PLURAL

PUBLIC AND PRIVATE SPACES OF THE POLYKATOIKIA IN ATHENS

Volume I

Richard Woditsch DipArch

Berlin University of Technology

Department of Design and Building Science
LIA – Laboratory for Integrative Architecture
Prof. Finn Geipel

University of Patras
Department of Architecture, Architectural Design
Prof. Panos Dragonas

Submitted to the Faculty VI – Institute of Architecture
by Richard Woditsch DipArch Ox
to obtain the academic degree
Doktor der Ingenieurwissenschaften - Dr.-Ing.-

Content

ix Abstract

x List of Tables

x List of Plans

xi List of Figures

xiii Acknowledgment

xv Foreword

2 1.0 Introduction
3 1.1 General Background
4 1.2 Research Question
6 1.3 Research Focus
9 1.4 Hypothesis
10 1.5 Research Structure
11 1.6 Contribution to the Scientific Field
12 1.7 Motivation
13 1.8 Circumscription

14 2.0 Methodology
15 2.1 Research Philosophy
16 2.2 Research Approach
17 2.3 Research Strategy
19 2.4 Research Instruments
23 2.5 Research Technique

28 3.0 Theoretical Background
29 3.1 History of Spatial Discourse
32 3.2 Definition of Spatial Language
43 3.3 Applied Spatial Discourse
46 3.4 The Differentiation between Form and Medium

50 4.0 Context
52 4.1 Description of Athens
58 4.2 Description of the Polykatoikia
68 4.3 Development of Athens and its Polykatoikia

76 5.0 Research Diagnostic
79 5.1 Stournari
80 5.1.1 Data Analysis
86 5.1.2 Spatial Configurational Analysis
90 5.1.3 Visibility Graph Analysis
92 5.1.4 Adaptation Analysis
97 5.2 Kaningos
98 5.2.1 Data Analysis
104 5.2.2 Spatial Configurational Analysis
106 5.2.3 Visibility Graph Analysis
108 5.2.4 Adaptation Analysis
113 5.3 Veranzerou
114 5.2.1 Data Analysis
120 5.2.2 Spatial Configurational Analysis
124 5.2.3 Visibility Graph Analysis
126 5.2.4 Adaptation Analysis
131 5.4 Alexandras
132 5.2.1 Data Analysis
138 5.2.2 Spatial Configurational Analysis
140 5.2.3 Visibility Graph Analysis
142 5.2.4 Adaptation Analysis
147 5.5 Veikou
148 5.2.1 Data Analysis
154 5.2.2 Spatial Configurational Analysis
156 5.2.3 Visibility Graph Analysis
158 5.2.4 Adaptation Analysis
163 5.6 Amfitheas
164 5.2.1 Data Analysis
170 5.2.2 Spatial Configurational Analysis
172 5.2.3 Visibility Graph Analysis
174 5.2.4 Adaptation Analysis
179 5.7 Alkyonis
180 5.2.1 Data Analysis
186 5.2.2 Spatial Configurational Analysis
188 5.2.3 Visibility Graph Analysis
190 5.2.4 Adaptation Analysis
195 6.8 Sarataporou
196 5.2.1 Data Analysis
202 5.2.2 Spatial Configurational Analysis
204 5.2.3 Visibility Graph Analysis
206 5.2.4 Adaptation Analysis

Content

211 5.9 Poseidonos
212 5.2.1 Data Analysis
218 5.2.2 Spatial Configurational Analysis
220 5.2.3 Visibility Graph Analysis
222 5.2.4 Adaptation Analysis
227 5.10 Sof. Venizelou
228 5.2.1 Data Analysis
234 5.2.2 Spatial Configurational Analysis
236 5.2.3 Visibility Graph Analysis
238 5.2.4 Adaptation Analysis
243 5.11 Peukon
244 5.2.1 Data Analysis
250 5.2.2 Spatial Configurational Analysis
252 5.2.3 Visibility Graph Analysis
254 5.2.4 Adaptation Analysis
259 5.12 Aiginis
260 5.2.1 Data Analysis
266 5.2.2 Spatial Configurational Analysis
268 5.2.3 Visibility Graph Analysis
270 5.2.4 Adaptation Analysis

274 6.0 Research Interpretation
275 6.1 Discussion of the Outcomes
286 6.2 Conclusion

290 7.0 Outlook

292 8.0 Bibliography

xvi Credits

xvii Appendix
xviii Methode
xx Manual for the use of UCL Depthmap
xxv Manual for the use of YED Graph Editor

Abstract

This PhD-thesis reflects the questions about the constituent components that allow the polykatoikia whether in the centre or in the periphery to absorb the city and its public spaces and to carry out its interior 'landscape' to the outside. For such research to be effective, the physical, spatial and programmatic pluralism of this building type is visualized and evaluated based on current research status of the polykatoikia and by means of an empiric configurational analysis of cases in Athens. Spatial effects are caused by these physical decisions, based in legal preconditions. The built forms of the polykatoikia are shaped, located and oriented by human agency, but in the light of laws which control their effects. Concluding the results, the human agency is identified in the physical shaping, locating and orientation of the built forms of polykatoikias. This thesis is intended as a first step in the exploration of these shifting relationships and provides an important basis for defining of a theoretical knowledge of the vernacular of the polykatoikia. By this the polykatoikia, a building type, which has proofed its sustainability and variability in space and time, offers an exemplary approach for future development of European cities.

List of Tables

53 density comparaison of european cities [table 01]

53 Athens population [table 02]

56 buildings utility [table 03]

57 buildings periods [table 04]

57 number of levels [table 05]

70 european cities comparison [table 06]

74 description of the evolution [table 07]

276 data summary [table 08]

282 summarized values of space steps [table 09]

282 summarized values of symmetry [table 10]

282 summarized values of non-distribution [table 11]

282 summarized values of of clustering coefficient [table 12]

282 summarized values of of agent counts [table 13]

282 summarized values of domain areas [table 14]

List of Plans

74 evolution of plans [plan 01]

75 evolution of facades [plan 02]

List of Figures

20 case selection template [figure 01]

35 personal space [figure 02]

51 topographie [figure 03]

53 building phases of Athens [figure 04]

55 Athens population density [figure 05]

57 social distribution plan [figure 06]

60 evolution of building regulations [figure 07]

63 number of floors [figure 08]

71 Athens space and landuse distribution [figure 09]

73 Athens green spaces diagramm [figure 10]

278 summary of J-Graph's [figure 11]

Acknowledgment

Firstly, my appreciation goes to my dissertation supervisor Professor Finn Geipel. He introduced me to Greece and its Polykatoikia. His guidance, his confidence in my work as well as his support in my ideas are highly appreciated.

I thank in particular Panos Dragonas, my second supervisor, for his spontaneous support and special knowledge about Athens and their polykatoikias. My gratitude goes to Dimitra Katsota and Stephan Buerger for the discussions we had and the good meals in between.

I am deeply indebted to Prof. Dr. Panayotis Tournikiotis and the TU Athens. Without them, it would have been impossible to approach any of the polykatoikias visited. The students facilitated contacts with the locals. In this context my special thanks go to the architecture students of the TU Athens Aliki-Myrto Persinaki and Dimitra Gavriladi for their patience and simply their company. I thank also Polynikis Krimitsas, Michalis Langenfass and their families for the selfless support and time for understanding the Greeks and their culture.

Furthermore I would like to express my thanks to Dr. Philippidis Dimitris, Dimitris Fatouros and Anastasia Paschou for their time and information about the polykatoikia.

Thanks to Jan-Oliver Kunze, who comforted me with his comprehensive knowledge about the Space Synthax.
I thank the TU Berlin students Mogdeh Ali, Nicolas Kulemeyer and Guillaume de Morsier for their activity during the research process.

I thank the whole team of LIA and in particular Nele Zareh for the backing in busy times. I am bound to Dr. Wilhelm Klauser, Andreas Gehrke, Nadim Habib, Elisabeth Leitner and Wonderland.

Dearest thanks to Nathalie Schaechter and Mark Kammerbauer, who have contributed to the thesis through their critical interventions in the text, but even more through their continuos moral support.

My thanks and respect to Prof. Dr. Alan J. Brookes for being Alan.

I owe a special debt of inspiration and reinforcement to Sandra Badji. Without her the thesis would never have become a physical reality.

Above all I thank my family for their constant support in all respects.

Foreword

Athens is an intriguing place for a foreigner, even more so for an architect. From afar formless, edgeless, intensely busy and strikingly homogenous spread allover the Attika basin, when looked upon from close, this extensive mass resolves into a single urban component: the polykatoikia. A building type that is structurally efficient, flexible and restrictive, singular and multiple in use, appealing yet viscous, open yet hermetic, hierarchical yet inclusive, internally compact and externally projective, public and private in character, contemporary and diachronic at the same time. The polykatoikia, a modern construct, defined and continuously evolved alongside the relentless 20th century expansion of metropolitan Athens. For decades this popular and generic type was continuously re-produced with a remarkable absence of critical and reflective thought, conceived, planned and executed by an array of speculators, from small contractors (so called 'Polykatoikitzides') to engineers with the rare involvement of architects. Besides the sporadic appearance of publications and academic research, such as the compilation of articles in issue 12 of 'Architecture in Greece' in 1978, "exploring important aspects of the polykatoikia as a phenomenon", only recently distinguished Greek academics and theoreticians, amongst them Dimitris Phillipides, Yorgos Simeoforides and Yannis Aesopos, embarked upon a critical reading of the polykatoikia and its impact on the contemporary Greek urban landscape, introducing this discussion internationally.

Richard Woditsch's take on the subject of the polykatoikia is a methodologically comprehensive, thorough and complete approach and definition. It is the product of a foreign, 'non-greek', scholar, who investigates this particular 'housing' practice within the context of an international discourse. His analysis distances itself from a purely descriptive approach and attempts through established methods - such as the 'space syntax' method - to comparatively assess and evaluate. His strict methods enable him to paint an articulate, precise, yet an abstracted image of the polykatoikia, suggesting for this type to be successfully deployed and tested in other urban contexts, within different geographies.

Stephan Buerger Athens, September 2008

1.0 Introduction

This opening chapter describes by which problem and inquiry this study has been directed. First it expounds the general background of the domain that is being addressed. From this delineation, a research question will be outlined and mark out the focus of this research. The chapter continues with the hypothesis and the research structure, which is accordant to the research strategy. In order to classify this work, the contribution to the scientific field will be presented and the motivation explained. Further, the reader shall be informed about the study's intent.

1.1 General Background

The phrases of ongoing discussions about urban development are like news tickers: they catch you by words like 'sustainability' or 'flexibility'. Those conceptional drafts are superficial and need to be fill with architectural theories to be adaptive for the cities. Looking back, it is easy to see that in spite of the attention paid to theory in architecture in the twentieth century, and in spite of the great influence that theories have had on our built environment, architectural theories in the last decades have in general suffered from debilitating weaknesses. Most have been strongly normative, and weakly analytic, in that they have been too much concerned to tell designers how buildings and environments should be, and too little concerned with how they actually are. As a result, theories of architecture have influenced our built environment enormously, sometimes for good, sometimes for ill, but they have done little to advance our understanding of architecture. First we have to think with buildings in order to think of buildings. Within the build environment of sustainable and flexible architecture the polykatoikia has proofed its authenticity over the last century. So, what can we learn for the future urbanism from the Greeks and their polykatoikias?

In the modern era, the functional integration of the ancient city has almost completely disappeared. The growing size of the city has led to a specialization of space, which has dismantled the symbolic and functional coherence of both public and private spheres. With the streamlining of architectural production, the functions of the urban household had been broken down into a palette of juxtaposed spatial programmes. Domestic life, work, transport, shopping and leisure were each assigned their own place in a landscape which, with the disintegration of traditional forms of craft and manufacture, was increasingly made to serve a purely visual purpose. Parallel to this spatial-functional segmentation, the grammar of architecture was pared down to 'less' that seldom if ever translated into 'more'. The public significance of public space had also, as it were, been rationalised out of existence. Streets in which everything was connected with everything else had once been taken for granted, but now the various functions were preferably kept separate. The standardised relationship between the public and private domains, in conjunction with large-scale development, has led to the emergence of large, homogeneous areas.

The use of purely architectural or urban planning instruments to construct meaning in the urban environment has resulted in one-sided, one-dimensional identities based on design scales such as the isolated private or public spaces. Buildings appear to be physical artefacts, like any other, and to follow the same type of logic about function and style. But this is illusory. Buildings are more than artefacts. It is this ordering of space that is the purpose of building, not the physical object itself. Insofar as they are purposeful, buildings are not just objects, but transformations of space through objects. It is the fact of space that creates the special relation between function and social meaning in buildings. The ordering of space in buildings is really about the ordering of relations between people. Because this is so, society enters into the very nature and form of buildings. They are social objects through their very form as objects. Architecture is not a 'social art' simply because buildings are important visual symbols of society, but also because, through the ways in which buildings, individually and collectively, create and order space, we are able to recognize society: that it exists and has a certain form. [Hillier 2007]

1.2 Research Question

Spatial order is one of the most striking means by which we recognise the existence of the cultural differences between one social formation and another, that is, differences in the ways in which members of those societies live out and reproduce their social existence. These might be differences between a society living in dispersed, highly subdivided compounds and another living in densely aggregated, relatively open villages; or differences between a city in which dwellings are directly related to the system of streets, as in Athens, and another in which closed courtyards interrupt this direct relation, as in Berlin. In either case, spatial order appears as a part of culture, because it shows itself to be based on generic principles of some kind. Throughout the social grouping, a similar family of characteristic spatial themes is reproduced, and through this repetition we recognise 'ethnicity in space' [Hillier & Hanson 1984]. At a general level, everyday language recognises this pervasive relation between spatial formations and lifestyles by using words like urban, suburban, village, and so on with both spatial and a behavioural dimension to their meaning. In everyday life and language, it seems, the experience of spatial formations is an intrinsic, if unconscious dimension of the way in which we experience society itself. We read space and anticipate a lifestyle.

But however pervasive, the link between society and space cannot be limited to questions of culture and lifestyle. Other evidence suggests that space is bound up even more deeply with the ways in which social formations acquire and change their very form. The most far-reaching changes in the evolution of societies have usually either involved or led to profound shifts in spatial form, and in the relation of society to its spatial milieu: these shifts appear to be not so much a by-product of the social changes, but an intrinsic part of them and even to some extent causative of them. The agricultural revolution, the formation of fixed settlements, urbanisation, the early development of the state, industrialisation, and even two major changes of today, the change of the way of working and the pluralism of the modern society, have been and will be associated with changes in the morphology of society in which social and spatial changes appear almost as necessary dimensions of each other. New types of family and family-like communities are using houses and apartments in new ways. Working processes operate in different ways, training and education are not conducted in the way they used to be, shopping habits have changed, and leisure-time rituals have practically been revolutionised. Different types of social formation, it would appear, require a characteristic spatial order, just as different types of spatial order require a particular social formation to sustain them.

The speed in which the way of working is changing has contributed to the development of activities, which is associated with new houses, transport and communication technologies. Following the printed word, the western urban society expected ten years ago that we would work less and revel in more leisure in the future. The expectation of today is that we will work in two jobs at home or in a closer distance. The dwellings in particular appear to be opposed to this kind of development.

There is another, more important argument claiming to demonstrate that normal city architecture is apparently unsuitable for modern urban society. Modern society's pluralism is thought to demand variety. In a democratic community, each citizen, each city-dweller has an equal right to self-realisation and self-presentation. And since each citizen and city-dweller is different from his or her neighbour, the city [it is claimed] has to reflect the variety of lifestyles and cultures that it has absorbed by showing off an exuberant range of different architectural forms.

The result of this attitude is a confusion of forms and associations that have lost all comprehensibility and all capacity for dialogue. In exactly the same way in which different people from different cultures can only really live together when they enter into a productive dialogue with each other, the modern city can only be a city of tolerant coexistence when it is able to offer such an existence usable locations and to give it architectural expression. Locations and expressions of this sort can never represent a mere arithmetical addition of the differences, however; nor can they consist merely of the lowest common denominator, which would function at an abstract level at best, but not at an aesthetic one. Instead, they need to symbolise the space and opportunity that are granted to individuals because of their differences, enabling them to

develop themselves individually and to combine to act collectively. Furthermore, the function of a building can change within its duration of existence i.e. by the changes of the surrounding area. Logically the graduation of the private and public in and around a building will change. Chermayeff and Alexander remind us [1999], that form is the expression of needs into structure. It is the final product of a process, which displays the answer of constraints. The interrelation between necessity or constrain and final product is sometimes direct and immediate obvious. It requires relative simple technical means. Within such requirements each form reflects the constraint, to which it owes it existence. The permanent form constitutes the frame within which transformations of space can take place. The frame defines the space for change. While the frame is specific, the space inside the frame is general, its purpose unspecified: it is generic space. The more we are able to articulate the permanent and give it meaning, the more space the changing aspect has in which to unfurl. Designing out of the permanent means designing for the unknown. This is not a question of charting that unknown aspect, but of developing the permanent out of a particular perspective on spatial domains. This perspective can help us decide what kinds of freedom the permanent should enable so as to make room for the unknown.

1.3 Research Focus

Looking on Athens we see a city which is in contradiction to the models of 20century. Athens is not divided into monofunctional areas and does by no means illustrates a functionalistic city structure, in which separation of unlike functions is the goal. One could compare the social dimension of Athens to old medieval cities, in which merchants and craftsmen, rich and poor, young and old, necessarily had to live and work side by side.

The uniqueness of Athens is formulated by two curiosities: First, there is one building typology of the polykatoikia which defines the city of Athens by its full coverage of the attic landscape from the centre to the periphery. And second, this building typology has proven the cability to accommodate a plurality of uses within one unit of the same structure. This shows quite plainly that laying out the characteristics of Athens in the 21st century means principally laying out the phenomenon of the polykatoikia. It seems that there are certain non-transferable modalities, definite cultural designs, which made the conversion of modernity in Greece incomparable with what happened in other parts of Europe. The introduction of a different case as the basic element of the city implies a fundamentally different relationship between urban planning and architecture, between the public and private domains.

Moving through Athens one gets aware the major difference. There are no designed public spaces. There is no mediation between the polykatoikia and the city. By a kind of interlude between the street, the public space of the city, and the polykatoikia, the private buildings become public elements, blazing their social value beyond the actual buildings. On the other hand, the city enters the building over the street level and is able to mix up the conventional separation of spatial spheres up to the top floor by putting public next to private uses. This embodies their characteristic urban character. It becomes a modernist spatial environment where contemporary life can develop freely. The animate mixture of the polykatoikia is not articulated spatially in the design of the building. There are no hierarchies of privacy in the section, no spatial interdependencies, no support amenities. The urban benefit of this mixture of uses is a continuous and lively public space in and outside of the polykatoikia. The polykatoikia enables transitions between domains to be gradual rather than abrupt, but to be designed as such; rather to be adapted by the users as such. In this way each spatial domain can be assigned a specific place. The polykatoikia is available for undifferentiated and continuous use. The simplicity of a polykatoikia as the basic motif might be an answer for future development of western cities by its expression of pluralism as mentioned before. Maybe it is not a model for our location, but maybe one could transform the approach to the challenges of the polykatoikia in a different way and come back again.

Looking at contemporary Greek cities one gets aware of an indifference to symbolic and representational architectural form. The polykatoikias that make up the city are the medium for the realization of a utilitarian urban strategy without a theory where no particular importance is given to the single building, its quality of construction or its architecture, but to the production of an abstract. The buildings are the same height, the size of the plot and the type are almost the same, too. The polykatoikias stand from the fifties on by its means of simplicity for nothing more than the commercialization of housing and the urban scene. A commercialization which is constantly encompassing more and more social activities and multi-uses. What is most particular about this building type in Athens is that a building that is specifically residential in layout and iconography, conceived in the clear segregation of uses of modern planning, has become the instrument of the mixing of uses at the microscale, which permits loose alignments. Originating in a systematization and typification of the building, a distinct quality of the polykatoikia is its ability to adapt to a variety of uses within a random process inside the same structure.

The purpose of my study is to identify the parameters that enable transformation of spaces in the urban context of Athens, on the basis of the polykatoikia, a building type which enables the change of use and spatial domains over the last fifty years, and explore its potential implications for the current discourse on modern urban society. Which are the physical and spatial topics and their application by the users to cover the solidity of such a relationship between the public and private?

Space is, however, a more inherently difficult topic than physical form, for two reasons. First, space is vacancy rather than thing, so even its bodily nature is not obvious, and cannot be taken for granted in the way that we think we can take objects for granted. Second, related spaces, almost by definition, cannot be seen all at once, but require movement from one to other to experience the whole. This is to say that relationality in space is rarely accessible to us as a single experience. Therefore space will be digressed for this paper as a phenomenon.

The peculiarities of interpretating the polykatoikias as artefacts lead to a very special problem in trying to understand them, and even in trying to talk about them analytically. It is a fairly straightforward matter to talk about artefacts in general, because in so doing we are talking about objects, and the important properties of objects are visible and tangible. But talking about buildings, we need not only to talk about objects, but also about systems of spatial relations. It is difficult to talk about buildings in terms of what they really are socially, that it is eventually easier to talk about appearances and styles and to try to manufacture a socially relevant discourse out of these surface properties. Spatial organisation through buildings and built environments becomes one of the principle ways in which culture is made real for us in the material world, and it is because this is so that buildings can, and normally do, carry social ideas within their spatial forms and are by that the transmission of culture through artefacts.

One thing is clear. The spatial uses of the polykatoikia are not attributes of individuals, but patterns, or configurations, formed by groups or collections of people. They depend on an engineered pattern of co-presence, and indeed co-absence. Very few of the purposes for which the polykatoikia was build are not 'people configurations' in this sense. We should therefore in principle expect that the relation between the people of Athens and the space of Athens, if there is one, will be found at the level of the configuration of space rather than the individual space. Through spatial configuration culturally determined patterns are embedded in the material and spatial 'objectivity' of the polykatoikia. By the analysis of spaces and functions in terms of their configurational relations within the polykatoikia, and the search for common patterns across samples, we can see how the polykatoikia can transmit common Greek cultural tendencies through appropriation of space.

Seeing the polykatoikia as the transmission of culture through artefacts does not mean of course that each polykatoikia will be identical with each other. On the contrary, it is common for vernacular architectures to exhibit prodigious variety at the level of individual cases, so much so that the grounds for believing that the cases constitute instances of a common vernacular style, either in form or space, can be quite hard to pin down. In building terms, the manipulation of the spatial and formal elements which make up the polykatoikia will, if carried out within the scope of non-discursive configurational ideas to think with, which govern key aspects of their formal and spatial arrangement, lead to exactly the combination of underlying common structure and surface variety that characterises vernacular architectures in general.

It is obvious from seeing Athens and its polykatoikia that architecture does not depend on architects, but can exist within the context of what we would normally call the vernacular. Basing on a clear systematization and typification of the building, the 'polykatoikia' is a solution which does allow for change over time. To the extent that the vernacular of the polykatoikia shows evidence of reflective thought and innovation at the level of the genotype, the Corbusian Dom-ino system, then that is evidence of the kind of thought which is called architectural within the vernacular. This does not mean that the innovative production of the polykatoikia which are phenotypically individual within a vernacular should be thought of as architecture. Such phenotypical variety is normal as the product of culturally constrained non-discursive codes.

In the vernacular of the polykatoikia the pattern of form and the pattern of space which give the building its social character are recreated through the manipulation and assembling of building elements. We can say then that the form of the polykatoikia, the spatial pattern and the functional pattern are known in advance and need only be recreated. In taking one of the most important characteristics of the 'polykatoikia', its vitality, as a constant necessity of European cities and a major need

for a sustainable and flexible development of cities, architecture has to be made out of the vernacular of the polykatoikia. In architecture then, because these crucial relations between non-discursive forms and outcomes are not known in advance, architecture has to recreate in a new, more generalised form, the knowledge conditions that prevail in the vernacular of the polykatoikia.

The passage from vernacular of the polykatoikia to architecture is the taking into reflective thought of the non-discursive, or configurational, aspects of space and form in this building type. In the vernacular tradition of the polykatoikia, these aspects are governed by the taken for granted ideas to think with of the Greek culture. In architecture, ideas to think with become ideas to think of. Spatial and formal configuration in buildings ceases to be a matter of cultural reproduction and becomes a matter of speculative and imaginative enquiry. Because architecture is a creative act, there must be something in the place of the Greek social knowledge structure as ideas to think with.

Since architecture is based on the general comparability of possible forms, this knowledge cannot simply encompass particular cases of the polykatoikia. It must encompass the range of possible cases and if possible cases in general. There is only one term for such knowledge. It is theoretical knowledge of the polykatoikia. Once it is accepted that the object of such a theoretical knowledge is the non-discursive – that is, the configurational – content of space and form in polykatoikias and their built environments, then the theory can only be developed by learning to study polykatoikias and their built environments as non-discursive objects. In the absence of such knowledge, architecture can be, as the twentieth century has seen, a dangerous art.

1.4 Hypothesis

The polykatoikia unites the diversity of a capitalist society by a random process of private and public spaces. Next to the pluralism of the polykatoikia in use and time, I believe that the polykatoikia is by its additional pluralism in spatial domains, the osmosis of private and public spheres in a modern urban context. The polykatoikia allows a solvent pass through the less concentrated outside into a more concentrated inside and vice versa by an overlap between domains. Stating this, the question regarding the constitution that allow the adaptation of spatial configuration has as already mentioned logically to follow.

1.5 Research Structure

The difficulties that exist in talking about space as a phenomenon will be taken in two stages in chapter 3.0. First, the problem of how far space can be seen as an objective, independent 'thing-in-itself' will be discussed There is the need to do so since there is great confusion about the status of space and how far it can be regarded as an independent entity rather than simply as a by-product of, say, the arrangement of physical things. Second, space will be expressed as a configuration, since it is as configuration that it has its most powerful and independent effects on the way buildings and built environments are formed and how they function for their purposes.

To feature a widespread generalization of the theory, I describe in the pre-analysis chapter 4.0 the constitute parameters of the genotypical polykatoikia and its historical, social, economic, cultural and architectural sense, and apply cross-case analysis [chapter 5.0]. I mapped and analysed them using the data analysis, spatial configuration analysis, visibility graph analysis and adaptation analysis.

Then I observed them repeatedly in terms of what are the distinctions between the inner and outer realms of the polykatoikia to be found in different parts of the system.

To study theses distinctions, it is essential to study the characteristics that distinguish them from each other, the borders that separate them and mediate between them, and the relationships between them. In chapter 6.0 I abstract the essences from the analysis and with a common interpretation I identify themes that emerge out of the distinction between the inner and outer realms of the polykatoikia. In my last step [chapter 7.0] an outlook will describe the potential use of the gained knowledge.

1.6 Contribution to the Scientific Field

My research about the private and public places of the polykatoikia is being conducted in an area where few, if any, previous studies have been undertaken. In reference works about the polykatoikia the spatial aspects of this typology seems to be disregarded. In my work I have not found it possible to build a great deal on what has been established before.

The cause for this is that, although these various lines of research approach the polykatoikia in a way which allows research to be done and data to be gathered, none defines the central problem of the use of the polykatoikia offering an exemplary approach for future development of European cities in the way which I believe is necessary if useful conclusions are to be developed. An exception is the book 'Metapolis 2001' that, edited by Yannis Aesopos and Yorgos Simeoforidis, touches this question, but the main focus of the literature about the polykatoikia is an architectural or urban one in terms of history and development.

The reason is found in the general approach of seeing the polykatoikia in its origin significance as a multi-family dwelling. In the late nineteenth and early twentieth centuries, the multi-family dwelling was still a fairly common type of housing.

However, with the rise of Modernism in the years that followed, it became less and less so. The modern condition shattered the unity of the worker's villa; rationality, hygiene and technical development led to specialisation and separation of housing functions. Rationalisation of the ground plan of the dwelling, as well as greater efficiency, led to fixed orientation of dwellings, standardised ground plans and a uniform relationship between public and private spaces. Variations in size and heterogeneous groupings disappeared from the architectural vocabulary. Composition was guided by repetition of objects and structures, without any direction or hierarchical relationship. Modern design focused on assembling or merging identical elements at a higher level of scale, without using the design instruments belonging to that level. Grouping simply became the accumulation or meshing of identical parts with no beginning or end, no hierarchy.

As a result, the multi-family dwelling did not become part of the canon of twentieth-century mass housing, and in the most recent reference works it hardly gets a mention. Yet it still has a prominent place in many European building cultures, including those of Germany, Austria, Spain and Italy, where it is a commonplace building type. Development there is small-scale and bottom-up, and most architecture is everyday and vernacular, so the type is not part of the official debate on architecture and spatial domains. Even modern, architecturally advanced building types in those countries tend to be seen as part of a particular architect's work rather than part of the general debate on housing. Taking back the multi-dwelling house, which will in the future not only be applied for living as explained in chapter 1.2, into the architectural discussion is also given attention in this work.

1.7 Motivation

The most interesting phase in the process of architecture starts when the architect has left the site. The building is built and the keys are finally handed over to the client. The building is no longer in the hands of the architect and hopefully meets in the best way possible all the principal requirements of architecture – such as construction, function and beauty. The client starts to use his or her building and a broader form of customization of the new home runs its course.

The polykatoikia can be seen as a symbol of a so-called 'architecture without architects' [Bernard Rudofsky]. Within one unit of the same structure a mix of different uses takes place, but more than likely it was never planned for such a variety. The variety becomes visible within the different signs and aspects of housing, working or commerce. The vitality of such different forms of urban life in time and space are the real beauty of those ‘white’ modules in modern greek cities. The building is alive. But what are the parameters of such a ‘biotope’ of different arrangements of urban life within one structure? What makes the polykatoikia sustainable in this manner and a durable architectural form for customization?

1.8 Circumscription

This work searches for the conceptual 'cement' binding the spatial domains of the polykatoikia. It is seen in my work as a building type, which generates an autonomous form in order to invigorate a variety of public and private spheres. The public domain is seen here as a non-formal category, as a space that does not automatically acquire public meaning through 'urban' design: publicness is created by linking up or overlapping domains [from private to collective and public] and there is no appropriation of any kind.

Building types can be defined using architectural or cultural models. Architectural models focus on the relationship between typology, urban planning and development, with the emphasis on finding the right form of architectural expression. Cultural models examine the use of the building type via social practices in the city, and mainly focus on the relationship between the public and private domains.

Since the aim of the polykatoikia is to link up domains through overlapping use, without causing the buildings to lose their autonomy or identity, this study of the polykatoikia will focus not only on the architectural autonomy of the building's main 'collective elements' or 'collective forms of expression', but also on the utilitarian link between building and space. Beyond the a-contextual monumentality that predominates in this urban building type, there will be a searching for different kinds of autonomy which is a more integral part of the critical elements of architecture and patterns of use and space in the city.

Suggesting an abstract context and a conscious logic behind the derivation of these building forms is more the intent here than presenting a model house of definitive causation. Here the form of expression is linked to local building traditions and a local interpretation of meaningful architectural forms, and does not refer to classic architectural traditions.

2.0 Methodology

The purpose of this chapter is to discuss the research philosophy, to describe the general research approach of the applied method, to expound the research strategy. The chapter ends with the introduction of the research instruments and research techniques that were developed in order to be utilised .

2.1 Research Philosophy

This research is based on the interpretivist philosophy, which suggests that only through the subjective interpretation of and intervention in reality can that reality be fully understood [Husserl 1965]. The study of the polykatoikia in their natural environment is key to the chosen philosophy. There may be many interpretations of reality, but these interpretations are in themselves a part of the scientific knowledge [Husserl 1965].

Reality is, as Husserl [1965] states, objectively determined, but socially constructed. The underlying assumption is that by placing people in their social contexts, there is greater opportunity to understand the perceptions that anyone has of their own activities [Hussey & Hussey 1997]. By the nature of the interpretivist philosophy, promoting the value of qualitative data is in pursuit of knowledge [Kaplan and Maxwell 1994].

In essence, this research paradigm is concerned with the uniqueness of a particular situation, contributing to the underlying pursuit of contextual depth [Myers 1997].

However, while interpretive research is recognised for its value in providing contextual depth, results are often criticised in terms of validity, reliability and the ability to generalise, referred to collectively as research legitimisation. These concerns are amplified in the single case scenario [Eisenhardt 1989; Perry 1998].

In reality, all these issues are interdependent and reflect on the layered complexity of the polykatoikia at hand:

-Reliability refers to the consistency or stability of a measure. Denzin [1970] states that multiple and independent methods should, if reaching the same conclusions, have greater reliability than a single methodological approach to a problem. This combination of methodologies in the study of the same polykatoikia is known as triangulation.
- In terms of validation and to lead the reader to an understanding of the meaning of the experience under study, the descriptive data is presented solid and clear [Stake 1995].

Remenyi et al suggest using multiple data sources, establishing an identifiable chain of evidence, and having a draft reviewed by the key informants to strengthen construct validity in this regard [1998]. Generalizability refers to the extent to which the findings of the enquiry are more generally applicable outside the specifics of the situation studied [Robson 2004].

In qualitative terms, the research goal is to offer a case description [including data collection procedures] that would allow the reader to repeat the research process in another case [Kidder & Judd 1986; Vaughan 1992]. Although a single case may not provide sufficient evidence to make robust generalisations, it can establish the existence of a phenomenon [Van Maanen 1988], which is adequate for the purposes of exploratory research [Remenyi et al. 1998].

2.2 Research Approach

In architecture, space is a central theoretical discipline, and the problem is to find a way to study it and to interpret it. Interpretation is, of course, more of an art than a procedure and it is never possible to establish in advance which spatial dimensions are likely to be the most relevant. It does, however, help to work systematically, insofar as this is possible. Working systematically means essentially four things at this stage:
First, the problem of identifying the morphological type of the polykatoikia becomes that of identifying the combination of elementary generators that yield a particular form of the polykatoikia, as you will see in chapter 3.0 [Theoretical Background]. This has the advantage that from the beginning on the abstract rules will become obvious which are underlying spatial forms, rather than spatial forms themselves - genotypes rather than phenotypes, in effect - then the comparative relations between different forms of the polykatoika become easier to see in chapter 5.0 [Research Diagnostic].

