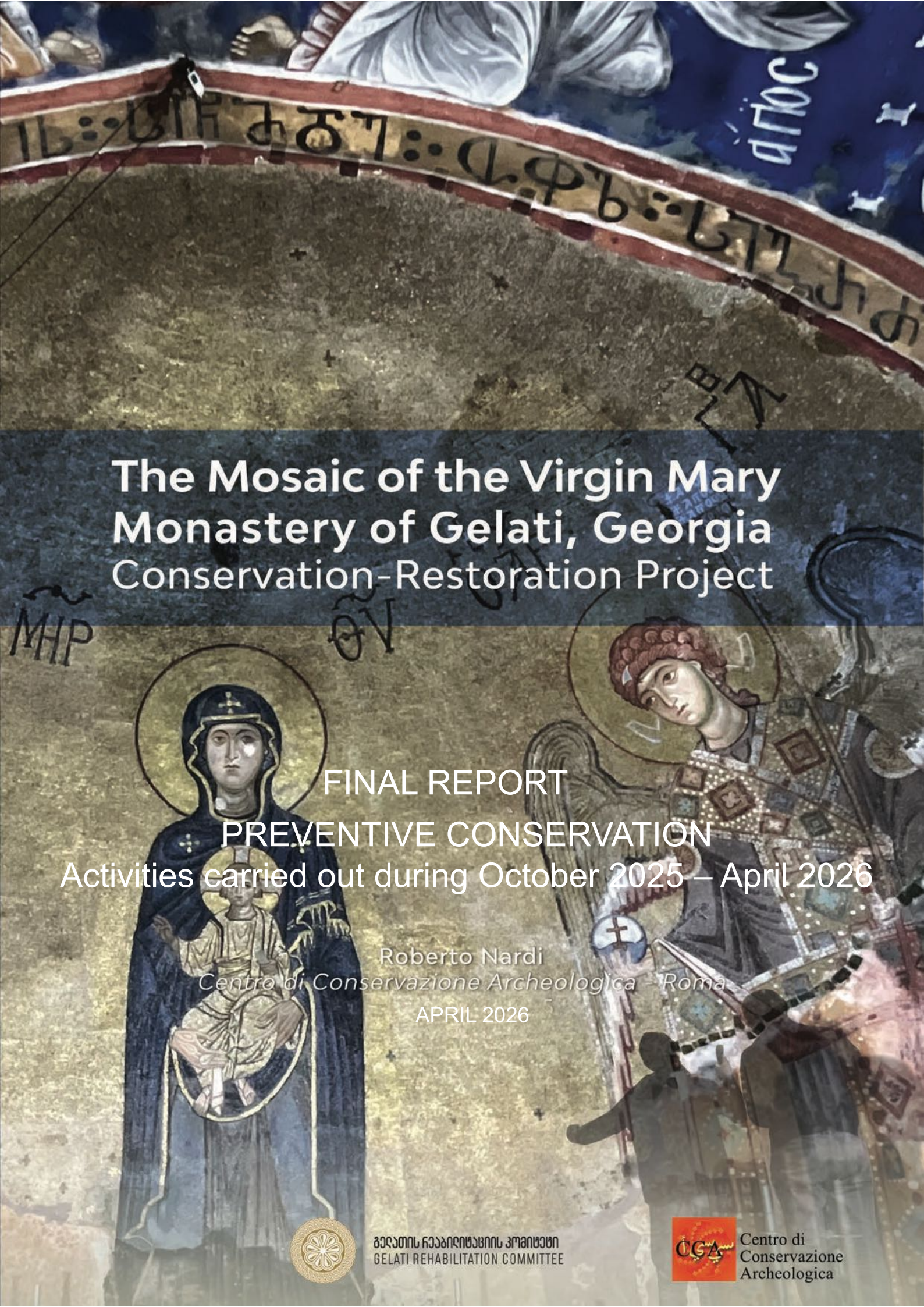


The Mosaic of the Virgin Mary Monastery of Gelati, Georgia
Conservation-Restoration Project

FINAL REPORT
PREVENTIVE CONSERVATION
Activities carried out during October 2025 – April 2026

Roberto Nardi
Centro di Conservazione Archeologica - Roma

APRIL 2026

გელათის რეაბილიტაციის კომიტეტი
GELATI REHABILITATION COMMITTEE

Centro di Conservazione Archeologica

The mosaic of the Virgin Mary
Monastery of Gelati, Georgia
Conservation-Restoration Project

PREVENTIVE CONSERVATION
Activities carried out during October 2025 – April 2026
according to the contract of services September 22nd, 2025
Interim Report

Roberto Nardi
Centro di Conservazione Archeologica – Roma

April 2026

Preamble

The study on the state of conservation of the mosaic of the Virgin in the Monastery of Gelati has highlighted a significant critical issue: the detachment of the mosaic from the masonry structure in the upper part of the apse bowl, with measurements ranging from 1 mm to 20 mm, covering an area of approximately 35 m².

This represents a risk of capital importance: a risk of collapse of an entire portion of the mosaic, currently mitigated only by the presence of the brass pins applied by Karlo Bakuradze during the intervention in the 1980s. To address this situation, it is extremely urgent to restore the physical continuity between the mosaic and the supporting structure, even more so in anticipation of any necessary interventions on the architecture of the apse, outside the church, to restore the protective coverings from the rain.

The same operation of consolidating the mosaic, which will involve filling the detachment from the wall with a lime-based mortar that must be applied to necessarily wet and thus heavier surfaces, requires the application of an external **preventive protection structure** for the mosaic. This structure will support the surfaces during the delicate phase of consolidation.

However, this structure must rest on a mosaic surface made consistent through the application of a protective veiling that must cover the entire surface affected by the detachment and the subsequent consolidation work.

To carry out this operation, some preventive activities needed to be performed on the mosaic:
- Review of the adhesion state of the tesserae and temporary securing of unstable ones;
- Review of the leveling layers of the tesserae and consolidation of points showing instability and/or fragility;
- Dry cleaning of the mosaic surfaces;
- Consolidation of the *cartellina* of the gold and silver leaf tesserae;
- Dry removal of crystallized salts;
- Pre-wet cleaning of small sections of the mosaic;
- Veiling of the mosaic.

Only after completing these preliminary operations the preventive protection structure will be installed, followed by the application of support props in contact with the mosaic.

Phase 1 of 2 of the Preventive Conservation Program.

In order to achieve the objectives described above, a contract was signed on 22 September 2025 between Gelati Rehabilitation Provisional Committee (i/n 204395537) and the Centro di Conservazione Archeologica srl, (reg N: REA 1001728). Objective of the contract was to create and install on the mosaic a metal structure, based directly on the floor of the altar area, with the function of preventive protection. The program also included a series of activities necessary to prepare the mosaic to receive such a structure. The program was divided in two phases, the first starting on October, ending in December 2025, the second starting in January, ending in April 2026. The first phase was carried out in Rome and in Gelati. The second phase was carried out in Tblisi and Gelati. The present document is the final report of this Preventive Conservation Program.

Narrative

October 2025 marked the beginning of this project, with the completion of the executive design of the preventive conservation program and with the construction, in Rome, of the structure itself.
In November, a CCA team traveled to Gelati to complete all the necessary operations to prepare the mosaic of the Virgin for the support structure. The team consisted of a group of conservators tasked with working on the mosaic, and a group of technicians and engineers tasked with reviewing the final details of the executive design of the support structure. The first group consisted of Roberto Nardi, and Maria Elisa Cappelletto, Giovanni Protopapa, Valentina Cardillo, and Giulia Gianmarinaro, CCA conservators. The second group consisted of Michele Musano and Fabrizio Noto, the engineers who designed the metal structure, and Massimo Canale, and Emanuele Canale, the specialists who manufactured the structure itself.

In January 2026 the construction of the metal foundation of the structure started in Tblisi under the responsibility of LLC B39 directed by arch. Vakhtang Zesashvili. The actual implementation of the foundation structure was carried out at Ltd MM GROUP, in Tblisi.
In this period the shipment from Rome to Gelati of the metal structure and materials for conservation was organized and carried out by Royal Express (9 Agmashenebeli Alley, Tbilisi, Georgia). This was also the time for the assembling of the foundation of the structure, under the responsibility of arch. Vakhtang Zesashvili.

Number		Content Metal elements	Height	Length	Depth	Weight x box	Total weight
2	Boxes	8 iron pylons	90	160	110	120	240
1	Boxes	4 iron pylon short	90	160	110	60	60
3	Boxes	Mixed tools	90	100	90	130	390
1	Boxes	Central iron block	40	160	80	80	80
2	Boxes	Long iron bands	40	300	20	110	220
Content Building materials							
1	Pallet	Building powders + additives	120	80	80	400	400
1	Pallet	Building powders	120	80	80	300	300
						TOTAL	**1690**

On March 13th, 2026, a second group from CCA travelled to Gelati. This consisted of Roberto Nardi, Andreina Costanzi Cobau, Maria Elisa Cappelletto, Chiara Scaccia, Massimo Canale, Emanuele Canale and Costantin Pisaltu. The objective of this group was to complete the preparation of the mosaic to receive the metal structure and to assemble the structure itself.

Due to some necessary improvements to the foundation structure, it was decided not to close of the props in contact with the mosaic. This allowed for work on the foundation base without transmitting vibrations to the mosaic. For this reason, it was decided to stop the work of the second campaign, leaving a 20 mm gap between the rubber pads and the mosaic, with the intention of returning shortly to complete the securing of the mosaic once the foundation was fully completed. The operation required to stabilize the foundation was to insert steel bases to all pillars and steel bracing in the two four-pillar columns supporting the structure's top. This operation was carried out by the architect Vakhtang Zesashvili between April 1-17, 2026, and therefore a third mission from CCA-Rome arrived in Gelati. The group operated in Gelati in April 15-19, 2026 with the objective to complete the basement and to close the supports so that the mosaic was finally secured. The group was composed of Massimo Canale, Emanuele Canale and Costantin Pisaltu.

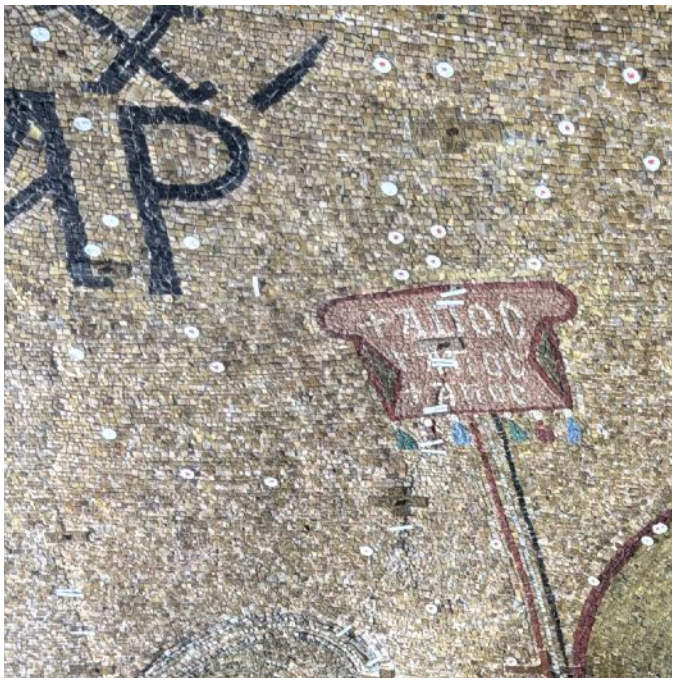
Technical operations carried out on the mosaic.

Following what was planned, the operations performed by the conservators are the following.

1. Review of the state of the tesserae and securing: the tiles were individually verified, and any detachments or fragility was highlighted using colored labels to proceed with preliminary fixings. The work was carried out on individual tiles and limited areas with a syringe using PLM SM diluted with water. All collected information updated the documentation produced during the planning phase.

2. Review of the state of the *cartellina* and securing: Point-specific and generalized consolidation of the *cartelline* protecting the gold tiles was carried out by injecting an acrylic polymers in solution, 10% Paraloid B72 in acetone.

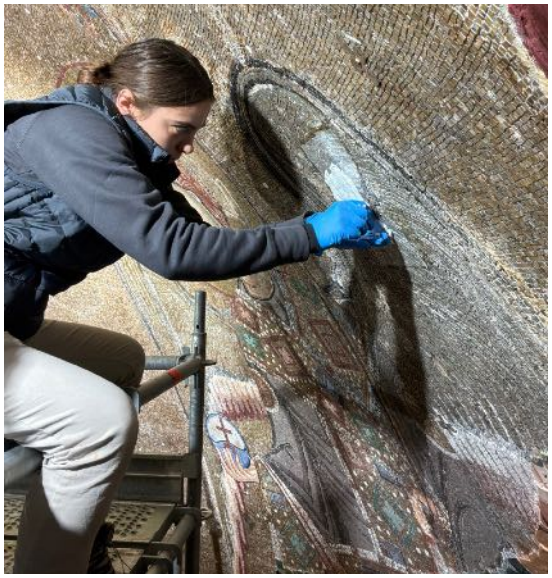
3. Review the setting-bed layers, pointing consolidation: in areas with instability of multiple tesserae, consolidation was carried out by infiltrating hydraulic mortar into the interstitial spaces.



4. Pre dry cleaning and dry removal of crystallized salts: the mosaic surfaces were dusted with soft brushes and vacuumed to eliminate dust deposits, including those concentrated in the interstitial spaces. In this phase, salt efflorescence were also removed.

- Consolidation of the *cartellina*: the *cartelline* protecting the gold tiles were consolidated by injecting acrylic polymers in solution, 10% Paraloid B72 in acetone.

- Pre-wet cleaning: on very limited areas where the presence of the brass pins from the 1980s restoration allows for safe intervention, pre-wet cleaning was performed in order to remove the most superficial and weakly coherent dirt. Deposits present in the interstitial spaces were also removed with gentle mechanical action using soft-bristled brushes, natural sponges, and finishing with scalpels.



Veiling of the mosaic with cotton gauze: all areas affected by the severe detachment of the mosaic from the masonry structure of the upper apse bowl (see map in red) were protected by applying a layer of cotton gauze directly onto the mosaic surface. This operation was carried out using: Aquazol 500 diluted in water because its low level of toxicity. It was decided to apply one single layer of cotton gauze because this will make the mosaic easier to read for future treatments. Specifically, this will allow for consolidation of the mosaic's deeper layers without removing the glaze.

Preventive Conservation of the Virgin Mary Mosaic in the Church of the Nativity of the Virgin, Gelati Monastery
გელათის მონასტრის ღვთისმშობლის შობის სახელობის ტაძარში წარმოდგენილი ღვთისმშობლის გამოსახულებიანი მოზაიკური კომპოზიციის პრევენციული კონსერვაცია

Time-table of the Activities / სამუშაოების გეგმა-გრაფიკი

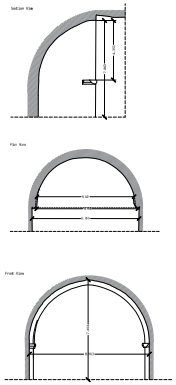
		Phase 1 - ეტაპი 1			Phase 2 - ეტაპი 2			
Description of works. სამუშაობის აღწერა		I month თვე	II month თვე	III month თვე	IV month თვე	V month თვე	VI month თვე	VII month თვე
		Oct 2025	nov-25	Dec 2025	Jan 2026	feb-26	mar-26	apr-26
1	Executive project of the Preventive Conservation Plan	planned / actual						
2	Executive design of the protective structure (in Rome); დამცავი კონსტრუქციის აღმასრულებელი (მუშა)		planned / actual					
3	Review of the state of the tesserae and securing (in Gelati) ტესერების ადჰეზიის მდგომარეობის შემოწმება და მაგრ ფიქსაცია (გელათი)		planned / actual					
4	Review of the state of the *cartellina* and securing (in Gelati) ტესერების ადჰეზიის მდგომარეობის შემოწმება და მაგრ ფიქსაცია (გელათი)		planned / actual					
5	Review the setting-bed layers, pointing consolidation (in Gelati) ტესერების საფუძვლისა და საფარის ფენების გადამოწმება და წერტილოვანი კონსოლიდაცია		planned / actual					
6	Pre dry cleaning (in Gelati) წინასწარი მშრალი წმენდა (გელათი)		planned / actual					
7	Consolidation of the cartellina (in Gelati) კარტელინის (საფარის) კონსოლიდაცია (გელათი)		planned / actual					
8	Dry removal of crystallized salts (in Gelati) კრისტალიზებული მარილების მშრალი ხერხით მოცილება (გელათი)		planned / actual					
9	Pre-wet cleaning (in Gelati) წინასწარი სველი წმენდა (გელათი);		planned / actual					
10	Veiling of the mosaic with cotton gauze (in Gelati) მოზაიკის დაფარვა ბამბის ქსოვილით (გელათი);		planned / actual					
11	Interim report			planned / actual				
12	Structure construction (in Rome); კონსტრუქციის დამზადება (რომი);			planned / actual				
13	Georgia) კონსტრუქციის, აღჭურვილობისა და მასალების ტრანსპორტირება (რომი და					planned / actual		
14	Installation of the protective structure (in Gelati) დამცავი კონსტრუქციის მონტაჟი (გელათი);						planned / actual	
15	Application of props and securing the mosaic (in Gelati); ტესერების ჩამაგრება და მოზაიკის ფიქსაცია						planned / actual	
16	Diagnostic investigation with laboratory tests			not planned / actual				actual
17	დოკუმენტაციის მომზადება და ტექნიკური ანგარიში (რომი და გელათი).						planned / actual	

Monastery of Gelati

Mosaic of the Virgin Mary

PREVENTIVE CONSERVATION
OCTOBER 2025 - APRIL 2026

Tesserae readhesion

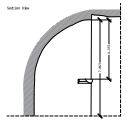


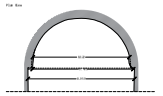
Monastery of Gelati

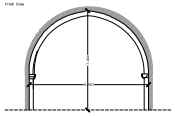
Mosaic of the Virgin Mary

PREVENTIVE CONSERVATION
OCTOBER 2025 - APRIL 2026

Pre wet cleaning





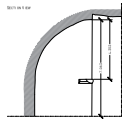


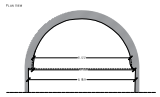
Monastery of Gelati

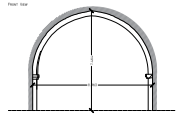
Mosaic of the Virgin Mary

PREVENTIVE CONSERVATION
OCTOBER 2025 - APRIL 2026

☐ Gauzing





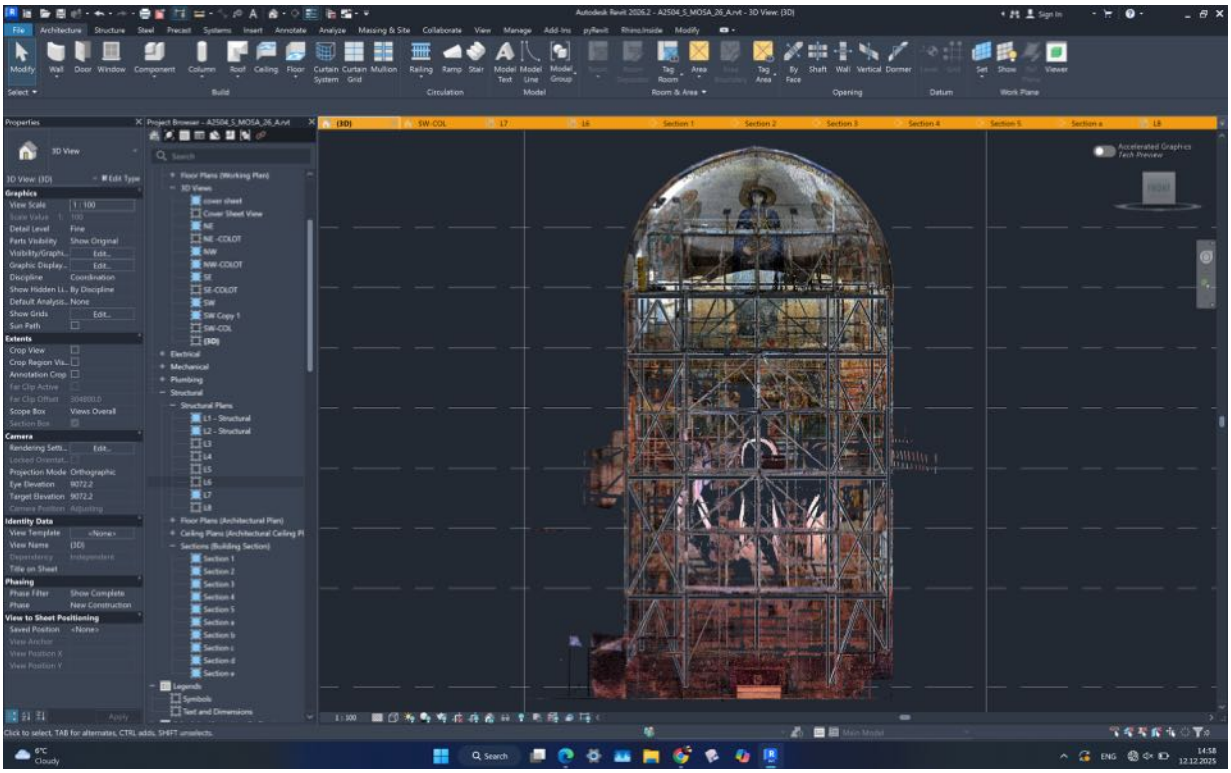


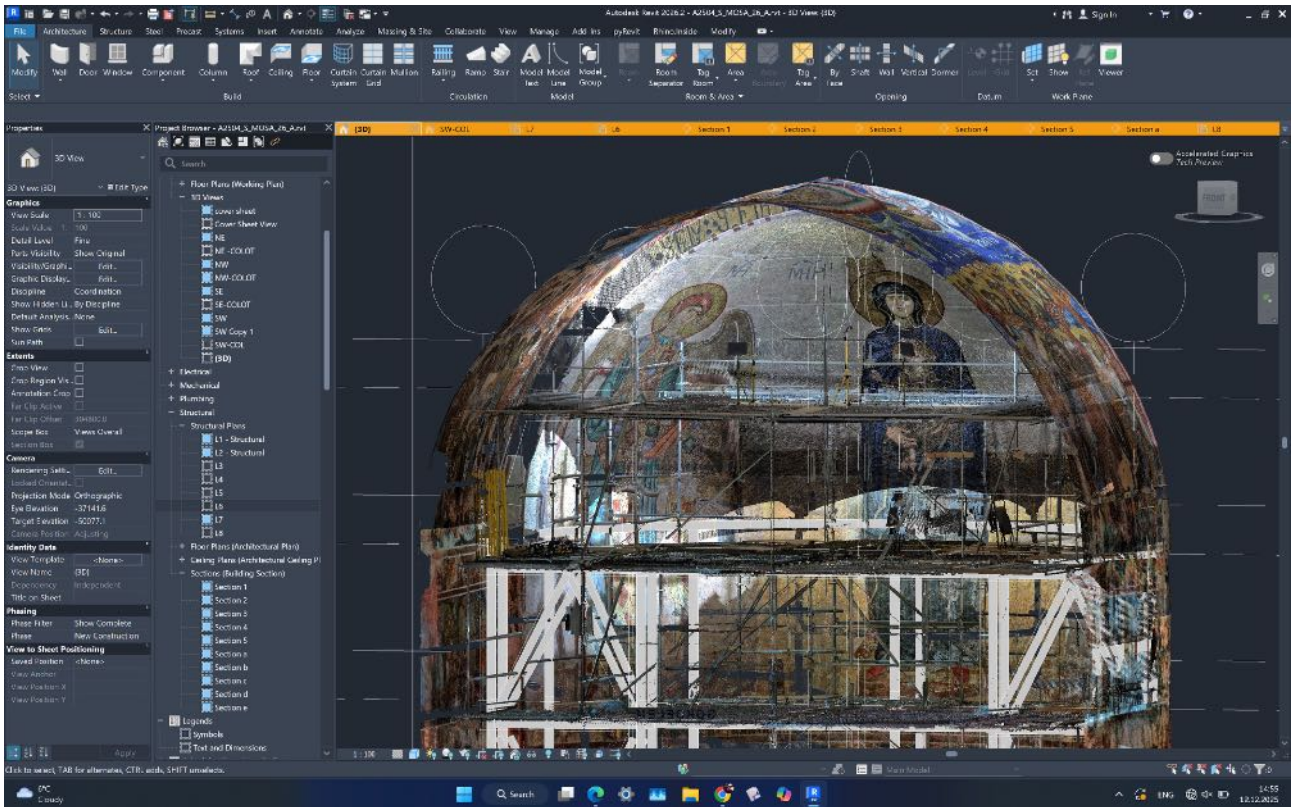
გელათის აღდგენითი კომიტეტი
GELATI REHABILITATION COMMITTEE

The upper protective structure

Parallel to the work carried out in Gelati, the executive design of the protective structure was carried out in Rome. A team of two engineers, Michele Musano and Fabrizio Noto, and two technicians, Massimo and Emanuele Canale, worked together to clarify any remaining doubts about the final structure and produce the final executive design. Before concluding this phase, the entire team had to visit Gelati to meet with the conservators. This took place during the second week of November.

