

The use of **metigoMAP** graphic software for survey, conservation planning and documentation of mosaic pavements



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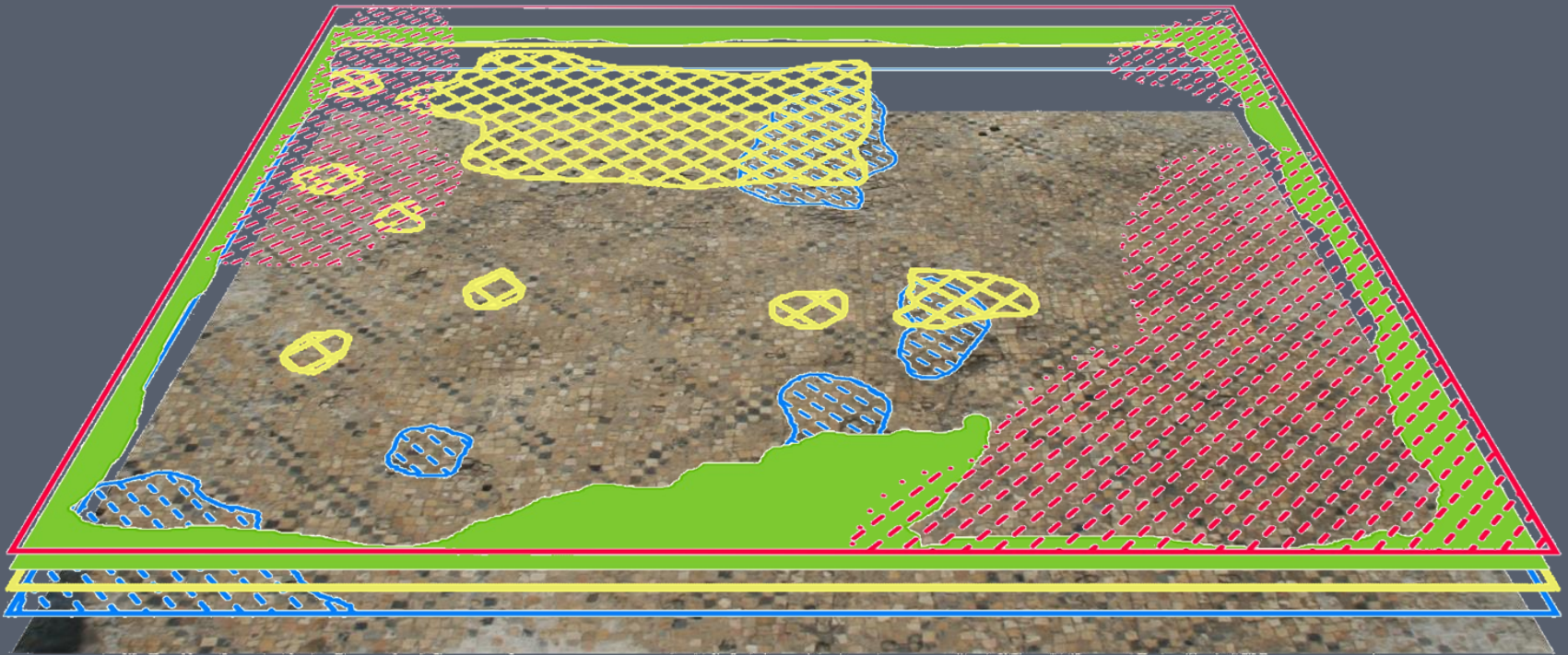
Main challenges of graphic documentation of mosaics

- *Large surfaces*
- *Large number of details to be registered*
- *Numerous phenomena related to various strata of the mosaic*
- *Legibility and clarity – grouping by subject*
- *Frequent updates: inflow of information resulting from the monitoring*
- *Combining graphic and descriptive information*
- *Dissemination and sharing*



Graphic Documentation Of Mosaics

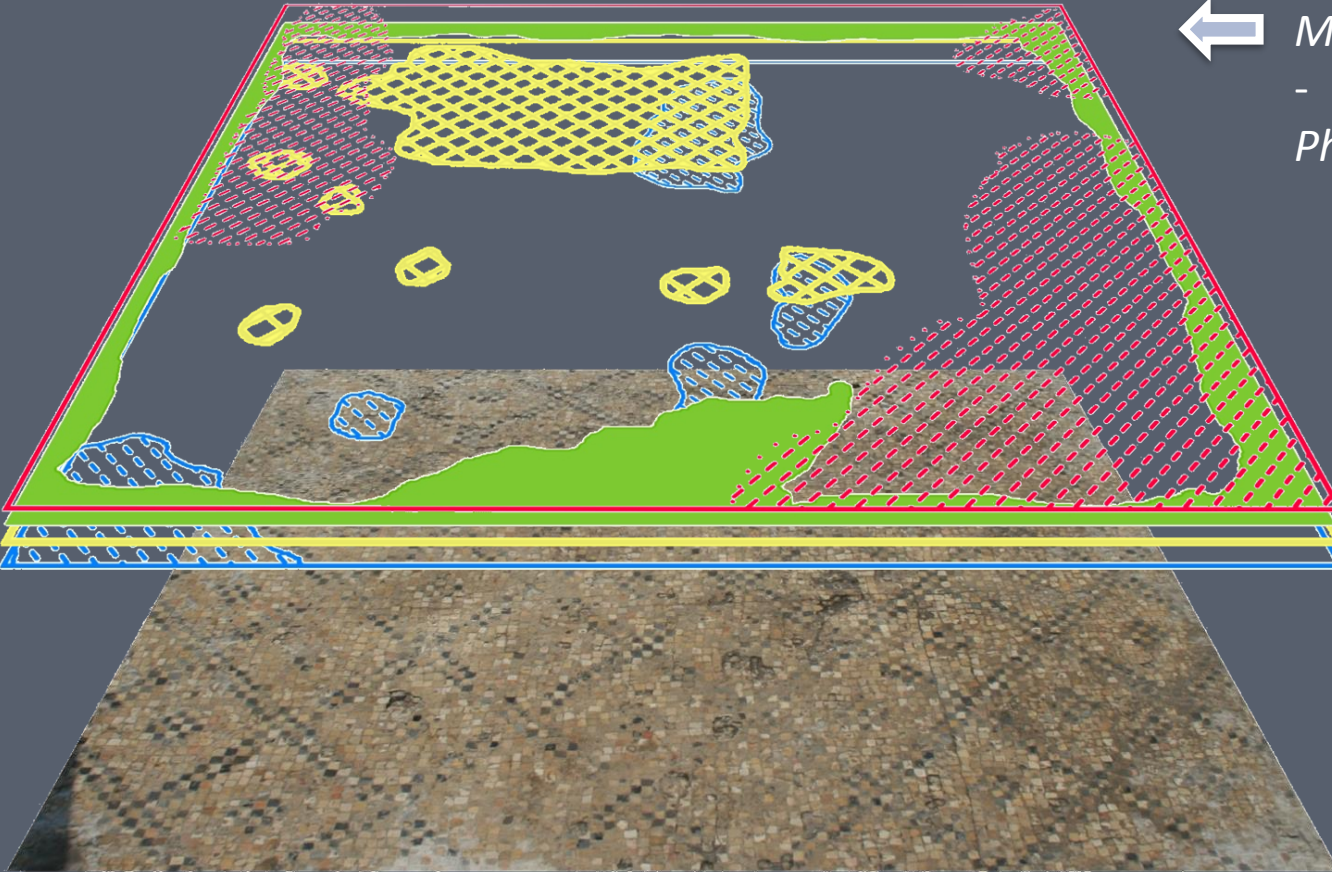
Base + Mapping





Mapping:

- **Raster software**, such as *Photoshop*
- **Vector software**: GIS (Geographic Information System) or CAD (Computer Aided Design)



Mapping Base:

- scanned polyethylene foil
- assembled digital photographs/ ortophotographs
- laser scanning

Mapping Base

- scanned polyethylene foil
- assembled digital photographs/ ortophotographs

Raster files large sizes



Precise vector drawing

Mapping

- Raster software, such as *Photoshop*
- Vector software: CAD, GIS

Neither meets all requirements of conservation documentation



Mapping in conservation-
designed software
(metigoMAP)

