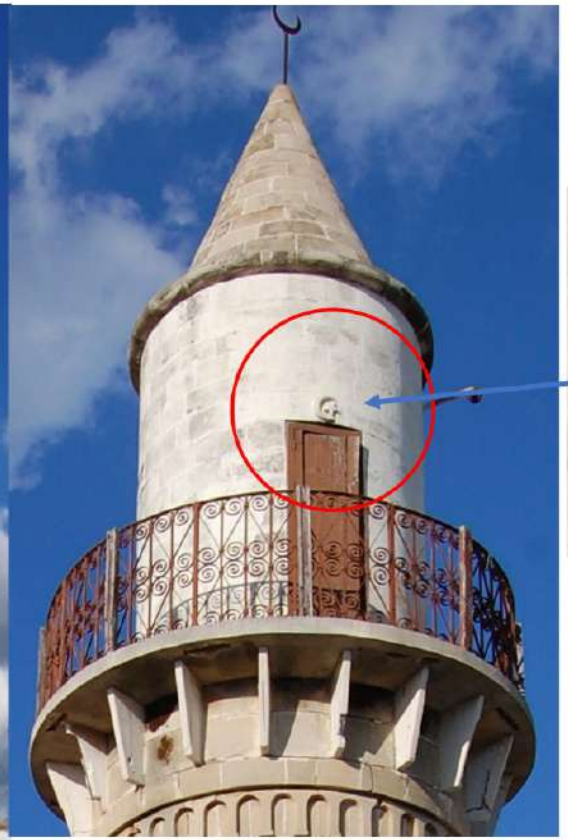
Interior wall East
Scale: 1:50

- **Where the garden now lays there existed either an extension of the building or there was intention to extend the building as built in arches were discovered during the restoration works**

The minbar and mihrab

- **The Minbar is built of stone in a simple design with 9 steps (except two later additions) up to the top. At the top 4 columns support triangular cap (tower).**
- **The Mihrab, a niche in the wall, directs the worshiper towards Mecca "Qible". Its location between the two windows but not centred, shows that it post-dates the wall. It is extremely simple (or robbed of its decorations.)**

The minaret



A plague on the minaret shaft, bears the year of 1841 and in unclear Arabic 13?1. It is unclear whether it was placed there from another site. We have to take into account the fact that minarets in Cyprus only came into use in the 19th c or even later. Before call to prayer was done from the roof of the mosque.

- **The Balcony "Serefe" was rebuilt from concrete and supported by mosaic cantilevered corbels in November 1953, with donations from Silahtar Huseyin Hamid Aga, possibly after the collapse of the original minaret. Over the door of the balcony is the crescent and star**

Kalo Chorio/Vuda, Larnaca District

Tools used for Architectural survey: 3d laser scanning / 3d point cloud model. scale 1:1 - for optimal precision

Kalo Chorio/Vuda, Larnaca District

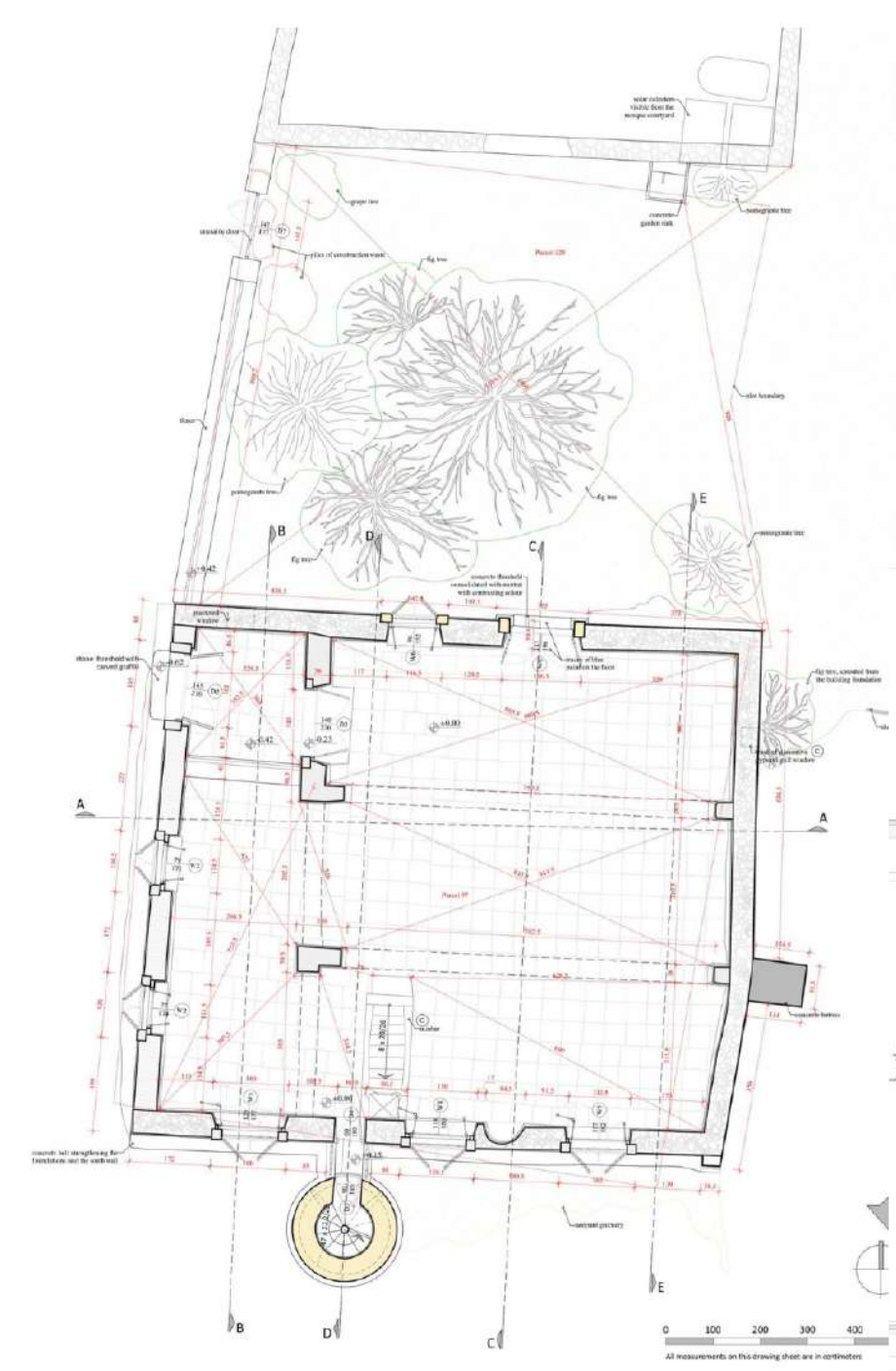
Tools used for Architectural survey : 3d laser scanning / 3d point cloud model. scale 1:1 - for optimal precision

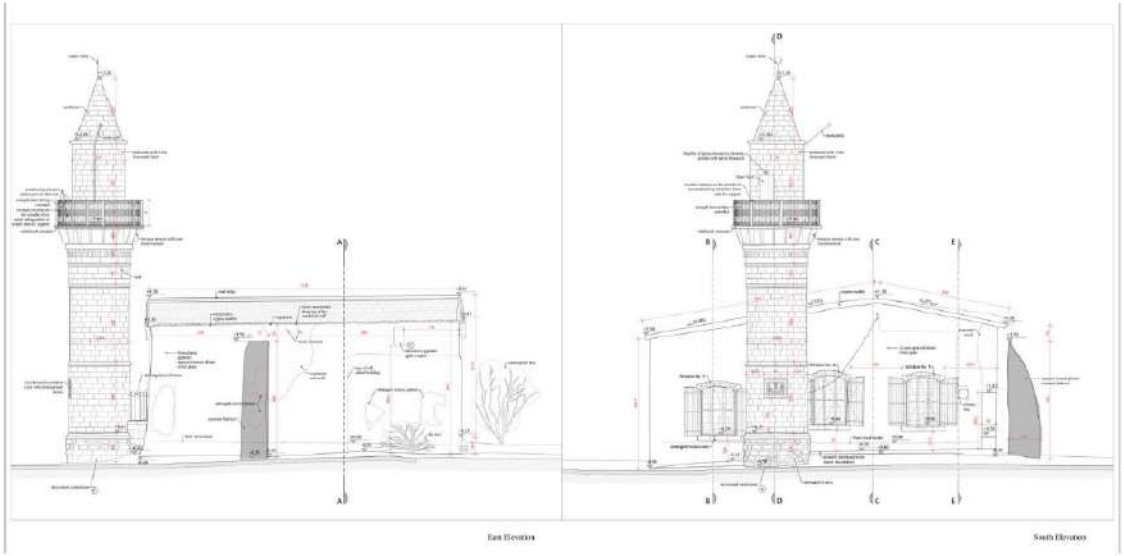
Kalo Chorio/Vuda, Larnaca District

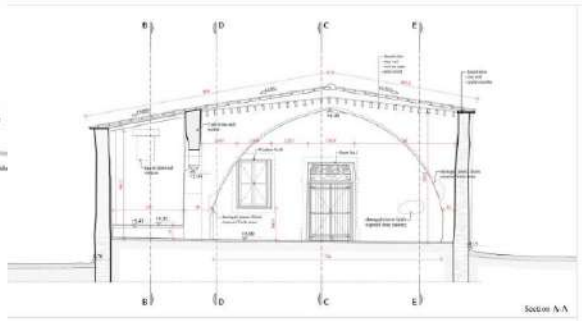
Tools used for Architectural survey: Arial photography for perception of site

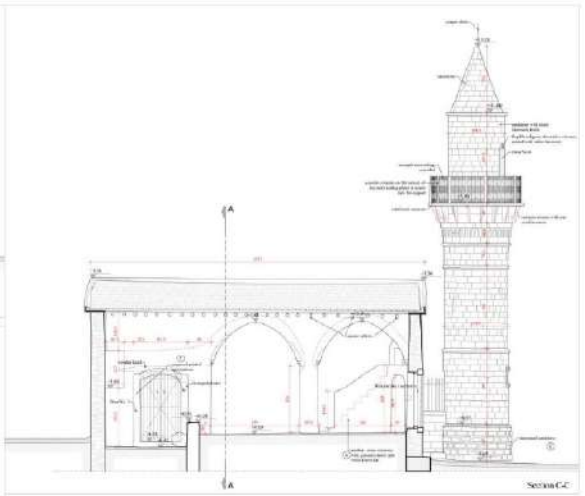
Kalo Chorio/Vuda, Larnaca District

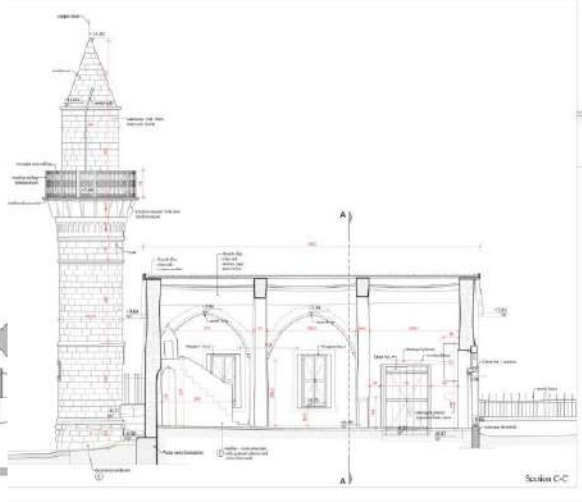
Architectural survey: 12 releve drawings

