Sustainable Urban Rehabilitation in Europe

Heritage Problems. Causes. Solutions

Erasmus+

Sustainable Urban Rehabilitation in Europe

3rd Semester

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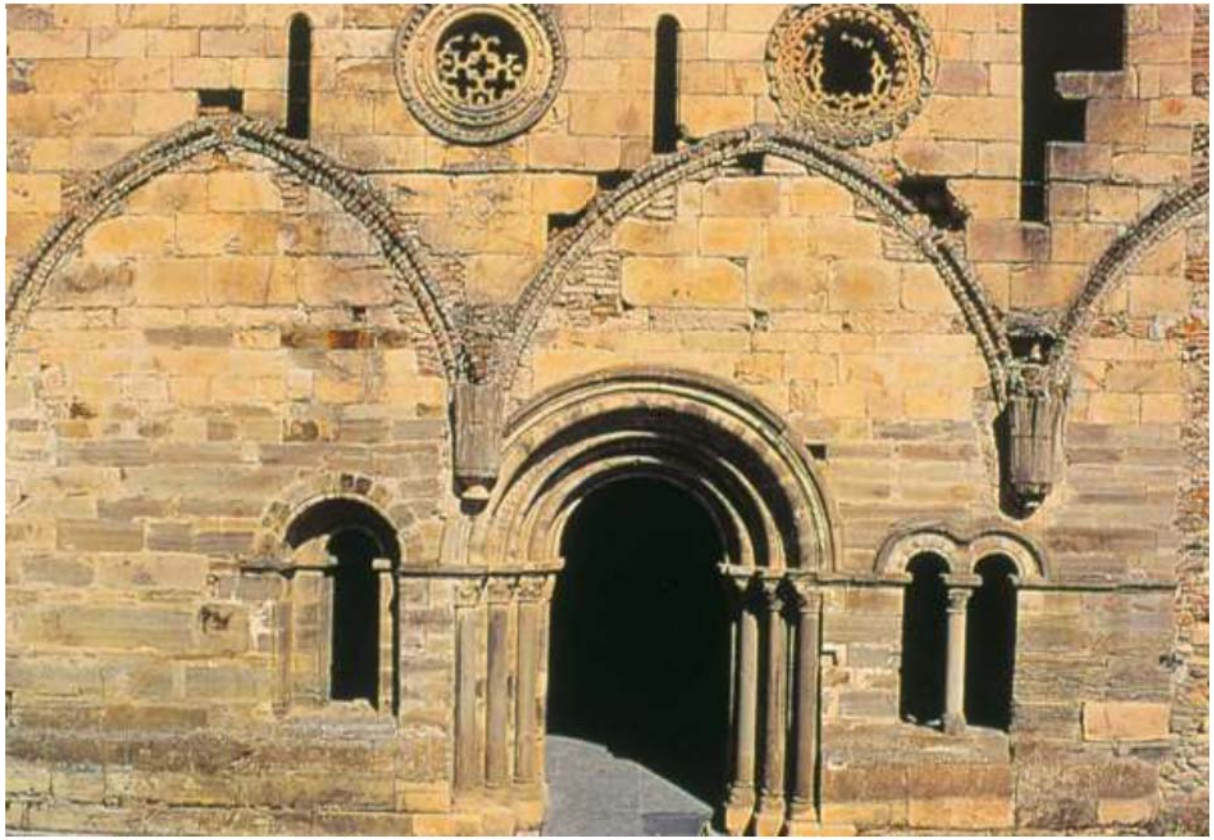
Camila Burgos Vargas

Heritage Problems. Causes. Solutions

3 ECTS

SH
Sustainable Heritage

EC
Elective Courses



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SURE
SUSTAINABLE URBAN REHABILITATION IN EUROPE

UNIVERSIDAD POLITÉCNICA DE MADRID

1. INTRODUCTION
2. FOUNDATIONS: DAMAGES
3. FOUNDATIONS: REPAIR SOLUTIONS
4. **WALLS: CONSTRUCTIVE SYSTEM**
5. WALLS II: PROBLEMS AND CAUSES
6. WALLS III: SOLUTIONS
7. VAULTS: CONSTRUCTIVE SYSTEM
8. VAULTS II: PROBLEMS AND CAUSES
9. VAULTS III: SOLUTIONS
10. FLOORS
11. WOOD
12. ROOFS: CONSTRUCTIVE SYSTEM, PROBLEMS AND CAUSES
13. ROOFS II: SOLUTIONS
14. OTHER TRADITIONAL STRUCTURES
15. SURFACE FINISHES, INTERIOR WOODWORK

