















Methodological approach to conservation



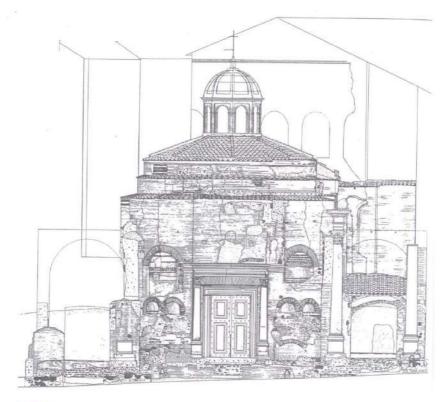
3rd Semester

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Methodological Approach to Conservation: Physical Approach

2 ECTS













Methodological Approach to Conservation: Physical Approach

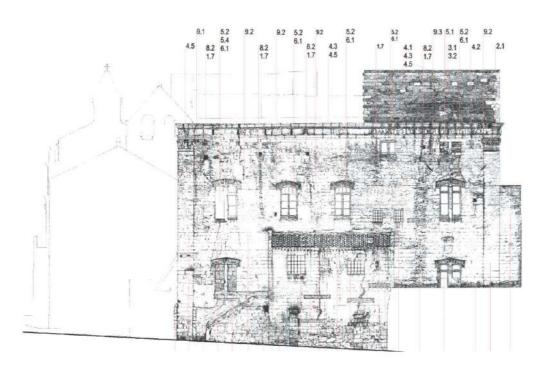
- Introduction to Methodological Approach
- Geometrical Survey
- 3. Geometrical Survey: traditional method
- Geometrical Survey: new tools
- Material Survey.
- 6. Mechanical Survey.
- Damage maps I: degradation problems
- Degradation types.
- 9. Damage maps II: fissure and crack problems
- 10. Damage maps III: moisture problems
- Damage tests on masonry constructions I
- 12. Damage tests on masonry constructions II
- 13. Survey, maps and tests on wooden contruction.
- 14. Archaeology.
- 15. Stratigraphy.







Methodological Approach to Conservation: Physical Approach



LESSON 09. DAMAGE MAPS II: FISSURE AND CRACK PROBLEMS

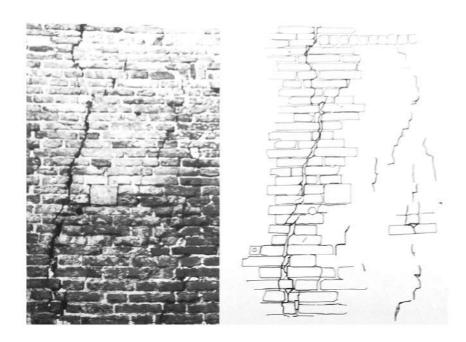






Definition

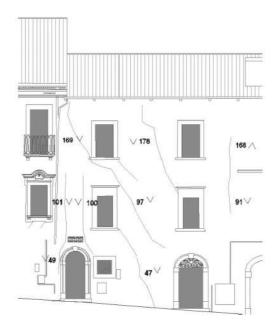
Survey of the fissure patterns through plants, sections, elevations and any axonometric representations, to provide spatial vision of the lesions trend. The reliefs must highlight the slits, the micro-cracks, the wall deformations with possible inflection of the vestments, showing if they are in agreement or discord. For the cracks, you will have to highlight the position, the trend, the inflection and depression points, the trend edges, etc. The representation of the picture (levers use scales ranging between 1:50 and 1:10.



Representation methods

Survey of the crack pattern must be performed with great care and accuracy, since it is possible to trace the causes that determined it from its analysis. In order to highlight the progress of the lesions, it is also advisable that the drawings contain little information to increase its legibility.

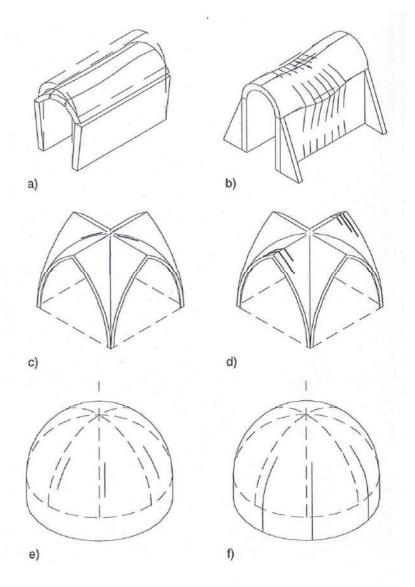
The methodologies to be used in detecting the crack pattern are generally direct and, in some particular cases, the photogrammetric ones. In the application of the direct method, the general trend of the lesions should be emphasized, if they cross the wall thickness, or if they are superficial; it is also necessary to highlight whether they are slits or microcracks.



