

# MODALITIES OF VISUALLY LOCATING THE INTERVENTION AREAS IN THE RESTORATION DOCUMENTATION

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**Abstract:** The aim of the present article is to present modalities of visually locating the areas of specific intervention within heritage buildings, using vector graphics and bitmap image software, employed in the framework of preservation-restoration documentation.

**Keywords:** digital technologies, heritage buildings, mural painting restoration, visual documentation

The preservation-restoration interventions on heritage artworks are always complemented by adequate specific documentation, which records all the data pertaining to the specific heritage building, from general information (location, history, architecture presentation, style and iconography analysis of the painted decoration, technique of execution etc.), through the identification and analysis of the state of preservation and the prior interventions, and then, to the methodology of restoration intervention, established following the specialist scientific investigations.

After Paolo and Laura Mora, the restoration documentation is required to “establish the results of the examinations, diagnoses and interventions in an objective form, which ensure, in a manner as possible clear and complete, the transmission of such results, for the future benefit of all specialists interested in such information<sup>1</sup>”.

From this point of view, one important section of the restoration documentation, which has not always received its deserved importance, regards the precise visual location of the intervention area within the church that is a heritage building. In a first stage, the wall painting decoration that will be restored is located, in relation to the cardinal points, in one of the distinct areas of the religious building (sanctuary, nave, narthex, exonarthex etc.), followed then by the location in registers, relating to the distance to the floor level and, finally, the identification by stylistic and iconographic means, if possible.

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<sup>1</sup> Laura & Paolo Mora; Paul, Philippot, *Conservarea picturilor murale [Conservation of Mural Paintings]*, Meridiane Publishing House, Bucharest, 1986, page 50.

The registration of the scene within the framework of the whole church communicates to the restorer important clues regarding the state of preservation of such work of art, the micro-climate influence it is subjected to, as well as the predisposition to certain types of degradation and certain specific activity mechanisms, which might be well explained by the relative location. The recording of such information in as precise a manner as possible, including in visual form, by the specific documentation, is highly important towards facilitating the subsequent access of the restoration specialists to the essential data of the heritage building<sup>2</sup>.

The general location of the intervention area is carried out, usually, by means of written documentation, while the visual location might be carried out on one hand, by means of photographic documentation, and on the other hand by means of graphical documentation, which is able to record also the restoration intervention carried out unto the heritage building.

The most effective form of visual location is, however, a composite method, which combines the advantages of both photographic and graphical methods, although somehow more difficult to execute: the entire image of the wall painting decoration undergoing restoration interventions is located in relation to the cardinal points within a cross-section type drawing or a ground-plan drawing.

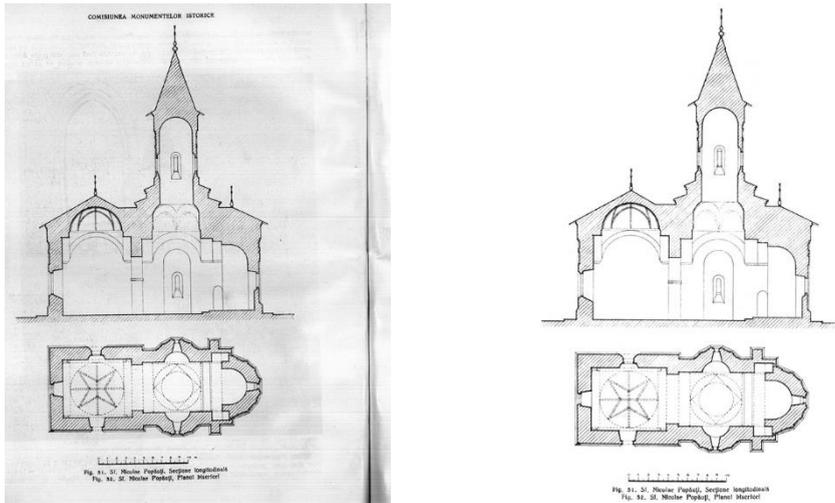


Fig. 1, 2. The church of Popăuți, Botoșani (15<sup>th</sup> century)<sup>3</sup>.  
Ground plan and axial cross-section.