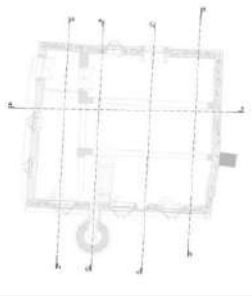




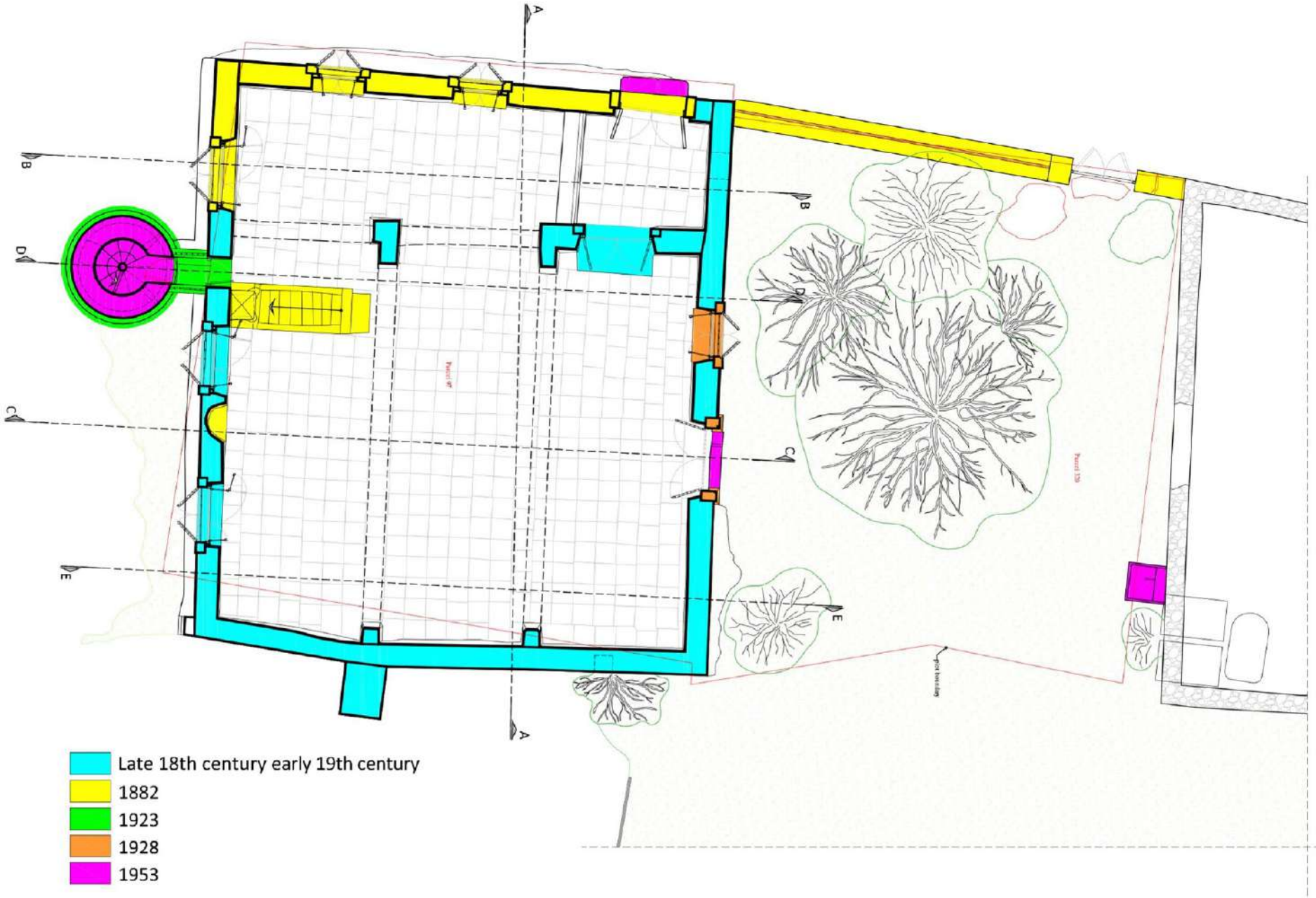




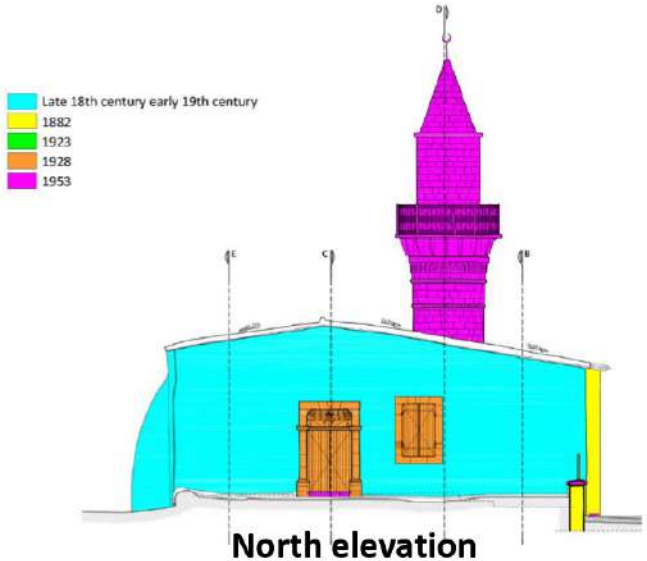




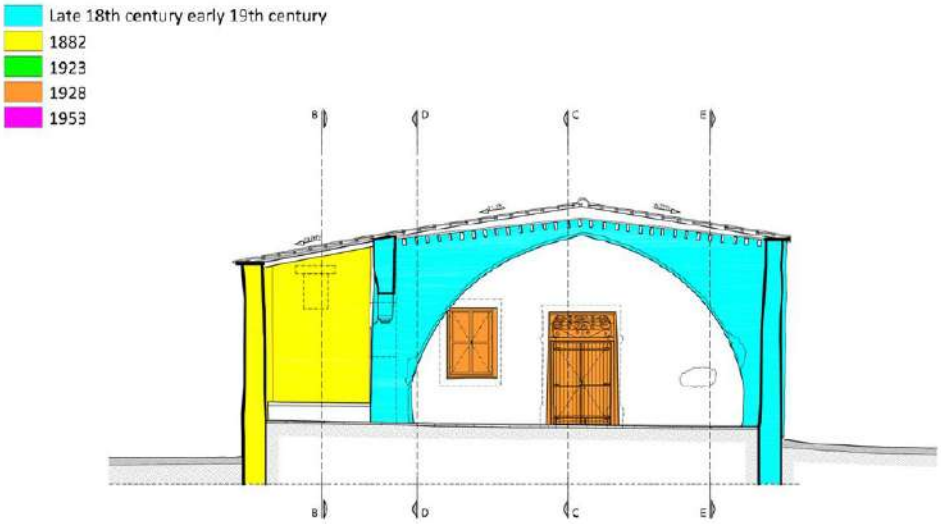
Construction Phases after 1882



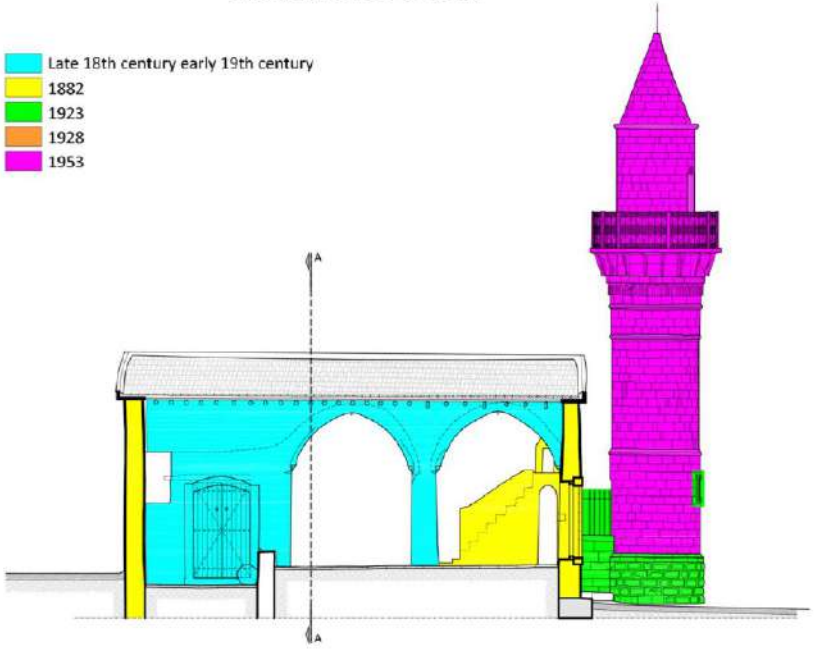
Construction Phases after 1882



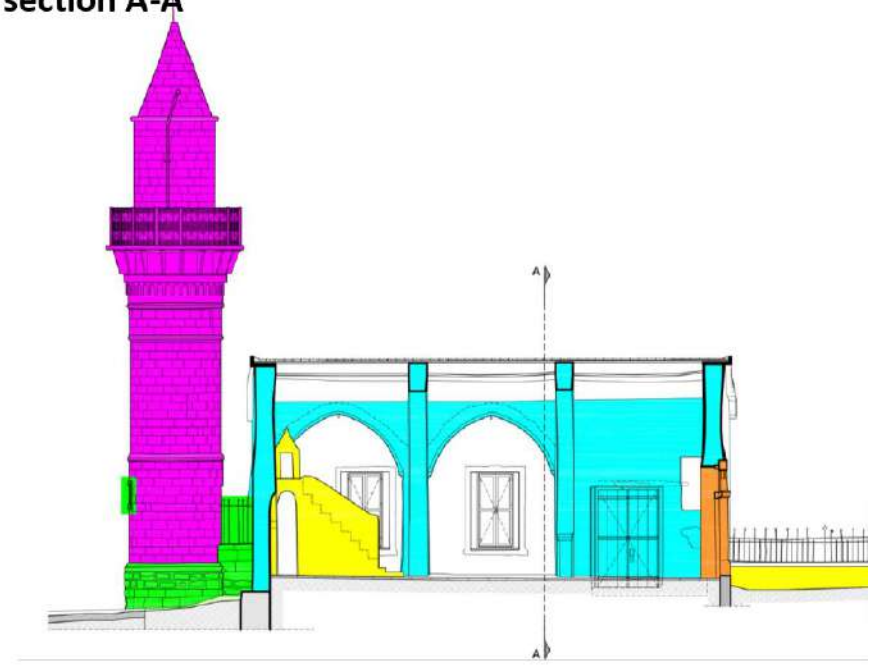
North elevation



section A-A

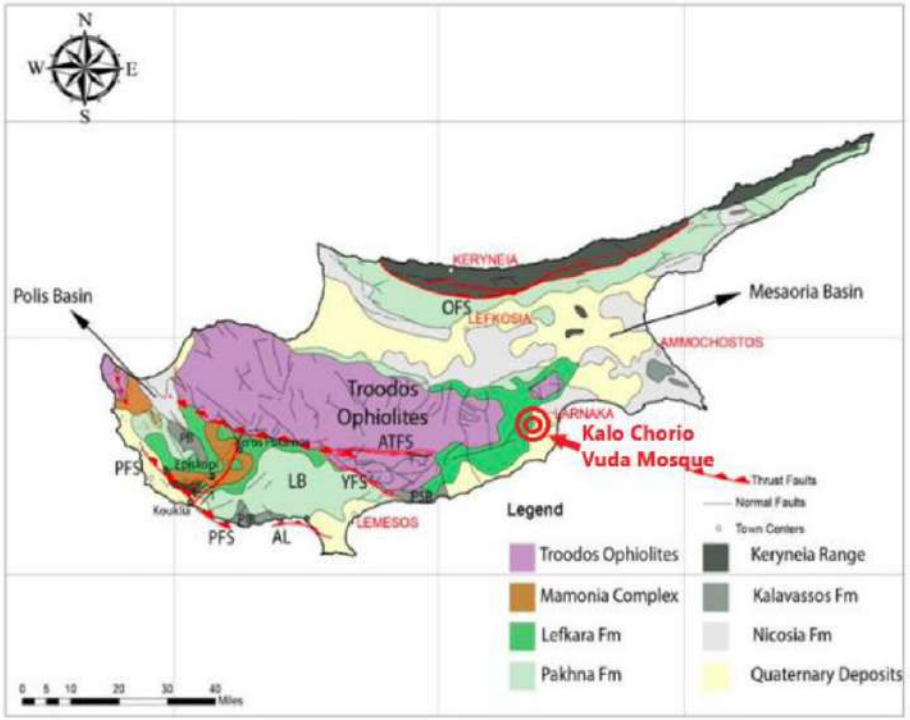


Section B-B



section C-C

Geology, earthquakes and natural disasters



Simplified geology map of Cyprus illustrating the distribution of the basement terranes (After Papadimitriou 2017: p.32, original Kinnard 2008).

Table of Catastrophic and Damaging Earthquakes on Cyprus 1896-2000 (Figure S6)

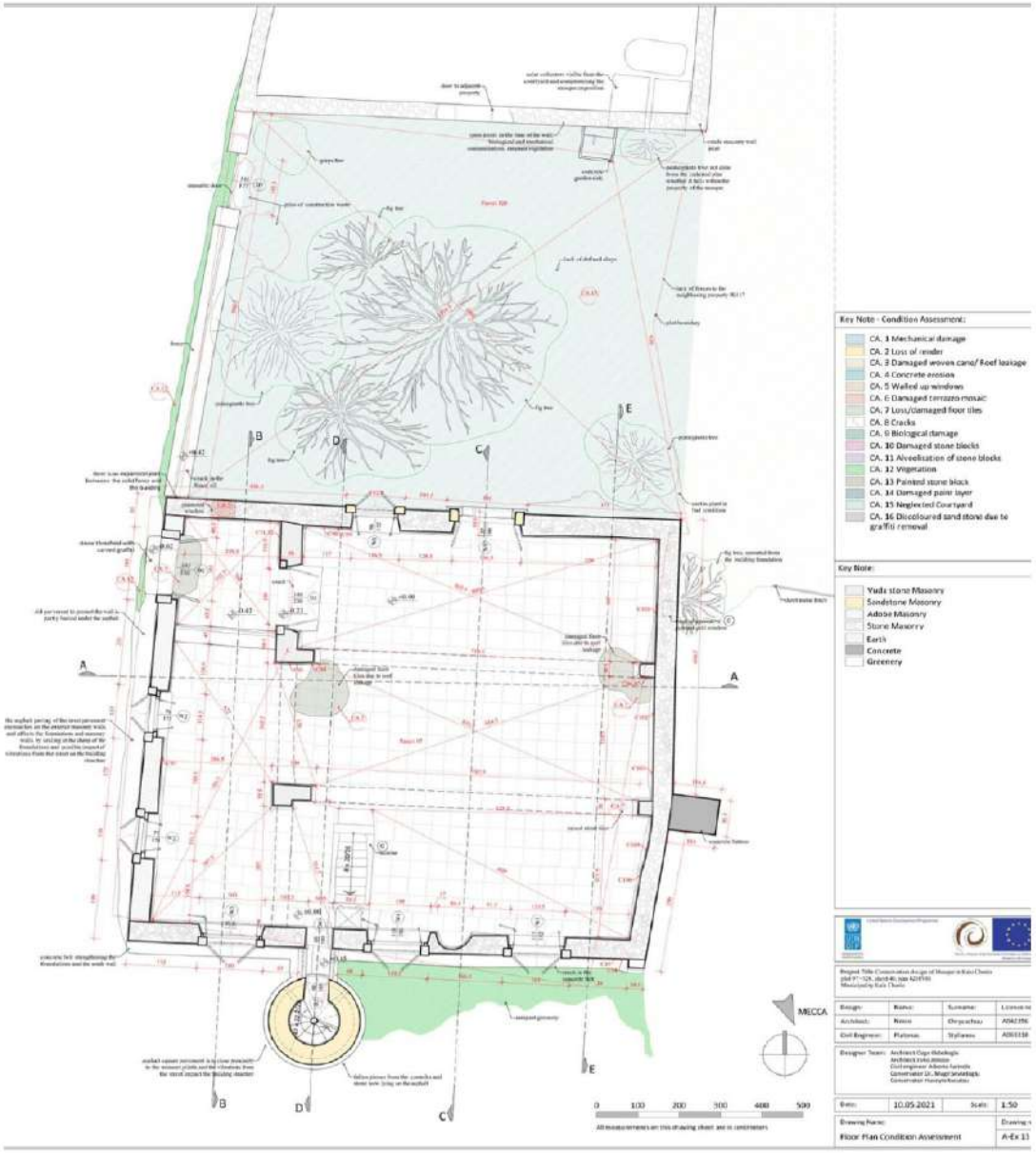
Date	Magnitude Ms	Description of damage
29/6/1896	6.5	Damage in the area of Limassol, especially at Akrotiri and Episkopi. Many aftershocks followed.
5/1/1900	5.7	Small damage in Mesaoria.
23/2/1906	5.3	Small damage in Limassol and Kolossi. Felt all over the island.
18/2/1924	6.0	Small damage in Famagusta.
13/12/1927	5.0	Small damage in Limassol and in villages to the north (Koilani, Pera Pedi, Monagri).
9/5/1930	5.4	Damage in Pafos town and the surrounding area.
26/6/1937	4.7	Damage in southwest Cyprus (Pachna, Omodos, Platres, Salamiou).
20/1/1941	5.9	Severe damage in the district of Famagusta, especially at Paralimni, where 24 people were injured and many houses collapsed. Limited damage in the districts of Nicosia, Larnaca and Kyrenia.
10/9/1953	6.1	Destructive earthquake in the district of Pafos with 63 dead, 200 injured and 4000 homeless. Many houses were destroyed in 158 villages. The main earthquake was followed by many aftershocks, which caused additional damage.
15/1/1961	5.7	Small damage in Larnaca town and the surrounding area.
28/3/1984	4.5	Small damage in the town and district of Larnaca where it was particularly felt.
23/2/1995	5.7	Destructive earthquake in the Pafos district with two dead. Many houses collapsed in the villages of Pano Arodes and Miliou. There was also damage in the villages of Peristerona, Steni, Gialia, Argaka, Pomos, Pyrgos, Lefka, Neo Chorio, Lachi and Polis.
9/10/1996	6.5	Very strong earthquake in the southwest of Cyprus caused panic to the residents of Pafos and Limassol and to the residents of multi-storey buildings in Nicosia, Larnaca and Paralimni. Twenty people were slightly injured and two lost their lives from indirect causes. Limited damage in Pafos and Limassol.
11/8/1999	5.6	Strong earthquake with the epicentre close to Gerasa caused damage to buildings in Limassol and the villages to the north of the town. Felt all over Cyprus. Forty people were slightly injured mainly because of panic. Many aftershocks followed.

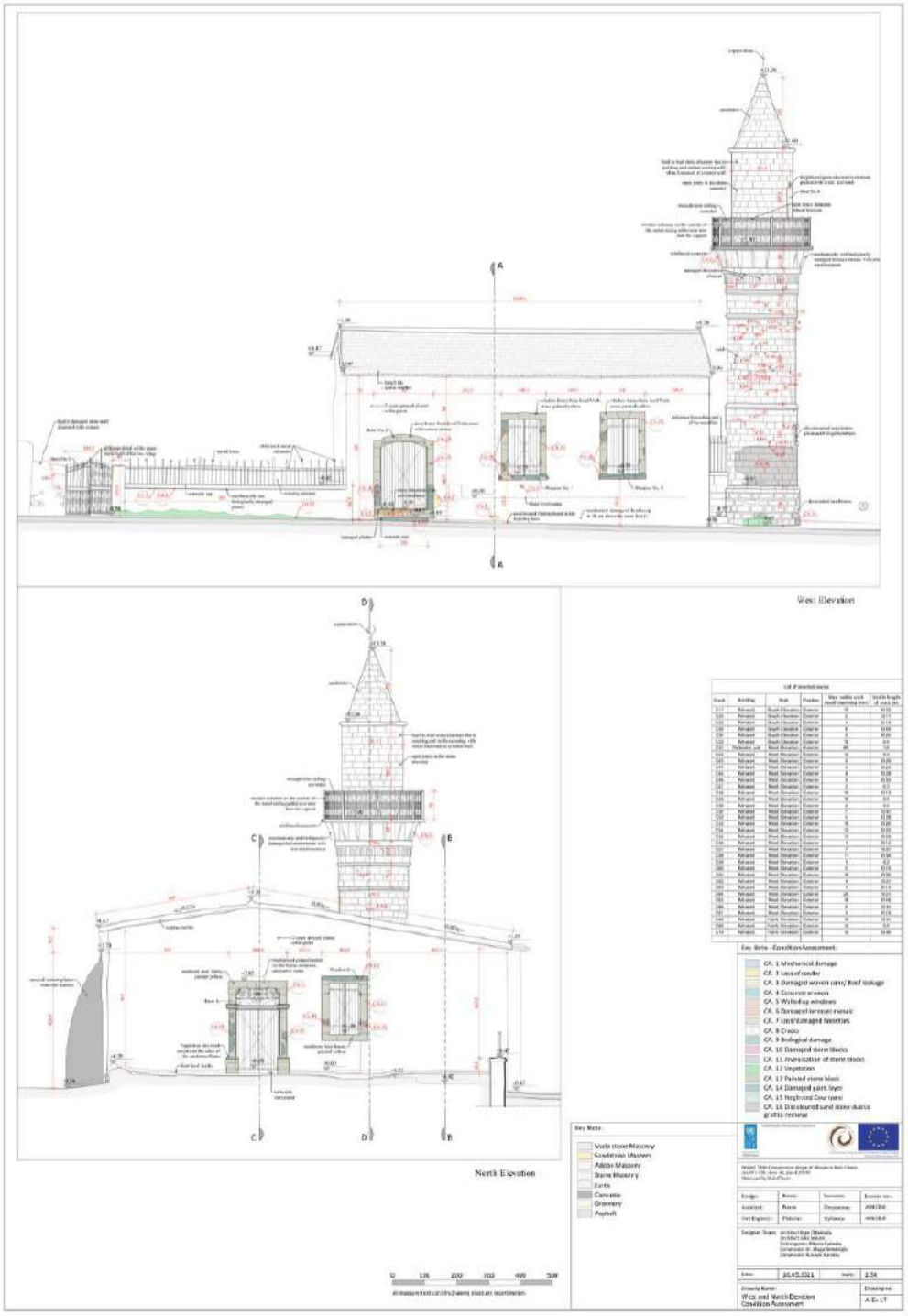
The most catastrophic earthquakes were those of 1941, 1953, 1995, 1996, and 1999.

Kalo Chorio/Vuda, Larnaca District

Set of Condition Assessment drawings

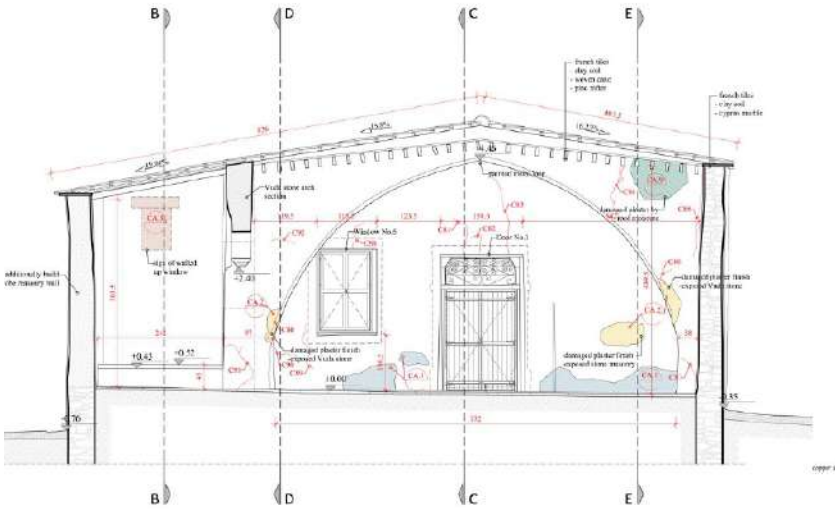
Following the architectural survey, a detailed conditional assessment was carried out to document and assess the pathology of the structure. Both the minaret as well as the mosque itself were investigated in great detail for structural damage.

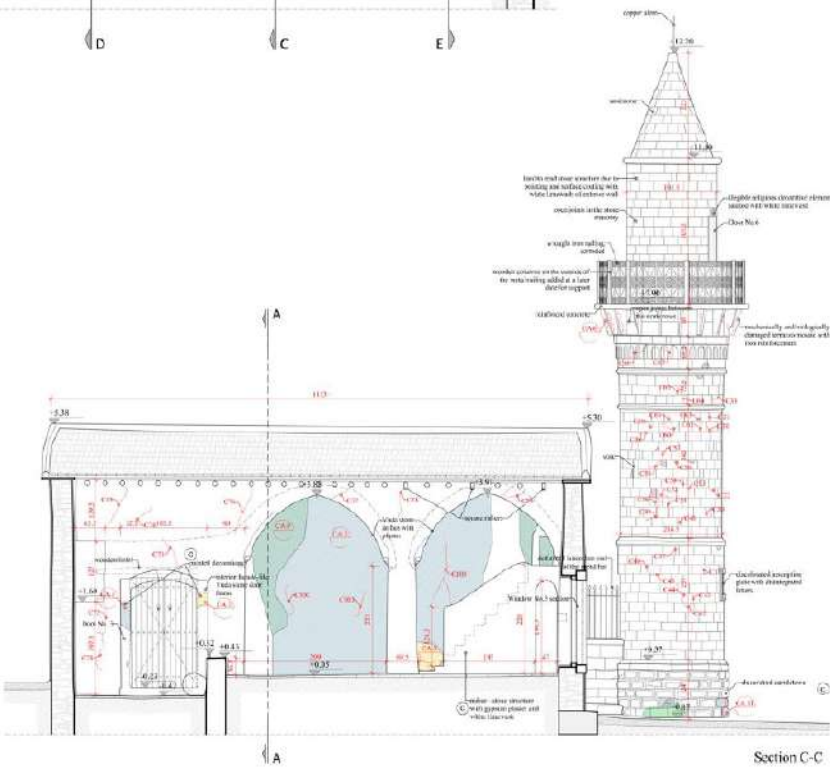




Condition Assessment

Each item was investigated and documented noting its pathology (cracks, deterioration of materials etc), and once the causes were documented, analysed and comprehended, a first proposed solution was suggested.