CURRICULAR CONTENTS

HERITAGE PROBLEMS. CAUSES. SOLUTIONS

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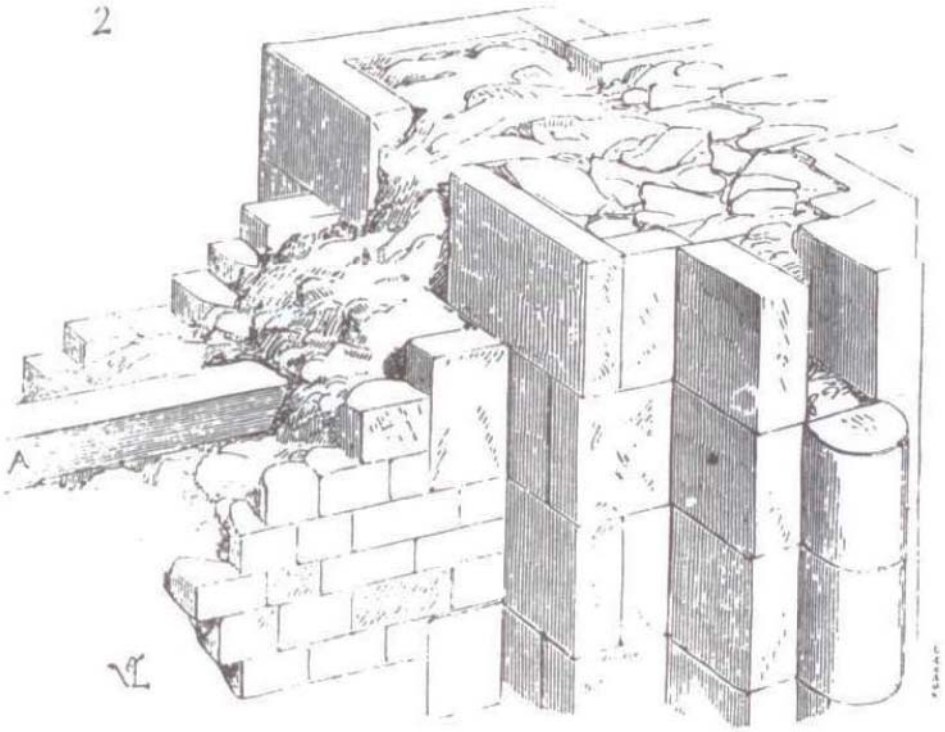
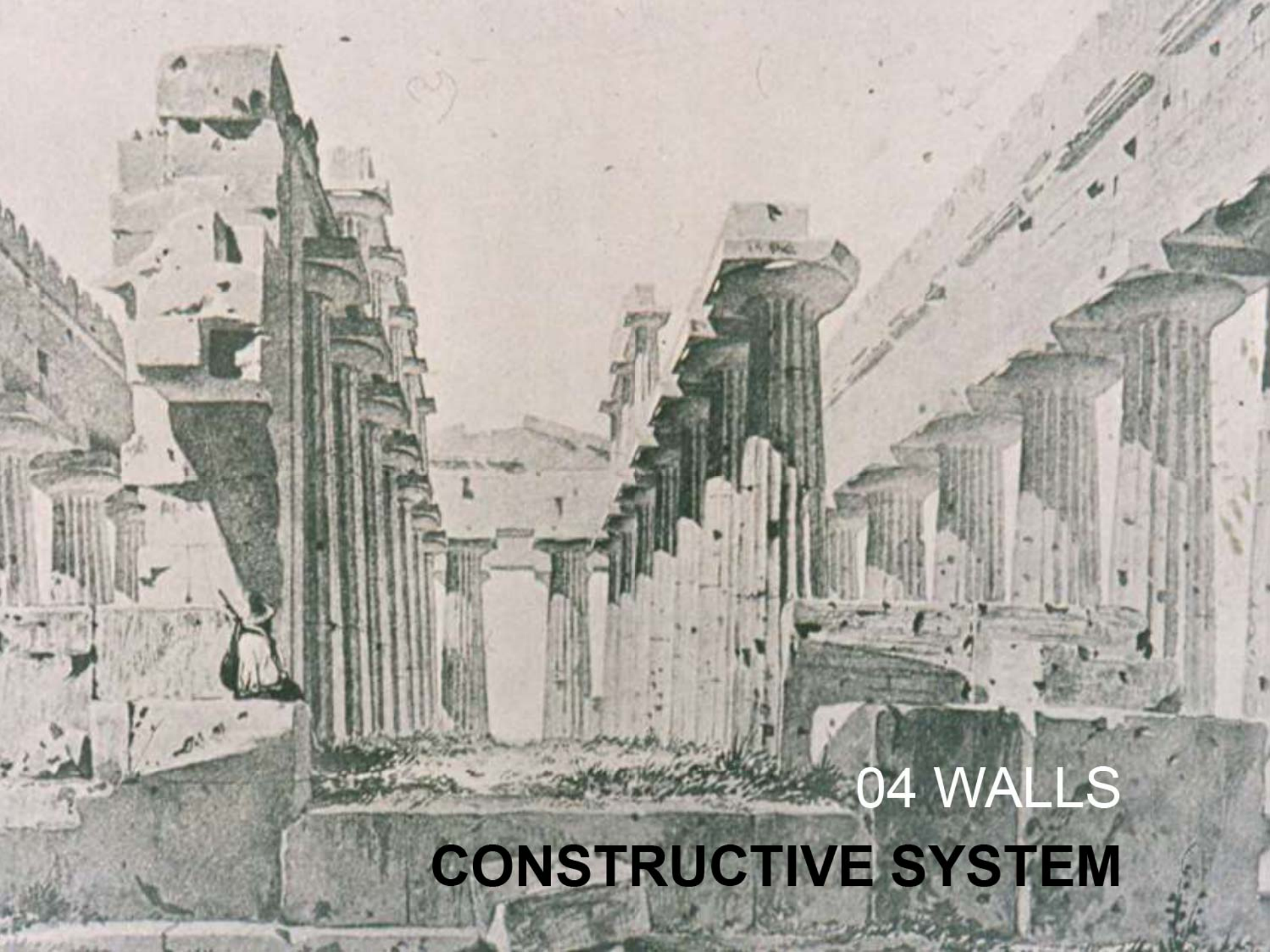
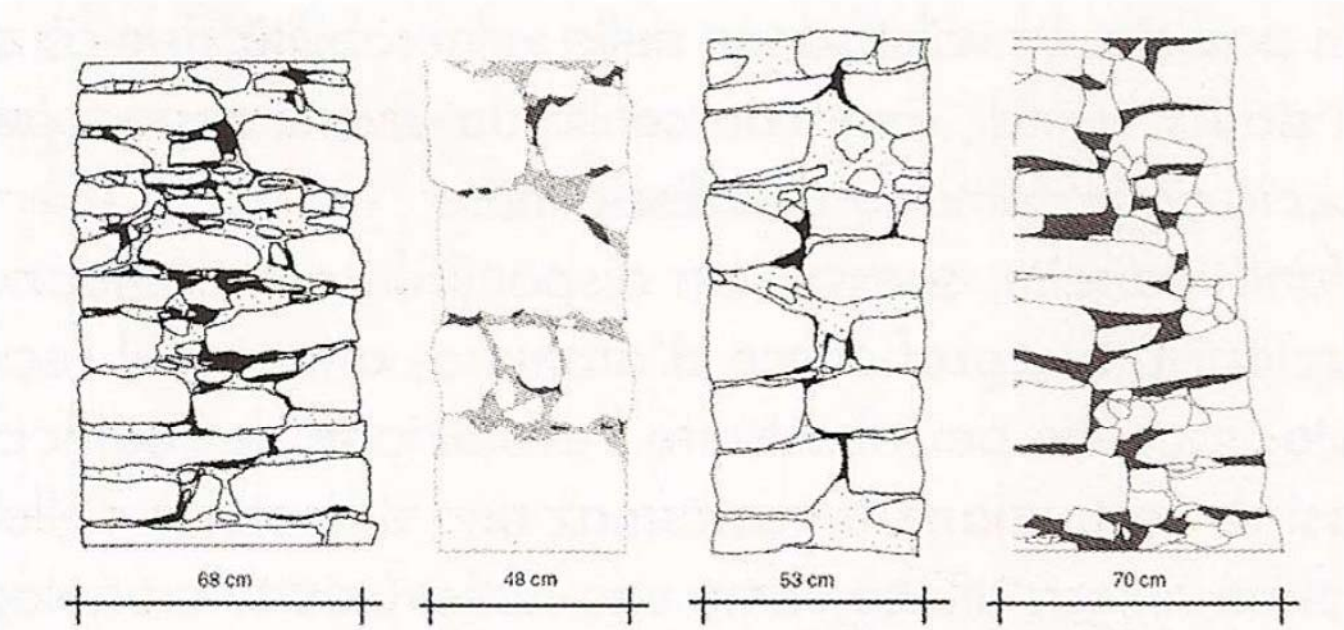