During this meeting, important decisions were made, and numerous technical details that had been planned only theoretically up to that point were verified and modified. The most important decision was to confirm the initial hypothesis of basing the supporting structure on pillars resting directly on the ground, without any connection to the scaffolding or the church's masonry. This choice was made to prevent any possible transmission of vibrations between the scaffolding and the mosaic, which, we reiterate, can be dangerous and even fatal to the stability of the entire original structure.





The second important decision was to divide the construction program between two separate groups: one, based in Rome, tasked with completing the upper part of the structure (the curved part that connects with the mosaic); the other, based in Tbilisi and supervised by architect Vakhtang Zesashvili, was tasked with completing the support structure from the base of the apse, the starting point of the curved structure, and the flooring. Technical design and supervision remained with the CCA engineering team. The reasons for this choice were primarily temporal. Given the long construction times required to create a complex structure like the one resulting from the study, and given the urgency of securing the mosaic, we thought it wiser to divide the construction of the structure between two different teams. This decision was facilitated by the evident quality of the steel structure built under the direction of the architect Vakhtang Zesashvili in the center of the church, from the ground floor to the dome.

Upper structure construction

Immediately after the meeting in Gelati, the team responsible for building the preventive support structure began production. Here following we describe the metal structure installed to protect the restoration of the vault in the apse of the Gelati monastery.

To allow safe intervention on the work, the following are required:

1) a platform at the level of the vault's impost to make the volume immediately below the vault accessible to restorers.
2) a contrasting structure (Figure 1) which supports a widespread system of small props (Figure 2), which guarantees the stability of the mosaic parts during the mortar replacement and consolidation operation.

The lower platform is described further on in this report. The upper support structure is made of steel and must be structurally independent from the platform, where the workers walk and operate, to prevent

vibrations induced by people from damaging the mosaics. This structure need also to be independent from the central steel structure related to the dome of the church.

The design philosophy behind the metal structure was based on two distinct scenarios, both conceived to safeguard the integrity of the mosaic above.

The **first scenario** involves the construction of a steel structure designed to handle the localized detachment of some portions of the mosaic, while ensuring limited deformations. The steel structure is designed to cope with these unexpected events, simulating the random fall of portions of the mosaic at critical points, where the applied load reaches ~200 kg. The idea is to preserve the structure's load-bearing function even in the presence of such anomalies, ensuring that overall deformations are less than 5 mm. This approach allows for high structural performance, ensuring that the remaining portion of the mosaic continues to be adequately supported and that the overall geometric structure does not undergo significant alterations capable of causing further damage.

The **second scenario** , however, does not consider the presence of detached portions of the mosaic, and the focus is on the structure's ability to withstand the pressure exerted by the injection mortar used to consolidate and stabilize the mosaic. The assumed pressure is 0.1 kPa , a value which, although low, applied to the entire surface represents a significant stress to manage. The design in this case focuses on optimizing and minimizing the weight of the steel structure, ensuring that the pressure of the mortar does not induce deformations or instabilities that could compromise the integrity of the entire system.

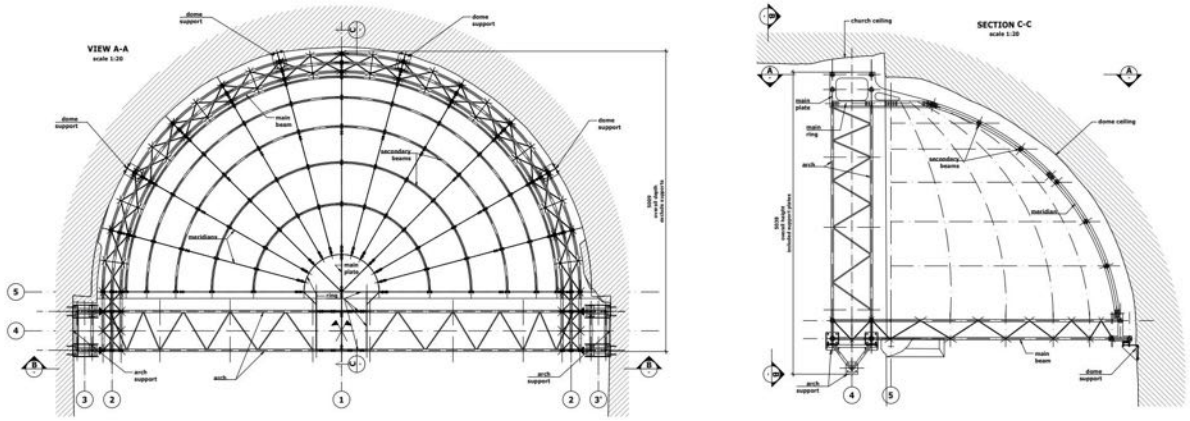


Figure 1– plan view (left) and side view (right) of structures

This dual design strategy allows for the development of two extremely versatile and resilient structural solutions. The first ensures the protection and support of the mosaic in the event of local detachment, preserving its integrity and artistic value. The second ensures that the structure can effectively adapt to the stresses during the grout injection process. The result is the definition of two structural solutions, each designed to optimally respond to different stress conditions. This approach allows for the structural intervention to be tailored to the most likely scenarios, while maintaining the principles of lightness, simplicity, and respect for the work's artistic value.

In both scenarios, due to the geometric irregularity of the dome, a height-adjustable prop system is essential, capable of precisely adapting to the (irregular) geometry of the vault. The arrangement and spacing of the meridians and beams were designed to facilitate the conservators' interventions: the operators can thus work comfortably between the different sections of the structure, approaching the mosaics without compromising their stability.

Furthermore, in both design scenarios, the structures must ensure sufficient strength and stiffness to effectively support the props during construction. This requirement ensures that, regardless of operational stresses or environmental conditions, the structural support remains reliable and safe.

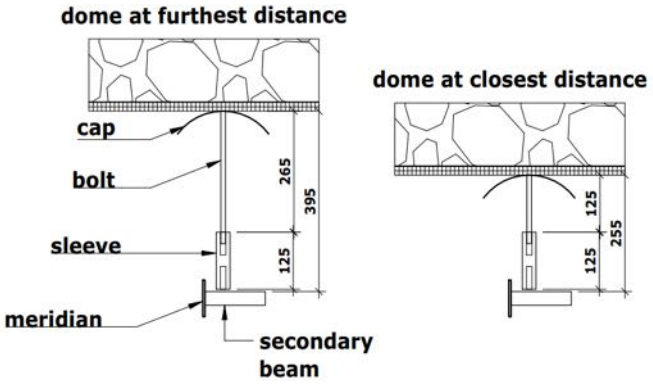


Figure 2– dome props

Upper structure. I scenario: Description

The structure is three-dimensional with a geometry approximately equal to a quarter of an ellipse (see Figure 3) with a transverse overall dimension of ~8m/9m (apse size and main arch size), a total height of ~5m and a depth of 4.5m ÷. The structure is made entirely of metalwork with bolted joints on site.

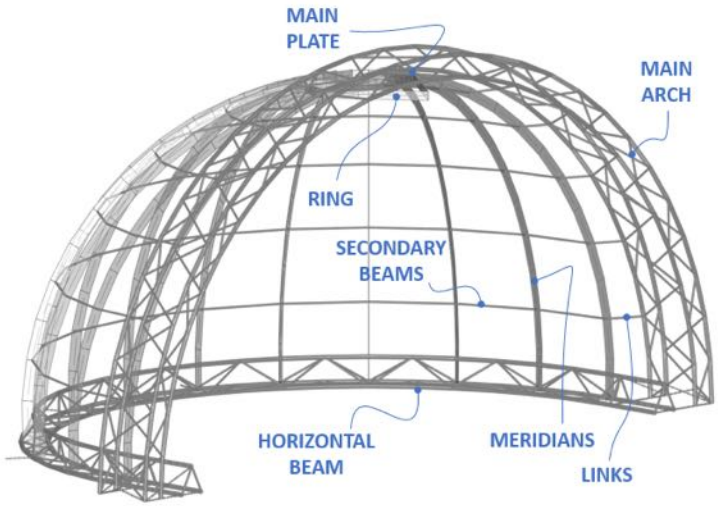


Figure 3– structure outline

The main elements of the structure are:

- the vertical beams, called meridians, which form the main framework and are made with plates cut and shaped (80mm ×6mm) to follow the curvature of the dome;

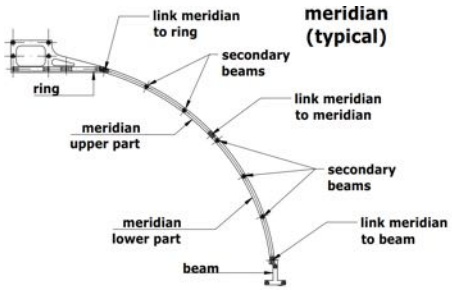


Figure 4– meridians

- the secondary horizontal beams that connect and stiffen the meridians, as well as allowing the props for the mosaics to be freely positioned, are made with 30mm box profiles;

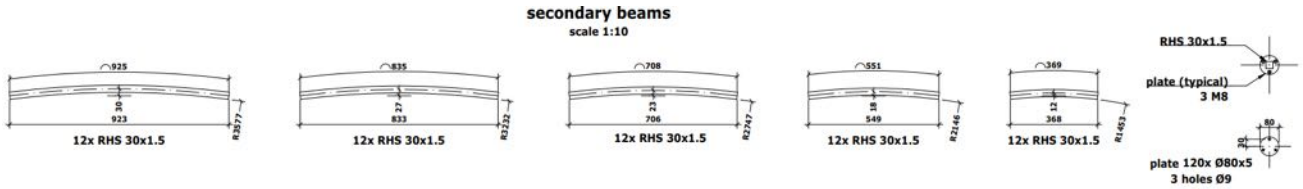


Figure 5– secondary beams

- the horizontal arched beam that connects all the meridians at the base is made with lattice ashlars made with 38 tubes and ∅10 bars ;∅

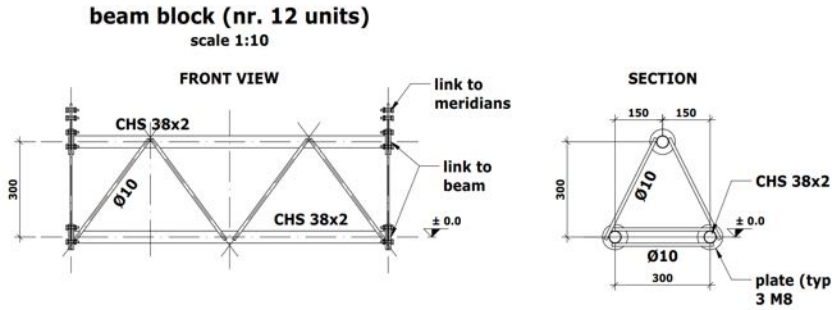


Figure 6– horizontal arch beam block (typical)

- the vertical arch that supports all the meridians (top) and the horizontal beam (bottom), is made with lattice ashlars made with 38 tubes and ∅10/16 ∅bars ∅.

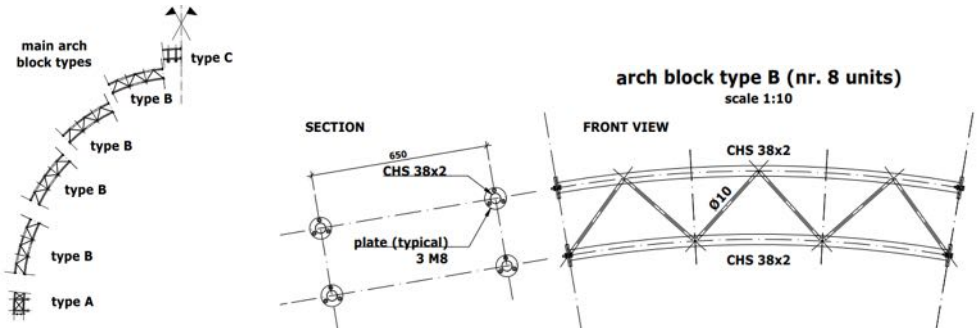


Figure 7– arch blocks outline (left), typical arch block (right)

The support points of the structure are two at the base of the vertical arch (Figure 8, left) and four supported by the horizontal arch beam on the side of the apse (Figure 8, right).

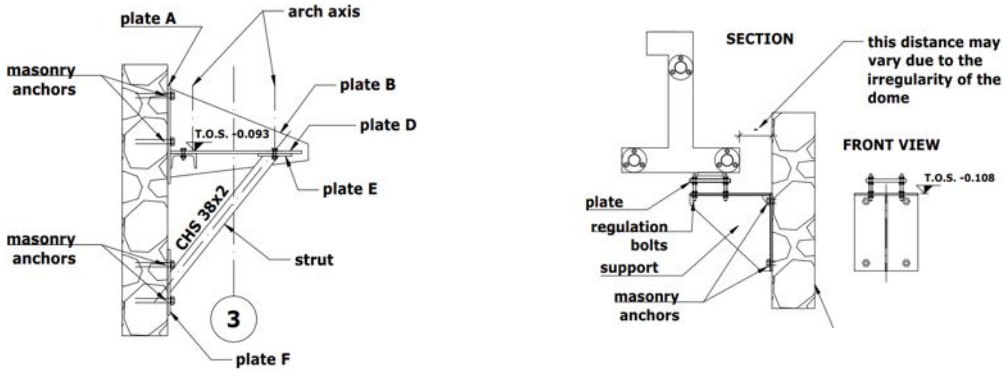


Figure 8– main arch supports (left), horizontal arch beam supports (right)

Upper structure. I scenario: Sizing the structure

The structure's own weight is less than 1000 kg, plus approximately 300 kg of permanent supports (props) if all mounted simultaneously. The structures are sized assuming a detachment of a portion of the canopy equal to ~200 kg, in the most unfavorable position (see Figure 9), so as to have a limited vertical deformation of less than 5 mm (see Figure 10).

Figure 9– accidental load positions

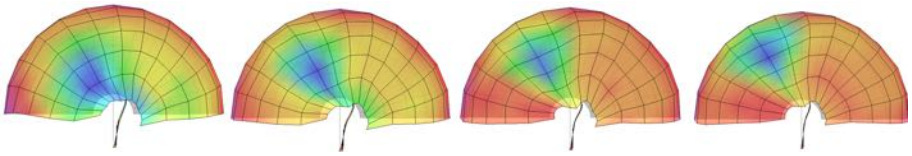


Figure 10– vertical deflection due to unintentional (live) load

Due to the low number of supports on the apse side and the severe loading conditions assumed in the analysis, the reactions at the support points in ultimate conditions (factored loads) require significant anchorages (e.g. 4M12).

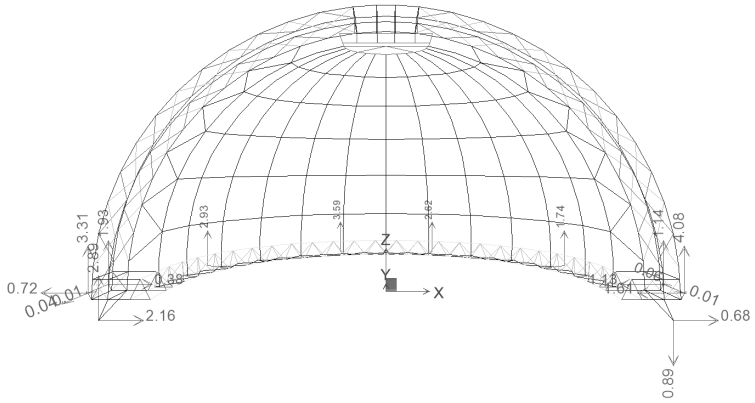


Figure 11– support reactions

Upper structure. II scenario: Description

After long and careful consideration, we concluded that Scenario II represented the best compromise between the required performance, weight, and impact of the structure on the church. We therefore decided to proceed with this second solution. This choice led to a variant of the original configuration. Specifically, the following changes were introduced:

- Reduction of the horizontal arch beam (Figure 13) **:** By reducing this element, a slimmer and less invasive profile was obtained, improving the integration of the structure with the pre-existing architecture.
- Reducing the severity of live load assumptions: The adoption of less extreme loads allowed for optimizing the sizing of the components, while still ensuring an adequate safety margin without weighing down the structure.
- Distributed support points through the insertion of columns from the base: To ensure better structural stability, a column-supported system can be adopted. This approach has allowed for a more balanced distribution of loads, minimizing interference with the masonry and limiting the number of

holes required for the installation of supports. An alternative solution based on a column system has also been studied. This configuration involves support starting from the base and extending upwards, offering an effective alternative to distributed supports. In total, thirteen supports are planned, each consisting of interconnected square profiles, thus ensuring the structural rigidity necessary to avoid excessive displacements. This solution, although it requires the insertion of columns from the ground, allows for improved stability of the entire structure, adapting to the specific needs of the context without compromising the integrity of the existing masonry (Figure 15).

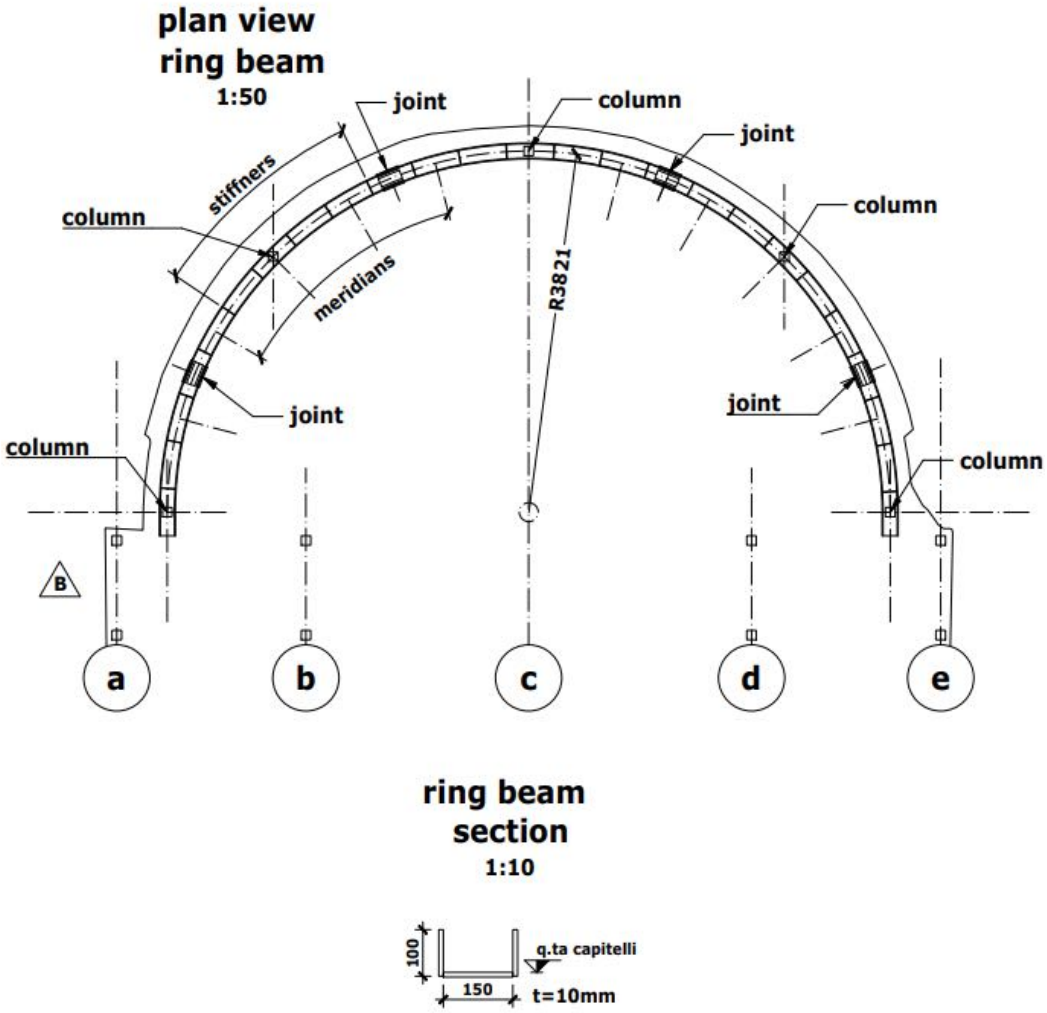


Figure 12– new ring beam

- Lightening the structure, both of the meridians and of the main arch: Through careful optimization of materials and cross-sections, it was possible to obtain a lighter structure, capable of preserving the delicacy of the dome without compromising the necessary strength and rigidity.

The overall weight of the new structure was kept to less than 750 kg, contributing to a lighter and less invasive solution. The live load, generated by the mortar injections and the dome's own weight, is assumed to be uniformly distributed with an approximate value of ~0.1 kPa , applied in both radial and vertical directions to realistically simulate the stresses to which the structure is subjected. Structural analyses confirm that the maximum deformations induced by this new live load remain limited, not exceeding 5-6 mm (Figure 14), which guarantees the stability and integrity of the intervention. Furthermore, to comply

with the aesthetic and functional conservation criteria, the anchors positioned on the side of the apse were redesigned with a smaller diameter (M8) than the original solution, thus ensuring less invasiveness.

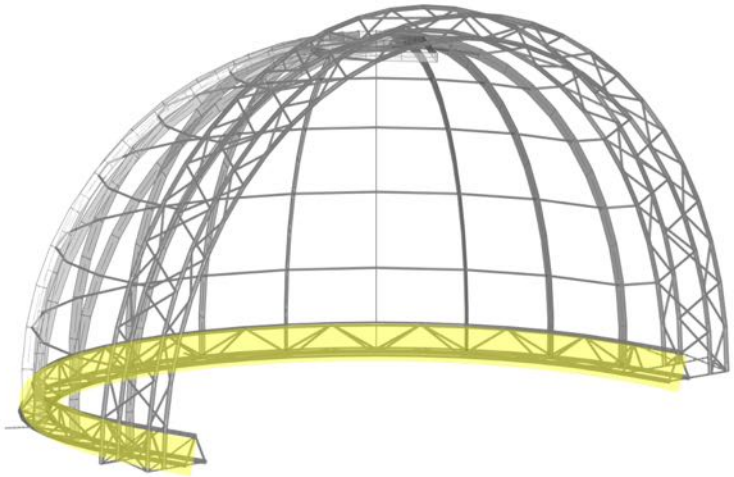


Figure 13– new structure outline with highlighted removed part

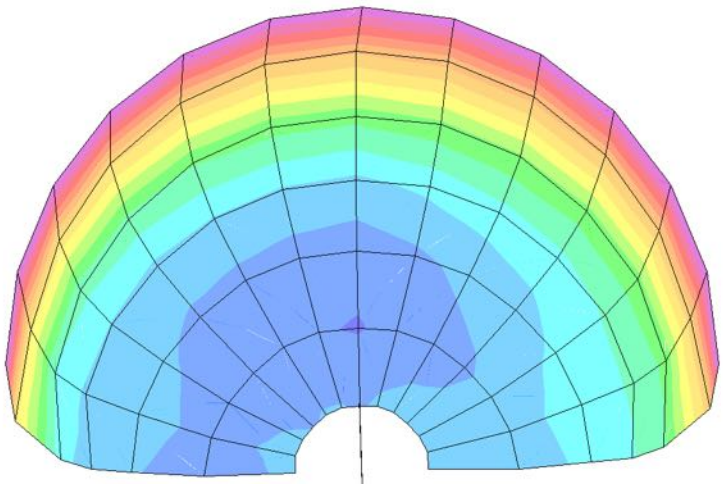
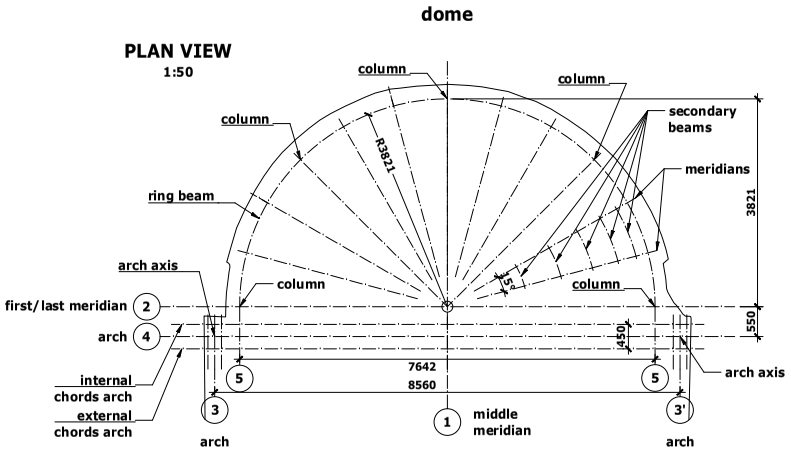
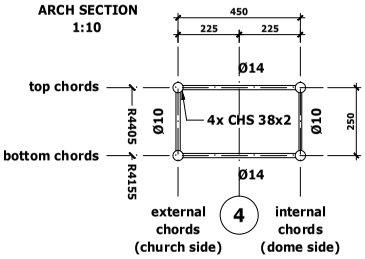


Figure 14– vertical deflection due to unintentional (live) load

Upper structure. The executive drawings.