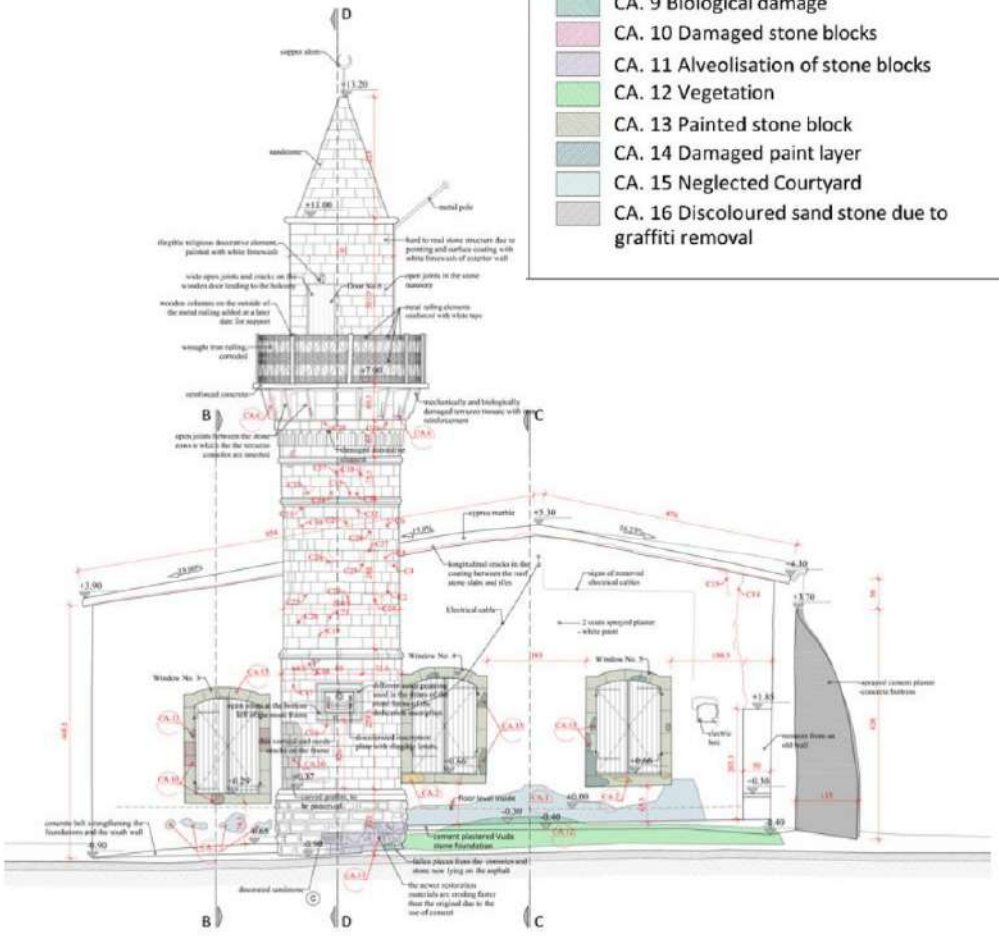




Section C-C

Key Note - Condition Assessment:

- CA. 1 Mechanical damage
- CA. 2 Loss of render
- CA. 3 Damaged woven cane/ Roof leakage
- CA. 4 Concrete erosion
- CA. 5 Walled up windows
- CA. 6 Damaged terrazzo mosaic
- CA. 7 Loss/damaged floor tiles
- CA. 8 Cracks
- CA. 9 Biological damage
- CA. 10 Damaged stone blocks
- CA. 11 Alveolisation of stone blocks
- CA. 12 Vegetation
- CA. 13 Painted stone block
- CA. 14 Damaged paint layer
- CA. 15 Neglected Courtyard
- CA. 16 Discoloured sand stone due to graffiti removal



South Elevation

ELEMENT	PHOTOGRAPHIC DOCUMENTATION	DAMAGE | PROPOSED INTERVENTION
MINARET 	 PH. 1  PH. 2  PH. 3  PH. 4  PH. 5	• GENERAL | Laboratory testing must be carried out to specify material characteristics. • PH. 1 & 5 – Damaged concrete elements & Rusted steel elements | Deteriorated concrete must be fully removed until health surface is reached. Corroded reinforcement, if any, must be thoroughly cleaned and / or replaced where extensive damage or loss of section is observed. Protection paint should then be applied and final coating with high strength repairing mortar. Repairing of brackets supporting the platform. Existing rail to be thoroughly cleaned from rust, repaired where necessary and application of anti-corrosion epoxy paint system for protection. • PH. 2 – Rusted Lintel | Existing lintel steel elements to be thoroughly cleaned from rust. If remaining section is structurally sufficient, application of anti-corrosion epoxy paint system for protection should be carried out. If loss of section is observed, replacement should be done carefully and following specific and approved methodology. • PH. 3 & 4 – Cracks on masonry wall / Deformed staircase stone axis | Structural tying of the minaret in specific levels to form a monolithical shaft section. All major cracks to be sealed with lime-based mortar injections.

ELEMENT	PHOTOGRAPHIC DOCUMENTATION	DAMAGE | PROPOSED INTERVENTION

MINARET

PH. 6

PH. 7

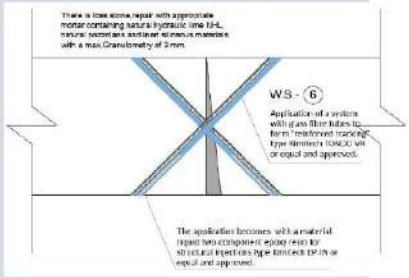
PH. 8

PH. 9

PH. 10

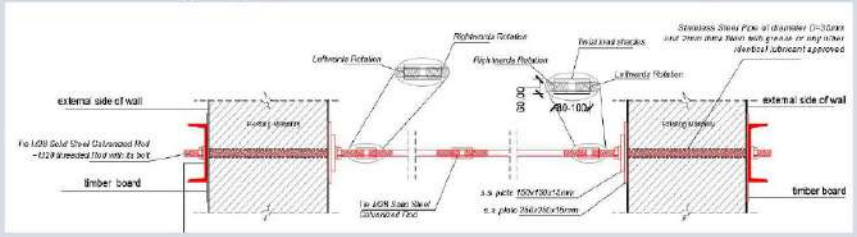
PH. 11

- PH. 6, 7 & 9 – Deteriorated stone elements, missing stones and older cement interventions in the base | Removal of all cement repairs, replacement of stone elements where loss of section is significant, deep pointing & jointing of the entire base, structural tying / capping of the base either by tie rods or stitching techniques.
- PH. 8 – Cracked lintel on both ends | Existing lintel steel elements to be thoroughly cleaned from rust and protected with anti-corrosion epoxy paint system. Further strengthening of the opening by installing glass fiber tubes or s/s bars anchored in a crossing form with the use of epoxy resin.



- PH. 10 & 11 – Weak damaged plaster & missing wall parts | Cement repairs to be removed, weak plasters to be removed as well, stone members to be repaired or replaced depending on damage extend, cracks treated accordingly, deep pointing and jointing to be carried out, lime plaster to be applied where necessary.

ELEMENT	PHOTOGRAPHIC DOCUMENTATION	DAMAGE | PROPOSED INTERVENTION
EXTERIOR	  PH. 12  PH. 13  PH. 14  PH. 15  PH. 16  PH. 17	• PH. 12 – Swollen plaster especially near the base | External apron slab with small outward inclination must be constructed to divert water away from the structure. • PH. 13 - External damaged plaster | To be removed, wall to be left to dry, cracks – if any - treated accordingly, new lime based protective plaster to be installed. Deep pointing and jointing to fix window sill. • PH. 14 – Cracks on pier element & vegetation growth | Repairing of stone with appropriate NHL mortar, deep pointing & jointing of the wall / pier. Treatment of the surfaces where organic growth is present by using appropriate biocide / herbicide. • PH. 15 & 16 – Damaged external wall & rusted steel elements | Damaged parts of the external wall needs to be fully and carefully demolished and rebuilt, where no capping is present, one should be constructed, existing steel elements to be thoroughly cleaned from rust, repaired where necessary and application of anti-corrosion epoxy paint system for protection. • PH. 17 - Further investigation of the ground condition needs to be considered and conducted prior to any intervention proposal. A number of investigation digs / boreholes is needed to specified locations to assess foundation condition.

ELEMENT	PHOTOGRAPHIC DOCUMENTATION	DAMAGE | PROPOSED INTERVENTION
EXTERIOR	  PH. 18  PH. 19	• PH. 18 – SE corner wall deformation | Wall deformation shows shifting of the corner towards east. Structural tying of the wall with the use of tie rods.  • PH. 19 – Strengthening of the buttress section near the base or full reconstruction, water drainage system (gutters / downpipes) on the roof to avoid water flow on the wall.
INTERIOR	PH. 20  PH. 21  PH. 22  PH. 23 	• PH. 20 & 21 – Cracked floor slabs | Floor to be repaired. Floor slabs to be removed, slab on grade and tie beams to be constructed, floor slabs to be put back in place, replacement of those who are cracked and damaged. Joint sealing. • PH. 22 – Deformed roof joists | All roof joists must be removed and replaced. Wooden tie beams must be introduced at the top of both supporting walls. • PH. 23 – Heavily moistened east wall | Damaged wall plaster to be replaced, proper water drainage system (gutters / downpipes) on the roof to avoid water flow on the wall and water penetrating inside.

ELEMENT	PHOTOGRAPHIC DOCUMENTATION	DAMAGE | PROPOSED INTERVENTION
INTERIOR		• PH. 24 – Weak swollen plaster | Plasters to be removed, inspection of wall and cracks treated accordingly, deep pointing and jointing to be carried out, lime based plaster to be applied where necessary. • PH. 25 – Detached plaster and damaged masonry | Damaged adobe wall to be replaced or strengthened with the use of wooden wedges and planks, plaster replacement. • PH. 26 – Wall structure disorganized and absence of homogeneity | Plaster to be fully removed, wall to be cleaned thoroughly and deep pointing and jointing to be carried out in order to form a bonded wall section. Stitching to be performed at all corners and T-junctions. • PH. 27 – Existing wooden lintel | Wooden beams in a fairly good condition. Wooden sections to be treated and protected properly with suitable protective paint. • PH. 28 & 29 – Stone arch cracked edge | Strengthening and restoring measures to be applied. Replacement of stone elements where loss of section or structural defficiency is significant, structural tying of the stone arched frame either by tie rods or stitching techniques. Finally, deep pointing and jointing.

PH. 24

Ph. 25

PH. 26

PH. 27

PH. 28

PH. 29

ELEMENT	PHOTOGRAPHIC DOCUMENTATION	DAMAGE | PROPOSED INTERVENTION
ROOF 	 PH. 30  PH. 31	• PH. 30 & 31 – Broken roof tiles & edge slabs | All roof tiles to be removed, timber joists to be replaced and roof structure to be re-constructed with appropriate inclination and water drainage system.
GARDEN 	 PH. 32  PH. 33	• PH. 32 & 33 – Garden wall with long cracks, demolished parts and absence of capping | Crack sealing with high-density mortar injections, deep pointing and jointing of the entire wall, construction of a continuous, RC capping at the top of the wall. Where wall parts are missing, wall filling in with similar stones must be done.

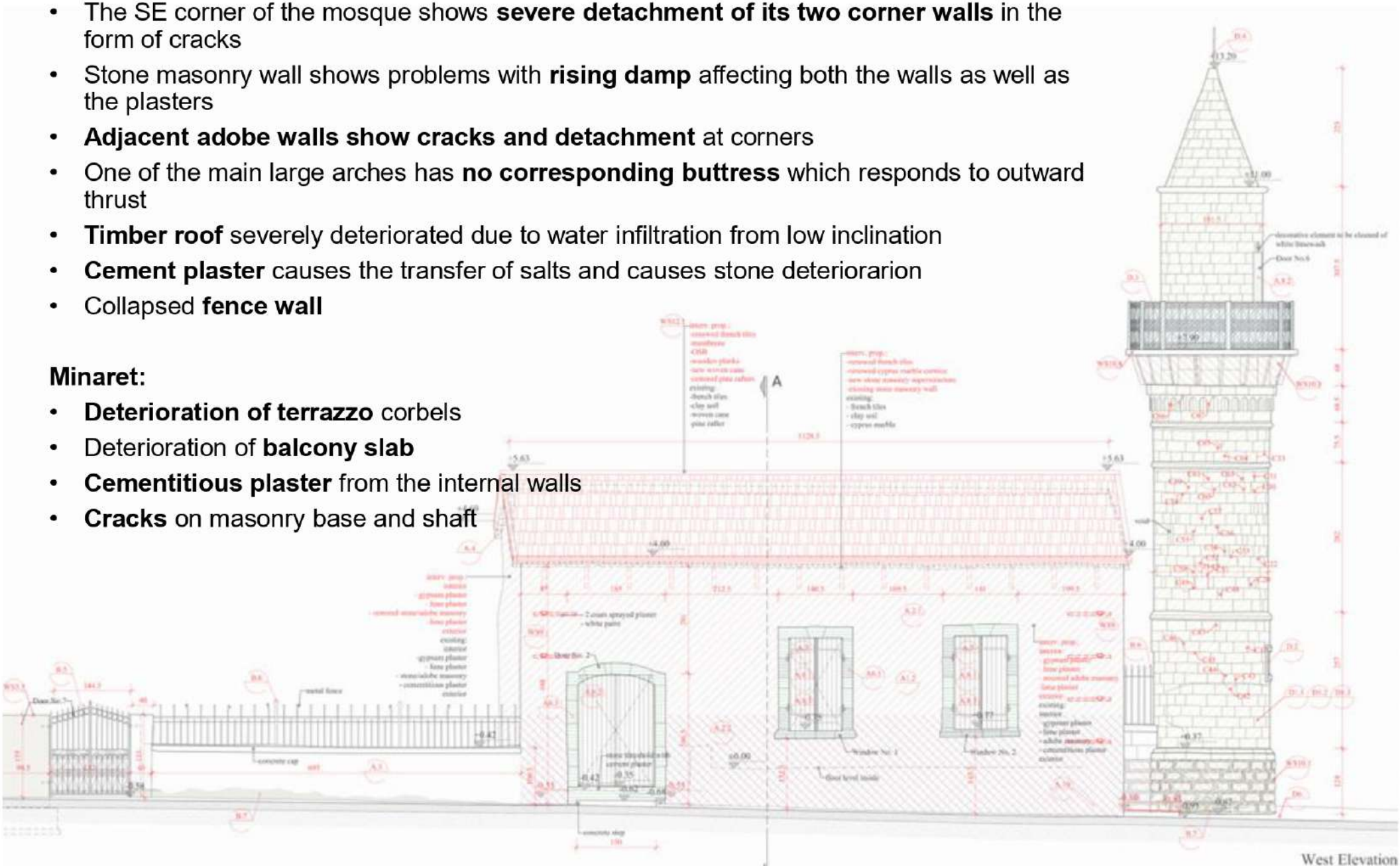
Summarizing the main pathology of the structure:

General Summary of pathology of the structure:

- The SE corner of the mosque shows **severe detachment of its two corner walls** in the form of cracks
- Stone masonry wall shows problems with **rising damp** affecting both the walls as well as the plasters
- **Adjacent adobe walls show cracks and detachment** at corners
- One of the main large arches has **no corresponding buttress** which responds to outward thrust
- **Timber roof** severely deteriorated due to water infiltration from low inclination
- **Cement plaster** causes the transfer of salts and causes stone deteriorarion
- Collapsed **fence wall**

Minaret:

- **Deterioration of terrazzo** corbels
- Deterioration of **balcony slab**
- **Cementitious plaster** from the internal walls
- **Cracks** on masonry base and shaft



Proposed Conservation works:

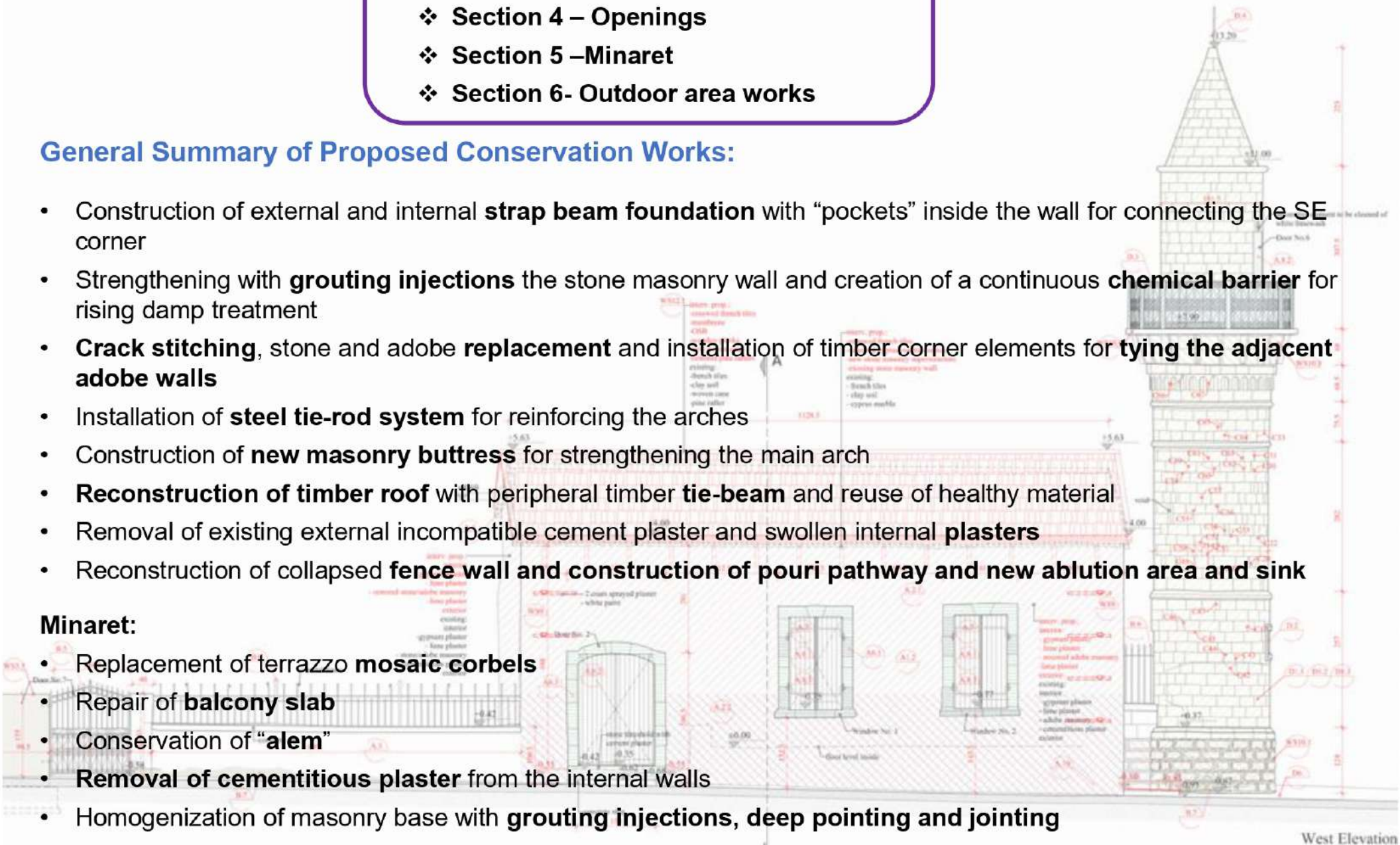
- ❖ **Section 1 – Foundation strengthening**
- ❖ **Section 2 – Walls**
- ❖ **Section 3 – Roof**
- ❖ **Section 4 – Openings**
- ❖ **Section 5 –Minaret**
- ❖ **Section 6- Outdoor area works**

General Summary of Proposed Conservation Works:

- Construction of external and internal **strap beam foundation** with "pockets" inside the wall for connecting the SE corner
- Strengthening with **grouting injections** the stone masonry wall and creation of a continuous **chemical barrier** for rising damp treatment
- **Crack stitching**, stone and adobe **replacement** and installation of timber corner elements for **tying the adjacent adobe walls**
- Installation of **steel tie-rod system** for reinforcing the arches
- Construction of **new masonry buttress** for strengthening the main arch
- **Reconstruction of timber roof** with peripheral timber **tie-beam** and reuse of healthy material
- Removal of existing external incompatible cement plaster and swollen internal **plasters**
- Reconstruction of collapsed **fence wall and construction of pouri pathway and new ablution area and sink**

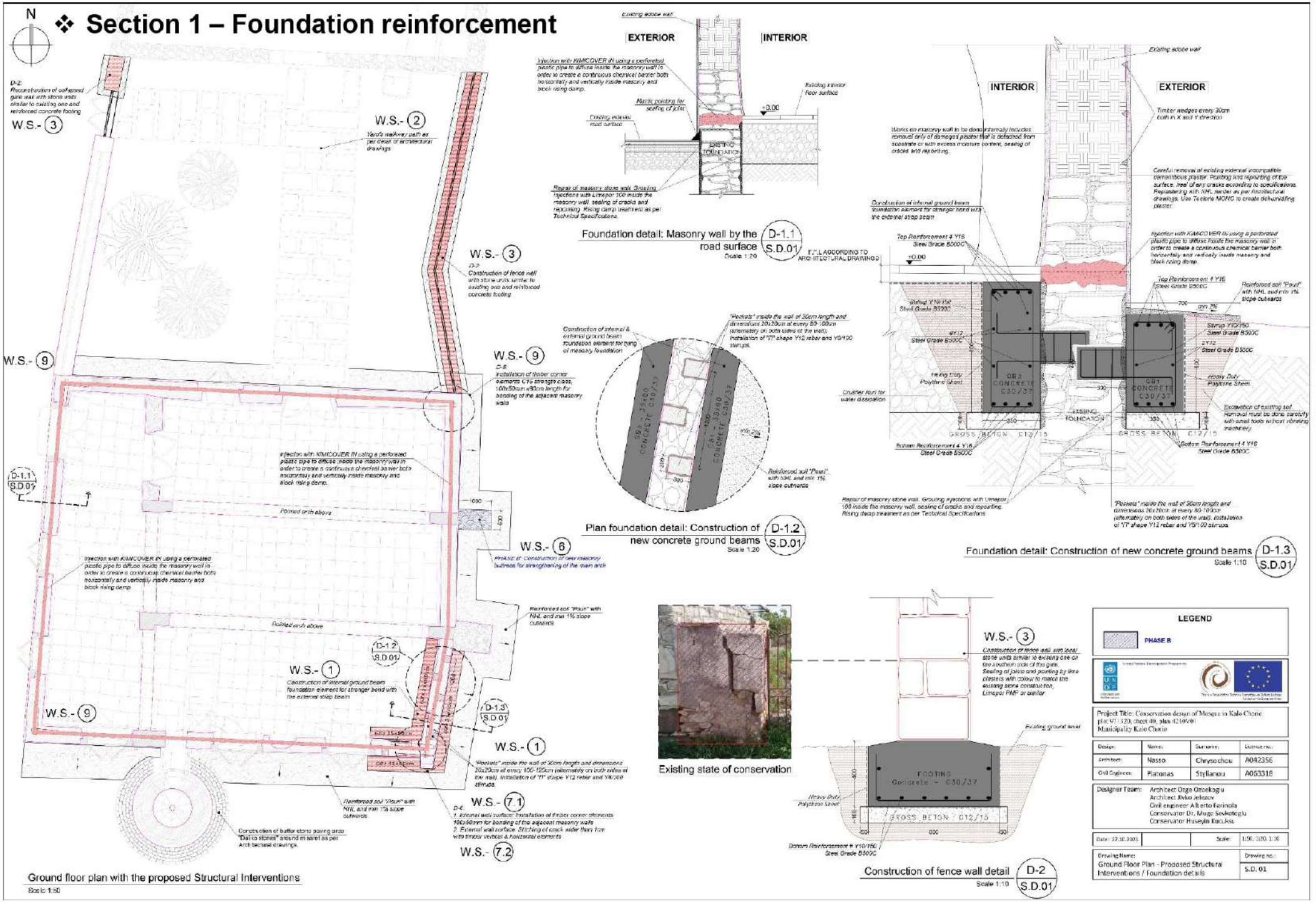
Minaret:

- Replacement of terrazzo **mosaic corbels**
- Repair of **balcony slab**
- Conservation of "**alem**"
- **Removal of cementitious plaster** from the internal walls
- Homogenization of masonry base with **grouting injections, deep pointing and jointing**



Proposed Conservation works [Foundation Reinforcement]

❖ Section 1 – Foundation reinforcement

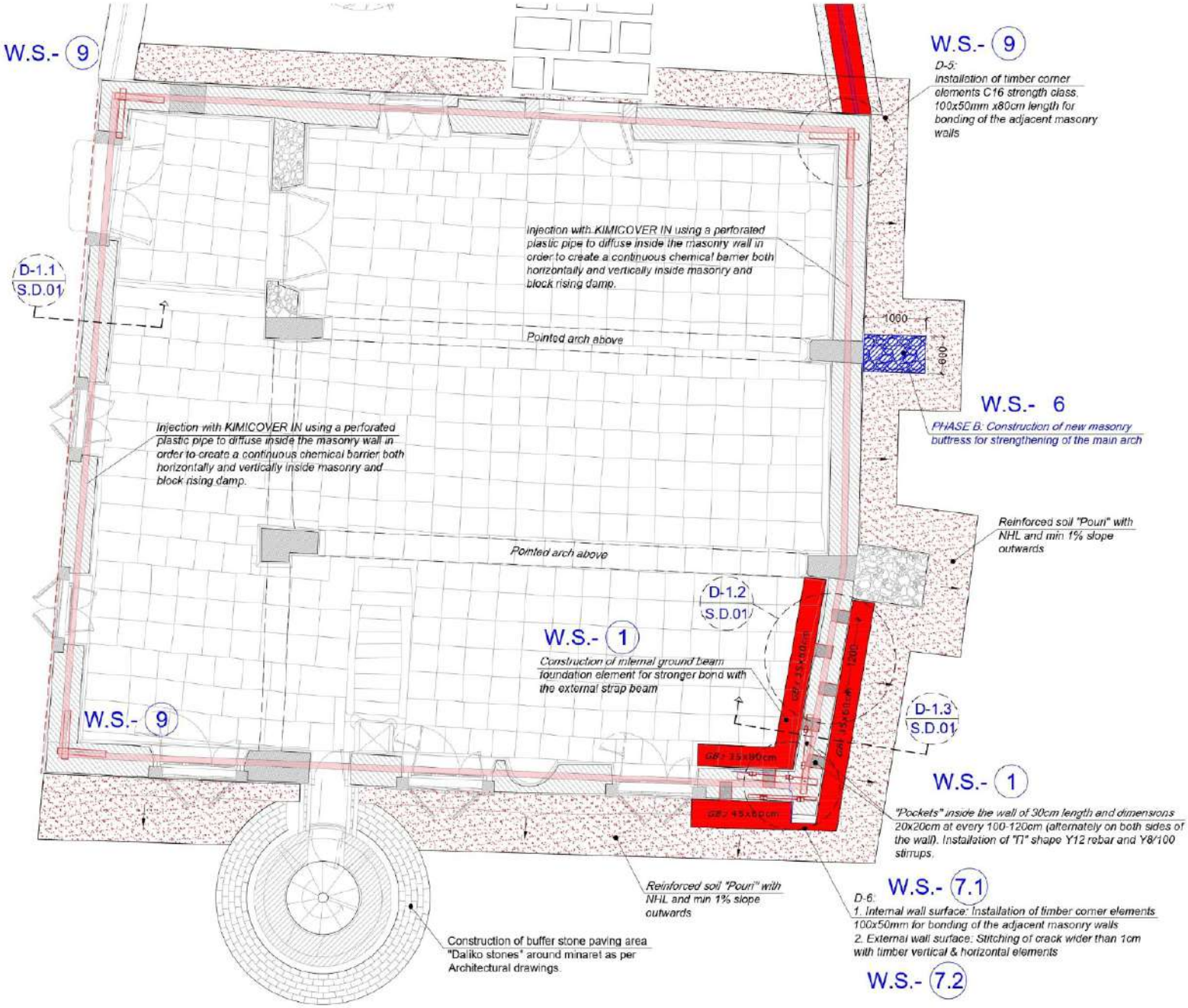


Proposed Conservation works [Foundation Reinforcement]

❖ Section 1 – Foundation reinforcement

➔ Construction of external and internal **strap beam foundation** with "**pockets**" inside the wall for connecting the SE corner

➔ Strengthening of the stone masonry wall with **grouting injections** and creation of a continuous chemical barrier for rising damp treatment



Proposed Conservation works [Walls]

❖ Section 2 – Walls

Key Note - Proposed Interventions

Structural Interventions

- WS1.1 Strengthening Grouting of stone masonry wall exterior and construction of external strap beam foundation - Phase A (SE corner)
- WS1.2 Strengthening Grouting of stone masonry wall interior and construction of internal strap beam foundation - Phase B (SE corner)
- WS1.3 Strengthening Grouting of stone masonry wall exterior - Phase B
- WS2 - Construction of handcrafted stone tiles pathway
- WS3.1 Reconstruction of fence wall with proper foundation
- WS3.2 Construction of fence wall
- WS4 Installation of tie rod on main arches
- WS5 Installation of tie rod - Existing buttress
- WS6 Construction of a new reinforcing structural element buttress
- WS7 Installation of Connection of corner detail (SE corner)
- WS8 Repairing crack 14
- WS9 Installation of Connection of corner detail
- WS10.1 Placement of Missing/Damaged Stones on the External Stone Masonry (base)
- WS10.2 Repair of vertical cracks on the minaret wall's surface
- WS10.3 Restoration of terrazzo mosaic corbels
- WS10.4 Repair of concrete balcony slab
- WS11 Installation of temporary scaffolding to support main arches
- WS12.1 Reconstruction of roof
- WS12.2 Installation of peripheral tie-beam

Mosque Building

- A.1.1 Removal of existing external incompatible cementitious plaster - Phase A
- A.1.2 Removal of existing external incompatible cementitious plaster - Phase B
- A1.3 Removal of moisture damaged or detached plaster and replastering
- A.1.4 Repair of cracks:
  - Repair of masonry cracks < 3mm
  - Repair of masonry cracks ≥ 3mm ≤ 10mm
  - Repair of masonry cracks > 10mm
- A.2.1 Cleaning biological and mechanical contamination
- A.2.2 Hydrophobic impregnation of mosque
- A.3 Cleaning mechanical staining
- A.4 Carefully cleaning of Cypriot marble
- A.5 Restoration of natural stone floor tiles
- A6.1 Repair, replacement and restoration of Window / Door Stone Frames
- A6.2 Processing of the lower horizontal part of the outer stone sill
- A6.3 Cleaning of paint from stone frames
- A.7 Conservation of the metallic bars of the window openings
- A.8.1 Restoration of wooden shutters
- A.8.2 Restoration of wooden doors
- A.8.3 Restoration of wooden windows
- A.8.4 Treatment of Inner window sill
- A.9 Restoration of stone arches
- A.10 Construction of new plinth protection element Pouri
- A.11 Restoration of decorative gypsum grill window

Minaret

- D.1.1 Removal of cement pointing and from previous intervention on the minaret plinth
- D.1.2 Cleaning of the applied white wash from the minaret walls
- D1.3 Pointing and Re-pointing with hydraulic lime mortar (whole Minaret)
- D.2 Restoration the stone carved dedication inscription
- D.3 Preservation of the wrought iron railing
- D.4 Conservation of copper 'alem'
- D.5 removal of the sealing cement plaster layer on the interior of the minaret
- D6 Construction of buffer stone paving area arround minaret

Courtyard

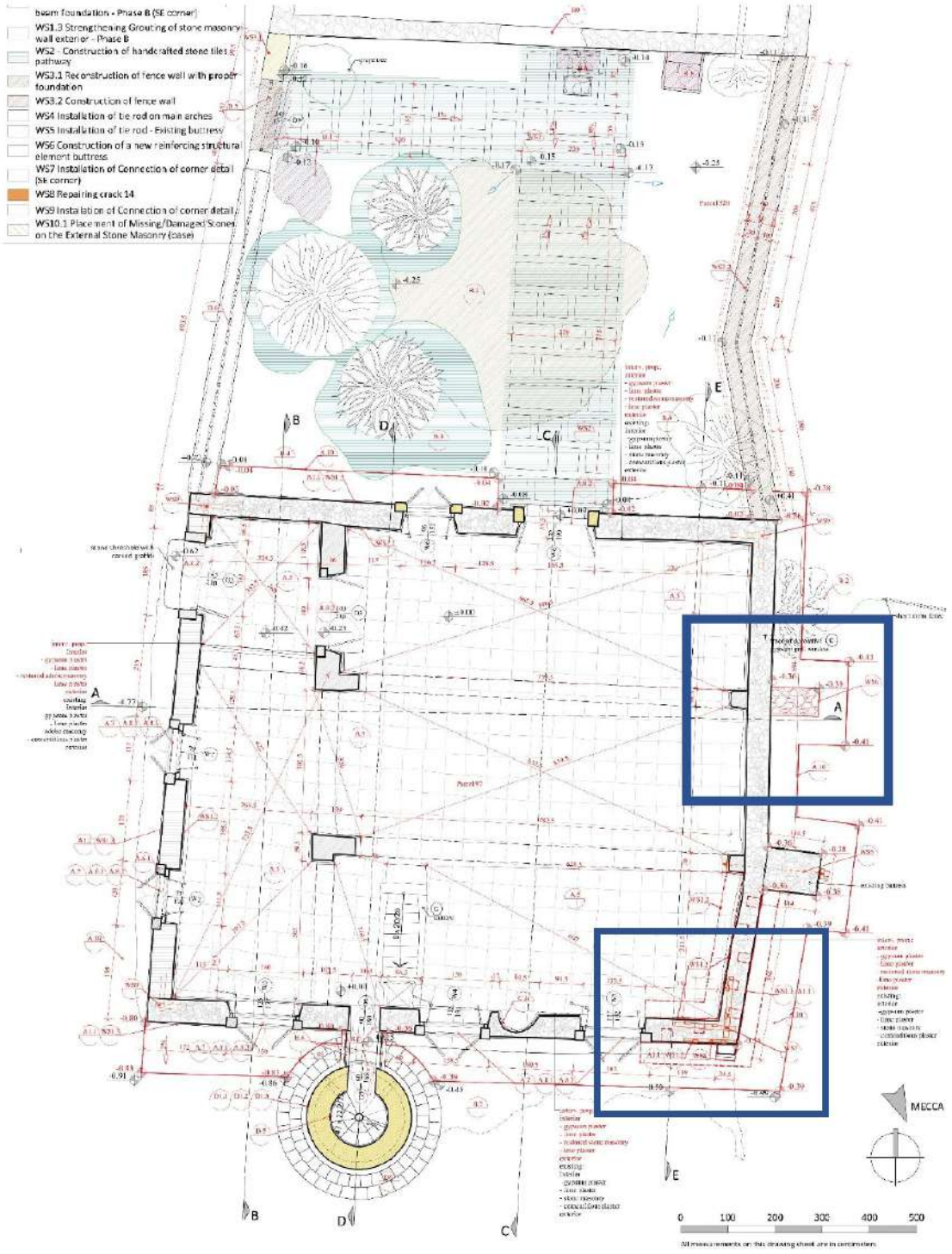
- B.1 Cleaning of site
- B.2 Removal of existing tree
- B.3 Pruning trees
- B.4 Leveling terrain
- B.5 Repairing metal garden door
- B.6 Repairing metal fence
- B.7 Removal of rampant greenery
- B.8 Organizing ablution area
- B9 Repair of north perimeter stone wall

Minbar and Mihrab

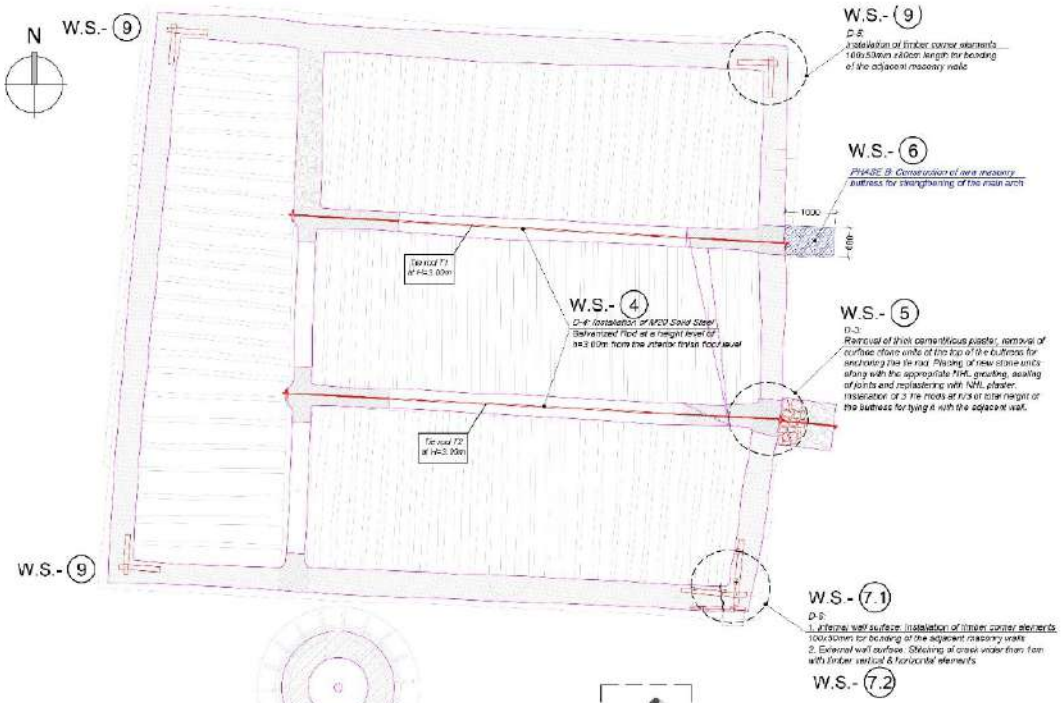
- C.1 Exploring for existing calligraphic writing of a prayer, paintings and/or motifs

Key Note:

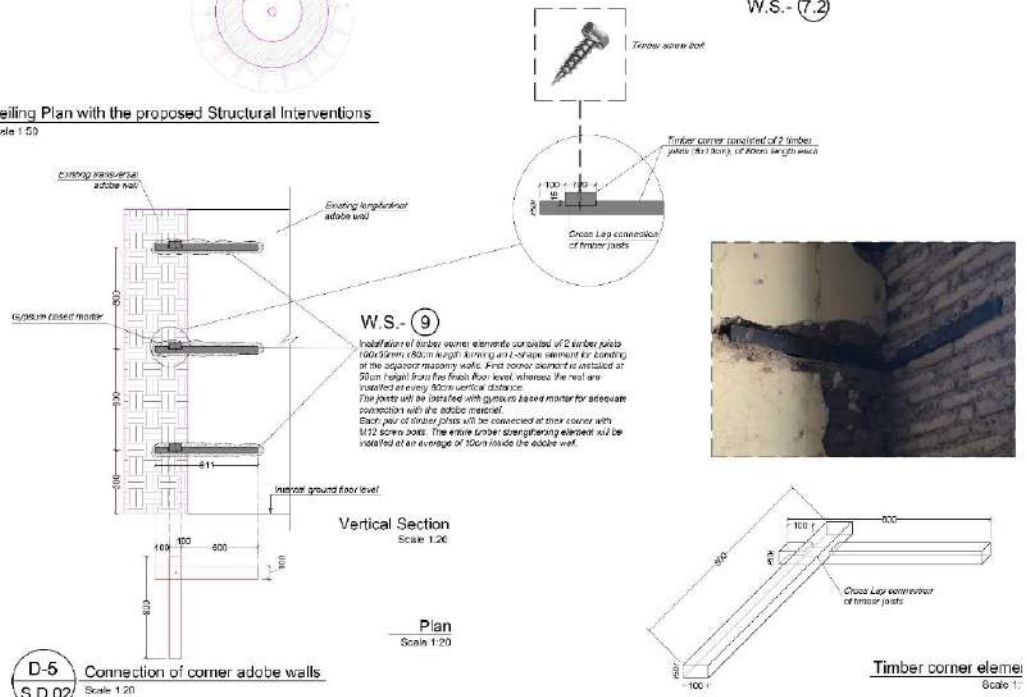
- Vuda stone Masonry
- Sandstone Masonry
- Adobe Masonry
- Stone Masonry
- Earth
- Concrete
- Greenery



❖ Section 2 – Walls – Reinforcement of Arches with Tie Rods and tying of Wall Corners

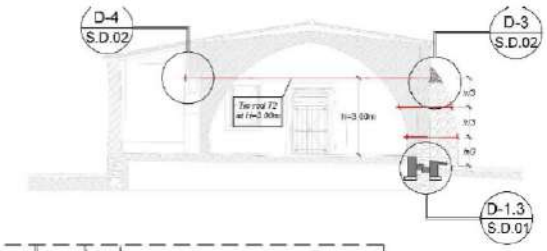


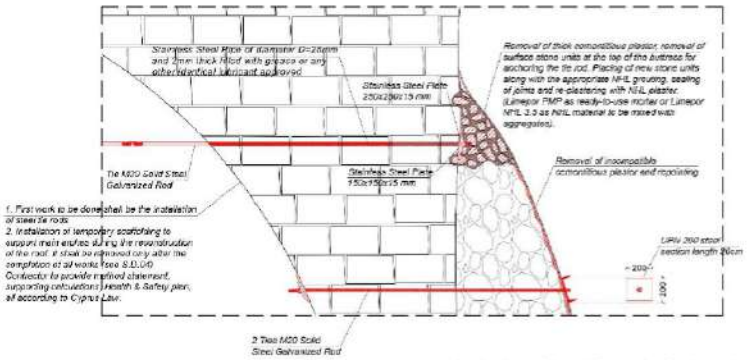
Ceiling Plan with the proposed Structural Interventions
Scale 1:50



D-5 S.D.02 Connection of corner adobe walls
Scale 1:20

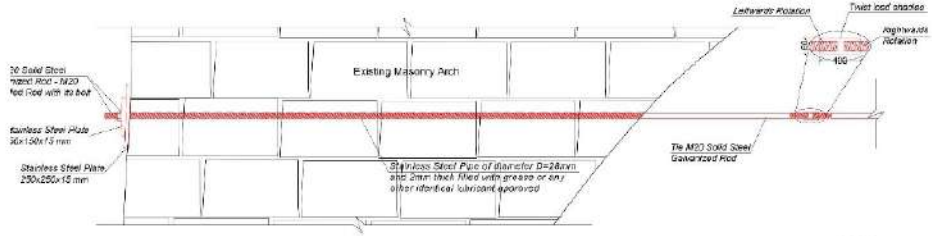
Timber corner elemer
Scale 1:





Anchoring of tie rod & repair of existing buttress
Scale 1:20
D-3 S.D.02

➔ Installation of **steel tie-rod system** for reinforcing the arches



Construction detail - Tie Rod System
Scale 1:10
D-4 S.D.02

➔ **Crack stitching**, stone and adobe **replacement** and installation of timber corner elements for **tying the adjacent adobe walls**

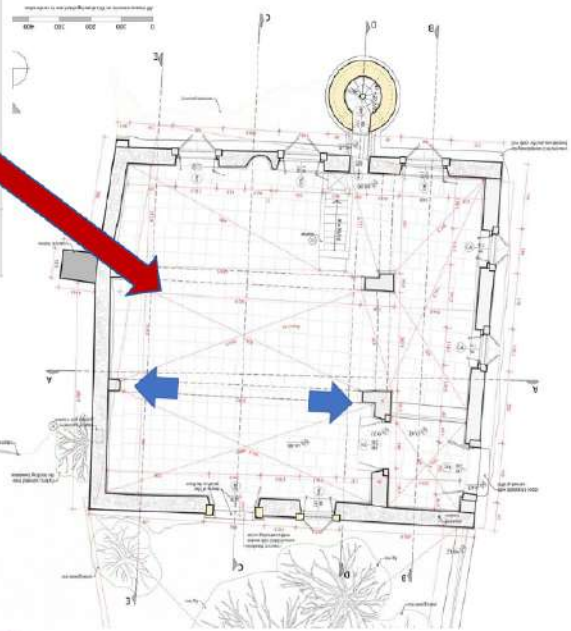
Proposed Conservation works [Walls]

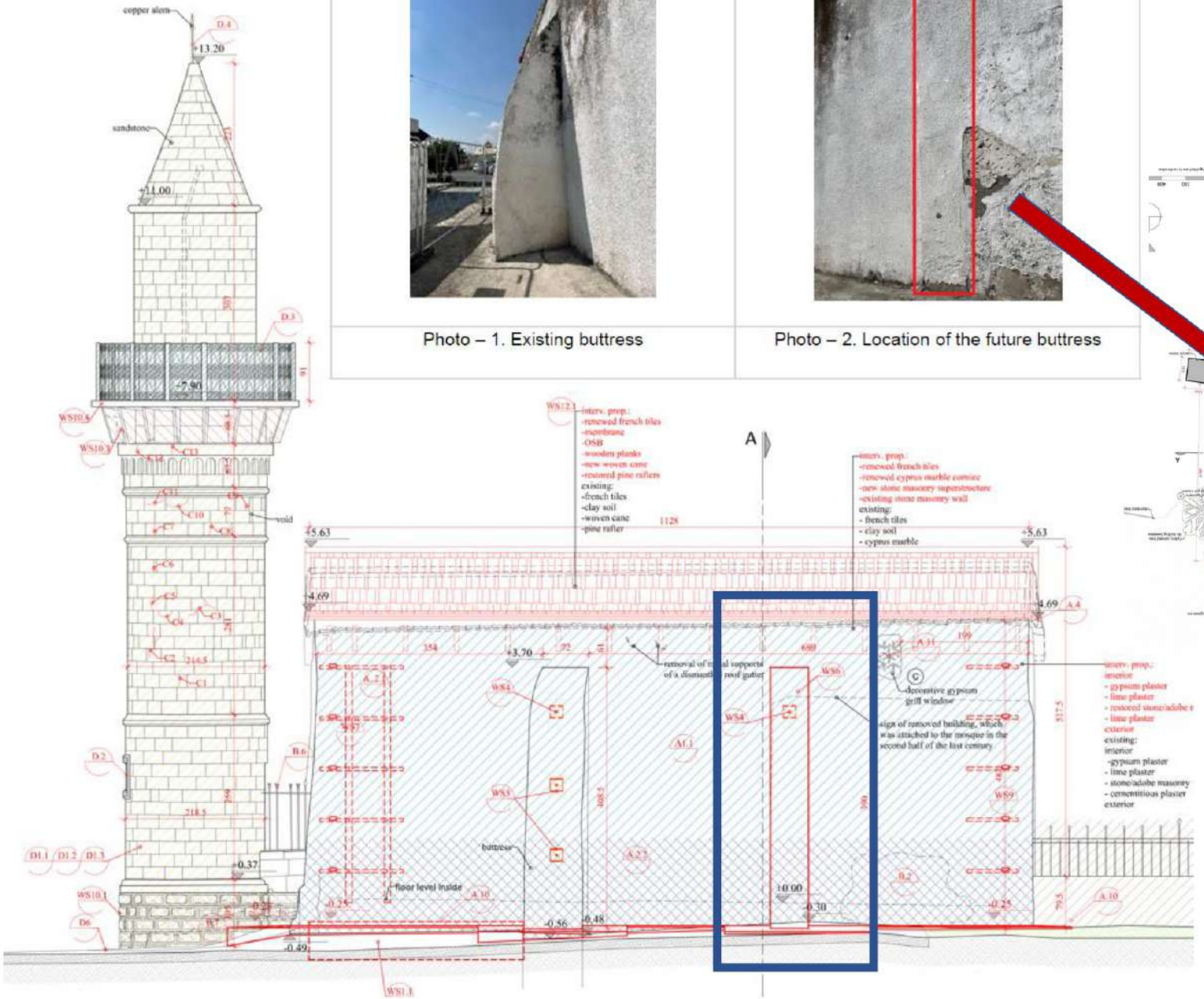
❖ Section 2 – Walls

➔ Construction of **new buttress** to counteract the lateral forces of the main arch along with the installation of steel tie rods

Photo – 1. Existing buttress

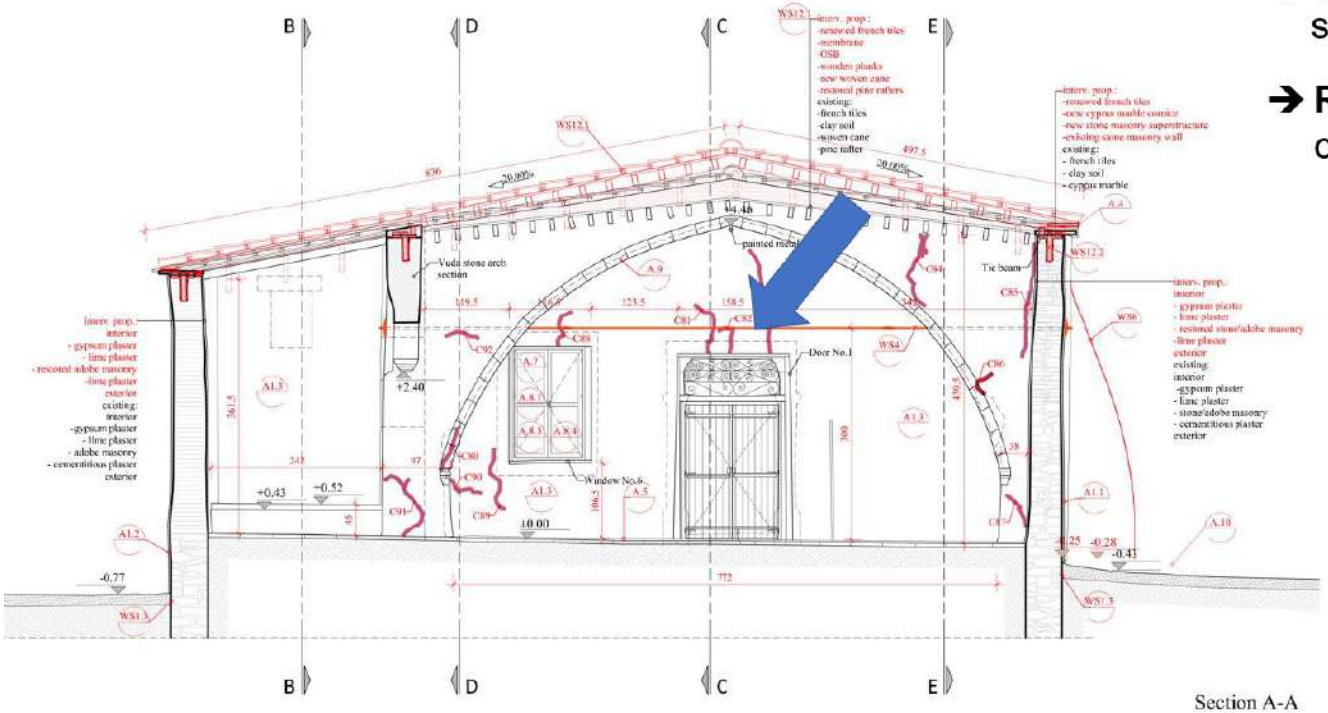
Photo – 2. Location of the future buttress





Proposed Conservation works [Walls]

❖ Section 2 – Walls



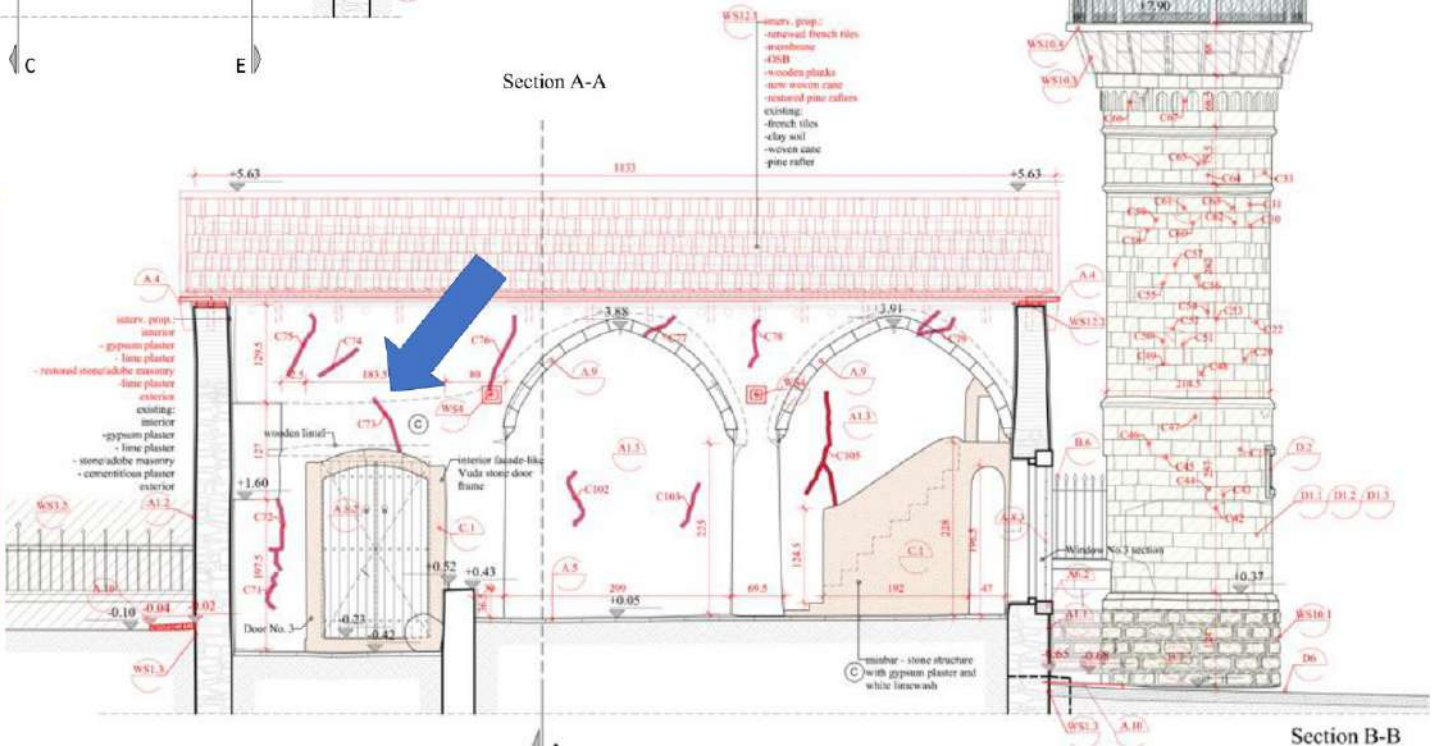
➔ Cracks over opening keys indicates wall separation in corners

➔ **Removal of existing** external incompatible cement plaster and swollen internal **plasters**

Mosque Building

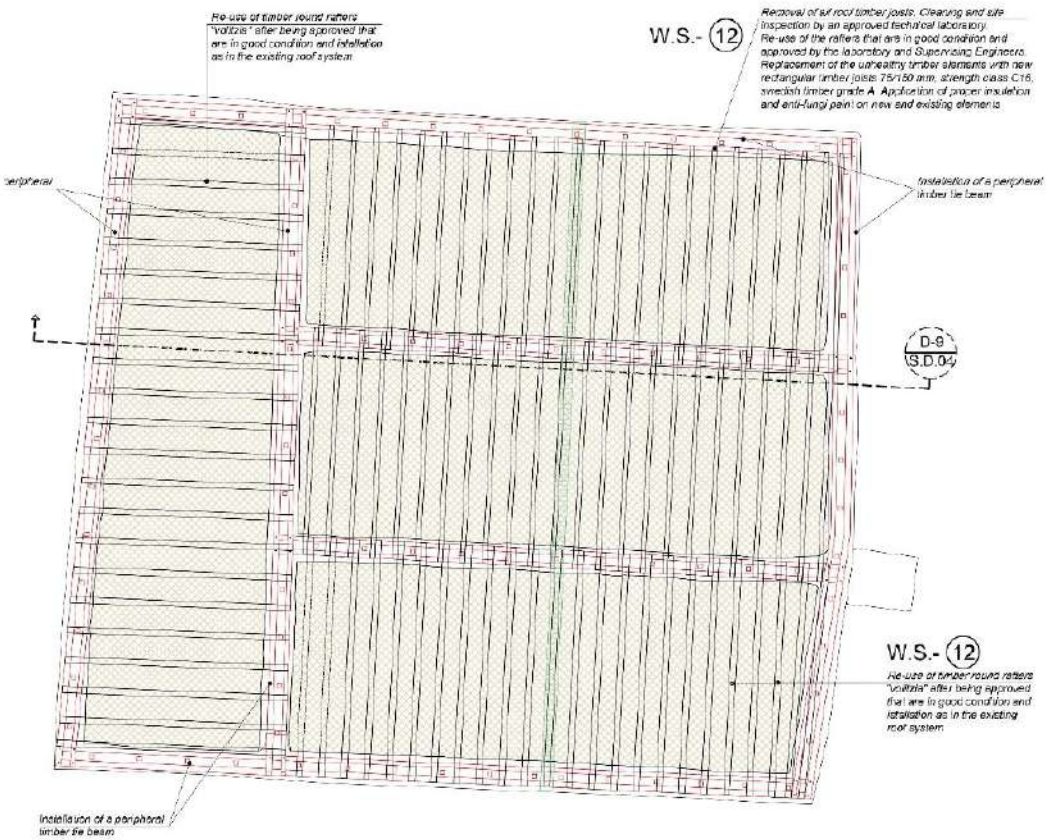
- A.1.1 Removal of existing external incompatible cementitious plaster - Phase A
- A.1.2 Removal of existing external incompatible cementitious plaster - Phase B
- A1.3 Removal of moisture damaged or detached plaster and replastering
- A.1.4 Repair of cracks:
- Repair of masonry cracks < 3mm
- Repair of masonry cracks ≥ 3mm ≤ 10mm
- Repair of masonry cracks > 10mm