04 WALLS:
CONSTRUCTIVE SYSTEM



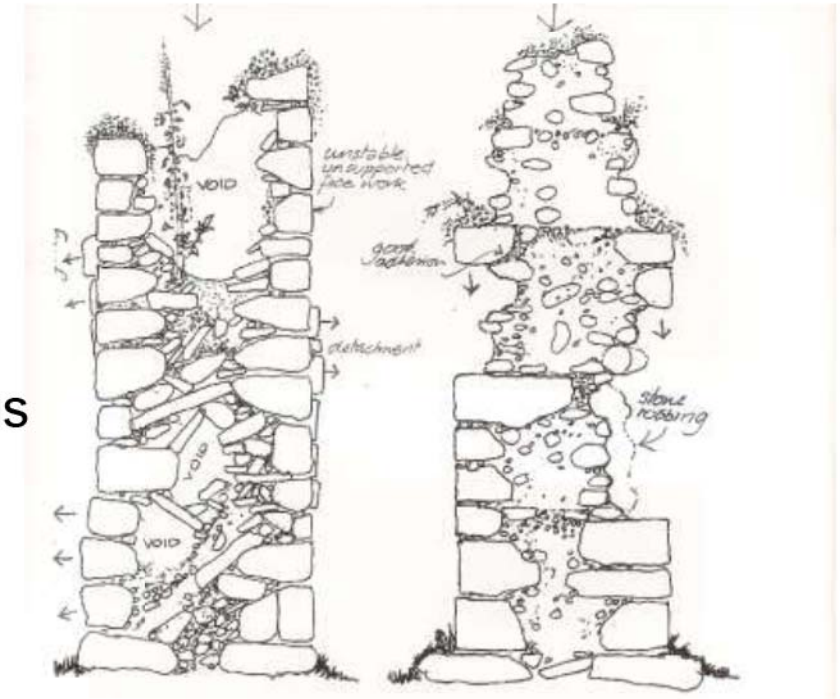
04 WALLS

CONSTRUCTIVE SYSTEM



TYPES OF WALLS:

Homogeneous / Heterogeneous
Cladding
According to composition
One or several leaves



STONE MASONRY

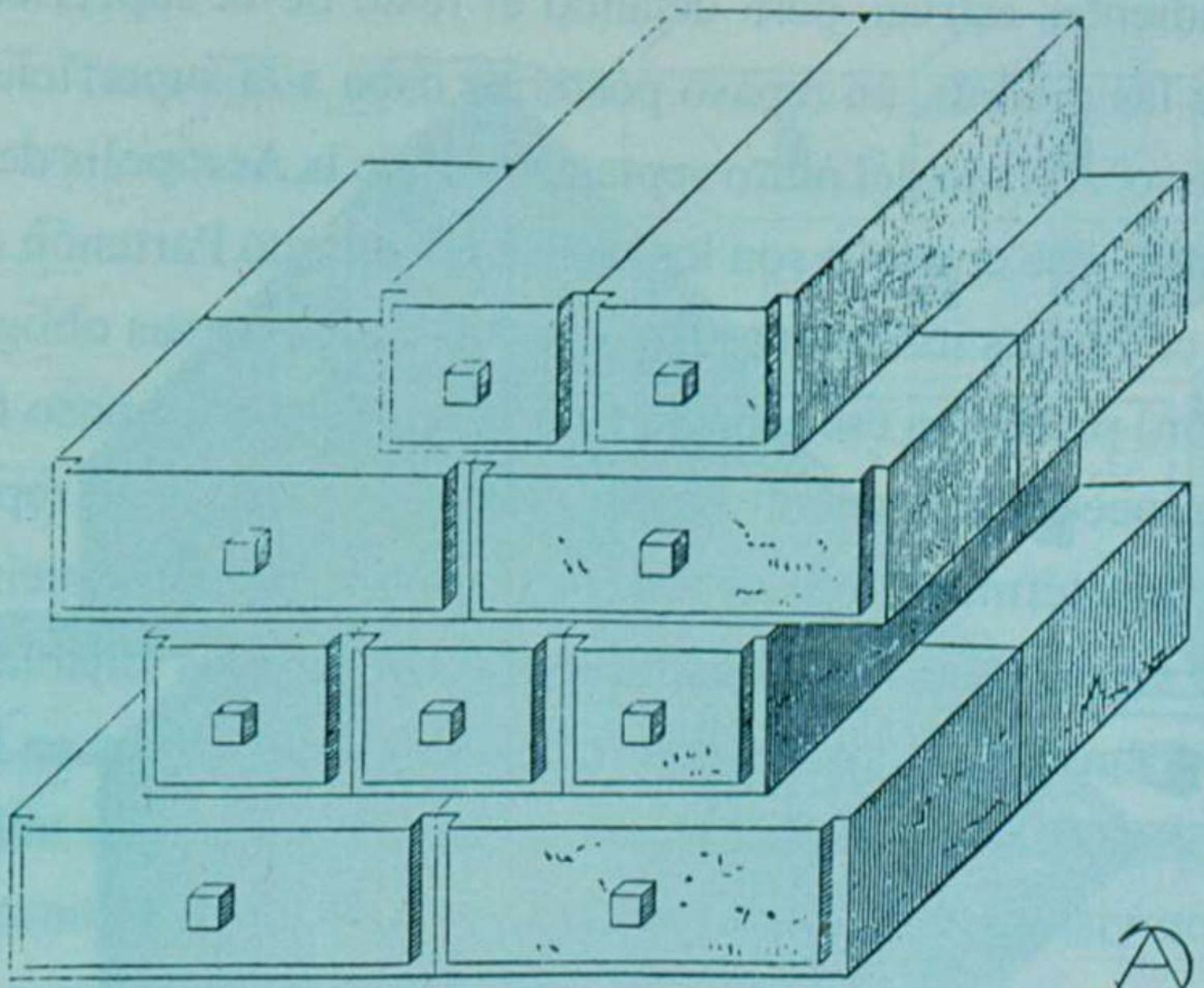
- ASHLAR MASONRY
- RUBBLED MASONRY

Carefully dressed stones with accurate bedding and fine joints

- ASHLAR FINE
- ASHLAR ROUGH TOOLED
- ASHLAR ROCK QUARRY FACED
- ASHLAR CHAMFERED
- ASHLAR FACING
- ASHLAR BLOCK IN COURSE

