American Research Center in Egypt
Egyptian Antiquities Project

"Conservation and Display of Roman Mosaics

Kom el-Dikka, Alexandria"

4th Progress Report

Completion Report for the Expanded Shelter Construction

submitted by Dr Wojciech Kołątaj, the Project Director

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This report was prepared for

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COMPLETION REPORT FOR THE EXPANDED SHELTER CONSTRUCTION

1. Introduction to the Expanded Project:

As part of the ARCE/EAP`s Program 2, Cycle Three Subproject, Conservation and Display of Roman Mosaics Kom el-Dikka, Alexandria, the walls and floor mosaics of an Early Roman period house are being conserved and a protective shelter is being built. As part of the shelter construction a revetment wall was constructed. During the construction work and installation of the water insulation system along the southern edge of the shelter a new fragment of mosaic was discovered. The newly discovered mosaic belongs to the complex of the rooms bordering courtyard of the villa from the east. This mosaic of high artistic value was found immediately below and behind the eastern section of the southern wall of the shelter.
The *opus tessellatum* mosaic (measuring 2,3 x 3 m) is composed of a central element surrounded by a wide fringe featuring a geometric design made of overlapping black and white squares and circles. The central element (1,3 m x 1,3 m) is decorated with an elaborate multicoloured floral design framing a small panel (0,5 x 0,5 m) with an animal represented. The panel is finely made of extremely small-sized tesserae. The mosaic is generally well preserved except for a large diagonal lacuna in its northern section and a small fragment of its western edge is considerably damaged with some of its tesserae dislodged, cracked or missing.

2. Construction of the niche:

Under the Expanded Statement of Work it was approved to incorporate the newly discovered mosaic under the protection of the specially designed shelter niche. The technical design for the shelter niche (4 m wide and 2, 5 m deep) was prepared and necessary construction work was completed according to the guidelines set in the Expanded Project. The niche was formed by dismantling a section of the southern wall of the Byzantine building B which had been entirely reconstructed in the 1970s. The construction of the niche increased the exhibition space of the shelter in the south-eastern direction. (Draw. No 1).
The construction work lasted from January 25, 1999 through March 7, 1999.

2.1. Southern revetment wall:

The engineering review appropriate to the site existing conditions, pointed to the crucial role of the revetment wall recessed deeper into escarpment. The escarpment behind discovered mosaic reaches the height of 6 m over the floor level. In such case the option of the southern wall of the shelter niche to be built as a reconstruction of the ancient one must be rejected. Newly built structure of such height made in relatively small stones would not be able to sustain the significant load of the escarpment. The southern

wall of the niche (3,5 x 3,4 m) was therefore made as reinforced concrete wall (ca 0,25 m thick) recessed into the escarpment.
Such wall stabilise the slope by transferring horizontal thrust on to the side walls of the niche, effectively buttressing the whole unit. (Draw. No 3)
The lower section of the revetment wall was additionally reinforced with structurally joined perpendicular concrete buttresses.(Draw. No. 2). The eastern one, (1,3 m high) was concealed behind restored wall of the Early Roman villa *alpha*. The western one, (1 m high) acts at the same time as an encasing wall, screening the foundations of the Byzantine house B walls founded upon rubble. (Draw. Nos. 3 and 5)

2.2. Side walls:

Both the eastern and western walls of the niche were formed by sections of ancient walls of the Byzantine house B. Upper courses of the walls were partially restored. Additional, reinforced concrete beams set on the top of those walls (Draw. No. 5), work as buttresses of the southern revetment wall in its upper level. Both beams abutted 2 concrete pillars of the main construction of the shelter. (Draw. No. 2).

2.3. Ceiling:

The niche was covered with reinforced concrete ceiling slab (0,20 m thick) placed 3,4 m over mosaics level and set on top of the south revetment wall and the side beams. An empty space 1,06 m high between the niche ceiling and the beam holding the entire construction of the shelter's roof from the south was filled up by the thin concrete wall. Such construction enabled extension of the slope over the niche, burying it in the adjacent escarpment. The general shape of the shelter roof remained unchanged. (Draw. No 4).

3. Water insulation:

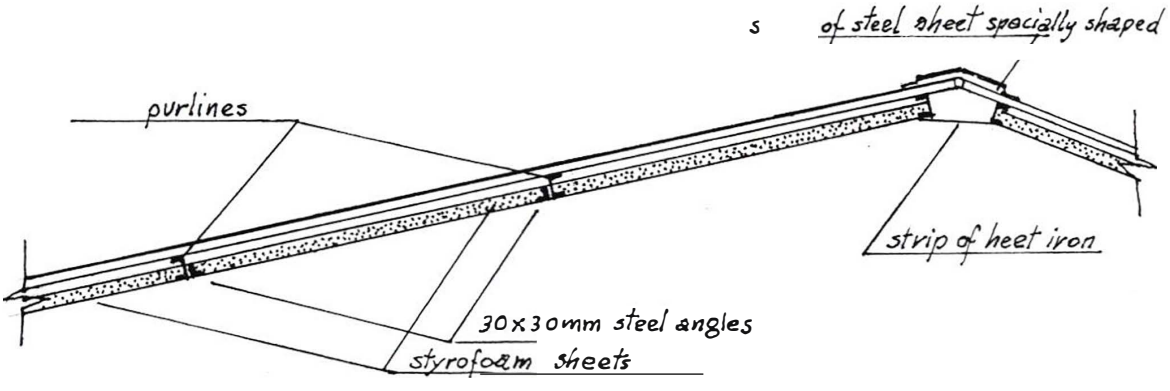
Behind the revetment wall, there exists previously reconstructed wall (1973), badly swerved in horizontal and vertical directions. (Draw. Nos. 2 and 4). On the northern surface of that wall, 2 layers of thick polystyrene foil were firmly pressed to the back surface of the concrete revetment wall. The protective layer of foil was laid also under the foundation and on the top of the wall. Over the upper surface of the niche ceiling, a draining structure made of small stones joined with cement mortar was shaped. (Draw. No. 4). The structure was made sloping 10% towards the east. (Draw. No 5). The upper surface of the structure as well as the back surface of the front wall of the niche were impregnated with ADDICON (acrylic resin based compound) and covered with double foil sheets. This insulation forming the U-shaped sloping surface (ca 1,5 m wide) behind the entire southern wall of the shelter protects whole construction even against heavy rains or surface flooding. (Draw. No 4).
Over the ceiling of the niche, along the southern edge of the shelter, a new stone revetment wall has been built. The said wall, built on top of the southern wall of the Byzantine house B, was structured as slightly inclined to the south. This structure was designed not only in order to shape a proper waterproof gutter along the southern wall of the shelter, but also to counteract horizontal and vertical thrust of the escarpment. (Draw. No. 4)

Statement of work completed as specified in Section 6.2. Workplan. Shelter Construction, that had not been completed at the time of submission of Progress Report No. 3 dated November 5, 1998.

1. Roofing

1.1. Roofing finishing work was completed. Roof ridge was covered with specially shaped strip of metal sheets of the same thickness and color as the rest of the roof.

1.2. During on-site inspection on March 2, 1999 by Mr. R.Vincent, EAP Project Director, and Mr. J. Dobrowolski, EAP Technical Director, and ensuing discussion, a decision was taken to relinquish the ceiling construction and to leave steel structure of the roof exposed.
Immediately below the roofing, 10 steel angles (30x30 mm, 15 m long) were welded to the purlins in required places, in order to fix thermal insulation (styrofoam sheets). (See sketch below). Gap between top purlins was screened from below with strip of sheet iron.