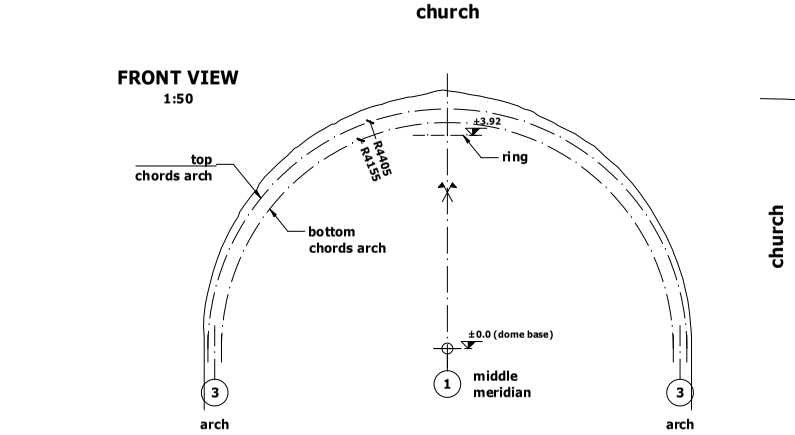
The upper section of the support structure was manufactured in Rome. Massimo and Emanuele Canale oversaw the production of the elements and performed a complete initial assembly in the factory to verify the accuracy of the design and the alignment of the connections. Once the system's efficiency was verified, the structure was dismantled and prepared for overland transport to Georgia.

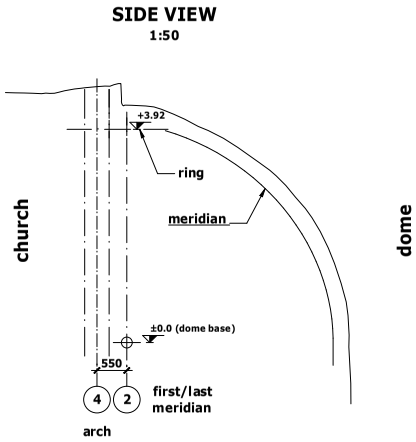




GENERAL NOTES
- all dimensions are in mm unless noted otherwise
- all levels are in metres unless noted otherwise and relate to dome base

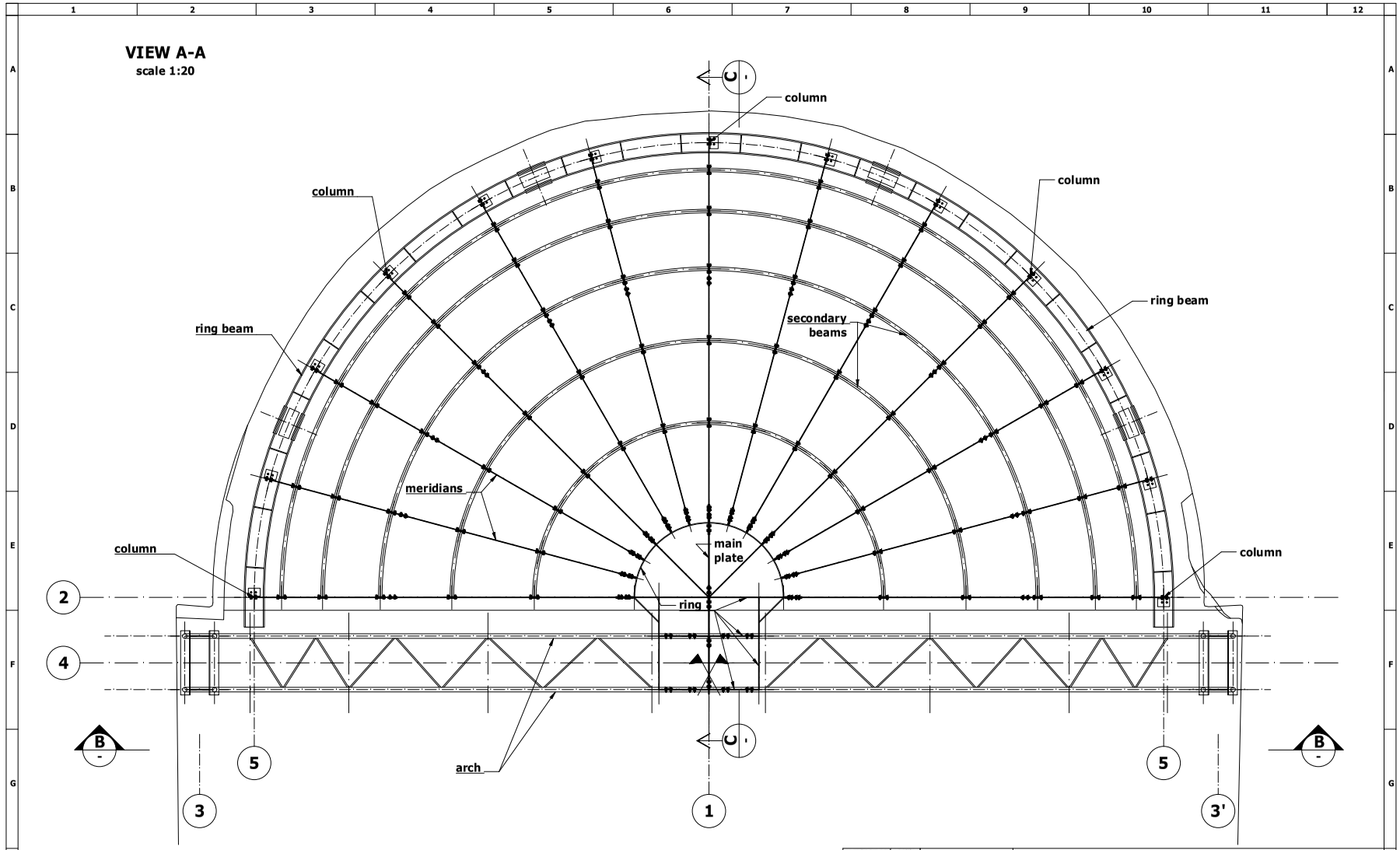
- steelwork grade S275
- bolt grade 8.8
- fillet welds z 0.7 t_{min} unless noted otherwise



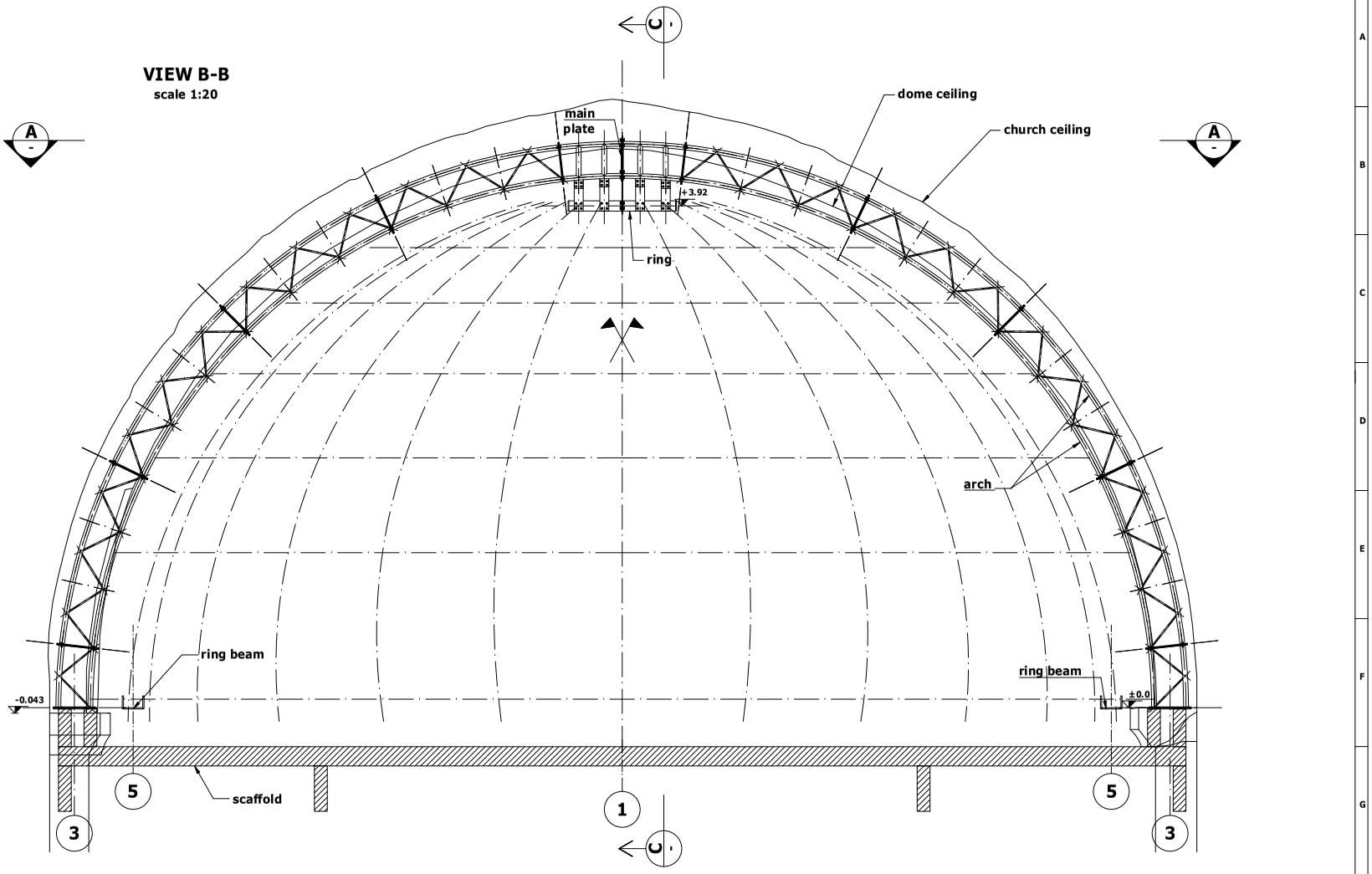


DRAWN	F.Noto	PROJECT					
CHECKED	M.Musano	Gelati Monastery Main Dome Mosaic Restoration					
APPROVED	R.Nardi	TITLE					
ISSUED	nov. 2025	ALIGNMENTS LAYOUT					
REVISION	2	SCALE 1:50	SIZE A2	SHT 1	DRAWING	S1	

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

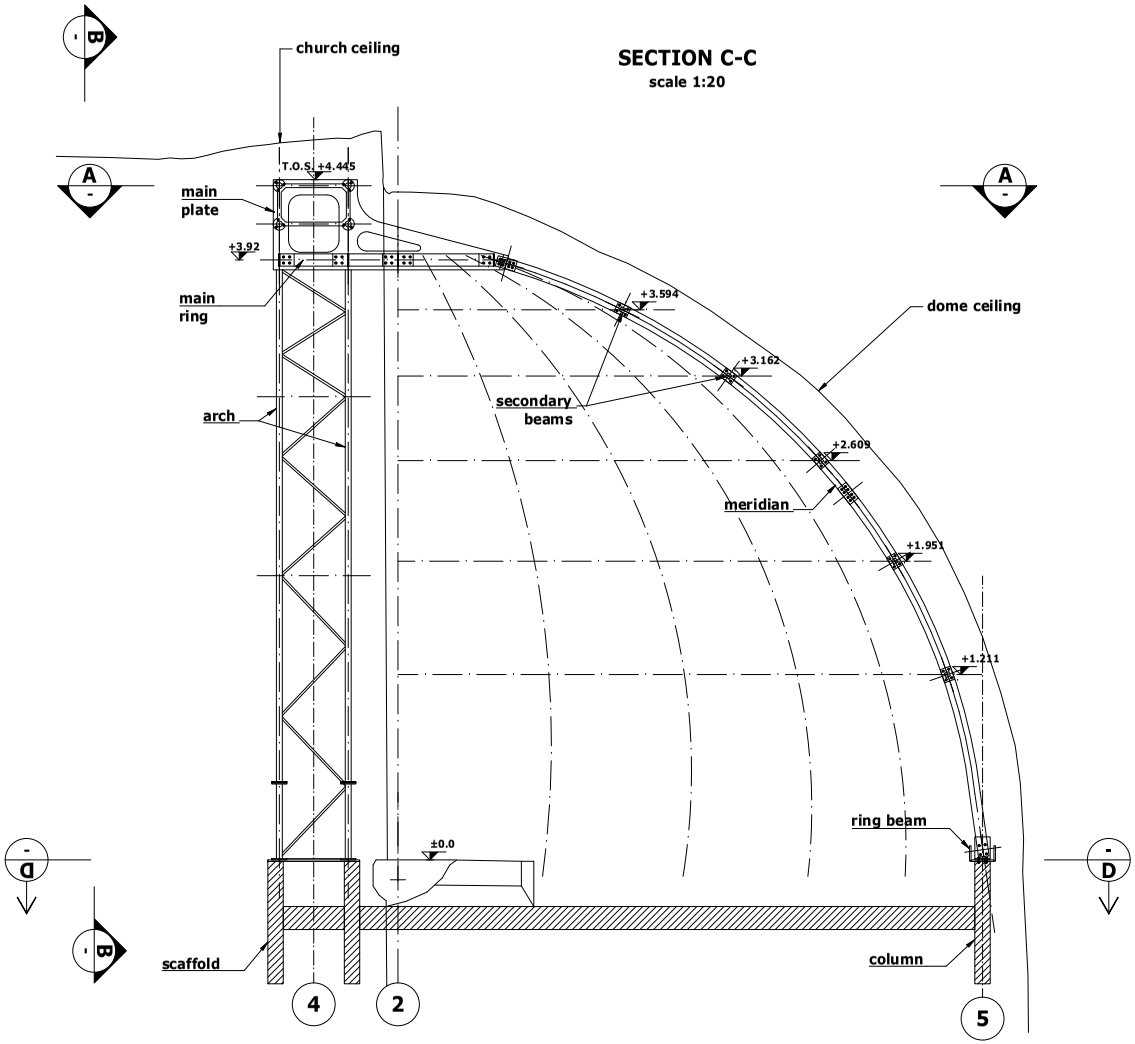


DRAWN	F.Noto	PROJECT					
CHECKED	M.Musano	Gelati Monastery Main Dome Mosaic Restoration					
APPROVED	R.Nardi	TITLE					
ISSUED	nov. 2025	PLAN VIEW A-A					
REVISION	2	SCALE 1:20	SIZE A2	SHT 1	DRAWING	S2	



DRAWN	F.Noto	PROJECT				
CHECKED	M.Musano	Gelati Monastery Main Dome Mosaic Restoration				
APPROVED	R.Nardi	TITLE				
ISSUED	nov. 2025	FRONT VIEW B-B				
REVISION	2	SCALE 1:20	SIZE A2	SHT 1	DRAWING	S3

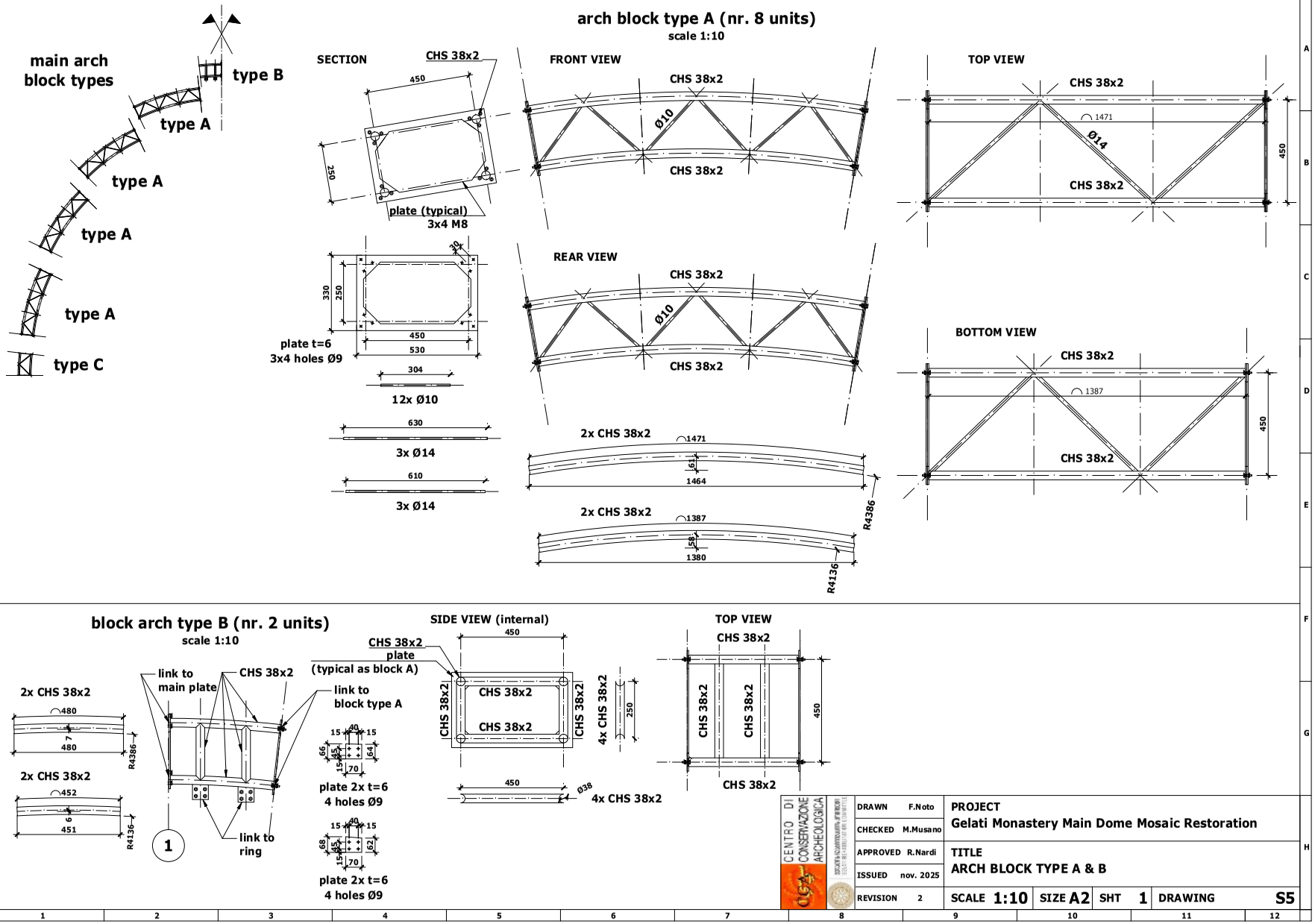
CENTRO DI CONSERVAZIONE ARCHEOLOGICA



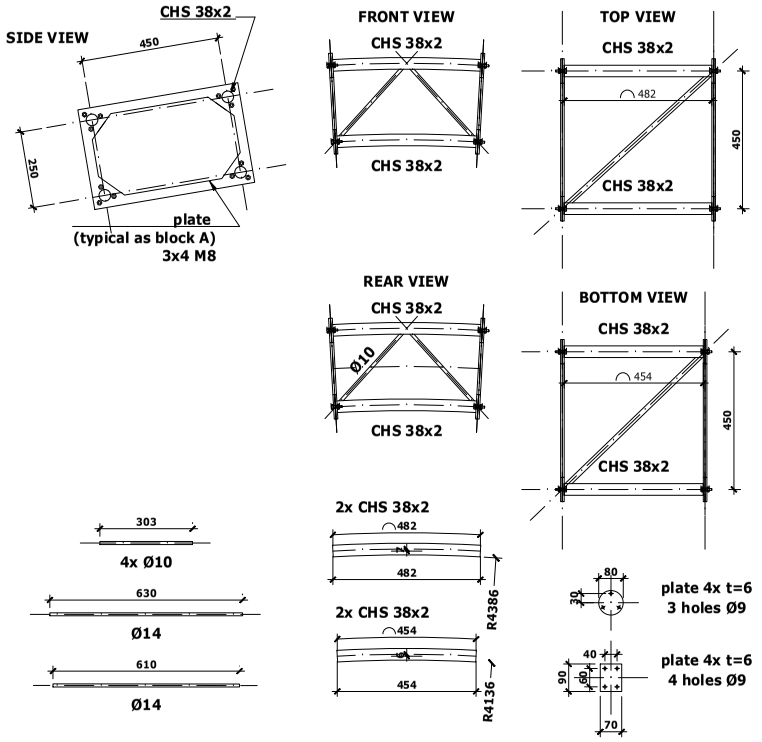
SECTION C-C
scale 1:20

DRAWN	F.Noto	PROJECT	Gelati Monastery Main Dome Mosaic Restoration
CHECKED	M.Musano		
APPROVED	R.Nardi	TITLE	SIDE SECTION C-C
ISSUED	nov. 2025		
REVISION	2	SCALE 1:20 / SIZE A2 / SHT 1 / DRAWING S4	

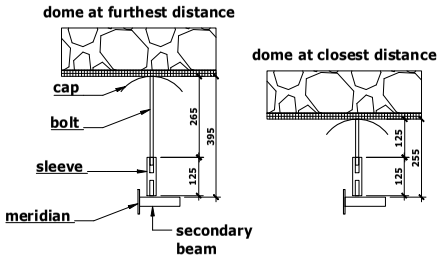
CENTRO DI CONSERVAZIONE ARCHEOLOGICA


arch block type A (nr. 8 units)
scale 1:10
main arch block types
type B
type A
type A
type A
type A
type C
SECTION
CHS 38x2
450
250
plate (typical)
3x4 M8
330
250
450
530
plate t=6
3x4 holes Ø9
304
12x Ø10
630
3x Ø14
610
3x Ø14
FRONT VIEW
CHS 38x2
Ø10
CHS 38x2
REAR VIEW
CHS 38x2
Ø10
CHS 38x2
2x CHS 38x2
1471
61
1464
R4386
2x CHS 38x2
1387
58
1380
R4136
TOP VIEW
CHS 38x2
1471
Ø14
CHS 38x2
450
BOTTOM VIEW
CHS 38x2
1387
CHS 38x2
450
block arch type B (nr. 2 units)
scale 1:10
2x CHS 38x2
480
7
480
R4386
2x CHS 38x2
452
6
451
R4136
link to main plate
CHS 38x2
link to block type A
link to ring
1
plate 2x t=6
4 holes Ø9
plate 2x t=6
4 holes Ø9
SIDE VIEW (internal)
CHS 38x2 plate
(typical as block A)
450
CHS 38x2
CHS 38x2
CHS 38x2
CHS 38x2
4x CHS 38x2
250
450
Ø38
4x CHS 38x2
TOP VIEW
CHS 38x2
CHS 38x2
CHS 38x2
CHS 38x2
450
DRAWN F.Noto
CHECKED M.Musano
APPROVED R.Nardi
ISSUED nov. 2025
REVISION 2
PROJECT
Gelati Monastery Main Dome Mosaic Restoration
TITLE
ARCH BLOCK TYPE A & B
SCALE 1:10
SIZE A2
SHT 1
DRAWING S5

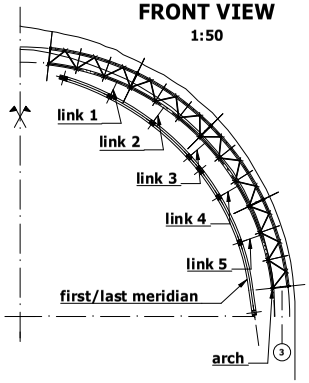
arch block type C (nr. 2 units)
scale 1:10



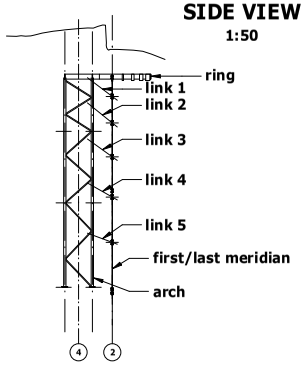
mosaic props
scale 1:10



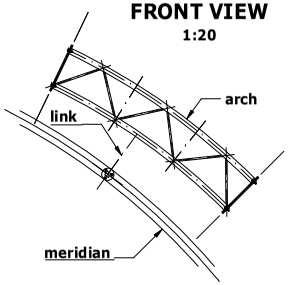
FRONT VIEW
1:50



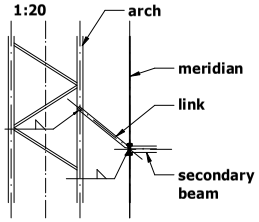
SIDE VIEW
1:50



FRONT VIEW
1:20

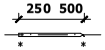


SIDE VIEW
1:20



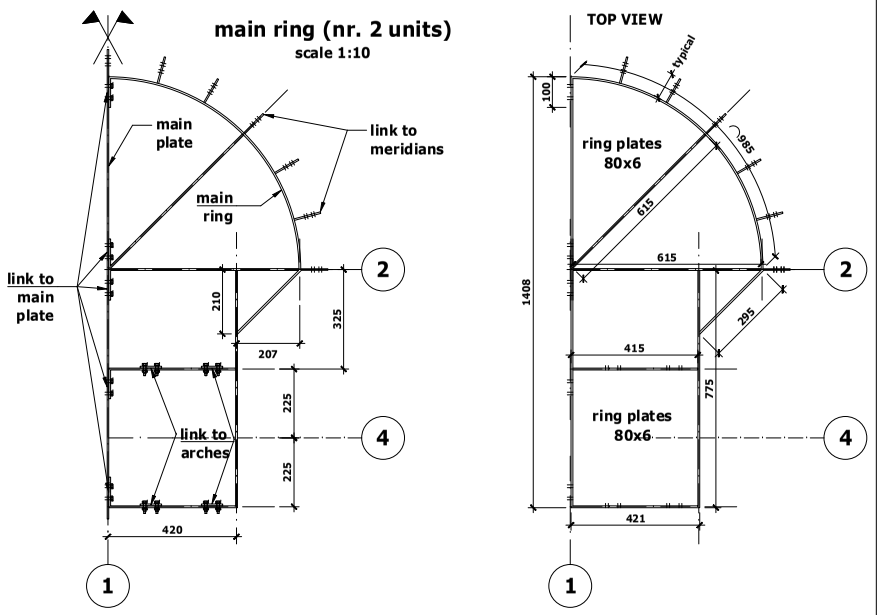
link arch/secondary beams
(nr. 2x5 units)