ASHLAR MASONRY

STONE MASONRY



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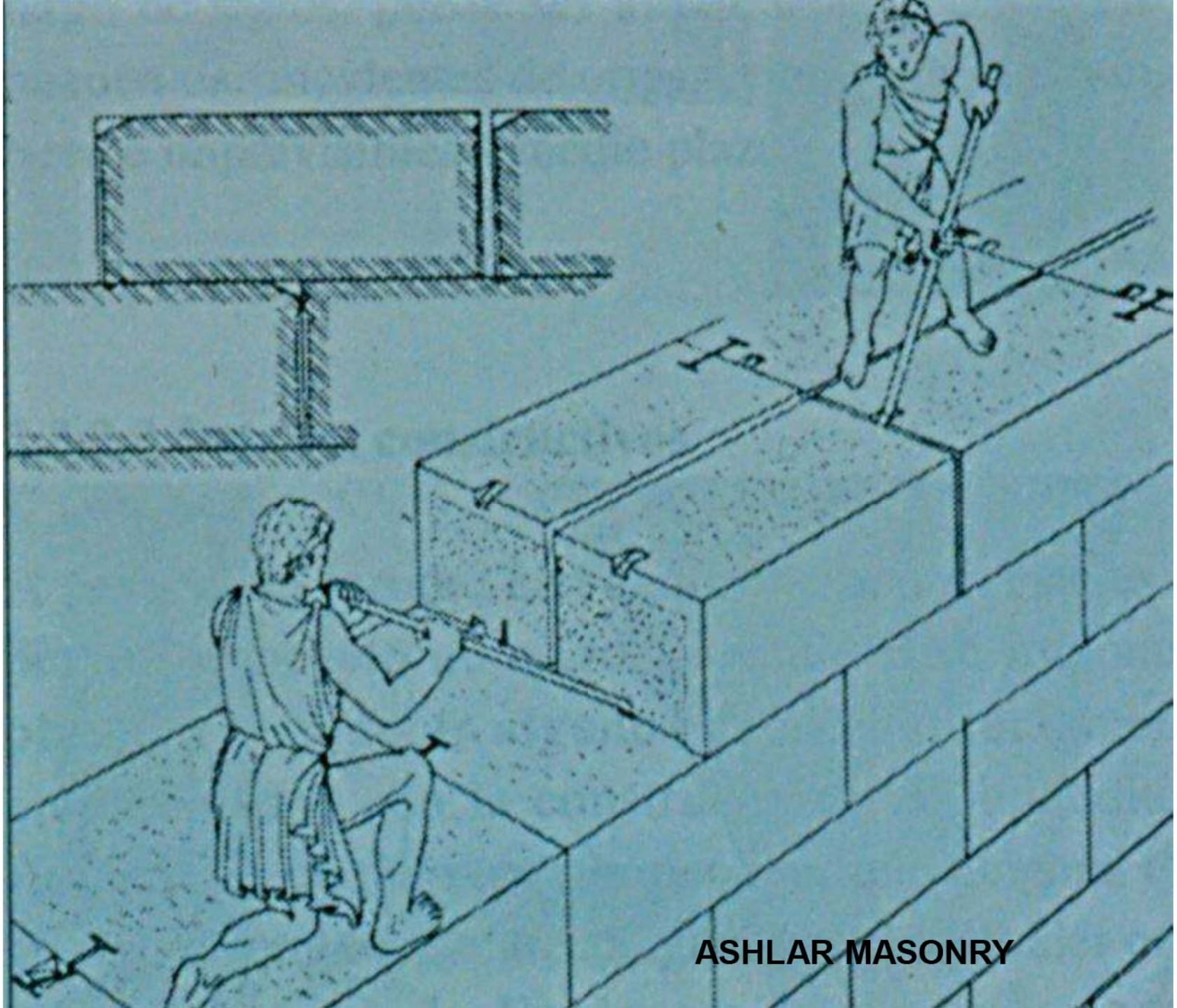
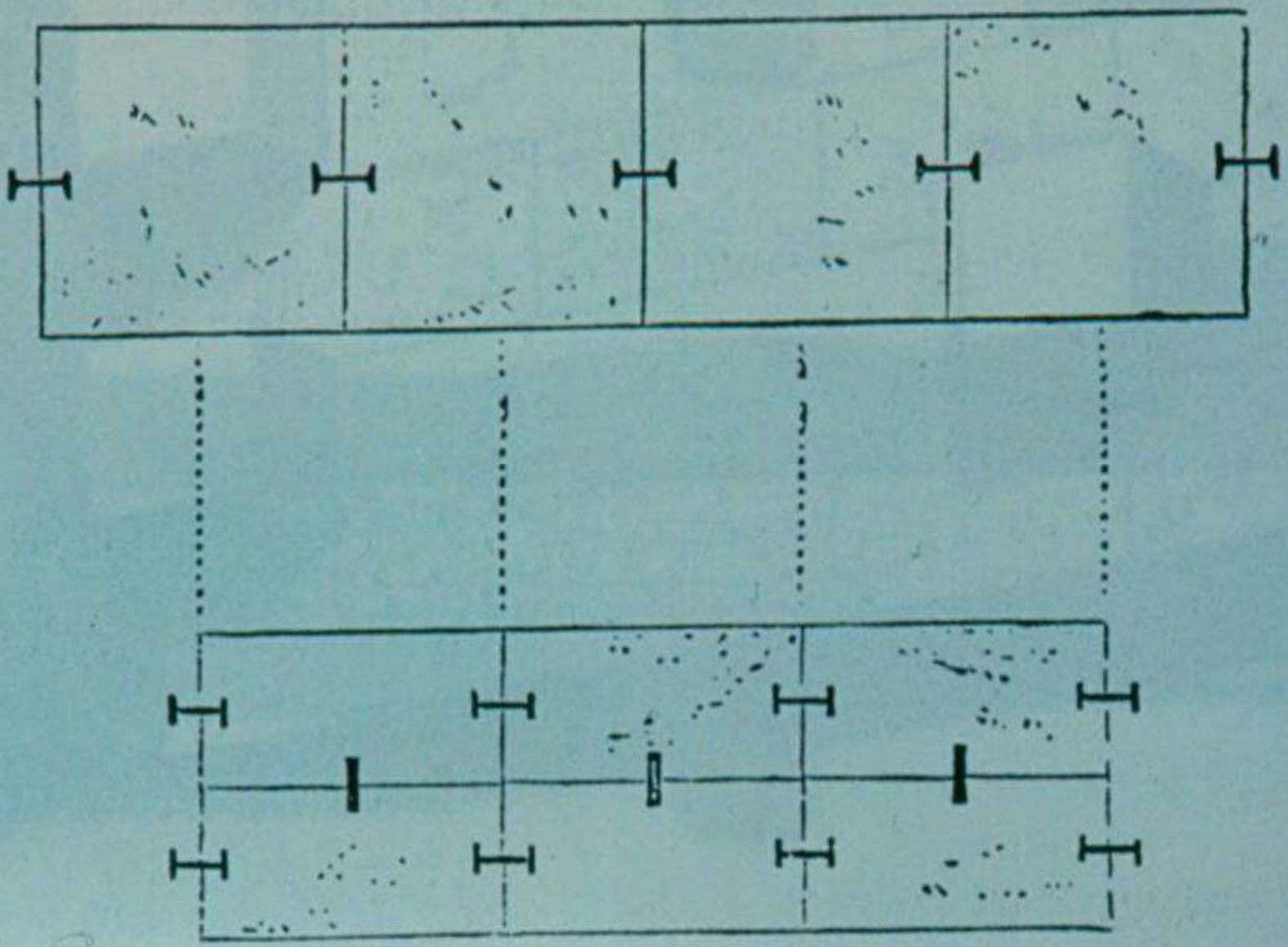