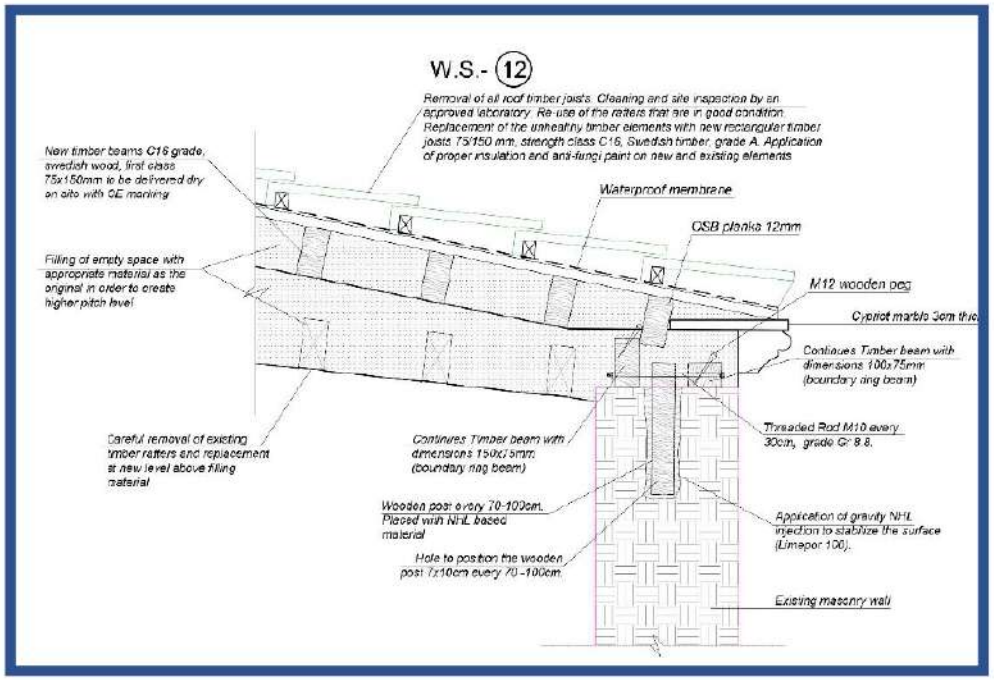
Section A-A



Proposed Conservation works [Roof]

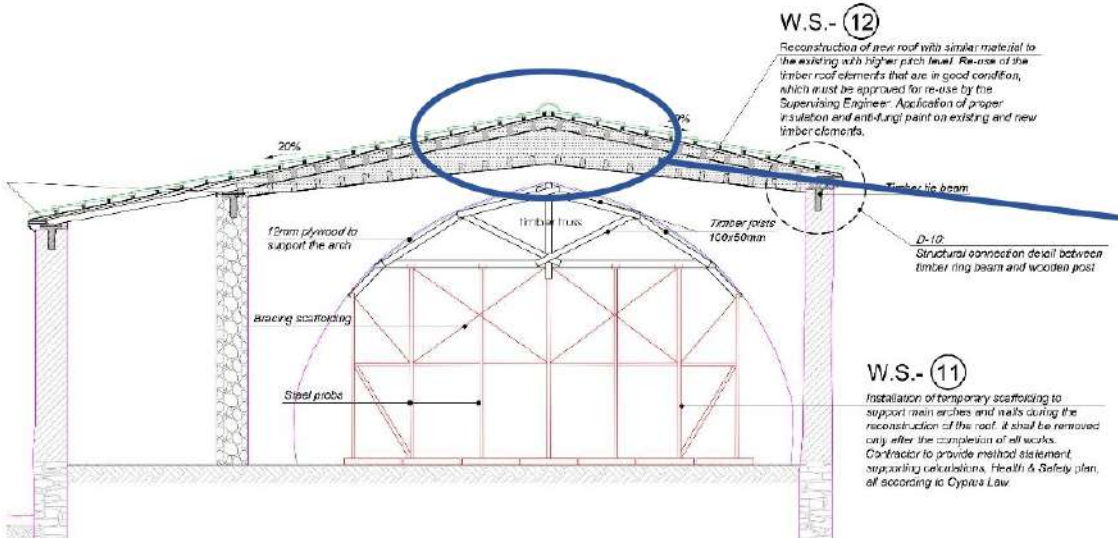
❖ Section 3 – Roof reconstruction with perimeter beam – reuse of healthy rafters





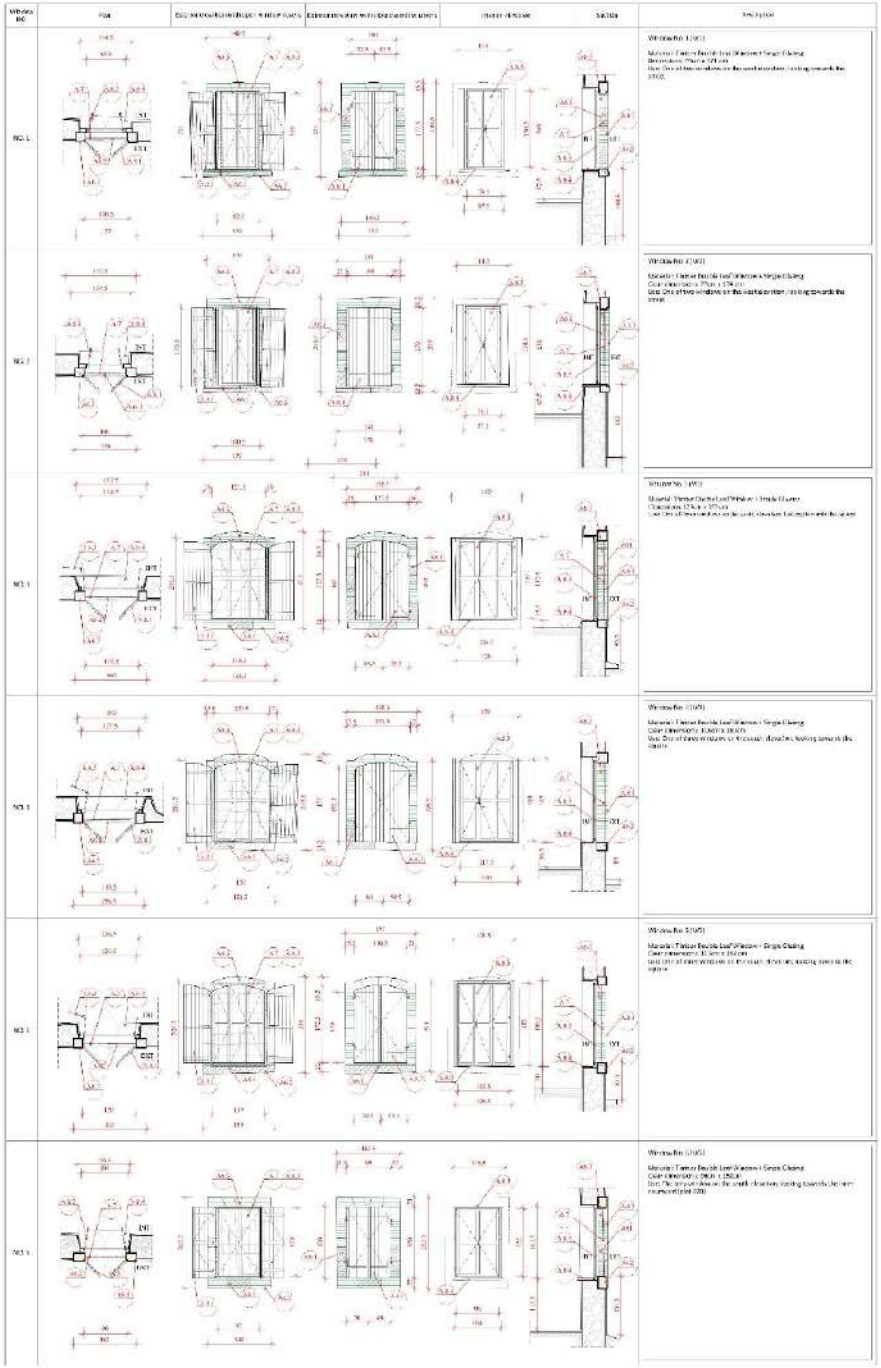
Structural connection detail between timber ring beam and timber post (section) D-10 / S.D.04

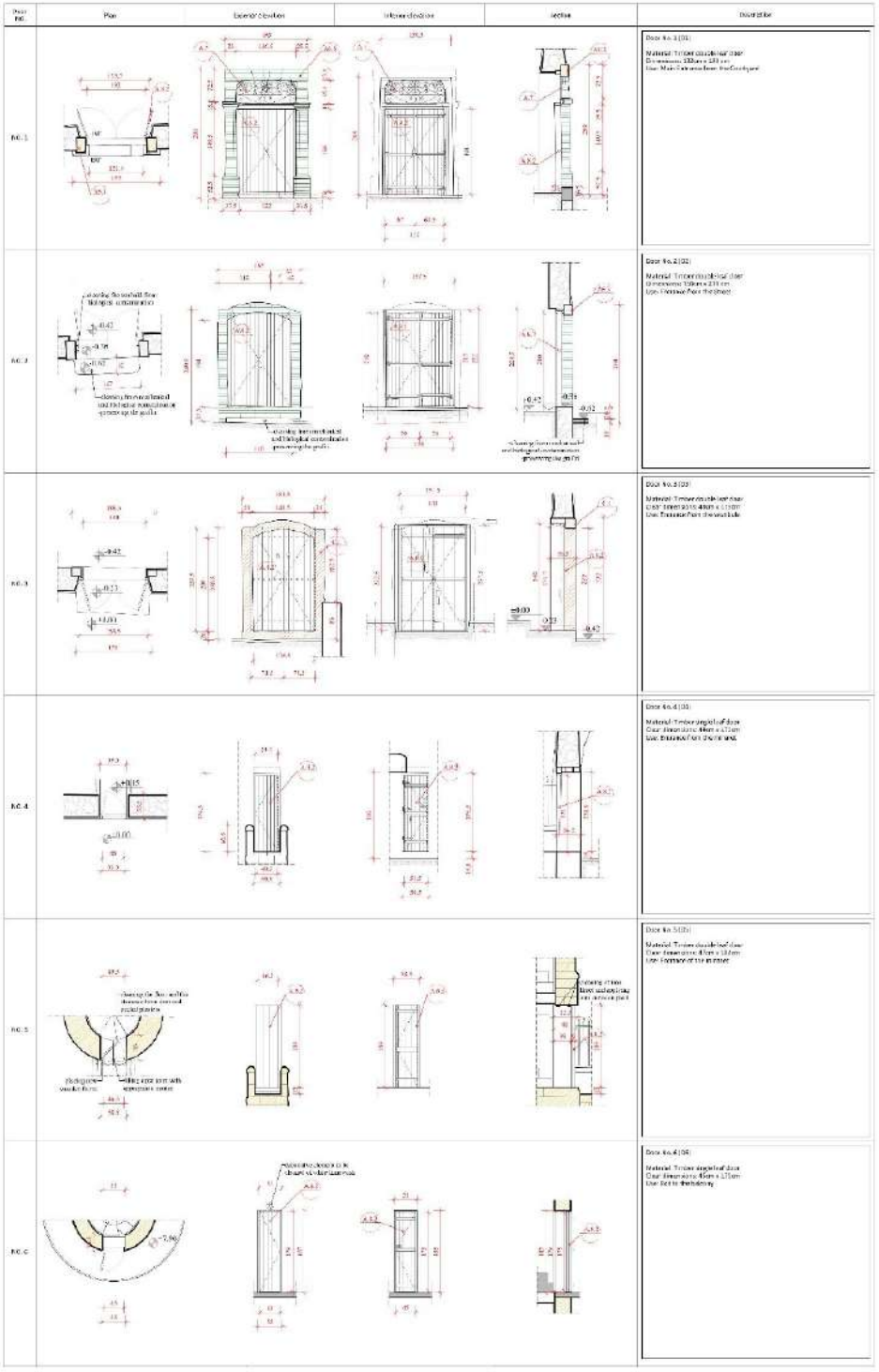
Scale 1:10



Proposed Conservation works [Openings]

❖ Section 4 – Openings – minor repairs



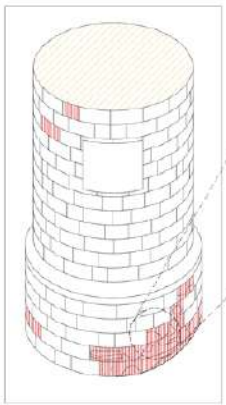


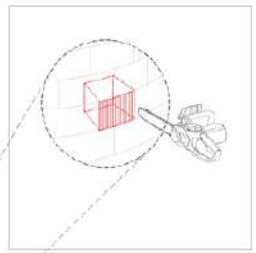
Proposed Conservation works [Minaret]

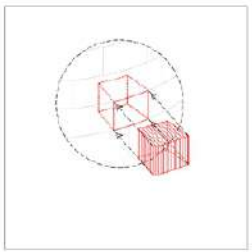
❖ Section 5 – Minaret

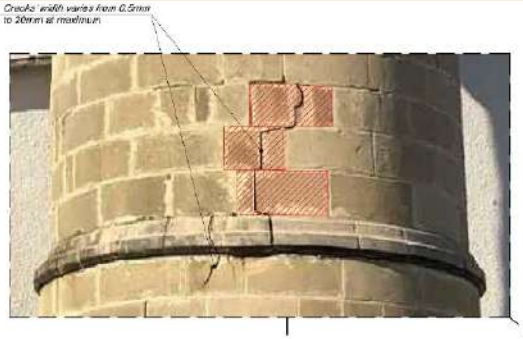
Minaret

- D.1.1 Removal of cement pointing and from previous intervention on the minaret plinth
- D.1.2 Cleaning of the applied white wash from the minaret walls
- D1.3 Pointing and Re-pointing with hydraulic lim mortar (whole Minaret)
- D.2 Restoration the stone carved dedication inscription
- D.3 Preservation of the wrought iron railing
- D.4 Conservation of copper 'alem'
- D.5 removal of the sealing cement plaster layer on the interior of the minaret
- D6 Construction of buffer stone paving area arround minaret
- WS10.2 Repair of vertical cracks on the minaret wall's surface
- WS10.3 Restoration of terrazzo mosaic corbels
- WS10.4 Repair of concrete balcony slab
- WS11 Installation of temporary scaffolding to support main arches
- WS12.1 Reconstruction of roof
- WS12.2 Installation of peripheral tie-beam

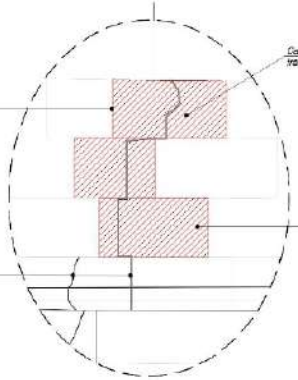








Existing state of conservation



W.S.- 10.2

Careful removal of stone loose material, rebuilding by placement of new stones connecting the two layers, surface treatment and proper pointing and jointing with NHL meterial (Limepor FMP) according to technical specifications.

Careful removal of damaged and fractured stone units.

Stones to be rebuilt - Placement of new stones connecting the two layers

Careful enlargement and breathing of the existing crack, fill the crack with the use of a material containing natural hydraulic lime and carbonate filler. The material should be compatible with the original components of the wall (Limepor 100 or equivalent).

D-7 / S.D.03 Detail of propagation of vertical crack along the stone units

Scale 1:10

Cracked and fractured corbels with exposed corroded rebars. Replacement of terrazzo corbels as per architectural drawings. Contractor to provide material samples for approval by Architect/Engineer. See also architectural detail.

W.S.- 10.3

Repair of concrete balcony slab with epoxy material and cleaning and repairing of wrought iron railing, use of anti-rust varnish to prevent corrosion

Repair or replacement of terrazzo mosaic corbels

W.S.- 10.2

D-7: Vertical cracks on the wall's surface that are heavily fractured. Careful removal of stone loose material, rebuilding by placement of new stones connecting the two layers. Proper pointing and jointing with NHL material according to technical specifications.

Consolidation/repair of smaller cracks with an NHL material

Cleaning of applied white wash with mild chemical methods

D-8 Removal of all cement repairs from the minaret's base. Damaged and eroded stone units where loss of section is significant will be replaced, deep pointing and jointing of entire base with NHL material according to Technical Specifications

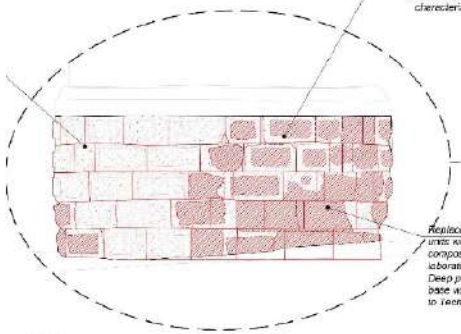
W.S.- 10.1

Minaret South Elevation

Scale 1:50

W.S.- 10.1

Careful removal of damaged and eroded stone units where loss of section is significant (Work to be done piece by piece in an approved method statement by the Supervising Engineer). The contractor to provide sample of the stone with similar characteristics of the original one. Material characteristics to be confirmed by an approved laboratory.