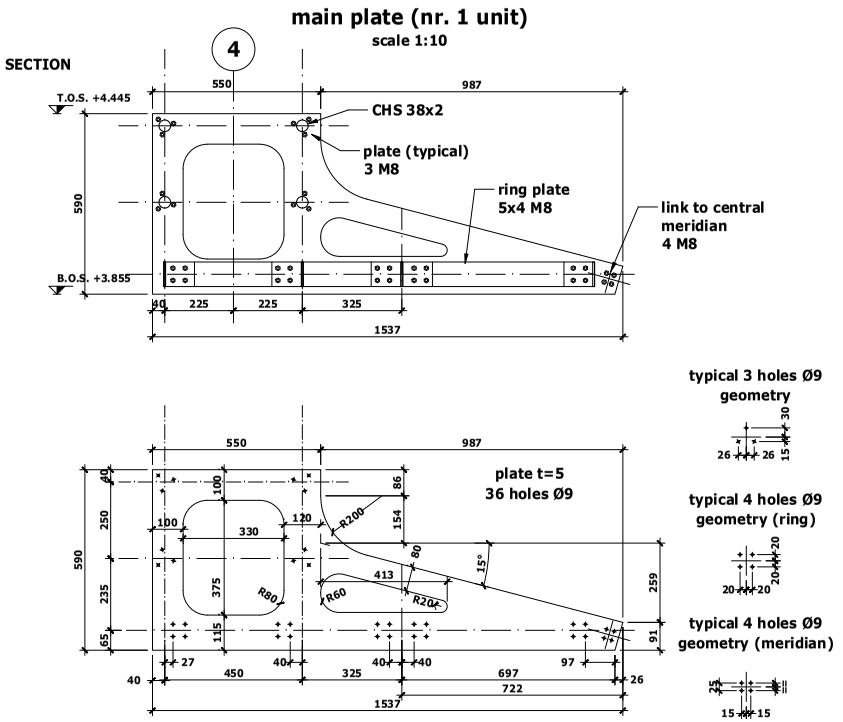
link CHS 21.3x1.4



* note: cut length and skewed bent to be adapted on site

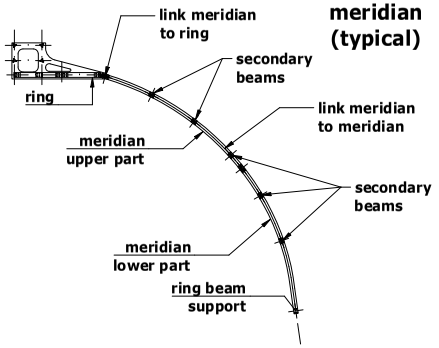
DRAWN F.Noto	PROJECT Gelati Monastery Main Dome Mosaic Restoration				
CHECKED M.Musano					
APPROVED R.Nardi	TITLE ARCH BLOCK TYPE C AND ARCH LINKS				
ISSUED nov. 2025					
REVISION 2	SCALE 1:10	SIZE A2	SHT 1	DRAWING	S6



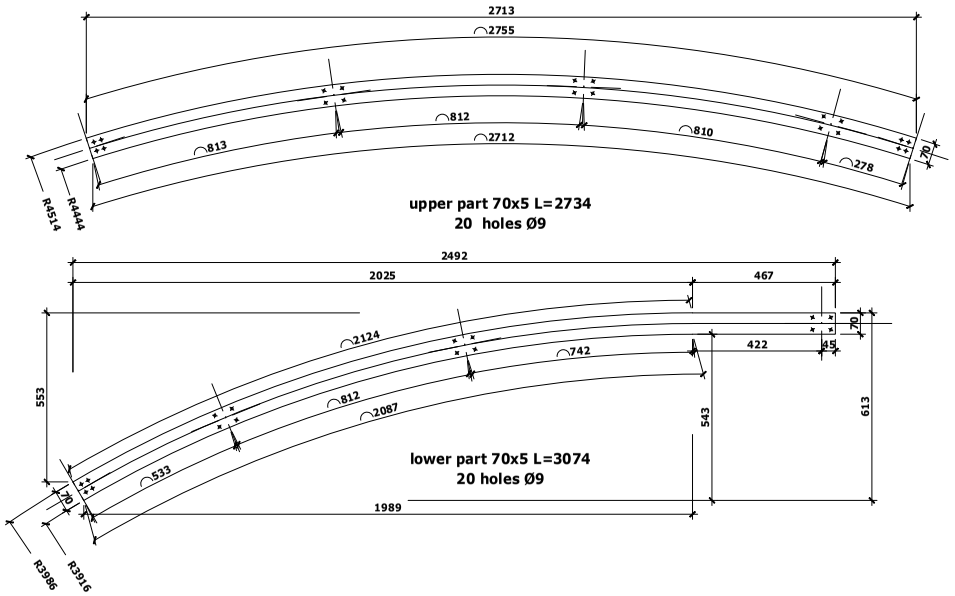


DRAWN	F.Noto	PROJECT	Gelati Monastery Main Dome Mosaic Restoration
CHECKED	M.Musano		
APPROVED	R.Nardi	TITLE	MAIN RING WITH PLATE DETAILS
ISSUED	nov. 2025		
REVISION	2	SCALE 1:10 · SIZE A2 · SHT 1 · DRAWING S7	

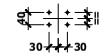
meridian (typical)



meridians (nr. 13 units)
scale 1:10



typical 4 holes Ø9 geometry (secondary beams)



typical 4 holes Ø9 geometry

plate (typical) 8 M8

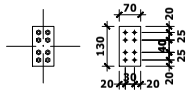


plate 6x t=5
8 holes Ø9

secondary beams
scale 1:10

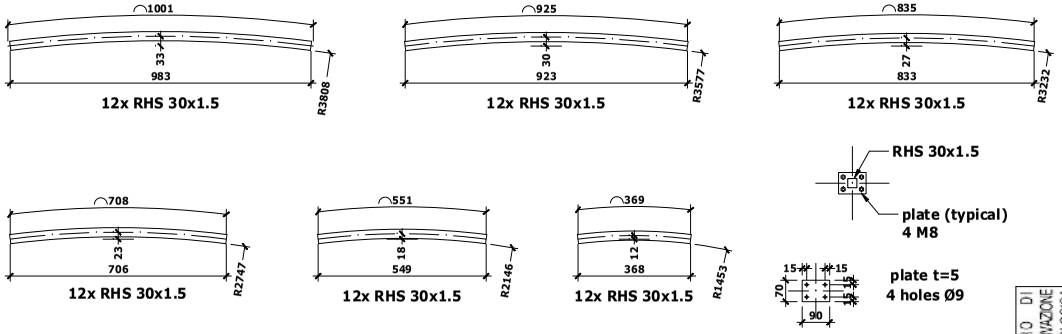
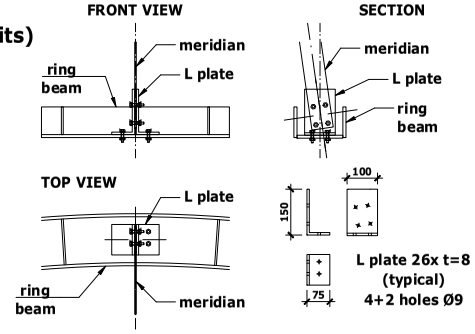


plate t=5
4 holes Ø9

meridians support (nr. 13 units)
scale 1:10



L plate 26x t=8
(typical)
4+2 holes Ø9

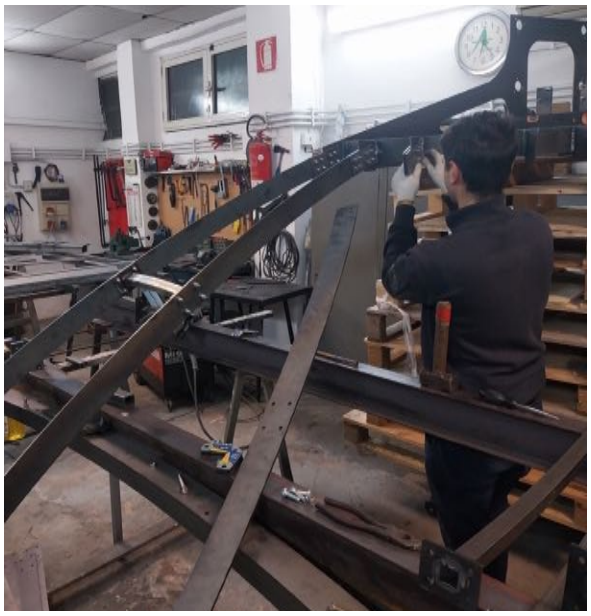
CENTRO DI CONSERVAZIONE ARCHEOLOGICA

DRAWN	F.Noto	PROJECT	Gelati Monastery Main Dome Mosaic Restoration		
CHECKED	M.Musano				
APPROVED	R.Nardi	TITLE	MERIDIANS AND SECONDARY BEAMS DETAILS		
ISSUED	nov. 2025				
REVISION	2	SCALE 1:10	SIZE A2	SHT 1	DRAWING S8


benq


metra

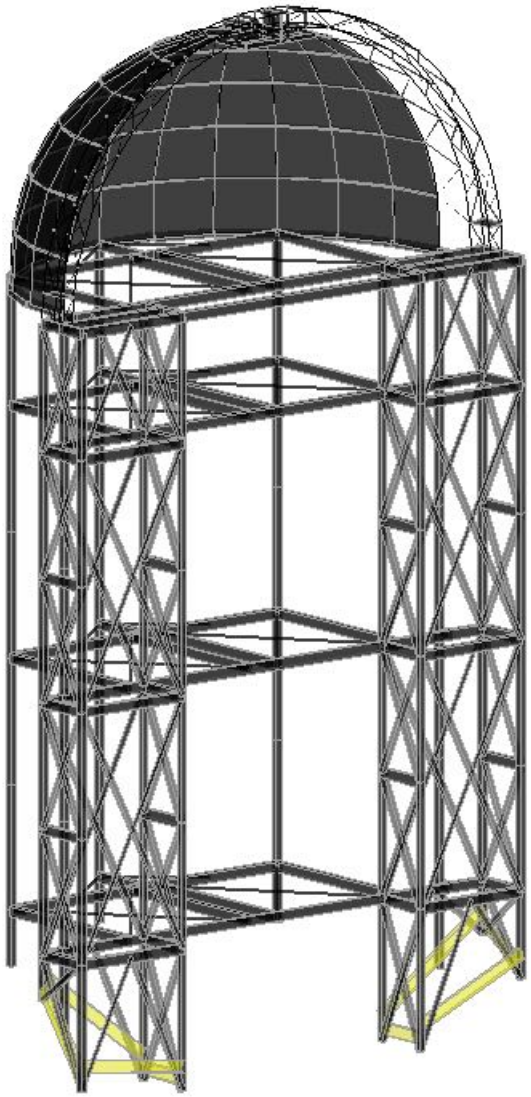

Galaxy A23 5G



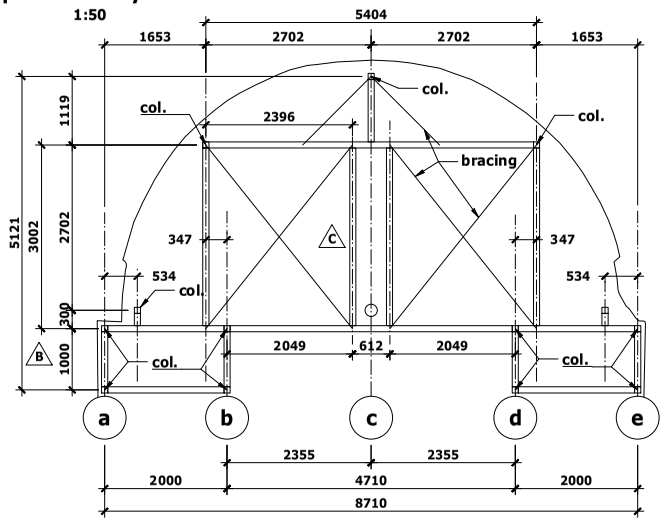

10
10
10
10
10
10

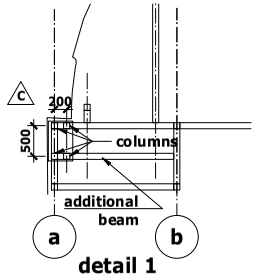
The foundation of the protective structure

In order to be more efficient the manufacturing of the foundation of the upper structure (lower structure) was assigned to the responsibility of arch. Vakhtang Zesashvili for the supervision and to Ltd MM GROUP (Tblisi) for the actual realization and for the mounting in place. The mounting process also included external workers under the supervision of arch. Vakhtang Zesashvili. This team worked in application of drawings produced by Michele Musano and Fabrizio Noto, the same engineers who designed the upper structure. The foundation components have been produced on January 2026. The construction on site was completed on February 2026.

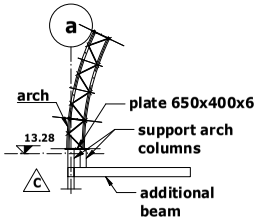


plan view layout
1:50





detail 1
plan view level 13.28
1:50



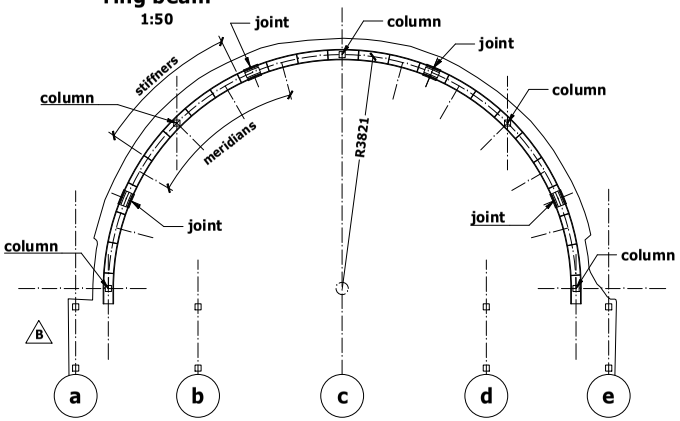
detail 1
section
1:50

GENERAL NOTES
- all dimensions are in mm unless noted otherwise
- all levels are in metres unless noted otherwise and relate to dome base

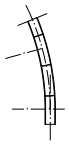
- steelwork grade S235
- bolt grade 8.8
- fillet welds z 0.7 t_{min} unless noted otherwise

ELEMENT SIZING (DRAFT)
- columns SHS 100x3mm
- beams RHS 160x80x3mm
- vertical bracing L80x80x6
- horizontal bracing CHS 50x2mm

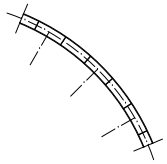
plan view ring beam
1:50



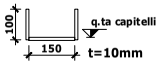
ring beam block type a (nr. 2 units)
1:50



ring beam block type b (nr. 4 units)
1:50



ring beam section
1:10



DRAWN	F.Noto	PROJECT	Gelati Monastery Main Dome Mosaic Restoration		
CHECKED	M.Musano				
APPROVED	R.Nardi	TITLE	SCAFFOLDING LAYOUT FOR DOME SKELTON 1/2		
ISSUED	nov. 2025				
REVISION	C	SCALE var.	SIZE A2	SHT 1	DRAWING X1

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

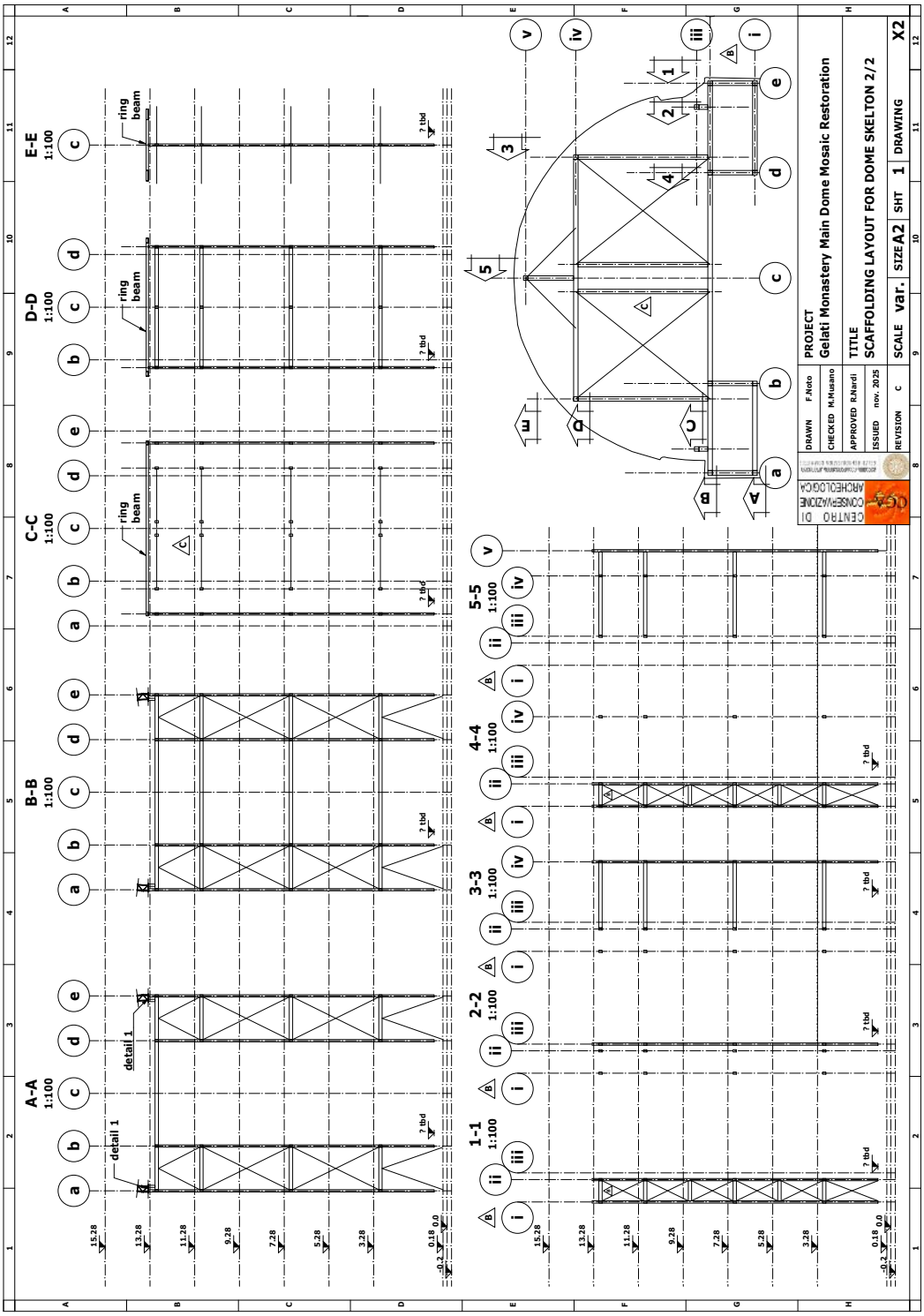
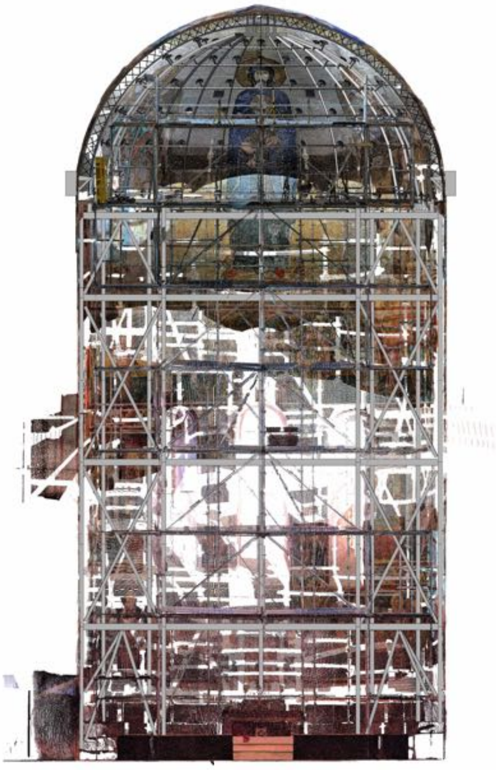


Figure 15– Column



შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN DOME MOSAIC RESTORATION

შემსრულებელი :
VI სტუდიო (405244025)
ბელინსკის 5, თბილისი
INFO@VISTUDIO.GE

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5 BELINSKI ST, TBILISI
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CHECKED :
M. MUSANO

APPROVED:
R. NARDI

სათაური:
თავფურცელი / COVER

დაფა:
A 001

თარიღი:
ISSUE DATE

მასშტაბი:

14.01.2026 11:44:42

სარჩევი / SHEET INDEX

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შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN DOME MOSAIC RESTORATION

შემსრულებელი :
VI სტუდიო (405244025)
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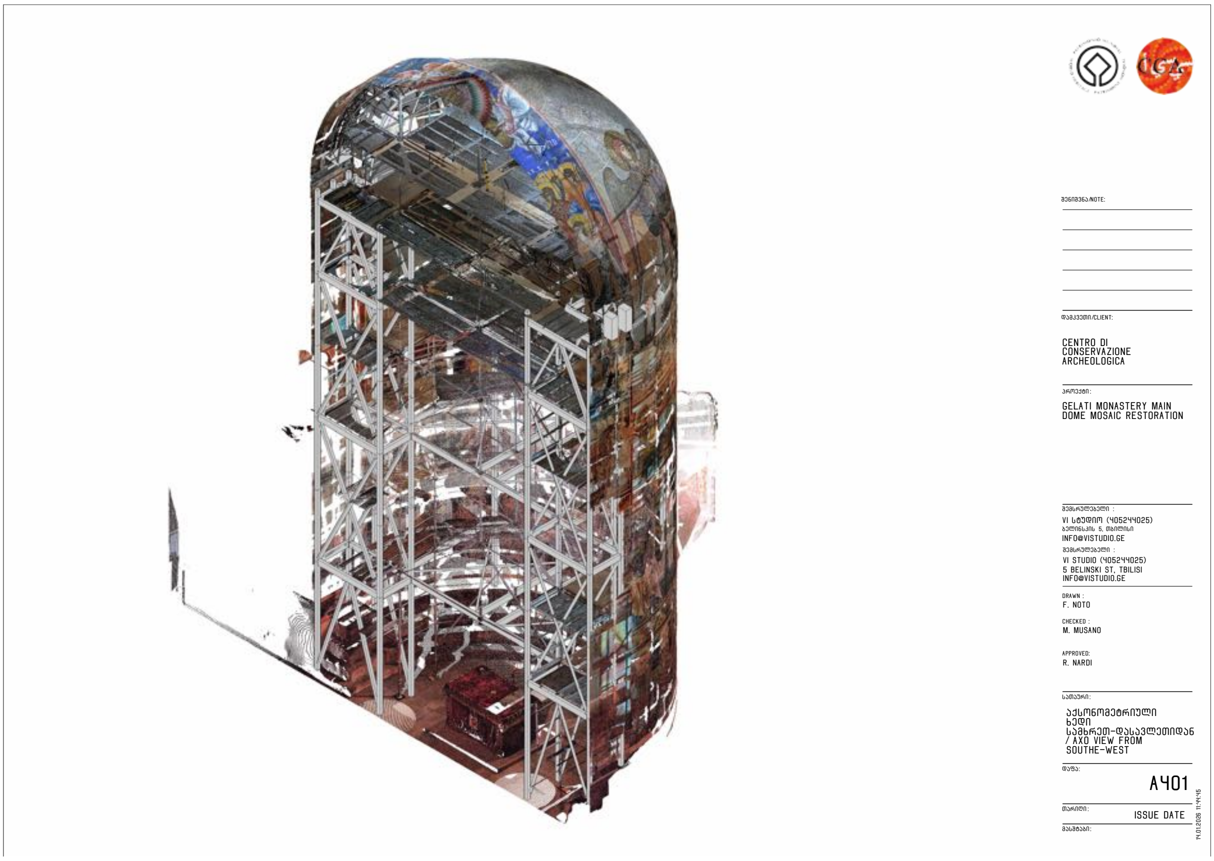
სათაური:
სარჩევი / SHEET INDEX