ASHLAR MASONRY



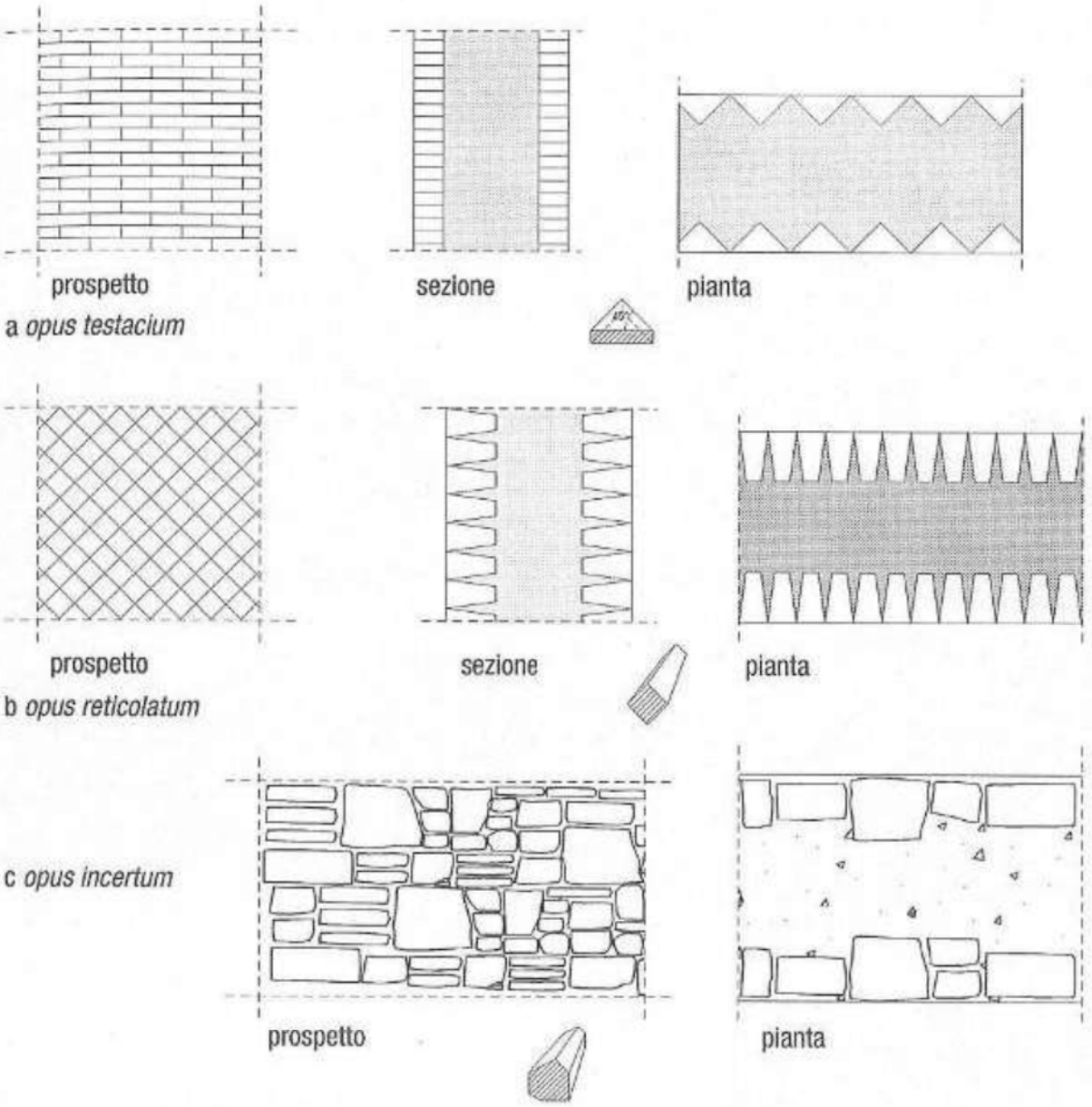
ASHLAR MASONRY

Stones are not of uniform size and shape and are not finely finished

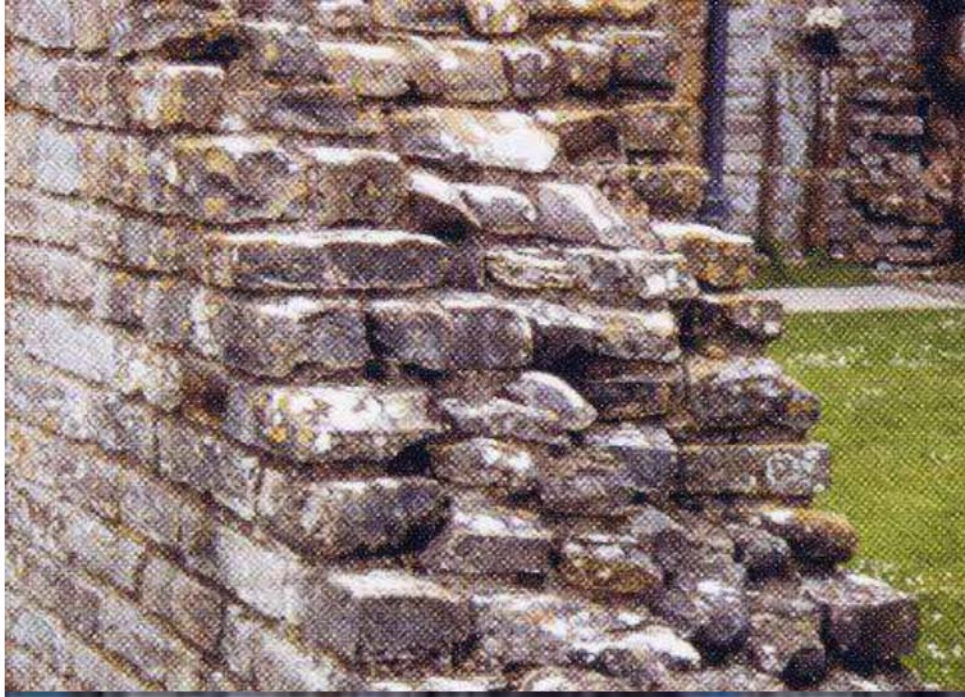
- UN-COURSED RUBBLE MASONRY
- RANDOM RUBBLE MASONRY
- COURSED RUBBLE MASONRY
- DRY RUBBLE MASONRY