Second, working from a summary of the main architectural, spatial and programmatic features of the system as shown by the visual and numerical analysis - plus any other features which one feels are present but which have not yet been expressed through representations or numbers.

Third, using the set of postulates as a general interpretative framework - always remembering that this aspect of space syntax is only a theory and may well not be adequate to explain one's material in a way that is satisfactory.

Finally, and most simply, trying to see the building as an interface between the two kinds of social relations: those among inhabitants and those between inhabitants and strangers. Trying to build a general picture of how the constituation of the interface generates and controls these relations. When attempting to do this, however, that the internal structure of the dwelling may be important to a full understanding of the system.

2.3 Research Strategy

In general, the built environment is the most obvious kind of object, and the one that forms our familiar background, but at the same time its inner logic and structure is as inaccessible to us as anything in nature. However, it has one great advantage as an object of study. Its very scale, its manifest character, and slow rate of change offer it up as the paradigm case for configurational investigation. The essence of the problem is to capture the local-to-global dynamics of architectural and urban systems, that is, to show how the elementary generators, which express the human ability to cognise and structure an immediate spatial reality, unfold into the ramified complexities of large-scale systems.

In this, methodological difficulties are central. The aim of a method must be to capture the local or elemental ordering, the emergence of global complexity, and how both relate to the human mind. For any of these, the manifest problem of configuration must be tackled head on, and must be approached first and foremost as an empirical problem. If the space-time products of abstract artefacts are held together by configuration, then configuration can be found by examining them.

The corpus of configurations that can be built through the study of real cases must be some indicator of where we might seek for the invariants in configuration of built environment processes. For this task, the very scale, relative stability and availability of built environments make them the ideal vehicle for an enquiry. All we need are techniques that permit the extraction of configuration from its space-time embodiments - that is, non-discursive technique. [Hillier & Hanson 1984]

The research strategy is based on the theoretical ideas which have been set out at in chapter 1.0. The analysis of the relationship between the spatial setting and the production and reproduction of knowledge can proceed effectively only within this type of theoretical framework. It is this theoretical framework that the chosen methodology of building science techniques combined with 'space syntax' seeks to convert into a programme of empirical investigation, by first collecting essential data of the chosen polykatoikia, secondly investigating space as a pattern in itself, then analysing its relationship to the distribution of categories and labels [non-interchangeabilities], and finally systematically observing its use. From form over space to applied use the understanding of the public and private domains will be achieved.

The method shows how buildings can be analysed and compared in terms of how categories are arranged and related to each other, and also how a building works to interface the relation between the occupants and those who enter as visitors. Small and large examples of domestic space are examined to show in principle that spatial organisation is a function of the form of social solidarity - or the organising principles of social reproduction - in that society.

The configurational formalisms used here as the basis for non-discursive technique are in some ways much simpler than others proposed for the similar classes of phenomena over the last twenty years. Yet they have proved the most powerful in detecting formal and functional regularities in real systems. There are probably three reasons for this.

First, the quantitative methods proposed are directed straight at the problem of configuration, that is, the problem of understanding the simultaneous effects of a whole complex of entities on each other through their pattern of relationships. Lack of attention to this central problem is the prime reason why past formalism often seemed to offer mathematical sophistication out of proportion to the empirical results achieved. With configurational analysis it is the other way round. Exceedingly simple quantitative techniques have led to a disproportionate success in finding significant formal and form-functional regularities. Configuration seems to be at least one of the things that architectural and urban patterns are about.

Second, in configurational analysis, as much theoretical attention has been given to the representation of the spatial or formal system that is to be analysed as to the method of quantification. As we will see, this quite normally gives rise to a whole family of representations of the same spatial system, each one relevant to some aspect of its functioning. It is also normal to combine representations, literally by laying one representation on top of the other and treating the resulting connections as real connections in the system. Through this, we find that diffe

rent ways of representations taken together yield formally or functionally informative results. In terms of research strategy, this means trying to represent space in terms of the type of function in which we are interested. For example, simple line structures drawn out of spatial configuration, temporarily discounting other properties, have proved sufficient [chapter 5.0] to account for many aspects of movement within buildings.

Third, and synthesising the previous two, much attention has been given to the graphic representation of the results of mathematical analysis, so that the formal structures identified in spatial or formal complexes can be intuitively seen and understood without the intermediary of mathematical formalism. This means that much can be understood by those whose temperaments lead them to prefer a graphical rather than a mathematical understanding. By representing mathematical results graphically, a level of communication is possible that permits large numbers of people to be interested and knowledgeable who would otherwise fall at the first fence of mathematical analysis.

2.4 Research Instruments

With the searching nature of my research question and the vast selection of polykatoikias in mind, I have used three different research instruments: literature research, interview research and case studies. These different instruments were chosen because the subject of spatial domains in- and outside the polykatoikia is too diverse and complex to rely on one source of evidence or one perspective. This is what in the literature is called 'triangulation'.

The term refers to an iterative process of comparing and checking the results of different sources of information, thus providing valuable feedback. Triangulation increases the reliability of the results, since it is a credible and useful method of conducting complex research, which can result in an increase in both quality and quantity of data gathered. Each instrument is described below in detail.

Literature Research

The literature study focused on reviews of the polykatoikia in architectural magazines and books, studies about building typologies and theories about form and space. There are three limitations of this literature study: First, the reviews of the polykatoikia rely on the historical and social meaning of the polykatoikia, which merely focus on its architectural development. Second, the studies about building typologies represent the way of visual comparison. By definition, how to make aspects perceptible? Third, the choice for the theories about form and space was led by finding architecture and urban related definitions of space and exploring methods to study those.

Interviewv Research

To get first-hand information about polykatoikias, I interviewed local builders, architects, developer, researchers and users. [Appendix] The interviews were 'open' and built around two questions: First, one can find the polykatoikia in the centre, in the semi-periphery and periphery. It seems that the typology has a 'gene' which allows it to be 'everywhere', which seems to be unique. 'What is in your opinion this 'gene'? ' And second, one characteristic of the polykatoikia is the intermixture of the polykatoikia and its utilities into the city and the urban life interfering into the uses of the polykatoikia. One could describe it as a contradiction of the reclusive domestic life and the exposed city in one building. 'How is the social influence of both – the polykatoikia and the city – among each other? '

Case Studies

The case study is advantageously undertaking theoretical building research, to test my thesis, without an already existing strong theoretical base for the research and the need to focus the phenomena of spatial overlapping in a natural setting. I considered the case study to be viable for the following reasons:

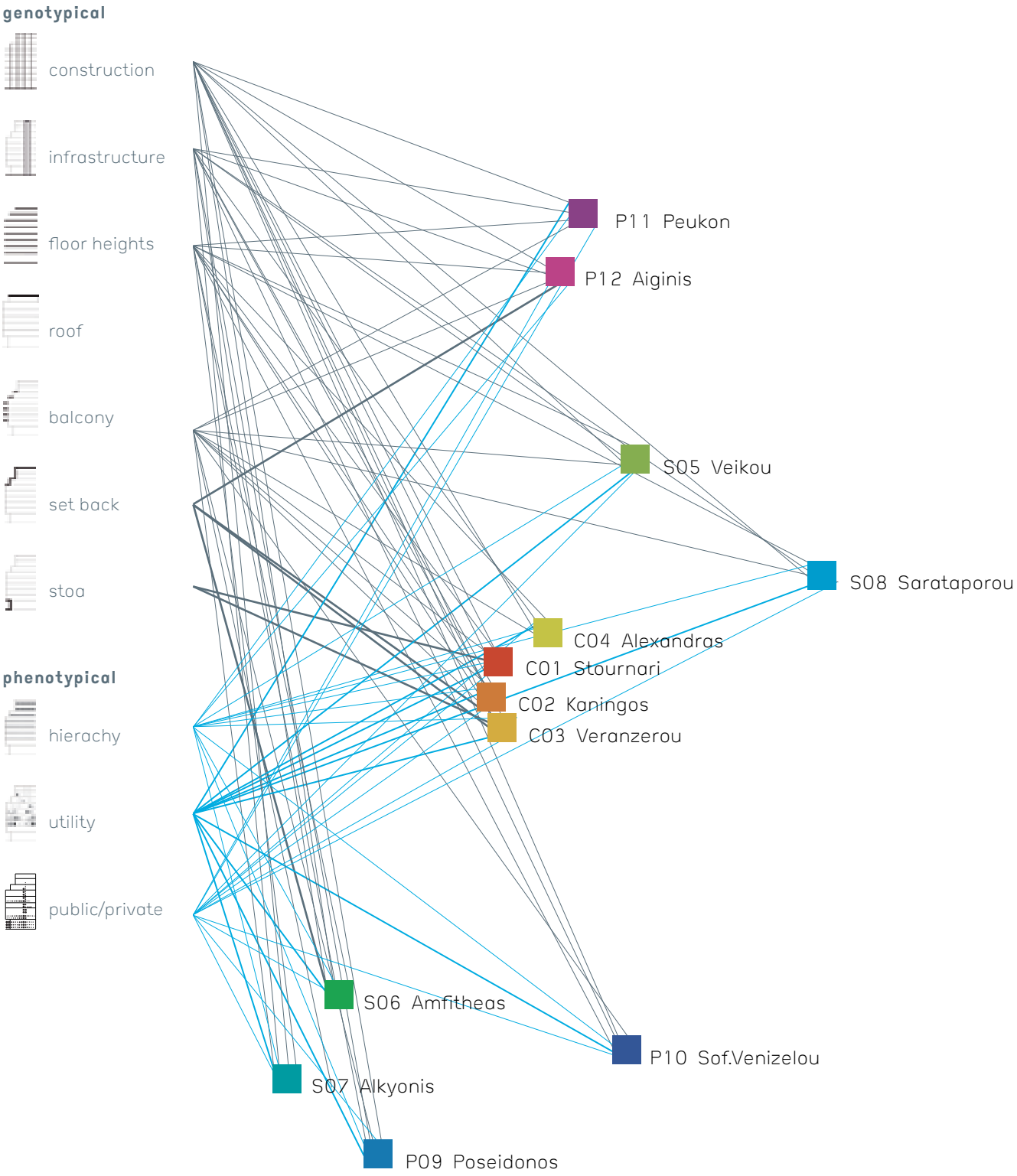
- It is necessary to study the phenomenon in its natural setting.
- I can ask 'how' and 'why' questions, so as to understand the nature and complexity of the processes taking place.
- Research is being conducted in an area where few, if any, previous studies have been undertaken.

My case studies are interpretivist in nature, concerning the approach, the data collected and the analytical techniques employed. As an observer-researcher, reality can be captured in greater detail with the analysis of more variables than is typically possible in experimental and survey research.

By taking a number of urban areas– atypical areas in the centre, semi-periphery and periphery of Athens - and a range of polykatoikias I sifted through 103 polykatoikias in the metropolitan area of Athens. Along with 12 finally chosen in-depth case studies [chapter 5.0] I examine the phenomenon of the polykatoikia, which involved frequent field visitations over an extended period of time. The boundaries of the phenomenon were not clearly evident at the outset of the research and no experimental control and manipulation was used. Employing multiple methods of data collection I gathered information from few entities, as described in detail later in this chapter.

When intending to study the public and private spaces of the polykatoikia in Athens, the initial question was what sample of polykatoikias might be appropriate as data. The polykatoikia exists as well as a pure multi-dwelling and multi-used building. In the PhD-thesis the latter has been chosen as the case for a closer analysis, since it offers the requested pluralism in spatial domains.

The first principle of the case selection process concerns the different urban locations of the polykatoikia inside the metropolitan area of Athens that only make the



case selection template [figure 01]

genotypic generators on this type visible, in terms of construction, infrastructure and floor heights. Here the sorted polykatoikia only occupies a simple plot, which is filled in fairly autonomously. The result is greater flexibility and mutual independence; the polykatoikia occupies a fairly autonomous position in relation to the fabric.

Researchers of the University of Technology Athens provided ideas on which areas of Athens would be described as the centre, the semi-periphery and the periphery. Out of the overall classification I choose the areas [Appendix] by their different urban situation for my fieldtrips on site, always accompanied by a Greek student of the Technical University of Athens who was familiar with the places. Also he/she was able to translate from English into Greek. In order to gain a large number of potential case studies of the different located polykatoikias 10 areas of the centre, 10 areas of the semi-periphery and 4 areas of the periphery were visited during my fieldtrips [Appendix].

According to the following overriding criteria the references were chosen:
- For a general overview the location was chosen in the centre, semi-periphery and periphery.
- For a purity of genotypic construction its peak construction phase [1950s – 1970s] in Athens was chosen.

Furthermore they had to meet the following phenotypic criteria:
- morphology: balconies [indicator for housing], setbacks and colonnades, called stoa [optional]
- rules about the organisation: different programs in a single building [overlapping spatial domains]

The selected 103 exemplary polykatoikias had to fulfil in the second phase of the case selection process the data collecting criteria as below:
- direct observation of activities, the phenomena of the polykatoikias and their environment
- measurements of the building
- documentation by photo and film
- printed and electronic information [plans from the authorities, aerial photos]

I used case studies to exemplify and clarify the results of the interviews and the literature study. A clear schedule of data collection activities was developed during the preparation of the fieldtrips. An outline of site visits was scheduled, detailing each visit's likely measurements and documentation. [VII.IV Appendix] The authorities were consulted to receive printed or digital building application drawings of the architect, aerial photographs from the army and statistic charts about Athens polykatoikia. A variety of data collection techniques allowed for a greater possibility of anomalies to be noted, and sought to accommodate limitations relating to the research techniques.

A full and complete accessibility was vital to successfully perform the case study identification to at least one utility space in the ground floor and common floor. Thus, following the identification of suitable cases, access was negotiated via personal contact with the owner. While negotiation took some time before access was granted, the collection of the data criteria was continued.

In order to comprehend the impact of the spatial domains of a polykatoikia, it was important to observe and to explore the polykatoikias and its users over an extended period. I was in the chosen areas of Athens for an initial two-week period. The process took eight to twelve hours daily, during which time I was present for observation purposes, taking detailed field notes and photos as required. Each 'working' day was followed by evenings documenting and interpreting the day's observations in order to establish new lines of inquiry for the following day's work. Subsequent three to seven - twelve days observation sessions at predefined chosen polykatoikias in one year did allow a documentation of the studied case providing substantial insight into organisational and social perspectives over time.

Finally, observation invariably raises ethical dilemmas. This dilemma was considered prior to commencing the study. With the support of a Greek student of the architecture department at the University of Technology Athens I was introduced to the owner or habitant, as a researcher of the Laboratory Of Integrative Architecture/ University of Technology Berlin to the case polykatoikia, to establish a documentation of the chosen case. My particular interest to the building was explicit on the usage and that the full accessibility to the chosen utility i.e. a flat or a

shop was essential. Issues of privacy and confidentiality were also discussed with both the owner and I in order to establish an appropriate balance of discreetness in this regard. The primary tools used for the documentation were a digital camera and paper for the notes. The owner was provided with a simple written statement detailing the study's research objectives and rights to confidentiality in acknowledgement of relevant ethical aspects of the research process. Not all owners or habitants of the chosen cases were approving my approach, which became by that a part of my case selection process.

Out of this selection twelve exemplary references stood out since they met all the mentioned criteria and the principle concern
[figure 01].

2.5 Research Technique

Data Analysis

Back in Berlin, the first step towards analysis the data was to digitally redraw the plans or measurement notes for legibility purposes. Compiling all the selected data produced a digital catalogue of site-plan, isometry, plans of all floors, section and elevations of the cases. Thus, initial perception of architectural- and vernacular-typic aspects was made possible. Some cases turned out to be of less interest in terms of morphology, site plot and usage during the research process, which specified the focus on the exemplary twelve cases.

Spatial Configuration Analysis

The usability of a space is strongly affected by the positioning within the spatial configuration. Through the theory of Space Syntax, the J-Graph method is chosen for studying the spatial configurations of the polykatoikias.

In the justified gamma map [J-Graph] one imagines that he or she is in a space, which one calls the root or base of the graph, situated outside of the polykatoikia and represented as 0.00. Then, representing spaces as numbers corresponding to the floor plans, and relations of access as lines connecting them, one aligns immediately above the root all spaces which are directly connected to the root, and draw in the connections. These are the spaces at 'depth one' from the root. Then an equal distance above the 'depth one' row one aligns the spaces that connect directly to first row spaces, forming the line of 'depth two' spaces, and connect these to the depth one spaces, and so on. The resulting j-graph is a picture of the 'depth' of all spaces in a pattern from the exterior space. On the basis of visual representations it is possible to see that each space, whether axial or convex [or even a building or boundary] has certain syntactic properties: it will either be distributed with respect to other spaces [have more than one way to it] or nondistributed [only one way], and it will be either symmetric with respect to other spaces [having the same relation to them as they do to it] or asymmetric [not having the same relation, in the sense of one controlling the way to another wit respect to a third]. I did use the yEd Graph Editor program for creating such a diagram.

'The distributions of depths that are shown through the j-graphs, and which underlie both architectural and geometrical effects - are in fact the most fundamental idea in quantifying the configuration properties of spatial or formal complexes.' [Hillier 2007, p. 76]

This method of representation, developed by Bill Hillier, has an immediate advantage over the ordinary layout diagram: it makes the syntax of the plan [its system of spatial relations] very clear, so that comparisons can be made with other buildings according to the degree that it possesses the properties of symmetry and asymmetry, distributedness and nondistributedness. It is also possible to compare the relative position of differently labelled spaces in a sample of plans, thus identifying the syntactic relations characteristic of different labels.

The degree to which a complex, seen from the outside, is based on direct or indirect relations is calculated by using a formula that expressed how far a pattern approximated a unilinear sequence in which each space leads only to exactly one more - the maximally indirect, or 'deep' form - or a bush, in which every space is directly connected to the outside world - the maximally direct, or 'shallow' form. This could then be repeated, but from every point inside the building, giving in effect a picture of what the pattern looked like from all points in it, and from the outside.

The measurement of relations is possible because the spatial structure of a building can be reduced to a graph, and this in turn is possible because, by and large, a building consists of a set of well-defined spaces with well-defined links from one to another. This is not, of course, a mathematical system, and even more emphatically it is not a mathematical enumeration. It is an attempt to capture the fundamental similarities and differences of real space forms in as economical a way as possible. The axioms of the system are not mathematical axioms, but a theory of the fundamental differences stated as carefully as possible.

As shown later, simple statistical analyses on easily available numerical data are here bringing about findings relevant for discussing the development of generality versus specificity of the interior space.

Visibility Graph Analysis (UCL Depthmap)

Using the Space syntax theory, which derives from a set of analytic measures of configuration, it is possible to show how people move through and use buildings and urban environments. Space syntax represents the open space of an environment in terms of the intervisibility of points in space. The measures are thus purely configurational, and take no account of attractors, nor do they make any assumptions about origins and destinations or path planning. Space syntax has found that, despite many proposed higher-level cognitive models, there appears to be a fundamental process that informs human and social usage of an environment. Space syntax is a graph-assisted, not a graph based theory of spatial description, which does not deal with topology in any mathematically precise sense of the word.

'Depthmap' is a single software platform to perform a set of spatial network analyses designed to understand social processes within the built environment. The original concept behind Depthmap developed from two strands of thought. One was isovist analysis [Benedikt 1979], and the other space syntax [Hillier and Hanson 1984]. Benedikt created maps of properties of the visual field at points within plans of buildings. He drew contours of equal visual area within the plan and called the resulting map an `isovist field'. He believed that these maps would give an insight into how people navigate the actual building. Since closely packed contours would indicate rapidly changing visual field he reasoned that these would indicate decision points within the building. Independently, Hillier and Hanson developed the theory of space syntax. They created various representations for the components of space; they then drew maps of these components, and crucially, the relationships of the components with each other. Within the space syntax community, the representation that has become most used is the axial map. The actual derivation of an axial map is quite complex, but essentially it involves drawing a set of lines through the open space of the plan. Hillier and Hanson then created an interesting twist to established theory at the time. They created a graph using the axial lines themselves as nodes, so that each line was considered connected to others that it intersected. From this graph, they calculated how well `integrated' each line was with respect to all the others in the graph, that is they calculated a measure of the average number of steps it takes to get from one line to any other within the axial map. The integration of axial lines is of particular interest to researchers as it correlates well with the number of pedestrians found to be walking along the axial line [Hillier et al. 1993, and numerous other studies since].

Since Benedikt had theorised that isovist fields would correspond in some way to movement patterns of people and Hillier et al. had shown that relationship between lines through the space does correspond with movement patterns within space, it was decided to combine isovist fields with space syntax to provide a measure of how well integrated isovists themselves are within a plan of an environment [Turner & Penn, 1999]. The methodology was later formalised more simply as visibility graph analysis, so called VGA [Turner et al. 2001]. In VGA, a grid of points is overlaid on the plan. A graph is then made of the points, where each point is connected to every other point that it can see. The visual integration of a point is based on the number of visual steps it takes to get from that point to any other point within the system. Various graph measures, not just integration, may be made: the idea was that all possible occupiable locations within the built environment would be categorised by their visual relationships to other occupiable spaces through a continuous map. Due to its providence, it was hypothesised that VGA would give a good indication of how people might interact with space. Depthmap was the tool created to perform these analyses.

Visibility analysis is an intuitively attractive way to investigate the environment as it seemingly gives one the perspective of the [able-sighted] occupant. It allows me to make rigorous mathematical statements about polykatoikias, and thus it would appear to allow me to apply mathematical certainty to the experience of the building environment. I will use two different visibility graph analysis: the clustering coefficient to discover the perception of the built environment and the agent analysis to talk about how people can move or interact within the visible space.

Clustering Coefficient

The clustering coefficient is defined as the number of edges between all the vertices in the neighbourhood of the generating vertex [that is, the number of lines of sight between all the locations forming the isovist] divided by the total number of possible connections with that neighbourhood size.

At first sight this measure relates to the convexity [or conversely the `spikiness'] of the isovist at the generating location. If the isovist being considered is almost a convex polygon, then almost all the point locations within the neighbourhood will be able to see each other, and hence Clustering Coefficient [CC] will tend to one. If, on the other hand, the isovist is very 'spiky' [not at all convex] then many points within the isovist will not be visible from each other, and CC will tend to zero.

Further consideration reveals that the clustering coefficient gives a measure of the proportion of intervisible space within the visibility neighbourhood of a point. It indicates how much of an observer's visual field will be retained or lost as he or she moves away from that point. If the neighbourhood of a point approximates a convex polygon, then the clustering coefficient is high and moving from that location in any direction will not cause any great loss of visual information. However, at a junction with multidirectional visual fields, CC will be low as moving from that location will involve loss of part of the currently visible area. Because movement in some sense involves making decisions about which parts of one's current visual information to leave behind, the clustering coefficient is potentially related to the decision making process in way-finding and navigation and certainly marks out key decision points within complex configurations. Further, if we regard vertices in the graph as potentially occupied by people, CC values indicate the potential for perceivable co-presence in a space and therefore the potential to form groups or to interact. In a closed convex area there is some potential for interaction, whereas in a junction there are numerous, but different, opportunities to form intervisible links. This seems likely to prove a useful property in studying the perception of spaces and may also be useful in behavioural studies.

Thus, because CC is not just a measure of geometric 'spikiness', but also a measure of how much objects of varying sizes disrupt the space, it may improve our understanding of how a space is perceived.

Agent Analysis

UCL Depthmap has an agent analysis module incorporated into it. This allows users to perform the 'agent-based' analysis presented in Turner and Penn [2002], as well as several enhancements of it. In agent-based analysis virtual 'people' [called agents or animats] are released into the environment, and make decisions on where to move within it. The agents require a visibility graph in order for them to have vision of the environment, however, the analysis appears to give a better correspondence with where people actually move than traditional measures of point visibility graphs, in addition to being much faster to calculate. Spatial agents use vision to assess the configuration, and move towards open space by a stochastic process: choosing a destination at random from the available space, and walking towards it. In this way, they are configurational explorers. The rules are: walk 3 steps, look around and choose a new destination, walk 3 steps, and so on. If their field of view is set to 170º [approximating human vision] the agents start to move, on aggregate, in a human like manner. The images show agent trails: as the agents walk over 1m grid squares they lay trails behind them. Black areas represent few agent trails and red areas many agent trails. The analysis is performed accurately, counting agents passing through gates just as people can be measured passing through gates in the real world.

Adaptation Analysis

After having analysed the formal and spatial elements of the polykatoikia logically the description of the use and the adaptation for the needs of the users has to follow. By listing up of the utilities floor by floor in a chart and schematic section of the building, a diagram is developed to demonstrate the distribution of the public and the private. The diagram allows the domains to be perceptible and is by that an interpretation of their significance within the spatial use. A further diagram shows the percentage of the public, semi-public, private and circulation areas of the building. The results from my observation and exploration are finally documented with photos of the in- and outside of the polykatoikia.

Representation

The next step was to emerge those architectural- and vernacular-typic aspects in the fields of realization, construction, distribution and utilities via diagrammatic drawings of plan and section. With the help of the latter the indication of public, semi-public, semi-private and private places were accessible.

From Jean-Nicolas-Louis Durand [1760-1834] and his Precis of the Lectures on Architecture [1802] and its companion volume, the Graphic Portion [1821], as both a basic course for future civil engineers and a treatise, I understood how to focus the analysis of my cases studies on architectural, utilitarian and spatial values. By using his way of representation, a formal systematization of plans, elevations, and sections, enabled me to emphasize the pragmatic values and the description of architecture as a closed system that subjected its own formal language to logical processes.

Knowing the Pamphlet Architecture of Steven Holl and William Stout [1998] as well as the 'Made in Tokyo' [2001] and 'Pet Architectural Guide Book' [2002] of Atelier Bow Wow I expanded each case study representation by a description, full page photograph, a map and 3d drawing.

The outcomes of Depthmap are displayed as coloured maps and tables that comparing measures against other measures or observed data. In the following evaluation of the analysis the gathered information is transformed into diagrams, which enable the comparison of the results.

3.0 Theoretical Background

Several attempts have been made in recent years to develop theory and definitions directly concerned with the relation between society and its architectural and urban forms. Before going on to give an account of the method set out in this research, some review of these theories and definitions is needed.

3.1 History of Spatial Discourse

From the early seventeenth century, when the private house began to develop as a broadly popular type, until the 1920s, when the electronic radio was introduced into the home, the privacy in the private house grew as the presence of the public world diminished. The architectural historian Spiro Kostof reminds us just how large this public presence could be in earlier times:

'The medieval town house is not only the family home, it is also a manufacturing locale, counting house, store, or shop' [Kostof 1999, p.73]: In addition, the so-called 'big house' of the Middle Ages, such as the Jew's House in Lincoln, England, sheltered the owner and his family along with relatives, employees, apprentices, servants, and frequent guests. Those guests, perhaps friends or relatives, were just as likely to have been on business with the owner, who, in the absence of hotels and restaurants, would have been expected to provide meals and lodging. The public character of these houses is further underscored by the lack of separate rooms for these various activities. In most instances, the inhabitants lived, slept, and ate in large, open halls that accommodated different functions principally by the rearrangement of furniture. The realization of privacy within the house was an evolutionary process that unfolded over centuries. During the Renaissance and on into later eras, bourgeois and even aristocratic families continued to inhabit medieval–style halls.

Nonetheless, beginning in the seventeenth century, the rising economic fortunes of the bourgeoisie were inversely reflected in the declining presence of the public in the home. By the early nineteenth century, the distinction between the private house and the public world had become so refined that it was thought to reflect various broader dualities as well, among them suburb and city, craft and industry, and nature and artifice. Walter Benjamin came to see the nineteenth-century private house as not only separate from the public world but, more significantly, as a retreat from it. In his essay 'Louis-Philippe, or the Interior,' he wrote, 'For the private person, living space becomes, for the first time, antithetical to the place of work'. [Benjamin 1985, p.167]

In each period, however always focusing on the European city in this PhD-thesis, the relationship between the public and private inside dwellings has taken a different form. To understand the contemporary relationship of these two, it is necessary to look at the way the house developed during modern times. The way the social structures, especially the household's configuration, and the house types have transformed are of particular interest in this investigation. More specifically, the modern process of functionalisation of space has had a central role in redefining the interior space of the dwellings, whereby private and public realms have been gradually separated in specified spaces, creating a new set of relationships inside the house.

The open plan was one of the five points of a new architecture advocated by Le Corbusier [1985]. The plan and the internal volume were freed from the constraints of the structure, allowing utility and convenience to predominate. In this sense, the functionalism of the modern architecture took on new forms that were breaking away from the traditional patterns of domestic space. As Le Corbusier put it, 'We can no longer accept traditional houses, which misuse space. We must… conceive a house as a machine for living, as a tool… A house was hitherto conceived as an incoherent agglomeration of larger rooms that were always oversized and, at the same time, cramped.' [Guiton 1981, p.88]

Their large sizes meant that they were expensive, 'As the price of building has quadrupled itself, we must reduce the old architectural pretensions and the cubage of the house by at least one half' [Le Corbusier 1927, p.222-233]. These smaller units paved the way for the spirit of building and living in mass produced houses, which was the ultimate aim in housing production. Le Corbusier was so concerned with the size and number of dwellings in mass production that he concluded that the internal barriers should be taken away to allow for a more flexible use of the smaller spaces.

Modernism essentially incorporated movement into its view of the world [Giedion 1967]. The functionalism of modernists, therefore, gave priority to cars and fast movement across urban space, a notion which undermined the close relationship between open spaces and buildings around them. The existing urban enclosures with closed vistas, such as streets and squares, were to be demolished in favour of vast open spaces which provided

a setting for a free and flexible location of buildings [Le Corbusier 1971]. Despite their emphasis on the primacy of public interests in the city, as promoted in the Charter of Athens [Sert 1944], the modernists paid little attention to the historically created public spaces of the city. What they sought was a redefinition of the relationship between public and private space, which would reshape the urban space, creating large quantities of open space for hygienic as well as aesthetic reasons. What resulted were vast expanses of space which could have little or no connection with the other spaces of the city and could be left under-used, only to be watched from the top of the high rise buildings or from the car windows.

The subdivision of the city into functional zones eroded the public space further. The effect of these functionally defined zones was to limit the diversity of people in the public spaces of these zones. The logic of the modernist city was indeed following the logic of the buildings' interior, as it gave priority to the living conditions of the private sphere, which could then be mass produced to create machines to live in. The house was designed from inside out and 'form followed function' [Brain 1997]. This meant that the public space followed the logic of private space, the void became subordinate to the mass, the public space was to become a residue of the buildings, a leftover.

The balance between the public and the private, between the void and the mass that characterized the pre-modern city was thus lost. This loss of public-private distinction paralleled the radical ideologies of the time that advocated the abolition of private property. In the new world, old distinctions were thought to make no sense any more. The new public space that was being created was taken over by the fast moving cars, allowing for a new experience of the buildings, combining the speed of movement and monumentality of buildings. After the static, enclosed public spaces of the past, the new public spaces were to be free-floating, fast-moving and all-encompassing.

As in the nineteenth century, the twentieth century had its own return to romanticism, in the shape of postmodernism. Once again, below the surface of this return to the primacy of sentiment over reason, of concrete over abstract there was an intense process of new scientific discoveries, new technologies and a worldwide process of breathless globalization. The recreation of the public space in the city in the latter part of the century was at once again an attempt at combining utility and display.

For those who remained unconvinced by such an imposition of an abstract notion of space onto the existing urban environment and the everyday life [Lefebvre 1991], a return to the historic notions of public space seemed inevitable. Once again, creation of spatial enclosure became a main prerequisite in urban design. As nodes and landmarks, public spaces became a means with which to navigate in the city [Lynch 1960], streets and squares became the alphabet with which to read and design urban space [Krier 1979]. Creating lively and active edges for these spaces was seen as an important condition of their success [Jacobs 1961]. Small, mixed land uses that generate a strong relationship between the public space and the buildings around it were promoted [Bentley et al. 1985]. It became absolutely essential for urban design to create 'positive urban space', i.e. space enclosed by buildings, rather than what is a leftover after the construction of buildings [Alexander et al. 1987].

The centrally located public spaces of towns integrated political, cultural and economic activities of the town, as exemplified by the Greek agora. However, they started to be multiplied and specialized as the towns grew in size and activities became more complex. The attitudes to public space also changed. In Greek and medieval cities, each building was the focus of attention and was an end in itself. In Roman and post-Renaissance cities, however, the notions of symmetry and harmony ruled, where public spaces became subordinate to dominant buildings and axial planning. The medieval city was a place of trade, where public and private interests competed constantly for space, shaping the city along this struggle. The city's location was often at the intersection of trading routes and its public spaces were elaborations of the roads and crossroads. Public spaces were treated as outdoor rooms, enclosed within lively and clear edges, closed vistas, embellished by public art, with a centre left open to be used for various activities. In complete contrast, the Renaissance and Baroque city

was a centrally planned display, symmetrically laid out, restricting the private interests to conform to public display of the power of the royal court, the secular state and the emerging age of reason, whose symbols occupied the centre of space. In all periods, the public spaces were, as Alberti reminds us, variations on the theme of crossroad, which were articulated for utility and display.

Modernism introduced a new concept of space. The motor car took over the urban space, changing the relationship between human beings and buildings, between buildings and open spaces, between mass and void, abolishing enclosed public spaces such as streets and square as known before. This gave way to vast open spaces and flexible location of high-rise buildings, subordinating the void to the mass, undermining the spaces of sociability. After the static, enclosed public spaces of the past in both East and West, the modernist public spaces were to be free-floating, fast-moving and all-encompassing.

