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L'AQUILA CITY-LAND: THE POST-EARTHQUAKE RECONSTRUCTION OF SMALL HISTORIC URBAN CENTRE

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ABSTRACT

In the immediate aftermath of the earthquake in L'Aquila in April 2009, various new regulations and operational methods were defined to enable reconstruction to begin as quickly as possible.
This brought opposing dynamics to bear on the urban and territorial system of L'Aquila and the numerous surrounding small settlements that historically played a part in its original foundation. Currently the most important issue is to rebuild the city and its system of outlying villages, at the same time seeking to identify new functional models and models of habitation.
With this in mind the reconstruction plans aim for seismic improvement and improved living conditions by making organic interventions that ensure the overall consolidation, safety, habitability and functionality of these built systems in their entirety, in full respect of their existing historic and contextual values.
As part of this integrated approach and in consideration of the complex issues involved, this paper presents the first outcomes of the activities of support provided to the municipality of Sant'Eusanio Forconese to assist in preparing the reconstruction plan for this ancient village, which in terms of its morphology, its building types, and its construction methods is an excellent exemplar for all the settlements that lie within the earthquake crater.

Key words: Reconstruction, Historic Centres, Restoration, Improved Energy Efficiency, Housing Models.

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Introduction

So far as reconstructing these minor historic centres is concerned, the action to be taken cannot be based solely on the technical aspects of lowering the seismic risk and pursuing the end goal of reducing their structural vulnerability; it is also an opportunity to bring their energy performance up to contemporary standards by defining principles of energy upgrading that encourage the use of renewable energy sources, energy saving, and the correct use of energy in its various forms.
But recovering this built heritage, which is widely diffused over a large area and is strongly characterised in typological/constructional and morphological/environmental terms, whilst at the same time upgrading its energy performance, cannot be seen as a form of technology transfer that relies on mechanically applying rules, processes and products designed and manufactured for new construction, but should be understood as an act of transformation and conservation that "plays by the rules" and safeguards the values of the existing situation whilst guaranteeing the sustainability of the upgrading processes, in ways that deliver new conditions of functionality and safety that meet the needs of present-day living whilst also guaranteeing energy efficiency and self-sufficiency for the useful life of individual buildings and the built context as a whole [1].
It is therefore fundamentally important to define methodological and operational tools that not only use quantitative parameters to define performance deficiencies and identify various technical options for intervention, but that also adopt qualitative parameters for assessing the transformability of this particular setting and the extent to which using renewable sources is compatible with it. In the same sense it also appears necessary, given this changed framework of requirements, to establish possible new typological housing models and assess their compatibility with the built heritage.

General characteristics of the reconstruction plan

Article 5 of Law No. 3 of 9 March 2010, promulgated by the President of the Abruzzo Region as Commissioner-Delegate, sets out the objectives and content of the reconstruction plans to be drawn up for rebuilding the municipalities damaged by the earthquake of 6 April 2009: plans that must ensure the socioeconomic recovery of the territory and promote regeneration of the urban places whilst also taking account of the density, quality and complementarily of the public services at the urban scale and of environmental quality in general, and that facilitate the return of the populations to their homes damaged by the seismic events of April 2009, which are to be recovered. Pursuing these goals must necessarily be planned at different levels that are linked by a cogent multidisciplinary, multi-scale approach to design and by the objective of identifying a common strategy for social and territorial development. The first level is concerned with recovering the residential building stock whilst improving its safety and functionality, and concerns works to single buildings by private individuals or works on ensembles of buildings by associations of private operators, using the most traditional planning instruments and construction methods. The second level is

concerned with renewing and enhancing the urban centres as a whole, giving primary importance to the design of their public spaces, their utilities networks, and their services whilst restoring their historic-cultural heritage, giving priority to identifying methods and types of action that reduce the future vulnerability of their urban systems. The third level is concerned with defining sustainable development strategies that encourage economic and social recovery by strengthening communities, improving the system of relationships between the urban centres and the rest of the territory, and enhancing the previously existing economic and manufacturing system, along with the physical landscape that it brought into being.