1.3. Mounts for gutters were welded along the northern and southern edge of the roof. Mounts were made in accordance with adopted gradient of drainage, (length of each mount varied from 17 to 27 cm). Gutters were then fixed on mounts.(Phot. nos. 14-15).

2. Foot-bridge for visitors.

The foot-bridge was constructed as a frame made of steel eyebars (180 mm) welded together to form a T-shape structure in plan. The frame composed of 2 perpendicular sections (12 m and 6,80 m respectively) rests on partially restored ancient walls of the villa. Walkway, 0,80 m wide is built of wooden planks in sections 1,5 m long (5 cm thick), supported by T-irons (50 x 50 mm) welded perpendicularly to the frame. (Phot. Nos. 16-17; Draw. No. 6)

3. Panel glass walls.

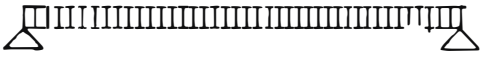
Steel structure of panel glass walls was completed in all three sections: from north, west and east. The construction was made of steel box-sections (80x40 /2mm). Tops of the vertical elements were welded to the steel beam from the north side, and to the girders from the west and east respectively. Bottom partes of the sections were sunk into concrete socle topped with sills. (Phot. Nos. 18-19)

ATTACHMENT No. 1

NICHE CONCRETE REINFORCEMENT
STRUCTURAL CALCULATIONS.

1. Ceiling concrete reinforcement.

o.w. = 0.10 x 0.15 x 2.5 = 0.0375 t./m'



L.L. = 0.2 t./m' sand = 1.5 t./m'

$$M = \frac{2.0\,(3.6)^2}{8} \quad 3.24 \text{ t.m'}$$

$$d = K\sqrt{\frac{M}{b}} \qquad d = 0.229\sqrt{\frac{3.24 \times 10^5}{100}} = 13.03 \text{ t.m'}$$

t = 15 cm

$$A_s = \frac{2.0 \times 10^5}{2158 \times 13} = 7.13 \text{ cm}^2 \text{ (6 } \Phi \text{ 16 mm/m')}$$

2. Front wall concrete reinforcement.

$E_1 = 3 \times 0.3 \times 1.45 = 0.15$ t./m'

$$E_2 = 3 \times 1.8 \times 1.45 \times \frac{1.45}{2} = 0.63 \text{ t./m'}$$

$$W = \frac{2}{3} \times 1.6 \times 1.45 \times 1.8 = 2.78 \text{ t./m'}$$

M = 0.15 (0.65) + 0.63(0.48) - 2.78(0.86) = - 1.99 t.m/m'

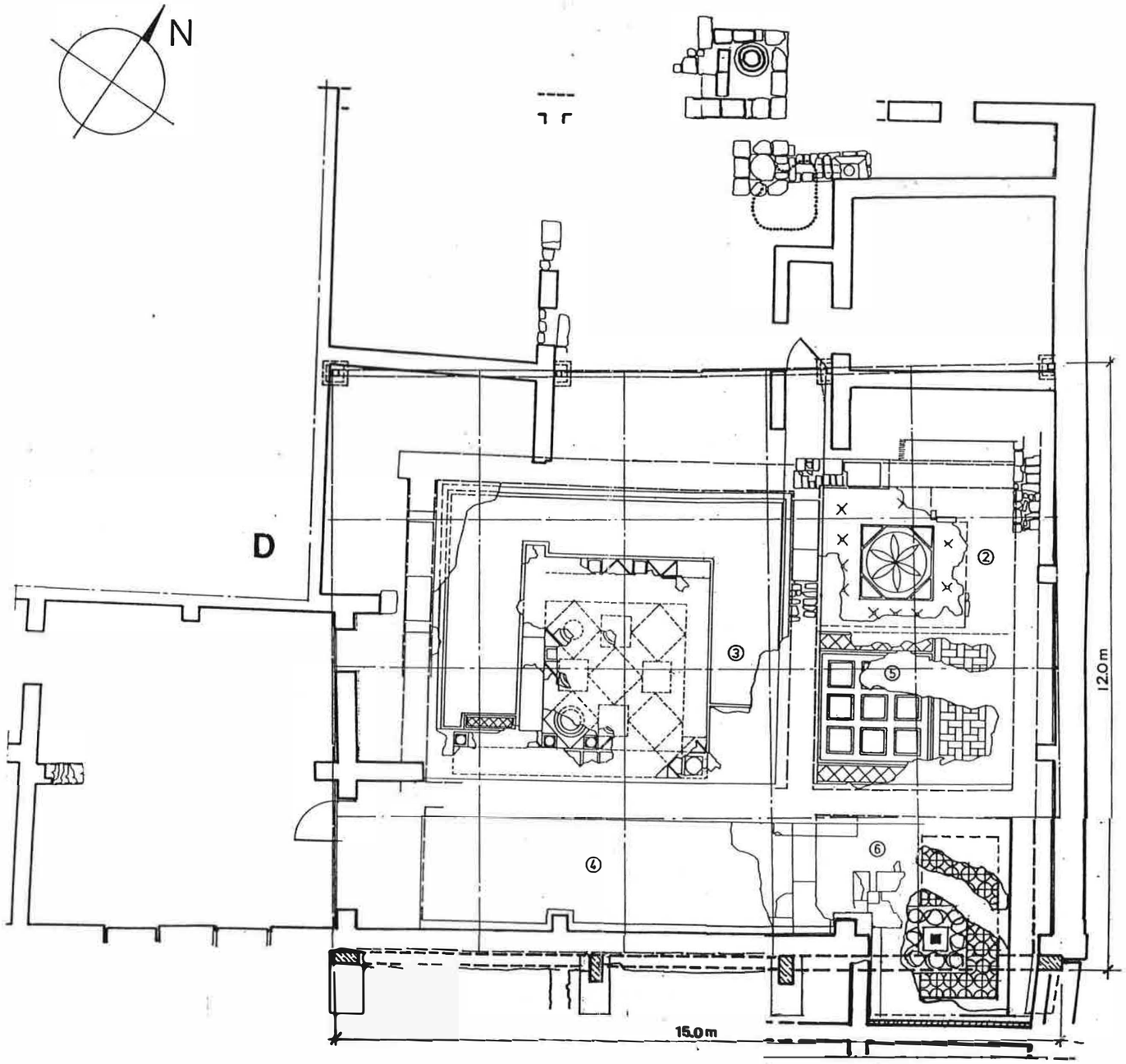
$$d = K\sqrt{\frac{M}{b}} \qquad d = 0.229\sqrt{\frac{1.99 \times 10^5}{100}} = 10.21 \text{ cm}$$

t = 12 cm

$$A_s = \frac{1.99 \times 10^5}{2158 \times 10} = 9.22 \text{ cm}^2 \quad (7\Phi \text{ 13 mm/ m'})$$