Even a generation ago, the philosopher Hannah Arendt could cite the modern concepts of nation and society as reconfigurations of the oikos and polis of ancient Greece and Rome, albeit on a scale far beyond that of the city-state from which they emerged. Although Arendt saw these reconfigurations as having effectively 'blurred' the idea of private and public, they were still dependent on the concept of the household and public realms as 'distinct, separate entities'.

Space is to be seen as the general abstract framework of expansion against objects which of objects are defined by the properties, a metric background to the material objects that inhabit space. This sight of space seems to most of us quite natural. But if we see space just in this way, we are condemned not to understand how it plays a role in social affairs. According to Bill Hillier [1996] space is culturally and socially never simply the inactive background of our material existence. It is a key aspect of how societies and cultures are constituted in the real world, and, through this constitution, structured for us as 'objective' realities. Space is more than a neutral framework for social and cultural forms. It is built into those very forms. Human behaviour does not simply happen in space. It has its own spatial forms.

Edward Hall [1966] suggests in his book 'The hidden dimension' [1966] that man´s sense of space is closely related to his sense of self, which is an intimate transaction with his environment.

'Man can be viewed as having visual, kinesthetic, tactile, and thermal aspects of his self which may be either inhibited or encouraged to develop by his environment.' [Hall 1966, p.63]

But the relation between space and social existence does not lie at the level of the individual space, or individual activity. It lies in the relations between configurations of people and configurations of space. As Hillier and Hanson [1984] remind us, it is the fact of space that creates the special relation between function and social meaning in buildings. The ordering of space in buildings is really about the ordering of relations between people. Because this is so, society enters into the very nature and form of buildings. They are social objects through their very form as objects. Architecture is not a 'social art' simply because buildings are important visual symbols of society, but also because, through the ways in which buildings, individually and collectively, create and order space, we are able to recognize society: that it exists and has a certain form.

Lefèbvre [2000] demarcates [social] space as a [social] product. [Social] space is not a thing among other things, nor a product among other products: rather, it unites things produced, and surrounds their interrelationships in their coexistence and simultaneity - their [relative] order and/or [relative] disorder. At the same time there is nothing 'ideal' about it, it is rather the outcome of past actions. Space is what permits fresh actions to occur, while suggesting others and prohibiting yet others.

The distinction between exterior and interior space becomes the distinction between power and control. The abstractly defined system of power categories is projected into a unified symbolic landscape. They have no specific form of spatial integration which mould the organisation of interiors.

'Space is, in short, everywhere a function of the forms of social solidarity, and these are in turn a product of the structure of society. The realisation of these differences in systematically different spati-

al forms is because, as Durkheim showed, society has a certain spatial logic and, as we hope we have shown, because space has a certain social logic to it.' [Hillier & Hanson 1984, p.22]

But a society does more than simply exist in space. And it is the society, which takes on a definite spatial form and it does so in two manners. First, it arranges people in space in that it locates them in relation to each other, with a greater or lesser degree of accumulation and separation, creates patterns of movement and encounter that may be dense or sparse within or between different groupings. Second, it arranges space itself by means of buildings, boundaries, paths, markers, zones, and so on, so that the physical milieu of that society also takes on a definite pattern. In both senses a society acquires a definite and recognisable spatial order.
At the same time, it has less control, in that while buildings tend to grow by aggregating boundaries. Settlement space tends to grow by accumulating spaces into one continuous system. Settlement space is richer in its potential, in that more people have access to it, and there are fewer controls on it. Hillier and Hanson [1984] say, it is more prospective in its relation to encounters, while building interiors are rather more limited. The differences between inside and outside, therefore, are already differences in how societies generate and control encounters.

One might even say, without too much exaggeration, that interiors tend to define more of an ideological space, in the sense of a fixed system of categories and relations that is continually re-affirmed by use, whereas exteriors define a transactional or even a political space, in that it constructs a more fluid system of encounters and withdraws which is constantly renegotiated by use. Alternatively one might, without stretching things too far, define the exterior space as that in which the society is produced, in the sense that new relations are generated, and the interior space as that in which it is reproduced. The former has a higher degree of indeterminacy, the latter more structure.
Now while all societies use both possibilities to some degree, it is often clear that some social formations use one more than the other. We can at least distinguish a certain duality in the ways in which societies generate space, and this duality is a function of different forms of social solidarity. At the extremes, these differences are based on opposing principles: the one must exclude what the other requires. One requires a strong control on boundaries and a strong internal organisation in order to maintain essentially transpatial form of solidarity. The other requires weak boundaries, and the generation rather than the control of events. The former works best when segments are small and isolated, the latter when the system is large and integrated.

Lefèbvre stresses the fact that spaces interpenetrate one another and/or superimpose themselves upon one another. They are not things, which have mutually limiting boundaries and which collide because of their contours or as a result of lethargy. Visible boundaries, such as walls or enclosures in general, give rise for their part to an appearance of separation between spaces where in fact what exists is an ambiguous continuity. The space of a room, bedroom, house or garden may be cut off in a sense from social space by barriers and walls, by all the signs of private property, yet still remain fundamentally part of that space.

In order to bring this surgery to an end and at the same time introducing the next chapter, I would like to point out that Zevi [1957] holds that a geometrical space is animated by the gestures and actions of those who inhabit it. He reminds us, in a most timely manner, of the basic fact that every building has an interior as well as an exterior. This means that there is an architectural space defined by the inside-outside relationship, a space which is a tool for the architect in his social action. […] Lefèbvre [2000] is obliged to conclude that the critical analysis of the boundary has simply never taken hold, and that space has remained strictly visual, entirely subordinate to a 'logic of visualization'. Zevi considers that the visual conception of space rests upon a bodily [gestural] component which the trained eye of the expert observer must take into account. Zevi's book brings this 'lived' aspect of spatial experience, without ever entertaining the idea that such a bodily component of optical space might put the priority of consciousness itself into question. Lefèbvre argues that Zevi does not appear to understand the implications of his findings beyond the pedagogical sphere, beyond the training of architects, and he certainly does

not pursue the matter on a theoretical level. How could any space be adjudged 'beautiful' or 'ugly', asks Zevi, and how could this aesthetic yardstick attain its primordial value? To answer one question with another, how could a constructed space be defined otherwise than through use?

3.2 Definition of Spatial Language

Madanipour wrote 2003 in his book "*Public and Private Spaces of the City*":

'Private Domain

The complexity of urban space is due to the fact that each urban space forms a layer of different interpretation by the inhabitants. Social territories help the individual to orientate. Territory behaviour is rarely defensive or aggressive. It's rather an expression of identification and affiliation.

Private Sphere

It is a commonly held belief that the mind is the innermost part of a conscious human being, his/her most private space.

To study the distinction between the inner and outer realms, it is essential to study the characteristics that distinguish them from each other, the borders that separate them and mediate between them, and the relationships between them. As with any other form of public-private distinction, this separation of the inner and outer space relies on a boundary, which in this case is the human body. It feels that the mind is hidden in the head, but understands the world through bodily senses and can communicate with others through gestures, patterns of behaviour, and language, i.e. through the body. The non-physical, inner, private space of the mind is thus highly dependent on the body to grasp the physical, outer space of the world. In other words, the body mediates between the states of consciousness and the world. The body is the boundary between the two realms. It is the medium through which the two realms are related to each other.

Personal space

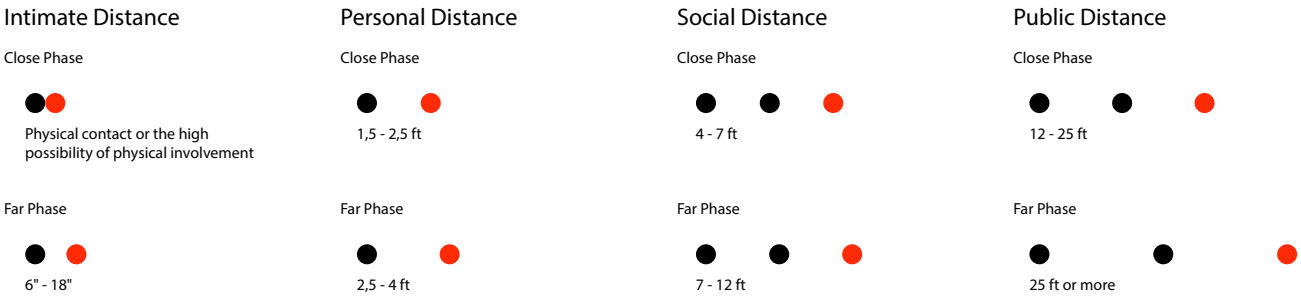
Between the interior space of the body and the space that finds architectural and geographical expression, there is one layer that is invisible and mobile. This is personal space, which is the space around the body. Earlier in this chapter we saw how the realm of the mind is considered the innermost private realm. The extension of the subjective realm, the innermost private space, is the realm of the body, the space associated with the body. While the mental realm is hidden from all, the body constitutes the realm that is potentially accessible and makes up the realm of behaviour and social interaction. It is here that a physical boundary between the self and the other is articulated: where a fundamental ingredient of the public-private relationship develops.

The theme of personal space was a key concern of the anthropologist Edward Hall, who discussed the cultural dimension of using and interpreting space different people [Hall, 1959; 1990]. Hall classified interpersonal relationships and following that the spaces among individuals, into four categories: intimate, personal, social and public.

The distances observed in each category depended on desired mode of communication, which he believed to be the core of culture. Personal distance, a term originally used by Heidegger, was 'a small protective or bubble that an organism maintains between itself and others. Two types of personal distance could be identified. The first was close phase, i.e. one and a half to two and half feet [45 to 75 cm], which is the distance one can hold or grasp the other person. The second is the far phase, i.e. two and a half to four feet [75 to 120 cm], which is the arm's length, or the 'limit of physical domination in the very real sense' [Hall 1990, p.113]. With a proper understanding of the spatial behaviour and needs of people in general and their variety different cultures, he argued, city design can create congenial environments for diverse urban populations.

Altman's argument [1975] was to see privacy as a central regulatory process through which access to a person or group is controlled. The desired level of privacy is achieved through mechanisms of personal space and territorial behaviour. Crowding and social isolation are the causes and symptoms of failing to achieve a desired level of privacy. Privacy is defined as 'an interpersonal boundary-control process, which paces and regulates interaction with others' [Altman 1975, p.10]. There is a direct link between the permeability of this boundary and the levels of privacy that can be achieved.

Personal space is a subjective space around individuals, as it is not visible or real. It is at the same time objective, in the sense that the individual and the others around him/her seem to agree in observing it, although they may disagree on the methods of this observation and the size of this personal space. The individual protects it and the others avoid invading it. Getting very close to a complete stranger often has the result that the stranger will move back to keep the distance. It is a piece of private space



personal space [Figure 02]

that individuals carry with them around wherever they go. That is why it is called 'portable territory' [Sommer 1969, p.27] It is this space in which individuals perform their social acts, where they feel safer and in control of their bodies. Social interaction in the public sphere therefore takes place from across personal spaces.
Personal space provides a person with a location in the world and is a barrier distinguishes and protects individuals from the outside world. It is part of a repertoire of a person's protective and communicative measures such as body gestures, clothing and speech. Therefore, personal space is another layer of privacy, beyond which the less private, or public domain lies. Beyond the private personal space, the space of others lies, including the public space. Personal space is less private than mental space, but more private than the intimate space of the home.

Personal space is, however, an aspect of the individual which cannot make sense in the absence of the others. Personal space, therefore, is an aspect of interpersonal relationships. Indeed it is possible to define its existence only in the presence of others, in the interaction between at least two persons [Bonnes & Secchiaroli 1995, p.84]. What appears to be an invisible bubble around an individual is in fact a dimension of interpersonal communication, as Edward Hall [1990] had articulated.

The private sphere that the personal space defines, like other aspects of privacy, makes sense only in relation to others. This is why the size and functions of personal space vary according to interpersonal situations, whether positive and collaborative, or negative and competitive.

The inner space of the body [that which is contained within the skin] is closely associated with personal space [the immediate space around the body]. Personal space is often closely related to the realm of privacy as its essential ingredient. It provides an invisible and portable protective layer for an individual, ensuring the desire for privacy and freedom from outside intrusion. With closer inspection, it becomes clear that it is equally a constituent part of the public realm. It is the building of social encounters, where individuals regulate their interaction through maintaining the appropriate distance from one another in interpersonal communication.

Personal space, therefore, is as much for protection as for communication, as much a part of the private sphere as it is of the public realm. It is as much determined by the personal as it is by the interpersonal dimensions of life in society. According to Hall [1966], personal space observation is directly related with a growing sense of individualism, and as such is present more strongly in the cultures that have nurtured individual autonomy and independent sense of the self. The significance of personal space, therefore, is that it not only denotes an individual territory but also a portion of the group space. It is established only in the context of social encounters, rather than being an absolute territory. Its features are mainly based on how they have been acquired by individuals, depending on their personal differences as well as their social and cultural contexts. It is a dynamic, ever changing sphere that evolves, expands and contracts according to the situations in which individuals find themselves.

Private Property

The private property is the visible and stationary space of private sphere. The space here is hidden behind fixed, often visible boundaries and is protected by the owner and the others as sanctioned by law.

Definitions of the word 'private' are often coupled with, and rely on, the meaning of the word 'public', so that one word does not appear to make sense without the other. The origins of the word go back to Latin, where privus meant 'single, individual, private'. Living a private life could denote a negative meaning and a sense of loss, as privare meant 'bereave' and 'deprive', while privatus meant 'withdrawn from public life, peculiar to oneself, a man in private life'. This negative interpretation seemed to be a definition that was produced from the perspective of those engaged in public life looking into the private realm.

In modern usage, the word's meanings, according to the Oxford English Dictionary, are mainly adjectives describing people, places, or activities. When the word refers to a person, its meanings include: 'not holding public office or an official position, of or pertaining to a person in a non-official capacity; not open to the public; restricted or intended only for the use of a particular person or persons; that belongs to or is the property of a particular person, one's own; of, pertaining to, or affecting a particular person or group of people, individual, personal; peculiar to a particular person or persons; particular, retiring; reserved; unsociable; formerly also, secretive'. [Oxford English Dictionary 1989, p.516]

Private sphere, therefore, is a part of life that is under the control of the individual in a personal capacity, outside public observation and knowledge and outside official or state control. It follows that private space is a pan of space that belongs to, or is controlled by, an individual, for that individual's exclusive use, keeping the public out. Much of the private sphere unfolds in private spaces, although it can also be continued into outside private territories, such as in a public library or in a park, which is a part of private life played out in a public place.

The notion of privacy has been hard to define and a wide range of analytical approaches have tried to clarify it [Wacks 1993], The 'archetypal' complaints in law about privacy have been about 'public disclosure of private facts' and 'intrusion upon an individual's seclusion, solitude or private affairs' [Wacks 1993, p.xv]. The common definitions of privacy, according to the Oxford English Dictionary, are 'the Slate or condition of being withdrawn from the society of others or from public attention, freedom from disturbance or intrusion; seclusion, absence or avoidance of publicity or display: secrecy; a private or personal matter; a secret'. [Oxford English Dictionary 1989, p.517]

Another definition by Gavison [Wacks 1993, p.xiii], sees privacy as 'limited accessibility', with three independent but related components: secrecy [information known about an individual]; anonymity [attention paid to an individual], and solitude [physical access to an individual]. When any of these areas is violated, a loss of privacy occurs, which is distinctive from an infringement of the right of privacy. This broader notion of privacy addresses some of the social and psychological forms of violation of privacy, as well as addressing the issue of space, where ensuring privacy may have a spatial dimension.

Territory

The continuous exertion of control over a particular part of physical space by an individual or a group results in the establishment of a territory. Territoriality, as closely associated with this process, has been defined by environmental psychologists as 'a set of behaviours and cognitions a person or group exhibits, based on perceived ownership of physical space' [Bell et al. 1996, p.304]. Ownership is mainly understood to be the legal entitlement to controlling a property.

It is also possible to establish territories without legal ownership, e.g. the area an office worker occupies and treats as personal territory, even though it would legally belong to someone else. Indeed there may be many layers of control, leaving each layer with a different sense of territory: from one who owns the land, who may be different from the one who owns the building, from the one who owns the company, from the managers and section managers who are in charge of all or a particular part of an office, to the one who works in a particular office, or even the one who frequently visits the office and thus feels a sense of belonging there. There is a hierarchy of pow-

er and control involved. But wherever their location in the hierarchy, these individuals will all feel a sense of territoriality, a degree of ownership and control over the physical space.

This is a sense of territoriality that has been derived from emotional attachment and familiarity, as well as from the more abstract forms of control through monetary, legal and institutional power over space. Territory is considered to be used as an 'organizer' of activities, by allowing us to anticipate the types of people and forms of behaviour in different places, and so plan accordingly for our daily lives. Furthermore, territory provides feelings of distinctiveness, privacy and a sense of personal identity [Bell et al. 1996, p.306]. According to Altman [1975; Bell et al. 1996], three forms of territory can be identified, depending on the duration of occupancy, the cognitive impacts on the occupant and the others in generating a sense of ownership, the amount of personalization, and the likelihood of defence when violated. A primary territory, such as home or office, is perceived to be owned by the occupant and others relatively permanently. It is extensively personalized and the owner has complete control over space, considering intrusion a serious matter. The second territory, such as a classroom, has a moderate level of control, as the occupant does not own the place and is considered as one of a number of qualified users. These users may personalize the place to some extent during their period of occupancy, which gives them some power over the space. The third level is public territory, such as an area of beach, where the degree of control is low, and difficult to assert. The occupant is one of a large number of possible users. These three forms in turn help individuals meet their needs by choosing the appropriate territory for their activities.

'Man, too, has territoriality and he has invented many ways of defending what he considers his own land, turf, or spread... The distinction is carefully made between private property, which is the territory of an individual, and public property, which is the territory of the group.' [Hall 1966, p.10]

While the private sphere may start from the person's mind and extend to the personal space of the body, it is in private property that it finds a strong, socially acknowledged expression. The self and the personal space may be seen as deeper, softer parts of the private sphere; it is only in private property that the private sphere finds a hard-edged embodiment. In the discussions about public and private spheres, the private sphere is often represented by private property, which is the historically established, spatial form of an individual's sphere of control. Through the control of its boundaries, individuals regulate their social interactions, and the balance between being on their own and being with others, both in space and in time.

Boundary

Public and private spheres in the city entirely depend on the boundaries that separate them. Both for those who defend the private sphere from public intrusion and those who defend the public sphere from private encroachment, the erection of boundaries signifies an act of delimitation and protection. This boundary, which regulates concealment and exposure, plays a significant part in human societies. According to Nagel, 'The boundary between what we reveal and what we do not, and some control over that boundary, are among the most important attributes of our humanity.' [Nagel 1998b, p.3]

The separate identities of the public and private realms mainly result from the construction of the boundary between them if the boundary is removed, how can a distinction be made? The character of each side depends, to a large extent, on the way this boundary is articulated, as much as the configuration of what lies behind the boundary. To study these boundaries, it is essential to know how they are constructed, what they are made of, what they are meant to signify, and how they relate to the spheres that lie on either side. There may be no intrinsic qualities to the subsections of the space. It is only the way this space is subdivided through boundaries that creates its character.

By defining space, enclosing it within boundaries which separate the public and the private, the social relations take a spatial form; a concrete and relatively fixed representation of constantly changing social phenomena. As much as it is a means of separating the two realms and protecting them from each other, the boundary is indeed a site of interface and communication between them. A gate in a wall is the starting point

of both the interior of a house and of the outside world of the street. At times, therefore, a boundary is part of both sides of the divide or of none, as it forms a threshold. The more ambiguous and articulate the boundary, the more civilized a place appears to be. When the two realms are separated by rigid walls, the line of interaction becomes arid, communication limited, and social life becomes more poor.

Very few of us would wish to live in an undistinguishable common space. But the main point is that separation of public and private is not often, and should not be, treated as a black and white distinction. Especially in space, the lines that divide the two are porous and ambiguous. This may not be the case in law, where private properties are clearly protected by documentation and the support of the legal system.

Private space is an individuated portion of social space, a part of space that individuals enclose to control for their exclusive use. It provides a physical home for the body, with its mental or portable personal spaces that were discussed in the previous chapter. This control offers humans social and psychological wellbeing by giving them an outlet for exerting their will on the outside world, to express and tame their aggression, and to find a location in the social world.

The control of enclosed, private space offers the individual an ability to communicate with others through becoming a means of expression of their will, identity and power. It also offers them the ability to be left alone by being protected from the intrusion of others. The establishment of a private sphere offers the individual the ability to regulate the balance of concealment and exposure, the balance of access to oneself and communication with others. Major moral problems arise, however, when the creation of a private sphere of their own is not possible for some while others expand theirs relentlessly. This occurs when the private sphere is no longer a response to a basic social and biological need.

The boundaries that separate the two realms are the most visible spatial manifestation of this division of social life. Architectural and geographical articulation of the boundary is thus the embodiment of a divide, the signifiers of a social organization.
The challenge of boundary setting, i.e. the challenge of city building, is to erect the boundaries between the two realms so that they combine clarity with permeability, acknowledging the interdependence of the two realms, and supporting both sides of the boundary according to the cultural/regional status-quo and traditional requirements.

Home

Home is the spatial unit that combines a number of traits of the private sphere, as we have discussed so far. It provides personal space, a territory, a place for being protected from the natural elements, as well as from the scrutiny of others, a location in the social world to engage in social life, socially acknowledged and legalized. In addition to being a haven for the individual, it is also a place for a social unit.
The inside and outside, as manifest in the internal space of the house and the external space of the world, form a dialectic of division. On the one hand, there is the intimate interior, which is concrete and secure, even though it can be also claustrophobic. On the other hand, there is the undetermined space of the outside, which is vast and free, but also possibly agoraphobic.

Houses can be seen as distinctive spaces in which individuals come together in intimate relationships, claiming the control of these spaces for privacy and comfort. These individuals, even though small in number, form an interpersonal forum that is less private than their own private worlds, creating a combination of private, semi-private, and at time even semi-public spaces. Therefore, the relationship between them takes various forms and, subsequently, the space they use for these relationships takes various degrees of privacy.
Also, the public realm of the outside finds its way inside the house in the form of visitors, some of whom are closer to the householders than others. Both these internal and external contacts and relationships mean that the dwelling is not an entity entirely cut off from the outside world. It is possible to trace a continuum of relationships from the most private to the most public, all within a realm that is often considered private. From the front of the house in a European city, which is its most public point, an entrance leads to the public parts of the dwelling. The entrance

is controlled by the residents and is the gateway between the enclosed realm of the interior and the world outside. The public parts of the house, such as the living and dining rooms, are those spaces where all the residents have open access and communicate with each other and with visitors. The private rooms, such as bedrooms, which are often separated from the public parts by doors, distance, or by difference of levels, on the other hand are the private realm of the individuals, often not easily accessible even to the other members of the household. These spaces create a continuum in which each space can be slightly more or less private than the others. However, the two ends of this continuum are entirely separated from each other: bedrooms are as far as possible from the entrance.

The form of the relationship between the public and the private, and the concepts of privacy and control of space may vary due to the cultural and behavioural patterns of the household. Depending on whether personal gratification and reinforcement of self-identity are at the core of the behaviour, or preference for the group is dominant, habits and forms of use of space vary [Howel & Tentokali 1989]. In all cases, however, a distinction appears to be made between private and public at home, even though this may not be institutionalized by physical forms and functional allocation.

The existence of a continuum shows how the organization of space inside the house is influenced by the way it relates to the outside world, to the public domain. This is also evidence of how it is not possible to see the house as an entirely private space, as it is organized according to two distinctive characteristics. First, it is expected to be open to the outside world in a controlled way. Second, it is meant to be suitable for communication between residents, which can have a public dimension, especially as the number of residents increases. Both of these characteristics, it may be argued, have existed ever since human beings have claimed or built spaces as their dwellings. It is a well known, although not always well observed, principle in housing design to be aware of this variety in the degree of privacy and its requirements to provide comfortable and useful spaces.

There is a tension at work between the home as seen from outside and what is indeed taking place inside this space. The home is seen as the sphere of the family, a concept that appears to be commonly held. Yet family is a notion that refers to a diverse range of family forms and living arrangements that have emerged in addition to the traditional patterns of family living characterized by parents and children. The intimate relationship that was established as the modern nuclear family mainly from the eighteenth century onwards, has now been transformed to a multiplicity of new forms of intimate living. A tension has arisen between the continued image of the traditional family as the inhabitants of the private realm and the measure of government policy [as well as collective myths and expectations] on the one hand, and the reality of the smaller households with their plural forms of living arrangements on the other hand.

The process of social and physical change in the house after the Middle Ages has been a move from large households living in shared spaces towards smaller households living in smaller, separate dwellings. This has coincided with the rise of individuals' claim to a set of rights unprecedented in the past. One of the most important of these rights is privacy, whereby each individual aspires to have a private realm. In households, this has been followed by a rise of single-person households, or establishing a private space inside the house, as compared to the period when all indoor, household activities would take place in one large space. This process of the rise of privacy and individualism forced the social and spatial relationships inside the house to change radically. The overall form of the dwelling has changed accordingly, by moving from townhouses to flats, terraced houses to semi-detached and detached houses, reflecting the weakening of old forms of social interaction, the independence of households, and the freedom of the individual.

Public Domain

The word 'public', which is derived from the Latin populus 'people', has a wide range of meanings. The Oxford Dictionary definitions of the term, as an adjective, include: 'of or pertaining to the people as a whole; belonging to, affecting, or concerning the community or nation: carried out or made by or on behalf of the community as a whole authorized by or representing the community; open or available to, used or shared by, all members

of a community; not restricted to private use; also [of a service, fund, amenity, etc.] provided by local or central government for the community and supported by rates or taxes: at the service of the public in a professional capacity, working in local or central government, open to general observation, sight, or knowledge: existing or done openly: accountable to the general public: of or pertaining to a person in the capacity in which he or she comes in contact with the community, as opposed to his or her private capacity etc: of or engaged in the affairs of the community: esp, [of a person] occupying an official position, holding a position of influence or authority; devoted or directed to the promotion of the general welfare; patriotic'. [Oxford English Dictionary 1989, p.778]

As a noun, the meanings of the word include: 'in public, in a place or state open to public view or access: openly; organized society, the body politic; a nation, a State; the interest or welfare of the community; people collectively; the members of the community; a section of the community having a particular interest in or special connection with the person or thing specified; a collective group regarded as sharing a common cultural, social, or political interest but who as individuals do not necessarily come into contact with one another'. The word is used in a variety of combinations and phrases, such as general public, going public, in the public domain, public act, public address system, public bar, public company, public education, public figure, public good, public health, public holiday, public interest, public life, public office, public opinion, public ownership, public relations, public sector, public service, public transport, etc. [Oxford English Dictionary 1989, p.778] These meanings of the word 'public' all refer to a large number of people, who are either conceptualized as society or as state, and what is associated with them. As the society, the term may refer to various demographic or territorial scales, including a group, a local community, a nation, or in a capacity that is now rarely used, the entire human race. As the state, it may refer to the various institutional scales of nation state, local government, and even individuals who are part of the state apparatus.

In addition to the ambiguity of how to define the society, there is an ambiguity around descriptive and normative interpretations of the public: while for some it describes a condition, for others it offers a recipe for action. At least two major approaches to the public sphere can be found in twentieth-century literature. The first is a descriptive approach, which attempts to offer an account of human conduct in presence of, and in interaction with, others. Public sphere is understood here as the co-presence of humans and the impact they have on each other, whether through interpersonal relations or the interaction between person and society in general. This approach is pursued in social anthropology, social psychology and sociology, amongst others. The key term here is the construction and communication of meaning in public sphere through conduct and performance. The second is a normative approach to public sphere, which attempts to offer a way forward in human interaction, i.e. how this interaction should be conducted. This is pursued in politics, political theory, and critical approaches to social sciences. The key word here is power, which is exerted in the public sphere, through detailed or structural interrelations.

Another source of ambiguity is whether private and public refer to personal and impersonal relations. As Allan Silver [1997] reminds us, personal is private and impersonal is public. In our investigations into the private sphere, the public appears to be, broadly defined, the realm of the non-intimate others, i.e. what lies beyond the personal realm of individuals and their intimate circle of friends and family. This realm, however, is further divided into the impersonal and the interpersonal realms. The impersonal realm of the market exchange, legal contract, bureaucracy and the state appears to be one form of the public realm, as distinct from the private sphere of the household and personal relations of trust and friendship. The interpersonal realm, however, which is often the realm of meaningful [as well as instrumental] face-to-face social encounters, stands in the middle ground. At times it is interpreted as private [when in opposition to impersonal] and at times it is seen as public [in opposition to the personal]. This causes ambiguity and overlapping in understanding the public and private realms and their relationships.

Benn and Gaus [1983] notice the potentially puzzling diversity of activities and practices which are

categorized as public or private, ranging, for example, from the public availability of books in a library to the public authority possessed by a government. To clarify this, they identify three broad types, which constitute the dimensions of publicness and privateness. These are three dimensions of social organization: access, agency and interest.

Within the broad frameworks of state and society, a public space is often provided and managed by the state and is used by the society as a whole. Using the criteria of access, agency and interest, a space can be considered public if it is controlled by the public authorities, concerns the people as a whole, is open or available to them, and is used or shared by all the members of a community. As with any other definition: this is, however, a generalized statement, each section of which can represent a wide range of possible conditions. Public authorities may or may not legitimately represent or serve a community; availability of space may be based on a diverse and complex set of rules and conditions; all members of a community may or may not be willing or able to use a particular space for functional, symbolic, or any other reasons. In this sense, a generalized definition of this kind becomes an ideal type, with a normative value, rather than necessarily describing the public spaces everywhere. A more accurate definition of public space, however, may be based on the observation that public spaces of cities, almost anywhere and at any time, have been places outside the boundaries of individual or small group control, mediating between private spaces and used for a variety of often overlapping functional and symbolic purposes. Urban, open public spaces, therefore, have usually been multi-purpose spaces distinguishable from, and mediating between, the demarcated territories of households and individuals.

One way to confront the range of ambiguities and overlaps is to see that the definition of the 'public' may depend on its context and on the other half of the formula, i.e. on the way the private sphere is understood. As we have seen so far, it seems that depending on what we define as private sphere, the public sphere is defined in relation to it. To put it another way, when the private is personal, the public can be interpersonal or impersonal. When the private is interpersonal, the public can be impersonal. Depending on the descriptive or normative orientation of the definition, each of these layers in the shades of meaning can find a different interpretation. Depending on the way the private realm is defined [mind, body, property, home], the public sphere finds a related but opposite meaning. If mind is the private realm, the outside world is the public. If the body is the private realm, the other bodies constitute the public. If private property is the private realm, what lies outside private possession and control is the public. If the household is the private realm, the larger organizations and the rest of society is the public. The private realm can be one or a number of these layers and as such the public realm can be formed of a number of such layers.

Richard Sennett [1976] investigates the theatre as model for investigation of the historical changes in the public roles of individuals and the shifting relationship between public and private life. He argued that the modern period has witnessed a decline of public life, which is rooted in the formation of a new capitalist, secular urban culture. Rather than taking pleasure in the cosmopolitan city, which is the world of strangers, people today see public life as a matter of dry formal obligations. Rather than seeing this as a worthwhile part of our life, the emphasis in modern life is on intimate relations, on private life of individuals and their relationships with family and intimate friends. This however, he argued, was not leading to a richer life, as 'the more privatized the psyche, the less it is stimulated, and the more difficult it is for us to feel or to express feeling' [p. 4]. Individuals are increasingly concerned with their 'single life-histories and emotions as never before; this concern has proved to be a trap rather than a liberation' [p. 5].

In his later writing, Sennett [2000] distances himself from viewing public life as impersonal encounters. But in his seminal writing, The Fall of Public Man, he praises impersonality: 'The obsession with persons at the expense of more impersonal social relations is like a filter which discolours our rational understanding of society' [1976, p.4]. Public life can only be understood through 'codes of impersonal meaning', rather than trying to work it out in terms of personal feelings and emotions [p. 5]. Indeed, the private life is in need of being restrained by a public world

in which individuals make 'alternative and countervailing investments of themselves' [p.6].
The public sphere is the place where individual masks are displayed, compared and reshaped. In the same way that public space is articulated through the display of building facades, the public sphere is the place of "social fronts" of individuals. Indeed, the facade of the buildings plays the same role as the masks of individual: a boundary between the private and the public realms, a medium of representation and communication, a tool of hiding and suppressing what needs hiding. Public space is a part of a "social front" to perform various tasks by individuals and institutions as well as the container in which these acts take place. We can identify, therefore, two ways of treating space for performance: one that keeps them separate and reduces their relation to mainly visual and another that brings the two together and creates participation and two-way communication. Rather than association with personal and intimate, public spaces of cities, almost anywhere and any time, can be described as places outside the boundaries of individual or small group control, mediating between private spaces and used for a variety of often overlapping functional and symbolic purposes. Descriptively, therefore, public spaces have been multi-purpose accessible spaces distinguishable from, and mediating between, demarcated-exclusive territories of households and individuals. Normatively, these spaces are considered public if they have been provided and managed by public authorities, and have concerned the people as a whole, being open or available to them and being used or shared by all members of a community.

Summary

Even though in the European city the public may be full of private and the private immersed in public, we constantly need to draw boundaries as part of our need for wellbeing. In the same way that we constantly aspire to understand the world around us and so invent interpretations to explain it, we constantly create boundaries and categories to feel in control. This control is a form of power, which some have or feel they have, and some have not. Therefore, even though it seems a necessity to draw boundaries and identify categories to be able to understand the world and live in it socially, it does not mean that these interpretations and categorizations are welcome by all. There is constant need to revisit these boundaries, to check them against the wishes and interests of those affected by them.
The distinction between public and private, therefore, is not and should not be rigid. It is often a shade rather than a clear-cut boundary. But the need to make distinctions should be acknowledged. Those who believe in the abolition of the distinction are leaning either to one side or to the other, either not believing in the merits of the private realm or of the public realm and wishing to extend one so far as to encompass the other. The experience of cities throughout history, however, has shown that a form of balance between the two is inevitably needed for social life, made more stable through providing mechanisms for its change.'