Activities in support of the municipal administration

Briefly described, the activities carried out in support of the municipal administration for preparing the reconstruction plan of the historic centre of Sant'Eusanio Forconese consisted of identifying the buildings and sites damaged by the earthquake, within the boundaries defined by the municipality under article 1 of Law No. 3 of 9 March 2010 promulgated by the Commissioner-Delegate, and carrying out a cognitive analysis thereof; preparing the reconstruction plans; re-planning the territories affected by the earthquake, again as defined by article 1 of Law No. 3 of 9 March 2010, in the form of integrated strategic plans for use as instruments for the process organisation of the strategies for intervention, and that aim to achieve a sustainable, cohesive, and intelligent form of development of this territory; and supporting the municipality in its dealings with the Commissioner-Delegate, the Technical Mission Structure, and other institutional and non-institutional bodies.

In order to implement this formative process, all the activities were structured into four phases established by the Technical Mission Structure. Phase 1 consists of revising the perimetration of the areas for which reconstruction plans are required; Phase 2 is the preparatory stage of the reconstruction plans; Phase 3 consists of developing these reconstruction plans and obtaining approval for them; and Phase 4 consists of implementing the plans themselves. The perimetration was divided into two zones: Zone A is the historic centre of Sant'Eusanio and Zone B is the outlying hamlet of Casentino. The support activities conducted by the University of L'Aquila (project manager Prof. Gianni Di Giovanni) are only concerned with Zone A (FIG 1).

FIG 1. System of L'Aquila outlying villages: Sant'Eusanio Forconese.

The historic village of Sant'Eusanio Forconese

Sant'Eusanio Forconese lies in the valley of the river Aterno about 15 km from the city of L'Aquila, in a part of the earthquake basin that slopes towards the east. Like most of the historic centres in this valley, Sant'Eusanio originated between the eleventh and twelfth centuries as a "villa" i.e. the core of an open settlement, without defensive walls. The village still retains its original ancient structure and its medieval fabric remains almost completely intact. As a system of settlement its particular configuration lies in its urban morphology, with radial and concentric streets and key points that structure a system of solids and voids. The generating nucleus of this urban structure is Piazza del Popolo, the most representative space in the village, where important monumental and patrician buildings emerge out of the rest of the built fabric and gravitate around the square, notably the church of St. Eusanio, which dates from 311 A.D., and the seventeenth-century Palazzo Barberini, whose architecturally impressive facade seems deliberately intended as a challenge to the religious power opposite, represented by the church. Adjoining Palazzo Barberini, the urban design of the village's most important public space is completed by a succession of other buildings that reinterpret the palazzo or noble house type. The architectural character of the other streets is based on a more modest local building language that consists of terraces of houses that follow the contour lines or sit perpendicular to them, thus organising the basic radial and polar structure of the village. At its eastern edge this urban system is physically closed by "city wall" houses, with powerful buttresses at their lower levels and pleasant loggias at the top (FIG 2).