დაფა:
A 002

თარიღი:
ISSUE DATE

მასშტაბი:

14.01.2026 11:44:42


შენიშვნა/NOTE:
დამკვეთი/CLIENT:
CENTRO DI CONSERVAZIONE ARCHEOLOGICA
პროექტი:
GELATI MONASTERY MAIN DOME MOSAIC RESTORATION
შემსრულებელი :
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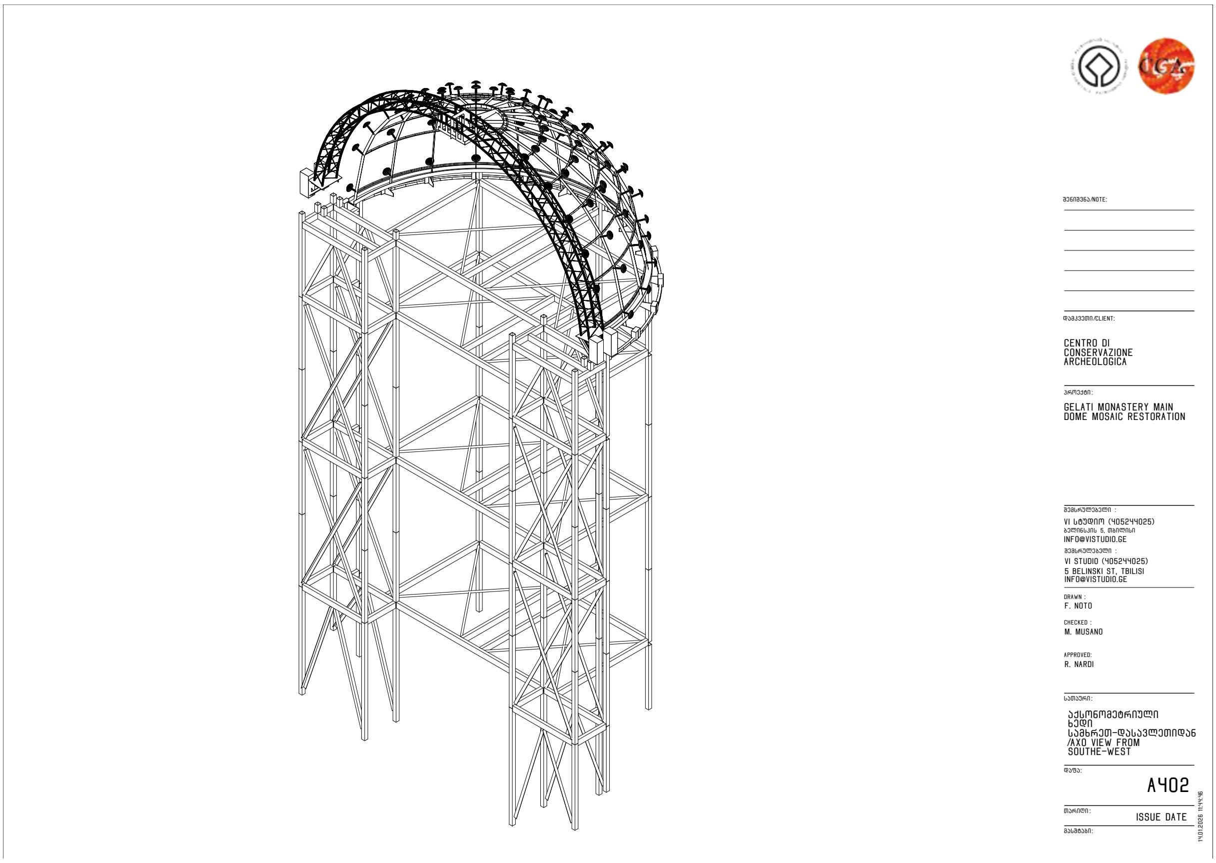
APPROVED:
R. NARDI
სათაური:
აქსონომეტრიული ხედი სამხრეთ-დასავლეთიდან / AXO VIEW FROM SOUTHE-WEST
დაფა:
A401
თარიღი:
ISSUE DATE
მასშტაბი:
14.01.2026 11:44:45


შენიშვნა/NOTE:
დამკვეთი/CLIENT:
CENTRO DI CONSERVAZIONE ARCHEOLOGICA
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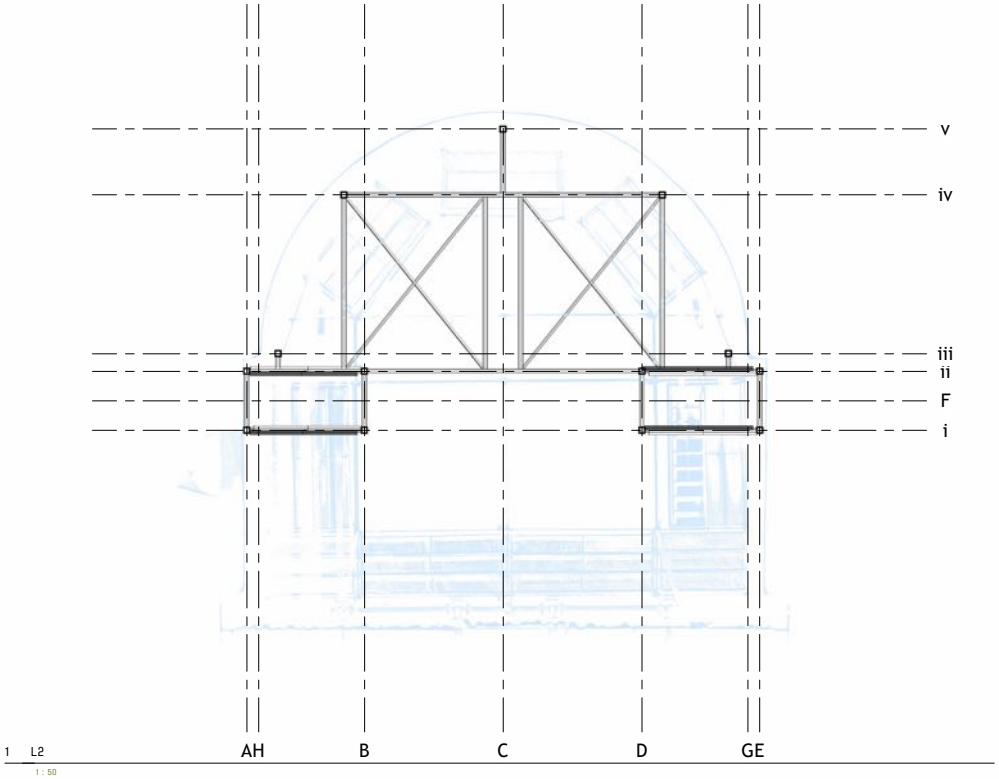
აქსონომეტრიული ხედი სამხრეთ-დასავლეთიდან /AXO VIEW FROM SOUTHE-WEST
დაფა:
A402
თარიღი:
ISSUE DATE
მასშტაბი:
14.01.2026 11:44:46



შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN DOME MOSAIC RESTORATION

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ნახაზის:

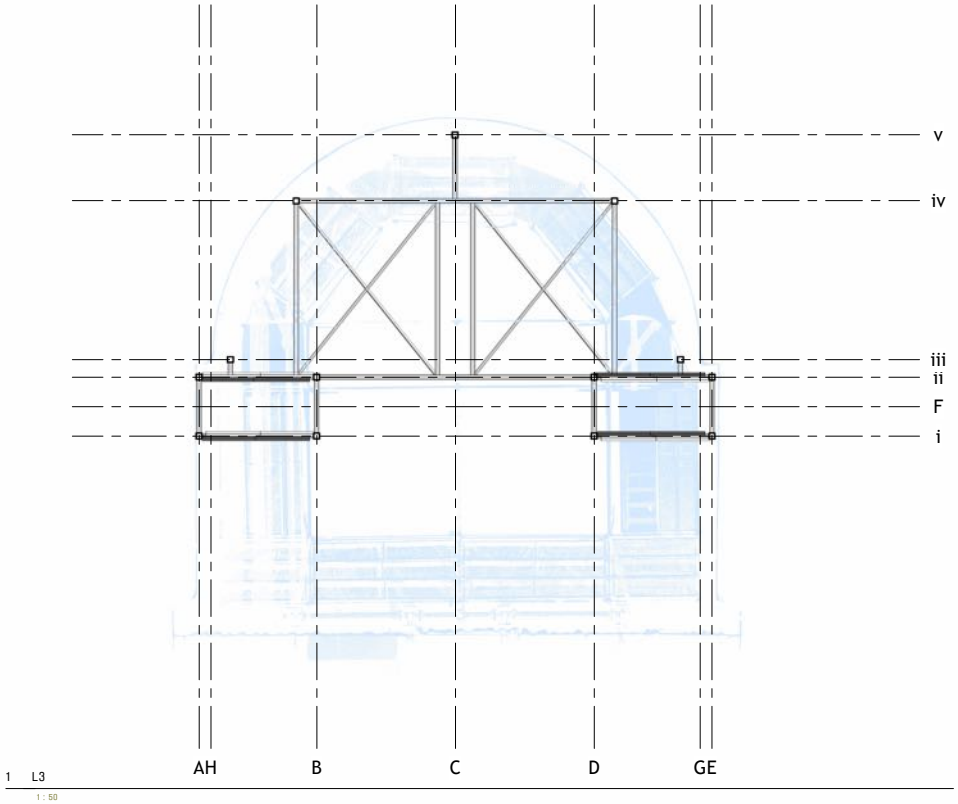
ხარაჩოს გეგმა - L2 / SCAFFOLDING PLAN L2

ფურც:

S102

თარიღი: ISSUE DATE

მასშტაბი: 1 : 50



შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN DOME MOSAIC RESTORATION

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R. NARDI

ნახაზის:

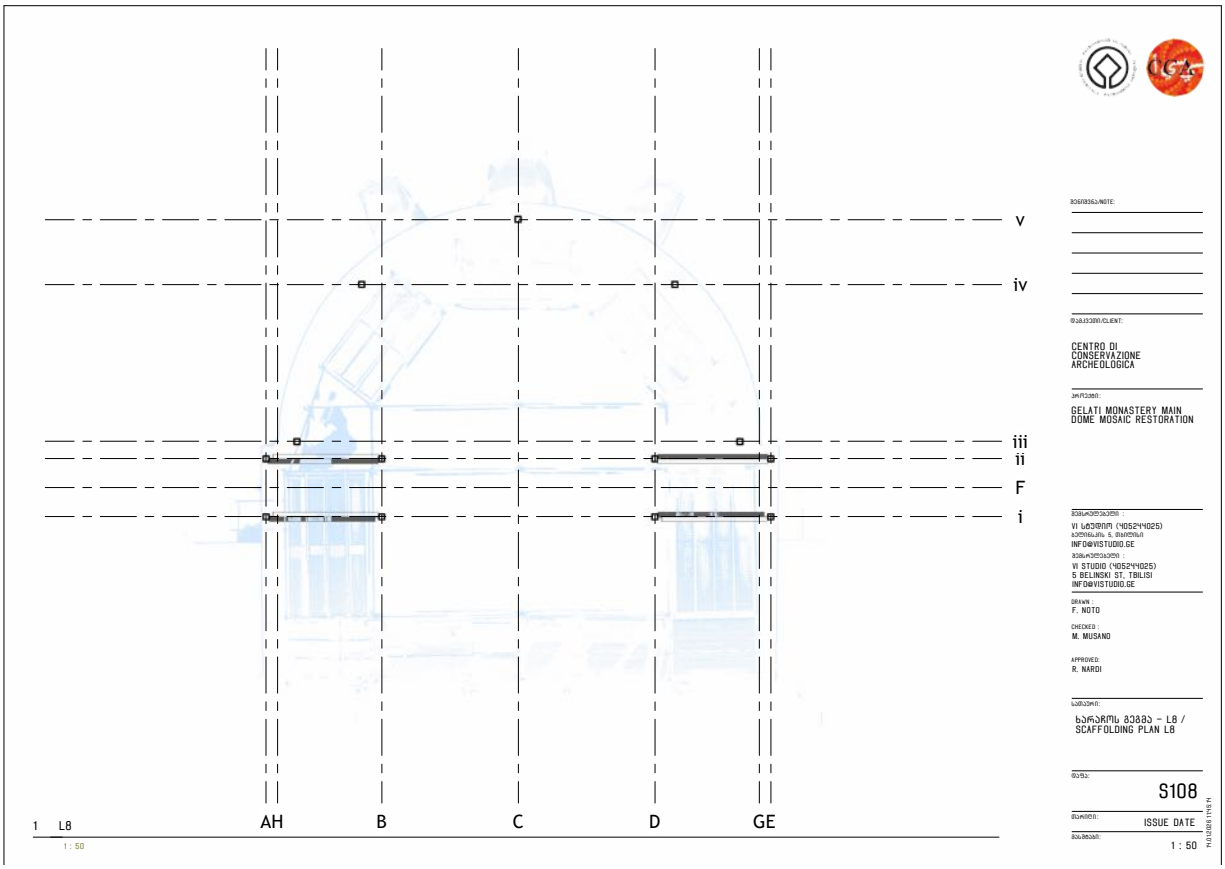
ხარაჩოს გეგმა - L3 / SCAFFOLDING PLAN L3

ფურც:

S103

თარიღი: ISSUE DATE

მასშტაბი: 1 : 50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CENTRO DI
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ARCHEOLOGICA
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DOME MOSAIC RESTORATION
VI STUDIO (+995244025)
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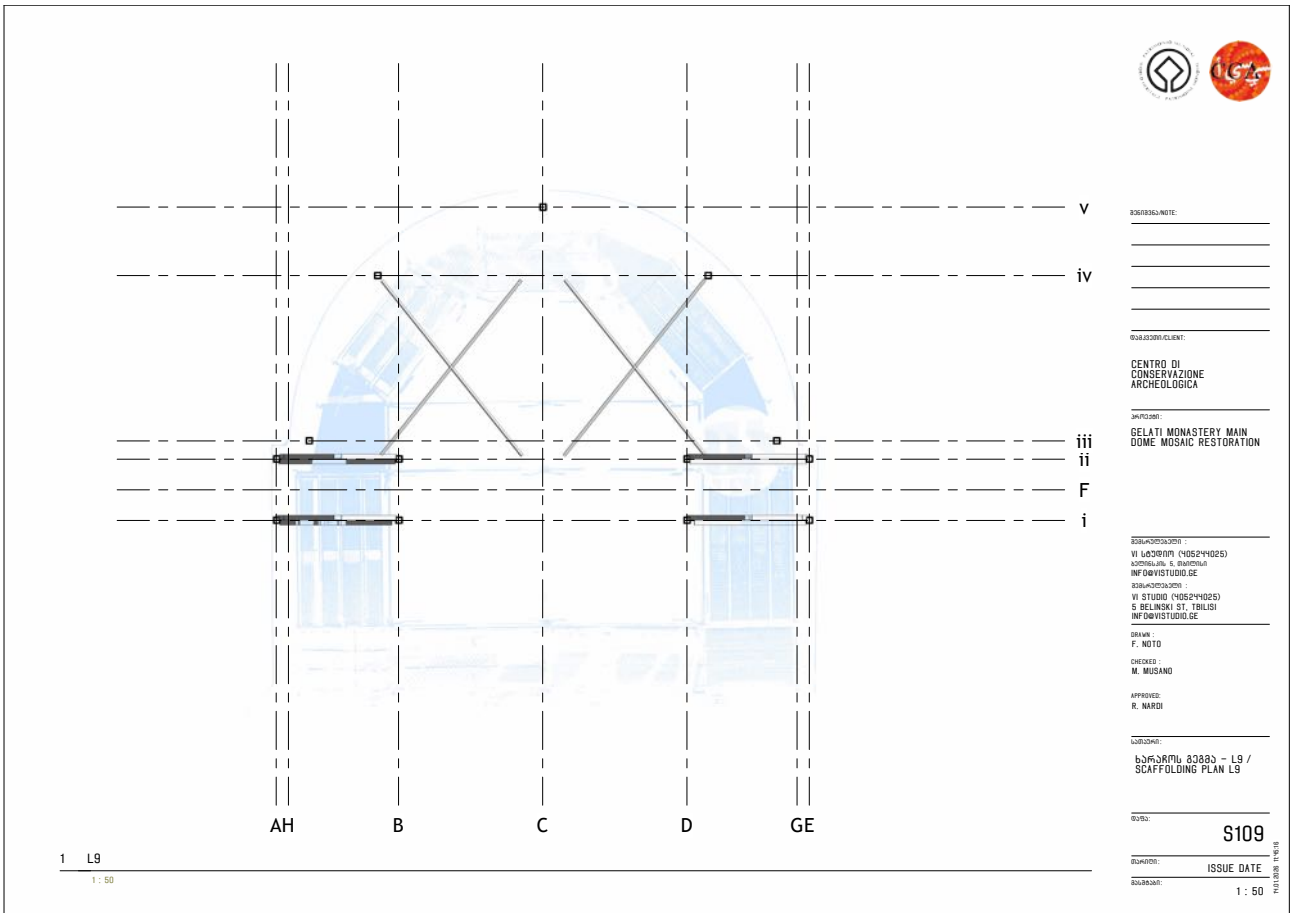
F. NOTO
M. MUSANO
R. NARDI
S108
ISSUE DATE
1 : 50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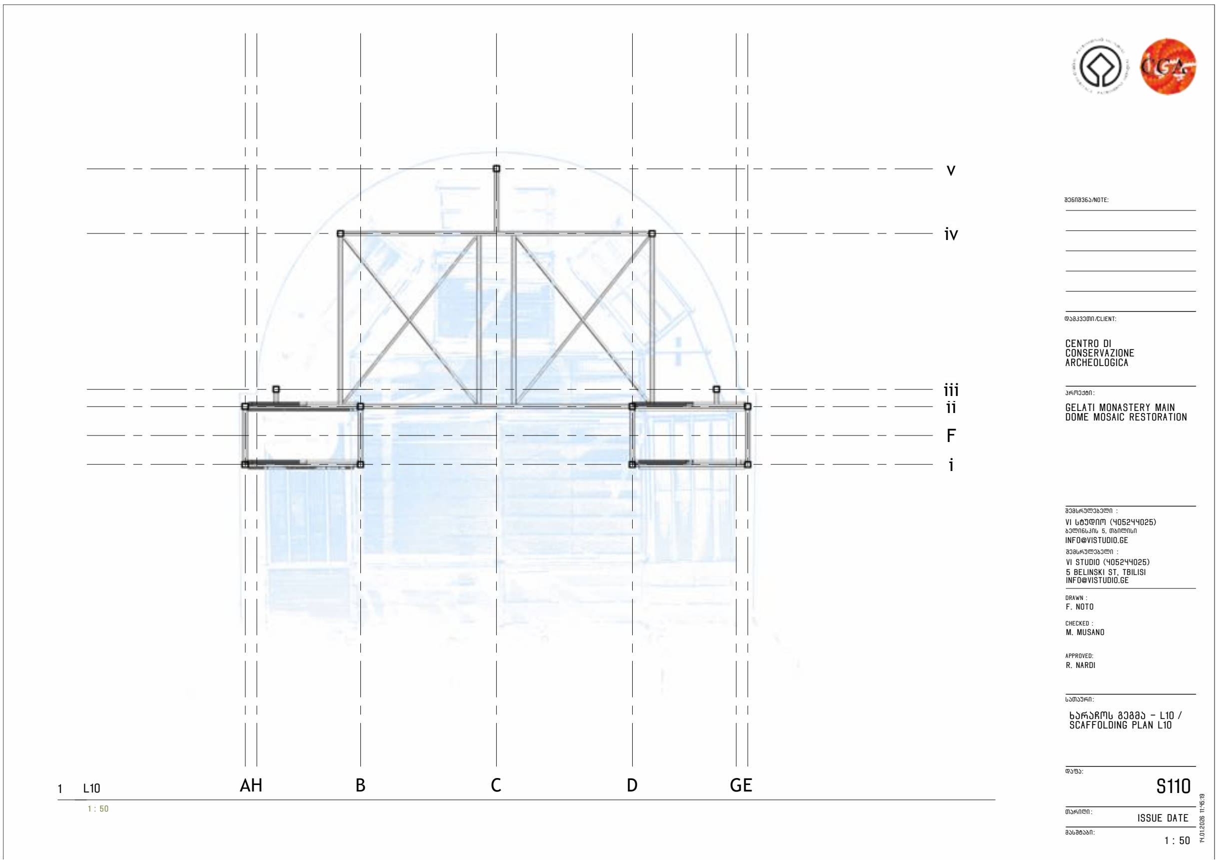
CENTRO DI
CONSERVAZIONE
ARCHEOLOGICA
GELATI MONASTERY MAIN
DOME MOSAIC RESTORATION
VI STUDIO (+995244025)
5 BELINSKI ST, TBILISI
INFO@VISTUDIO.GE
F. NOTO
M. MUSANO
R. NARDI
S109
ISSUE DATE
1 : 50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შენიშვნა/NOTE:
დამკვეთი/CLIENT:
CENTRO DI CONSERVAZIONE ARCHEOLOGICA
პროექტი:
GELATI MONASTERY MAIN DOME MOSAIC RESTORATION
შემსრულებელი :
ვი სტუდიო (405244025)
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F. NOTO
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M. MUSANO
APPROVED:
R. NARDI
სათაური:
ხარაჩოს გეგმა – L10 / SCAFFOLDING PLAN L10
დაფა:
S110
თარიღი:
ISSUE DATE
მასშტაბი:
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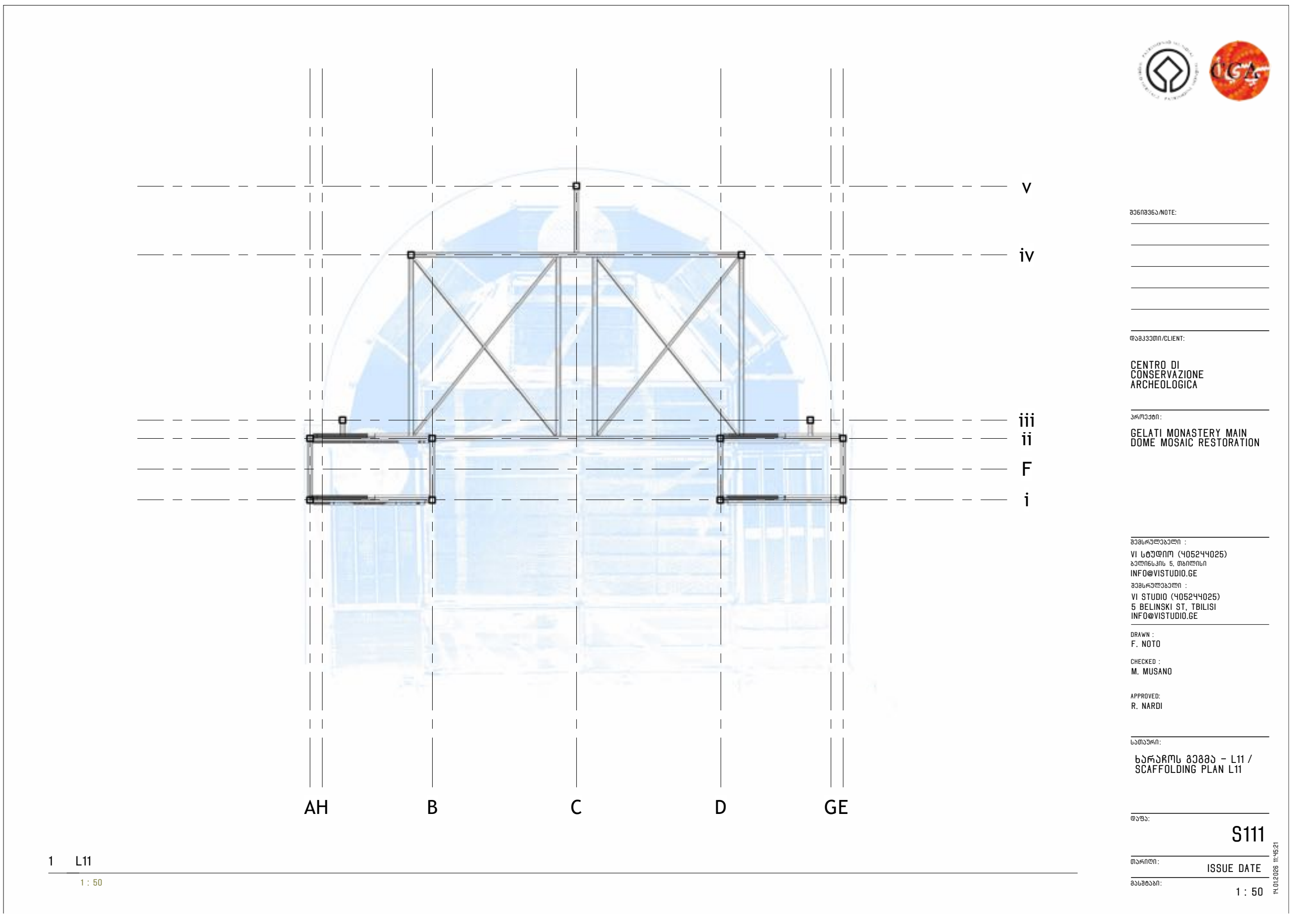
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1 : 50
შენიშვნა/NOTE:
დამკვეთი/CLIENT:
CENTRO DI CONSERVAZIONE ARCHEOLOGICA
პროექტი:
GELATI MONASTERY MAIN DOME MOSAIC RESTORATION
შემსრულებელი :
ვი სტუდიო (405244025)
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F. NOTO
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M. MUSANO
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R. NARDI
სათაური:
ხარაჩოს გეგმა – L11 / SCAFFOLDING PLAN L11
დაფა:
S111
თარიღი:
ISSUE DATE
მასშტაბი:
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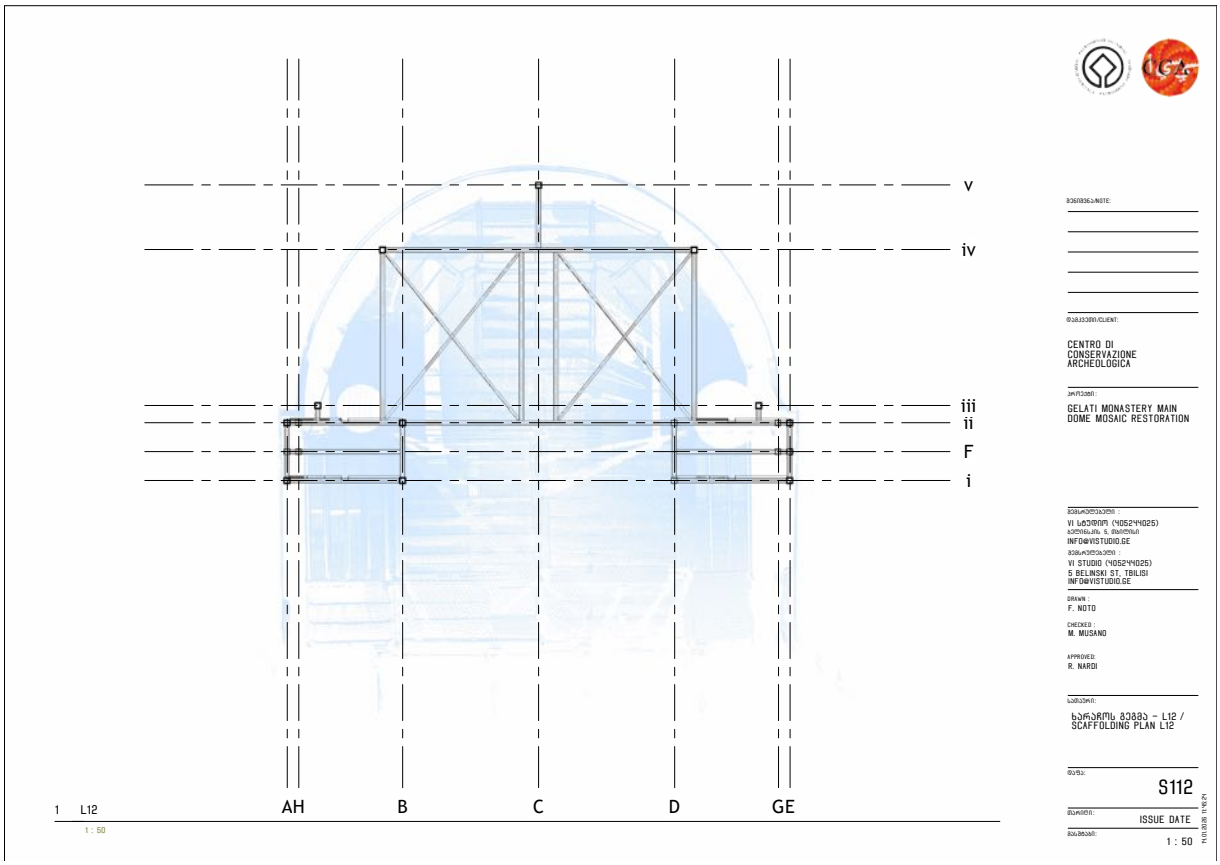
v
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CENTRO DI
CONSERVAZIONE
ARCHEOLOGICA
GELATI MONASTERY MAIN
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R. NARDI
ხარაჯრომს გეგმა – L12 /
SCAFFOLDING PLAN L12
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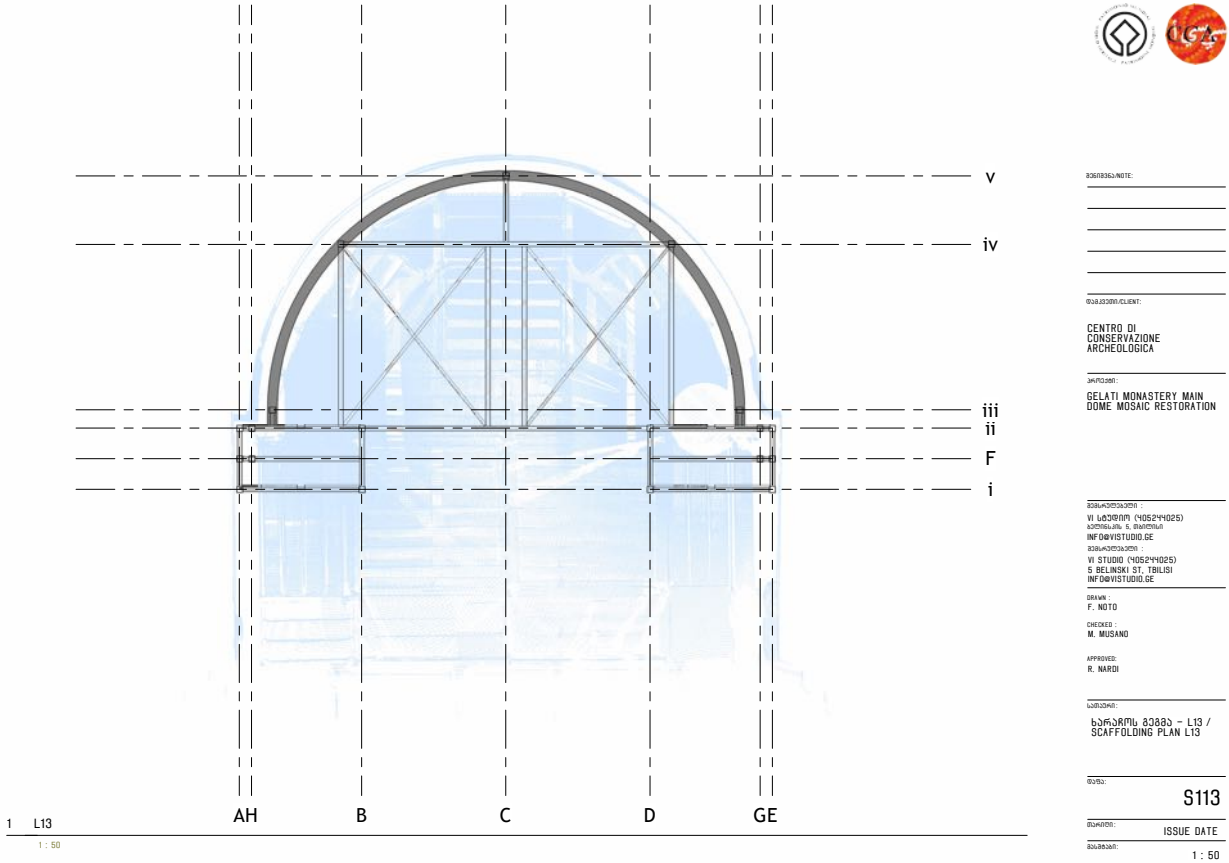
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CENTRO DI
CONSERVAZIONE
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M. MUSANO
R. NARDI
ხარაჯრომს გეგმა – L13 /
SCAFFOLDING PLAN L13
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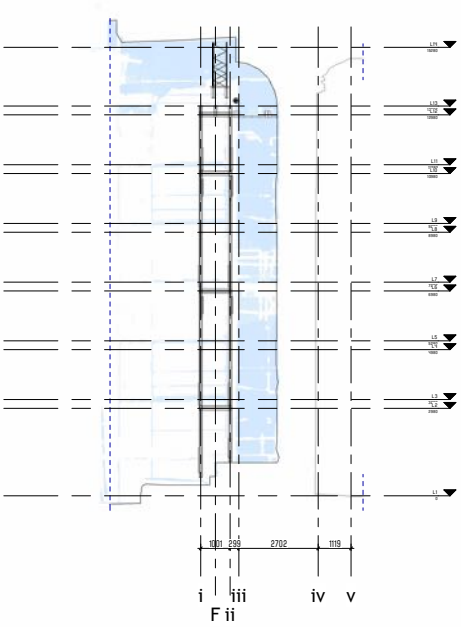
1 : 50