Circumstances of application of the method



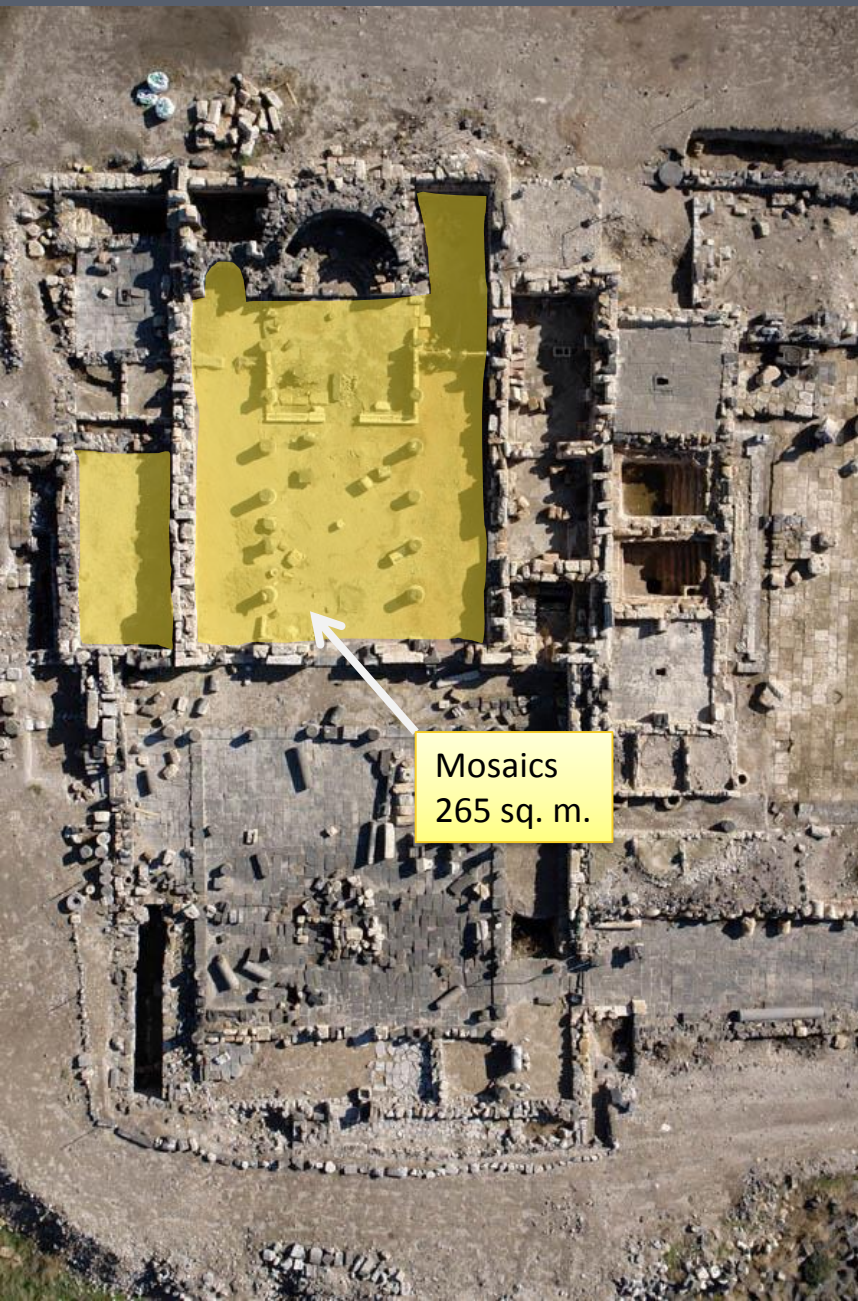
The North-West Church in Hippos-Sussita of the Decapolis, 6th - mid 8th c.

- Excavated and treated in 2000-2008
- Checked annually during excavations
- Necessary treatments applied



2002

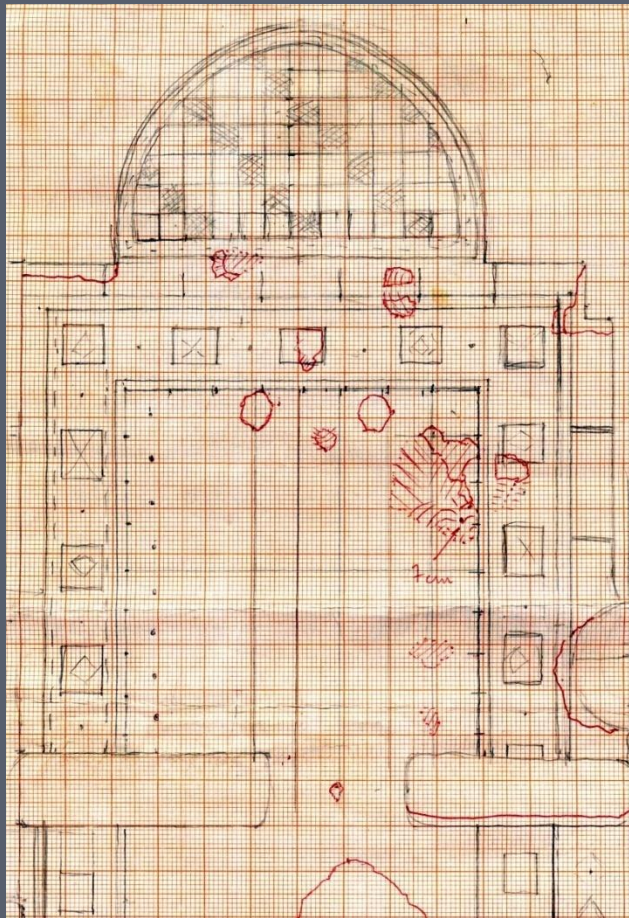
Circumstances of application of the method



- Documentation done during the excavations
- No resources, proper equipment and conditions for detailed photography of the entire mosaic
- No financial resources for laser scanning
- Documentation to serve during annual checks – needs to be updated each time
- Each update of the documentation needs to be clearly marked