RUBBLED MASONRY

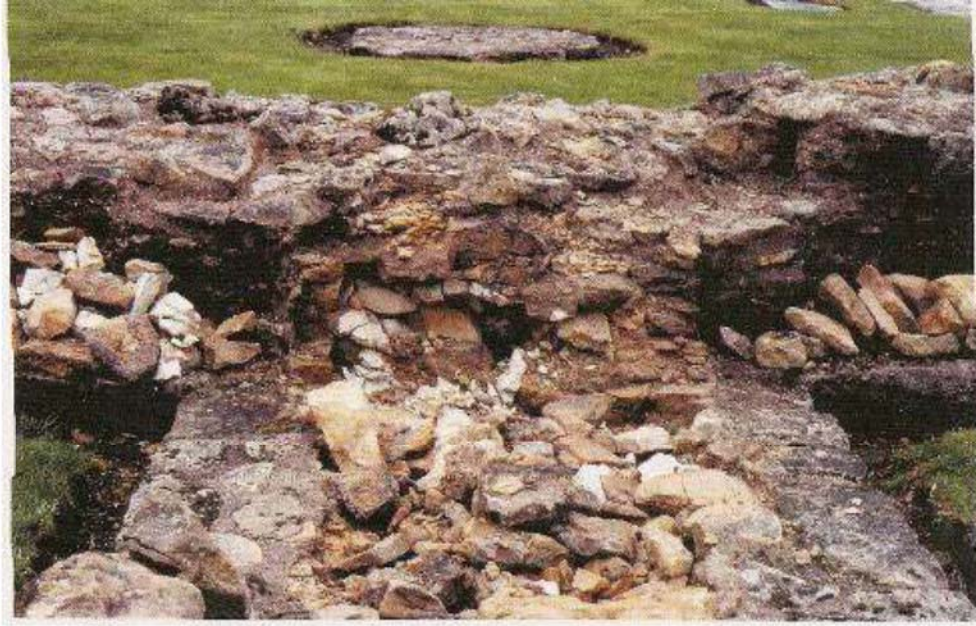
STONE MASONRY

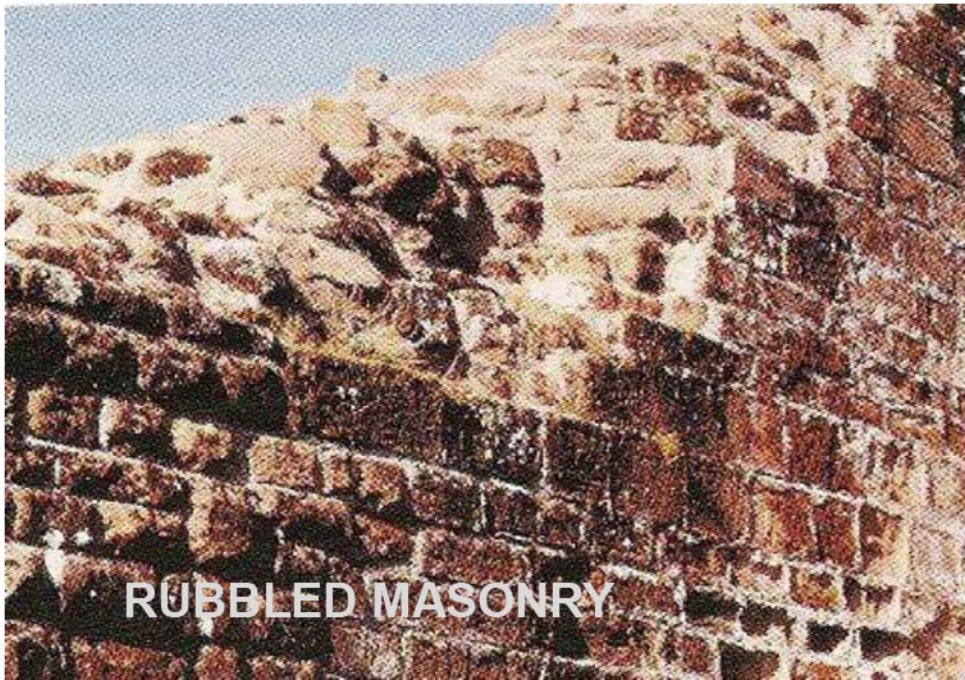


Three types of *opus cementicium*: *opus testacium, opus reticolatum, opus incertum.*