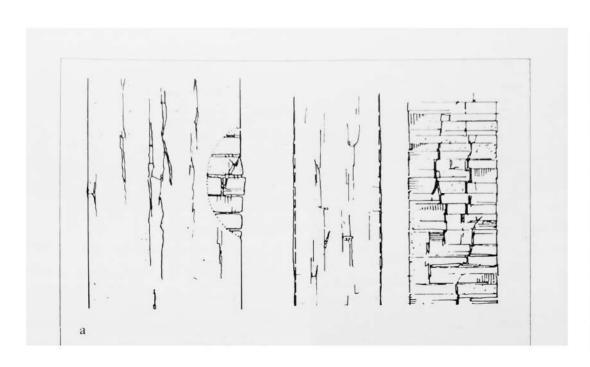
Map of damages. Cracks.

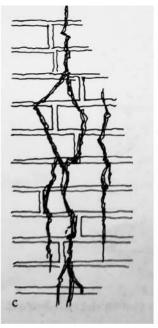
Vaults and domes. Injuries.

In addition to the progression of the lesions, the wall deformations and any inflections of the vestments must also be noted and, in the case of vaulted structures, if a depression of the vaulted part has occurred, It has already been said that the progression of the lesions, their position or form can clearly indicate the causes that led to their emergence; therefore, the detector is called to account not only for the spatial trend of the lesions, but also for their size, and to document whether this is constant if it has a variable trend, as well as the beginning, the end and the point of maximum opening of the lesion itself; it is also necessary to highlight, with possible detailed drawings, the trend of the two margins, so that it can be ascertained whether there has been a simple detachment due to removal of the two parts of the masonry, or a rotation.

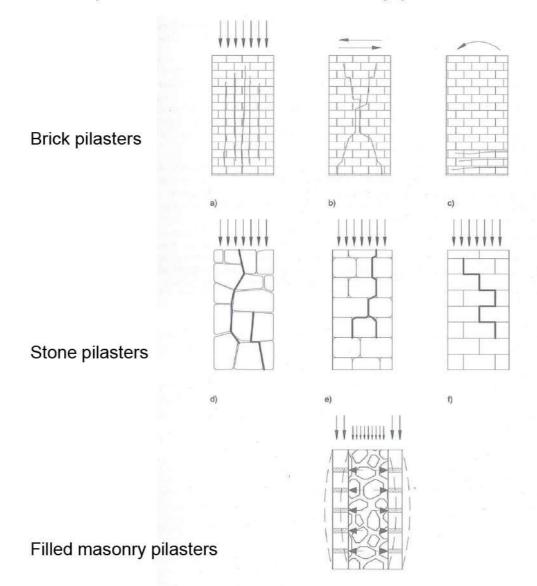


Figures a, c are examples of elevations, with indication of crush lesions;



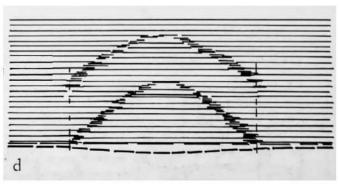


Possible cracks patterns of cracks in masonry pillaster under pressure.

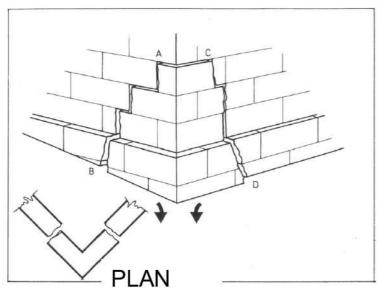


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In figure d there are injuries due to failure of the foundation.

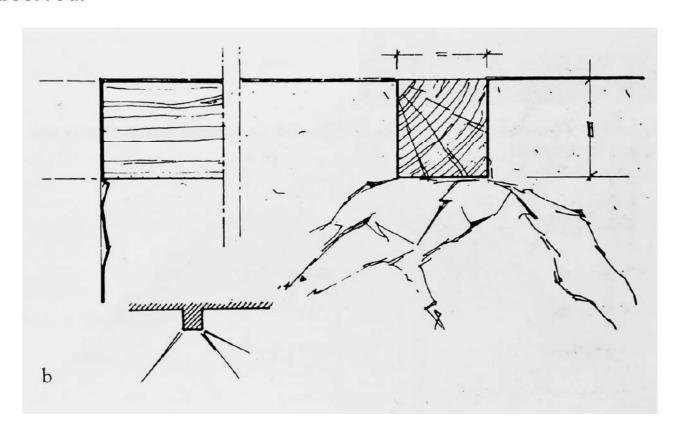


Possible soil subsidence.