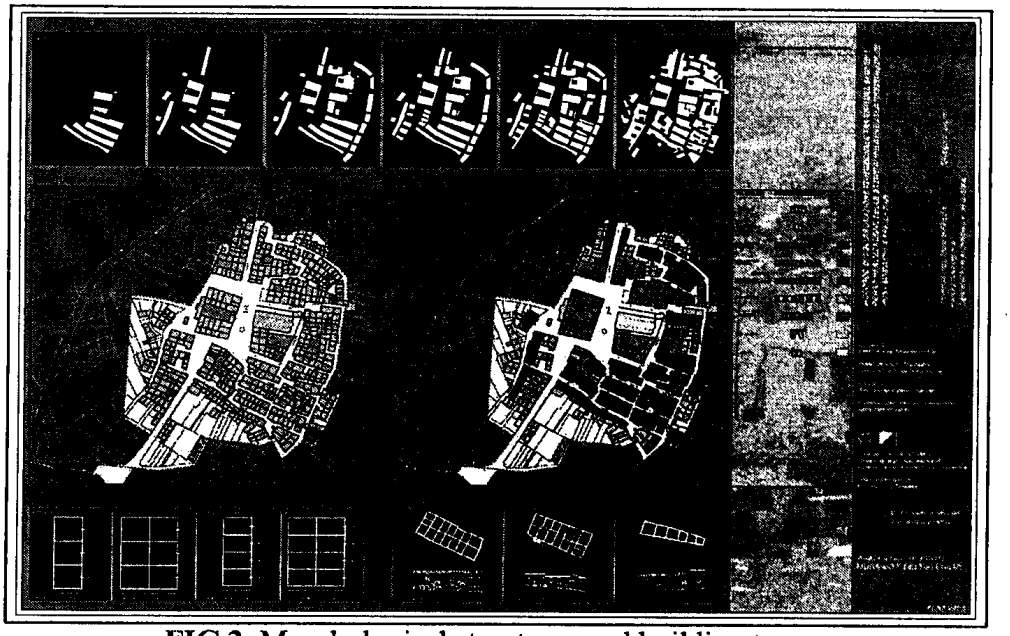

FIG 2. Morphological structures and building types.

Current condition of the places and cognitive analysis

Our surveys and site investigations brought to light the very severely damaged condition in which Sant'Eusanio currently finds itself. The most evident aspect of this is the way in which the damage was uniformly distributed throughout all the building types and all the different parts of the village; some of the buildings have since been propped up, whilst others have been partly or completely demolished. By amassing knowledge of the mechanisms that caused the damage (FIG 3) and how they were distributed (vertical elements that collapsed, panels of masonry walls that fell over, large lesions that opened up in floors, etc.) we were able to frame the problems of programming reconstruction and identifying compatible modes of intervention. The complexity of the current condition of the village means that consideration must be given not only to seismic repair and improvement, but also to new build in this historicised setting. It is therefore centrally important to acknowledge the value of the historic, architectural, environmental, technical, and construction elements, and construction elements that characterise villages like Sant'Eusanio. Defining an appropriate form of organisation for the reconstruction plan therefore focussed firstly and fore mostly on carrying out cognitive analyses of the particular characteristics of this historic village and systematically reading its setting within the territory to which it belongs. Our analyses of its built fabric highlighted the architecturally most important buildings, the ways in which several buildings form a single organism, how the basic building types evolved over time, the structure of open spaces, and the "margins" between old and new, and made it possible to build up a definitive picture of the particular characteristics of this operational context, for which planned action had to be defined within a critically aware approach. Our findings showed that dynamics of settlement in the village, and development of its typologies, were part of a continuously evolving process of growth and stratification. Acquiring knowledge about historic fabric brought out this process of formation and morphological and functional structure that resulted from it.

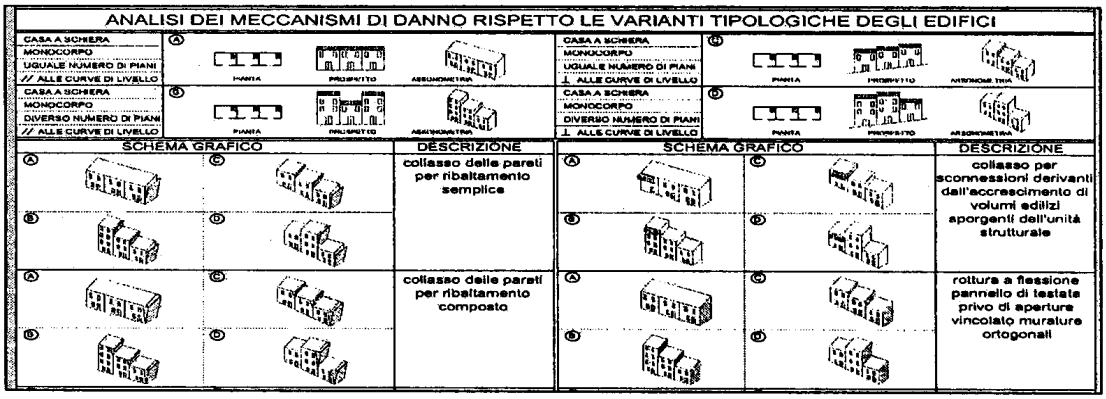

FIG 3. Building types and mechanisms of damage.