NICHE SITUATION WITHIN THE SHELTER

Drawing No. 1
drawn by W.Kołątaj

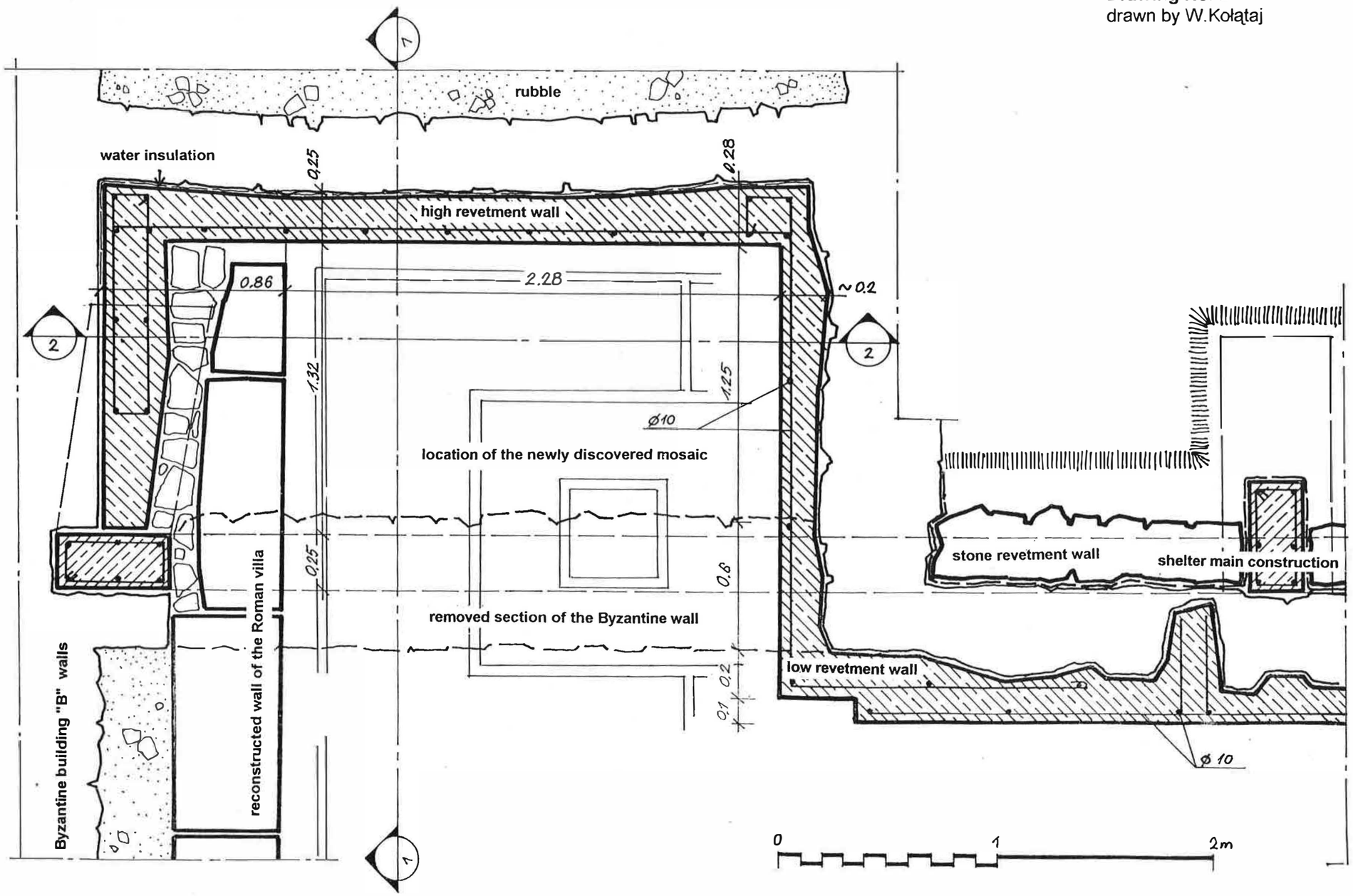


NICHE CONSTRUCTION

GROUND PLAN, Lower level

(1 m above mosaics level)