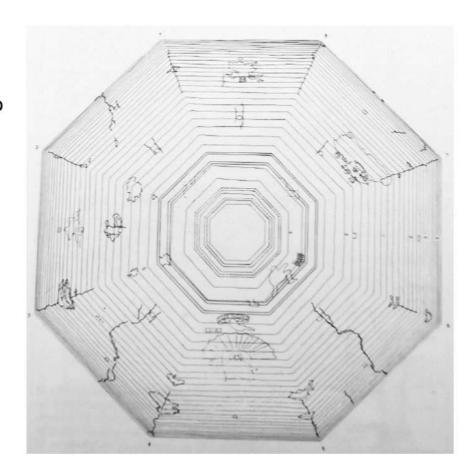
Soil subsidence. Corner cracks.

In figure b an example of injuries induced by crushing a beam can be observed.

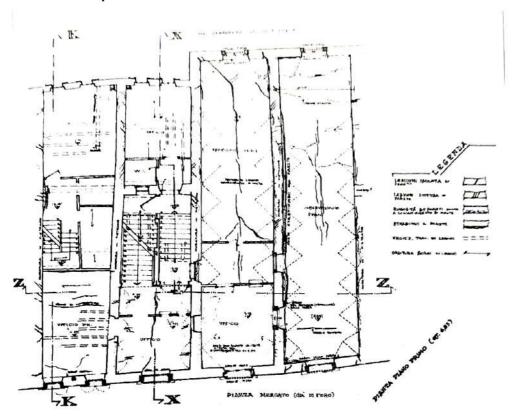


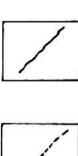
As can be deduced from these examples, it is essential that all the elements that characterize a lesion are taken into consideration in the survey operations. In particular, the angle of deviation of the lesion with respect to the vertical with the aid of plumb lines; for inclined injuries, it is advised to measure the angle with respect to the vertical or the horizontal. In these cases it is essential that all the survey operations are accompanied by exhaustive photographic documentation and, regarding the detailed photographs, it is suggested to overlay a plumb line and a meter to the lesion to obtain reference elements on the photo that allow a simple control of its progress.

Furthermore, photogrammetric filming carried out at a later time also allows deferred monitoring. An example of this technique is shown in the figure



For the representation of the cracking pattern, it is not only necessary to bring the progress of the lesions up and down





lesioni visibili sulla faccia della parete visible lesions on the face of the wall



lesioni formate dall'insieme di fessurazioni avanzate lesions formed by the set of advanced



lesioni sulla faccia opposta lesions on the opposite face



rilievo delle zone soggette a schiacciamento cracks relief of areas subject to crushing



lesioni passanti passing lesions



riliavo della zona in cui si manifestano processi di degradaziosurvey of zone where degradation processes have appeared

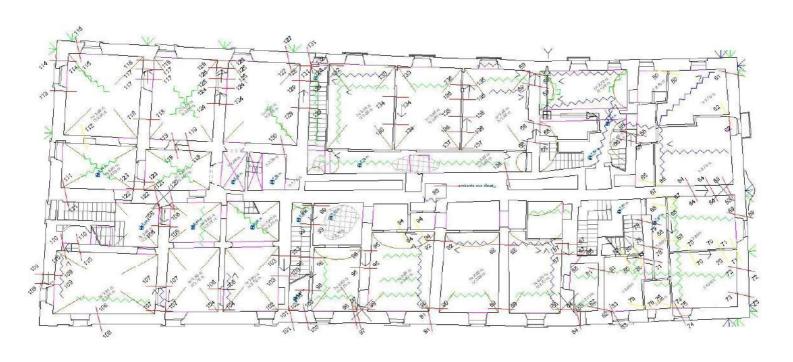


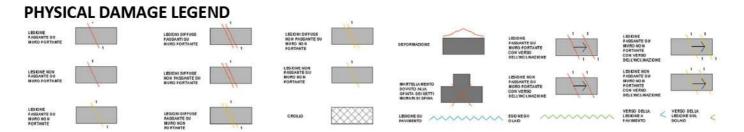
fesioni passanti in obliquo passing lesions at an angle