შენიშვნა/NOTE:

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CENTRO DI
CONSERVAZIONE
ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN
DOME MOSAIC RESTORATION

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ნახაზი:

ჭრილი 1-1 / SECTION 1-1

ფურც:

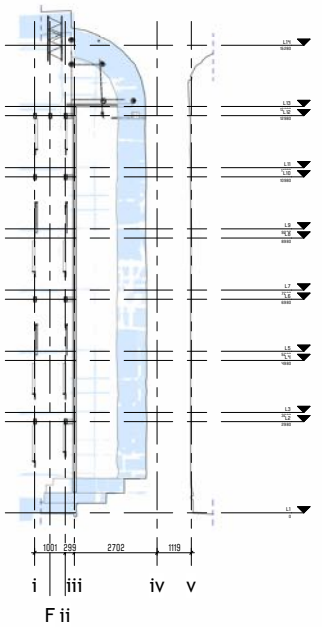
A301

თარიღი:

ISSUE DATE

მასშტაბი:

1 : 100



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CENTRO DI
CONSERVAZIONE
ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN
DOME MOSAIC RESTORATION

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ნახაზი:

ჭრილი 2-2 / SECTION 2-2

ფურც:

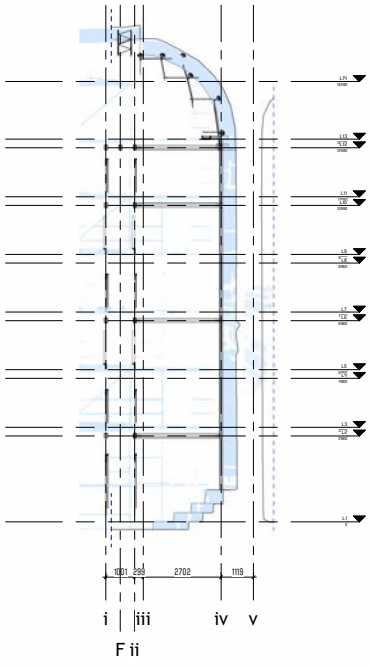
A302

თარიღი:

ISSUE DATE

მასშტაბი:

1 : 100



შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN DOME MOSAIC RESTORATION

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ნახაზის:
ჭრილი 3-3 / SECTION 3-3

ფურც:
A303

თარიღი:
ISSUE DATE

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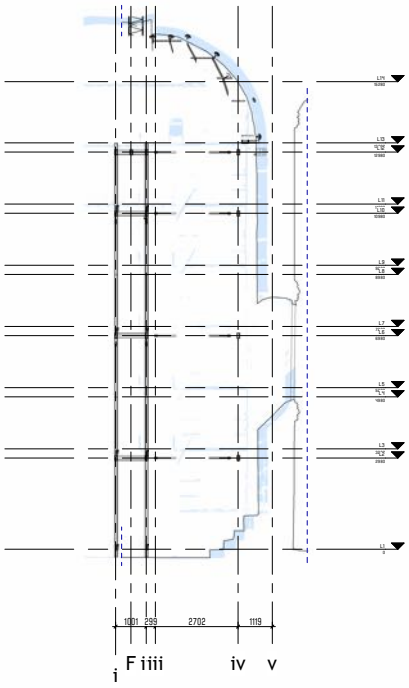

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CENTRO DI CONSERVAZIONE ARCHEOLOGICA

პროექტი:

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ნახაზის:
ჭრილი Ч-Ч / SECTION Ч-Ч

ფურც:
A304

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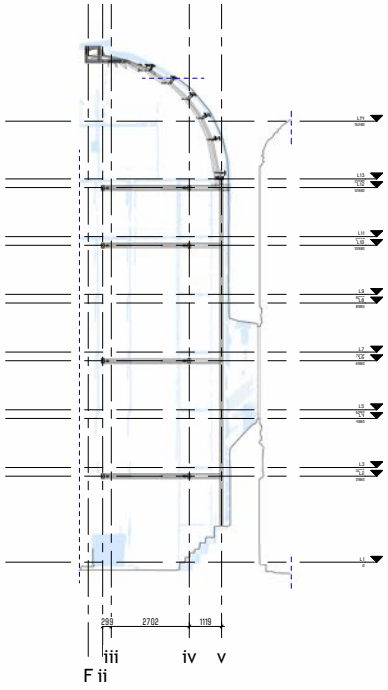

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ARCHEOLOGICA

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CHECKED :
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APPROVED:
R. NARDI

ჭრილი 5-5 / SECTION
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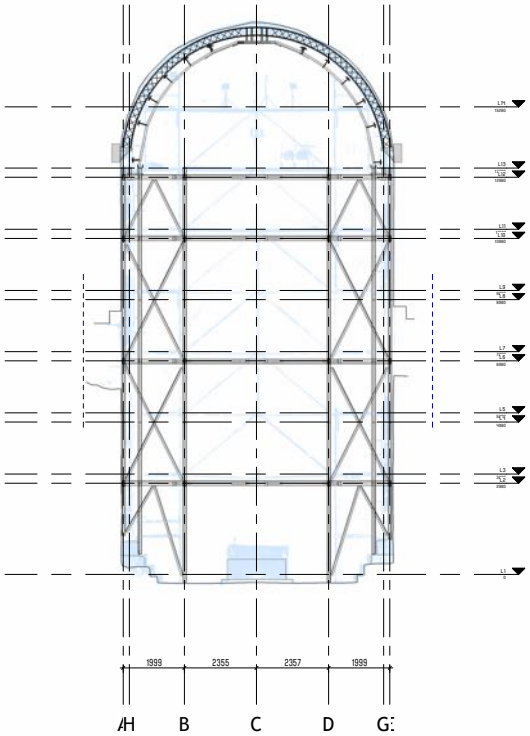
ISSUE DATE

1 : 100



CENTRO DI
CONSERVAZIONE
ARCHEOLOGICA

GELATI MONASTERY MAIN
DOME MOSAIC RESTORATION

VI STUDIO (+995 599 44 90 25)
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VI STUDIO (+995 599 44 90 25)
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DRAWN :
F. NOTO

CHECKED :
M. MUSANO

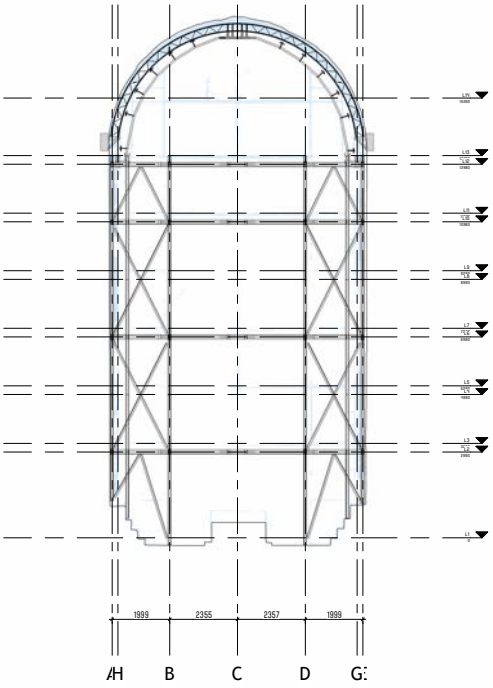
APPROVED:
R. NARDI

ჭრილი A-A / SECTION
A-A

A306

ISSUE DATE

1 : 100



შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI
CONSERVAZIONE
ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN
DOME MOSAIC RESTORATION

მთავარი არქიტექტორი :
VI სტუდიო (+995244025)
ბელინსკის ქ. 5, თბილისი
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M. MUSANO

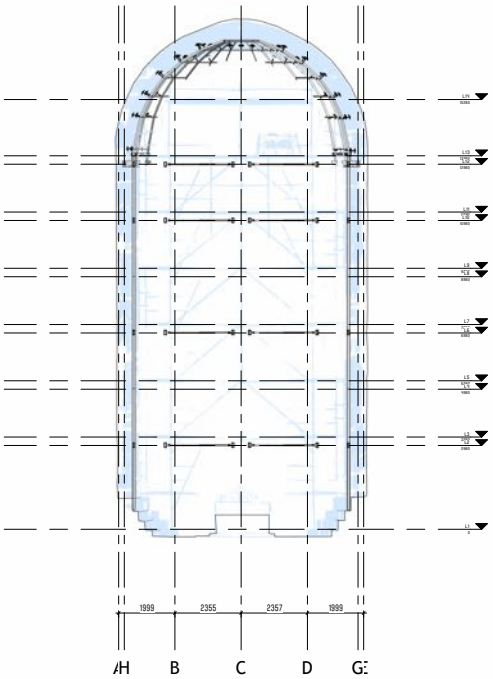
APPROVED:
R. NARDI

ნახაზის:
ჭრილი B-B / SECTION
B-B

ფურც:
A307

თარიღი:
ISSUE DATE

მასშტაბი:
1 : 100



შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI
CONSERVAZIONE
ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN
DOME MOSAIC RESTORATION

მთავარი არქიტექტორი :
VI სტუდიო (+995244025)
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VI STUDIO (+995244025)
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M. MUSANO

APPROVED:
R. NARDI

ნახაზის:
ჭრილი C-C / SECTION
C-C

ფურც:
A308

თარიღი:
ISSUE DATE

მასშტაბი:
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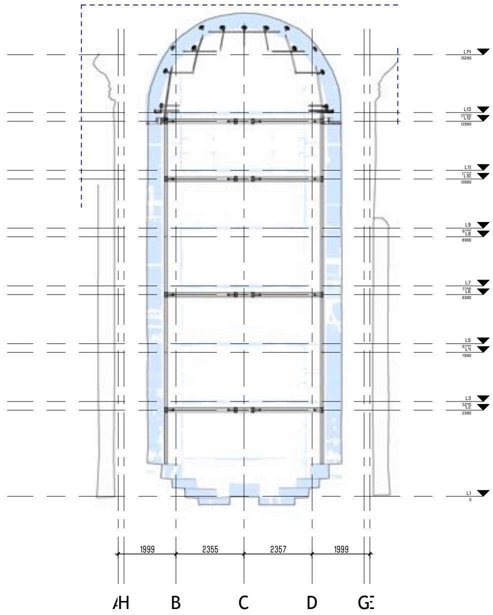

შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN DOME MOSAIC RESTORATION

შემსრულებელი :
VI სტუდიო (405244025)
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INFO@VISTUDIO.GE

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VI STUDIO (405244025)
5 BELINSKI ST, TBILISI
INFO@VISTUDIO.GE

DRAWN :
F. NOTO

CHECKED :
M. MUSANO

APPROVED:
R. NARDI

სათაური:

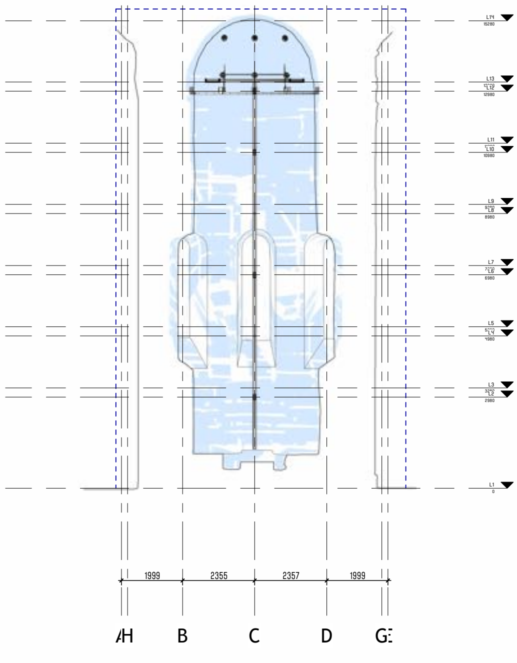
ჭრილი D–D / SECTION D–D

დაფა:
A309

თარიღი:
ISSUE DATE

მასშტაბი:
1 : 100

14.01.2026 11:45:52



შენიშვნა/NOTE:

დამკვეთი/CLIENT:

CENTRO DI CONSERVAZIONE ARCHEOLOGICA

პროექტი:

GELATI MONASTERY MAIN DOME MOSAIC RESTORATION

შემსრულებელი :
VI სტუდიო (405244025)
ბელინსკის 5, თბილისი
INFO@VISTUDIO.GE

შემსრულებელი :
VI STUDIO (405244025)
5 BELINSKI ST, TBILISI
INFO@VISTUDIO.GE

DRAWN :
F. NOTO

CHECKED :
M. MUSANO

APPROVED:
R. NARDI

სათაური:

ჭრილი E–E / SECTION E–E

დაფა:
A310

თარიღი:
ISSUE DATE

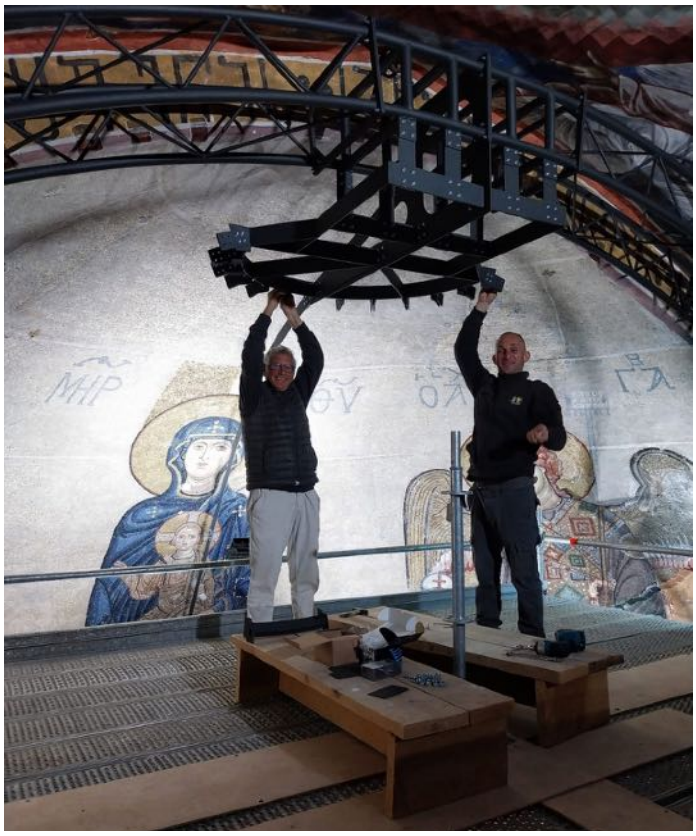
მასშტაბი:
1 : 100

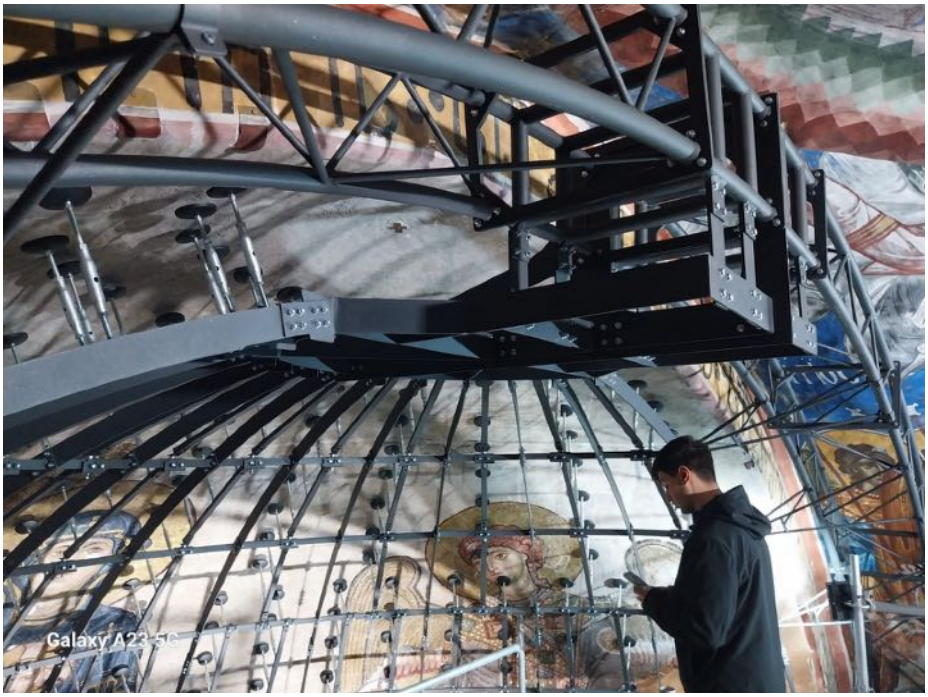
14.01.2026 11:45:55

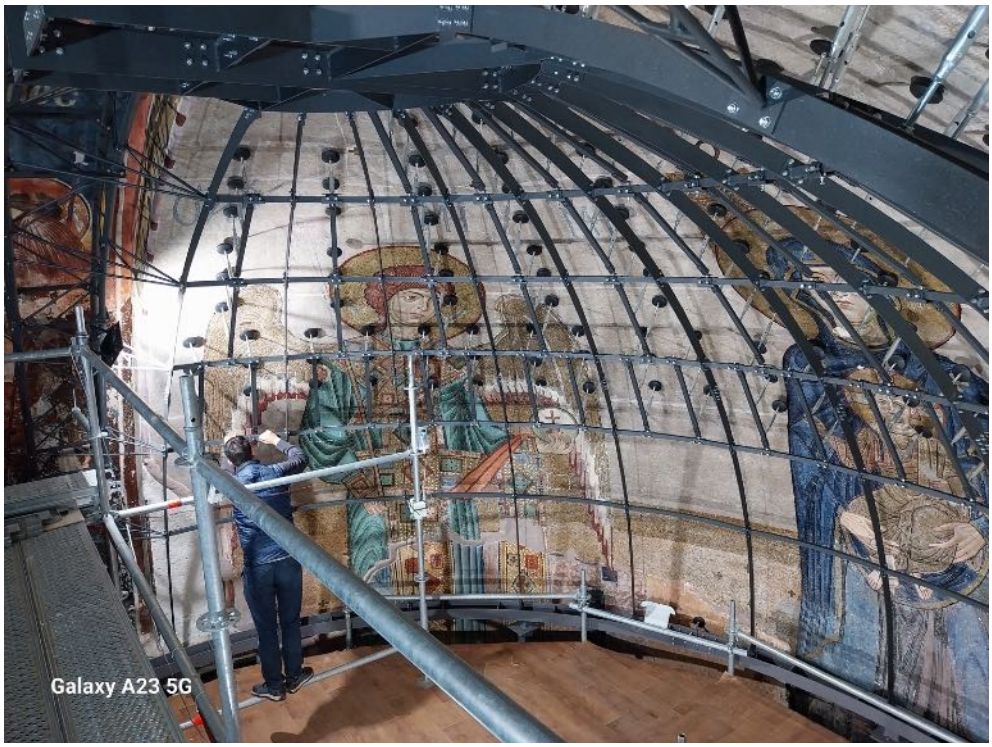
Upper structure. The assembling on site.