Drawing No. 2
drawn by W.Kołątaj

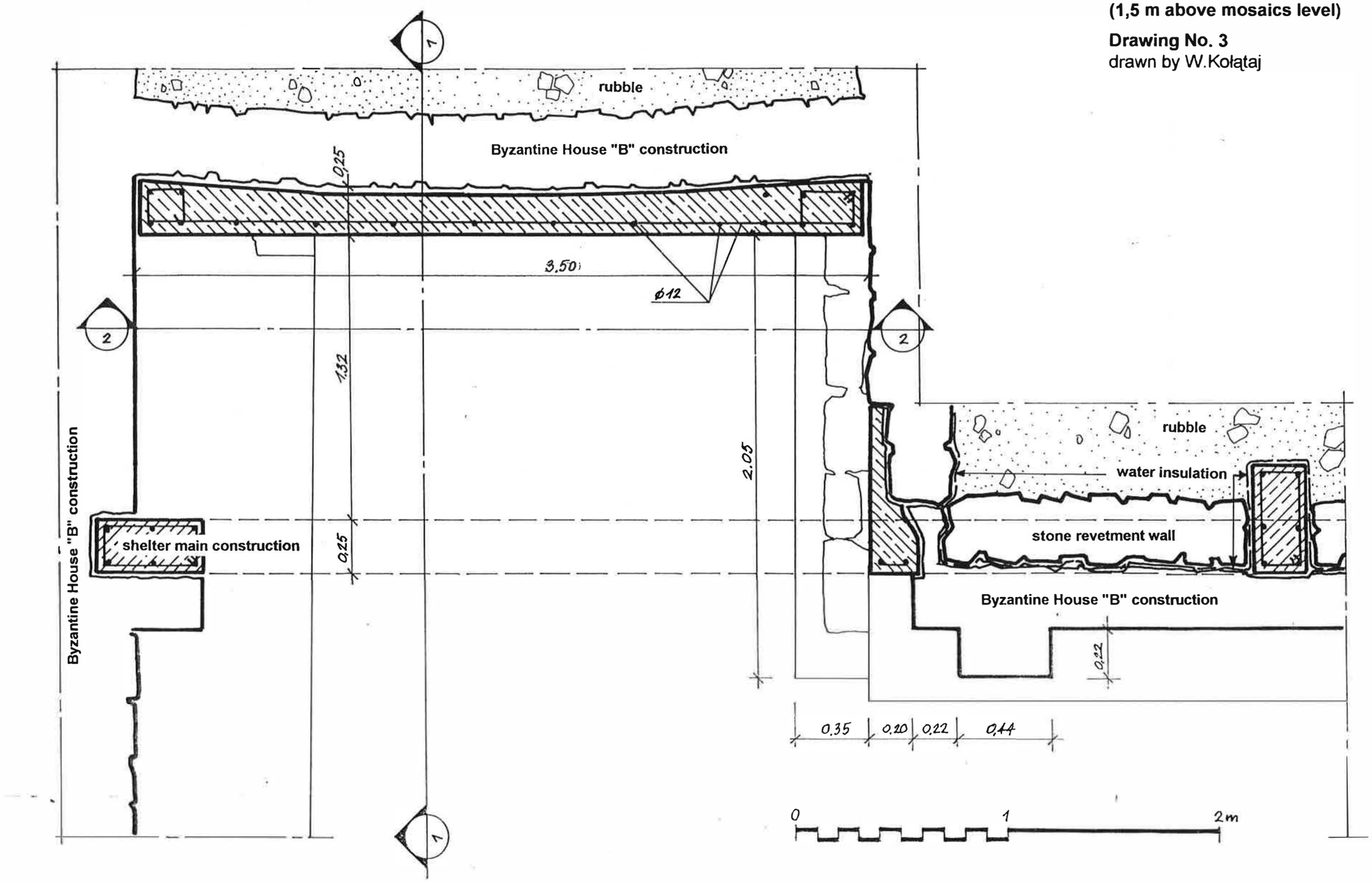


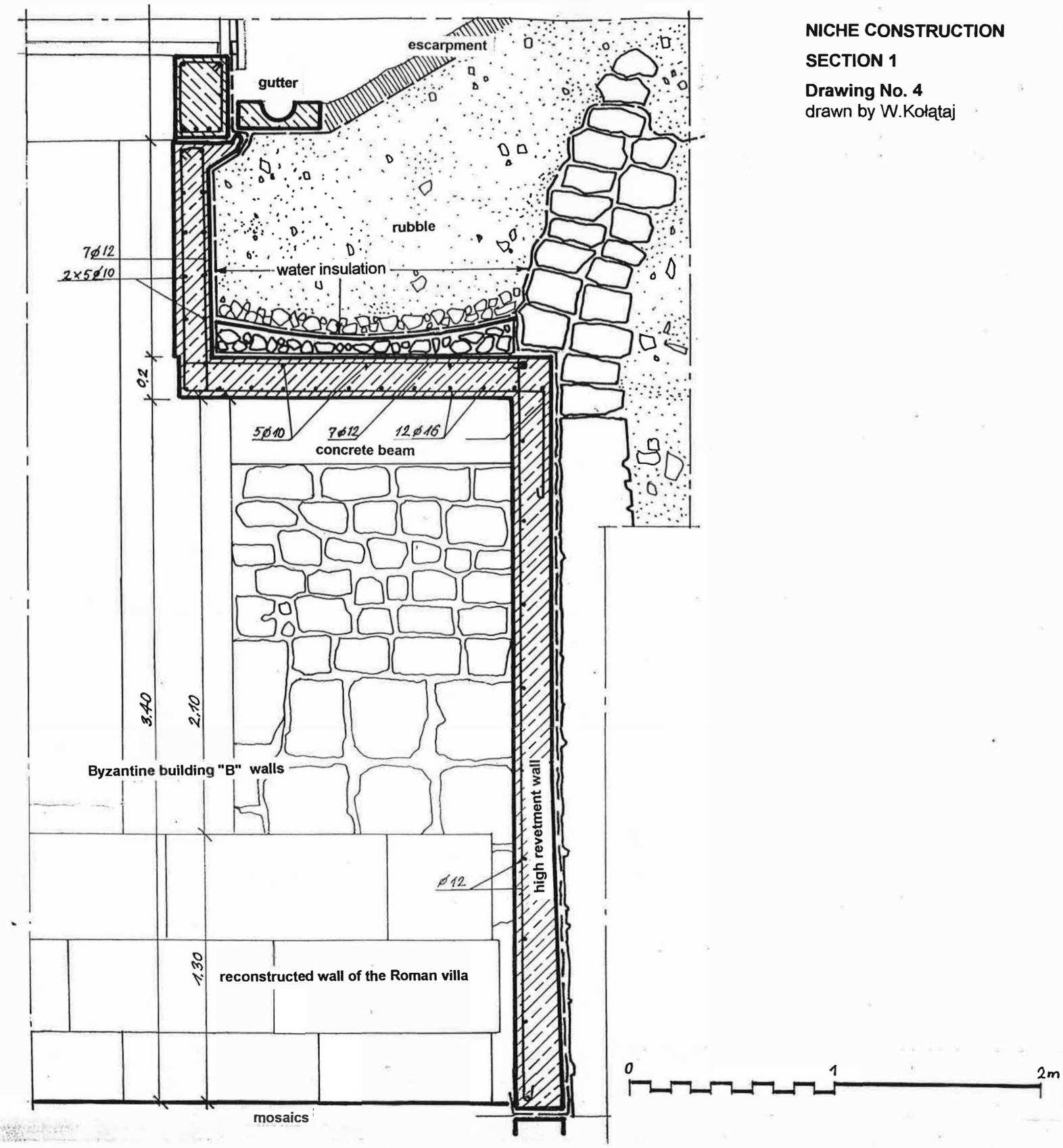
NICHE CONSTRUCTION

GROUND PLAN, Upper level

(1,5 m above mosaics level)