<sup>2</sup> “[...] the whole process undertaken by such specialist [restorer – n.n.] remains enclosed inside the specialist documentation, with data recorded as written, graphic and photographic, digital and film, documentation” - Carmen Solomonea, Voroneț, Popăuți, Probota și Moldovița. *Metode tehnice ale picturii murale*, Editura Artes, 2009, pag. 11.

<sup>3</sup> Baș, G., *Bisericile și mănăstirile din veacurile al XVII-lea și al XVIII-lea*, vol. 3, Institutul de Arte Grafice „E. Marvan”, București, 1933, fig. 51, 52.

In a first stage, the printed images of the cross-sections and ground plans are digitized by high-resolution scanning<sup>4</sup>, an example of such scanned and non-processed image is illustrated in Fig. 1. The images are then processed by means of bitmap image processing software such as Adobe Photoshop, which allows the rotation of the image, the cutting-out of the irrelevant areas and the blotting out of as much noise as is possible out of the background<sup>5</sup>, as illustrated by Fig. 2.

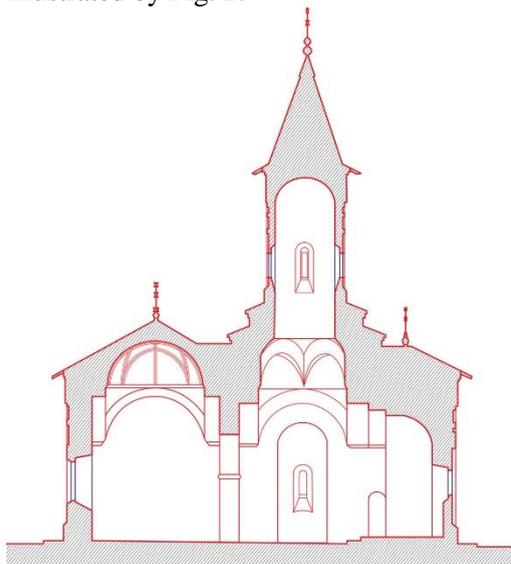


Fig. 3. The church of Popăuți, Botoșani (15<sup>th</sup> century).  
Axial cross-section redrawn using CorelDraw

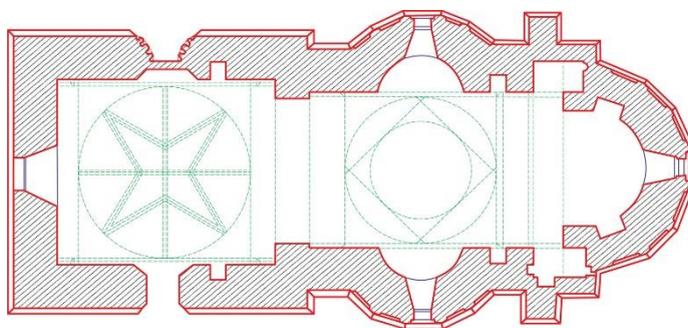


Fig. 4. The church of Popăuți. Ground plan, redrawn using CorelDraw

<sup>4</sup> If the resolution is too small, the image quality will be lower, and “the pixels composing the image will be visible, and one will say about the image that is pixelated” - Galer Mark, Les Harvat, *Imaginea digitală. Aplicații*, Editura Ad Libri, București, 2004, pag. 18.

<sup>5</sup> Gavrilean, Bogdan, *Modalități de valorificare a intervențiilor de restaurare cu ajutorul informației digitale*, în „Monumentul-Tradiție și Viitor”, Ediția a VII-a, Ed. Fundației Axis, Iași, pag. 353.

The corrected bitmap image is then used as model for the precise redrawing of both the ground plan and the axial cross-section, using the CorelDraw software (see Fig. 3 and 4, which illustrate the vector graphics of Popăuți church, drawn by the author in CorelDraw), achieving in the end a detailed vector graphic.

The main advantage of this type of images is the small storage space it takes, as well as the fact that the information is easy to correct and to update compared to hand-drawings, which, on any modifications must be practically redrawn completely from zero. Another advantage is the fact that the vector graphics can be scaled to any physical dimensions, the resulting image being of the same print quality, both in small and in very large formats, compared to the bitmap images, where the aliasing effect shall appear eventually, regardless of the resolution<sup>6</sup>. Fig. 5 and Fig. 6 illustrate the difference in quality between images, both presenting a detail of the ground plan of the church of Popăuți monastery, both zoomed up to 2100%: bitmap (left) and vector (right).