3.3 Applied Spatial Discourse

Over the last 20 years, initiated by Bill Hillier, Julienne Hanson, and others at the UCL London, a graph-based theory of architectural and urban space has been developed under the term 'Space Syntax'. The theory of Space Syntax is based on the assumption that the interconnection of subspaces within an architectural configuration of spaces is a major factor in experience and use of that space, and thus in the social dimension of architecture.

These properties of interconnection are regarded as 'non-discursive', i.e. properties that have no expression in our language of spatial description, and therefore - in contrast to visual properties of style - are widely ignored in architectural theory. The measurements from graph theory serve in this context as means to uncover network effects of space and move them out of the realm of architects' and planners' intuition, to turn them into consciously examinable and even quantifiable parameters. Space Syntax analysis begins at identifying spatial entities in order to examine their connections.

Hillier and Hanson [1986] make the observation that architectural space has two basic 'generic' categories of functioning as human environment, namely as movement space and as occupation space.

These types of space afford basic human action and interaction conditions: connection and copresence. They link them to two corresponding basic forms of spatial entities: linear spaces [such as streets or walkways] and convex spaces [such as squares or rooms].

It is far from obvious that space is, in some important sense, an objective property of buildings, describable independent of the building as a physical thing. Most of our common notions of space do not deal with space as an entity in itself but tie it in some way to entities that are not space. For example, even amongst those with a interest in the field, the idea of 'space' will usually be transcribed as the 'use of space', the 'perception of space', the 'production of space' or as 'concepts of space'. In all these common expressions, the idea of space is given significance by linking it directly to human behaviour or intentionality. Common spatial concepts from the social sciences such as 'personal space' and 'human territoriality' also tie space to the human agent, and do not acknowledge its existence independently of the human agent. In architecture, where concepts of space are sometimes unlinked from direct human agency, through notions such as 'spatial hierarchy' and 'spatial scale' we still find that space is rarely described in a fully independent way. The concept of 'spatial enclosure' for example, which describes space by reference to the physical forms that define it rather than as a thing in itself, is the most common architectural way of describing space.

Since 'The social logic of space' was published in 1984, Bill Hillier and his colleagues at the University College London have been conducting research on how space features in the form and functioning of buildings and cities. A key outcome is the concept of 'spatial configuration' — meaning relations which take into account other relations within a complex. New techniques have been developed and applied to a wide range of architectural and urban problems. The aim of their books is to assemble some of this work and show how it leads the way to a new type of theory of architecture: an 'analytic' theory in which understanding and design advance together. The success of configurational ideas in bringing to light the spatial logic of buildings and cities suggests that it might be possible to extend these ideas to other areas of the human sciences where problems of configuration and pattern are critical.

One of the most common assumptions about space, sometimes explicit, more often implicit, is that human spatial organisation is comprised of the workings of common behavioural principles through a hierarchy of different levels. Thus from the domestic interior, or even from the individual space, to the city or region, it is assumed that similar social or psychological forces shape space, differing only in involving larger numbers of people and larger physical aggregates. The assumption is so common that it deserves a name: Hillier calls it the 'continuum' assumption. If the continuum assumption were true, the analysis of interiors would simply be a matter of taking the principles and techniques for the analysis of aggregates and applying them on a smaller scale. Unfortunately, this would lead us to overlook a very fundamental fact, one which adds a whole new dimension to the system when taken into account. Bill Hillier calls it the fact of the boundary.

A settlement presents itself as a continuous object by virtue of the spatial relations connecting the outsides of boundaries. By moving about the settlement we build up knowledge of these exterior relations until we have a picture of some kind of the settlement structure. The spaces inside the boundaries have a quite contrary property: they are a series of – potentially, at least - separate events, not a continuous system. The same drawing of boundaries that constructs a settlement as a continuous spatial aggregate with respect to the outsides of cells creates a set of discontinuous spaces on the insides of those cells, which do not normally present themselves to experience as a continuous spatial system with a global form, but as a series of discrete events, expressly and explicitly disconnected from the global system. They are experienced one by one as individuals, not as a single entity sustained by physical connections. This property lies in the very nature of a boundary, which is to create a disconnection between an interior space and the global system around, of which it would otherwise be a part.

By virtue of this fact of disconnection, the set of spaces interior to boundaries creates a different kind of system: a transpatial system. A transpatial system is a class of spatially independent but comparable entities which have global affiliations, not by virtue of continuity and proximity but by virtue of analogy and difference. In such a system the nature of our spatial experience is different from our experience of a spatially continuous system. We enter a domain which is related to others not by virtue of spatial continuity, but of structural comparability to others of its type. We experience it as a member of a class of such interiors, and we comment on it accordingly. The relations between interiors are experienced as conceptual rather than as spatial entities, and the mode of organising global experience out of local observations is transpatial rather than spatial.

This is the fundamental fact of the boundary. There is no homogeneous continuum of spatial principles from the very large to the very small. In the transition from large to small there is a fundamental discontinuity where the system in effect reverses its mode of articulation of global experience out of local events. In moving from outside to inside, we move from the arena of encounter probabilities to a domain of social knowledge, in the sense that what is realised in every interior is already a certain mode of organising experience, and a certain way of representing in space the idiosyncrasies of a cultural identity.

Even the continuous scale of spatial organisation is shown to be illusory by the reversal effect of the boundary. Behind the boundary, the reference points of space do not become correspondingly smaller. On the contrary - they expand through their primarily transpatial reference.

As a consequence of the nature of the boundary, the most localised scale of spatial organisation tends to become the most global in its reference. The boundary refers to the principles of a culture.

Two distinctions out of the terms of 'space syntax' will be essential for this PhD-thesis: symmetric and asymmetric, distributed and don-distributed. These words are syntactic descriptions of spaces. On the basis of visual representations it is possible to see that each space, whether axial or convex (or even a building or boundary) has certain syntactic properties: it will either be distributed with respect to other spaces (have more than one way to it) or nondistributed (only one way), and it will be either symmetric with respect to other spaces (having the same relation to them as they do to it) or asymmetric (not having the same relation, in the sense of one controlling the way to another wit respect to a third).

The essential proposition of gamma-analysis, developed by Bill Hillier and Julienne Hanson and used in this paper, is that buildings transmit social information through their interior structures both through general variations in the basic syntactic parameters, and also - perhaps primarily - through the variations in the syntactic parameters which appear when the complex is looked at from the points of view of its various constituent spaces. We may define a space syntactically in terms of how the complex is seen syntactically from that space. The richness in this differentiation is the means by which interior structures carry more social information than exterior relations. An alpha or settlement system is characterised by the general syntactic homogeneity of the bulk of its primary cells, a gamma or interior system by the absence of such homogeneity. For

this reason labels are more significant in gamma. If a genotype in alpha can be defined in terms of parametrised syntactic generators governing encounter probabilities, a genotype in gamma can be defined in terms of associations between labels of spaces and differentiations in how those spaces relate to the complex as a whole, in terms of the syntactic dimensions. As in alpha, genotypes will be the result of relations of inhabitants with inhabitants and inhabitants with visitors, but the more controlled interfaces of gamma will articulate differences and similarities in forms of social solidarity with greater precision and greater differentiation than in alpha. In the sense that all buildings, of whatever kind, map relations between the inhabitants and between inhabitants and visitors, through some parametrisation of the syntactic dimensions of symmetry-asymmetry and distributedness-nondistributedness, then all buildings share the same abstract genotype. As the forms of solidarity to be mapped into the buildings change, and as the relations between inhabitants and visitors change accordingly, consequent changes in the syntactic dimensions will construct a building of a certain type, and with a certain individuality.

3.4 The Differentiation between Form and Medium

Dirk Baecker first assumption in the essay ‚Dekonstruktion der Schachtel' [1990] states that without making distinctions we cannot make observations and that without denoting the distinction from all that we have distinguished, we cannot know what we are talking about. His second assumption harks back to George Spencer-Browns indication-calculus and postulates that anything which creates a distinction from another thing becomes visible as a form. As long as it is self-referential [for the form] as well as externally-referential [for the observer] it maintains itself as a form. 'It has to refer back to a distinction, which is applicable recursive and by that maintain what maintains itself.' [Baecker 1990, p.68-70]

Heidegger has already pointed out that space for humans is not oppositional, whether as an outer object nor as an inner experience. Space imposes differentiation for the simple reason that it owes its existence to differentiation, namely the differentiation of places. Space is not the precondition for defining boundaries, in fact inversely; it is a product of demarcation. Thus, space itself cannot serve as a guiding idea in architecture, but only as something which establishes demarcations.

In whichever manner architecture is designed, presented, used or occupied, one only knows that it is architecture when one steps inside and comes out again, experiencing the relational change during this sequence. During the transition between inside and outside, a change is anticipated and enacted, but only when one knows this and knowledge is mutually assumed. Here the construction and communication of architecture is made possible. But not only is the perception of architectural space made possible, the architecture itself, representing a tension between construction and communication, is manifest during the process.

How can you think about the entity of the difference between in- and outside if not by considering the relationship between internal and external form? The answer is easy and perhaps not so new. The point of architecture is not primary and fundamental, nesting - as Frank Lloyd Wright [1963] has suggested, but it is about enclosure. It seems that Wright does not acknowledge this keynote, which has importance, both for the external and self-referential aspects of architecture. It is not about the architecture of physical function, but about elementary design elements. The point is not that architecture can be residence and shell, but how it can serve such needs.

The moment the enclosure of a box-shaped floor plan is deconstructed and its four walls separated, the walls become independent, and following Christoph Feldtkeller`s [1989] observation, screening as a basic element of architecture comes into play. Screening exists with the differentiation of inside and outside and as such it encompasses the concept of differentiation. In order to view the enclosure in Wrightian terms, as a requisite of architecture, the differentiation between inside and outside needs to be constructed in an asymmetric manner: architecture does not exist independently in a breaking of symmetry which denotes the inside as stronger than the outside. It is not the differentiation between inside and outside, which counts, but the differentiation which excludes the inside from the outside. The differentiation protects against from outside, which nevertheless has to be accessible from inside. And the unavoidability of this fracture of symmetry doesn't decrease when the design of exterior over interior of a building is emphasized. Even its outside form has to be recognizable and usable as a screening of the inside, if it wants to be partial to architecture. Screening establishes the difference between inside and outside. The idea of this difference is to accentuate. This means that screening is not the same as the construction of closure.

By contrast, the act of screening comes into its own when the possibility of enclosing is distinguished against the possibility of opening and both possibilities remain present. The outside must not only be physically external, it must remain accessible. And likewise the inside must not only provide protection, it must also offer egress. The screening of a space is the propensity to close and by contrast, to open. And this is the point when architecture becomes self-referential, enabling the recursive enclosing of architecture beyond its physical possibilities.

Taking another notion of form and distinguishing it neither from material nor from content, but from medium, it becomes unclear what can be distinguished from materiality on the one hand and form

on the other. Not just because it is not clear anymore what can on one hand be distinguished from the content of something from the form on the other hand. The differentiation between form and medium is in the first instance nothing but a differentiation between fixed and loose elements. Fritz Heider [2004] distinguishes 'things', which appear as self-related events with natural frequencies, from 'medium', which exhibits an external frequency. This external frequency is influenced by forced frequency. The logic of differentiation suggests that for everything that we can see, we cannot see the forces which enable our vision. Likewise, for everything that we can hear, we cannot hear the forces which enable us to hear and for everything that we can feel or think, we can neither feel nor think the forces which enable us to feel and think, etc. For example, on the hill across from us, we can see the tower, but we cannot see the light which gives it its form. We can hear the ticking of a clock, but not the air which carries the sound waves. We feel pain and think thoughts, but we do not feel the nerves which transmit the pain and do not think the bio-chemical processes which create thoughts in our brains. In short, each entity has a medium in which we perceive it. We don't usually notice the medium itself unless we observe it as a thing within another medium. We only take notice of something which is connected to something. We can only take notice of it because it connects elements as a fixed link, but also occurs in a state of loose link, and is not noticeable for us in this state. This differentiation between form and medium suppose an understanding of Heider beyond the particular perceptual-psychological context to a wider theory of form the crucial starting point of which is differentiation itself: between form and medium and between fixed and loose connections of elements. The question about form has a double meaning: firstly, one must question the medium from which the architecture is being produced. And secondly, in order to answer the first question, a question arises about the elements which comprise the loose connection or medium and the fixed connection; the architectural form. Building upon ideas which we have already covered it seems that both answers are clear. In understanding Frank Lloyd Wright, we have identified screening as a basic element of architecture. In this respect, the notion that a room, a chamber or a house are the principal elements of architecture seems somewhat dubious. In fact, Feldtkeller's position that the wall is simply an entity of separation and non-separation, more 'immaterial' than rooms and chambers, is perhaps more compelling.

And with this we return again to the question of the specification of architectural screening, the medium of architecture, the loose diversity of all possible screenings itself dependent on a medium, perhaps most suitably described as the medium of space. Because each screening which is suitable for the element of the architectural medium can be regarded as form which owes itself to a medium. This is the case of architecture; neither a physical, biological, psychological or social medium, but rather, a medium of space. Just as screening is the medium of architecture, space is the medium of screening.

Closing exists in contrast to opening and, likewise opening in contrast to closing, and these interrelations enable architecture. The conclusion to these thoughts may be that one can see the difference between closing and opening towards an entity from two positions. Firstly in the direction of the medium, which defines difference, and secondly in the direction of form, the creation of which enables difference. This means that space as well as architecture can be seen as an entity which distinguishes closing and opening. One can see how easy it is to deduce from architecture the idea of space as its 'elementary event'. But this reading overlooks the essential quality of screening as the difference between closing and opening. It overlooks the form-creations that emerge in the medium of space, and which further provide the basic forms for the creation of architectural form. Not until a notion of screening to close and, by implication to open, is space accessible and available for architecture.

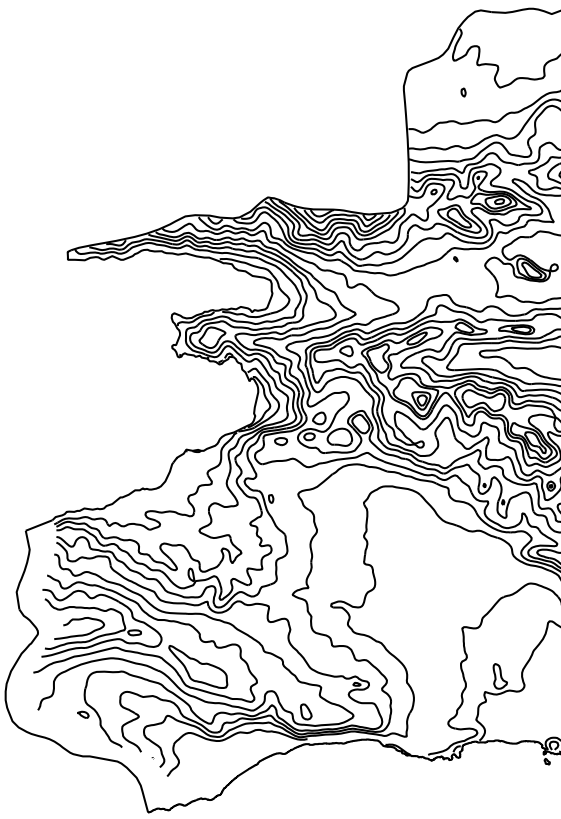
With these distinctions between space as a medium and medium of architecture is the deployment of possible screenings, closings and openings of the actual space obtained.

As we have seen, one can answer the frequently asked question about architectural form. The answer is provided by the differentiation between form and medium, architecture as a creation in

the medium of screening, in which screening is always to be viewed the twofold process of closing and opening. Screening is not just the basic condition of architecture, not just its mediating idea, but a real element which supports the separation of inside from outside and vice-versa.

When the architect is demanded of a proper analysis about the activities, which can take place in a building, which he designs. The conditioning by functionality is a conditioning by appropriation. The fact that more and more buildings are orientated towards multi-functionality means that the task of the architect doesn't get any easier. Certainly, in one respect, the architect can reduce his design to a system of screenings as screenings and by aesthetical and constructional concerns he creates buildings instead of functions, but he must find on the other hand the solution for a mixture of utilities.
Even more interesting is the question of which appropriation has to be separated in which way? Here we can imagine all kinds of combinations of closing and opening, according to a screening between living and sleeping, looking after oneself, working, and studying. But, fundamentally, it's always about screening, where one's privacy is mediated by an apparent ease of access and egress, and likewise, abundant openings are interrupted by barriers and interior thresholds in order to amplify accessibility or prolong and protect privacy.

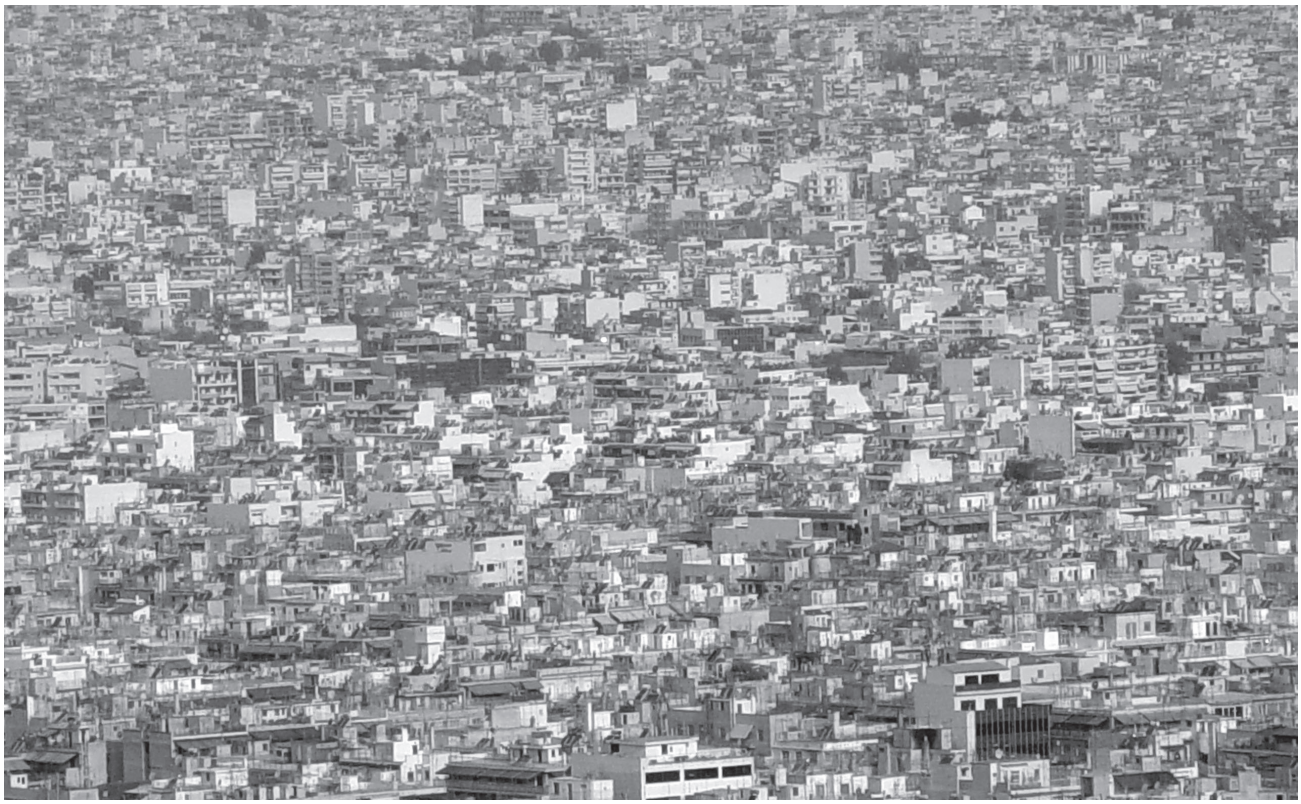
4.0 Context



This chapter introduces the urban and historical context of the case studies, chosen during the research process. Exposing the characteristics of Athens in the 21st century implies and demands the further detailing of the phenomenon of the polykatoikia. This is intended as a way of expressing the urban nature of the polykatoikia and its specific relationship to the development of Athens.

topographie [figure 03]
source: National Statistical Service of Greece 2001

4.1 Description of Athens



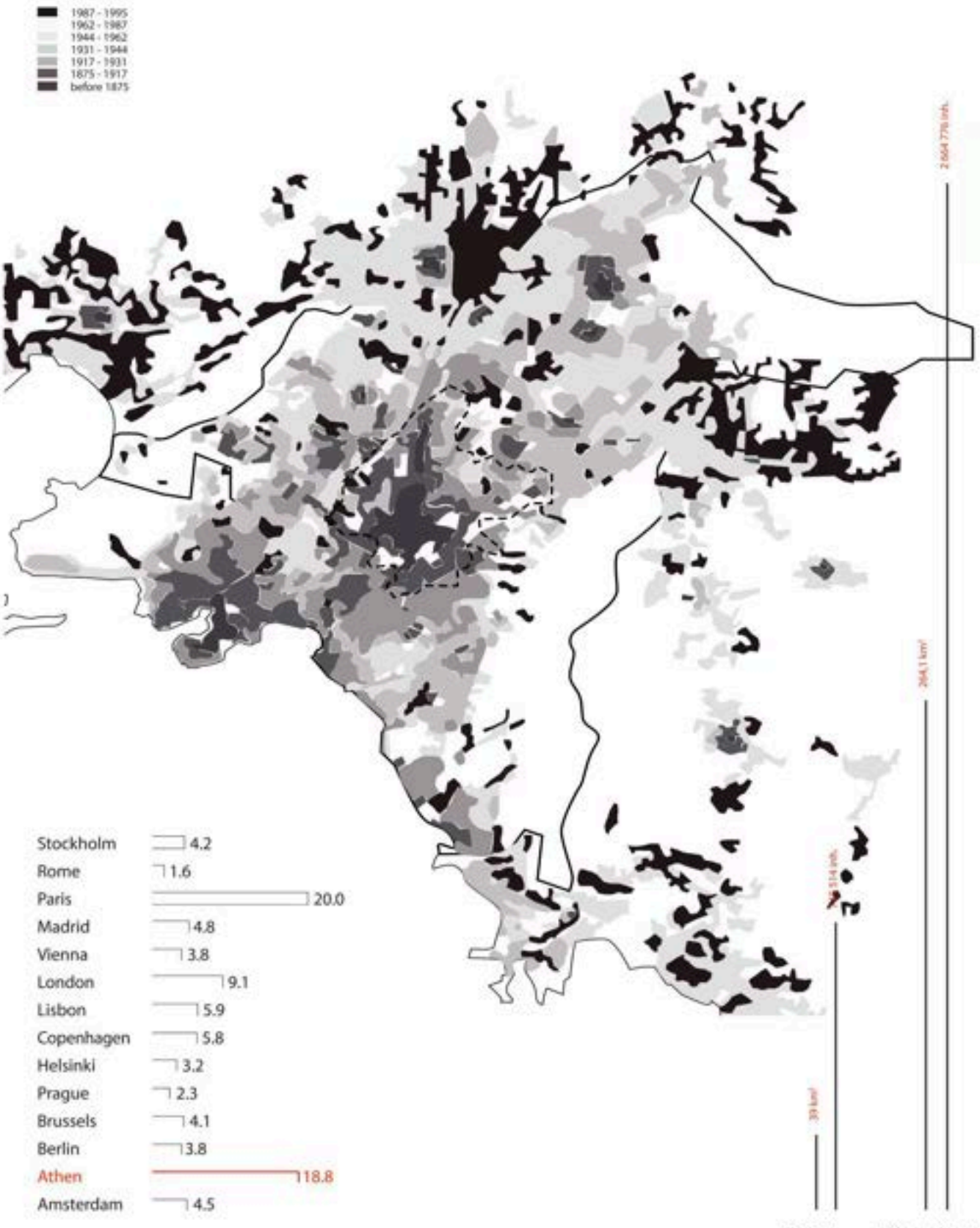
'Athens is for certain the modern city par excellence, [...]' [Frampton 2001, p.61]

'[...] a very beautiful example of what you call a 'Generic City'.' [Christiaanse 2001, p.75]

In a context of cultural disconnection during the last century the city of Athens has been transformed simply into sets of apartment blocks - in which almost half the country's population is concentrated. [table 02] The building typology of the polykatoikia defines the city of Athens by its completely covering the attic landscape, from the centre to the periphery. It seems that there are certain untransferable manners, certain cultural patterns, which made the arrival of modernity in Greece incomparable with what happened in other parts of Europe. Giving shape to the future, Athens made its own history becoming a stranger between the repeating urban apartment blocks. According to Pophyrios [1999, p.291], 'Modern architecture helped to bring about the synchronic city in Greece, gagging memory irreversibly'. The concentration of various polykatoikias together is in most cases an accidental accumulation of incomplete decisions of politicians and officials. The production of housing was unique in Europe because it was, from the start, almost completely in the hands of the private sector, produced industrially or mechanically. As Aesopos and Simeoforidis [2001, p.37] explained: 'The polykatoikia is at the same time the infra-structure [since there are often no pre-existing infrastructural networks] and the superstructure. The polykatoikia incorporates its own development being, simultaneously, the medium and the result.' Its interesting how the decisions of the family had far-reaching effects for urban development, resulting ultimately in a repitition of this same building type creating a matchless urban environment: only one typology, the greek urban apartment block, expands continuously, neutrally, from the center to the edge of the city, forming a city without segmentations. According to Kenneth Frampton [2001, p.67], '[…] this civilized level of urban construction, with no other like it in any other place of the contemporary world' is the 'unconscious' achievement of the Greeks.

Aesopos and Simeoforidis [2001, p.199-201] emphazised this uniqueness thus: 'If the urban center has to do with historical, 'designed' public spaces and buildings and dense construction, then -with the exception of a few very small areas historically defined around specific squares or axes which are products of commissioned design - there is no center in the contem-

building phases of Athens [figure 04]
source: National Statistical Service of Greece 2001



density comparaison of european cities [m inh/ km²] [table 01]
source: Institue National de la Statistique et des Etudes Economiques 2005

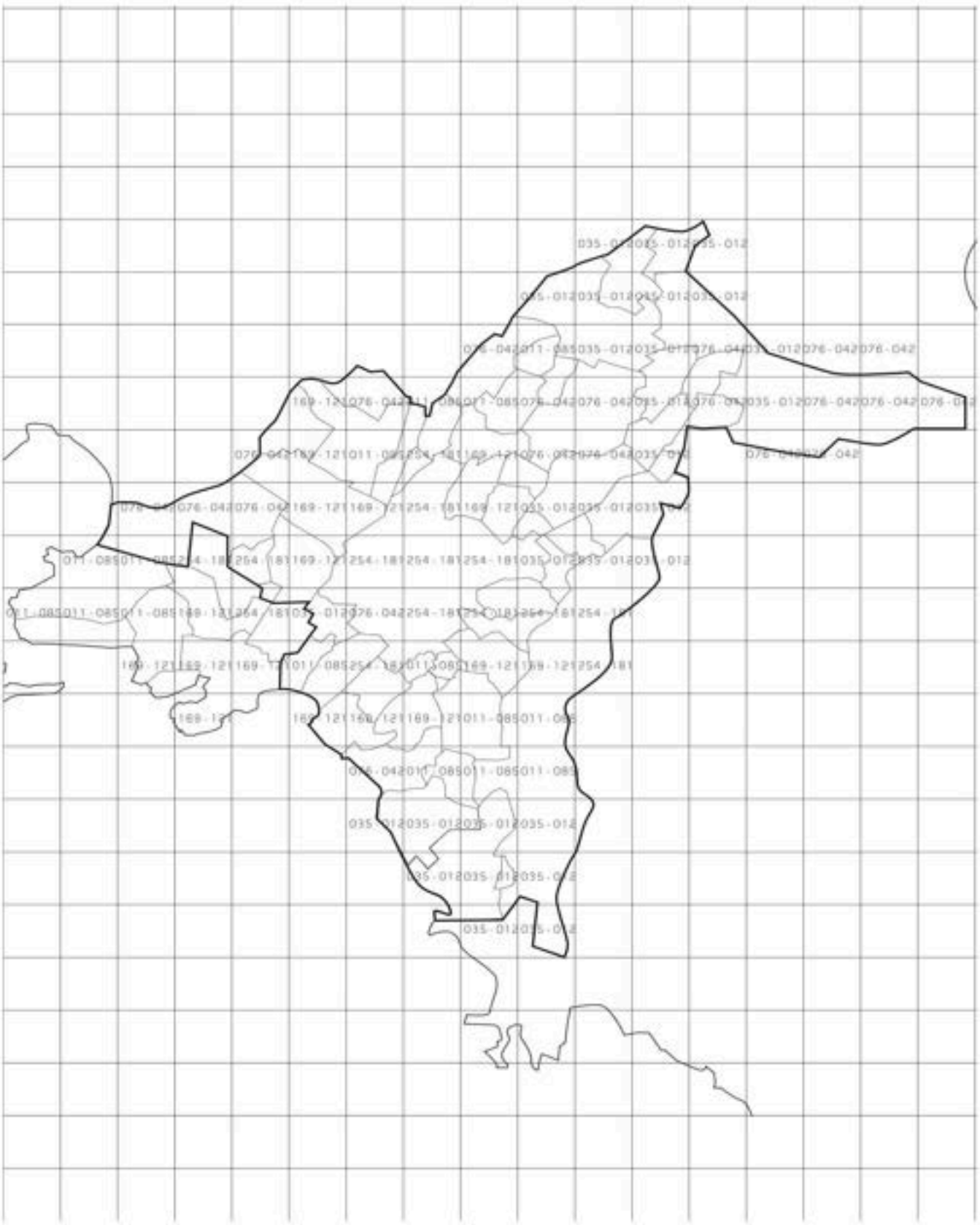
Stockholm	4.2
Rome	1.6
Paris	20.0
Madrid	4.8
Vienna	3.8
London	9.1
Lisbon	5.9
Copenhagen	5.8
Helsinki	3.2
Prague	2.3
Brussels	4.1
Berlin	3.8
Athen	18.8
Amsterdam	4.5

Athens population [table 02]
source: National Statistical Service of Greece 2001

porary Greek city.' In a free and enlarged use of the term, the Greek city is itself a periphery: the three-dimensional, six-storey layer of the Greek city, made up of private polykatoikias and public in-between space, expands continuously, indifferently covering the natural landscape. On the other hand, if the periphery has to do with reduced or minimum programmatic density, residential areas and low-rise constructions, then -with the exception of a few suburbs which constitute realizations of a Greek version of the 'garden city' – there is no periphery in the contemporary Greek city. In every part of the city, the variety and the unpredictable combination and density of programs prove that zoning has no place here. The urbanized character of the Greek city is not reduced as the city expands: the density of the built space remains the same, the streets are narrow, all solids and voids are of a small-to-medium-size scale, public space is neglected and undefined.

As already mentioned in chapter 1.3, Athens is in contradiction to other cities of the 20 century, because it is not divided into monofunctional areas and by no means illustrates a functionalistic city structure, in which separation of different functions is the goal. One could compare the social dimension of Athens to old medieval cities, in which merchants and craftsmen, rich and poor, young and old necessarily had to live and work side by side. Such cities embodied the advantages and disadvantages of an integration-oriented city structure. The necessity to meet the housing requirements of large sections of the population in the city led, during the 20th century, to an increase in the density of urban areas, creating favourable conditions for the cohabitation and intermingling of different social groups. [figure 06] The relatively weak community segregation becomes obvious by the vertical social differentation of Athens. In their study about this characteristic Maloutas and Karadimitriou [2001] noted that the Vertical social differentiation is partly the corollary of the choice of the middle classes, like in several western and central European cities, to continue living in the city centre, in spite of the important changes brought about by industrial development. The majority of the population Athens defines itself as middle class. In Athens, a separation of social groups in sectors dominates [between west and east or between north and south], with the affluent categories on one side, the less affluent on the other one, the business center being occupied by the affluent categories. This separation results from the recent migration of the richer and more average categories towards the suburb. The impression of a weak social segregation in Greek cities is a consequence of the rarity of juxtaposition of districts with inhabitants of varying social strata, as well as in a relative homogeneity of society. [figure 09] After the War politics did not consider a sensible combination of private and public buildings as their duty and therefore not as a design problem. By helping private builders and leaving out the public domain, the spatial structure that came into existence had hardly any cultural value. It was a derivate of private infrastructural action.