riliavo della zone interessate da umidità

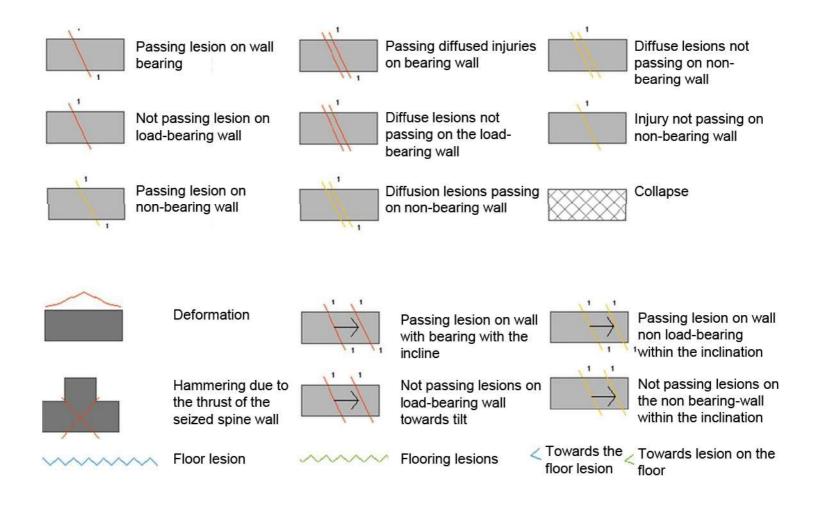
survey of areas affected by humidity

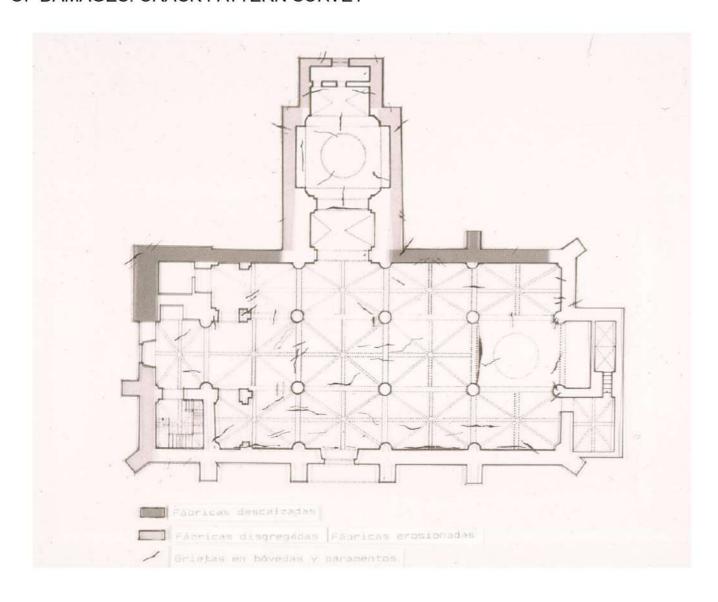


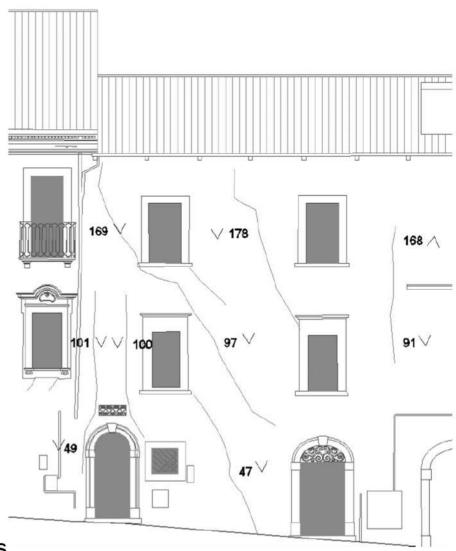


Plan. Map of mechanical damage

PHYSICAL DAMAGE LEGEND

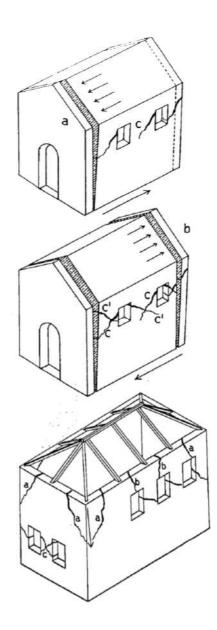






Map of damages. Cracks.

For the representation of the cracking pattern, it is not only necessary to report the injuries in plan and elevation. In some cases it is necessary to have a spatial pattern of their progress, as well as normal representation, with axonometric views allowing a synthetic spatial vision



















Project "SURE - Sustainable Urban Rehabilitation in Europe" implemented in frames of Erasmus+ Programme Key Action 2: Strategic Partnership Projects
Agreement n° 2016-1-PL01-KA203-026232

This publication has been funded within support from the European Commission.

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Co-funded by the Erasmus+ Programme of the European Union