Drawing No. 3
drawn by W.Kołątaj





NICHE CONSTRUCTION

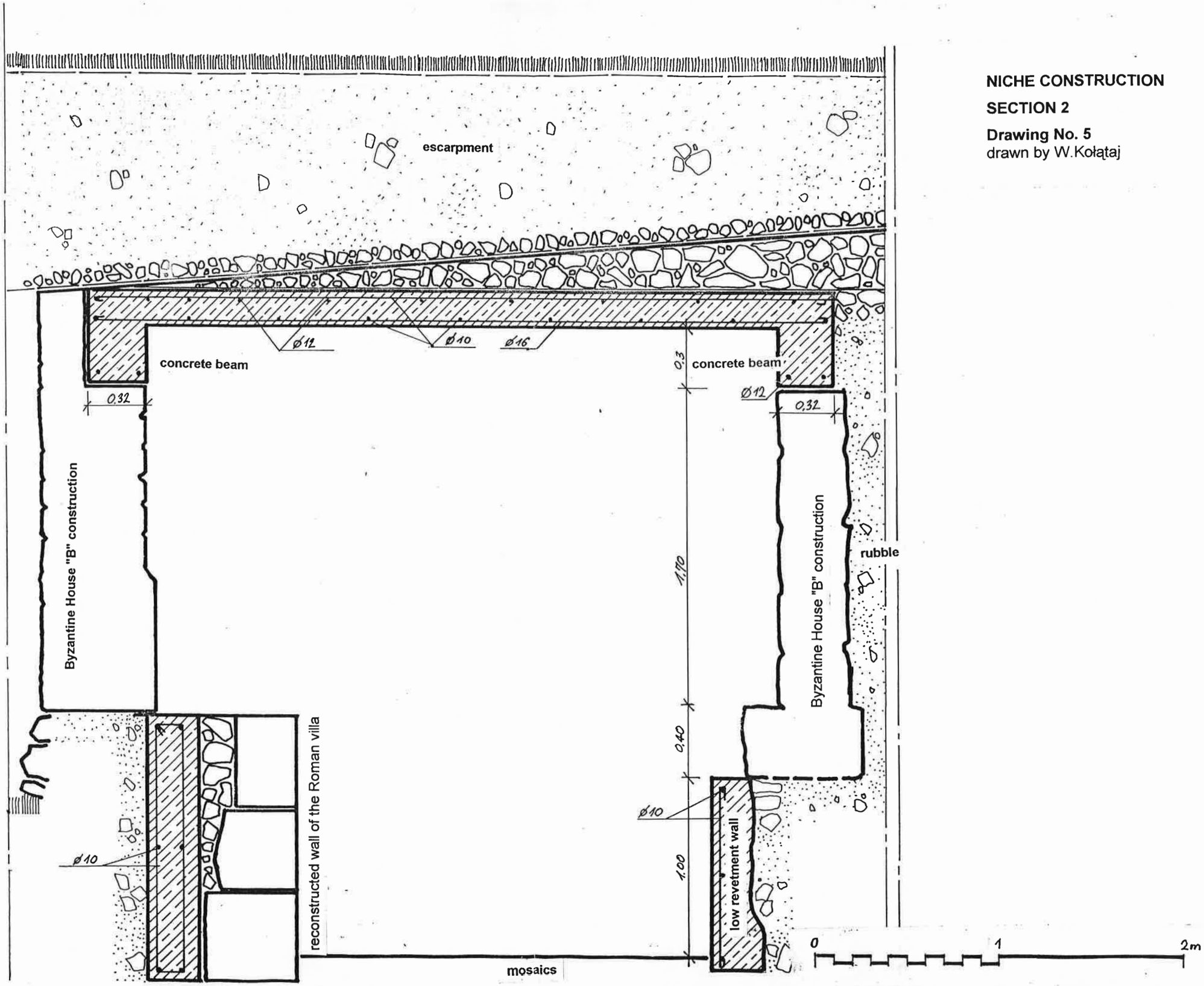
SECTION 1

Drawing No. 4
drawn by W.Kołątaj

NICHE CONSTRUCTION

SECTION 2

Drawing No. 5
drawn by W.Kołątaj

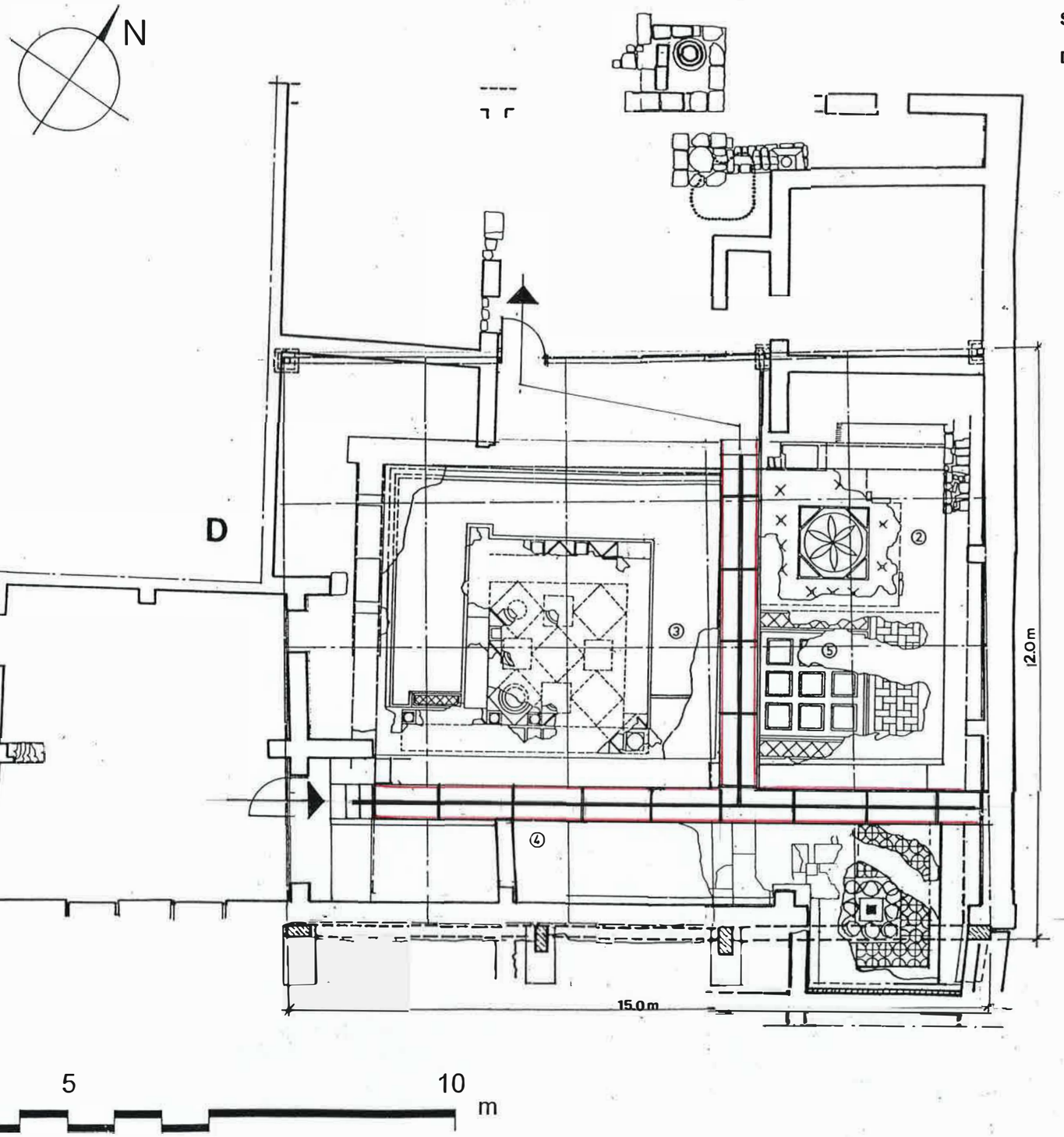


Drawing No. 6

FOOT-BRIDGE

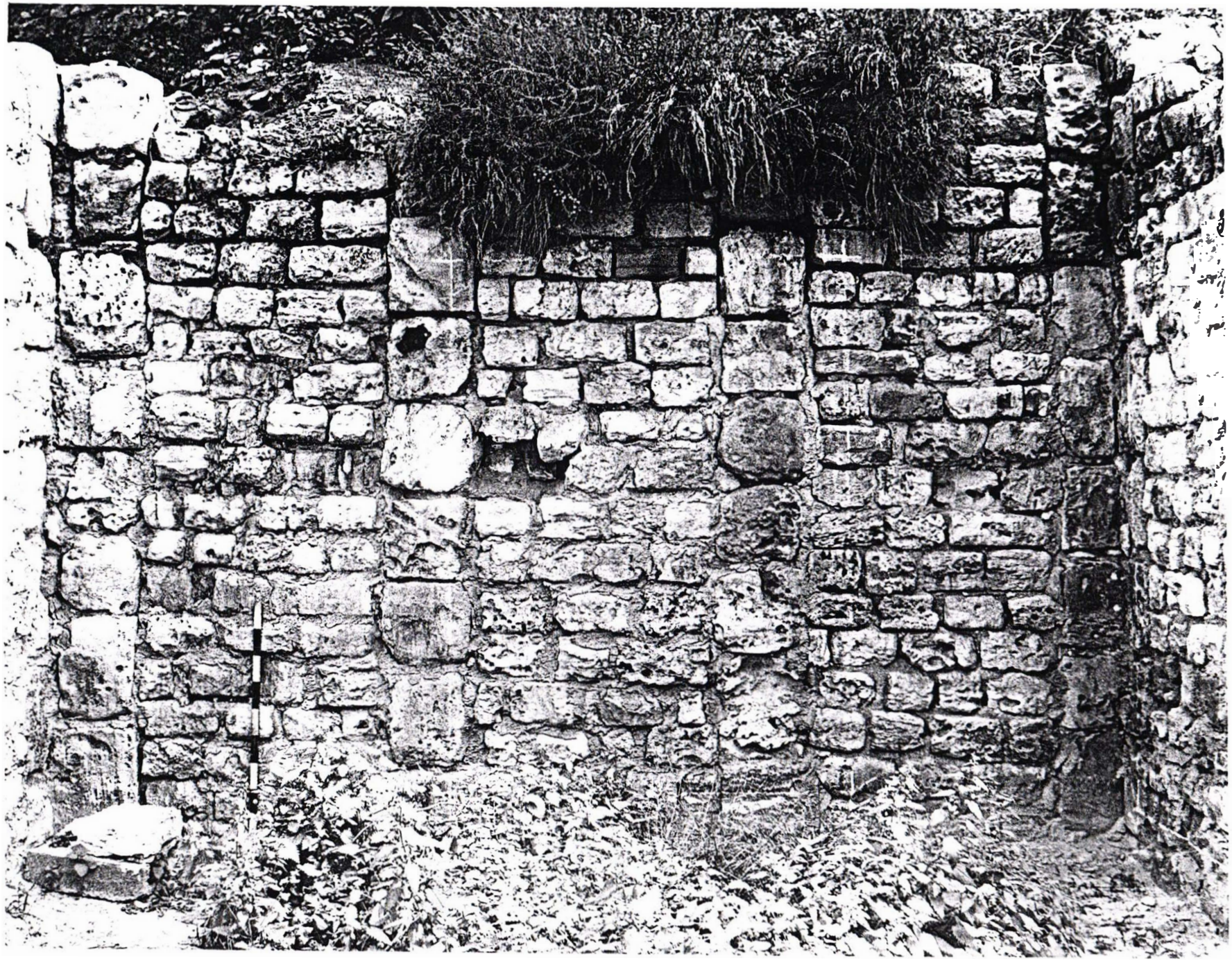
STRUCTURE AND LOCATION

Drawn by. W.Kołątaj



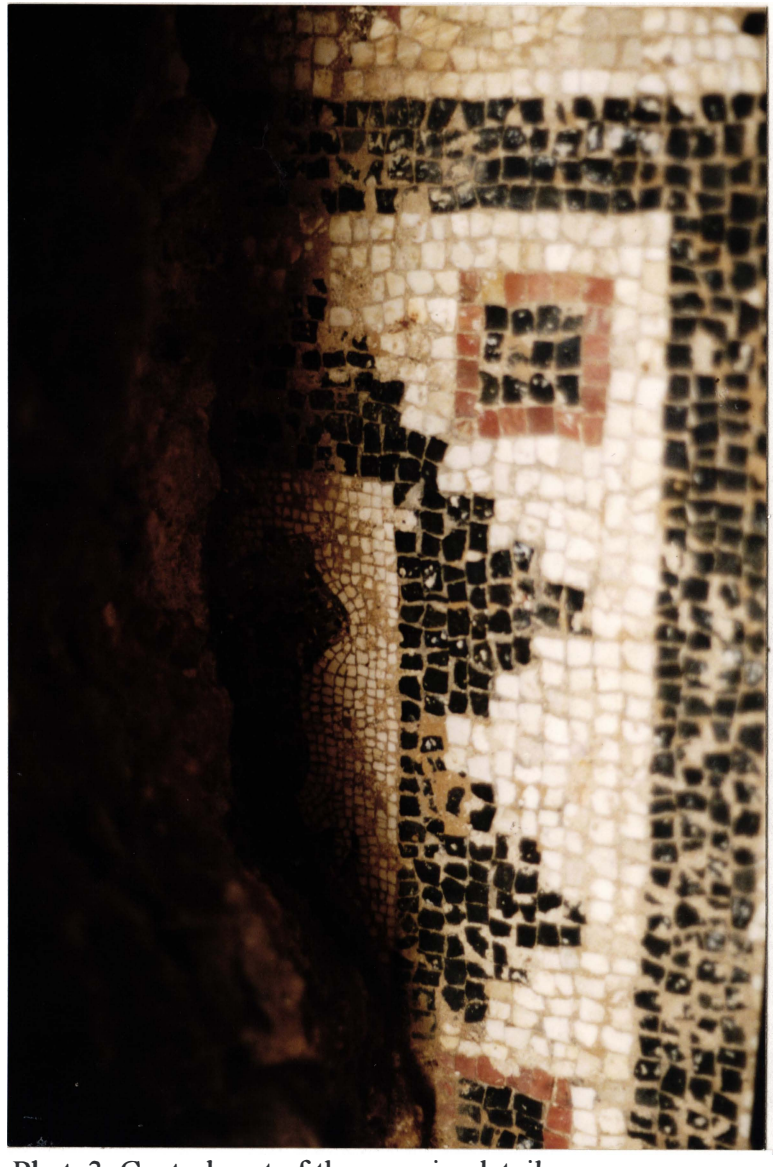
PHOTOGRAPHS

by E. C. Brock