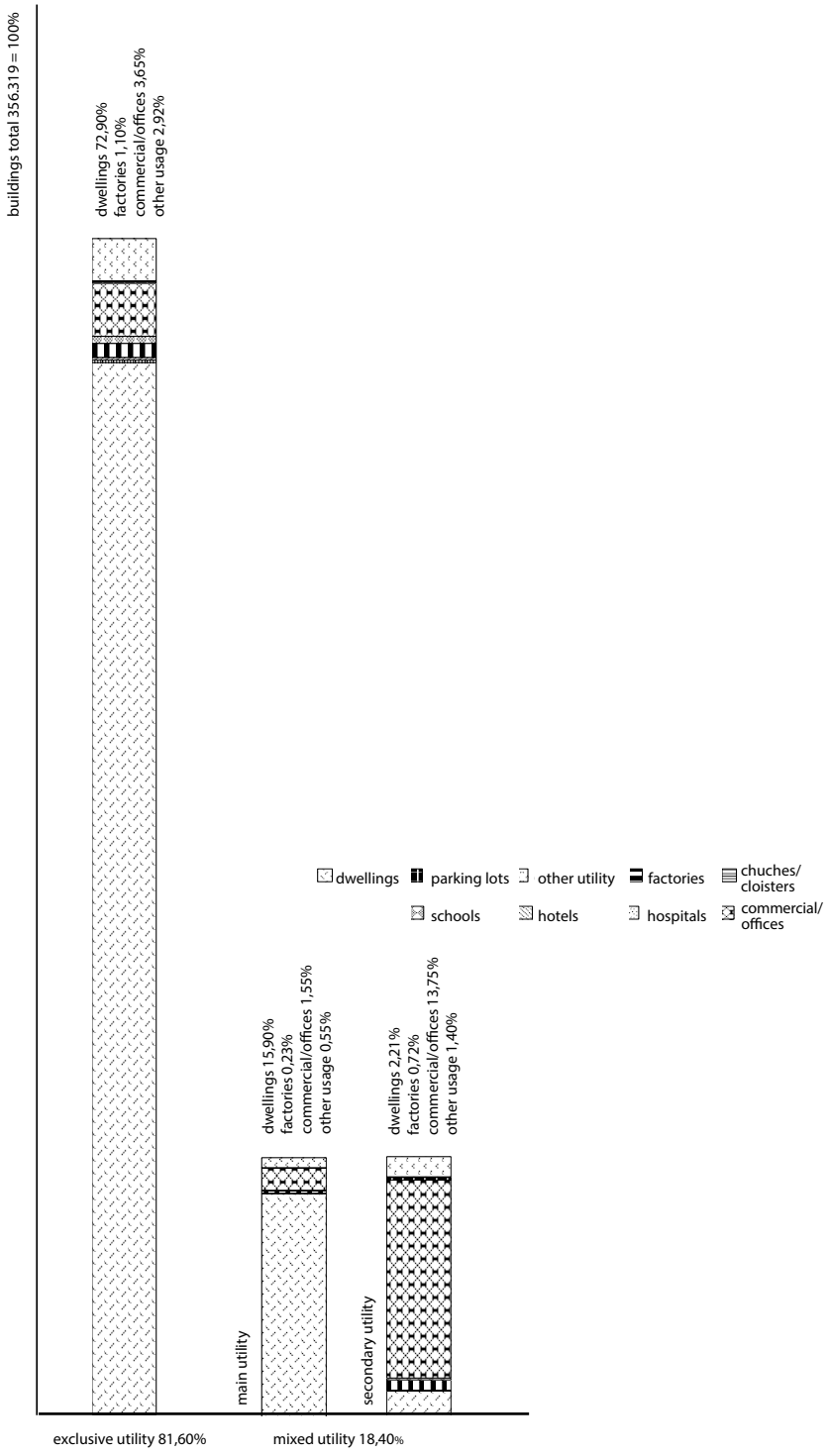
Moving through Athens, one sees that the streets are completely filled with life. By a kind of interlude between the street, the public space of the city, and the polykatoikia, the private buildings become public elements, radiating their social value beyond the actual buildings. On the other hand, the city enters the building on the street level and is able to transgress the conventional seperation of spatial spheres up to the top floor by putting public next to private uses. This embodies the characteristic urban character of the polykatoikia. It becomes a modernist spatial environment where contemporary life can develop freely. 'The distinct character and, I dare say, beauty of Athens are to be found in such moments of balance between articulation and evenness, between separation and simultaneity.' [Sarkis 2001, p.155] In the Greek city, with few exceptions, there are no



0 5 Km

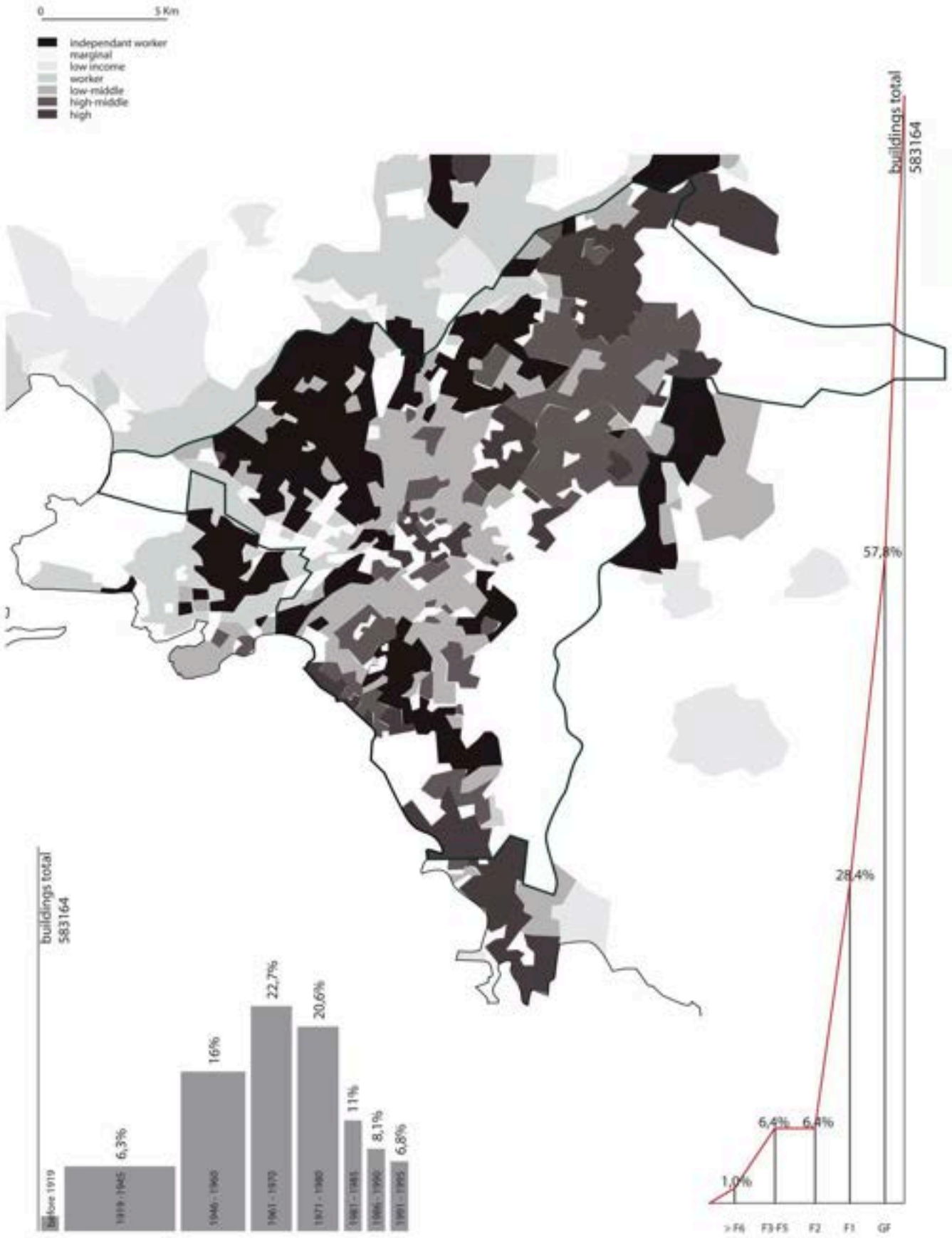
Athens population density (inh/ha) [figure 05]
source: National Statistical Service of Greece 2001

designed public spaces. Public spaces are the residue of the built environment, based on their programmatic density and not on a design. Appropriated streets, non-designed public squares, urban beaches, open-air markets, expansions of streets, 'strange' design-less spaces unsuitable, in conventional terms, for social usage, constitute the public spaces of the Greek city. The randomness and the design-less character of the Greek public spaces incorporates the vulnerability of their existence, the possibility of their occupation by unrelated, private uses that will eventually lead to the diminution of their importance and role and, finally, to their abolition. The public spaces of the Greek city, spaces of intense collectivity and no representational value, remain programmatic densities without legal constitution, events that can disappear at any time. [figure 10] According to traditional analysis, the differences between the new -linear- and the traditional center are located in the structure of space as well as in its use. The traditional Athenian center is an area of continuous building mass, where urban space is an object characterized by boundaries, a positively defined field. This field's structure is complemented by its function, which is essentially the acceptance and incorporation of all [traditional] urban functions. The simultaneous presence of these functions spatially and temporally is what gives the city its dynamic. [table 03] In the new strip-centers on the other hand, space is the residue of the individual buildings. Here networks are of key importance. In Athens, these networks are limited to main and secondary roads.



buildings utility [table 03]
source: National Statistical Service of Greece 2007

social distribution plan, according to CSP [figure 06]
source: National Statistical Service of Greece , 2001



building periods [table 04]
source: National Statistical Service of Greece 2007

number of levels [table 05]
source: National Statistical Service of Greece 2007

4.2 Description of the Polykatoikia

The cubic white buildings that comprise contemporary Athens are collectively known as the poIykatoikia. It is a typological phenomenon based on the private sector and private initiative, which underwent a remarkable boom in connection to the economic and social situation since the 1930's until today. It predominates and forms the main fabric of the city. The polykatoikia defines the public urban space of Athens to a large degree.

There are several explanations attempts to define the polykatoikia by synonyms of architectural historical references. Frampton [2001] quotes the cité industrielle which Tony Garnier proposed at the beginning of the century.

Aesopos and Simeoforidis [2001] described the typical Greek apartment building as 'the realization of the Corbusian Dom-ino system'. They localize the polykatoikia by five definitions, which combine some of the major characteristics: the unit [offering space for different kind of uses], the whole [being the infrastructure and superstructure], the form-less [different in every part], the border-less [no designed public spaces] and the place-less [artificial discontinuity].

In order to investigate the characteristics of the polykatoikia, such as habitability and communication of the users, and to understand the model and its symbolic meaning, it is necessary to regard it as a product. 'Apartment houses in Athens, like the built urban environment as a whole, clearly bear the dual stamp of commercialism and bureaucracy.' [Antonakakis 1978, p.151] The product of the polykatoikia is sold and bought by small and bigger enterprises, consumed by the people, and follows the laws of the free market economy. Supply and demand, more vital as functional and aesthetic questions, play the most important part in the design of this multi-residential building type. The architect or planner is thus required to provide a solution for a given building lot under stifling restrictions, which are the [a] anti-parochi system, [b] the General Building Regulations and their interpretation by the bureaucracy [figure 07] and [c] the established standard model for apartment houses and flats, which corresponds to specific social structures.

It would be wrong to define the polykatoikia as a homogeneous typology. The combinatory feature of this typology is comprised by its differences and its similarities. 'The differentiating social, economic and programmatic constitution of the city is reflected in the subtle but distinguishable differentiation in form, quality of construction and size of buildings and apartments.' [Aesopos, Simeoforidis 2001, p.41]

To mention some of the aspects which distinguish between one and the other: the cost per square metre, planned by an architect or not, good and bad functionality, the status of the area in which it is built, the social environment of the habitants, etc. But most of all, the user – or to quote Thackaras [2005, p.221] term – 'the actor adapts the building in a legal or illegal way to his needs'.

Three broad categories emerged that had as much to do with social status as with location: the low-income polykatoikia in the neighbourhoods located immediately at the semi-periphery and in the peripheries of the city, the middle-class polykatoikia in the central neighbourhoods of the city, and the luxury polykatoikia in select upper-class neighbourhoods primarily in the centre of the Athens. And after all, an architect is not involved in all of these three categories: small building companies are responsible for the construction of the polykatoikia in the peripheries. The polykatoikia of the middle-class is designed partly by architects, mainly by engineers and the luxury ones are designed by an architect.

Despite their social differences as mentioned before they are remarkably similar in the following aspects:
The 'polykatoikia' uses the elementary construction principles of the Corbusian 'Dom-ino' system; repeating the same structural pattern of a reinforced concrete structure. Each polykatoikia consists of a column grid and a core. Those are, for structural purposes, more or less equal in dimension. The structure is entirely separated from the functions of the building and thus permits a maximum flexibility of program.

It is designed directly for people with simple and recognisable desires and needs. It is constructed in simple materials, and built by the hands of unskilled labours. Established by the measure of what is feasible, the materials and the implementation of the 'Dom-ino'

system are still approximate to those used by the unskilled building worker: gravel, sand, cement, stone, wood and aluminium.

'The rules of Greek architecture are still subject to the earth, to simple logic, to the natural imperfection of the human hand. At the same time, the media and the magnitudes are those in keeping with the demands of thrifty construction, to suit the average Greek family, the small or medium-sized firm, the public sector with its permanent deficits, the internal limits of the necessary and sufficient.' [Tournikiotis 1999, p.54]

There is a clear organization of accessibility and infrastructure. For reasons of economy, vertical water lines and sewage facilities are concentrated with the stairwells in the centre of the floor plan so as to reduce the length of the corridors and save space for the rooms.

The polykatoikia usually does not exceed six storeys and has a typical width and shape.
As a general rule, the ground floor at street level [height ca. 5m] contains small commercial spaces. Above it, residential apartments [height ca. 3m] are situated, which have two distinct zones: the public areas with view towards the street , including balconies, while the private areas [including service areas] are oriented towards the light-wells in the back of the plot, ranging in size according to the quality of construction. Each apartment contains a small hallway area [hòl], a reception room [living room or salòni], dining room, kitchen, two or three bedrooms, one or two bathrooms, and a small maid's room – in the 1950s it was common for maids to find employment with Middle-class families.

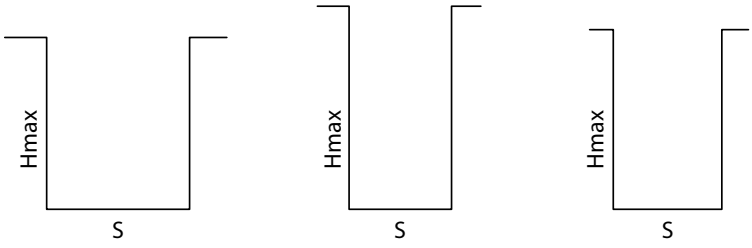
The living room appears to be the main room of the apartment in quantitative and qualitative terms. Its form is mainly a square or even sometimes an L-shape. The television is the fundamental characteristic of all living rooms and thus crucial in the organization of space. Sofas and armchairs are placed around the TV. Bookshelves have a rather decorative than functional purpose. Work of art graces the living room and their value expresses the status of the habitants. The dining room is part of the living room and not separated. Corridors vary in size and shape as well. They can be compact and small, but they can also receive embellishment on a grand scale in order to be considered as a

Section

Hf maximum facade height

S relative street width

Hmax maximum height



Hmax = 1.2S | Hmax = 1.75S | Hmax = 1.65S

Building volume facades and arcades

1955 - 1973

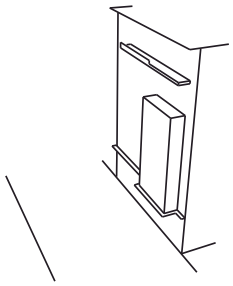
Minimum arcade height = 4 m

Minimum arcade width = 2.8 m

1985 - 2000

Minimum arcade height = 3.5 m

Minimum arcade width = 2.5 m



Building volume general regulations

1919 - 1934

Penthouse setback = 2.5m

Penthouse height = 4 m

1934 - 1973

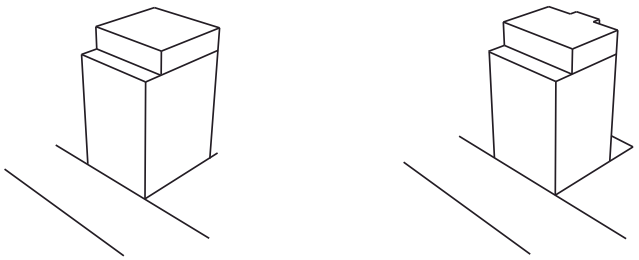
Penthouse setback = 2.5m

Penthouse height = 4 m

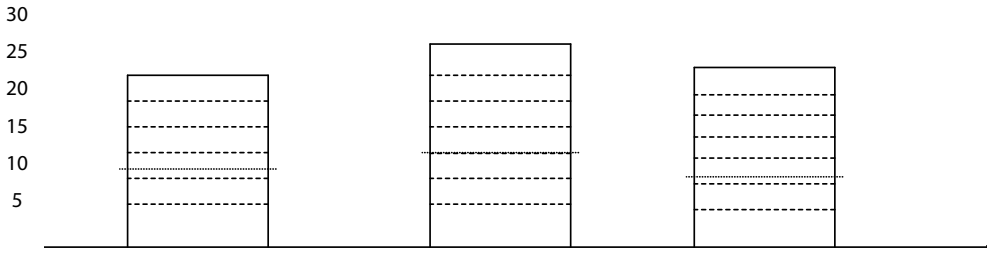
1973 - 2000

Penthouse setback = 2.5m

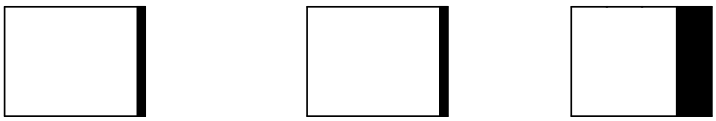
Penthouse height = Hmax - Hf



Heights [m]



Free plot areas [%]



minimum free plot area

minimum area covered by pilotis

No Restriciton | E = [Hmax]m> 10 m² | 25%

floor levels

Area covered by pilotis

compulsory free plot area

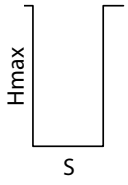
minimum height

1919

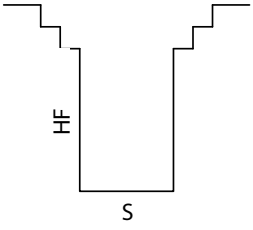
1922
zone a

1929
zone a

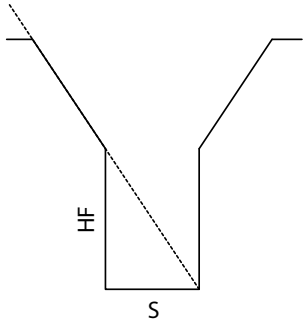
evolution of building regulations [figure 07]
source: Paschou 2001



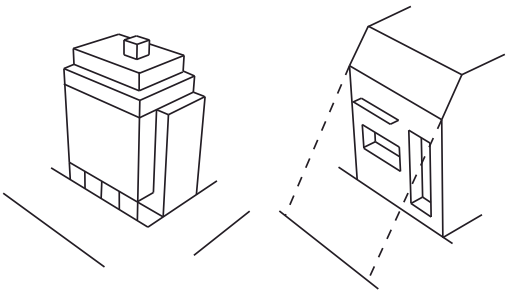
Hmax = 2S<18

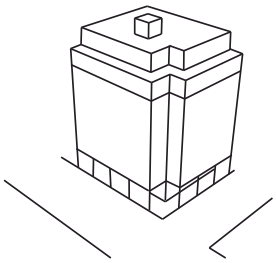


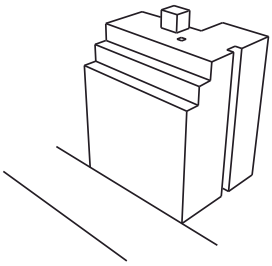
Hmax = 2S<24

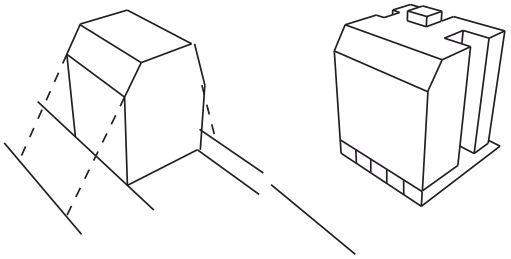


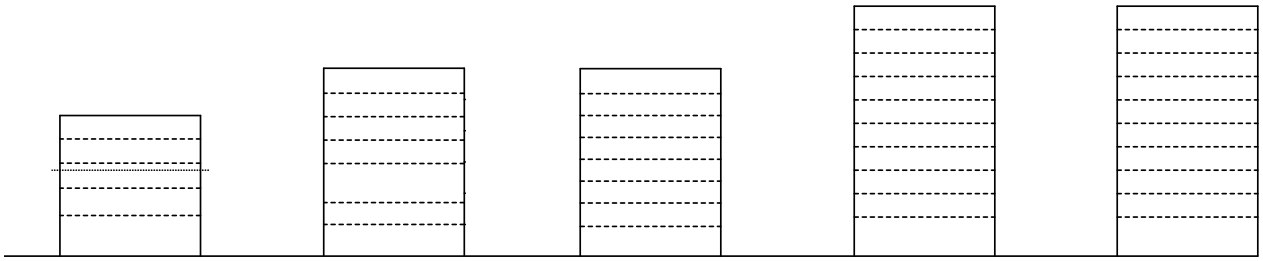
Hmax = 2S<24











No Restriciton

E = [Hmax]m> 10 m²

25%

30%

50%

30%

50%

1934
section 1

1955
section 1

1973

1985

2000

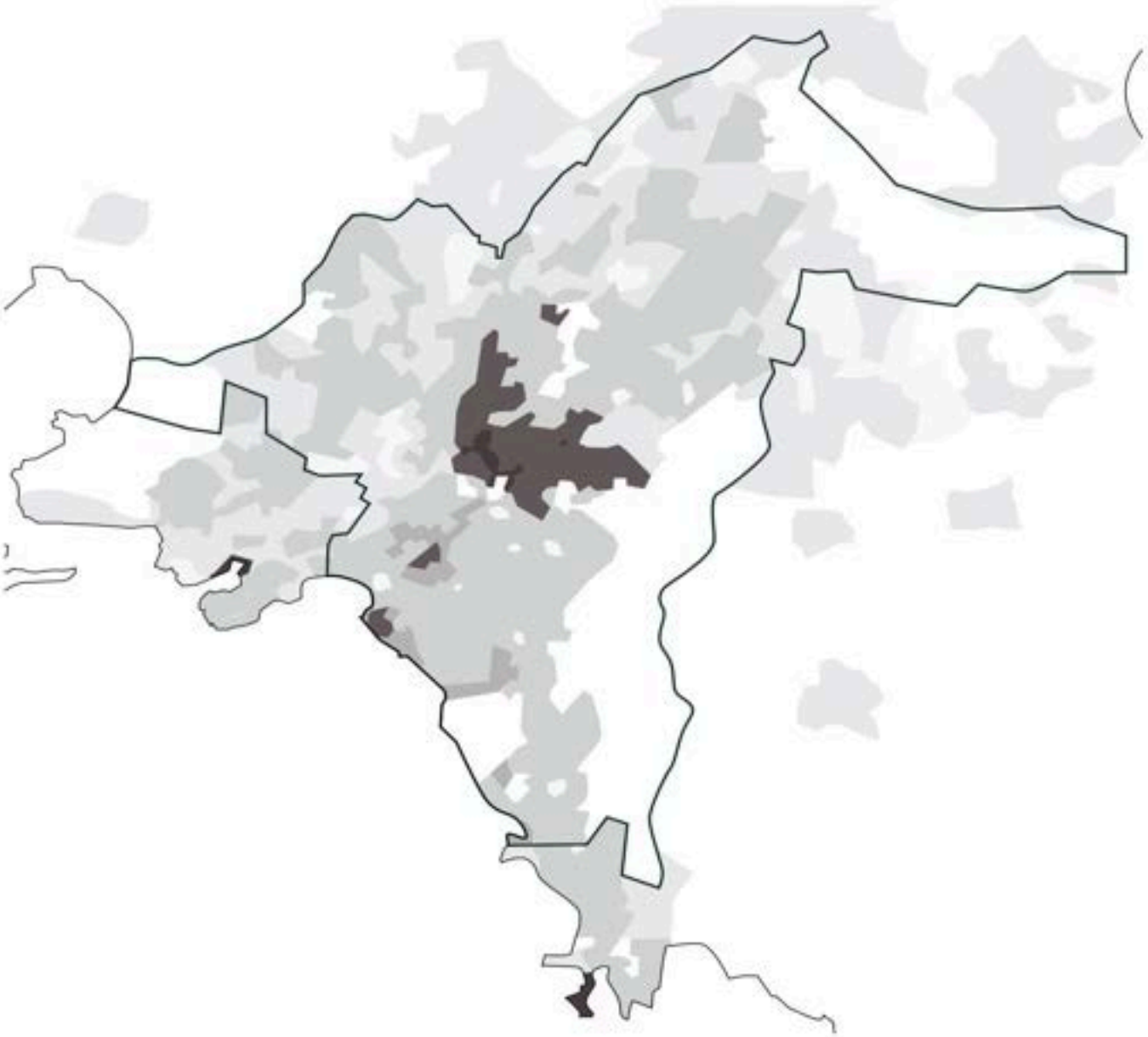
proper room in order to use it effectively. But they all have one characteristic in common. Whether big or small, corridors are without daylight. Sleeping rooms in different sizes are used for different members of the family: big room for the parents, small room for the children. Built-in cupboards are a common standard. In most cases, the kitchen is rather very small, badly oriented, and poorly illuminated. They face the light wells or the rear of the building. The shape is often inappropriate. Instead of comprising a square floor plan, they are rather rectangular and elongated in their organisation. Storage rooms do not exist, so that the balcony, the guest toilet, or a niche under a piece of furniture takes over this function.

The polykatoikias offer similar facades, expressing the scanning of the plan, with ground-level stoas and linear balconies. The surrounding and stretched balconies extend the privacy of the residence towards the city and are an outdoor living space for approximately half the year, as permitted by the climate. Balconies are protected by tall awnings, which comprise a strong facade element. The sum of the horizontal lines of the balconies and awnings create uniformity and subdivide the facades. Verandas are located in the upper floors of the polykatoikias and are dimensioned generously in to offer space for playing children. At roof level, one can see, from time to time, illegal extensions, such as wood construction for sun-protection.

Angellidakis [2001] points out the horizontality as follows: 'But perhaps nobody noticed that the Greek City was born out of the coupling of horizontal planes of concrete and vertical surfaces of fabric. The result is a rhizome structure which extends as far as the mountains. With the help of a few matches, it climbs the mountain to connect to another Rhizome creating a larger entity of balconies and awnings, until the next one.'

In contrast, a difference between polykatoikias is provided by a variation in organizing spaces within the construction of the domino-building system. Common spaces vary from one polykatoikia to another. The stoa, a frequent extension of the pavement and the commercial use of the ground floor, defines the threshold between the polykatokia and urban space by positioning columns, called pilotis, along the demarcation. The commercial use on the street level and the entrance to the upper floor are adjacent in the rear of the stoa. The shops, cafes and betting agencies push their products and seats into the weatherproofed 'pedestrian agora'.

The entrance is the indication of income status of inhabitants. The more generous the merrier is the lost of possible utilities in the ground floor. Next to the elevator shaft and the staircase there is a little space for the porter except for lower social strata, where there is no porter. Size and construction of the porter's area emblematize the status of the building, which can go from a simple desk up to a wood construction with marble cladding. A further element is the house phone, which comforts the



number of floors [figure 08]
source: National Statistical Service of Greece 2001

need of safety for the middle class polykatoikias. Thus, the entrance is very important for the first impression of the interior but also for the exterior space.

The staircases, depending on the social status of the building, may continue without pedestral to the upper floors in order to not waste precious floor space. Or it takes the habitants along an illuminated stair well to their destination. As well, the elevators can strongly differ in their comfort level from each other. The corridors, connecting the centrally placed staircase to the doors of the single units, are hardly illuminated by daylight and comprise places without low spatial quality.

Light wells are regulated by building code. These airspaces are arranged either between or inside of multi-residence buildings. Kitchens, bathrooms, and staircases are directed to these actual public spaces. These spaces cannot be called common spaces, like i.e. a courtyard can, because they are extremely small and not accessible for the user. Light wells are regarded in the planning as unbuilt spaces. An obvious outcome of the economically orientated building regulations are the upper-floor volumetric set-backs. Depending on the maximum height of the building and the width of the streets, the top floors are recessed, leaving space for verandas and allowing the winter sun to touch the street level. In order to squeeze out and sell every possible square metre, the very last floor obtains a rather small size and shape. The roofs are rarely used and commercialized, even so they are the biggest common spaces of the multi-residence building. A room, which supposed to serve as a lavatory, is either used as a storage or one-room apartment for students.

The ultimate and definite goal of a polykatoikia was to shelter the families itself. The building typology served as a certification of optimum living conditions for generations to come, in an incredibly Mediterranean mentality towards family members.
An interesting aspect is the social hierarchy prevailing in the most buildings. Vertical social differentiation is bound to be present wherever there is a vertical differentiation of apartment attributes and apartments are allocated through the market. Most of the time, this social differentiation is contained within a broad segment of class hierarchy. The value of the apartment [ground floor – upper floor – top floor, big – small, etc.] generates the relationships between the habitants. Rarely does someone from the top floor build up a connection to someone from the ground floor.

The vertically differentiated stock is not the old housing stock, which was usually low-rise, but the rather new stock built during the 1960s and early 1970s that - unlike the Parisian model - was not designed for class cohabitation. Its rather homogenous social structure has rapidly changed since the mid-1970s, and what has been a social gradient of floor preference contained in a middle-class environment has gradually changed to interclass cohabitation. As a result, the more affluent inhabitants of the vertically differentiated areas occupy the higher floors and the working class and other manual labourers the lower ones, including the ground floor and the basement.

One of the most important characteristics of the polykatoikia is its vitality. Basing on the introduced systematization and typification of the building, the polykatoikia is a solution which allows for change over time. The type and the grid are no more or less than the tools whose generality permits unforeseen uses and appropriations. Though designed as housing units, the polykatoikias were later used for various other different programmes, a basis for a kind of vernacular architecture. They incorporate anything and accommodate any use, from private tutoring services, to offices or gyms, publishing companies, medical practices, etc. The multifunctionality is a simultaneous and diffuse presence. Functions are stratified, not divided.

The polykatoikia has proved capable of accommodating a variety of uses other than residential, with this adaptability no doubt becoming the main cause of its ubiquity. What is most particular about this building type in Athens is that a building that is specifically residential in layout and iconography, conceived in the clear segregation of uses of modern planning, has become the instrument of the mixing of uses at the micro-scale.

'[…] as an 'open' building system, [it] offers the maximum comfort possible within the minimum space.' [Aesopos & Simeoforidis 2001, p.33]


NOKIA




KOTE

MARINER






INTERAMERICAN

The stoa, as visual separation between the ground level and the upper floors, changes gradually, depending on location, from the centre to the periphery into a widely refurbished and converted professional space, appropriate for small private entrepreneurships and car dealers. Often, due to their site, such polykatoikias completely shed the residential use: the upper floors become an extension of the ground level business. The change of use requires a change of look and, intuitively, entrepreneurs enforce a more commercial, non-residential facade design. They attach outdoor projections to the windows, balconies and, in the periphery, even on the roof. Being visible and being present is the obvious effort. Mostly built by their own occupants, these buildings materialize popular and commonly accepted notions towards professional space.












4.2 Development of Athens and its Polykatoikia

After World War II Greece faced the reconstruction of destroyed urban areas and started off with the postwar development of the capital city, Athens. Just as in the rest of Europe, the housing problem was immediately dealt with by government initiatives and actions. The political unrest and civil strife that followed the war created aggravating circumstances for repairing the destruction. Government housing programmes in Greece were limited both in number and in scale.

'The government of Canstantinos Karamanlis - supported by American financial aid - initiated major public infrastructural projects which totally changed the image of Athens. The attempt to re-establish a civic aura with the Cultural Center competition in 1959 won by John Despotopoulos and partially implemented, was followed by the construction of the new US Embassy [TAC/Gropius, 1959], the new international airport in Athens [Eero Saarinen, 1960-62], new highways connecting Athens to the north [the National Highway articulating all the country's industrial areas] and south [Poseidonos Avenue, which articulated the residential developments and leisure activities of the sea front], ferry terminals [the Passenger Terminal in Piraeus, architects Ioannis Liapis, Elias Scroumbelos, 1962-69], new university buildings [the Faculties of Law and Divinity, Library and Administration building, Thessaloniki, architects Costas Fines, Costas Papaioannou] and social housing on the periphery.'[Aesopos & Simeoforidis, 2001, p.21]

As a result, the housing problem passed into the hands of private businessmen, first in Athens and then in other cities. These entrepreneurs began reconstruction in the central districts of Athens and later in the outlying districts and provinces.

The wave of migration to the cities, the growth of industry, the tendency to imitate foreign patterns, the discovery of a source of profitable occupation for a large number of engineers and contractors - these things, combined with a rapid rise in urban land values, a preference of the public towards apartments as an investment, and the social status conferred by ownership of such property, created an unprecedented boom in the building industry which continued until the mid-1960s.