Documentation on the site

- Measurements and hard copy drawings prepared on the site



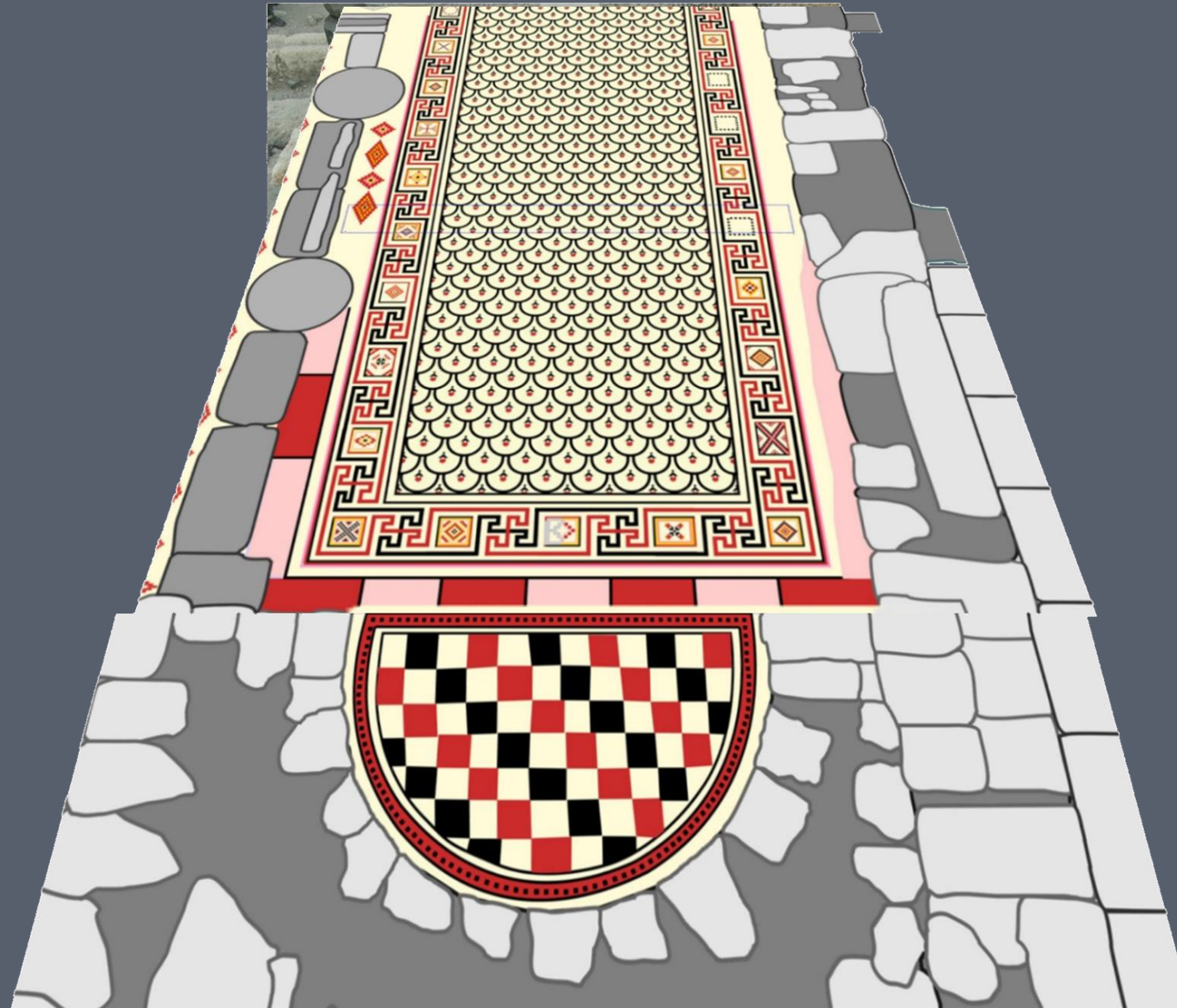
- Overall photographs

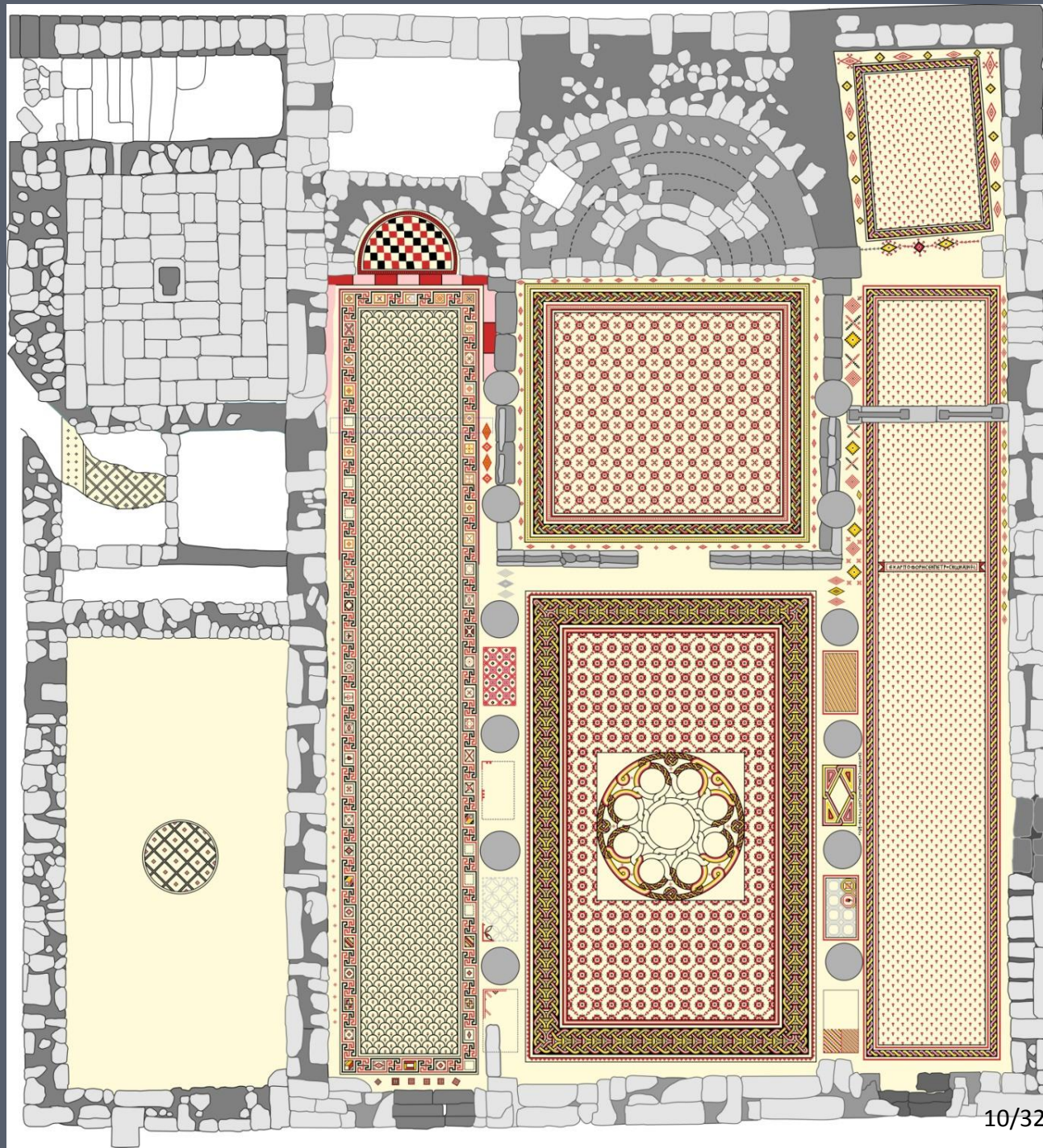


- Detail photographs of condition



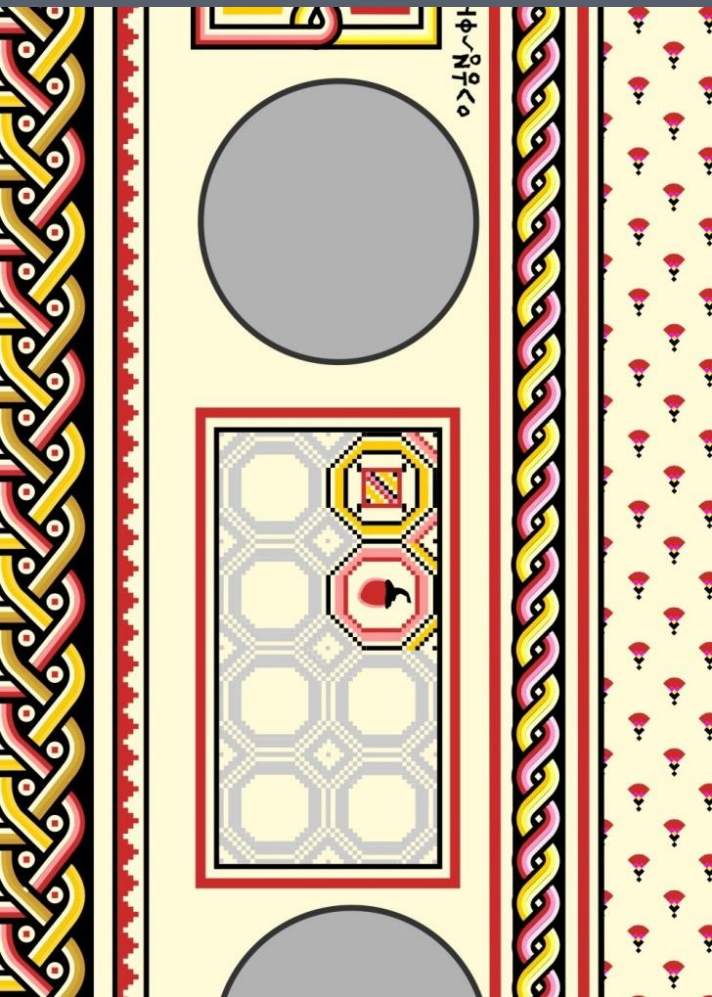
Preparation of the vector drawing (software: CorelDRAW)