On March 13th, 2026, a group from CCA travelled to Gelati with the objective to assemble the upper structure. This group consisted of Roberto Nardi, Andreina Costanzi Cobau, Maria Elisa Cappelletto, Chiara Scaccia, Massimo Canale, Emanuele Canale and Costantin Pisaltu. Michele Musano and Fabrizio Noto assisted the operation from Rome.

The upper structure was already tested in Rome and a complete assembling process had been carried out. Therefore the assembling on site was carried out without problems or unplanned situations.






Galaxy A23 5G


Galaxy A23 5G

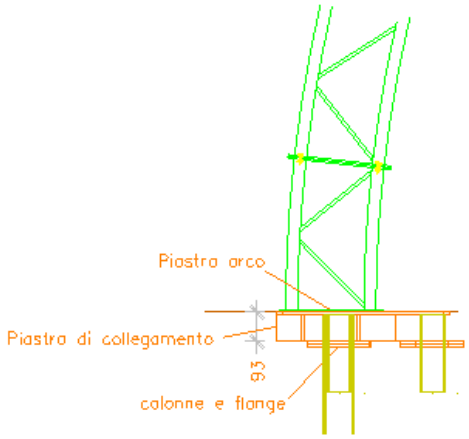

6
Galaxy A23 5G

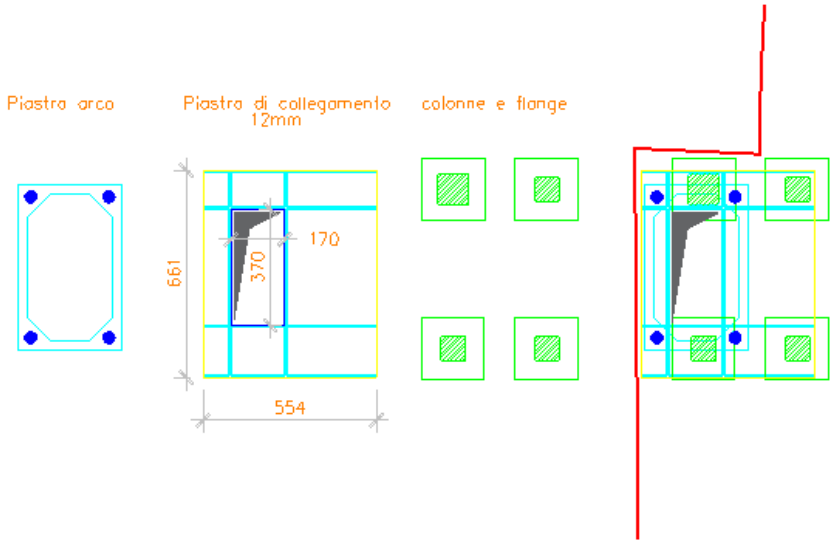

Galaxy A23 5G

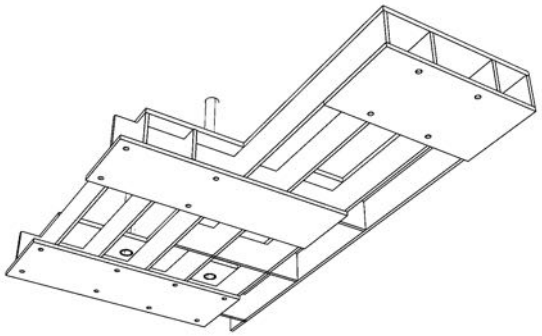

Galaxy A23 5G

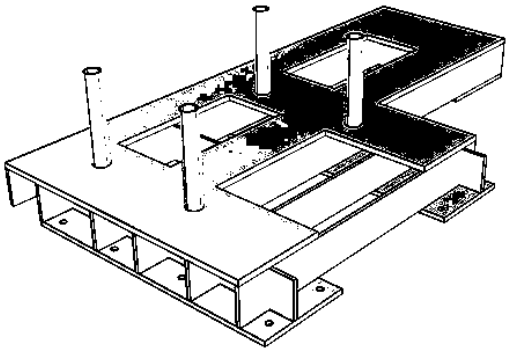
Upper and Lower structures

Due to minor differences in level and misalignment with the underlying structure, it was necessary to design some unplanned elements to correct the imperfections. One was made of two connecting plates to be installed between the bases of the arch of the upper structure and the foundation columns. The second is a series of bases for the pillars and some connecting steel elements to be installed between the pillars.
In order to dampen some minor vibrations in the structure, it was deemed useful to insert eight counterweights, with orthogonal thrust, between the foundation structure and the church walls. To accomplish this, four pairs of props were constructed, resting on the masonry using a rubber-lined aluminum bar. The counterweights were applied in areas where the wall decoration was in good condition and without figurative decorations. The modification worked perfectly and the assembly of the upper structure on the lower foundations was completed without further difficulties.

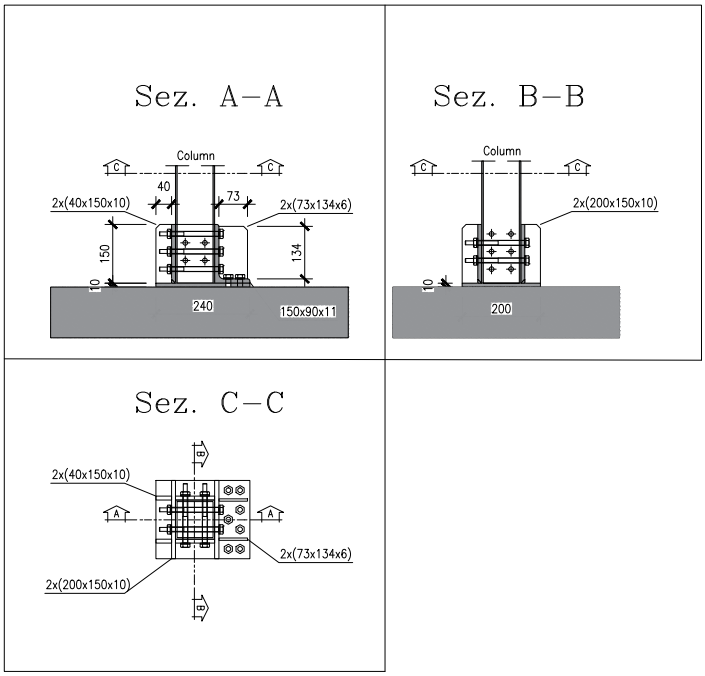


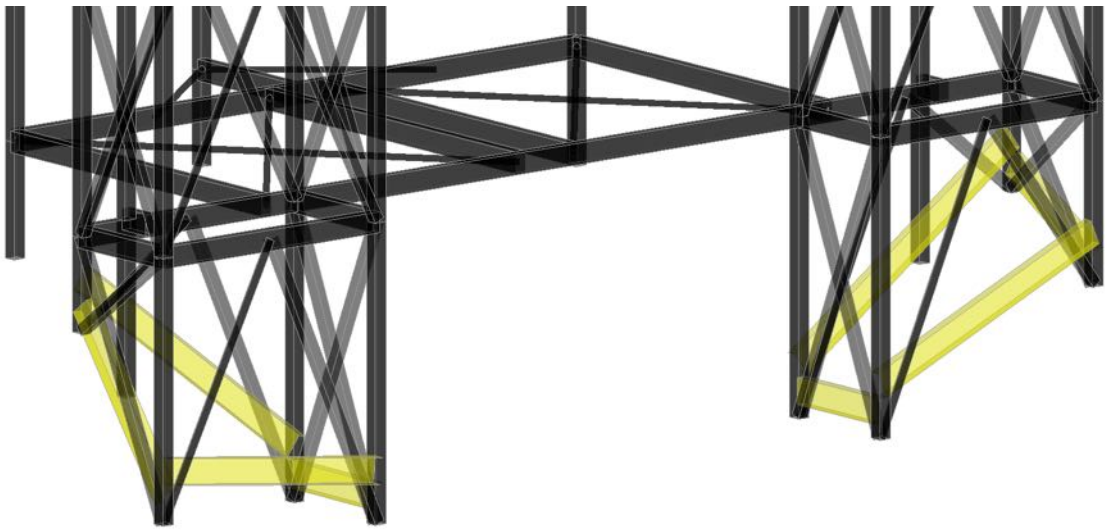






All columns


Sez. A–A
Column
C
C
40
73
2x(40x150x10)
2x(73x134x6)
150
134
10
240
150x90x11
Sez. B–B
Column
C
C
2x(200x150x10)
10
200
Sez. C–C
B
2x(40x150x10)
A
A
2x(73x134x6)
2x(200x150x10)
B

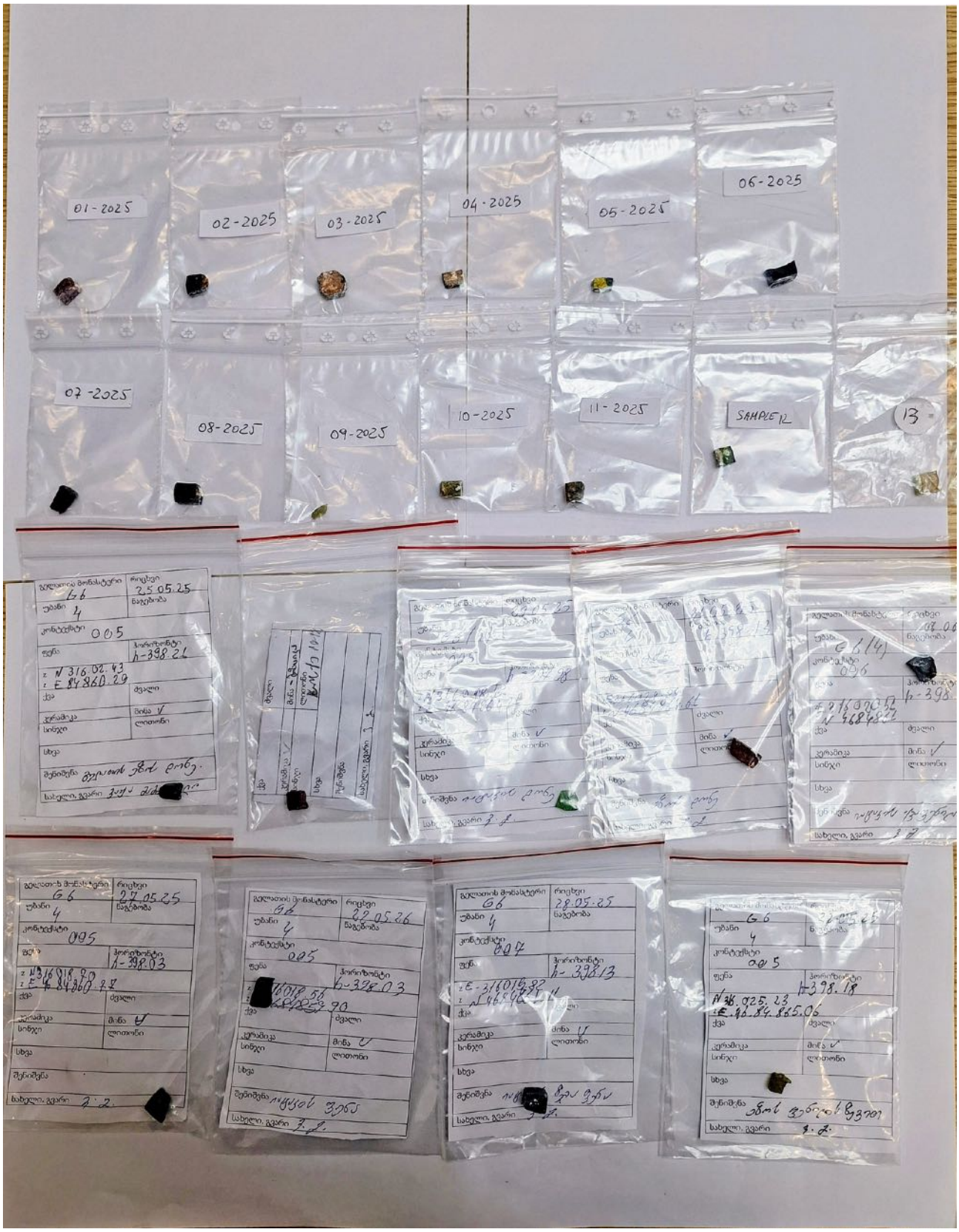


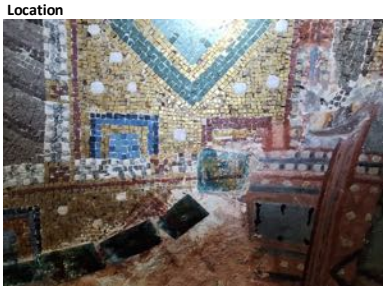
Study of the original materials

The November 2025 working campaign allowed to further study of the original materials already conducted in the laboratory of the Centro Sperimentale per il Vetro in Venice during the first phase of the study in 2025. To do this, 13 samples were collected in November 2025. This step of the research was focused on red, violet, blue, green and gold tesserae.

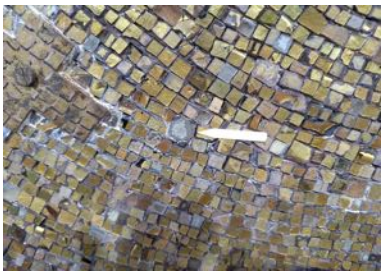
To the 13 samples collected, nine tesserae were added, provided to us by Father Kirion, from the archaeological excavation conducted during the year on the esplanade of the Church of the Virgin. Studying these samples will allow us to identify (or exclude) potentially important parallels between the archaeological finds and the mosaic. See attached map of samples.

In March 2026 the tesserae were reimported in Georgia and relocated in the original position. The archeological material was given back to Misha Gaprindashvili, on March 26, 2026. Here following you can find the photographic documentation of the testing process, from the removal of the tesserae to their relocation in place.



Sample	Color	Location	Detail
01/2025	Rosso		
			

Sample	Color	Location	Detail
02/2025	Nero/viola		
			

Sample	Color	Location	Detail
03/2025	Argento		
			

Sample	Color	Location	Detail
04/2025	Oro		
			

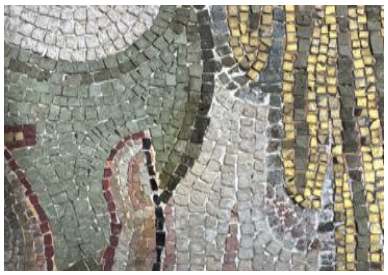
Sample	Color	Location	Detail
05/2025	Oro		
			

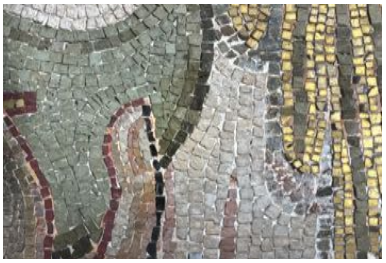
Sample	Color	Location	Detail
06/2025	Nero/blu		
			

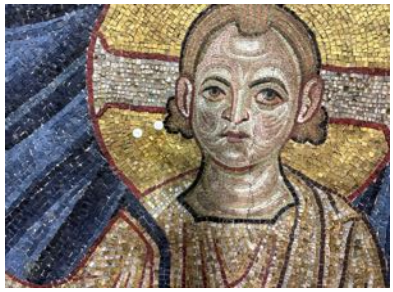
Sample	Color	Location	Detail
07/2025	Nero/verde		
			

Sample	Color	Location	Detail
08/2025	Nero/verde		
			

Sample	Color	Location	Detail
09/2025	Verde		
			

Sample	Color	Location	Detail
10/2025	Verde		
			

Sample	Color	Location	Detail
11/2025	Verde		
			

Sample	Color	Location	Detail
12/2025	Oro		
			

Sample	Color	Location	Detail
13/2025	Oro		
			

კულტურული მემკვიდრეობის ძეგლზე სამუშაოების


KA990132468333425

05 / ნოემბერი / 2025 წ.

სანებართვო მოწმობა №ნ/12/224

1. ნებართვის მფლობელი
გელათის რეაბილიტაციის დროებითი კომიტეტი (სსიპ - საქართველოს სამოციქულო ავტოკეფალური მართლმადიდებელი ეკლესია, საიდენტიფიკაციო კოდი: 204395537), მისამართი: ქ. თბილისი, ვ. ჯორბენაძის ქ. N3.

2. სამართლებრივი საფუძველი
გელათის რეაბილიტაციის დროებითი კომიტეტის თავმჯდომარის მოადგილის, არქიმანდრიტ კირიონ (ზაზა) ონიანის 2025 წლის 31 ოქტომბრის N209 (სააგენტოში რეგისტრაციის N6724, 31.10.2025 წ.) მომართვა; სსიპ - საქართველოს კულტურული მემკვიდრეობის დაცვის ეროვნული სააგენტოს გენერალური დირექტორის 2025 წლის 05 ნოემბრის N04/303 ბრძანება.

3. სანებართვო ობიექტი
მსოფლიო კულტურული მემკვიდრეობის ნუსხაში შეტანილი უძრავი ძეგლი - ტყიბულის მუნიციპალიტეტი, სოფელი გელათი, გელათის ღვთისმშობლის ტაძარი /ძეგლთა ნუსხაში იდენტიფიცირებულია: სოფელი გელათი, ტაძარი ღვთისმშობლისა, XII საუკუნე/.

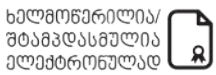
4. შესასრულებელი სამუშაო
მსოფლიო კულტურული მემკვიდრეობის ნუსხაში შეტანილი უძრავი ძეგლის, გელათის ღვთისმშობლის ტაძრის /ძეგლთა ნუსხაში იდენტიფიცირებულია: სოფელი გელათი, ტაძარი ღვთისმშობლისა, XII საუკუნე/ ცენტრალურ კონქში წარმოდგენილი მოზაიკური კომპოზიციის პრევენციული საკონსერვაციო სამუშაოები.

5. სამუშაოთა შუალედური ანგარიშის წარდგენის ვადა

6. ნებართვის მოქმედება
2025 წლის 05 ნოემბრიდან 2026 წლის 15 მაისის ჩათვლით, საბოლოო ანგარიშის (დამოწმებული პროექტის ავტორის მიერ) წარმოდგენის ვალდებულებით.

7. ნებართვა გაცემულია
„კულტურული მემკვიდრეობის შესახებ“ საქართველოს კანონის საფუძველზე.

გენერალური დირექტორი



თეა ონიანი

საქართველოს კულტურულ ფასეულობათა საქართველოდან გატანის

KA990156954994825

14 / ნოემბერი / 2025 წ.

სანებართვო მოწმობა №22/2998

1. **ნებართვის მფლობელი**

   რობერტო ნარდი (პ/ნ YA9978128)

2. **სამართლებრივი საფუძველი**

   გელათის რეაბილიტაციის დროებითი კომიტეტის თავჯდომარის მოადგილის, არქიმანდრიტ კირიონის განცხადება N214/12.11.2025 (სსიპ საქართველოს კულტურული მემკვიდრეობის დაცვის ეროვნულ სააგენტოში რეგისტრაციის N7034) საქართველოს კულტურული მემკვიდრეობის დაცვის ეროვნული სააგენტოს გენერალური დირექტორის მოადგილის 2025 წლის 14 ნოემბრის ბრძანება 06/224

3. **გასატანი კულტურული ფასეულობა**

   გელათის ღვთისმშობლის შობის ეკლესიის მთავარ კონქში წარმოდგენილი მოზაიკური კომპოზიციიდან, კვლევითი და საკონსერვაციო პროგრამის ფარგლებში, საკონსერვაციო დიაგნოსტიკის მიზნებისთვის ამოღებული 22 (ოცდაორი) მოზაიკის ნიმუში (გელათის ღვთისმშობლის შობის ეკლესიის მთავარ კონქში წარმოდგენილი მოზაიკური კომპოზიციიდან აღებული 13 ერთეული; არქეოლოგიური კვლევის შედეგად აღმოჩენილი 9 ერთეული).

4. **მიმღები ქვეყანა**

   იტალია

5. **ნებართვის მოქმედება**

   2025 წლის 16 ნოემბრიდან 2026 წლის 30 აპრილის ჩათვლით, საქართველოში უკან შემოტანის ვალდებულებით

6. **ნებართვა გაცემულია**

   „ლიცენზიებისა და ნებართვების შესახებ“ (24-ე მუხლის 52-ე პუნქტი) და „კულტურულ ფასეულობათა საქართველოდან გატანისა და საქართველოში შემოტანის შესახებ“ (მე-11 მუხლის 1 პუნქტი) საქართველოს კანონების საფუძველზე

7. **გასატანი კულტურული ფასეულობის თანდართული ფოტოსურათი(ები)**

   22 (ოცდაორი) ცალი ოთხ ფურცლად თან ერთვის

8. **სანებართვო მოწმობის გაცემის თარიღი**

   14.11.2025 წ.

გენერალური დირექტორის მოადგილე

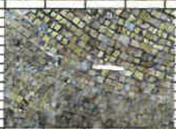
ხელმოწერილია/შტამპდასმულია ელექტრონულად

პაატა გაფრინდაშვილი

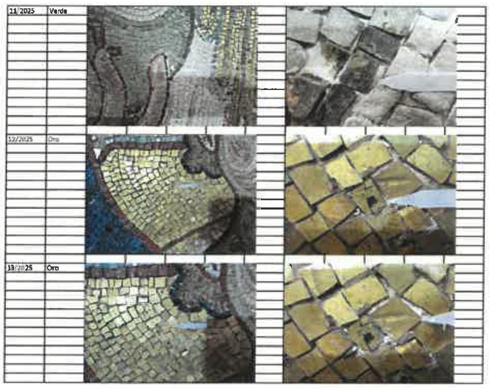
[illegible] 1

[illegible] 2025 [illegible] 16 [illegible]

[illegible] 13 [illegible]

Sample	Color	Location	Detail
01/2025	Rosso		
02/2025	Nero/verde		
03/2025	Argento		
04/2025	Oro		
05/2025	Oro		
06/2025	Nero/blu		
07/2025	Nero/verde		
08/2025	Nero/verde		
09/2025	Verde		
10/2025	Verde		

სსიპ საქართველოს კულტურული მემკვიდრეობის
დაცვის ეროვნული სააგენტო
L.E.P.L. NATIONAL AGENCY FOR CULTURAL HERITAGE
PRESERVATION OF GEORGIA
საქართველოს გარეთ გატანა
ნებადართულია
EXPORTED OUTSIDE OF GEORGIA IS
P E R M I T T E D
№ 22/1998 "14" 11 2025 წ.
უფლებამოსილი პირი
AUTHORIZED PERSON

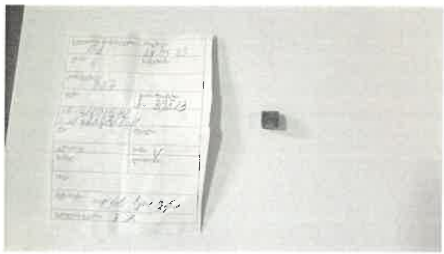


[illegible]

დანართი 2

2025 წლის 16 ნოემბერს, რობერტა ნარდის მიერ, კვლევის მიზნით, საქართველოდან იტალიაში გასატანი 9 ერთეული ტესერის ნამონათვალი, რომელიც აღმოჩენილ იქნა 2025 წელს საქართველოს ეროვნული მუზეუმის მიერ გელათის მონასტრის ტერიტორიის სამხრეთ პერიმეტრზე ჩატარებული არქეოლოგიური კვლევის შედეგად.