New houses were now constructed either illegally in suburban areas, or inside that plan on the antiparoche system, translatable as quid pro quo. This system - a unique characteristic of the building market in Greece - was apparently lucrative for land owners and builders, which explains why it was maintained and became so widespread. On the one hand a family was invited to exchange its plot of land and/or house for a multi-storey apartment block to be constructed on the site, in which the family members would live in the future. The builder, on the other hand, gained land without spending money, which he than

could rather devote into the construction itself. In fact, he would often sell the apartments in advance, from the preliminary plans, thus minimising his own financial participation in the project and increasing his profits. The state encouraged this system by increasing the number of floors which were permitted, doing so because, on the one hand, it perceived that this was a way of solve the housing problem and, on the other, that the building trade would be boosted in general terms, enabling it to function as a lever for economic recovery. [figure 06]

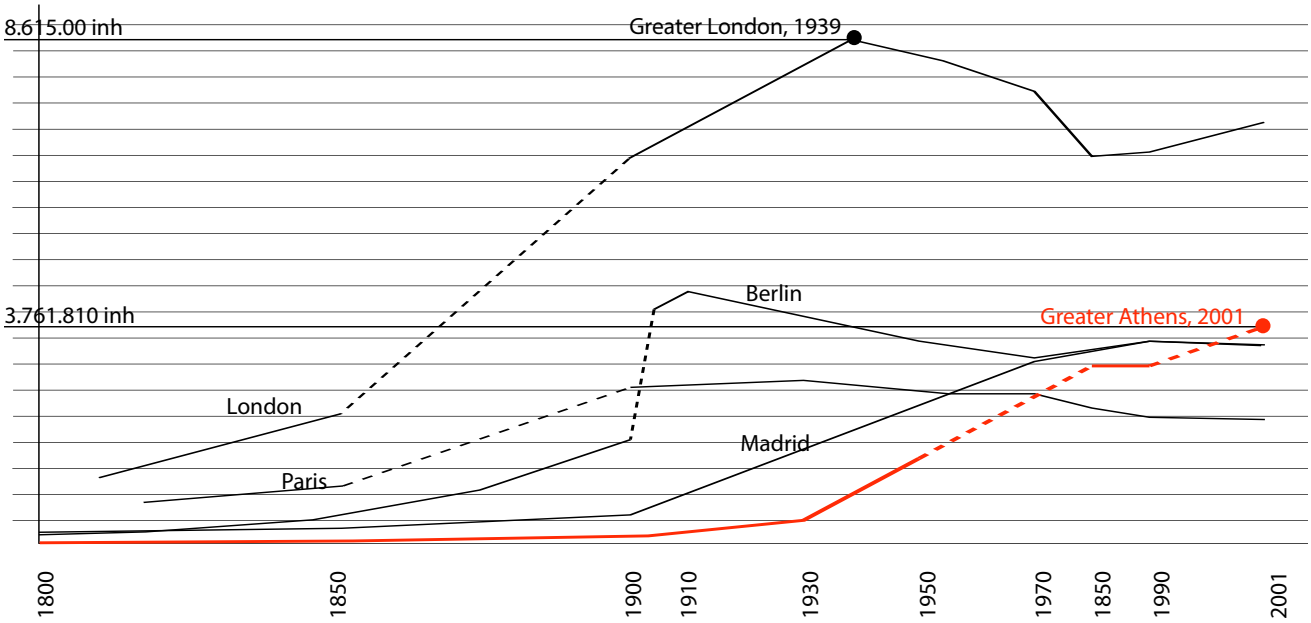
Referring to Ioanna Theocharopoulou [2005, p.66] 'In the years following the end of the World War II and the Civil War [1947-1949] Athens experienced a remarkable economic growth, one of the highest in Europe at the time. Largely through the wave of migration from the countryside, the city's population doubled from 1.378.586 inhabitants in 1951 to 2.530.207 in 1971. (...) There was a much better chance of finding work in the city rather than in the impoverished countryside. (...) Many of the inhabitants found work in the construction industry. (...) Most of these new Athenians moved into (...) white housing blocks, collectively known as the polykatoikia (...)' - a term which began to be used widely during the interwar period to decribe urban apartment buildings. By now, it is the synonym for the beginning of modernization in Greece.
[figure 06]

Not just thanks to the antiparoche system, the construction of apartment blocks flourished as never before, but also, according to Aesopos and Simeoforidis [2001, p.21] it was 'the 'spring' of post-War Greek architecture'.

In the beginning of the 1950s a number of Greek architects, who had studied and worked abroad during the postwar years, imported the new models influenced by architects of the era, such as Le Corbusier and Mies van der Rohe. They undertook the adaption of this new architecture to the conditions in Greece, according to, e.g., the climate.

Since postwar Greece did not experience the same or related development such as the rest of Europe, from a rural to a industrial society, from agriculture to bourgeoisie, from family enterprises to social welfare, the questioning of forming an adequate industrial city did not exist prior to this development taking place. The missing infrastructure and past made the country eager, supported with the growth of the industry in the 1960s, to modernize the domestic environments and catch up as soon as possible with the western world in terms of lifestyle, visualized with the scattering of international trends and the popularization of the new architecture. The neo-classisism of the first years was abandoned for good, and contemporary forms started spreading from the centre of Athens to outlying districts.

During the 1950s and 1960s, self-settlement was the prevalent way of housing all throughout Greece, resulting out of the well-considered state policy. Not only done in this way by wealthy citizens, who



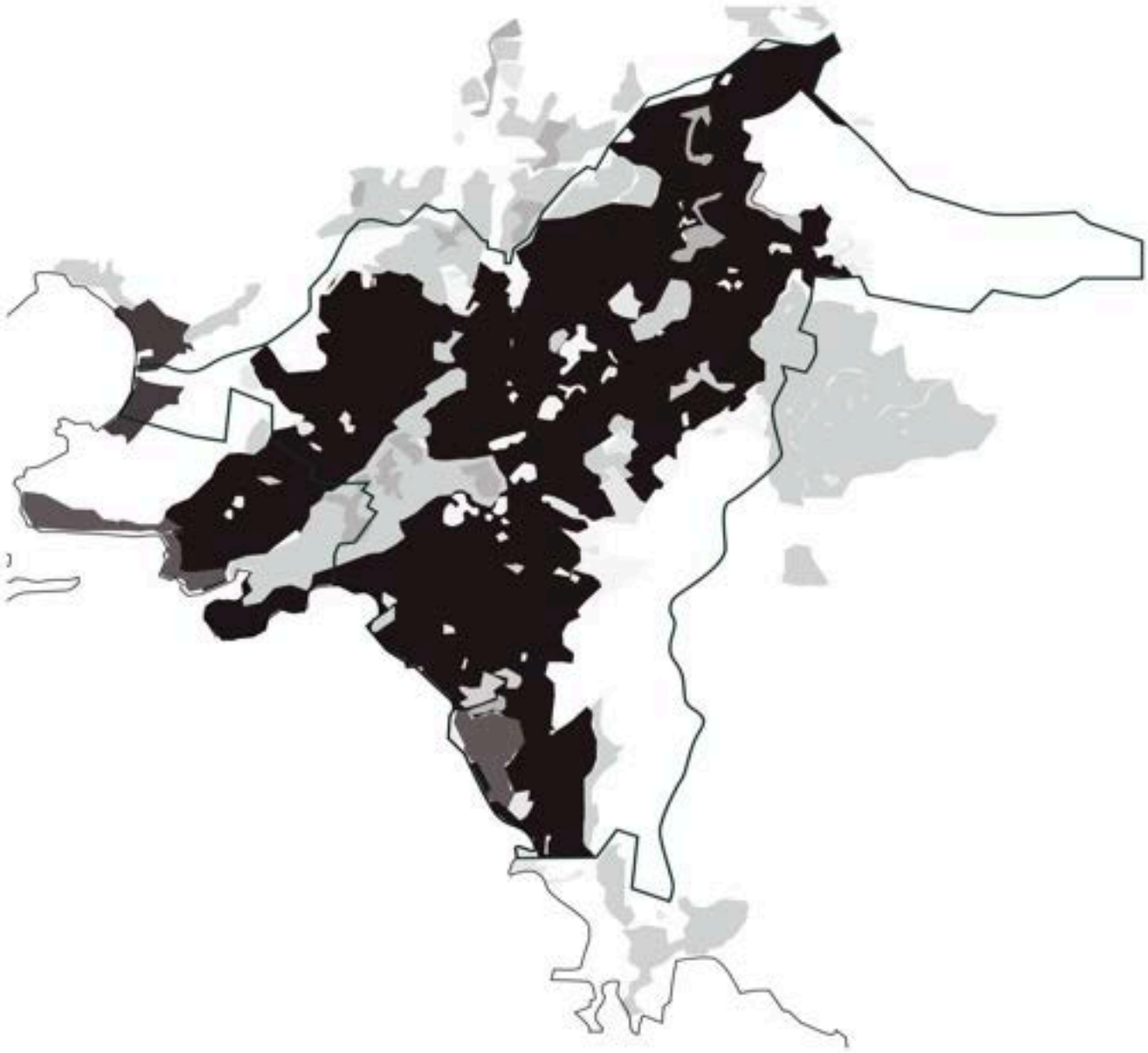
european cities comparison [table 06]
source: National Statistical Service of Greece 2001

assigned the construction of their homes to architects and civil engineers, but also by the lower social class in the urban centres. This latter category built their dwellings almost completely on their own. The plan of the apartments was arbitrary. Long, impratical corridors, badly lit rooms, and unfortunate organization characterize those multi-residence-blocks. No element of the plan expresses itself in the façade. The buildings provide no articulated response to their surrounding. Construction techniques were relatively simple and builders' equipment minimal. The new techniques, easily learned, sustained few and slow changes. Their work, while not identical to 'traditional' stone building, was certainly an updated version of it. Concrete, mixed manually on site and then carried up on ladders in small tin buckets, became the principal building material.

According to Ioanna Theocharopoulou [2005,p.66-67] 'In a formal sense, the postwar polykatoikia certainly looks modern. White unadorned facades, rectangular outlines, reinforced concrete skeletons, wide openings, flat roofs, often with pilotis for cars parking, certainly suggest modernist principles. Yet for the most part, this is modern architecture without architects. Post-World War II Athens is a particularly striking example of a city primarily composed of so-called informal, indeed often illegal building. About 95 percent of all buildings in Athens today were constructed at a very rapid pace in the first postwar decades by small-scale builder-entrepreneurs [for the lower middle classes] and engineer-developers [for the middle classes]. Yet it is architects who are usually blamed for this largely unplanned and hastily put-together urban housing, even though they were the ones who least participated in it.' [table 09]

The detailed and hair-splitting conditions of the General Building Regulations like siting of the building, predetermined heights, binding maximum foot print, etc. made the spontaneous standardization of the polykatoikia on a self-serve basis in large numbers possible. This standardization of commercial housing led to mass production of an overall uniformity of demand, with the predominance of a certain model. Those commercialized houses had a homegeneity in construction, but also in typological features and of the basic equipment of the residence.

The building industry is one of the most sensitive sectors of the economy because of its many links to other sectors. Capital invested in building finds its way quickly to many people. In contradiction to countries like Germany or France, ownership of flats is an overruling way of investement since building has served as a safety valve



Athens space and landuse distribution [figure 09]
source: National Statistical Service of Greece 2001

in times of cyclical change, against overheating and crisis. Families put money aside not only for various needs, but also specifically for the childrens dowry – which often became an apartment in a polykatoikia housing block in the close neighbourhood. Among prospective middle class urban buyers, it is still this fostered myth of the 1950s of the apartment as a declared source of comfort, luxury, security and steady income.

'The stated aim of postwar housing policy was the provision of a home for everybody. This was not, however, pursued through public housing, which amounted to less than 0.02 per cent of total housing production'. [Economou & Sapounakis 1966, p.204]. State intervention was based on a number of direct and indirect incentives aiming to promote home ownership and the market for rented houses. These incentives ranged from tolerating the construction of houses in areas not included in the city plans [and eventually legalising the houses] to increasing plot ratios and controlling the prices of raw materials for building.

Judging from the percentage of home ownership in Greece, which is one of the highest in the European Union [70 percent in 1986], this housing policy could be considered as highly successful.'
[Madanipour et al. 2000, p.158-159]

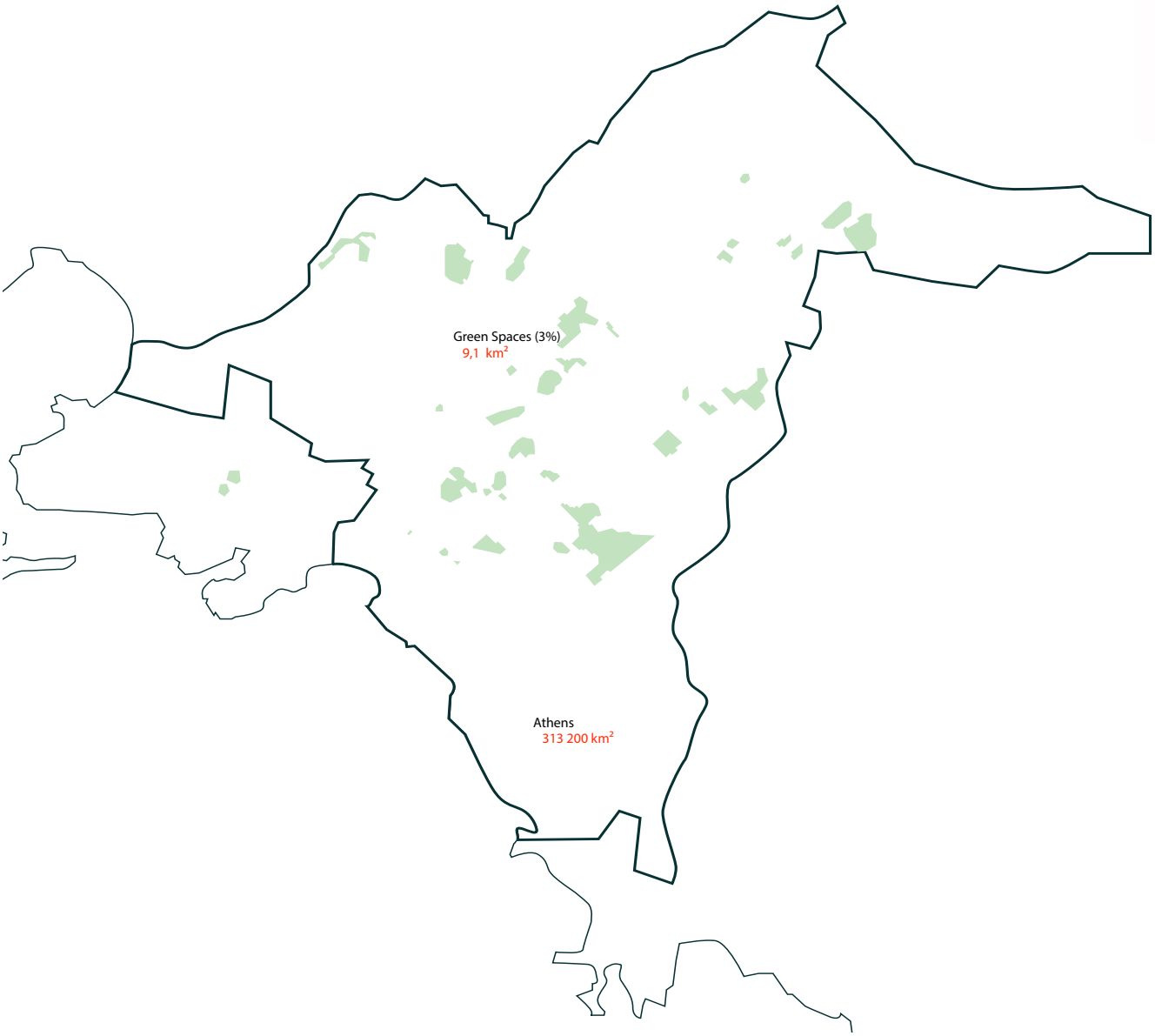
The consequences of this rapid city development soon became obvious:
a] The value of land was a factor which was strongly linked to the location of the lot in the city. The centre of Athens became the favoured location of business offices resulting in skyrocketing prices and displacement of residential housing and then small businesses.
b] The geographical distribution of housing was influenced by the income level of the residents. The upper class occupied privileged city sections and suburbs, while the upper-middle income group settled [at lower prices] on the lower floors of deluxe buildings and on the edges of wealthy suburbs. Middle-income residents who did not own private houses in the suburbs lived on the middle floors of average Athenian apartments. The low-income groups were already living in peripheral districts, i.e. in the now downgraded downtown area, in illegal settlements outside the city plan, and sometimes in the basement and groundfloor flats of middle-income apartment buildings.

The period of the fifties and sixties, which was the most important one for the development of modern Athens, ended with the military coup in 1967 and led into seven years of dictatorship. The population growth in Athens laid bare the lack of urban infrastructure and increased serious environmental concerns. The wild urbanization process that was based on the 'copy-paste' reproduction of the 'polykatoikias' by small building companies had destroyed the Attic landscape. The morphology and form of the polykatoikia allowed hardly any public space. Its accumulation combined with the lack of urban planning permitted only a ricicilously small amount of green areas. Many greek architects then ignored this problem and its reality. Most of them talked about the functional advantages or were bothered about the surface of the polykatokia, in which case they simply modified the façade. Even though the 1970s brought several developments in apartment-house building [i.e. free standing buildings in the greater Athens or improvment of construction technology], the problems resulting from mass production reached their critical point - too late in order to realize big chances or new solutions.

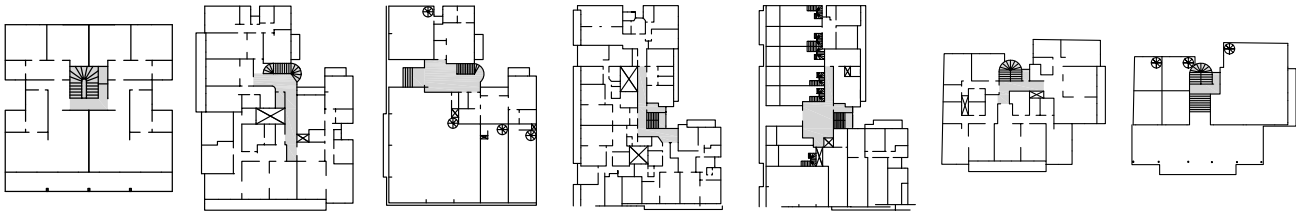
'This unorthodox urbanization process that was based on the infinite reproduction of the "polykatoikias" devastated the Attic landscape. The optimism of the '60s was replaced by nostalgia for what the migrants from the countryside had left behind. The modernist era was over and Athens became a repressed city in the '70s and '80s'. [Dragonas 2004, p.30]

Just as in the years 1928 and 1955, the public authorities tried to maintain the direction of urban development by the General Building Regulations, but mainly to maxime the codex in terms of site and floor occupancy.

'The features of the building laws in Greece could be distinguished in categories of first and second-priority sizes: the first-priority ones were regulating the allowable percentage of the plot area to get built and the maximum height of the building and its façade [the difference of this two numbers was covered with penthouses in set backs] according to the size of the street and the area of the city



Athens green spaces diagramm [figure 10]
source: National Statistical Service of Greece 2001

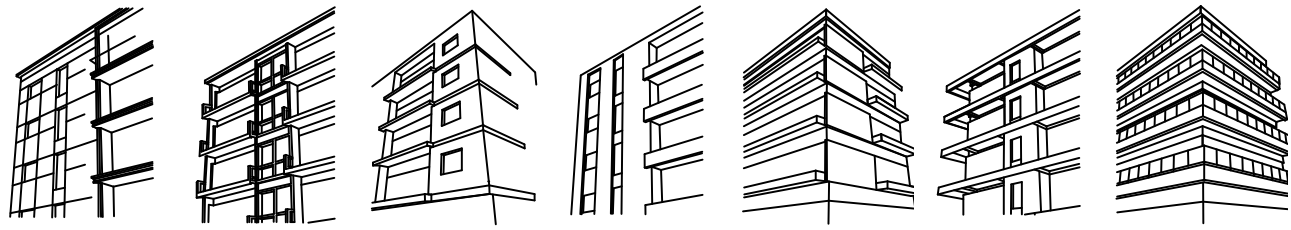


1950 1960 1980

evolution of plans [plan 01]
source: Paschou 2001

1950	• 4 floors - 2 apart. per floor • Flats symmetrical organised • Spacious flats with modern outlook of integraded common spaces • 5 floors - 4 apart. per floor • Staircase and corridor to serve 4 flats • 4 light wells, 2 very small	• Facades visualize the horizontal and vertical openings • Balcony slabs and its breast walls treated as detached rectangular motives
1960	• Ground floor designed for shops • Small flats at the back • Shops with attics • WC with small light pipe • 5 floors - 5 apart. per floor • Flats served with 1 staircase and corridor • Less but bigger light wells	• No decorative motives • Same material follows the foreheads of balcony slabs • Facade is organized by surfaces-panels in recess, openings or balconies are grouped • Corners of the buildings are dissolved in meeting point of solid walls and panels with openings
1970	• Squized motive of many shops • Small single flat • 5 floors - 4 apart. per floor • Small squeezed flats • Light pipes unefficient	• Concrete slab and concrete beam joined in one surface and treated as one continuous horizontal forehead in recess or excess
1980	• Ground floor formed with arcades • Shops with no supplementary facilities • Small shops with attics	• Surrounding forefronts of balconies exaggerated in height

description of the evolution [table 07]
source: Paschou 2001



evolution of facades [plan 02]
source: Paschou 2001

where the building was situated; the second-priority sizes were referring to the minimum surface of light pipes, around which secondary rooms -kitchens and bathrooms- were situated, the distance of the building from the plot limits, the floor heights, the staircase regulation and the maximum extension of balconies or other façade elements.' [Paschou 2001, p.16]

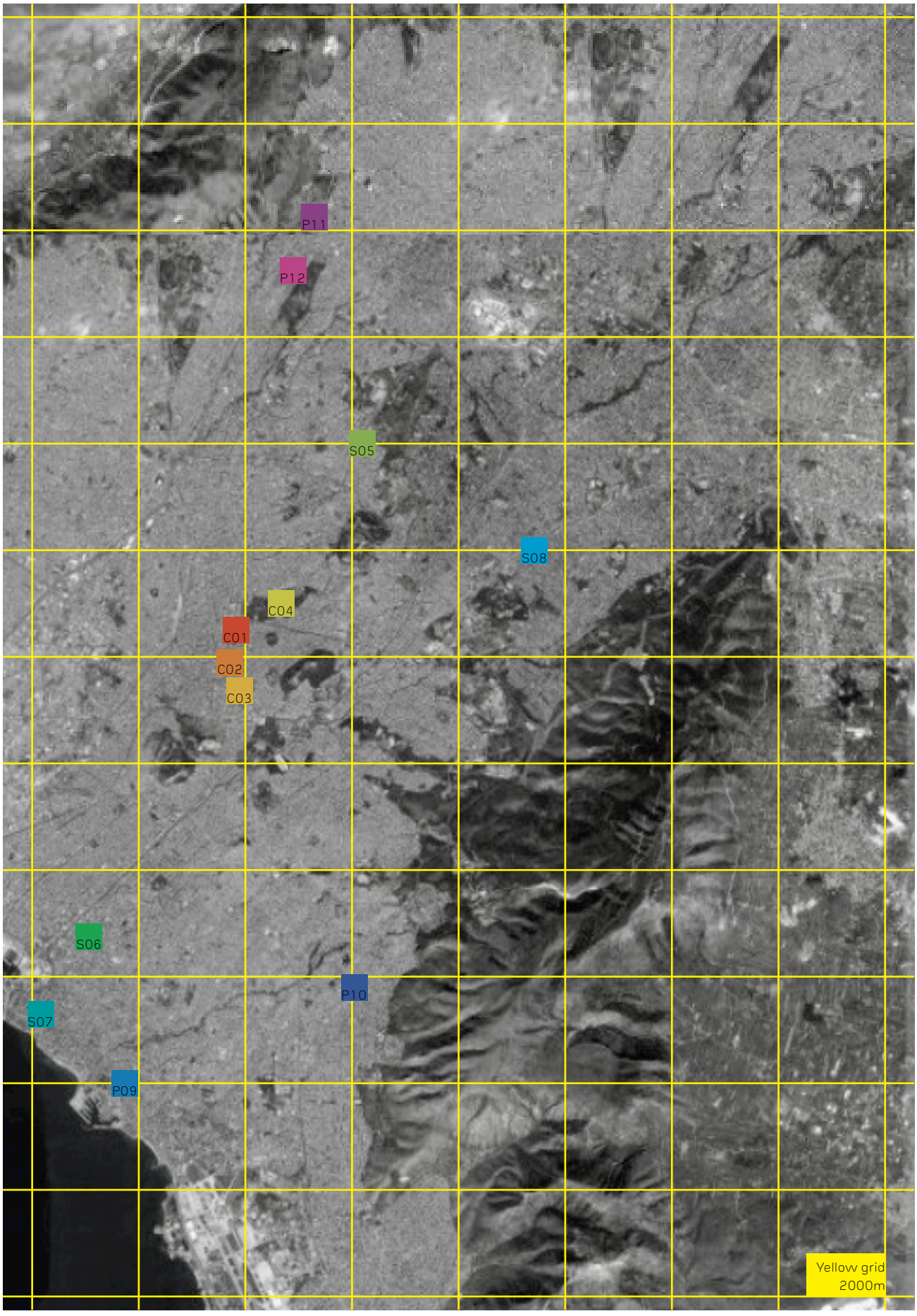
With the last change of the building law in 1985, in which e.g. parking space was, for the first time, regarded as necessary and placed beneath a slab held up by the obligatory pilotis, the urban apartment house turned out to have reached the limit of its development potential from the viewpoint of typology and form.
1980s architecture was dominated by the historicist formalism of Post-Modernism, combined with the interest in preservation of the historical settlements and buildings of vernacular and neo-Classical architecture. In the ninthies, a new modernization process accompanied the 'opening up' of Greek architecture to the international – European-landscape. In this period, characterized by end of the cold war and by the influx of immigrants from Eastern Europe and Asia, Greece prepared for the Olympic Games to be held in Athens in 2004. Major infrastructure projects were on its way [the new Athens International Airport, the new Athens Metro, the Museum of Contemporary Art, etc.], to be finished just in time.

'The mixing of forms and historical elements is a cultural symptom of Greek society which displays the phenomena characteristic of post–modernity. The role of the private client is decisive at this point - in particular, of those clients who are in a position to affect the development of the city by investing in their image through architecture: among such clients are banks, insurance firms, construction companies. At the same time, Athens seems to have succumbed to the prevailing life-styles, with the diffusion of shops, cafés, and show-rooms and the proliferation of contemporary art within the urban fabric through private museums and art galleries, while large distribution and retail networks, burger-joints and entertainment facilities are beginning to constitute the peripheral landscape of fhe city 'a-la-carte', with the Goody's, and MacDonalds restaurants, Carrefour and Praktiker supermarkets, and Village Center multiplex cinemas running ahead of institutional policies and projects.' [Aesopos & Simeoforidis 2001, p.21-23]

Greece, a country at the periphery of Europe and with unique characteristics of its own, experienced the interlude of the outcomes of international developments and local identity; and was and will be constantly redefined.

5.0 Research Diagnostic

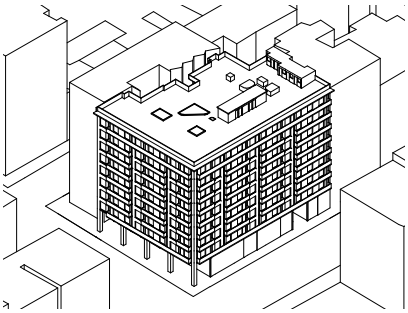
The analysis in the following chapter presents the final application of the research techniques. In the first step the analysis describes the gathered data of the chosen cases. In step two, the spatial configurations will be investigated considering the permeability of the boundaries. The third step measures the visibility of the each space and illustrates people's movements through the polykatoikias. In the final step, the adaptation in regard to users' needs will be determined.


P11
P12
S05
S08
C04
C01
C02
C03
S06
P10
S07
P09
Yellow grid
2000m

5.1 Stournari

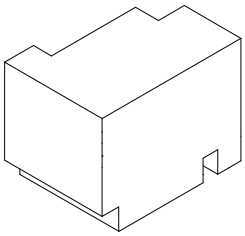
centre, Exharia

siteplan, [1/2000]



5.1.1 Data Analysis

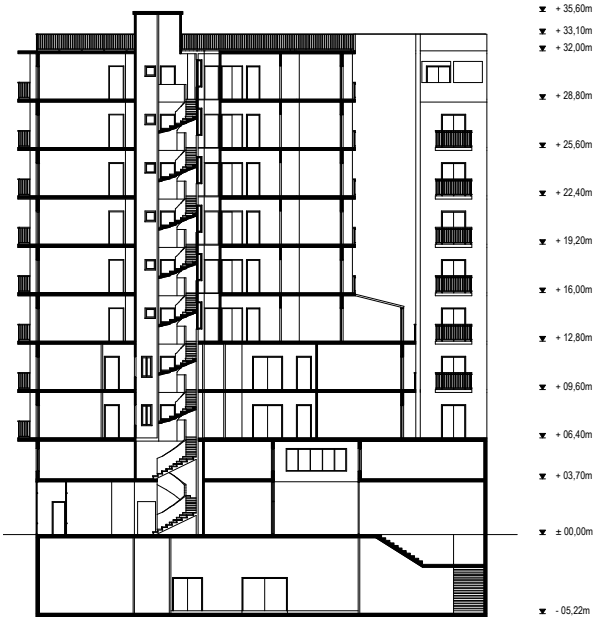
C 01



Stournari

Location Stournari 57 / Patision 37
Area Exharia
Year 1959 / 1971
Type corner buidling

elevation, [1/500]

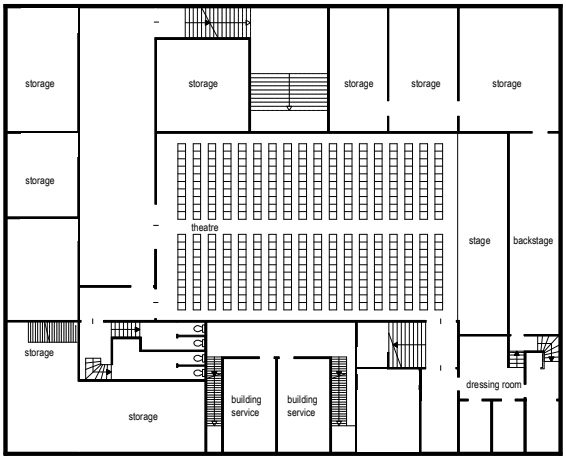


section, [1/500]

Plot Area 1225m²
Site Occupancy Index 0,98
Floor-Space Index 9,6
Built Up Area 1198m²
Gross Area 11700m²

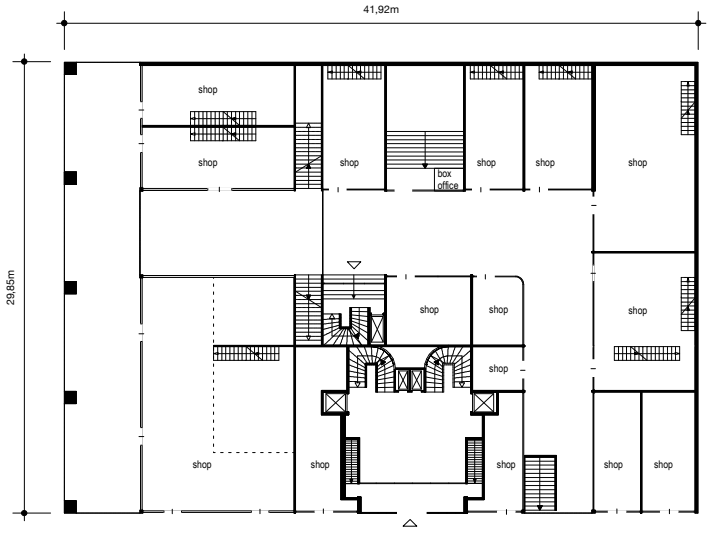
Number Of Floors 10
Dimension 41,90m x 29,80m x 32,00m
Height Of Ground Floor 3,70m [+3,30m]

Units On Each Floor 9, [22 in floor 01-02]
Façade Above Ground 2324m²
Total Window Area 836m²
Flats Total 73
Offices Total 19
Shops Total 14
Medical Pratice Total 6
Extra 1 theatre



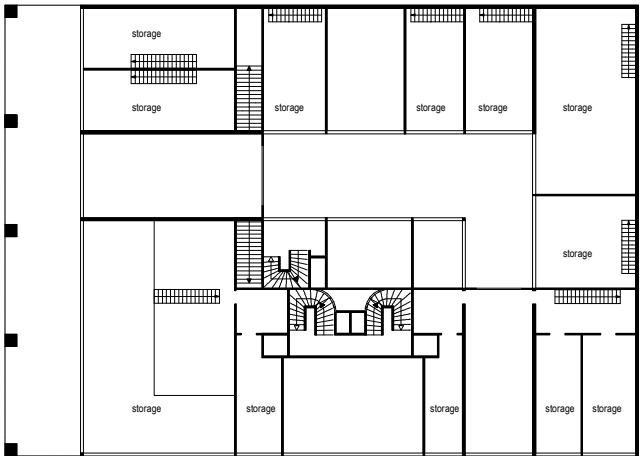
basement, [1/500]

9 storage [26 to 80m2]
1 theater [548m2]



ground floor, [1/500]

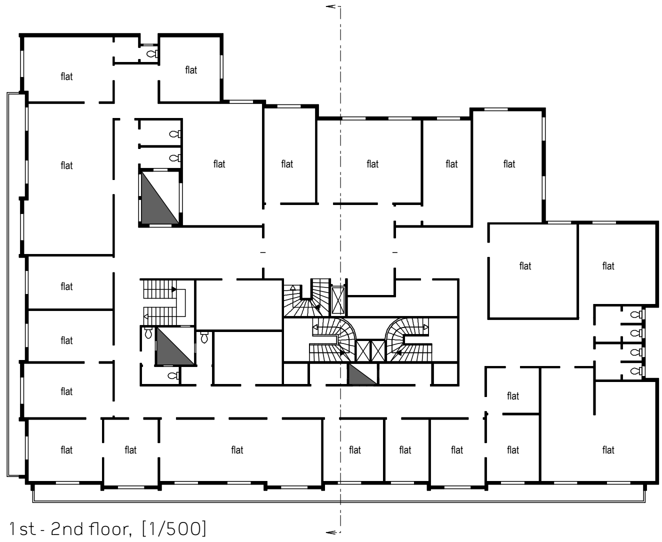
14 shops [25 to 154m2]



semi floor, [1/500]

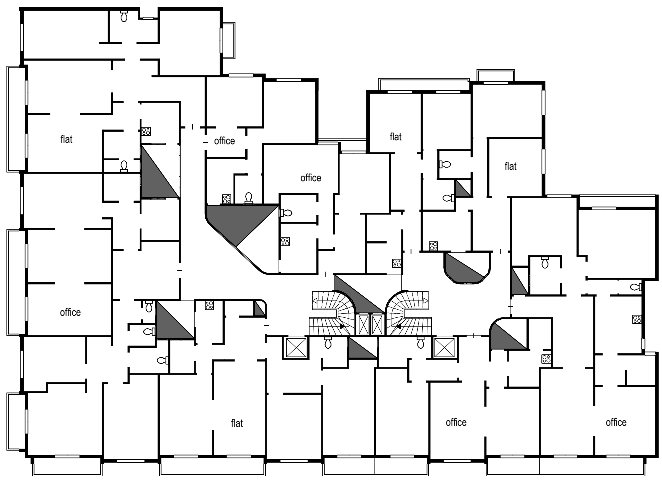
12 storages [25 to 154m2]

22 flats [11 to 56m2]
social housing



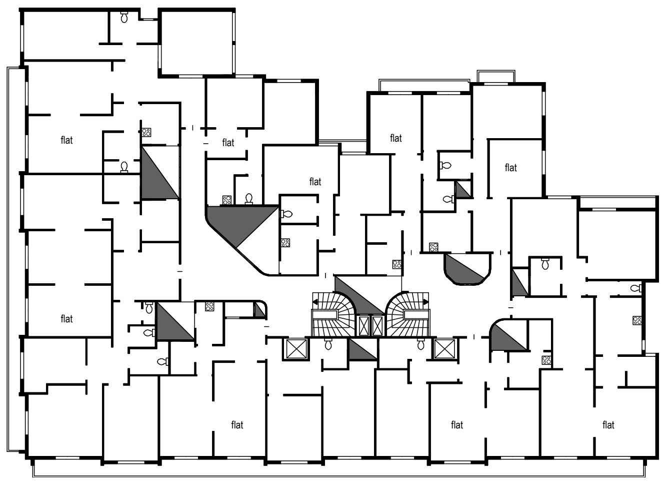
1st - 2nd floor, [1/500]

4 flats [58 to 133m2]
5 offices [48 to 181m2]



4th floor, [1/500]

9 flats [44 to 166m2]



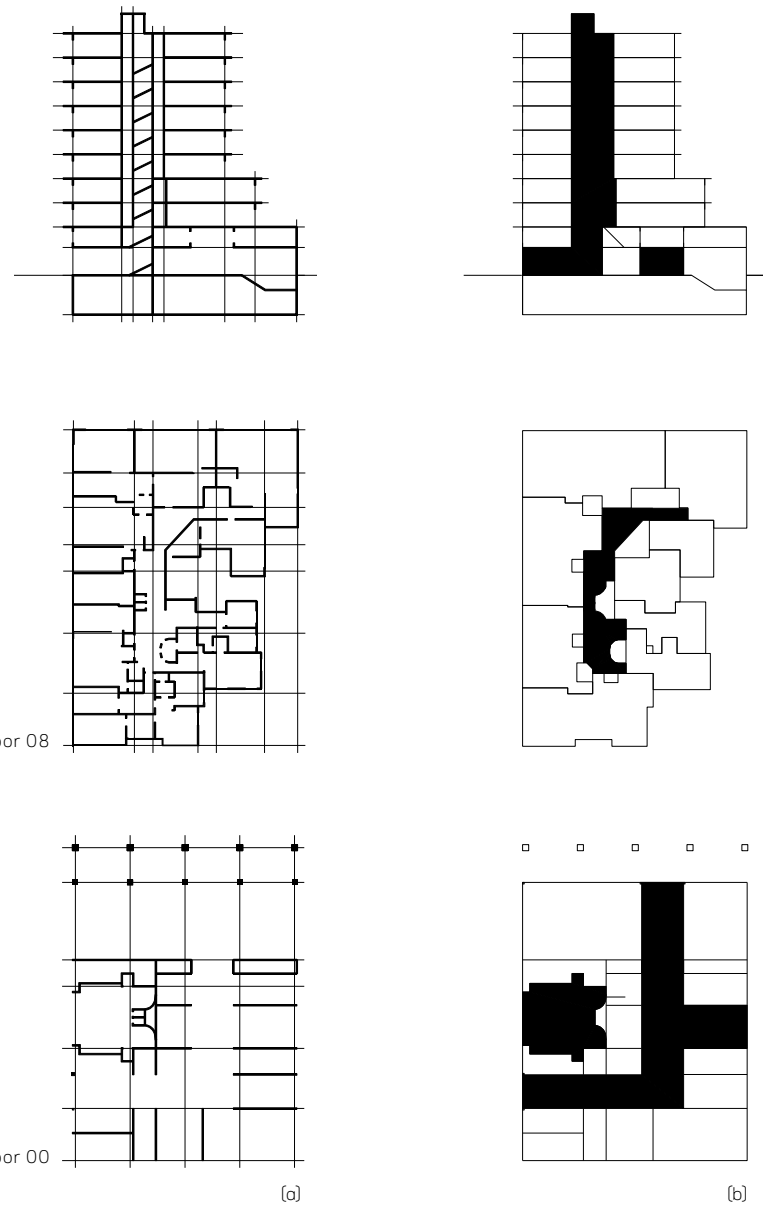
8th floor, [1/500]

Description The massive size block of this polykatoikia is exceptionally big for the urban formation in Athens. Situated along a main street of the city centre which connects the north to Omonia Square, it faces the University of Athens.