Replacement of degraded stone units with new ones equivalent in composition, size and colour as per laboratory analysis. Deep pointing and jointing of entire base with NHL material according to Technical Specifications

D-8 / S.D.03 Detail of deteriorated minaret's base

Scale 1:20

Existing state of conservation

Project Title: Conservation design of Mosque in Kalo Chorio
plot: 97/320, sheet: 40, plan: 4210V01
Municipality: Kalo Chorio

Design:	Name:	Surname:	Licence no.:
Architect:	Nasso	Chrysochou	A042356
Civil Engineer:	Platonas	Stylianou	A063318

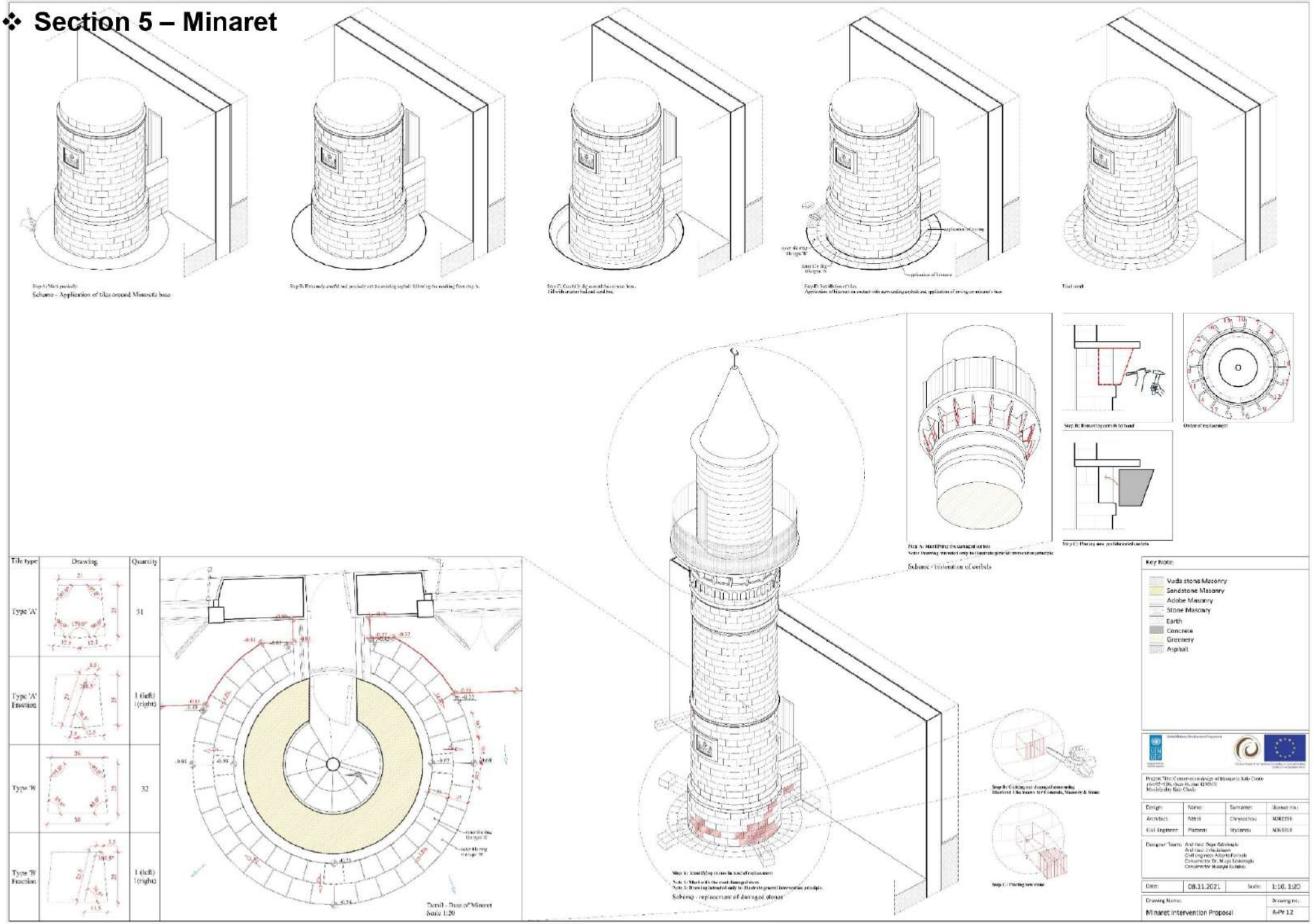
Designer Team: Architect Ozge Ozbekoglu
Architect Jivko Jelezov
Civil engineer Alberto Farinola
Conservator Dr. Muge Sevketoglu
Conservator Huseyin Kucuksu

Date: 08.07.2021 | Scale: 1:50, 1:20, 1:10

Drawing Name: Proposed Structural Interventions - Masonry walls and Minaret | Drawing no.: S.D. 03

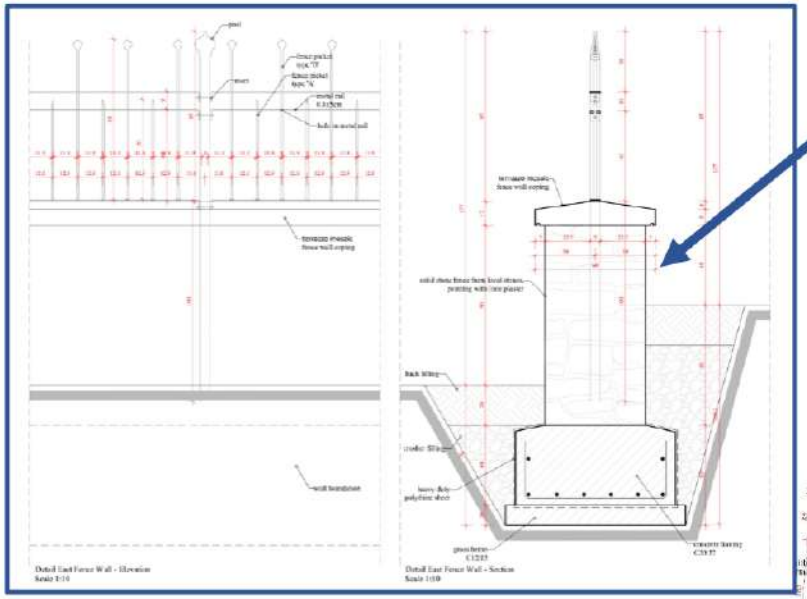
Proposed Conservation works [Minaret]

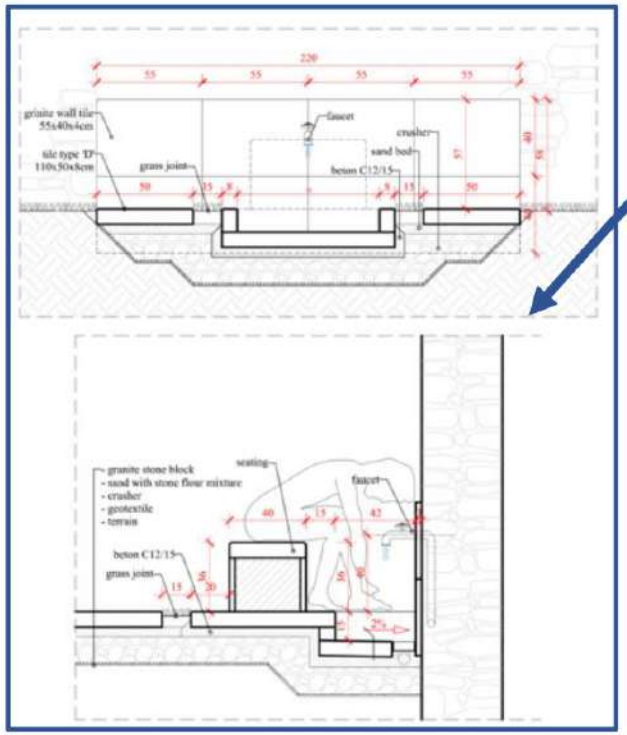
❖ Section 5 – Minaret

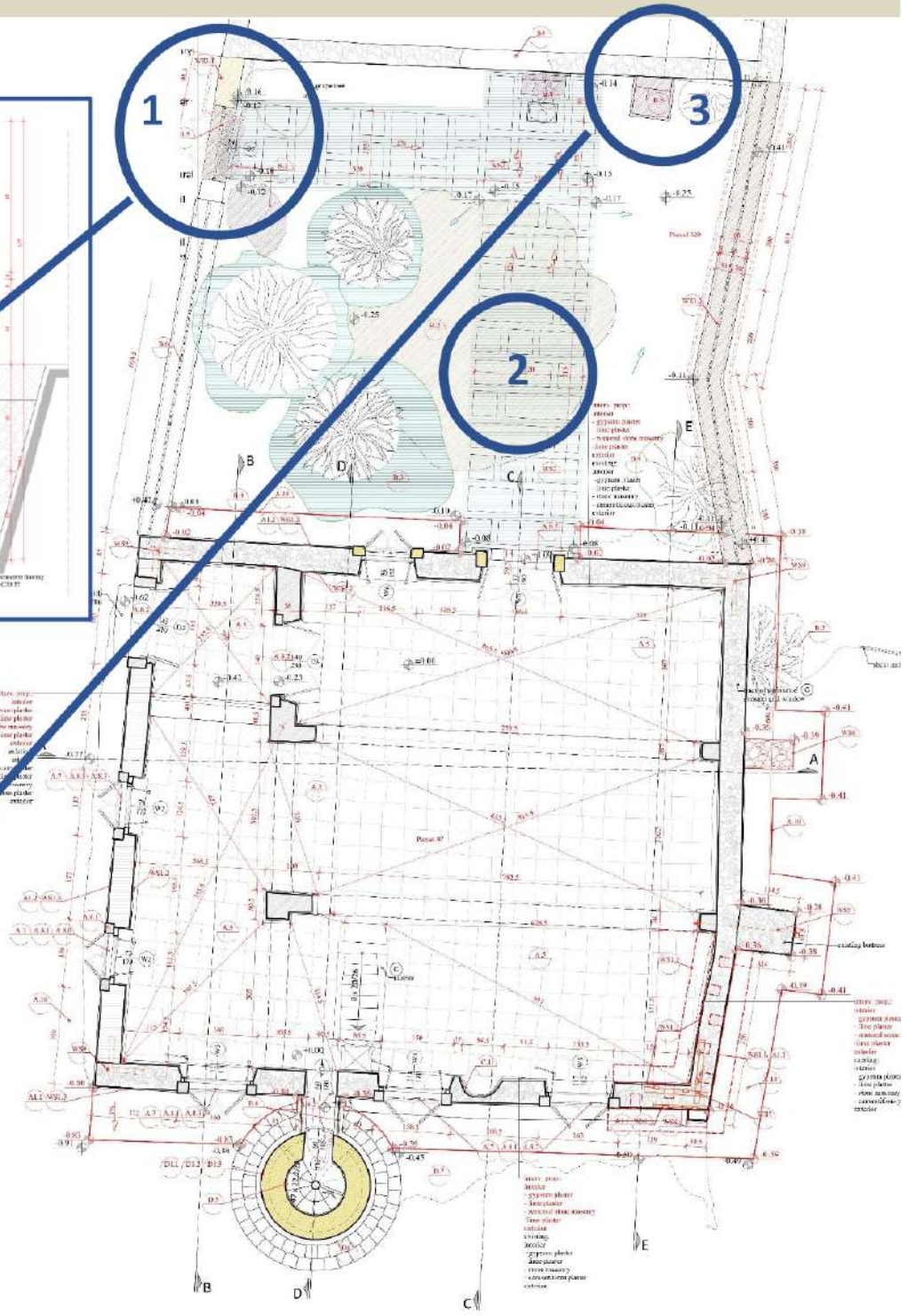


Proposed Conservation works [Outdoor area works]

❖ Section 6 – Outdoor area works







1. Reconstruction of collapsed **fence wall**

2. Construction of **pouri pathway** reinforced with NHL

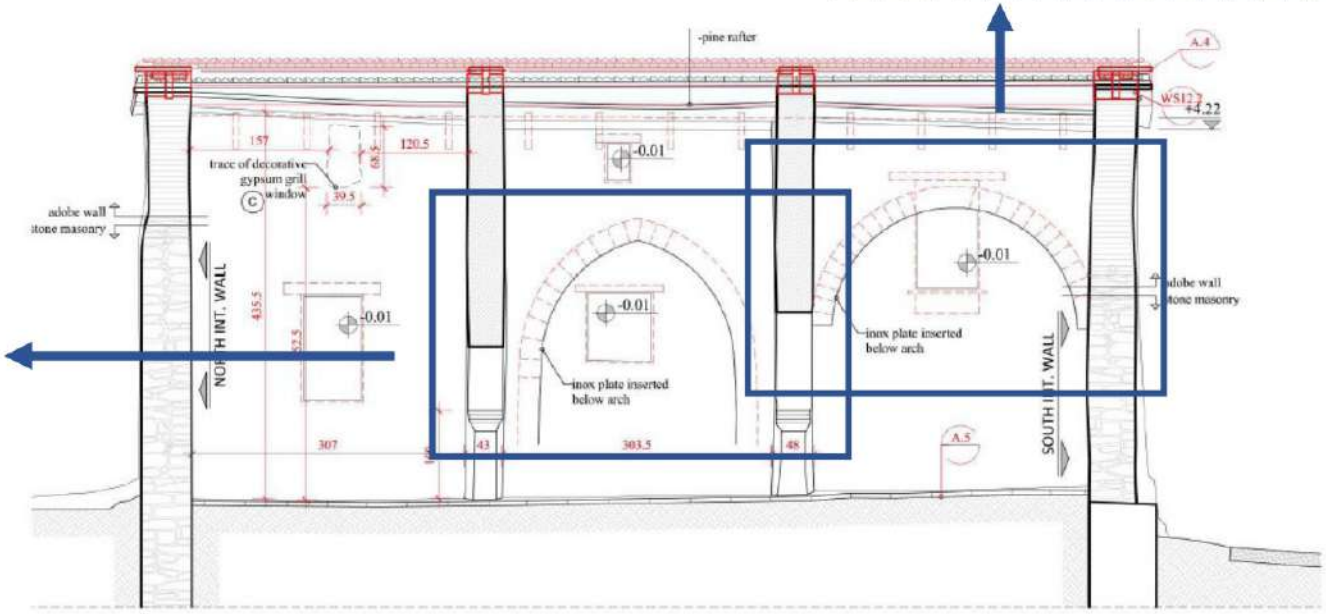
3. Construction of **new ablution area** and **sink**

Executed Conservation works – **Walls and plasters**

➔ Removal of internal plasters had led to the discovery of **past hidden arches** inside the masonry wall's surface as well as **past window openings** that were all later filled!

➔ The new findings were recorded and documented by the Architects and Conservators of the design team.

➔ The final decision made between the AB, UNDP and the Designer's team was to **indicate the past openings and arches with a small recess** from the plaster, in order to keep the historical memory alive.

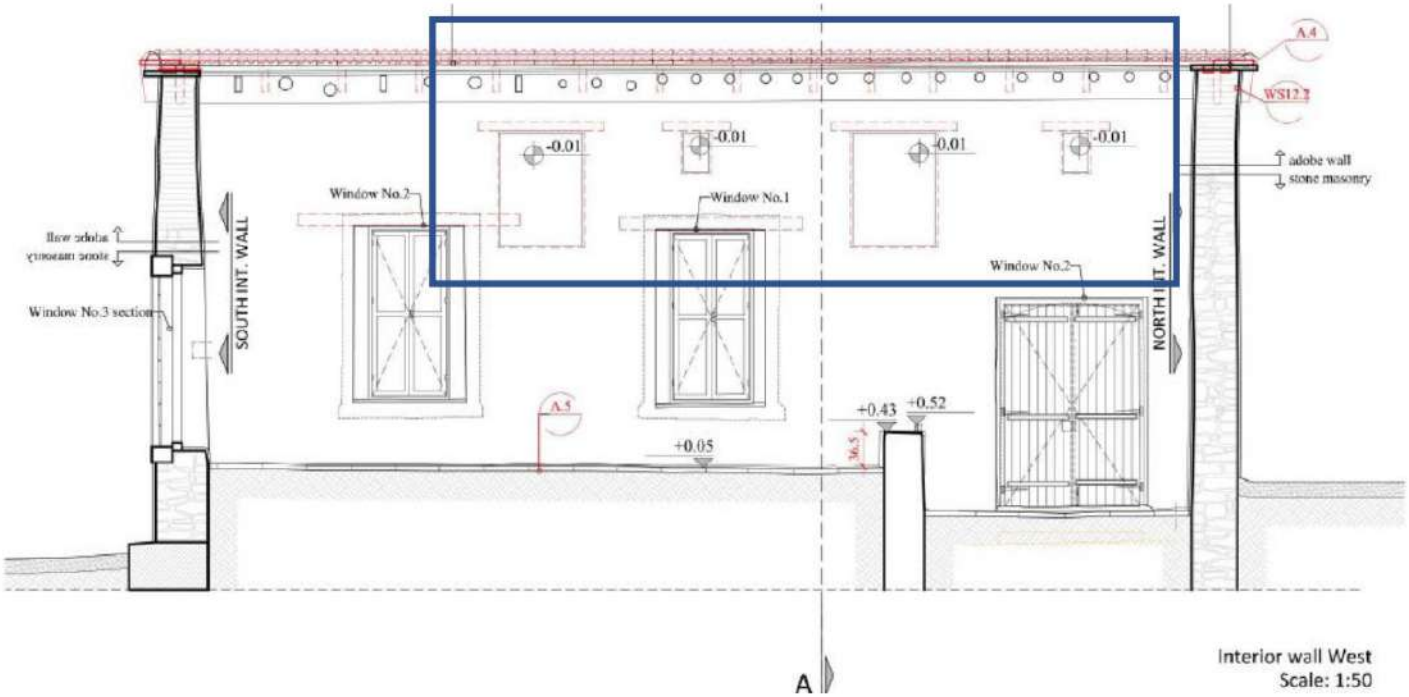


Interior wall East
Scale: 1:50

Executed Conservation works – **Walls and plasters**

Photo – 2: Founding of larger window that will be strengthened with two (2) timber ties.

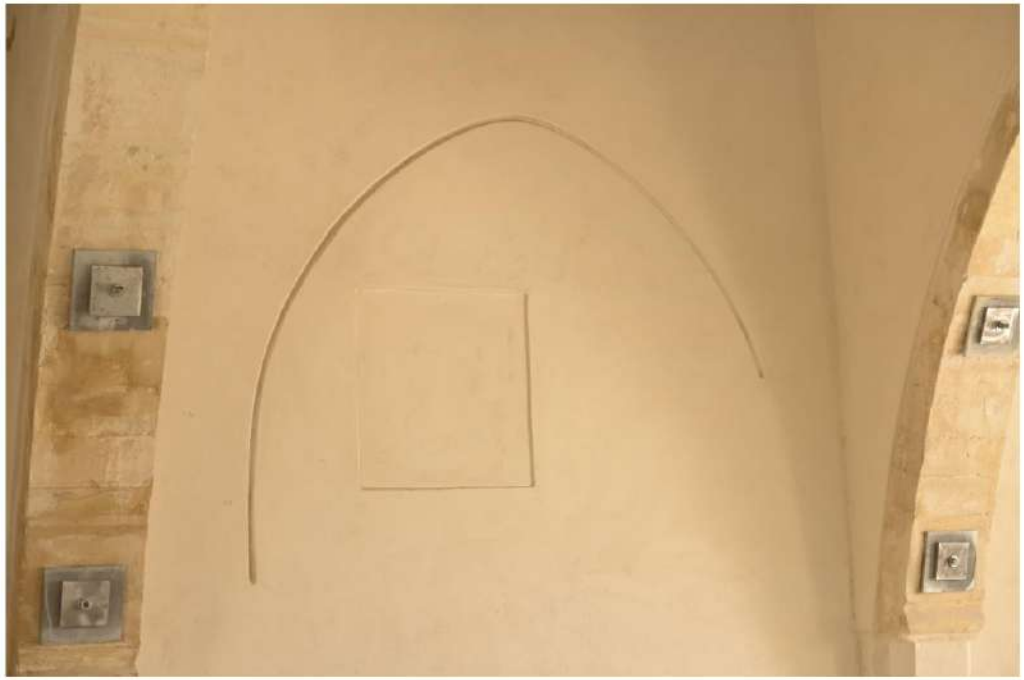
Photo – 3: Founding of small window that will be strengthened with one (1) timber tie.