Identifying this morphological structure of the built fabric, and classifying the basic construction methods used (FIG 4), made it possible to take their sustainability into consideration when planning the works to be carried out. Our studies of traditional construction techniques [2] were accompanied by readings of the geological structure of the territory, climatic analyses, and bioclimatic and biophysical investigations of the existing relationships between the climate and the built fabric (see Fig. 5, Fig. 6); these were all added to our interpretative analyses of the general territorial framework. One particularly problematic and important factor was the considerable amount of rubble, which had to be assessed in terms of its coherence and type, so as to define compatible and coordinated procedures for disposing of whatever materials were left over from collapses or that remained after reconstruction had been carried out, indicating where and how to select and reuse whatever parts of it were historically or architecturally important, and creating a lapidarium for it. The results of all these analyses made it possible to identify which groups of buildings should be reconstructed as a single operation, and to prepare thematic maps as support for the reconstruction plan.

Critical issues of the built fabric and operational strategies

The problems that emerged in relation to restoring the built fabric can be classified under three headings: critical issues affecting its spatial and typological space system, critical environmental and climatic issues, and critical issues affecting services and service networks. The plan has to be able to manage these issues and target reconstruction so that it complies with regulatory requirements on seismic safety, energy conservation, and upgrading technological services whilst also dealing with the rubble.

The system of programmed actions that form the structure of the restoration plan must in fact respond to a complex framework of requirements and must therefore incorporate operating strategies aimed at:

- initiating reconstruction of the historic centre with the primary objective of bringing the residents back into their houses;
- redesigning and reconstructing the buildings in the historic centre in ways that accord with current regulations;
- returning the village to its historic role as the emerging element and reference point for a wider urban system that today includes the areas around its outer fringes, the areas of expansion identified in the General Regulating Plan (PRG) and which are at present experiencing a favourable dynamic of construction, and the area earmarked for Temporary Housing Modules (MAP - Moduli Abitativi Provvisori) which currently serves as a reference point of civil and social interest;
- ensuring conservation of the historic, architectural, and contextual values of all the buildings and spaces;
- having regard for issues of sustainable building and energy conservation at the territorial scale, the urban scale, and the scale of the urban block whilst dealing with reconstruction [3];

- resolving the critical issues that emerged in terms of the urban fabric as a whole;
- respecting the ecosystem;
- incrementing the range of natural and tourism attractions.