The main disadvantage of vector graphics is the large amount of time required in the beginning for the elaboration of the drawings, which are effectively made using the mouse of the computer or a graphic table, as well as the required acquiring of knowledge in operating a specialist software, which disadvantages are mitigated in time, after the digital technology competences are acquired.

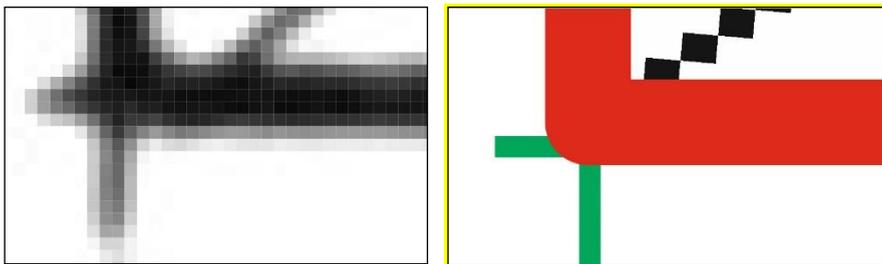


Fig. 5, 6. 300 dpi – scanned bitmap image (left) and vector graphic drawn in CorelDraw (right)

The second phase is aimed at obtaining an integral image of the wall painting decoration, which will allow the general visualization of the scene.

In order to obtain such image, one must observe though the fact that in case of scenes located in the upper areas of the building, clear photographs of the whole scene are impossible to take from ground level, either due to the insufficient light inside the church, or the architectural particularities of each building.

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<sup>6</sup> “[...] the vector images consist of graphical objects described by mathematical formulae and have the advantage, among others, of resizing (scaling up or down) without aliasing effects” - Grigoraș, Florin, *Procesarea computerizată a imaginii*, Editura Artes, Iași, 2002, pag. 23.

When the wall painting decorations are undergoing restoration, the obtaining overall scene photographs of high quality is more difficult, as the presence of the scaffolding obscures almost entirely the visibility of such scenes, e.g. the scaffolding erected in the nave of Golia monastery church for the restoration interventions (see Fig. 7).

Most of the time, the only effective option is to take images on each scaffolding level, although, in this case one must consider the fact that the levels of the scaffolding erected for interventions inside the church are up to 2 meters high, while the decks are up to 2 meters wide.

In these conditions, obtaining a single contiguous image of the work area is difficult, due to the extremely tight photographing angles onto the work area from the decks of the scaffolding, as the scaffolding “cuts” the image in several horizontal or vertical sections, the larger scenes being sometime located on even two or three registers). Fig. 8 illustrates the repartition on two registers of the “The Denial of Peter” scene in the church of Popăuți monastery, Botoșani, while the detail in Fig. 9 outlines the area between two registers, covered by scaffolding, and only visible from a very tight angle.

In the most frequent situations, though, the various scaffolding members interfere with the view of the scene, as illustrated by the examples in Fig. 9 – 11 and 13, showing the metal members of the scaffolding.

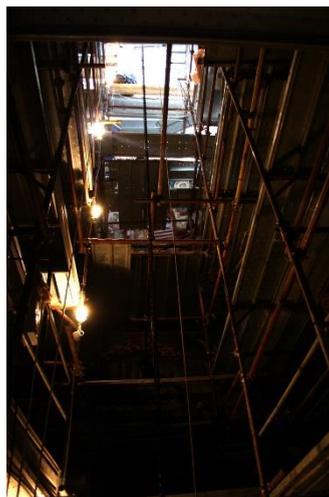


Fig. 7. Scaffolding inside Golia monastery church



Fig. 8, 9. The scaffolding inside Popăuți monastery church – general view of the “The Denial of Peter” scene – which is located on two decks of the scaffolding (left) and detail of the scene (right).



Fig. 10, 11. Popăuți monastery church – “The Denial of Peter” scene.  
Metal members of the scaffolding



Fig. 12, 13, 14. Popăuți monastery church – “The Denial of Peter” scene.  
Scanned images of the photographs taken on the upper (left)  
and lower half of the scene (center and right)

The only effective option in this situation remains the photographing of the scene from multiple angles (Fig. 9 - 14), followed by the digital stitching together of the images using Adobe Photoshop. The preliminary procedures are identical to the first phase, with the difference that in this latter phase, the images are processed, both to eliminate the perspective distortions (due to the atypical photographing angles, as illustrated by Fig. 9 – 14, on “The Denial of Peter”) and to eliminate the chromatic aberrations generated during the image acquisition (photographing and then scanning).