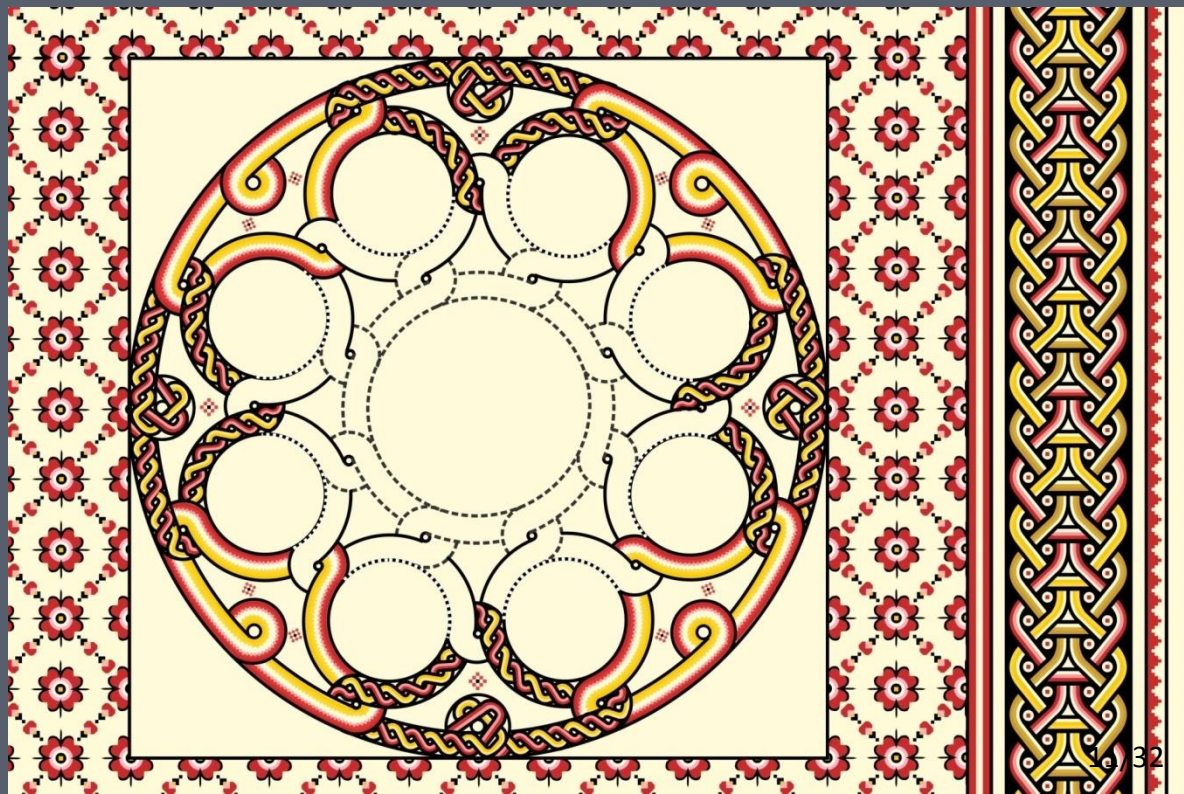


Scale of the drawing 1:20

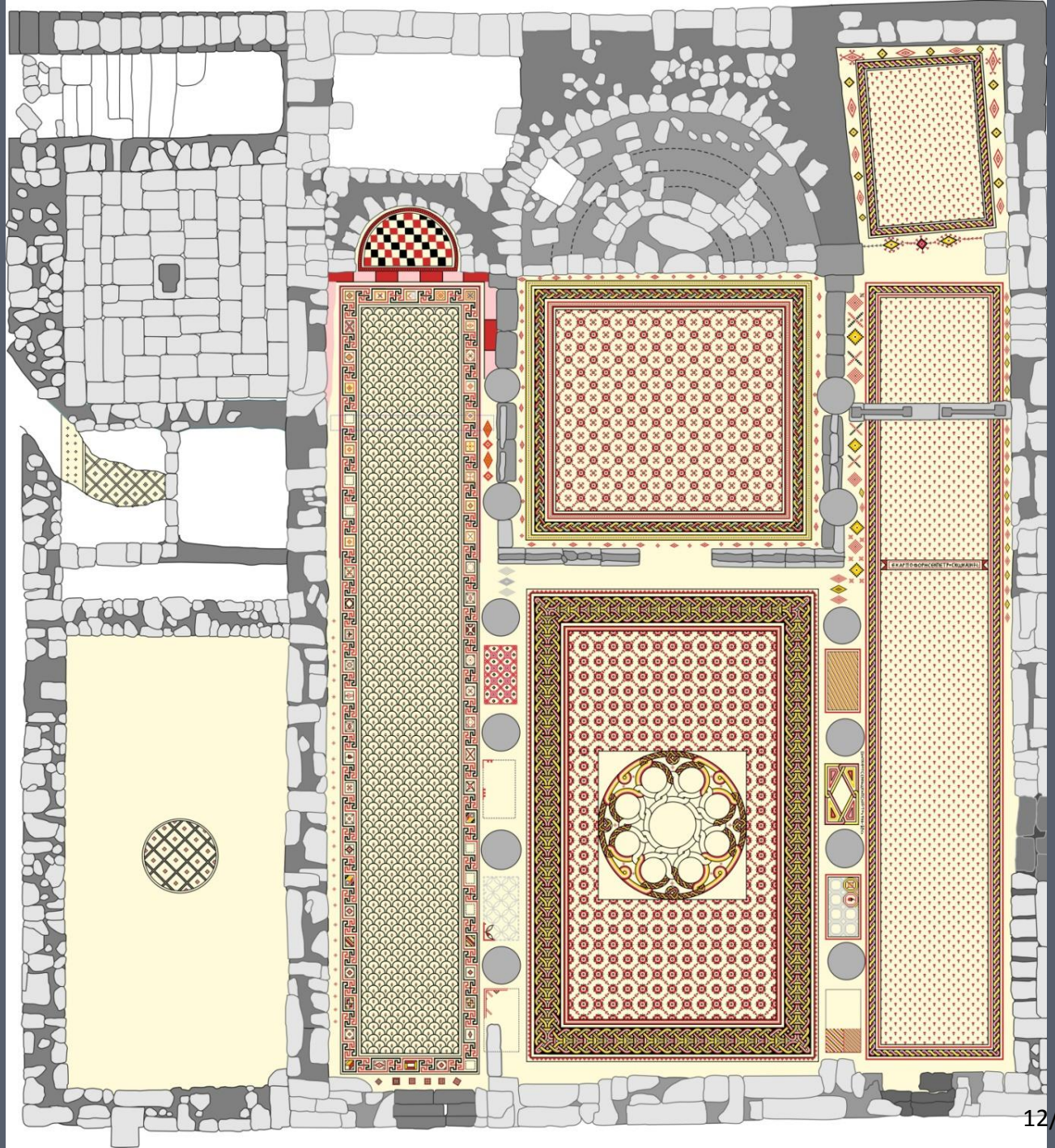
File size: 3.6 MB



0>Nφ<0



✓ Mapping base



Choosing the mapping software:

Possibilities	CAD	GIS	Photoshop/ Corel Photo- Paint	metigoMAP
Image adjustments (color balance, contrast, brightness, sharpness, etc.)	X	X	✓	✓
Overlaying various images	X	X	✓	✓
Vector tools	✓	✓	X	✓
Raster tools	X	X	✓	✓
Text editing	✓	✓	✓	✓
Rectification of mapping bases	X	X	X	✓
Annotations and data fields	X	✓	X	✓
Automatic legends and layout options	X	X	X	✓
3D	✓	X	X	X
Learning efforts	high	high	moderate/ low	moderate

Basic steps of documentation in metigoMAP

- 1. Setting a mapping base – ‘rectification’*
- 2. Mapping process*
- 3. Organizing documentation: mapping ‘groups’ (categories)*
- 4. Mapping templates*
- 5. Measurements*
- 6. Linking external data to the mapping*
- 7. Legends*
- 8. Export and dissemination*

'Rectification' of a Mapping Base

metigo MAP - [Final plan cropped - Zoom: 7.9%]

Project Image Edit Mapping Layout Data sheets data fields View Batch processing ?

Rectification

- Original images
- Final plan cropped
- N
- Detail photo

Rectification

	Original Image:	Rectified Image:
	Final plan cropped.jpg	Final plan cropped_N
Resolution:	300.0 [dpi]	300.0
Scale:	23.20	25.00
Image Size (MB):	360.6	317.7
Image Size (cm):	91.4 x 98.9	85.6 x 93.0
Image Size (pixel):	10791 x 11680	10114 x 10979

Image Quality: standard high userdef.

Rectification

Distance	Length	Error
1>2	13.500	-0.012
2>3	20.800	-0.018
3>4	13.450	-0.012
4>1	20.500	-0.018
1>3	24.600	0.021

Evaluation Area Rectify only Evaluation Area

reticule Step size: 1.000 m

Rotation

Activate Rotation

Reference Line:

Vertical horizontal

Reference Points

Background Colour: white

Rectification

Show result

Transfer to Map

Kind of Transformation: 2D image rectification [prc]

Resampling: Bi-cubic B-Spline [4x4]

Project Mapping Rectifications D8

Metric(108.12 cm, -39.56 cm) Pixel(12770.06, 4672.28)

Working set (Memory): 753,304MB, phys.: 61%

D₁

D₂

metigoMAP screenshot: rectification process

Two dimensions: D₁; D₂

'Rectification' of a Mapping Base

metigo MAP - [Final plan cropped - Zoom: 7.9%]

Project Image Edit Mapping Layout Data sheets data fields View Batch processing ?

Rectification

- Original images
- Final plan cropped
- N
- Detail photo

Rectification

Distance	Length	Error
1>2	13.500	-0.012
2>3	20.800	-0.018
3>4	13.450	-0.012
4>1	20.500	-0.018
1>3	24.500	0.021

Image Data

Original Image:	Rectified Image:
Final plan cropped.jpg	Final plan cropped_N

Resolution: 300.0 [dpi] / 300.0

Scale: 23.20 / 25.00

Image Size (MB): 360.6 / 317.7

Image Size (cm): 91.4 x 98.9 / 85.6 x 93.0

Image Size (pixel): 10791 x 11680 / 10114 x 10979

Image Quality: standard high userdef

Rectification

Evaluation Area Rectify only Evaluation Area

reticule Step size: 1.000 m

Rotation

Activate Rotation

Reference Line:

Vertical Horizontal

Reference Points

Background Colour: white

Rectification

Show result

Transfer to Map

Kind of Transformation: 2D image rectification [prc]

Resampling: Bi-cubic B-Spline [4x4]

Metric(108.12 cm, -39.56 cm) Pixel(12770.06, 4672.28)

Working set (Memory): 753,304MB, phys.: 61%

metigoMAP screenshot: rectification process

Six dimensions: D_1 ; D_2 ; D_3 ; D_4 ; D_5 ; D_6

'Rectification'. Elimination of distortions of photographs

metigo MAP - [2005 (100) - Zoom: 37.2%]

Project Image Edit Mapping Layout Data sheets data fields View Batch processing ?