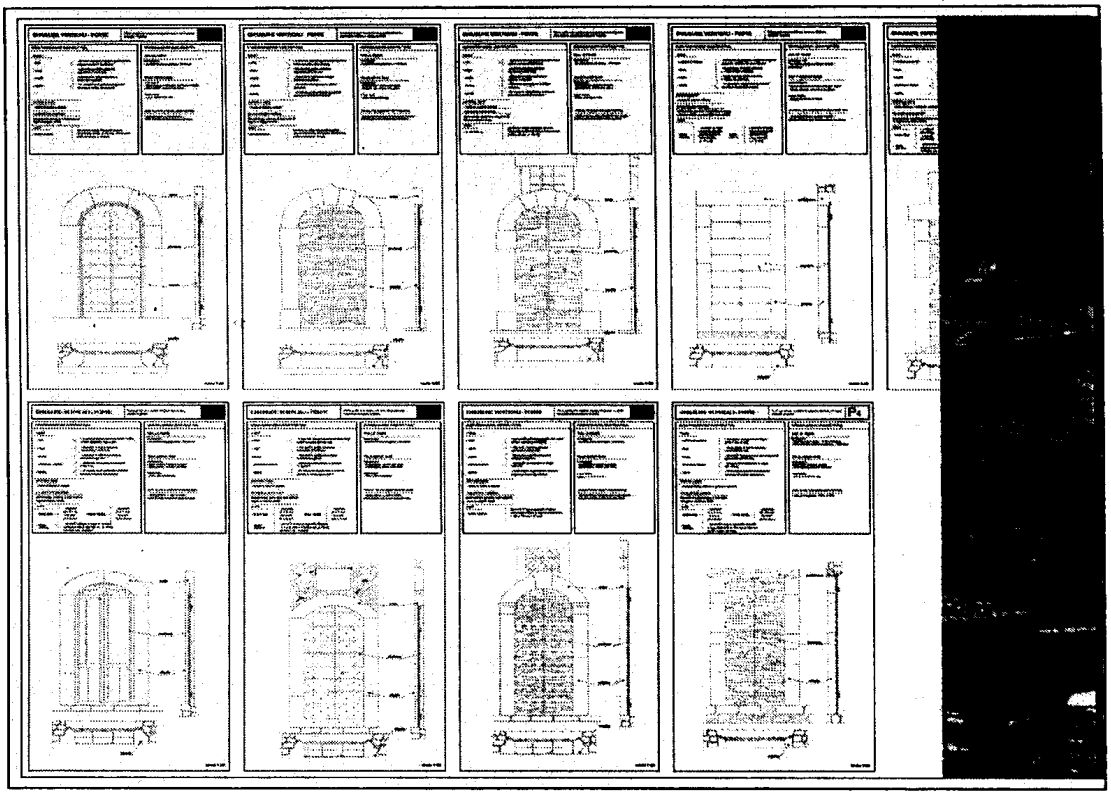

FIG 4. Critical analysis of basic construction characters.

Operating a different scales for recovery of Sant'Eusanio

As part of continuing and deepening the research on the ancient towns of the Abruzzo being pursued within the Department of Architecture and Planning of the University of L'Aquila, the reconstruction plan aims to define compatible approaches that ensure active conservation of the entire built organism of Sant'Eusanio, in ways that integrate them into a complex of structural elements in masonry, counter-arches, and arch houses and interrelate them with the system of open spaces (urban voids, streets, squares, places where streets simply widen) which configure the connective structure of the whole built fabric. This very particular urban structure induces us to work synchronically on the whole system of buildings and open spaces, including the collapsed parts and the inappropriate reconstructions, in an organic approach that

keeps sustainability in mind and aims at improving the performance levels of the whole system in respect of its basic typological and building languages and its contextual, historic, and architectural values.

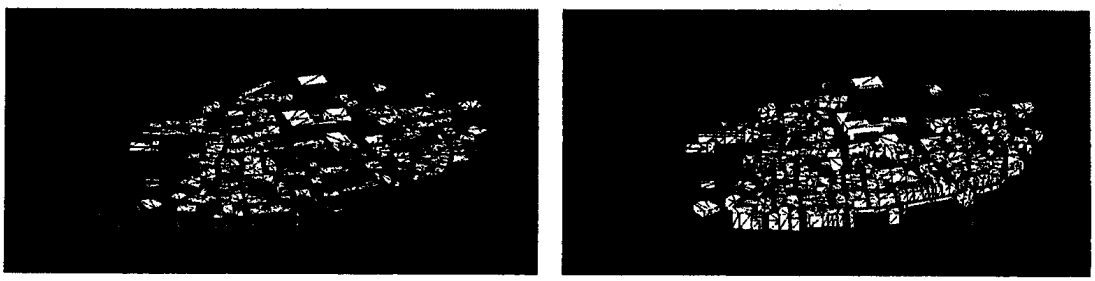

FIG 5. Sant'Eusanio Forconese: three-dimensional view of the village and its shade on 21.06 at 18 and on 21.12 at 8.30.