The building is divided into a commercial part on and under the ground level and a housing part on the upper floors. The façade is comprised of small windows like holes and single balconies on a background coloured light blue.

On the ground floor, the pedestrian sidewalk is extended through the building into a peristyle (in Greek Stournari) and used as a stoa, whereas entrances on all sides of the building allow the circulation flow of pedestrians and inhabitants to its inner part.

Among the shops with their goods and clients, there are two entrances. One leads to the theatre in the basement and the other to the social housing on the first and second floor. By passing first the porter in the porch, two staircases and two elevators provide vertical access to the upper floors. The corridors towards Patison Street are less spacious than the ones towards Stournari Street. The two corridors are linked by an iron bridge in the light well in the centre of the building. Two further elevators are located here. The flats or offices vary in size. The interior was designed in the 1950s and the majority of inhabitants has been living here since then.



schematic plans of construction (a) and public/private (b), [1/1000] [plan 03]

5.1.2 Spatial Configuration Analysis

J-Graph Properties

floor 03
premises 105
space steps 7
symmetric 81%
non-distributed 96%

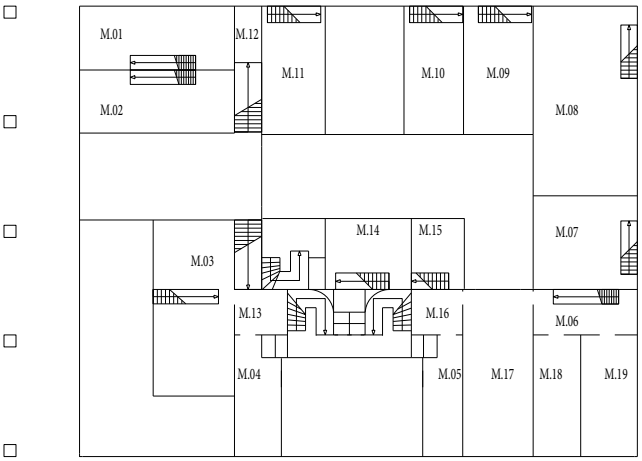
floor 02
premises 58
space steps 5
symmetric 69%
non-distributed 86%

floor 01
premises 55
space steps 4
symmetric 67%
non-distributed 91%

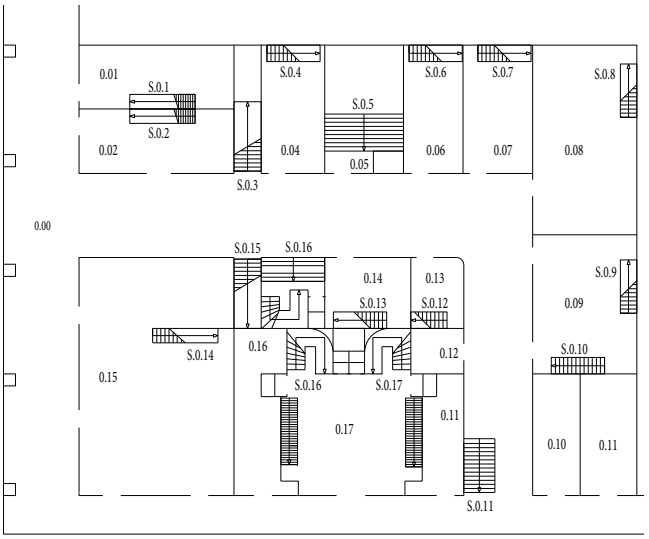
floor 1/2
premises 19
space steps 3
symmetric 23%
non-distributed 100%

floor 00
premises 35
space steps 2
symmetric 65%
non-distributed 100%

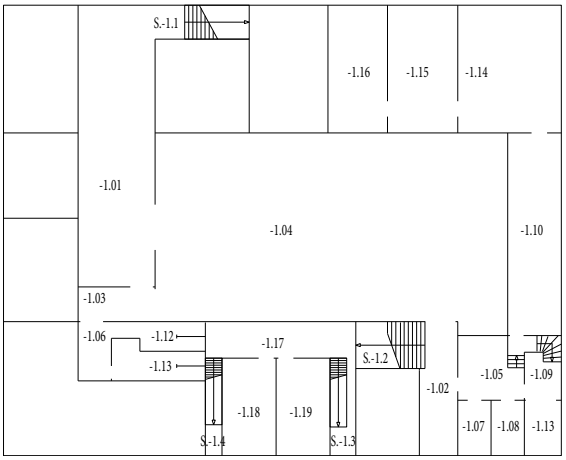
floor -01
premises 29
space steps 7
symmetric 62%
non-distributed 79%



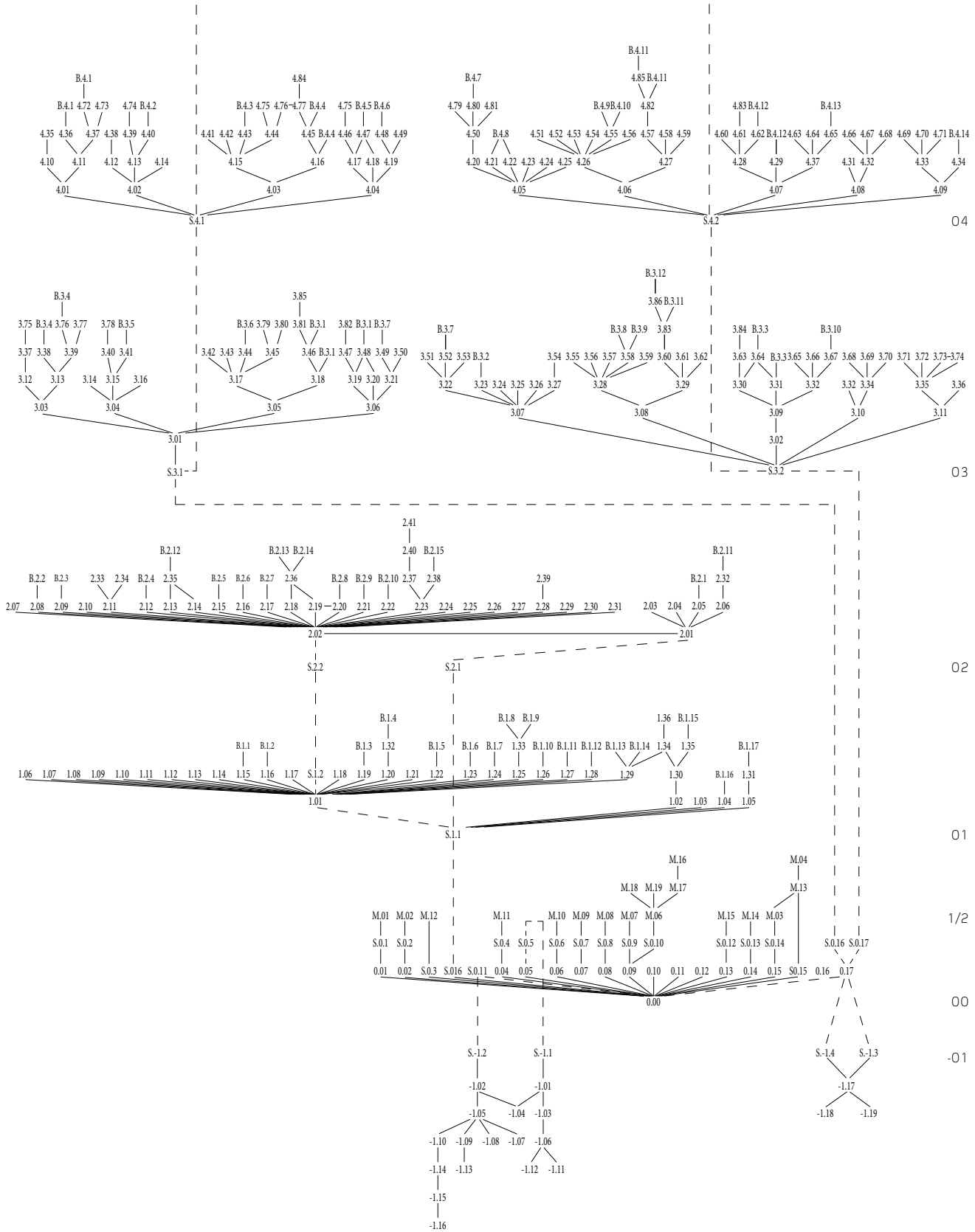
floor 1/2, [1/500]



floor 00, [1/500]



floor -01 [1/500]



J-Graph C01, floor -01 - 04 [figure 11]

J-Graph Properties

floor 09
premises 8
space steps 1
symmetric 100%
non-distributed 100%

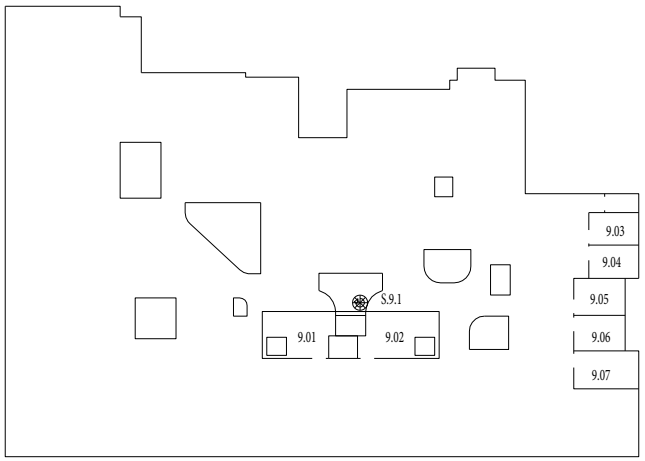
floor 08
premises 122
space steps 6
symmetric 84%
non-distributed 93%

floor 07
premises 104
space steps 6
symmetric 83%
non-distributed 96%

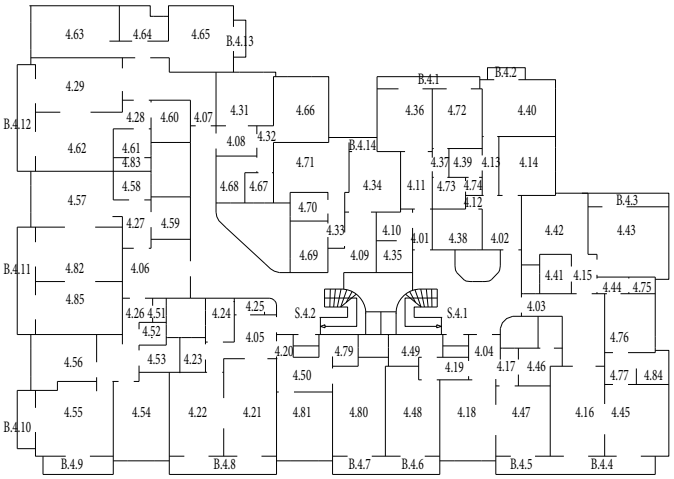
floor 06
premises 104
space steps 6
symmetric 83%
non-distributed 96%

floor 05
premises 104
space steps 6
symmetric 83%
non-distributed 96%

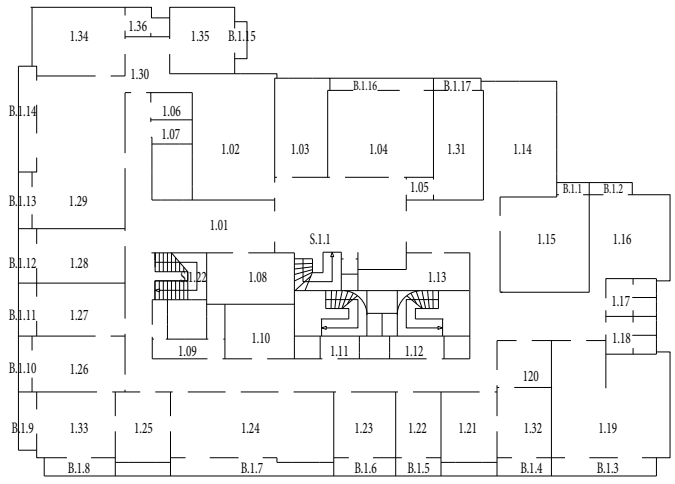
floor 04
premises 104
space steps 6
symmetric 83%
non-distributed 96%



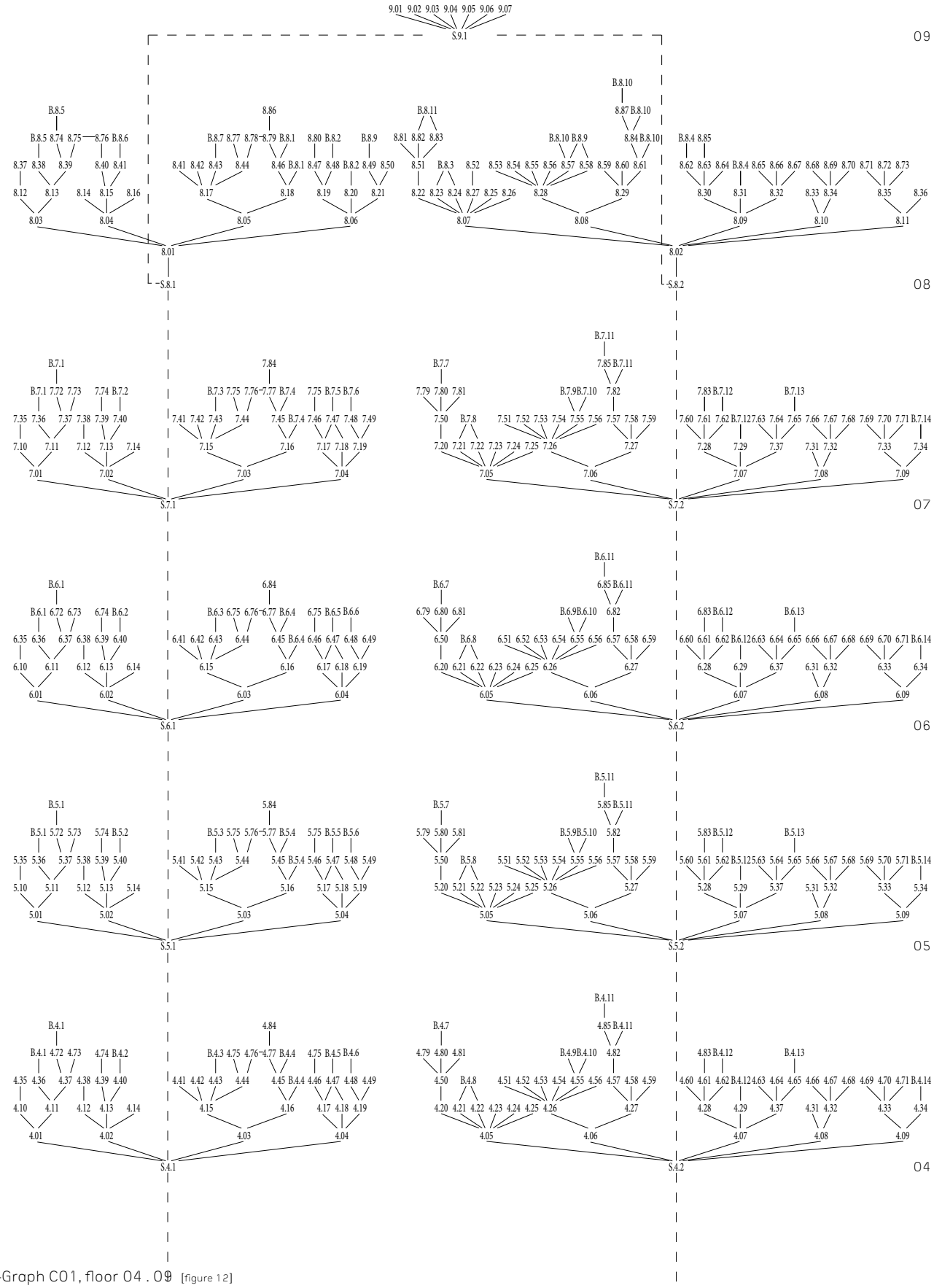
floor 09, [1/500]



floor 03 - 08, [1/500]

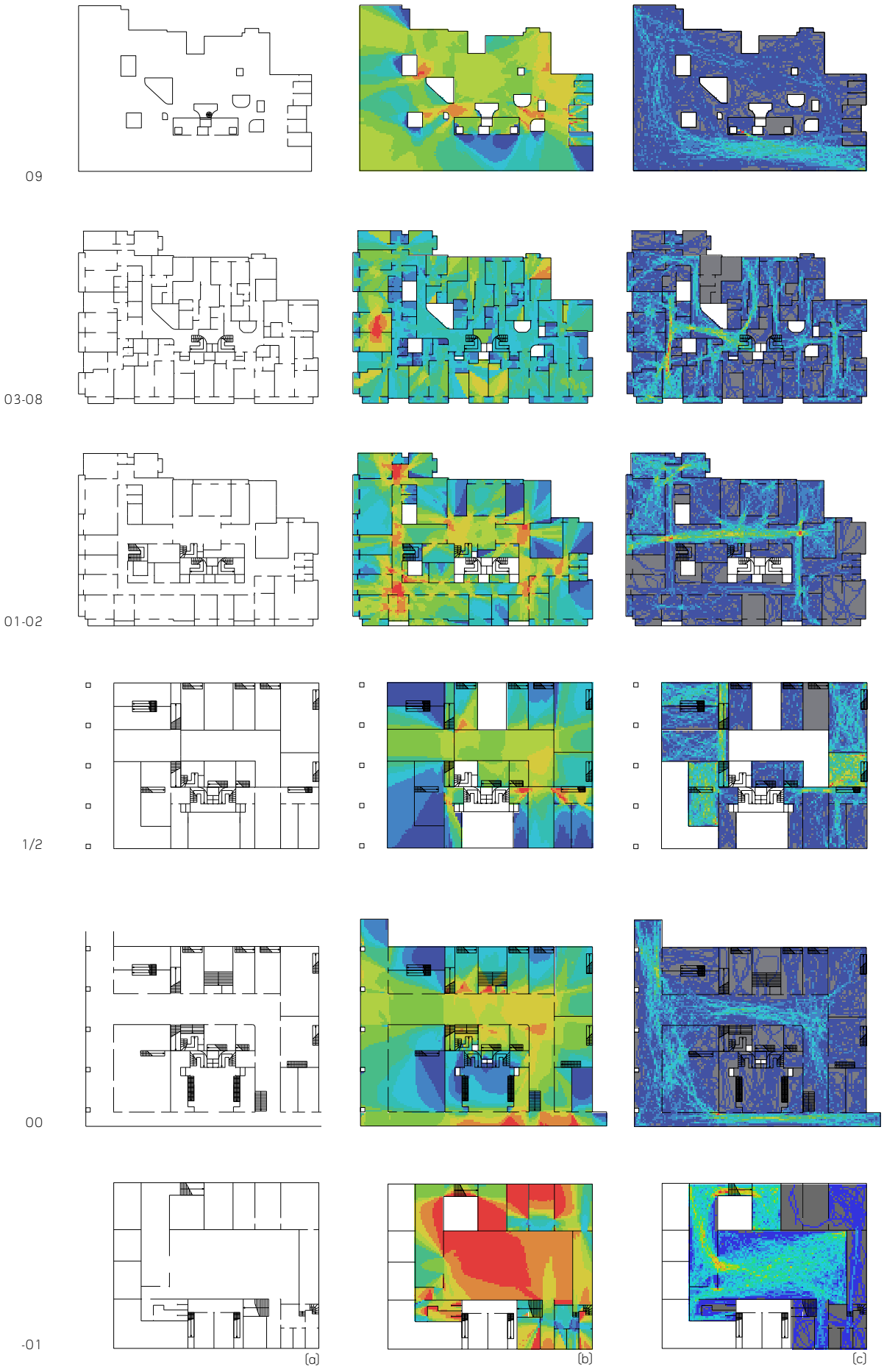


floor 01 - 02, [1/500]



J-Graph C01, floor 04 . 09 [figure 12]

5.1.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 13]

Clustering Coefficient

floor 09
min 0.3793
average 0.6770
max

floor 03-08
min 0.3063
average 0.7024
max 1

floor 01-02
min 0.3100
average 0.6820
max 1

floor 1/2
min 0.3872
average 0.9339
max 1

floor 00
min 0.371172
average 0.710139
max 1

floor -01
min 0.3527
average 0.8320
max 1

Agents Counts

floor 09
min 1
average 4.05824
max 47

floor 03-08
min 1
average 4.80481
max 47

floor 01-02
min 1
average 4.1773
max 34

floor 1/2
min 1
average 5.0195
max 24

floor 00
min 1
average 3.3226
max 27

floor -01
min 1
average 7.0974
max 39

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.1.4 Adaptation Analysis

Utilities

floor -01
1 theater

floor 00
6 shops
3 bistros
1 office
entrances to theatre
entrance to social housing

floor 1/2
1 gallery for each shop

floor 01
social housing

floor 02
social housing

floor 03
1 flat
1 office
2 lawyer's office
2 medical practices
1 dentist's practice
1 group therapy cente
1 unknown

floor 04
4 flats
2 lawyer's offices
2 offices
1 publisher's office

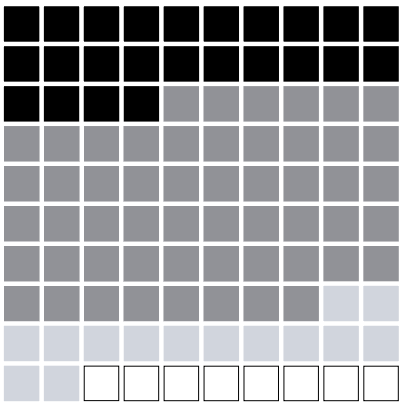
floor 05
6 flats
1 office
1 lawyer's office
1 unknown

floor 06
2 flats
3 lawyer's offices
1 insurance company
1 business centre
1 medical pratice
1 psychologist pratice

floor 07
5 flats
3 lawyer's office
2 doctor's pratice

floor 08
9 flats

Domain Areas [table 08]



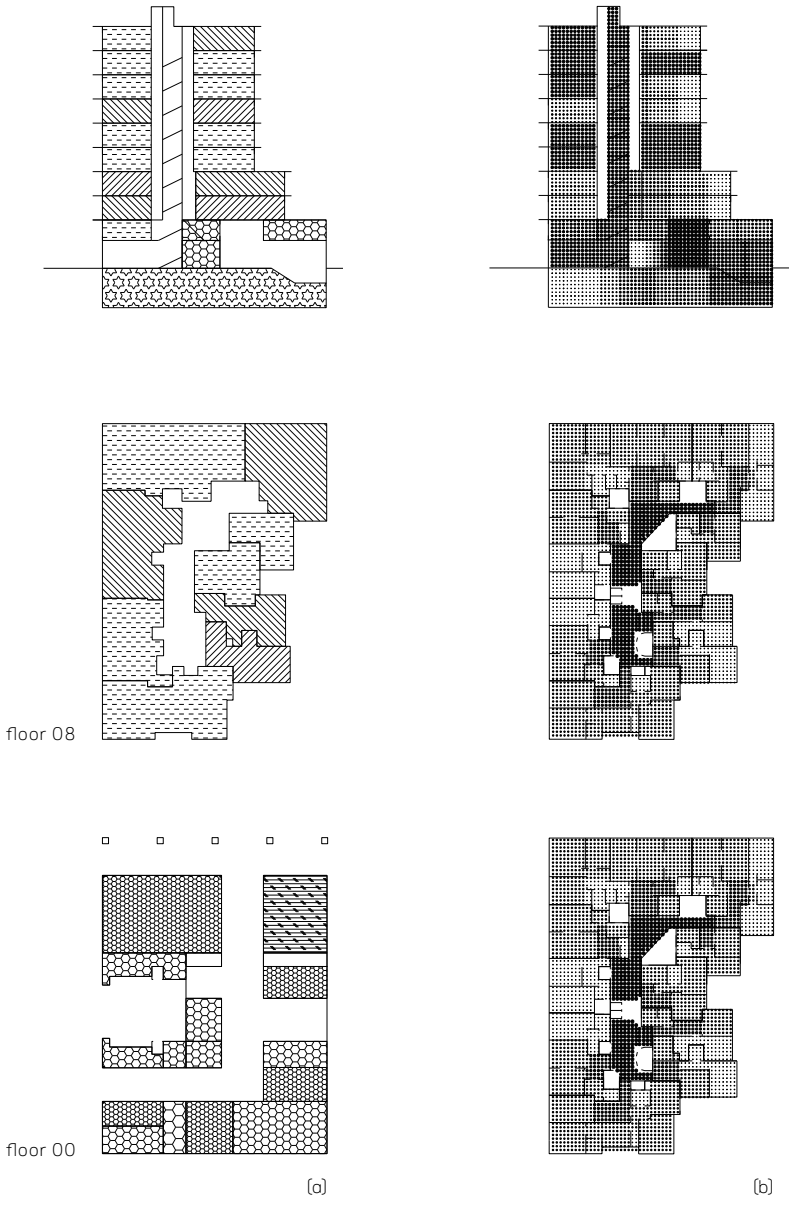
circulation 4145.50m²

private 9081m²

public 2416.10m²

semi-public 1271.30m²

total 16913.90 m²



schematic plans utilities (a), public/private (b), [1/1000] [plan 04]

balcony

back facade

back facade

upper floor utility

upper floor utility

upper floor utility

ground floor utility

ground floor utility

ground floor utility

stoa

gallery

gallery / entrance to 1st and 2nd floor

corridor and access to light well

door of flat

light well distribution

porch

straircase and elevator

porter

nameplate

entrance

entrance

gallery utility

entrance theater

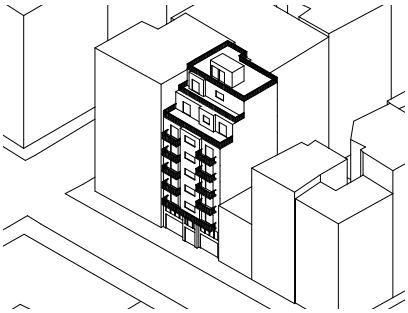
theater

95

5.2 Kaningos

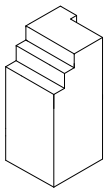
centre, Exharia

siteplan, [1/2000]



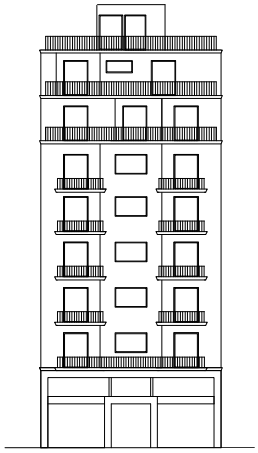
5.2.1 Data Analysis

C 02

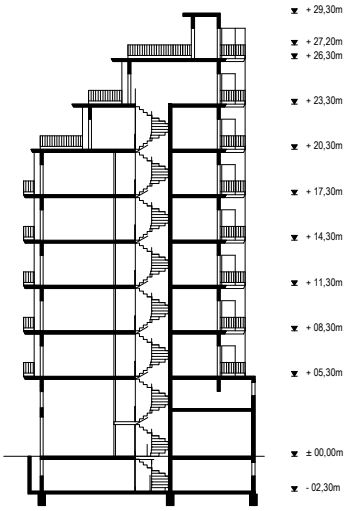


Kaningos

Location Kaningos 28
Area Exharia
Year 1959
Type urban infill



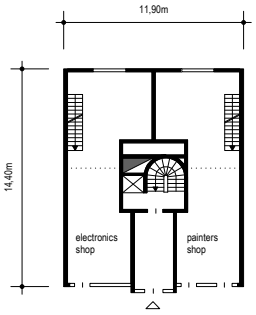
elevation, [1/500]



section, [1/500]

Plot Area 184m²
Site Occupancy Index 0,93
Floor-Space Index 6,6
Built Up Area 171m²
Gross Area 1204m²

Number Of Floors 8
Dimension 11,90m x 14,40m x 26,30m
Height Of Ground Floor 5,30m

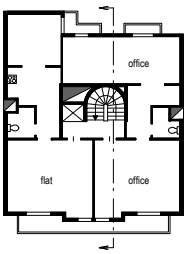


ground floor, [1/500]
2 shops [104m²]

Units On Each Floor 2
Façade Above Ground 697m²
Total Window Area 226m²
Flats Total 2
Offices Total 5
Shops Total 2
Extra Acoustic Company

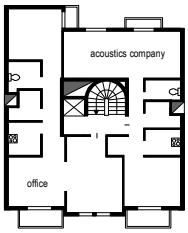

TASCAM
B&W
McIntosh
JBL
Source Tech
Stanton
ADCOM
Hi-Fi
POWER
power
PITTSBURGH
PITTSBURGH PAINTS
Voice of Co
Α. ΠΟΓΚΟΝΣ

1 flat [56m2]
1 office [63m2]



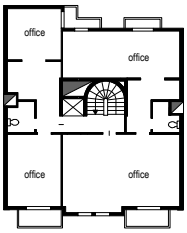
1st floor, [1/500]

1 flat [65m2]
1 company [73m2]



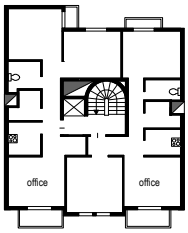
5th floor, [1/500]

2 offices [44-74m2]



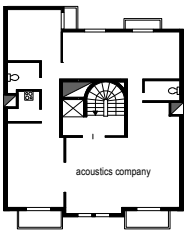
2nd floor, [1/500]

2 office [58-59m2]



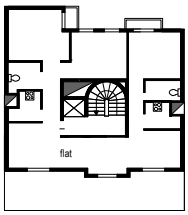
6th floor, [1/500]

1 company [118m2]



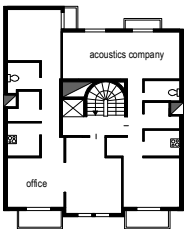
3rd floor, [1/500]

1 flat [88m2]



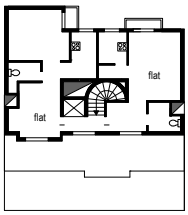
7th floor, [1/500]

1 flat [65m2]
1 company [73m2]



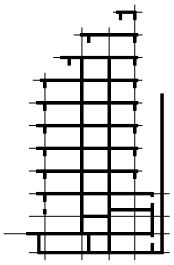
4th floor, [1/500]

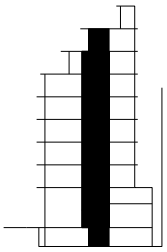
2 flats [31-35m2]

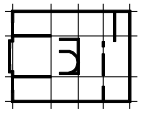


8th floor, [1/500]

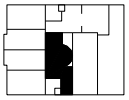
Description The building is located north of Omonia Square, next to the Polytechnics School. Like a typewriter, its last two storeys are stepped back. The facade, which is in a poor condition, is typical for the late 1950s. Balconies indicate that the original use of the building was housing. From the 80s on most of the space has been used for office purposes. Just four of the original 10 apartments remained.
15 years ago the electronics shop succeeded a clothing shop in the ground floor . The whole interior was renewed. The gallery of the shop was modified into a storage room and an office. The office on the second floor is owned by a lawyer for the last 17 years a lawyer. Before this time an apartment and a dentist were renting thi space. The lawyer did not change anything in the structure of this floor. The lawyer , as he was asked about any need to be changed, that he would like to paint the facade. The next-door office is as well a lawyer's office.
In the fourth floor an apartment was changed into an office space by knocking down a wall. A smaller office is used as an extension in the second floor. The user, a member of the parliament, is like all the other inhabitants of the owner of the used space. Just the shops in the ground floor are rented. Two apartments were combined to one unit 20 years ago for the company Siemens. The company has a further office in the upper floor. The inner organization of the floors was changed completely. Almost all walls were removed and replaced by glass curtains. In the close future they want to open the ceiling in order to connect both parts of the company by an inner staircase.