Following the rescaling to the same size and the correction of perspective deformations for each image individually, the image segments are juxtaposed in Adobe Photoshop to obtain the general image of the work area. The assembled image in Fig. 15 illustrates the state of preservation of the scene before restoration, while Fig. 16 illustrates the scene close to the end of restoration operations.



Fig. 15, 16. “The Denial of Peter”. Images stitched in Photoshop.

One must mention that, although the final assembled images are superior to the hand-drawings of the scenes, these do not have an absolute degree of precision, as certain errors are inevitable, either from a chromatic point of view or in relation to certain dimensional reference points. However, the digitally assembled images fulfil the purpose, i.e. to provide a whole-picture image without the interference caused by the scaffolding.

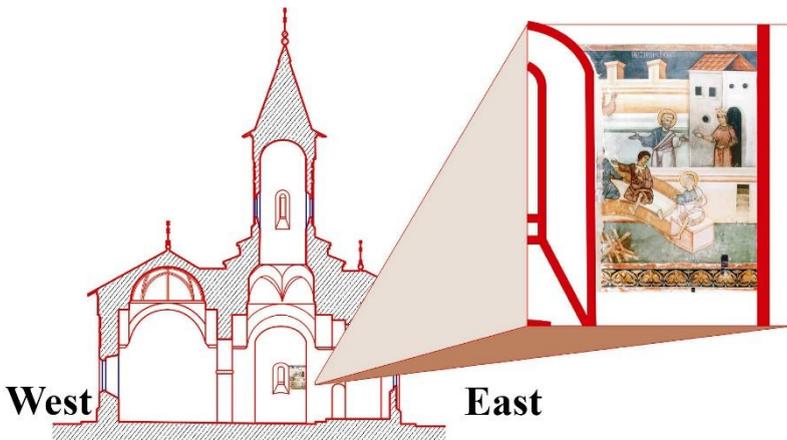


Fig. 17. The location of the wall painting decoration using the axial cross-section.

The assembled bitmap image is then resized and located within the vector drawing of cross-section (as illustrated by Fig. 17) and the ground plan (Fig. 18) of the church.

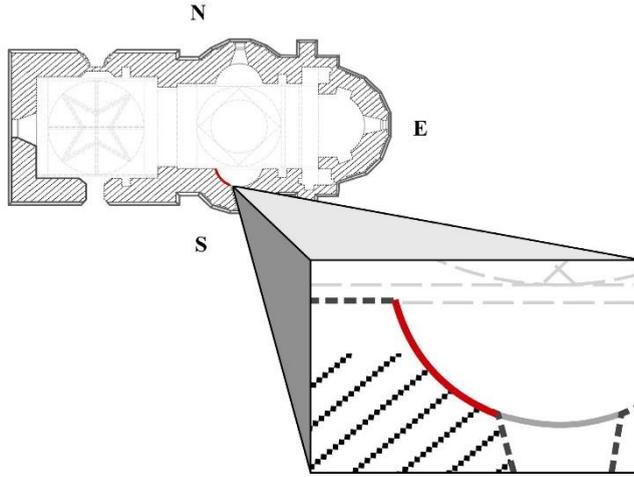


Fig. 18. The “Denial of Peter” scene, located using the ground plan

The composite method of visual location for the specific areas of intervention, within the whole church heritage building, is presented by the image in Fig. 19, in which the contiguous images of the restored wall painting decorations are illustrated using the cardinal points within the axial cross-section, while Fig. 20 shows a detail with the repartition of scenes on registers. This method can also be extended to the graphical documentation that are always attached to the restoration documentation.