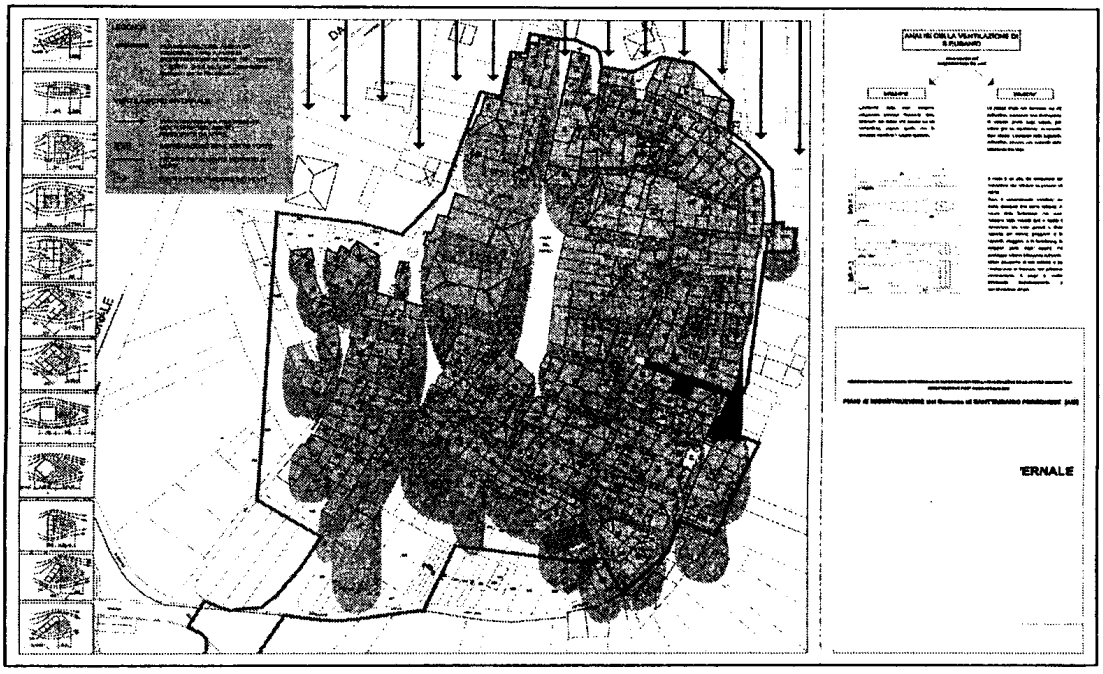

FIG 6. Sant'Eusanio Forconese: winter ventilation of the village. In evidence the areas downwind and exposed faces.

The particular need to respond to today's expected living standards, expressed as defined new possible types of housing models, comfort standards and energy performance requirements, and to do so in ways that are sympathetic to the spatial

structure of these medieval villages, translates into an approach that functions at three different scales [4].
At the first of these, the urban scale, the elements that configure the scenario of decisions set out in the plan are based on defining those parts of the village that are homogeneous in terms of their climatic, morphological and critical aspects, establishing suitable criteria for their energy upgrading that must necessarily go along with a rationalisation of their services distribution networks and upgrading their system of open spaces.
At the second scale, the single group of buildings, critical issues must be identified and performance levels defined in ways that make it possible to draw up a framework of the compatible measures to be taken; these have to be integrated with the other components necessary to guarantee structural safety, usability, accessibility, and the need to recompose the typologies and morphologies of the street frontages. This is the most complex of the three scales at which the plan is developed; its objective is to define a programme of interventions on the built fabric by synthesising all the requirements that affect the system of external spaces, the urban structure, the typological and technological system on which work is to be carried out, and the needs of human habitation.
At the third scale, that of the smallest unit for intervention, the operational guiding principles relate directly to the historic construction system of the village and its typological configuration. Once the decisions in the plan have been defined at larger scales, at this level the guiding principles have to correspond with the methods of implementation of the plan, in terms of how to realize the new functional and distribution systems, how to intervene on the built fabric and how to insert the new elements required for restoring and improving performance levels, trough the use of renewable energy sources also, if compatible; they must therefore also consider how to modernise the services distribution systems and the environmental and technological performances.

Conclusion

As the activities that support the preparation of the reconstruction plan are taken forward, issues are emerging in relation to the imperfect congruence between the cultural approach adopted and the categories for intervention set out in Law 380 of 2001 to which the plan refers, and which in some cases are too elastic, or in others too stringent with respect to the needs of such an historic place of habitation, which is also a built heritage of high value as an ensemble and has often become depopulated before. A qualitative advancement in the methods of implementation would therefore be advisable. We suggest that this could consist of carrying out test simulations capable of guaranteeing a correct conjunction between the needs of conservation and the need to upgrade overall performance levels.

References

[1] Morganti R., Tosone A. - Processi trasformativi del costruito e sostenibilità. Orientamenti e indirizzi operativi., in Gaspari J., Sfide per una dimensione sostenibile del costruire. Edicom Edizioni, Monfalcone, 2009, pp. 35-50.

[2] Zordan L., Bellicosa A., de Berardinis P., Di Giovanni G., Morganti R. - Stone house building traditions: materials, techniques, models and experimentation. Alinea editrice, Firenze 2009.

[3] De Berardinis P., Rotilio M. - The Building Code as instrument to be used in the rehabilitation of the built heritage. Proceedings of Heritage 2008 Congress – Vila Nova de Foz Coa, Portugal 2008.

[4] Di Giovanni G. - The sustainable recovery intervention. Proceedings of XXXIII IAHS World Housing Congress- Trento, 2004.