ნიმუში 1:



ნიმუში 2:

ნიმუში 3:

დანართი 2

ნიმუში 4:

ნიმუში 5:

REPORT
No. 000221852

RICHIE DENT AND

Centro di Conservazione Archeologica - Roma

VIA DEL GAMBERO 19 00187 ROME RM

CONTRASSE GNO - INFORMATION PROVIDED BY THE CLIENT
Pieces from a Mosaic and an Excavation

INDIC E
ANALYSIS OF GLASS MOSAIC TILES FROM GELATI (GEORGIA)

TO THE C.A.
Roberto Nardi

MURANO
March 12, 2026

CONFIRMATION
Confirmation of your email dated 12/19/2025

SAMPLE
Mosaic Tiles

CHAMPIONSHIP BY
Customer

RECEIVED ON
12/18/2025

TEST PERFORMED AT
Murano

FROM
12/01/2026

As of March 12, 2026

PREPARED BY
Dr. Roberto Falcone

THE DIRECTOR OF LA BORATORI
Dr. Nicola Favaro

digitally signed by Nicola Favaro according to current legislation
certificate issued by INFOCAMERE QES, N. 7420106009144306

Stazione Sperimentale del Vetro S.c.p.A.
The Glass Research Centre
Operational Headquarters: Via Briati, J0 - 30J41 Murano (VE)
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Secondary office: VEGA Pegaso Building, Via delle Industrie 13 - 30175 Venice Marghera T. +39 041 5383J08 • T. +39 04J. 5383J12
VAT No. IT04J76390278 -spevetro@spevetro.it — www.spevetro.it

ANALYSIS OF GLASS MOSAIC TILES

In response to your request, we analyzed samples of glass mosaic tiles selected from two collections labeled MOSAICO and SCAVO, respectively. As agreed with you, we selected, in collaboration with Dr. Marco Verità, six tiles from each collection for a total of twelve samples; the labels and colors of the analyzed tiles are listed below.

MOSAICO TILES

1. G25—1: opaque red
2. G25-2: transparent black (emerald green)
3. G25-3: transparent yellow gold leaf
4. G25-6: dark blue, transparent
5. G25-7: transparent black (purple-brown)
6. G25-10: opaque yellow

SCAVO TILES

1. G25—S1: opaque red
2. G25-S2: transparent black (purple-brown)
3. G25-S3: opaque olive green
4. G25-S4: black (emerald green) transparent
5. G25-SS: dark blue, opaque
6. G25-S6: transparent yellow

All tiles were examined and photographed under a stereoscopic optical microscope (MO) both as-is and as polished sections. From each tile, with the exception of sample G25-S3, a small portion was removed using a precision cutter; the samples were then embedded in self-curing resin and polished using abrasive discs of appropriate grit (polished section); one side surface of tile G25-S3 (gold leaf) was polished using abrasive discs of appropriate grit. The chemical compositions of the tiles were determined by X-ray microanalysis using a BRUKER M4 TORNADO energy-dispersive X-ray microfluorescence μspectrometer BRUKER M4 TORNADO with a rhodium (Rh) tube, polycapillary optics (spot size 25 μm) and a silicon energy dispersive spectroscopy (SDD) with an active area of 30 mm^2, calibrated using standard glass samples. Three measurements were performed on each polished section under the following analytical conditions: voltage 50 kV, current 200 μA, and measurement time 600 s. The chemical compositions were determined as the average values of the measurements performed on each sample. Below are photos of the wafers taken with the MO as received and polished (Figs. 1–12) and their chemical compositions determined by μEDXRF (Tables 1–12).

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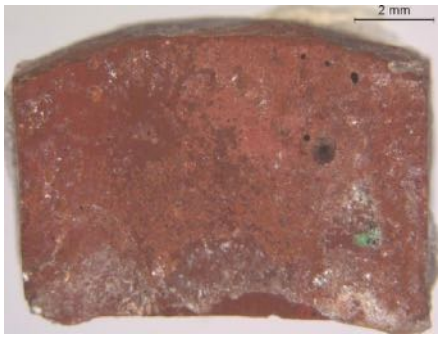
VAT No. IT04J76390278 -spevetro@spevetro.it — www.spevetro.it

Sample G25-1 Opaque
red



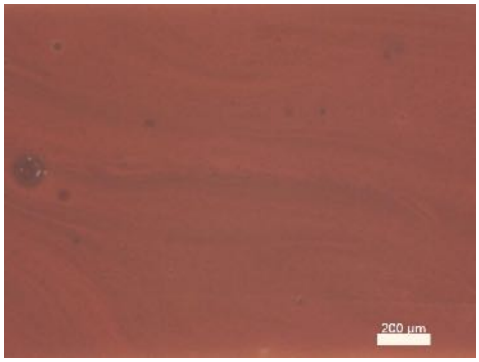


Photo 7 - Reflected light optical microscope image of tile G25-ì (top) and detail of the polished section (bottom)

% by weight	G25-1
SiO2	62.8
Al_2O_3	3.11
Na_2O	12.8
20	1.60
MgO	1.56
CaO	7.2
BaO	< 0.10
503	< 0.02
20,	0.17
Fe_2O_3	5.00
Cr_2O_3	< 0.02
TiO2	0.13
MnO	0.80
CoO	< 0.02
NiO	< 0.02
CuO	3.00
ZnO	< 0.02
R*2O	< 0.05
SrO	0.06
SnO2	0.11
S d2O3	<0.05
PbO	0.38
Cl	0.8
éS2 O3	<0.05

Table 1 - Chemical composition of sample c2s-1

Sample G25-2
Black (emerald green) transparent

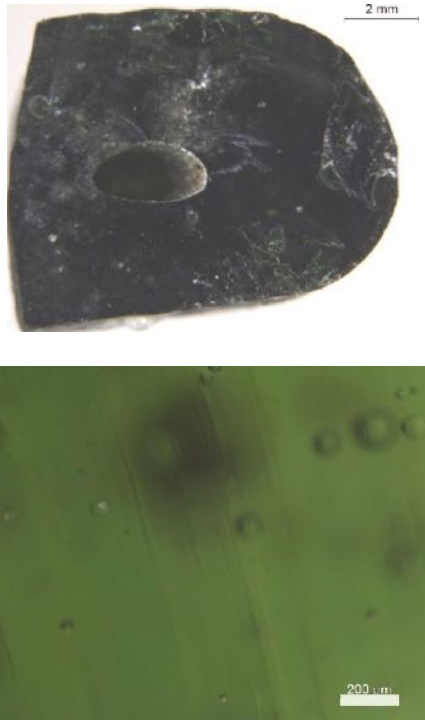


Photo 2 - Reflected light optical microscope image of tile G25-2 (top) and detail of the polished section in transmitted light (bottom)

% by weight	G25-2
SiO2	64.8
Al_2O_3	3.12
Na_2O	13.5
20	1.70
MgO	1.56
CaO	7.3
BaO	< 0.10
503	< 0.02
20,	0.17
Fe_2O_3	1.19
Cr2O3	< 0.02
TiO2	0.12
MnO	0.60
CoO	< 0.02
NiO	< 0.02
CuO	4.15
ZnO	< 0.02
R*2O	< 0.05
SrO	0.06
SnO2	0.18
S 203	<0.05
PbO	0.36
Cl	0.7
[illegible]	<0.003

Table 2 - Chemical composition of sample G23-2

Sample G25-3
Yellow gold leaf

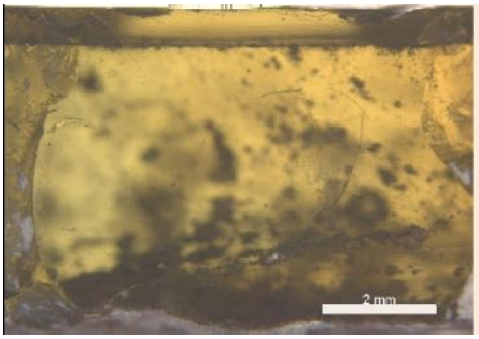


Photo 3 - G25-3 tile (top) and a close-up of a polished side surface photographed under a transmitted-light microscope at various magnifications (center and bottom)

% by weight	G25—3	
	folder	Backing
SiO2	66.3	66.5
Al2O3	2.42	2.40
Na_2O	17.3	17.6
20	0.90	0.91
MgO	1.20	1.10
CaO	7.6	7.6
BaO	< 0.10	< 0.10
503	0.30	0.30
2O,	0.12	0.10
Fe_2O_3	1.10	1.02
Cr_2O_3	< 0.02	< 0.02
TiO2	0.17	0.17
MnO	1.05	0.75
CoO	< 0.02	< 0.02
NiO	< 0.02	< 0.02
CuO	< 0.02	< 0.02
ZnO	< 0.02	< 0.02
Rb2O	<0.05	< 0.05
SrO	< 0.05	< 0.05
SnO2	< 0.05	< 0.05
S 203	<0.05	< 0.05
PbO	< 0.05	< 0.05
Cl	1.0	0.9
éS2 O3	< 0.05	<0.05

*e - *Chemical composition of sample G23-3*

Sample G25-6 Dark blue transparent

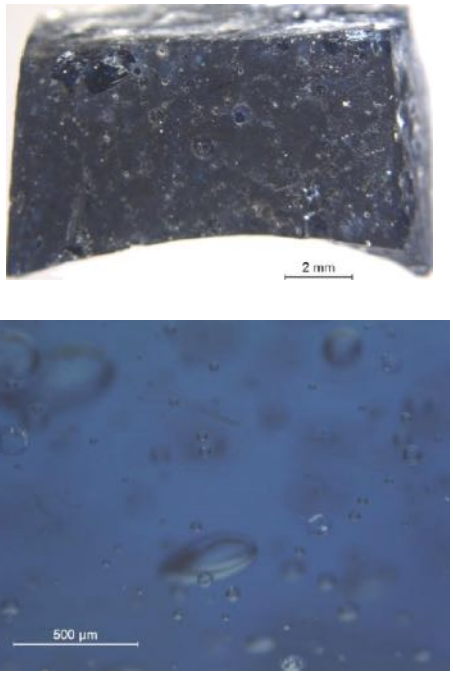
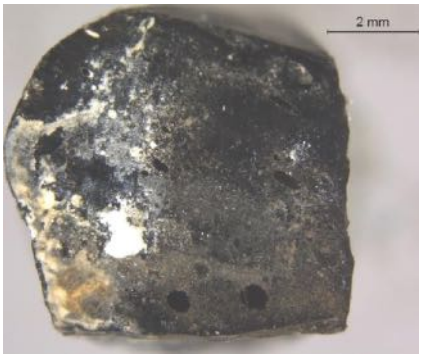


Photo 4 - Reflected light optical microscope image of tile G25-6 (top) and detail of the polished section in transmitted light (bottom)

% by weight	G25-6
SiO2	65.4
Al2O3	3.10
Na_2O	14.3
20	1.74
MgO	2.15
CaO	8.4
BaO	< 0.10
503	< 0.02
20,	0.15
Fe_2O_3	2.23
Cr_2O_3	< 0.02
TiO2	0.12
MnO	0.61
CoO	0.09
NiO	< 0.02
CuO	0.10
ZnO	0.02
R*2O	< 0.05
SrO	0.07
SnO_2	< 0.05
S>2O3	< 0.05
PbO	0.31
Cl	0.7
6S2 O3	008

Table 4 - Chemical composition of sample G25-6

Sample G25-7
Black (dark purple) transparent



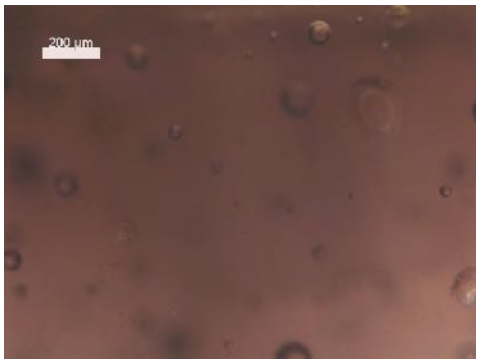
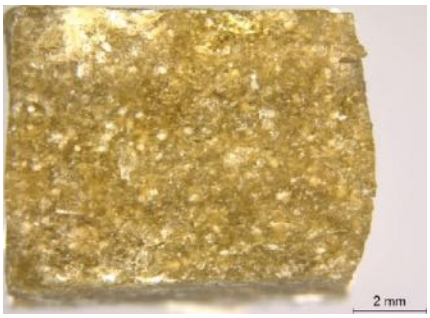


Photo 5 - Reflected light optical microscope image of tile G25-7 (top) and detail of the polished section in transmitted light (bottom)

% by weight	G25-7
SiO2	65.3
Al_2O_3	2.90
Na_2O	14.5
20	1.71
MgO	1.86
CaO	8.1
BaO	< 0.10
503	< 0.02
20,	0.15
Fe_2O_3	1.50
Cr_2O_3	< 0.02
TiO2	0.11
MnO	2.20
CoO	< 0.02
NiO	< 0.02
CuO	0.08
ZnO	0.06
R*2O	< 0.05
SrO	0.06
SnO2	< 0.05
S 203	<0.05
PbO	0.27
Cl	0.7
ÒS203	<0.05

Table S - Chemical composition of sample G23-7

Sample G25-10
Opaque yellow



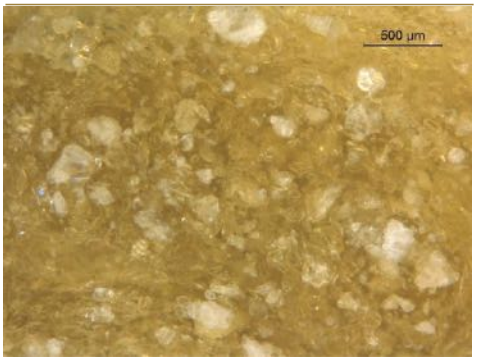


Photo 6 - Reflected light optical microscope image of tile G25-ì0 (top) and detail of the polished section under reflected/transmitted light (bottom)

% by weight	G25-10
SiO2	72.6
Al_2O_3	4.60
Na_2O	12.6
20	1.91
MgO	1.17
CaO	4.4
BaO	< 0.10
503	< 0.02
20,	0.20
Fe_2O_3	1.21
Cr_2O_3	< 0.02
TiO2	0.15
MnO	0.04
CoO	< 0.02
NiO	< 0.02
CuO	< 0.02
ZnO	< 0.02
R*2O	< 0.05
SrO	< 0.05
SnO2	< 0.05
S 203	<0.05
PbO	< 0.05
Cl	0.8
ÒS2O3	<0.05

Table 6 - Chemical composition of sample G2s-lo

Sample G25-S1 Opaque
red

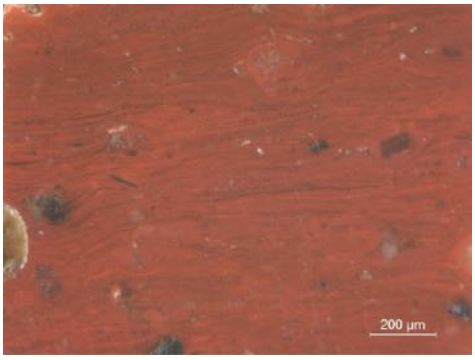
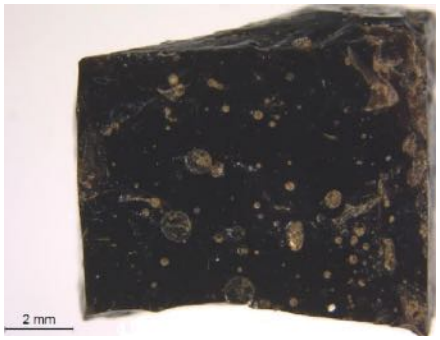


Photo 7 - Optical microscope image in transmitted light of the G2S-81 sample (top) and detail of the polished section in reflected light (bottom); the presence of regularly shaped crystals (devitrified calcium silicate of the wollastonite type) and metallic particles (copper sulfide) can be observed

% by weight	G25-S1
SiO2	55.0
Al_2O_3	280
Na_2O	15.0
20	0.87
MgO	0.73
CaO	7.1
BaO	< 0.10
503	< 0.02
2O,	0.25
Fe_2O_3	2.90
Cr_2O_3	< 0.02
TiO2	0.17
MnO	0.66
CoO	< 0.02
NiO	0.04
CuO	2.07
ZnO	0.82
R*2O	< 0.05
SrO	0.06
SnO_2	3.20
S 203	< 0.05
PbO	7.30
Cl	1.0
S203	< 0.05

Table 7 - Chemical composition of sample G25—S)

Sample G25-S2
Transparent black (purple-brown)



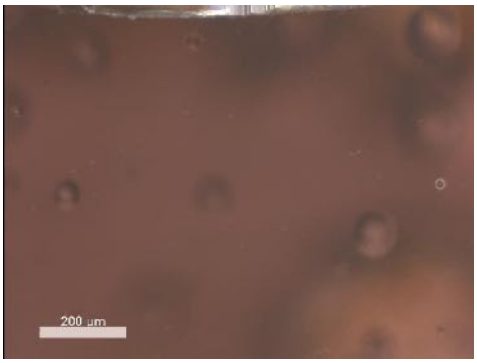


Photo 8 - Reflected light optical microscope image of tile G25-S2 (top) and detail of the polished section in transmitted light (bottom)

% by weight	G25-S2
SiO2	66.0
Al_2O_3	2.95
Na_2O	14.5
20	1.74
MgO	1.90
CaO	8.0
BaO	< 0.10
503	< 0.02
2O,	0.20
Fe_2O_3	1.54
Cr_2O_3	< 0.02
TiO2	0.11
MnO	2.22
CoO	< 0.02
NiO	< 0.02
CuO	0.09
ZnO	0.07
R*2O	< 0.05
SrO	0.08
SnO_2	< 0.05
S 203	<0.05
PbO	0.36
CI	0.7
[illegible]	< 0.05

Table 8 - Chemical composition of sample G2S-82

Sample G25-S3
Opaque leek green

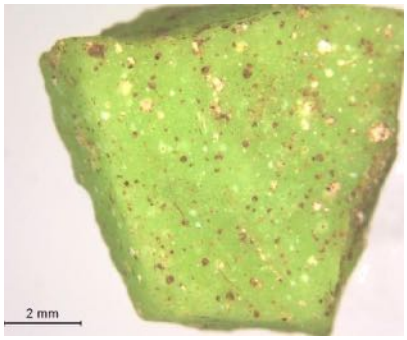


Photo 9 - Reflected light optical microscope image of tile G25-S3 (top) and a detail of the polished surface under reflected/transmitted light (bottom); yellow particles with a maximum size of approximately 0.7 mm are visible

% by weight	G25-S3
SiO2	63.3
Al_2O_3	3.31
Na_2O	14.2
20	0.67
MgO	0.50
CaO	6.8
BaO	< 0.10
503	< 0.02
2O,	< 0.10
Fe_2O_3	0.30
Cr_2O_3	< 0.02
TiO2	0.005
MnO	0.03
CoO	< 0.02
NiO	< 0.02
CuO	0.64
ZnO	< 0.02
R*2O	< 0.05
SrO	< 0.05
SnO2	1.20
S 203	< 0.05
PbO	8.20
Cl	0.8
ÒS203	<0.05

Table 9 - Chemical composition of the sample G2s-s3

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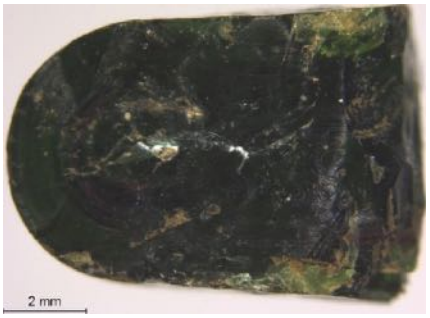
Sample G25-S4
Black (emerald green) transparent



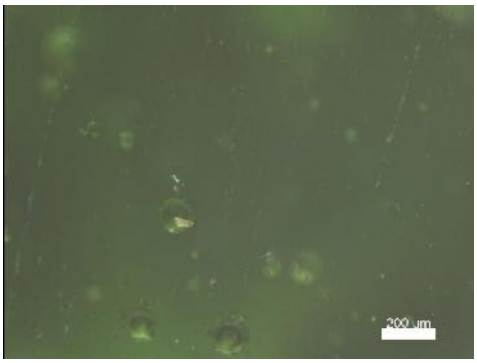


Photo J0 - *Reflected light optical microscope image of tile G25-S4 (top) and transmitted light detail of the polished surface (bottom)*

% by weight	G25-S4
SiO2	63.5
Al_2O_3	3.32
Nà2O	13.9
20	1.73
MgO	1.60
CaO	7.6
BaO	< 0.10
503	< 0.02
2O,	0.25
Fe_2O_3	1.22
Cr_2O_3	< 0.02
TiO2	0.12
MnO	0.62
CoO	< 0.02
NiO	< 0.02
CuO	4.25
ZnO	< 0.02
R*2O	< 0.05
SrO	0.07
SnO2	0.14
S 203	<0.05
PbO	0.37
CI	0.8
ÒS203	< 0.05

Table 7O - *Chemical composition of the sample G2S-S4*

Sample G25-S5 Dark opaque blue

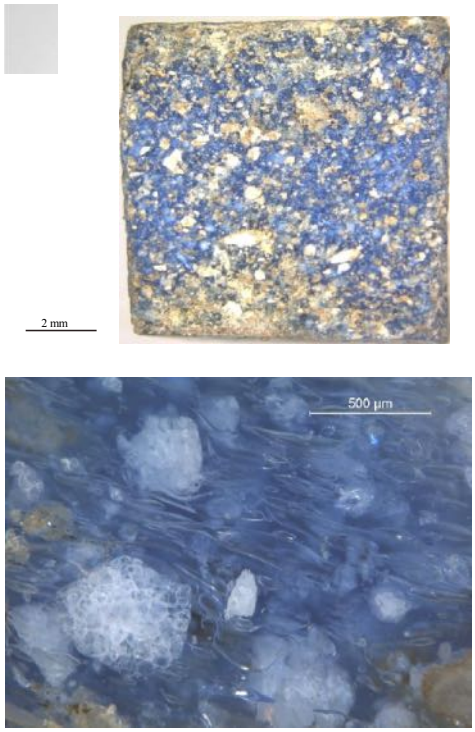


Photo 2 - Reflected light optical microscope image of tile G25-SS (top) and detail of the polished surface in reflected/transmitted light (bottom)

% by weight	G25-SS
SiO2	71.4
!2O3	2.80
Na_2O	11.9
20	1.47
MgO	1.81
CaO	7.1
BaO	< 0.10
503	< 0.02
20,	0.16
Fe_2O_3	2.07
Cr_2O_3	< 0.02
TiO2	0.11
MnO	0.52
CoO	0.08
NiO	< 0.02
CuO	0.07
ZnO	0.02
R*2O	< 0.05
SrO	0.05
SnO_2	< 0.05
Sd2O3	< 0.05
PbO	0.19
Cl	0.5
éS2 O3	0.008

Table 11 - Chemical composition of the sample G2s-s5

Sample G25-S6

Transparent yellow

Photo 72 - Photo taken with a light microscope of tile G25-S6 (top and center) and detail of the polished surface in transmitted light (bottom)

% by weight	G25-S6
SiO2	680
!2O3	2.00
Na_2O	11.8
20	2.70
MgO	2.00
CaO	9.2
BaO	< 0.10
503	0.10
2O,	0.15
Fe_2O_3	2.00
Cr_2O_3	< 0.02
TiO2	0.09
MnO	1.60
CoO	<0.02
NO	<0.02
CuO	<0.02
ZnO	< 0.02
Rb_2O	< 0.05
SrO	< 0.05
SnO_2	< 0.05
Sd2O3	< 0.05
PbO	< 0.05
CI	0.7
As2 O3	< 0.05

Chemical composition of sample G2S-s6

— END OF REPORT ——

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Roma, 4 maggio 2026

Roberto Nardi

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