Phot. 1. Section of the reconstructed wall of the Byzantine building "B"; before dismantling.

Phot. 2. Fragment of the mosaic found below walls of the Byzantine building "B".



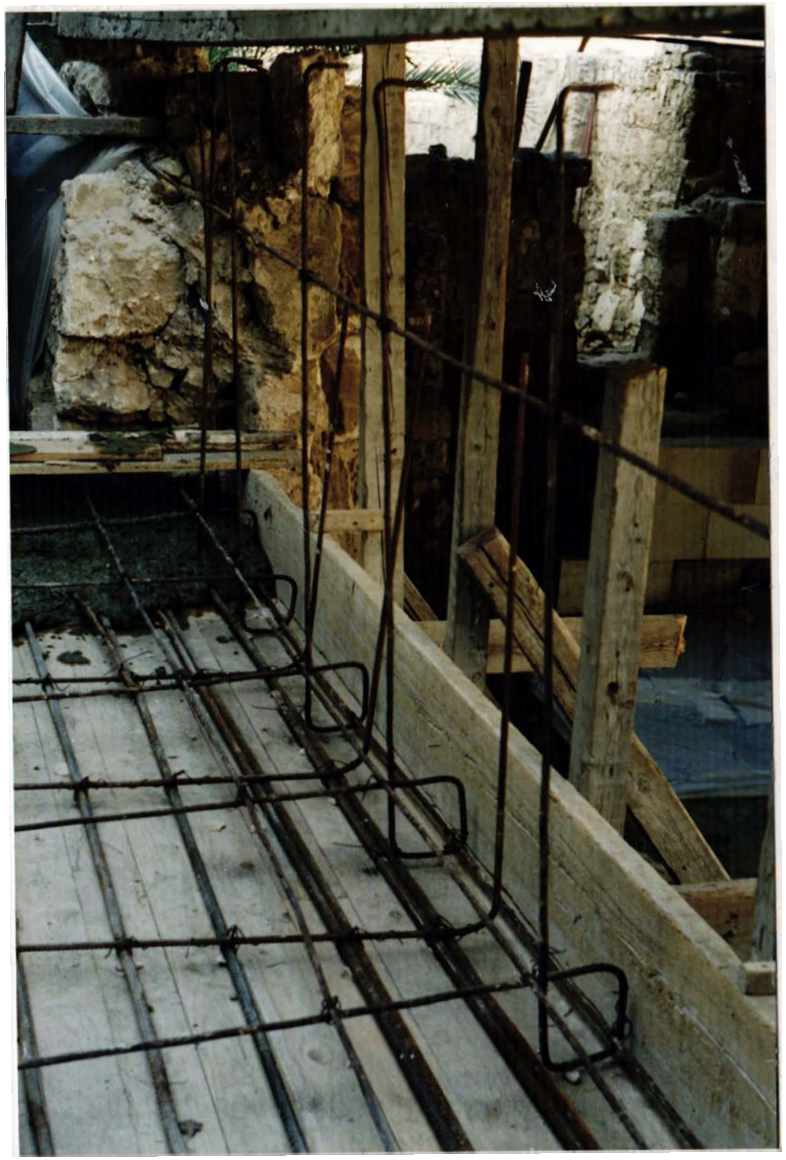
Phot. 3. Central part of the mosaic; detail.

Phot. 4. Southern revetment wall; insulation and reinforcement structure.

Phot. 5. Southern revetment wall; boarding.

Phot. 6. Ceiling of the niche; boarding.

Phot. 7. Front wall above the ceiling; boarding.