RUBBLED MASONRY





RUBBLED MASONRY

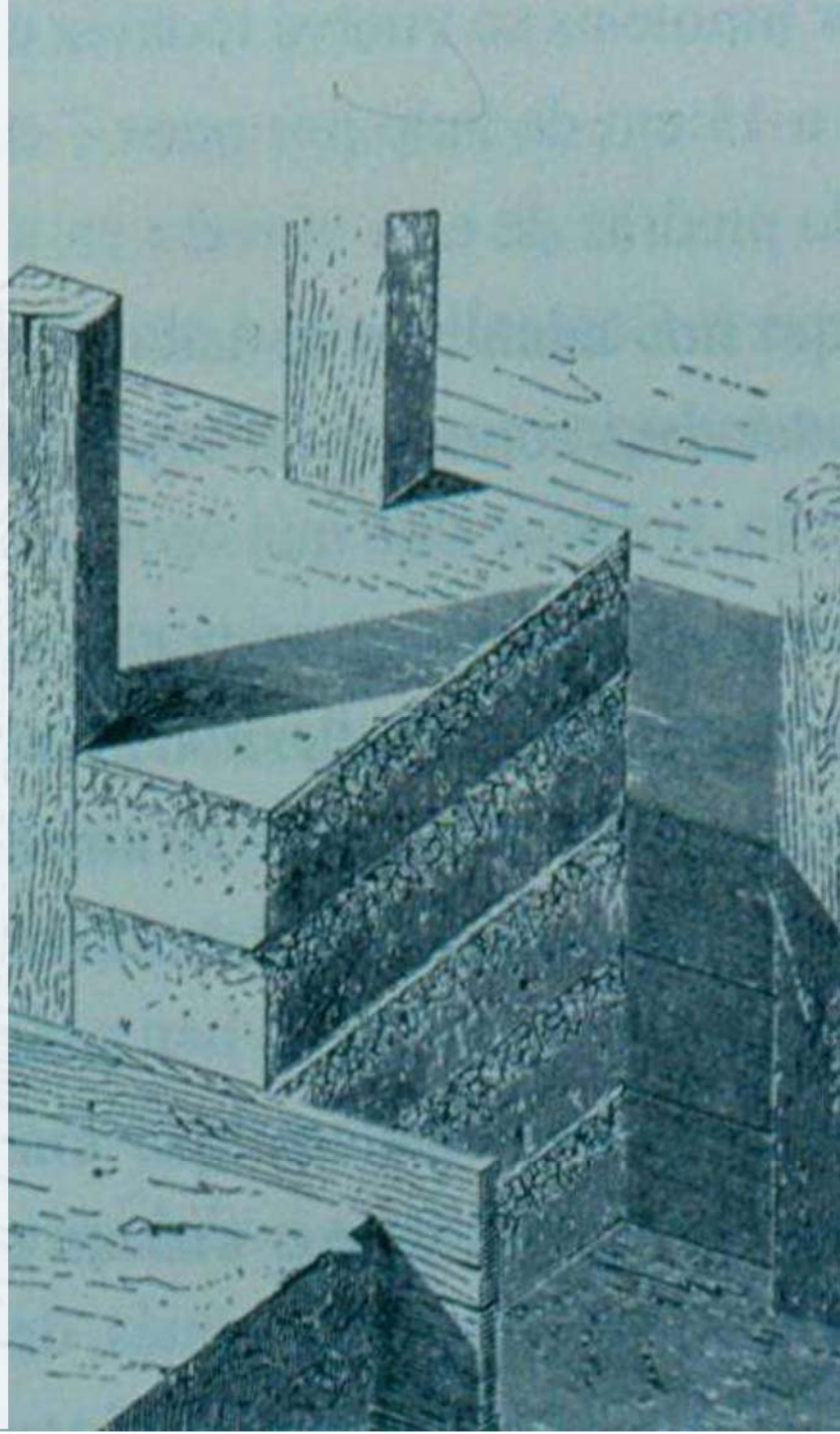
BRICK MASONRY

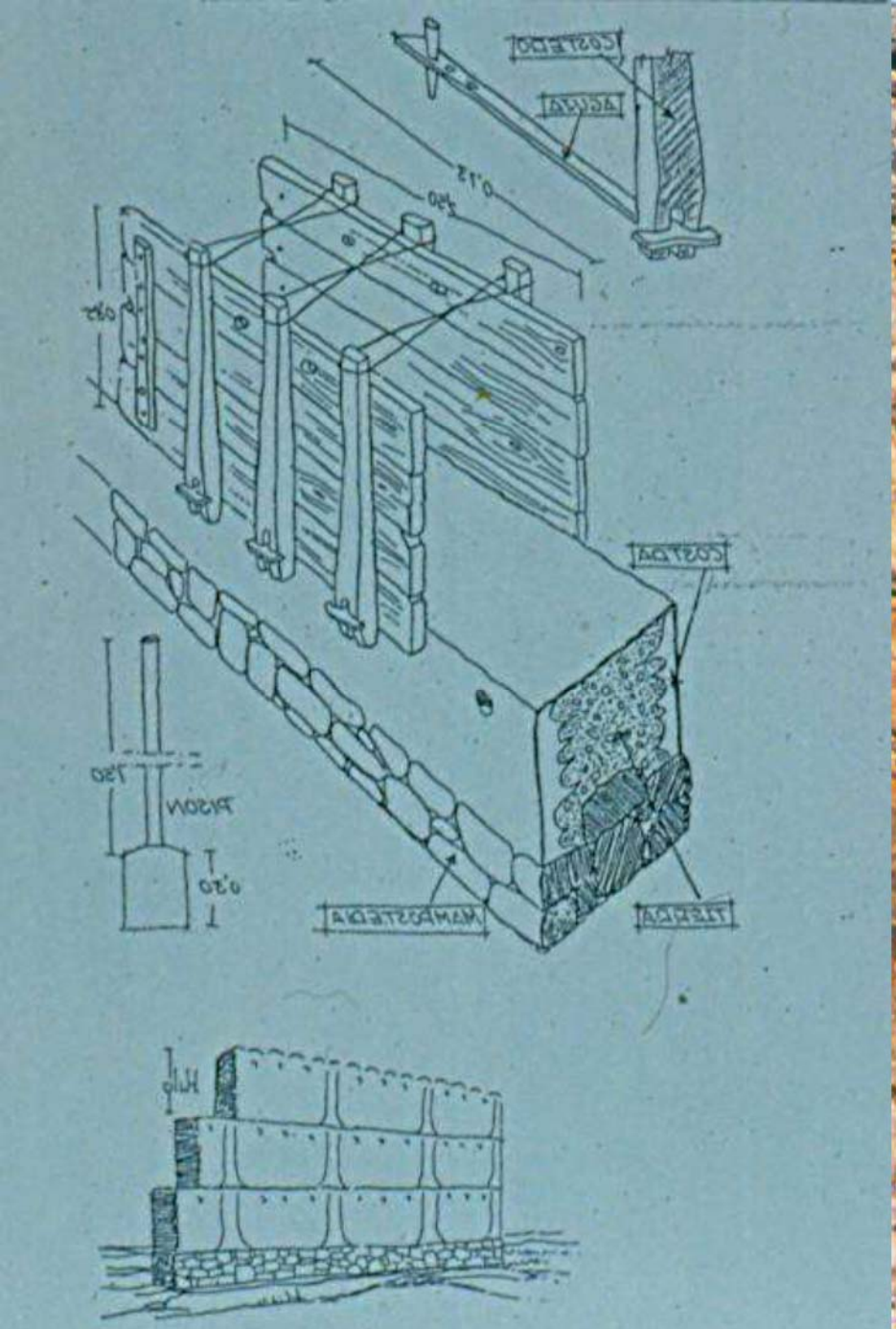
BRICK MASONRY

BRICK MASONRY

RAMMED EARTH WALL

- USE OF NATURAL RAW MATERIALS
- NON-COMBUSTIBLE
- THERMALLY MASSIVE
- STRONG
- DURABLE





RAMMED EARTH WALL

From the proceedings of
11th Canadian Masonry Symposium, Toronto, Ontario, May 31- June 3, 2009
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PDF

A HISTORICAL SPANISH TRADITIONAL MASONRY TECHNIQUE: SOME FEATURES ABOUT *TAPIA VALENCIANA* AS A REINFORCED RAMMED EARTH WALL

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REINFORCED RAMMED EARTH WALLS IN SPAIN

The diffusion of rammed earth techniques in Spain can be explained in term of the low cost of the construction process and to the use of local, abundant raw materials with good mechanical performance. For these reasons *tapia*, as a rammed earth wall is called in Spain, is visible in all types of architecture, whether humble, religious or defensive buildings. Plinius documents the presence of some earth fortifications along the Iberian Peninsula, probably the traces of a Punic conquest.