Rectification

Original images

- IMG_0640
 - R
- 2005 (100)
 - R
- Detail photo

Rectification

Image Data	Original Image:	Rectified Image:
	2005 (100).JPG	2005 (100)_R_04010
Resolution:	400.0 [dpi]	400.0
Scale:	9.83	10.00
Image Size (MB):	0.0	25.9
Image Size (cm):	0.0 x 0.0	21.4 x 17.0
Image Size (pixel):	0 x 0	3374 x 2685

Image Quality: standard high userdef.

Rectification

Width [m]: 1.000

Height [m]: 0.750

Evaluation Area Rectify only Evaluation Area

reticule Step size: 1.000 m

Rotation

Activate Rotation

Reference Line: Vertical horizontal

Reference Points:

Background Colour: white

Rectification

Show distorted image

Transfer to Map

Kind of Transformation: 2D image rectification [prc]

Resampling: Bicubic B-Spline [4x4]

Navigator

Project Mapping Rectifications Data sheets

Metric(1.17 m, 0.42 m) Pixel(1976.63, 1152.38)

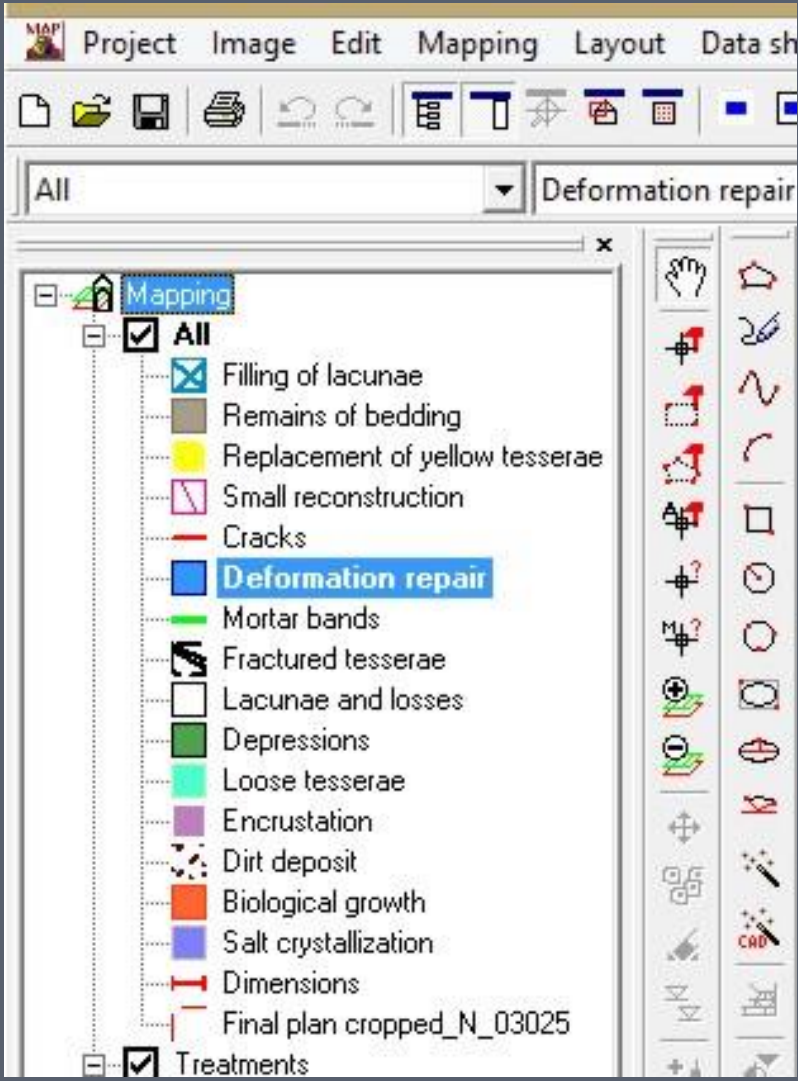
Working set (Memory): 110,572MB, phys.: 32%

metigoMAP screenshot: rectification of a photograph

Mapping

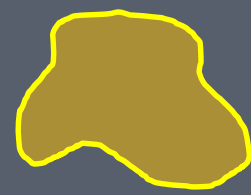


*metigoMAP
screenshot:
condition mapping*



metigoMAP screenshot: mapping classes

Area mapping



Line mapping



'Signatures'

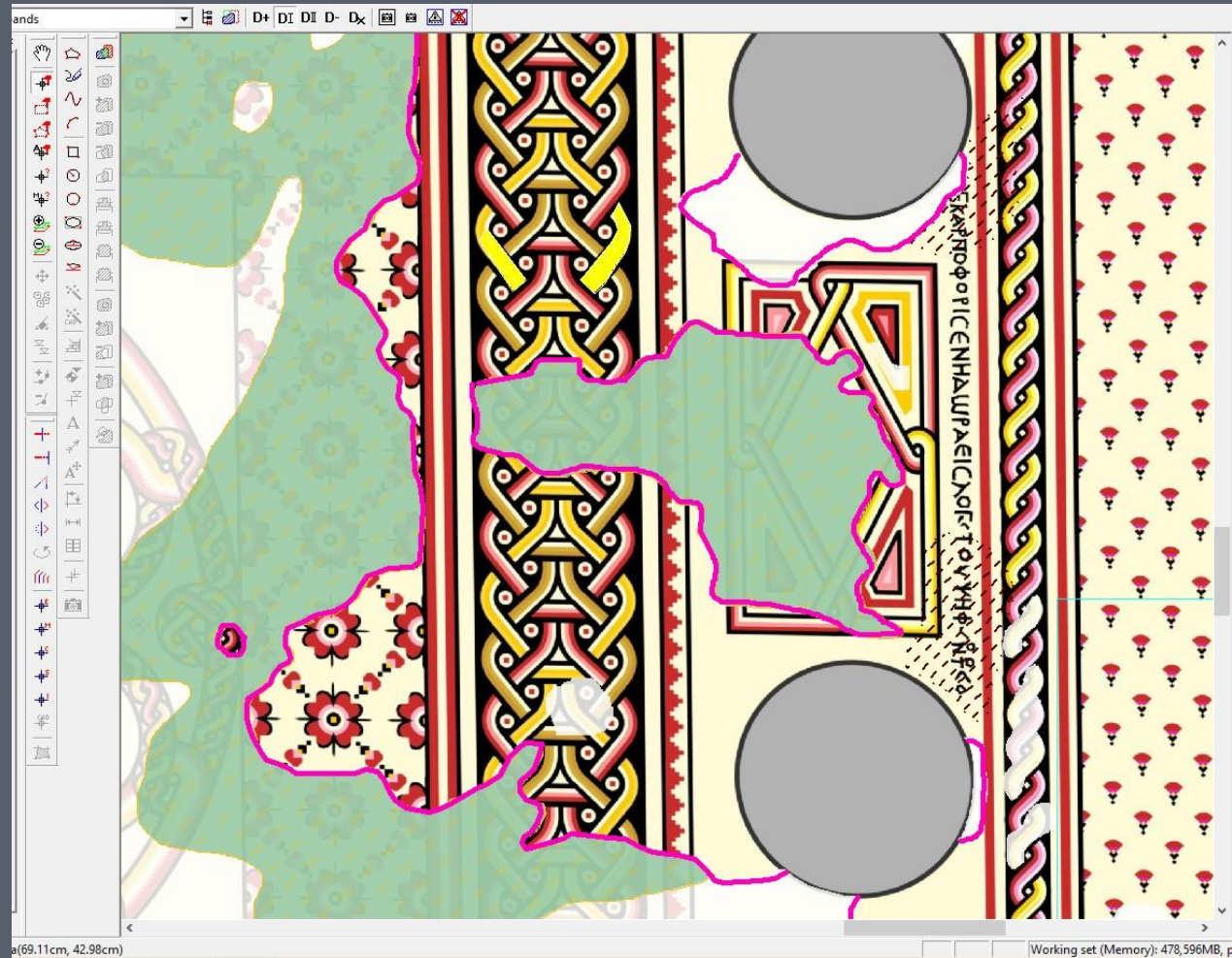


Measurements



Mapping Features:

- Colors
- Color transparency
- Type and color of line/ outline
- Type and color of hatchings
- Width of lines/hatching



Mapping Groups

Dirt deposit
Biological growth
Salt crystallization
Dimensions
Final plan cropped_N_03025

Condition

Final plan cropped_N_03025
Remains of bedding
Lacunae and losses
Depressions
Cracks
Fractured tesserae
Loose tesserae
Salt crystallization
Dirt deposit
Encrustation
Biological growth

Treatments

Final plan cropped_N_03025
Small reconstruction
Deformation repair
Mortar bands
Filling of lacunae
Replacement of yellow tesserae
Grouting
Consolidation of powdery tesserae