Interior wall West
Scale: 1:50

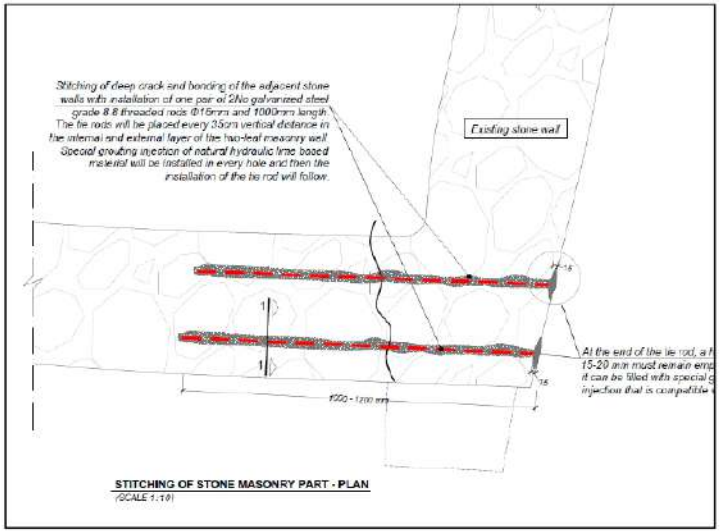
Kalo Chorio/Vuda, Larnaca District

Executed Conservation works **– Past hidden arches and openings, indicated with a small recess**



Executed Conservation works – **Walls and plasters**

- South-East corner stitching detail was revised after the discovery of stone wall at the bottom and adobe wall on the top half.
- The lower stone part was reinforced with galvanized steel threaded tie rods installed every 35mm vertically apart with special NHL grouting material.
- The upper adobe corner was tied with timber corner elements as per the initial design approach.



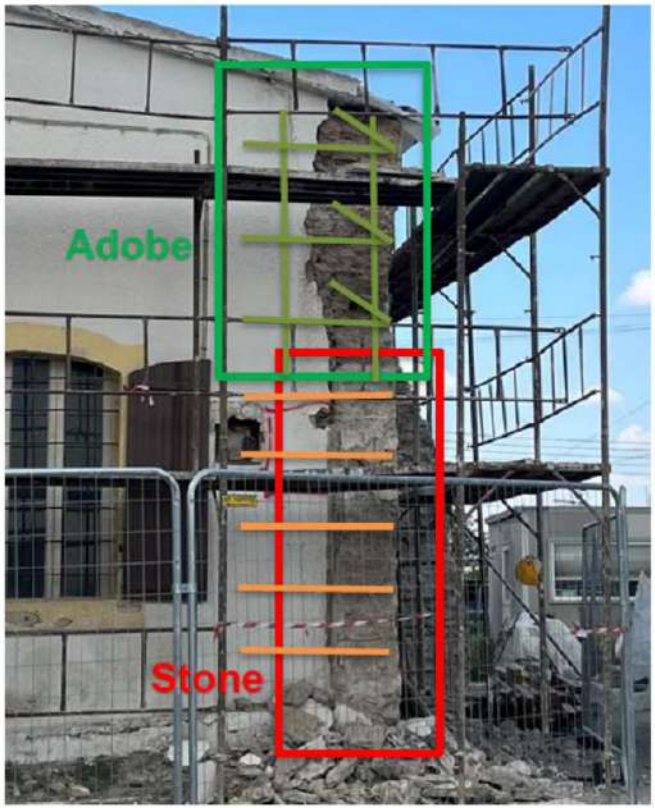


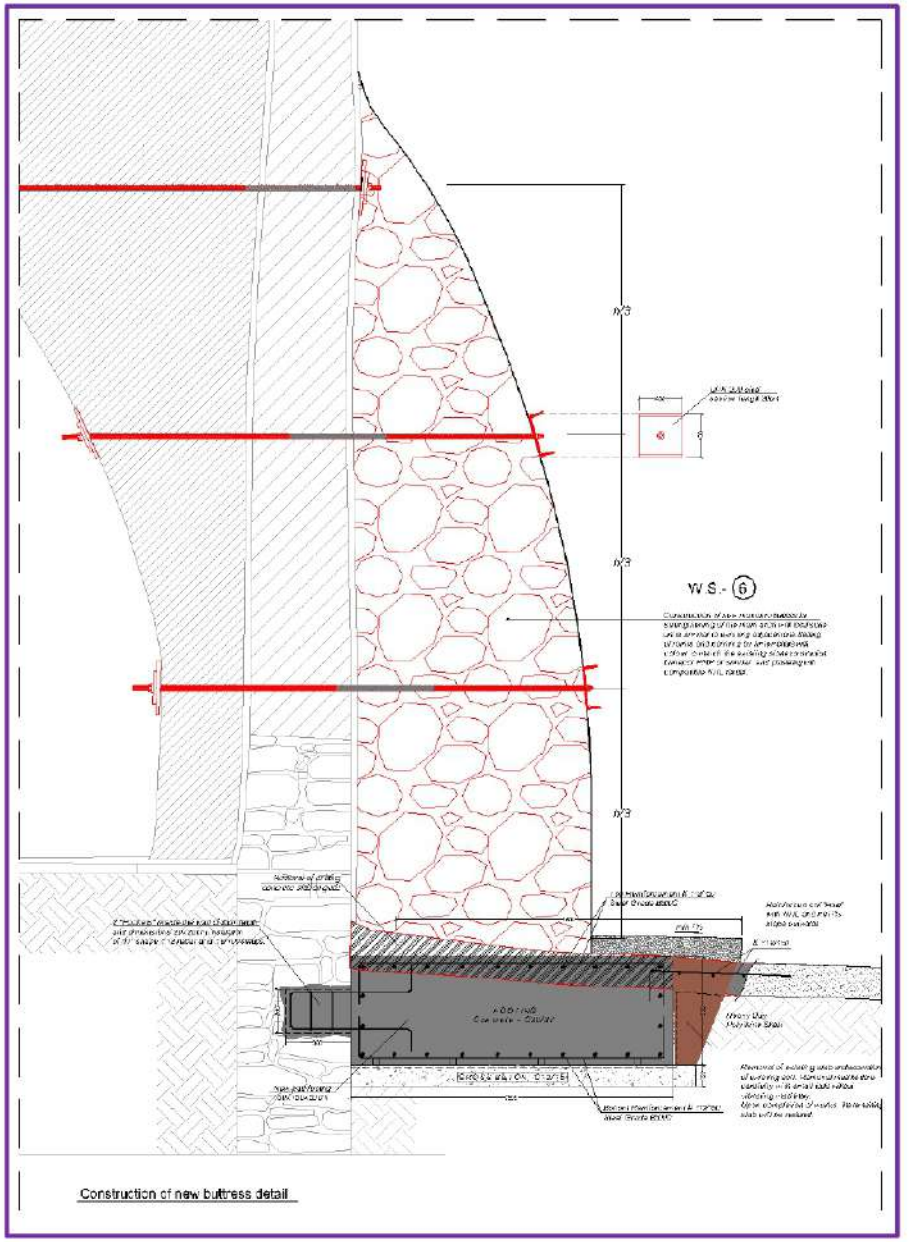
Photo – 8: Existing S-E corner wall typology – bottom half part made of stone masonry, upper half part made of adobe masonry

➔ **External corner RC strap beam detail**

Executed Conservation works – **Walls and plasters**

❖ **Section 2 – Walls**

➔ Construction of **new buttress** to counteract the lateral forces of the main arch along with the installation of steel tie rods



Kalo Chorio/Vuda, Larnaca District

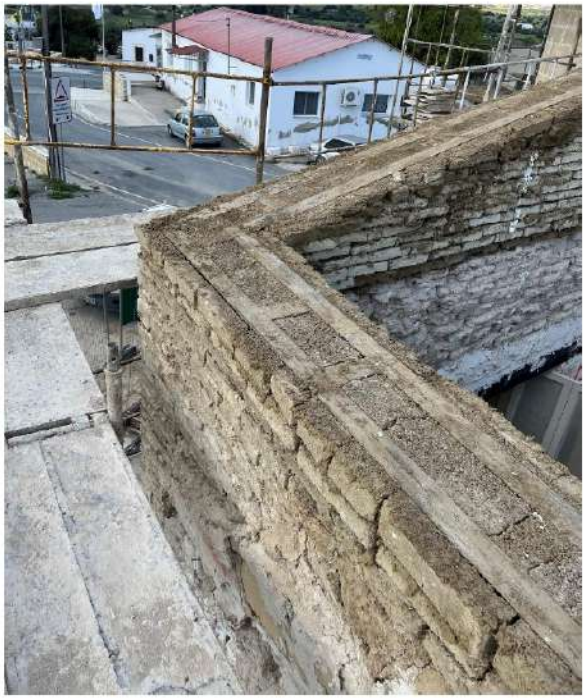
Executed Conservation works – **Walls and plasters**

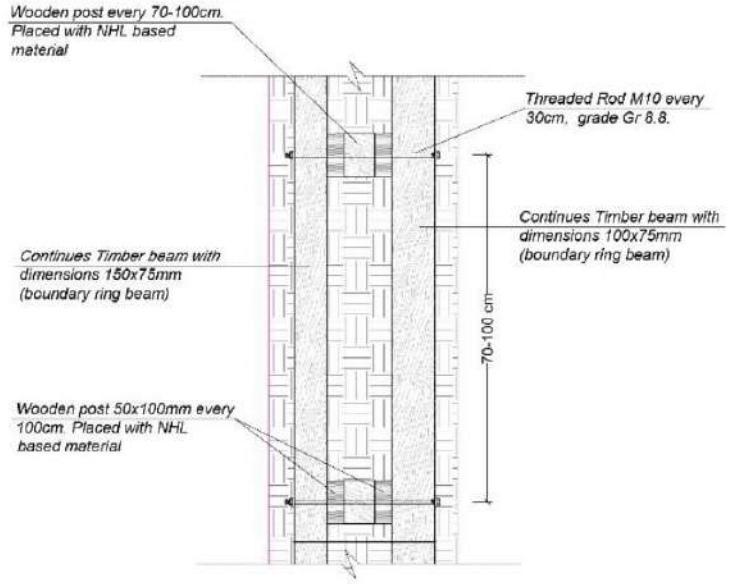
➔ Advice on which parts of adobe masonry walls should be removed and reconstructed due to their heavy deteriorated state.

➔ The majority of the adobe bricks were found heavily damaged and deteriorated, possibly by the trapped moisture inside the surface of the wall due to the incompatible cementitious “sprits” plaster and/or leaks from the roof.

Kalo Chorio/Vuda, Larnaca District

Executed Conservation works – **Roof reconstruction**





Structural connection detail between timber ring beam and timber post (plan) D-10 S.D.04

Scale 1:10

Kalo Chorio/Vuda, Larnaca District

Executed Conservation works – **Minaret**

Consultants' technical advice during supervision – Example Report

Conservation works of Mosque in Kalo Chorio (Vouda), Larnaca District UNDP
OUTPUT 3: CONSULTANTS' TECHNICAL ADVICE
Participants from UNDP: Mrs. Katerina Tomanti - Project Engineer
Participants from the Contractor's company: C. Koushas Trading & Development Ltd Mrs. Maria Kousha – Site Engineer Mr. Savvas Savva – Foreman
Participants from Designers Team: Engineers: Mr. Platonas Stylianou, Mrs. Maria Kyriakou

View at Reporting Day

Date: 08.11.2022 Hours held: 11:30 till 13:00 pm

The meeting / discussion with UNDP was held during a site visit at Kalo Chorio/Vuda Mosque on the 8th of November 2022 at 11:30am. The site visit involved the inspection of both the interior and exterior spaces of the Mosque.

UNDP, the Designers team and the Contractor's team met and discussed the following issues:

A. Issue regarding the replacement of existing lintels

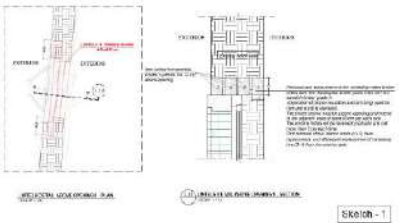
Questions were raised concerning the discovery of timber lintes and not stone lintes above the openings and their possible need for replacement. The discussion examined whether all lintels must be removed and replaced with new ones or only some of them.

Advice given:

- The Designers claimed that all lintes must be inspected, checking their ends for rot and if found unhealthy and rotten they will be replaced with new rectangular timber joists 10x15cm Swedish timber grade A, to cover the wall's width.
- Relevant scope of work is described in the technical specifications A6.1 "provide and install new wooden lintal if necessary" and A6.3 "careful removal for restoration of wooden windows ... replacement of rotten elements ...".

- The timber lintels must be placed standing and extend to the adjacent walls at least 60cm per each side. It was stated that it is important that the existing lintels are removed gradually and not more than 2 per each time be per detail attached.
- Application of proper insulation and anti-fungi, anti-termite paint must be done to all new and existing timber elements.
- A relevant detail will be sent the following day (Sketch – 1).

Photo – 1: Existing timber lintels found above openings



Sketch - 1

Sketch – 1: Replacement of lintels above existing openings

B. Issue regarding the discovery of several new openings

Following the removal of plasters in the interior of the mosque, several openings were revealed which were later filled with coeba bricks, irregular stone units or gypsum material. The new openings have been recorded and documented in drawing format in the Site Report no.3 sent on the 25/10/22.

Questions were raised concerning the structural strengthening of the openings within the adobe wall. The Contractor suggested to install timber tie beams in each opening to connect the adobe wall. As per the Contractor's suggestions, one timber tie element will be installed in the small windows and two timber elements will be place in the larger windows.

Advice given:

- The Designers agreed with the Contractor's recommendation and approved the methodology proposed.
- It was stated that all existing lintels will be inspected and if found unhealthy and rotten they will be replaced with new rectangular timber joists of Swedish timber grade A. Installation methodology of lintels replacement to be followed as per issue A - advice given and relevant Skelch - 1. The new rectangular timber joists of the lintels will be 10x10 cm covering the width of the wall.
- The detail for the lintel's replacement will be similar to Skelch – 1 but with timber losts of 10x10 cm.
- After the installation of timber ties, the windows will remain blind and will be replastered with a recess from the wall's surface as per Site Report no.3 – part 2.1, with the exception of the decorative gypsum grill windows that will be restored and preserved visible.

Photo – 2: Founding of larger window that will be strengthened with two (2) timber ties.

Photo – 3: Founding of small window that will be strengthened with one (1) timber tie.

C. Issue regarding the corner tying of transverse walls

1. Questions were raised concerning the proposed stone stitching detail for crack repairs which was suggested by the Contractor and sent to the Designers for their recommendations on the 03/11/2022. The stone stitching detail indicated installation of limassol stones alternately on both sides of the walls at 30-100 cm vertical distance, at the connection between the main arches and the perpendicular masonry wall and pilars.

Advice given:

- This issue was agreed that is not suitable for this type of masonry walls since by the removal of plaster at the corner it appears to be adobe masonry.
- It was clarified that three (3) pairs of timber corner elements will be installed as per WS.9 in BoQ and the Technical Specifications (see relevant photo 4)

Photo – 4: Stitching of cracks found in the corner connection of the masonry walls by means of 3 pairs of timber corner elements as per WS.9

2. Questions were raised concerning the application of the timber corner tie beam elements as per Work Specification WS.9 and BoQ – item W30.

Advice given:

- It was stated that after the removal of internal plasters and the reveal of the masonry type, this detail is found to be appropriate also for the stone masonry walls. This is due to the rubble masonry consisted of relatively small stone units therefore, the timber joists will be easily installed and provide the necessary bonding while restoring the walls continuity.
- The Designers clarified that the North-East corner will be tied with installation of a total of four (4) pairs of timber corner elements as per drawings and specifications (see relevant photo 5).

Photo – 5: Two additional timber corner elements to be installed in the N-E corner.

D. Issue regarding the plaster removal of an additional window finding on the East wall

The Designers mentioned that the existence of a new window located on the left side of the East wall which was documented on the Site Report no.3 – part 2.1 must be also examined, following the removal of the plaster, counter to the Contractor's suggestion to be kept (see relevant photo - 6). The works to be done are as described for the other now window findings (see Site Report no.3).

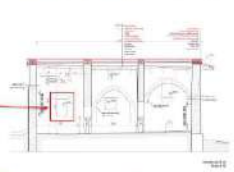


Photo – 6: New window finding under the plaster that was suggested to be kept

E. Issue regarding the temporary scaffolding detail of the two main pillars that was requested by UNDP

- The proposed scaffolding/temporary support detail of the main pillars was sent to UNDP by the Designers on the 06/11/22 together with their recommendations.
- The detail was discussed on site and was agreed also by the Contractor. All questions have been answered.
- The reasons for these additional scaffoldings were thoroughly provided in Site Report no.3 – part 1.1, in which it was specified that the found small, damaged stones at bottom of the pilars will be replaced with stone units similar to the arch's in order to restore their continuity.

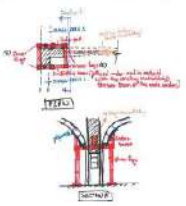


Photo – 7: Temporary support detail of the two main pillars.

F. Issue regarding the progress of the Minaret's restoration

The Contractor mentioned that they will commence with the restoration of the base of the minaret following the technical specifications and the drawings.
First work to be done is the careful removal of the damaged and eroded stone units and their replacement with new ones, equivalent in composition, size and colour as per laboratory analysis.

G. Issue regarding the South-East corner stitching detail

Questions were raised concerning the South-East corner stitching detail which must be revised after the discovery of the new hidden arch. After the removal of the interior plasters and some of the exterior, the pier of the arch was found to made of stone units, contrary to the adobe wall that was given in the drawings.

Advice given:

- The Designer advised that the crack stitching detail as per WS7.2 is not appropriate for the bottom part of the wall that is made of stone masonry, but only for the upper half which is consisted of adobe bricks.
- It was stated that a new detail will be sent the following day (Sketch – 2).
- The Designers clarified that the upper half part will be repaired as per WS-7.1 and WS-7.2 according to the detail of the installation of timber corner elements externally for bonding of the adjacent walls and the stitching of the deep crack externally with timber vertical and horizontal elements.
- Additionally, for the lower stone masonry wall, galvanized steel threaded tie rods of Φ16 mm will be installed every 35 cm vertically with special grouting injection of NHL material, as per detail attached (sketch – 2).

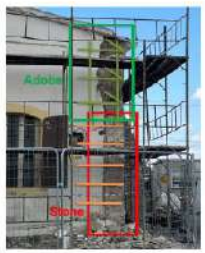
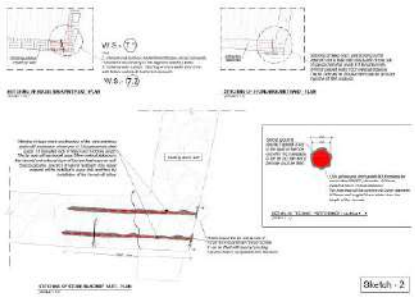


Photo – 8: Existing S-E corner wall typology – bottom half part made of stone masonry, upper half part made of adobe masonry



Sketch - 2

Sketch – 2: Stitching detail of stone masonry part

Photographic Material

Photo 9 – External north side of the mosque.

Photo 10 – View of the temporary scaffoldings for commencement of works at the minaret.

Photo 11 – View of the small arches and the pillar that will be supported.

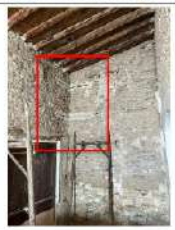


Photo 12 – View of the already installed timber corner tie beams.

Kalo Chorio/Vuda, Larnaca District

Photographic Documentation (Before and After)

Kalo Chorio/Vuda, Larnaca District

Photographic Documentation (Before and After)

Kalo Chorio/Vuda, Larnaca District

Completion Event – 08.09.2023

Thank you for your attention!