Fig. 19. The visual location on registers, using the axial cross-sections

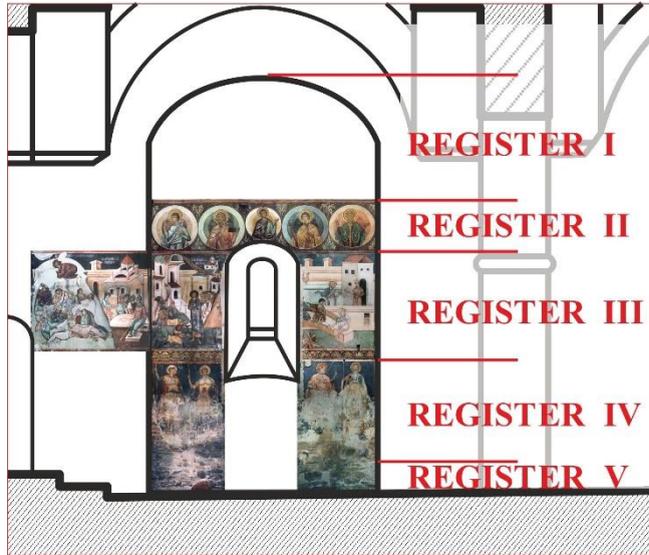


Fig. 20. The visual location of the frescoes, using the axial cross-sections (detail).

Moreover, the location of a certain scene in the general framework of the heritage building might be carried out by means of outline drawings, with either hand-drawn modulated lines, on tracing paper, overlaid on an image printed at standard scale, or directly as digital graphic. The main advantage of this type of drawing is allowing the focus on stylistic or iconographic typologies particular to the scene.



Fig. 21. Hand-drawn outline representation of the “Ascension of Jesus” scene

Fig. 21 represents a measured outline hand drawing, of the “Ascension of Jesus” scene, St. Nicholas church, Popăuți, Botoșani, which was subsequently scanned and assembled in Adobe Photoshop.

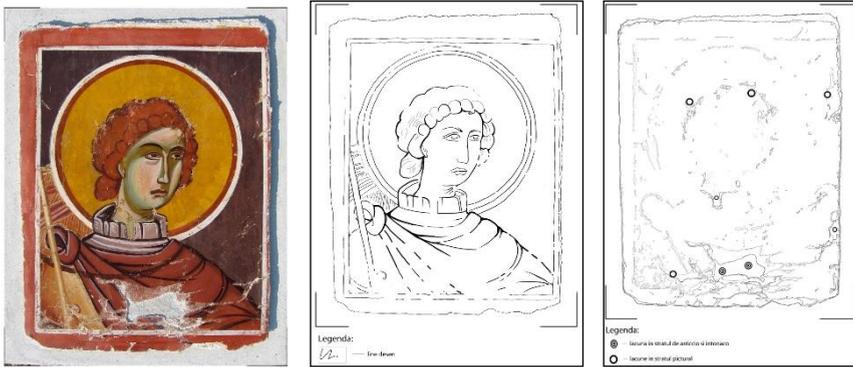


Fig. 22, 23, 24. Image used as background (left), outline drawing (center) and digital graphic representation of the state of conservation (right) of an extracted wall-painting decoration

Within the preservation-restoration documentation, the graphical reliefs present, along the outline drawings of the scene, certain other specific aspects, such are: *Execution Technique*, which records the materials that constitute the wall painting decoration, the technologic and chromatic particularities of the scene; *State of preservation* – which records the types of degradation, at masonry, preparation and paint level; *Previous interventions*, which records the destructive prior interventions, either “restorations” or vandalisms; and finally *Restoration interventions*, which records all activities of the restorer. All these graphical reliefs, accompanied by explanatory captions, are the fastest and most effective form of visual documentation for recording and presenting the restoration interventions on heritage buildings, available to both specialists and general public<sup>7</sup>. After Paolo Mora & Paul Phillippot, “the drawn reliefs constitute a form of documentation that is essential to the restorer, as it is the only one that allows the clear and systematic understanding of a complex assembly, of its state, as well as the nature of the interventions it had undergone”<sup>8</sup>.

To conclude, we exemplify the two main types of elaboration of graphical reliefs: the elaborations that use integrally digital technologies are presented in Fig. 22-24<sup>9</sup>, while the elaborations that use hand-drawings on tracing paper are illustrated in Fig. 25-29<sup>10</sup>.

<sup>7</sup> An eloquent example for this is the graphical representations of the outline drawings of the scenes, as well as the methodology stages of the restoration interventions is *The Restoration of the Probota Monastery*, UNESCO, 2001.

<sup>8</sup> Laura & Paolo Mora; Paul, Phillippot, *Conservarea picturilor murale*, Editura Meridiane, București, 1986, pag. 52.