Condition

Treatments

Final plan cropped_N_03025
Small reconstruction
Deformation repair
Mortar bands
Filling of lacunae
Replacement of yellow tesserae
Grouting
Consolidation of powdery tesserae

Treatments 2010

Final plan cropped_N_03025
Surface cleaning
Filling of lacunae
Mortar bands
Consolidation of powdery tesserae

Treatments 2011

Final plan cropped_N_03025
Deformation repair
Small reconstruction
Mortar bands
Replacement of yellow tesserae

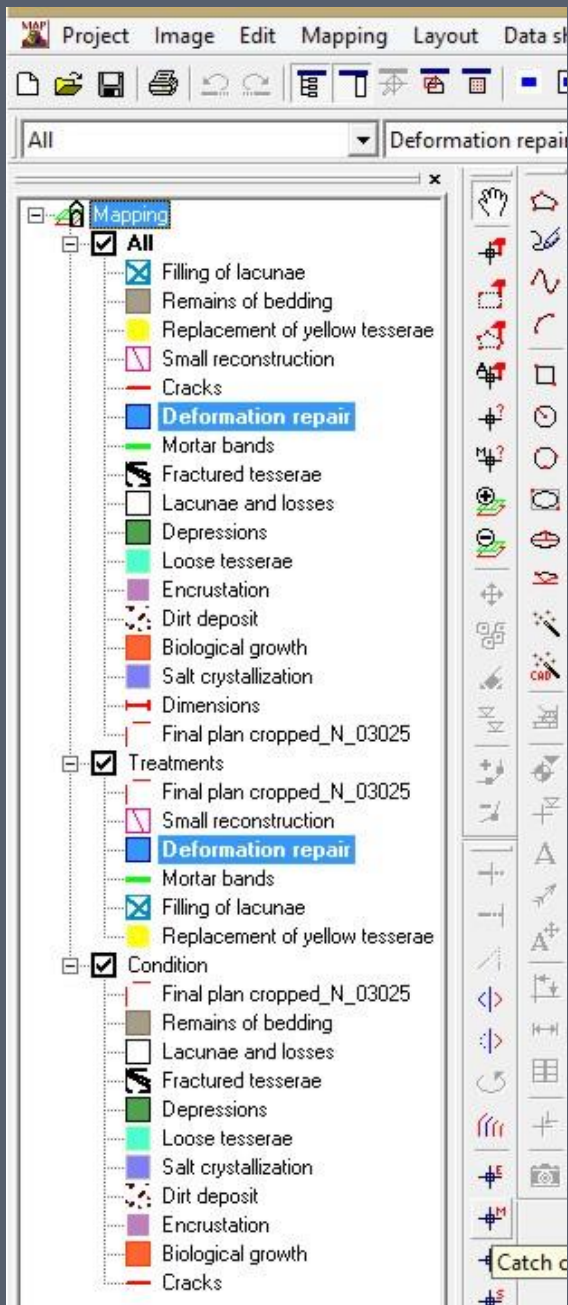
Treatments 2012

Final plan cropped_N_03025
Replacement of yellow tesserae
Grouting
Consolidation of powdery tesserae
Surface cleaning

Treatments 2013

Final plan cropped_N_03025
Deformation repair
Small reconstruction
Consolidation of powdery tesserae
Surface cleaning

Mapping Templates



Export of mapping color code as a template - To be used in other projects

Mosaic A

Mosaic B

Mosaic C

Mosaic D

Mosaic E

Measurements - Quantitative Data

To measure:

- areas of particular areas (i.e. area of a given *lacunae*)
- total areas of mapping classes (i.e. total area of *lacunae*)
- length of lines (i.e. length of mortar bands to be applied)
- any dimensions and distances

Units:

nm, μ m, mm,
cm, dm, m, km

The screenshot shows a GIS software interface with a map of a site. The map displays various features, including a large green area with a value of 13.38 and a smaller green area with a value of 8.75. The map is overlaid with a grid of red and yellow markers. The interface includes a toolbar, a legend, and a table of depression areas.

Name	I.	Area	Area man.
<input checked="" type="checkbox"/> Depressions_015	1	13.38	
<input checked="" type="checkbox"/> Depressions_016	2	8.75	
<input checked="" type="checkbox"/> Depressions_012	1	5.21	
<input checked="" type="checkbox"/> Depressions_008	1	5.03	
<input checked="" type="checkbox"/> Depressions_001	1	4.97	
<input checked="" type="checkbox"/> Depressions_002	2	4.52	
<input checked="" type="checkbox"/> Depressions_011	1	3.74	
<input checked="" type="checkbox"/> Depressions_013	1	3.70	
<input checked="" type="checkbox"/> Depressions_004	5	3.64	
<input checked="" type="checkbox"/> Depressions_009	1	2.37	
<input checked="" type="checkbox"/> Depressions_006	7	1.05	
<input checked="" type="checkbox"/> Depressions_007	8	0.83	
<input checked="" type="checkbox"/> Depressions_010	1	0.68	
<input checked="" type="checkbox"/> Depressions_014	1	0.49	

Dimension Unit: [dm²]

Area of each element



Areas | Size Classes | Classes

	Name	I.	Area
<input checked="" type="checkbox"/>	Lacunae and los...	3	82.366
<input checked="" type="checkbox"/>	Lacunae and los...	3	3.237
<input checked="" type="checkbox"/>	Lacunae and los...	2	1.683
<input checked="" type="checkbox"/>	Lacunae and los...	1	1.494
<input checked="" type="checkbox"/>	Lacunae and los...	9	0.753
<input checked="" type="checkbox"/>	Lacunae and los...	1	0.348
<input checked="" type="checkbox"/>	Lacunae and los...	2	0.334
<input checked="" type="checkbox"/>	Lacunae and los...	6	0.279
<input checked="" type="checkbox"/>	Lacunae and los...	2	0.232
<input checked="" type="checkbox"/>	Lacunae and los...	2	0.231
<input checked="" type="checkbox"/>	Lacunae and los...	3	0.225
<input checked="" type="checkbox"/>	Lacunae and los...	3	0.216
<input checked="" type="checkbox"/>	Lacunae and los...	3	0.216
<input checked="" type="checkbox"/>	Lacunae and los...	1	0.157
<input checked="" type="checkbox"/>	Lacunae and los...	2	0.140
<input checked="" type="checkbox"/>	Lacunae and los...	5	0.111
<input checked="" type="checkbox"/>	Lacunae and los...	5	0.111
<input checked="" type="checkbox"/>	Lacunae and los...	3	0.101

Dimension Unit: [m²]

Number of elements

Total area/
Total length



Areas | Size Classes | Classes

Class	Number	Total
Biological growth	2	2.005
Consolidation of powd...	5	0.443
Deformation repair	3	0.071
Depressions	14	0.583
Dirt deposit	9	12.374
Encrustation	5	0.684
Filling of lacunae	51	7.294
Fractured tesserae	3	0.066
Grouting	2	0.341
Lacunae and losses	67	93.602
Loose tesserae	2	0.039
Remains of bedding	5	8.517
Replacement of yello...	5	0.046
Salt crystallization	5	1.679
Small reconstruction	6	0.625
Surface cleaning	1	12.926

Dimension Unit: [m²]