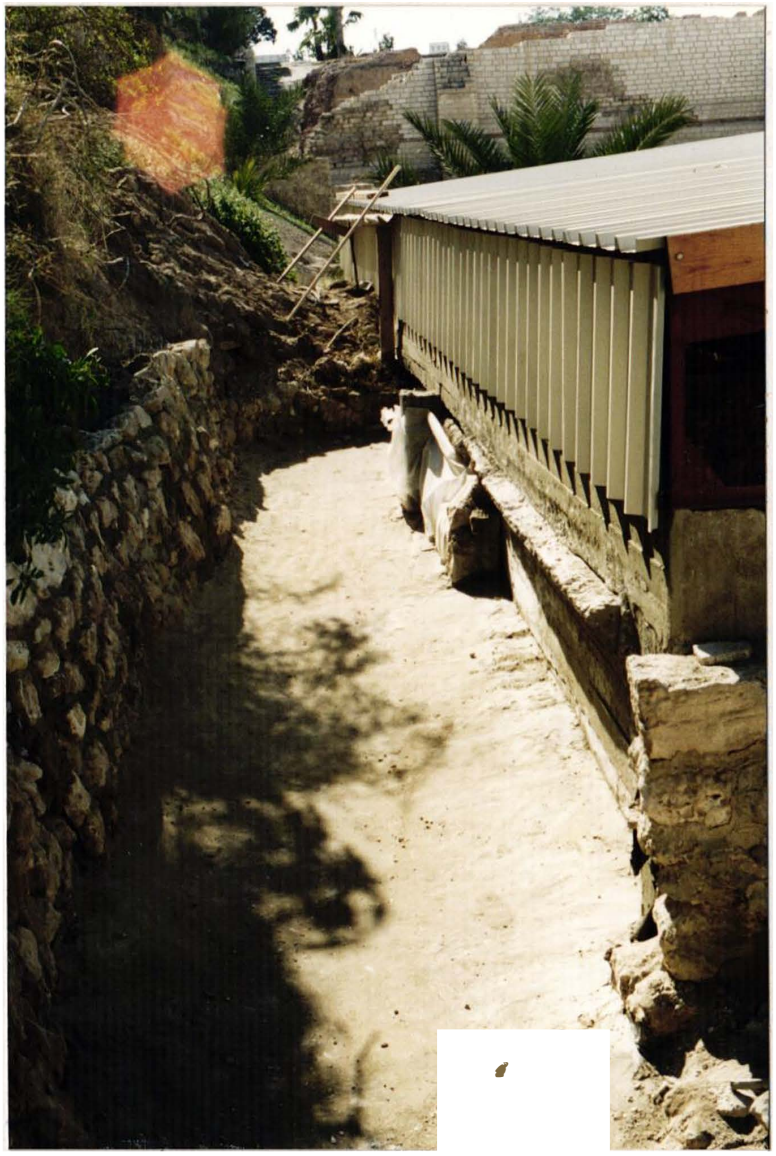


Phot. 8. Ceiling of the niche; reinforcement.

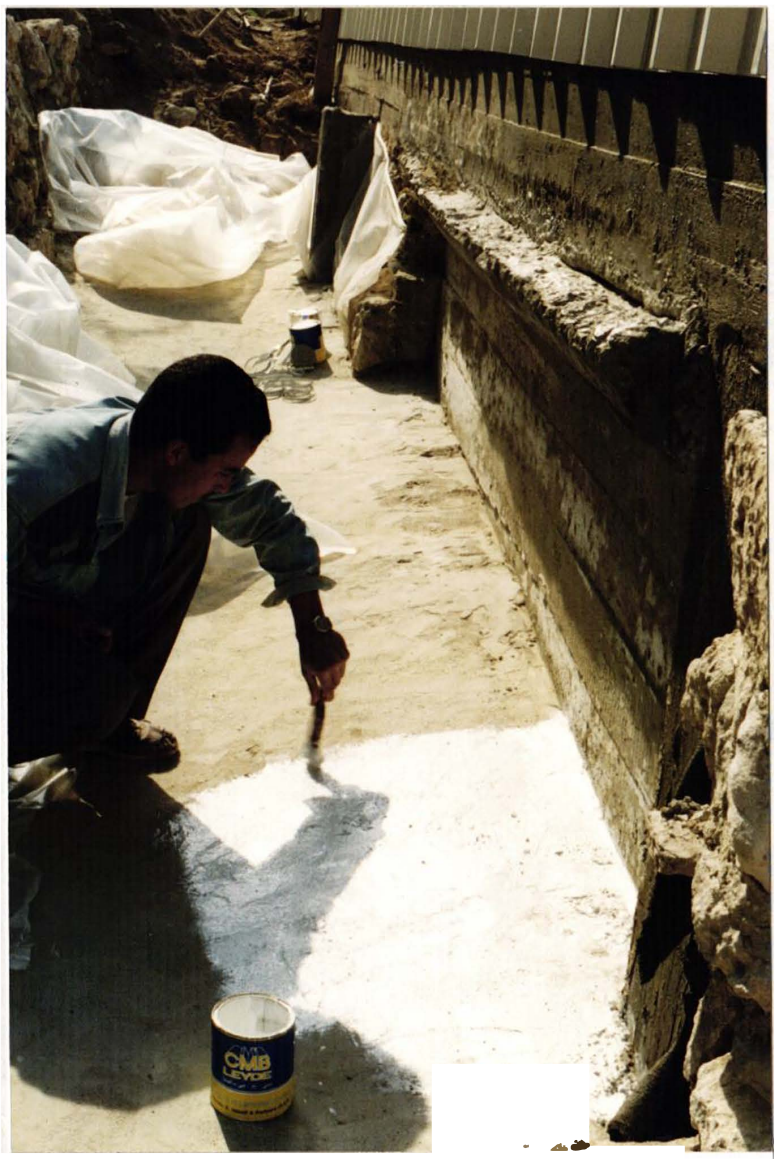
Phot. 9. Ceiling of the niche; placing concrete.

Phot. 10. The niche and boarding of the corner, view from the north.

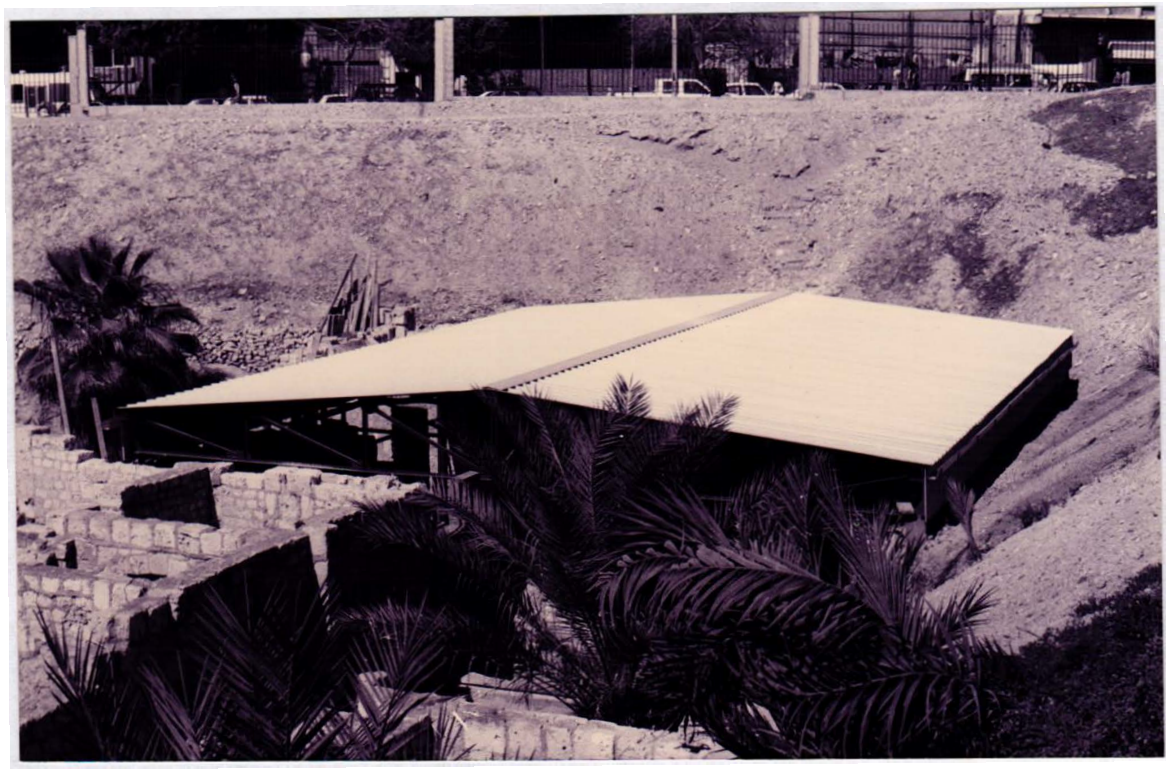
Phot. 11. The niche after completion of construction work.