The legacy of the Roman Empire spreads in Spain the use of *opus caementitium*, like a filling of *opus lateralicium* or cyclopean walls. But this is just a short parenthesis because a variety of earth construction's techniques take roots in the peninsula, coming from the North African Muslim Empire, at the beginning of 8th century.
After the Christian conquest (*Reconquista*), *tapia* walls are still part of the traditional constructive culture, whether in peasants' shelters or in farms or stores. This development grows until the 20th century, when concrete or brick masonries replace this traditional rammed earth technique.

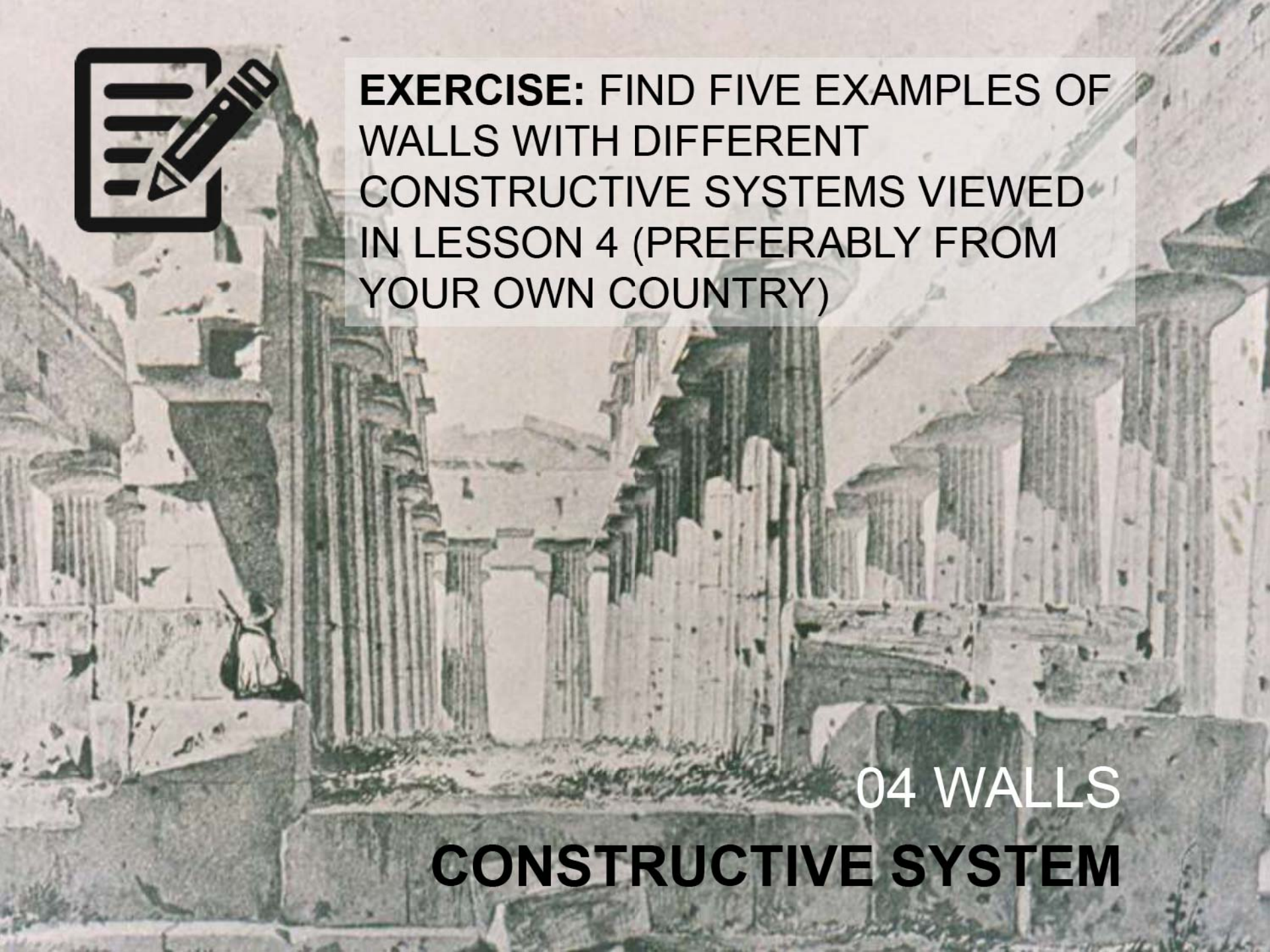
The clearest and simplest definition of *tapia* is: "*Tapia* is a rammed earth wall made with a *tapial*, as is called the quarter-deck" (ALGORRI-GARCIA AND VASQUEZ ESPÍ). These words can suggest some more features about the technique, for example: the use of cheap materials, the easy transfer and recovery of the quarter-deck, the quick operations for the assembling of the wooden structure, the stability during the flowing and tamping of the rammed earth… and so on.
The widespread and simplest type of *tapia* is made with a mixture of earth and water, rammed in the quarter-deck, with corners reinforced by bricks or stone masonries. But from this basic recipe, it is possible to develop some more reinforced solutions, with the addition of stones, straw, reeds, timber or bricks and lime.

Like other techniques based on rammed earth, *tapia* walls show a special resistance against the weather's attacks, as can be seen in well-preserved ancient Andalusian masonries traces all along the Iberian Peninsula.

http://www.restapia.es/files/14809

WOODEN FRAME WALL

- ADOBE (MUD BRICK)
- BRICK



EXERCISE: FIND FIVE EXAMPLES OF WALLS WITH DIFFERENT CONSTRUCTIVE SYSTEMS VIEWED IN LESSON 4 (PREFERABLY FROM YOUR OWN COUNTRY)

04 WALLS

CONSTRUCTIVE SYSTEM

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