Cost Calculation

DIANA_kosztorys [Tryb zgodności] - Microsoft Excel użytek niekomercyjny

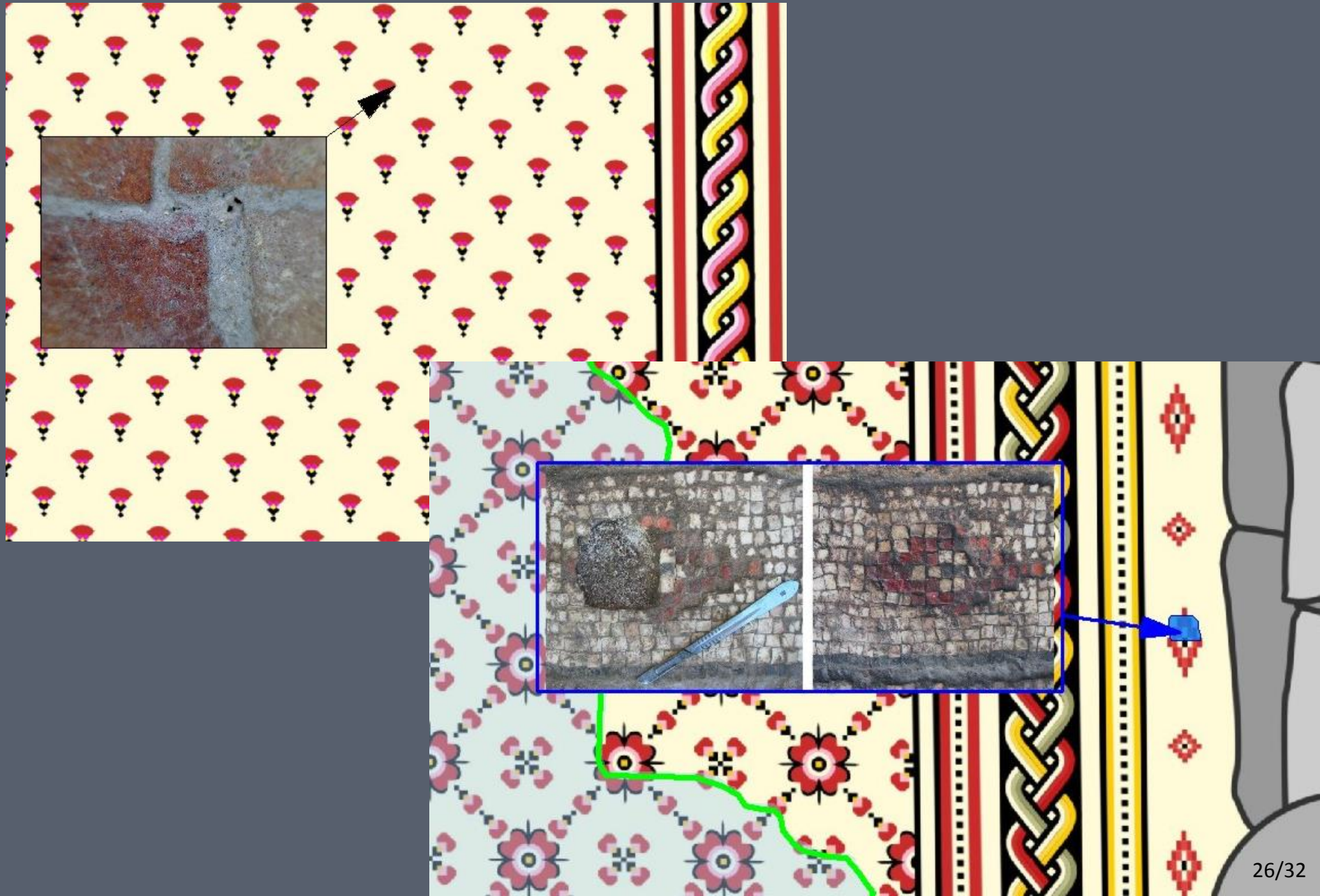
	B	C	D	E	F	G	H	I
	zadanie	poz. w tabeli	st. rew.	% stawki podst.	stawka podst.	cena za 1 dm ²	pow. dm ²	wartość robót
2								
3	1 Elewacje i elementy architektoniczne							
4	Ściany (drewno)	8.B-2.e	0,3	0,37%	3 081,48 zł	3,42 zł	7061	24 151,92 zł
5	Trzony kolumn (16 szt., drewno)	8.D-1.b.	1	0,35%	3 081,48 zł	10,79 zł	9066	97 775,85 zł
6	Kapitele kolumn (drewno)	8.D-1.b	1	0,32%	3 081,48 zł	9,86 zł	1965	19 377,53 zł
7	Bazy kolumn (drewno)	8.D-1.b.	1,5	1,69%	3 081,48 zł	78,12 zł	660	51 522,50 zł
8	Plinty (drewno)	8.D-1.b.	1,5	1,69%	3 081,48 zł	78,12 zł	261	20 422,52 zł
9	Podium świątyni (otynkowane cegły)	8.E-3	1	0,25%	3 081,48 zł	7,70 zł	1380	10 632,18 zł
10	Płyty pod posągami lwów (piaskowiec)	8.D-1.b.	1	1,50%	3 081,48 zł	46,22 zł	211	9 742,72 zł
11	Cokoły pod posągami lwów (otynkowane cegły)	8.B-1.e.	1	0,40%	3 081,48 zł	12,33 zł	628	7 738,34 zł
12	Okna (drewno)	8.B-2.e.	1	0,40%	3 081,48 zł	12,33 zł	171	2 110,20 zł
13	Obramienia okien (drewno)	8.D-1.a.	1	0,30%	3 081,48 zł	9,24 zł	368	3 397,70 zł
14	Drzwi frontowe (drewno)	8.B-3.c.	1	0,70%	3 081,48 zł	21,57 zł	325	7 007,56 zł
15	Framuga drzwi frontowych (drewno)	8.B-2.e	0,3	0,37%	3 081,48 zł	3,42 zł	127	432,72 zł
16	Portal	8.B-2.e	0,3	0,37%	3 081,48 zł	3,42 zł	221	757,15 zł
17	Drzwi tylne (drewno)	8.B-3.d.	1,5	0,30%	3 081,48 zł	13,87 zł	326	4 525,80 zł
18	Framuga drzwi tylnych (drewno)	8.D-1.a.	1,5	1,20%	3 081,48 zł	55,47 zł	147	8 150,27 zł
19	Architrav (drewno)	8.B-2.d.	1	0,50%	3 081,48 zł	15,41 zł	1196	18 420,16 zł
20	Fryz (drewno)	8.D-1.b.	1,2	0,40%	3 081,48 zł	14,79 zł	1211	17 909,22 zł
21	Gzysms (drewno)	10.G	0,2	1,00%	3 081,48 zł	6,16 zł	1285	7 922,24 zł
22	Architrav + fryz + gzysms (WSZYSTKO RAZEM)	8.B-3.d.	0,5	0,37%	3 081,48 zł	5,70 zł	3692	21 046,04 zł
23	Frontony (drewno)	8.E-3	1	0,20%	3 081,48 zł	6,16 zł	1188	7 320,36 zł
24	Konsole (104 szt., drewno)	8.B-2.e.	1	0,45%	3 081,48 zł	13,87 zł	774	10 728,02 zł
25	Podłoga (drewno)	kalk. indyw.					3048	50 000,00 zł
26	Schody	8.B-4.a.	1	1,00%	3 081,48 zł	30,81 zł	1353	41 681,02 zł
27	Dach	8.D-2	0,3	1,08%	3 081,48 zł	9,98 zł	8028	80 152,84 zł

1

wnetrza | elewacje | Arkusz3

Zaznacz obszar docelowy i naciśnij ENTER lub wybierz Wklej

Linking External Data To The Mapping – Detail Photographs



Legends

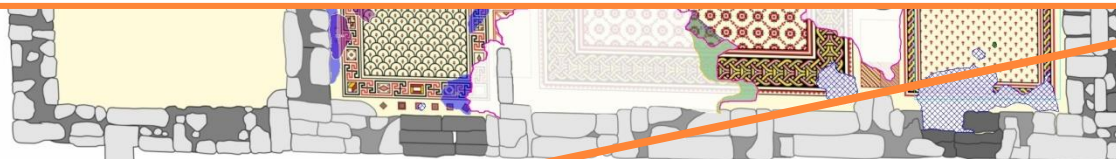


CONDITION

Class name	Number	Total	%M_M(A)
Remains of bedding	5	8.517 m ²	6.03%
Lacunae and losses	67	93.602 m ²	66.26%
Depressions	14	0.583 m ²	0.41%
Cracks	3	1.480 m	1.40%
Loose tesserae	2	0.039 m ²	0.03%
Fractured tesserae	3	0.066 m ²	0.05%
Dirt deposit	9	12.374 m ²	8.76%
Salt crystallization	5	1.679 m ²	1.19%
Encrustation	5	0.684 m ²	0.48%
Biological growth	2	2.005 m ²	1.42%

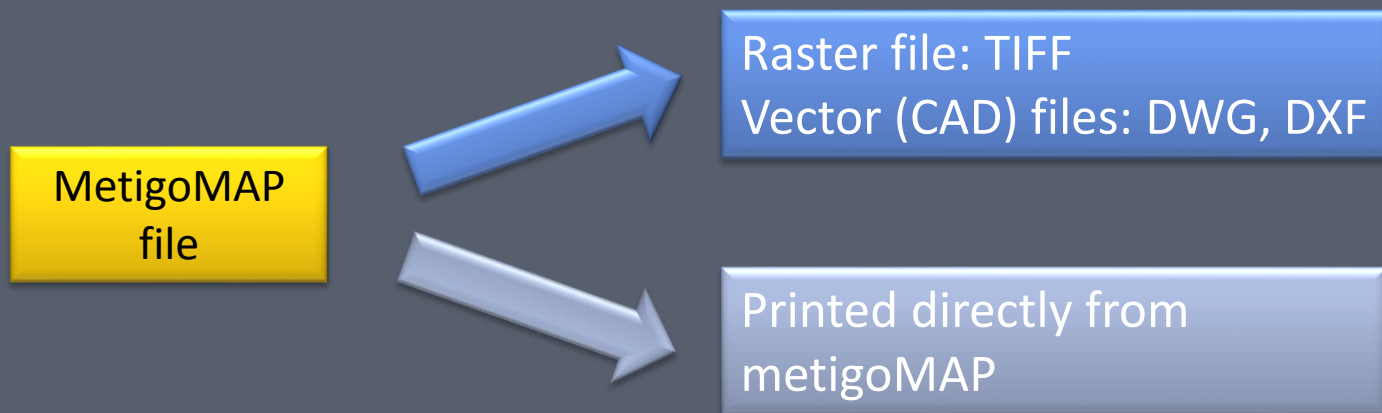
TREATMENTS

Class name	Number	Total	%M_M(A)
Replacement of yellow tesserae	5	0.046 m ²	0.03%
Filling of lacunae	51	7.294 m ²	5.16%
Consolidation of powdery tesserae	5	0.443 m ²	0.31%
Small reconstruction	5	0.597 m ²	0.42%
Grouting	2	0.341 m ²	0.24%
Surface cleaning	1	12.926 m ²	9.15%
Deformation repair	3	0.069 m ²	0.05%
Mortar bands	31	104.010 m	98.60%