Phot. 12. Draining structure built above the ceiling.

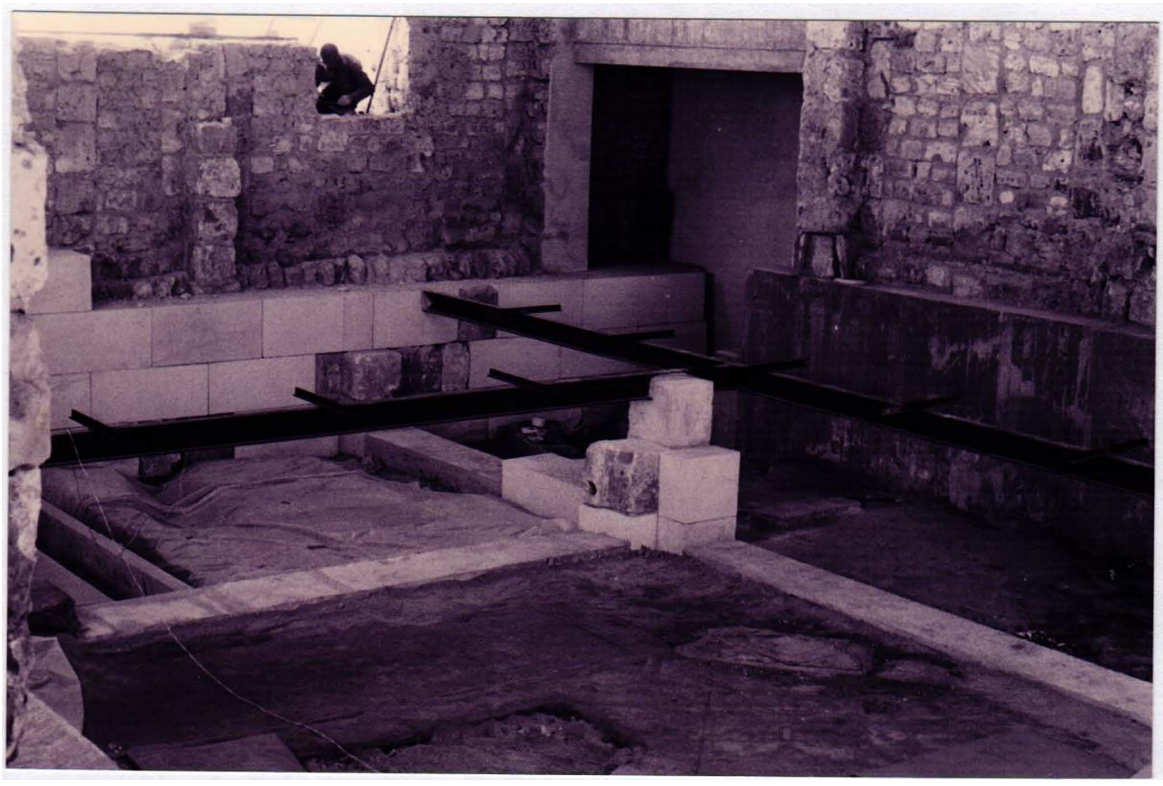


Phot. 13. Draining structure during insulation work.

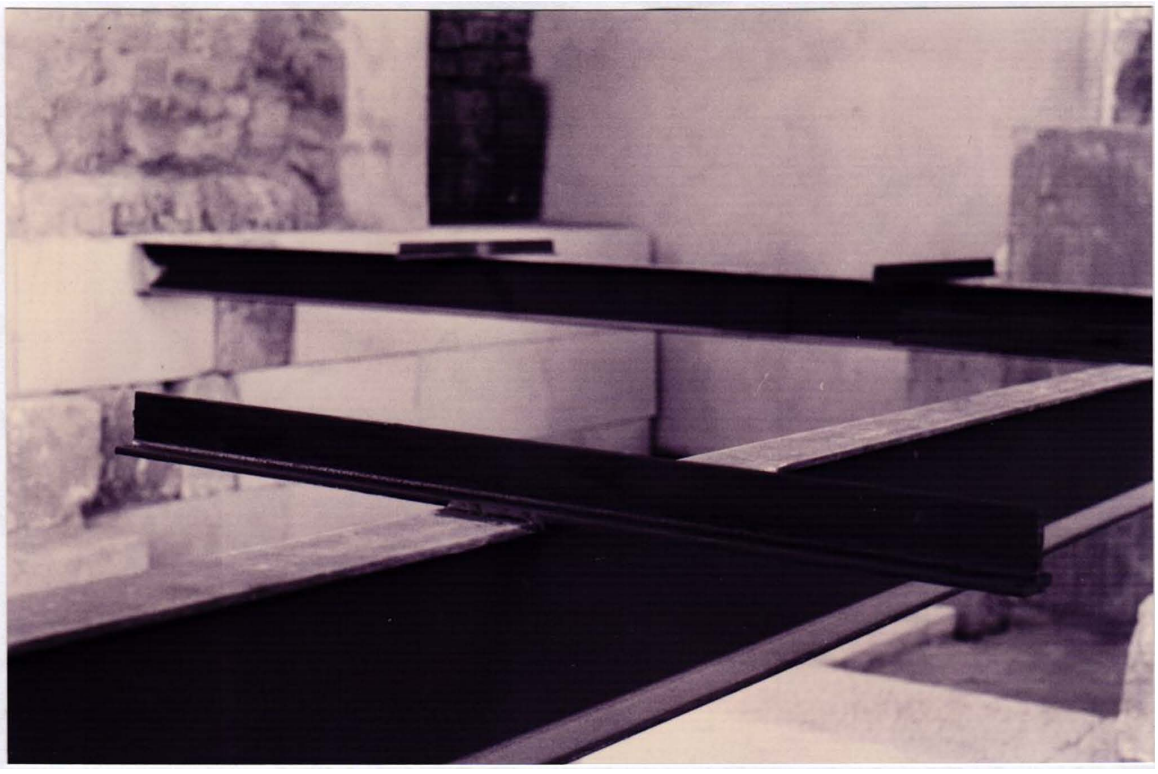


Phot. 14. Gutters along the southern edge of the roof.

Phot. 15. Gutters along the northern edge of the roof.



Phot. 16. Foot-bridge. General view.



Phot. 17. Foot-bridge. Construction detail.

Phot. 18. Panel glass frames. Northern side of the shelter.

Phot. 19. Panel glass frames. Western side of the shelter.