<sup>9</sup> Fig. 22-24 illustrate examples of the study works of students, for the Specialization Course “The Preservation and Restoration of the Work of Art” Iași, the specialty *Computer processing of images*.

<sup>10</sup> Fig. 25-29 are graphic representations of the restoration interventions carried out on the “Deisis” scene, Moldovița (images of the graphic representations portfolio of the License

Both types of elaborations are accompanied by explanatory graphical captions, which are located, in Fig. 22-24 below the drawing, while in Fig. 25-29 on the right side of the drawing.

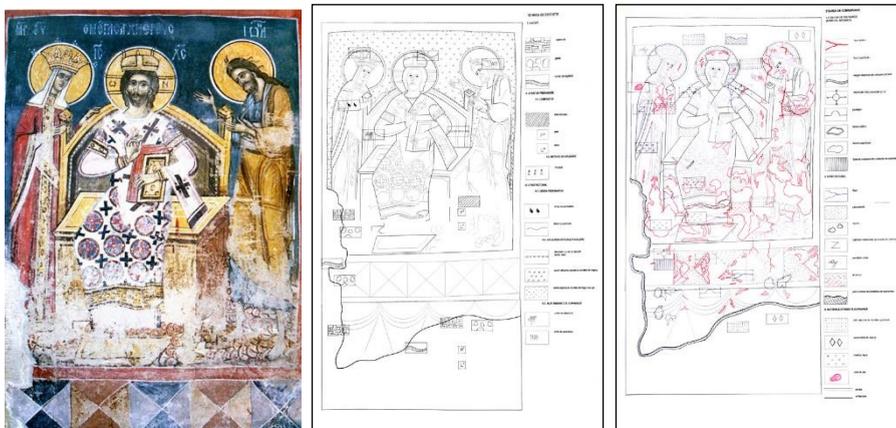


Fig. 25, 26, 27. The general image of the “Deisis” scene, the church of Moldovița Monastery (left); Hand-drawn graphic representation illustrating *The Outline drawing of the scene and the Execution technique* (center), and *State of preservation of the preparation layers* (right)

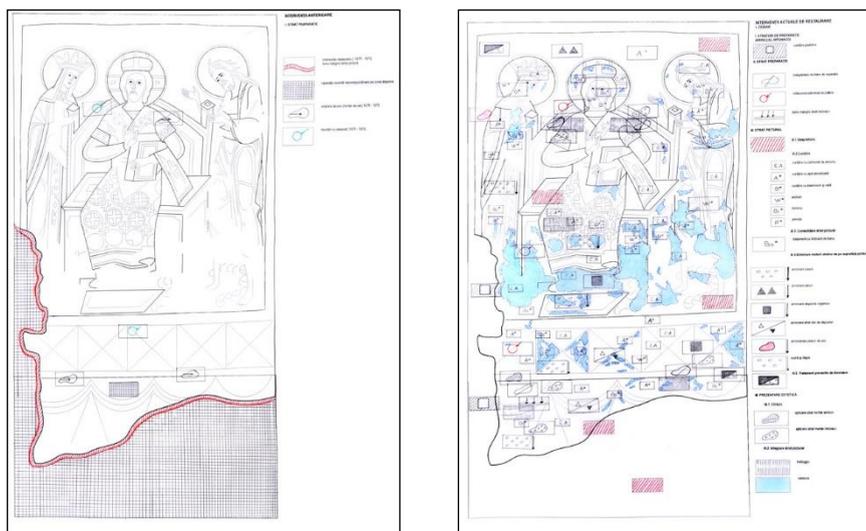


Fig. 28, 29. Hand-drawn graphic representation of the “Deisis” scene, illustrating the *Prior interventions* (left) and the *Current restoration interventions* (right).

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7. \*\*\*, *The Restoration of the Probota Monastery*, UNESCO, 2001.

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- Fig. 22-24. student Burcă Alexandru, graphic representation elaborated during several semester works, on an extracted fragment wall-painting decoration, for the Specialization Course “The Preservation and Restoration of the Work of Art”, Iași, 2012;
- Fig. 25-29. student Dumitraș Raluca, graphic representations of the restoration interventions carried out on the “Deisis” scene, Moldovița (images of the graphic representations portfolio of the License Dissertation “Preservation and Restoration interventions on the wall-painting decoration in the church Moldovița Monastery”, F.A.P.D.D., Iași, 2004).