CONDITION				TREATMENTS			
Class name	Number	Total	%M_M(A)	Class name	Number	Total	%M_M(A)
Remains of bedding	5	8.517 m ²	6.03%	Replacement of yellow tesserae	5	0.046 m ²	0.03%
Lacunae and losses	67	93.602 m ²	66.26%	Filling of lacunae	51	7.294 m ²	5.16%
Depressions	14	0.583 m ²	0.41%	Consolidation of powdery tesserae	5	0.443 m ²	0.31%
Cracks	3	1.480 m	1.40%	Small reconstruction	5	0.597 m ²	0.42%
Loose tesserae	2	0.039 m ²	0.03%	Grouting	2	0.341 m ²	0.24%
Fractured tesserae	3	0.066 m ²	0.05%	Surface cleaning	1	12.926 m ²	9.15%
Dirt deposit	9	12.374 m ²	8.76%	Deformation repair	3	0.069 m ²	0.05%
Salt crystallization	5	1.679 m ²	1.19%	Mortar bands	31	104.010 m	98.60%
Encrustation	5	0.684 m ²	0.48%				
Biological growth	2	2.005 m ²	1.42%				

Export of mapping



Documentation of the mosaic:

- Condition mapping
- + Collection of detail photographs
- + Written reports

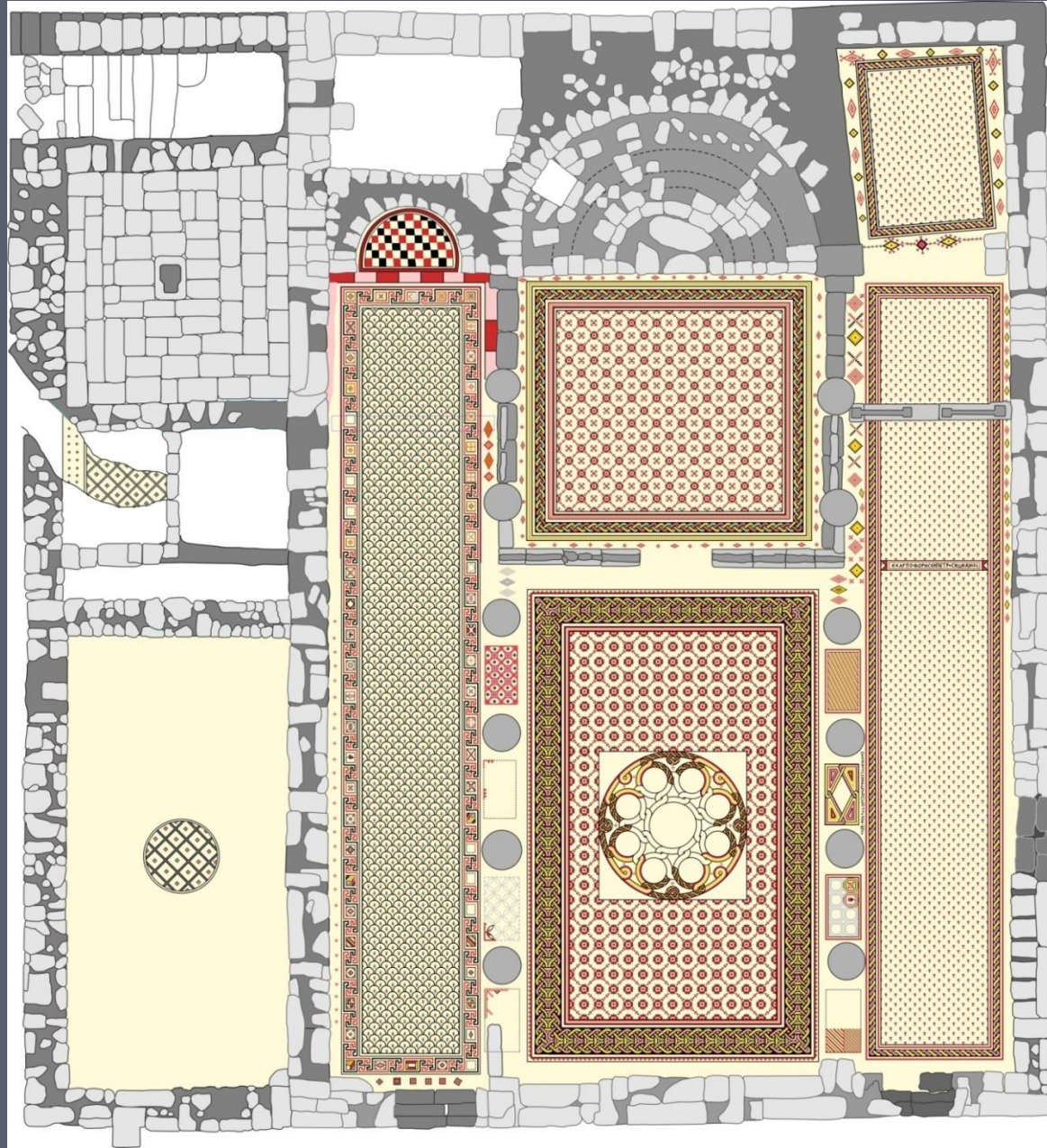


CONDITION				TREATMENTS			
Class name	Number	Total	%M_SAA	Class name	Number	Total	%M_SAA
Remains of bedding	5	0.517 m²	0.03%	Replacement of yellow tesserae	5	0.046 m²	0.03%
Lacunae and losses	67	93.602 m²	66.20%	Filling of lacunae	51	7.294 m²	5.16%
Depressions	14	0.583 m²	0.41%	Consolidation of powdery tesserae	5	0.443 m²	0.31%
Cracks	3	1.480 m	1.04%	Small reconstruction	5	0.597 m²	0.42%
Loose tesserae	2	0.639 m²	0.45%	Grouting	2	0.341 m²	0.24%
Fractured tesserae	3	0.666 m²	0.47%	Surface cleaning	1	12.826 m²	9.16%
Dirt deposit	9	12.374 m²	8.76%	Deformation repair	3	0.069 m²	0.05%
Salt crystallization	5	1.679 m²	1.19%	Mortar bands	31	104.910 m	98.60%
Encrustation	5	0.684 m²	0.48%				
Biological growth	2	2.005 m²	1.42%				

Method Evaluation

1. Vector drawing

- ✓ Very good for large mosaics
- ✓ Very good for geometric patterns
- ✗ Not photorealistic – has to be supplemented with photos
- ✗ Preparation more time-consuming for figurative representations



Method Evaluation

2. metigoMAP software

- ✓ Very good for large mosaics
- ✓ Many drawing functions
- ✓ Easy sorting of the mapping
- ✓ Many layout possibilities
- ✓ Clarity and legibility
- ✓ **Automatic calculations**

✗ Learning effort

■ Price (ca. € 1500)



CONDITION				TREATMENTS			
Class name	Number	Total	%M_SAA	Class name	Number	Total	%M_SAA
Remains of bedding	5	0.517 m ²	0.03%	Replacement of yellow tesserae	5	0.046 m ²	0.03%
Lacunae and losses	67	93.602 m ²	66.20%	Filling of lacunae	51	7.294 m ²	5.16%
Depressions	14	0.583 m ²	0.41%	Consolidation of powdery tesserae	5	0.443 m ²	0.31%
Cracks	3	1.480 m	1.04%	Small reconstruction	5	0.597 m ²	0.42%
Loose tesserae	2	0.639 m ²	0.03%	Grouting	2	0.341 m ²	0.24%
Fractured tesserae	3	0.666 m ²	0.05%	Surface cleaning	1	12.826 m ²	9.16%
Dirt deposit	9	12.374 m ²	8.76%	Deformation repair	3	0.069 m ²	0.05%
Salt crystallization	5	1.679 m ²	1.19%	Mortar bands	31	104.910 m	98.60%
Encrustation	5	0.684 m ²	0.48%				
Biological growth	2	2.005 m ²	1.42%				

Thank you