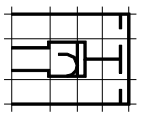




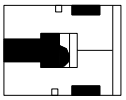


floor 04





floor 00



(a)

(b)

schematic plans of construction (a) and public/private (b), [1/1000] [plan 05]

5.2.2 Spatial Configuration Analysis

J-Graph Properties 4.10

floor 08
premises 2
space steps 1
symmetric 100%
non-distributed 100%

floor 07
premises 15
space steps 4
symmetric 86%
non-distributed 100%

floor 06
premises 13
space steps 4
symmetric 83%
non-distributed 100%

floor 05
premises 19
space steps 3
symmetric 78%
non-distributed 100%

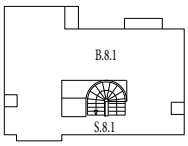
floor 04
premises 19
space steps 5
symmetric 88%
non-distributed 100%

floor 03
premises 14
space steps 5
symmetric 83%
non-distributed 57%

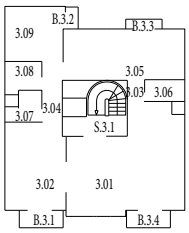
floor 02
premises 13
space steps 4
symmetric 82%
non-distributed 100%

floor 01
premises 13
space steps 4
symmetric 83%
non-distributed 100%

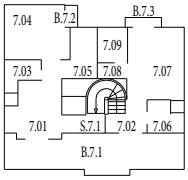
floor 00
premises 5
space steps 1
symmetric 100%
non-distributed 100%



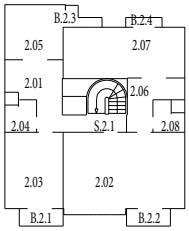
floor 08, [1/500]



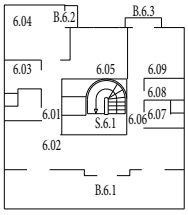
floor 03, [1/500]



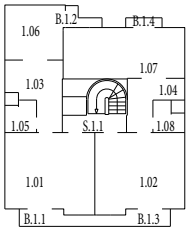
floor 07, [1/500]



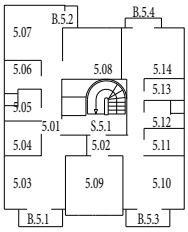
floor 02, [1/500]



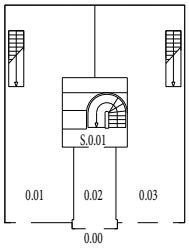
floor 06, [1/500]



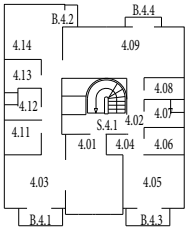
floor 01, [1/500]



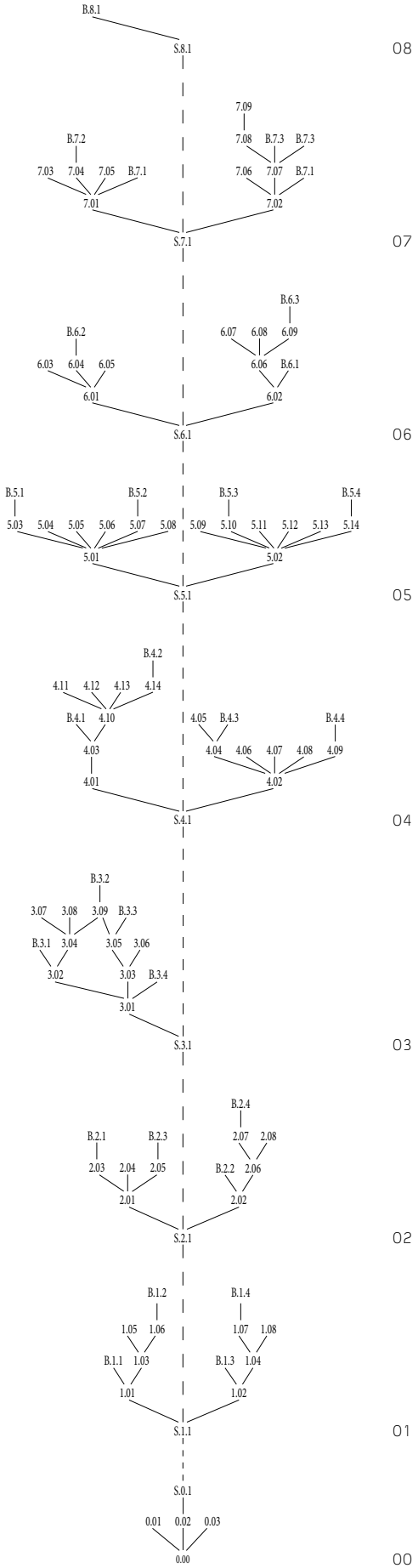
floor 05, [1/500]



floor 00, [1/500]

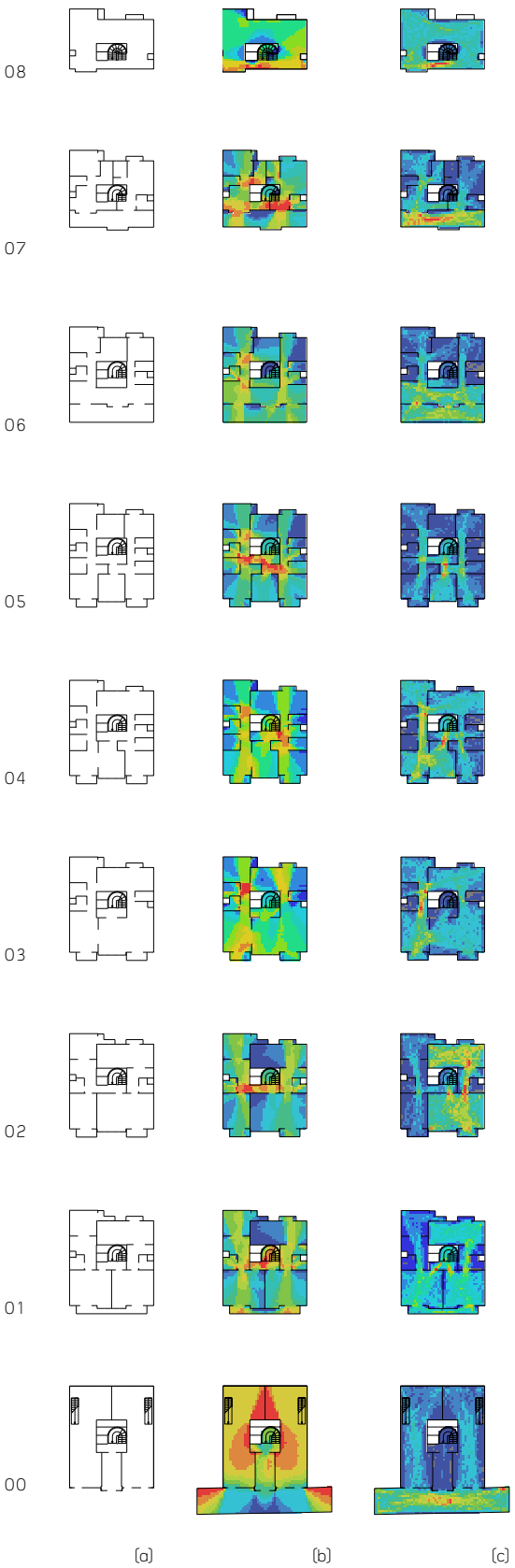


floor 04, [1/500]



J-Graph C02 [figure 14]

5.2.3 Visibility Graph Analysis



schematics plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 15]

Clustering Coefficient

floor 08
min 0.575422
average 0.791473
max 1

floor 07
min 0.430194
average 0.722035
max 1

floor 06
min 0.341984
average 0.729577
max 1

floor 05
min 0.357759
average 0.740584
max 0.990068

floor 04
min 0.362458
average 0.730608
max 0.994157

floor 03
min 0.435005
average 0.741386
max 0.984874

floor 02
min 0.406494
average 0.768245
max 0.993355

floor 01
min 0.430315
average 0.748133
max 1

floor 00
min 0.50061
average 0.827633
max 1

Agents Counts

floor 08
min 1
average 45.4794
max 140

floor 07
min 1
average 36.7392
max 134

floor 06
min 1
average 24.8644
max 93

floor 05
min 1
average 27.5111
max 162

floor 04
min 1
average 27.8719
max 105

floor 03
min 1
average 26.488
max 109

floor 02
min 1
average 24.4573
max 77

floor 01
min 1
average 93.1631
max 332

floor 00
min 1
average 20.9526
max 88

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.2.4 Adaptation Analysis

Utilities

floor 00
1 electrical equipement shop
1 colour shop

floor 01
1 flat
1 lawyer's office

floor 02
2 lawyer's offices

floor 03
1 acoustic company

floor 04
1 office
1 acoustic company

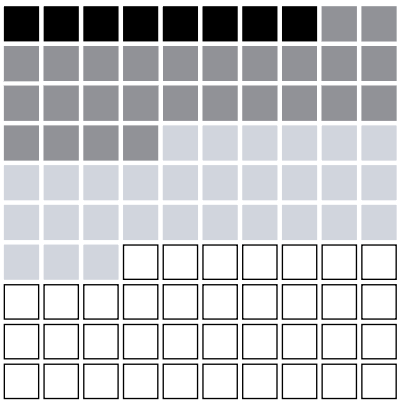
floor 05
1 office
1 acoustic company

floor 06
1 office
1 lawyer's office

floor 07
1 flat

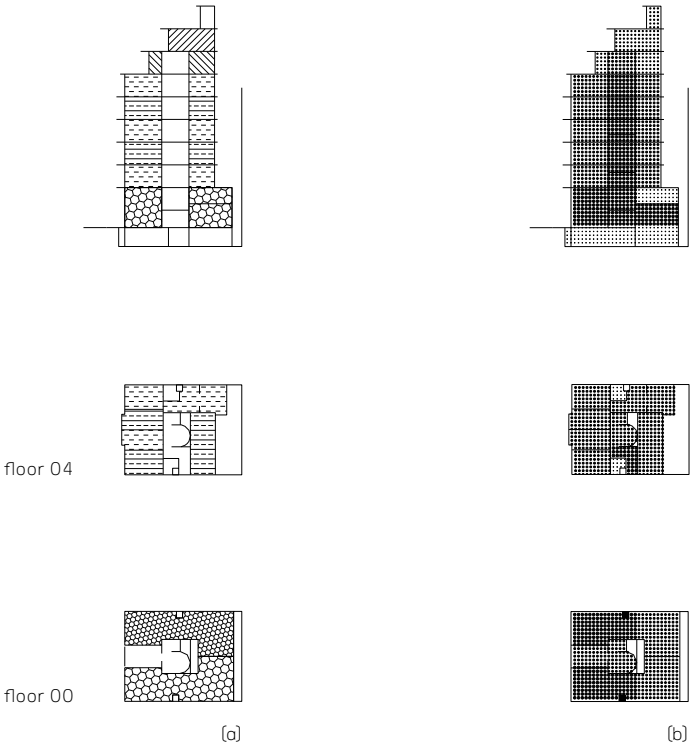
floor 08
2 flats

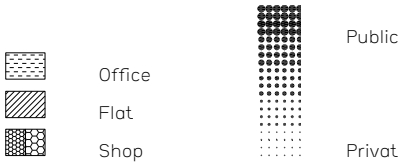
Domain Areas [table 09]



circulation 102m²
private 333m²
public 366m²
semi-public 454m²

total 1255 m²





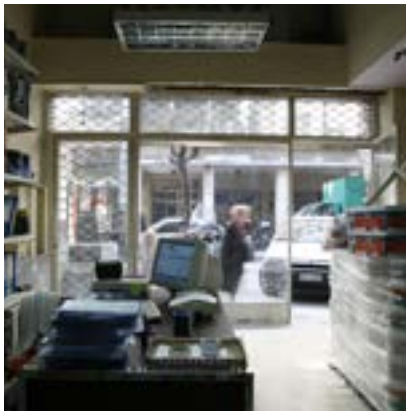
schematic plans utilities (a), public/private (b), [1/1000] [plan 06]

balcony

advertisement sign

upper floor utility

upper floor utility



ground floor utility

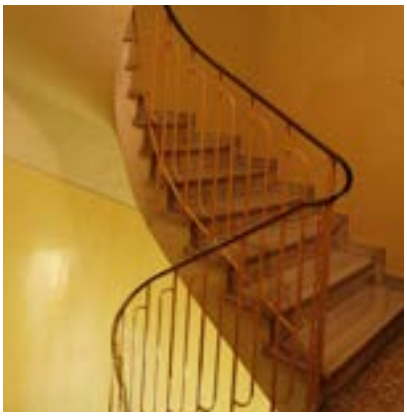
ground floor utility

ground floor

ground floor

ground floor

door of flat



straircase

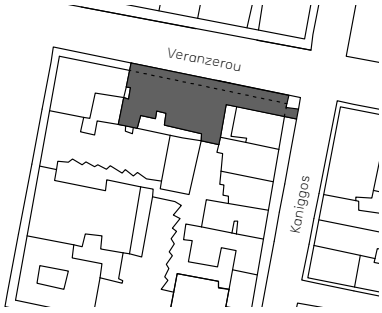
nameplate

entrance

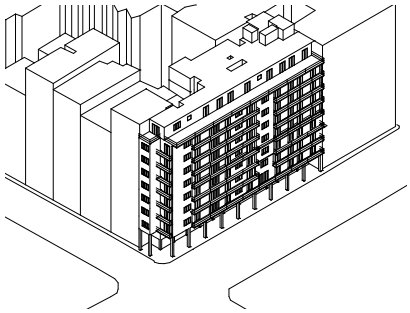
straircase and elevator

5.3 Veranzerou

centre, Exharia

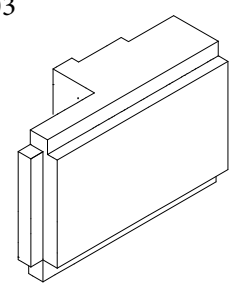


siteplan, [1/2000]



5.3.1 Data Analysis

C 03



Veranzerou

Location Veranzerou 13

Area Exharia

Year 1960

Type corner buidling

elevation, [1/500]

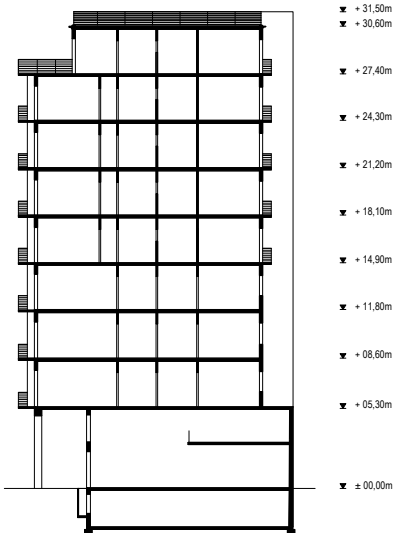
Plot Area 546m²

Site Occupancy Index 0,96

Floor-Space Index 9,1

Built Up Area 527m²

Gross Area 4990m²



section, [1/500]

Number Of Floors 9

Dimension 46m x 16,60m/6,70m x 30,60m

Height Of Ground Floor 5,30m

Units On Each Floor 1-16

Façade Above Ground 1526m²

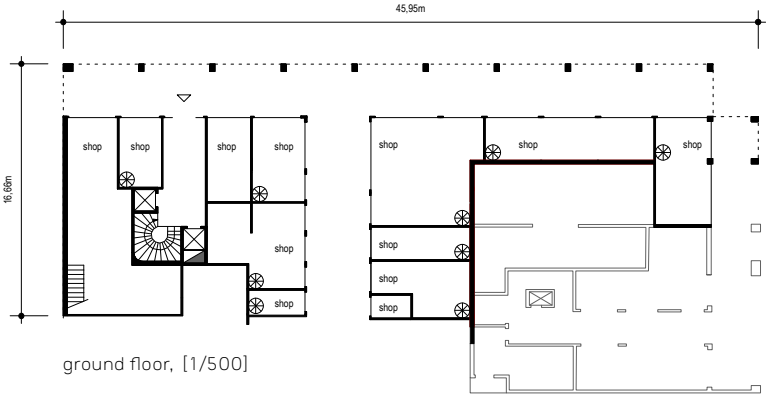
Total Window Area 510m²

Flats Total -

Offices Total 74

Shops Total 12

Extra 1 school, 1 taverna (semi-floor)



ground floor, [1/500]

12 shops [4-59m2]

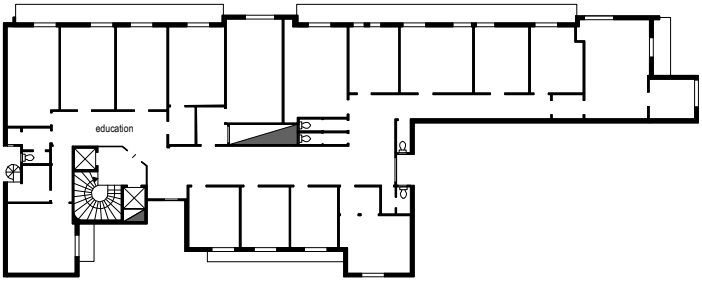
1st, 6th, 7th floor, [1/500]

16 offices [15 to 44m2]

2nd floor, [1/500]

11 offices [14 to 138m2]

1 school [140-283m2]

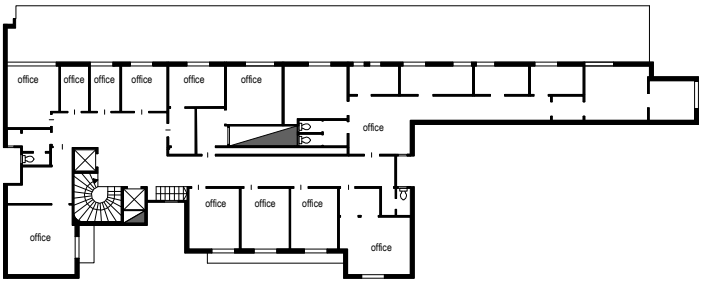


3rd, 4th floor, [1/500]

1school [21 to 23 m2]
9 offices [17 to 43 m2]

5th floor, [1/500]

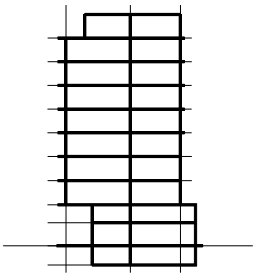
12 office [6 to 151m2]

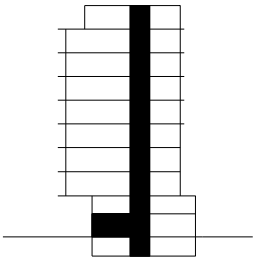


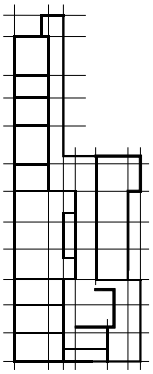
8th floor, [1/500]

Description This L-shaped, sliced building is one of the biggest polykatoikias of Athens and is facing a busy square in the centre of Athens. It is part of a commercialized block consisting of several polykatoikias. A stoa, in front of the shops in the ground floor, is extended through the building into a peristyle. This inner shopping street connects all buildings of this block on ground floor level. A staircase in the centre of the block is taking one down to further shops in the basement. The stores, originally planned as equally sized units, are frequently united to bigger continous sales areas. The goods are displayed along the stoa and the peristyle. The entrance towards the offices and school on the upper floors is situated between the shops along the stoa. A staircase and two elevators are taking, having passed a porter, the visitors to the upper floors. The polykatoikia is today entirely used by offices and education centres, even it was original applied for apartments. The balconies are still remains of this planning phase. Above the entrance, in the semi-floor, a taverna is offering food and drinks for all the inhabitants. Chairs and tables are placed along the staircase.

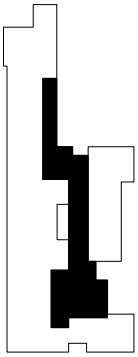
The first and top floors are similar in their organization. Single rooms are used for offices. In the third and fourth floor is a language school located. The inner organisation is entirely different to the rest of the building. Seats, copy-machines and gargoyles are placed in all the corridors of this case. The staircase is open towards the corridors and well illuminated by daylight. The space on the roof is not used, even so there is a public toilet situated next to the elevator shaft.

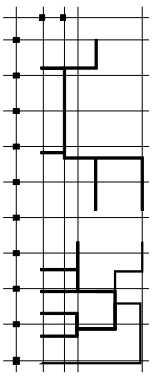






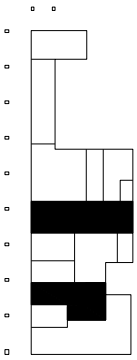
floor 03





floor 00

(a)



(b)

schematic plans of construction (a) and public/private (b), [1/1000] [plan 07]

5.3.2 Spatial Configuration Analysis

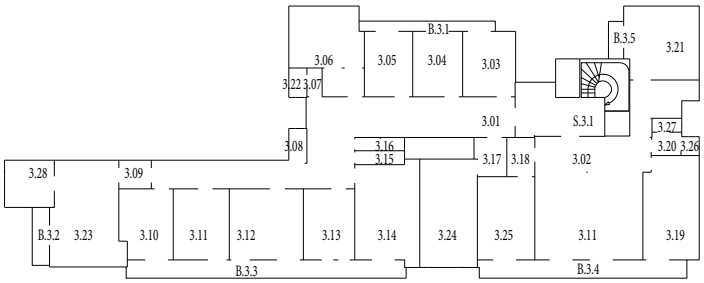
J-Graph Properties

floor 03
premises 35
space steps 4
symmetric 84%
non-distributed 58%

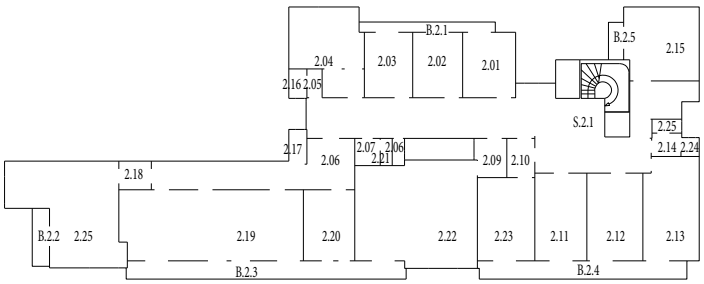
floor 02
premises 31
space steps 3
symmetric 84%
non-distributed 42%

floor 01
premises 29
space steps 3
symmetric 79%
non-distributed 55%

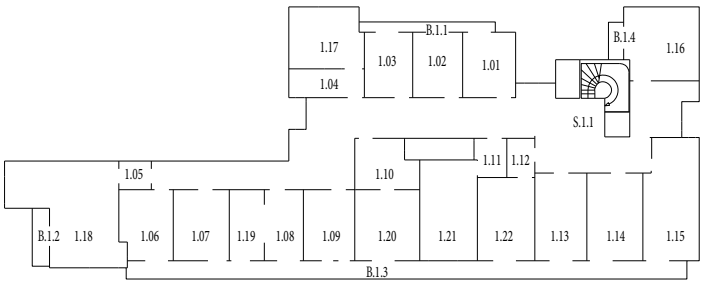
floor 00
premises 15
space steps 2
symmetric 93%
non-distributed 100%



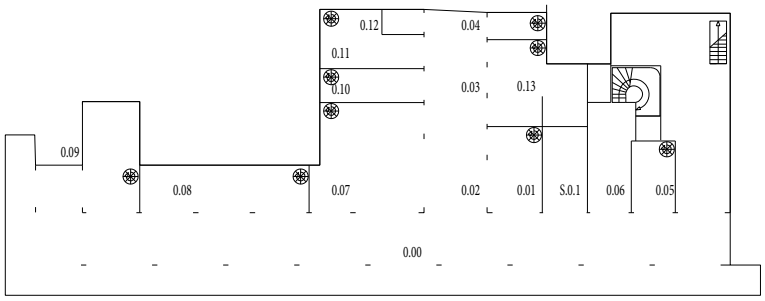
floor 03, [1/500]



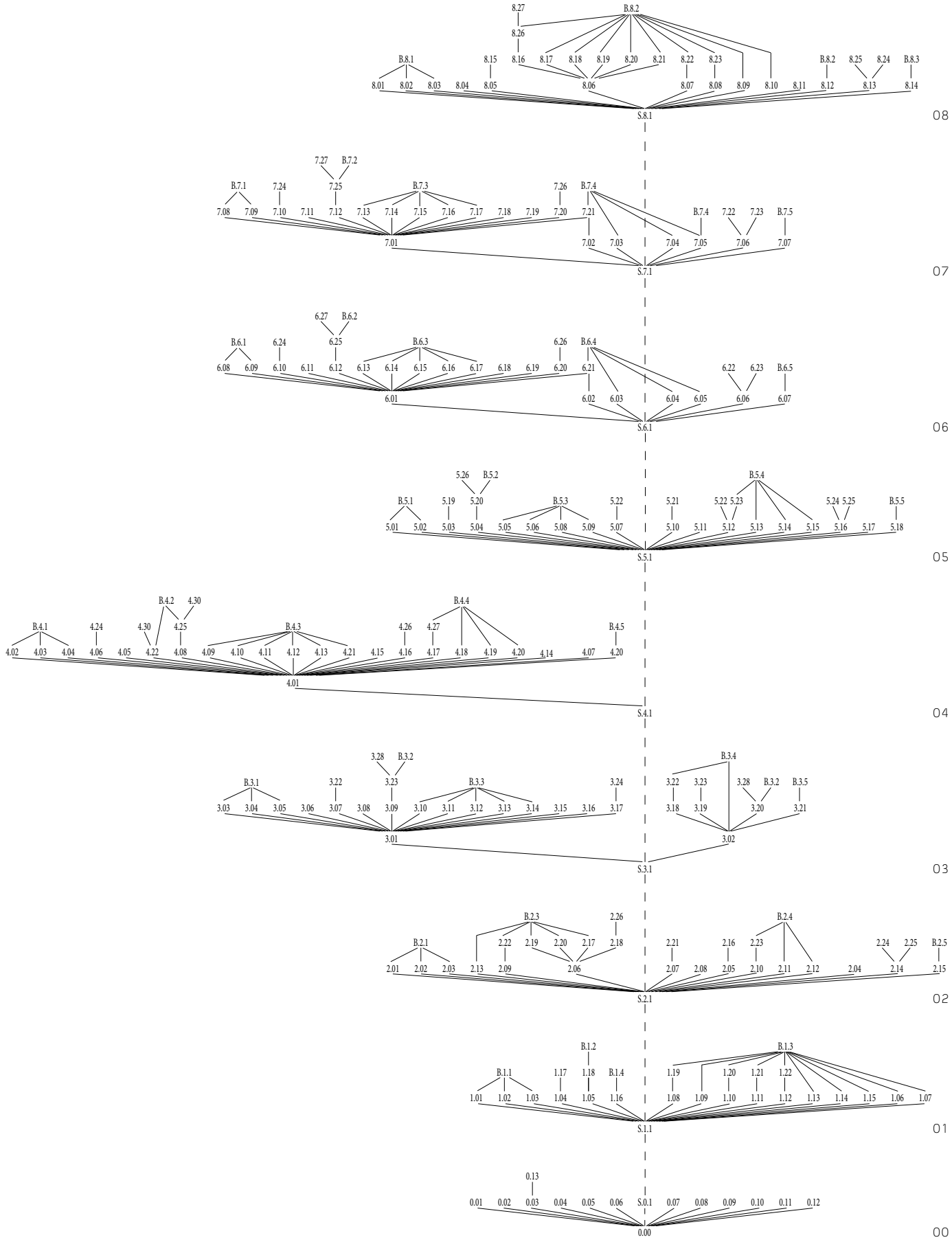
floor 02, [1/500]



floor 01, [1/500]



floor 00, [1/500]



J-Graph C03 [figure 16]

J-Graph Properties

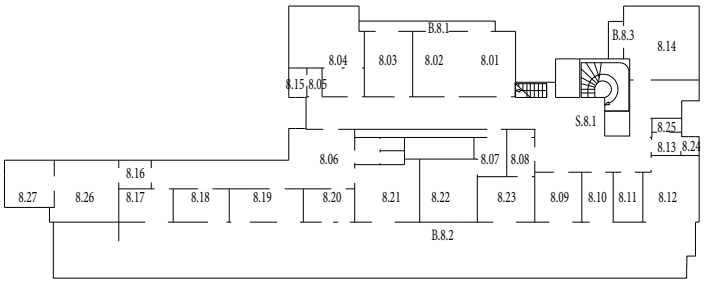
floor 08
premises 31
space steps 4
symmetric 85%
non-distributed 64%

floor 07
premises 33
space steps 4
symmetric 90%
non-distributed 52%

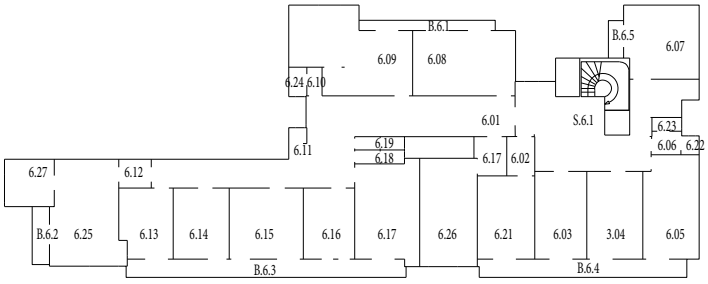
floor 06
premises 33
space steps 4
symmetric 90%
non-distributed 52%

floor 05
premises 33
space steps 3
symmetric 87%
non-distributed 45%

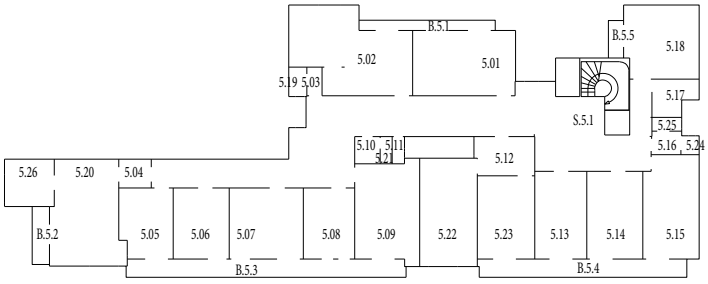
floor 04
premises 40
space steps 4
symmetric 75%
non-distributed 62%



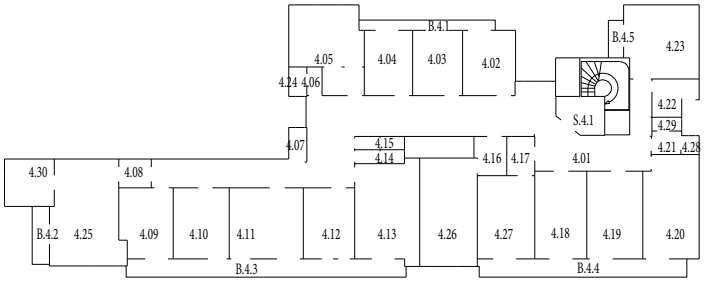
floor 08, [1/500]



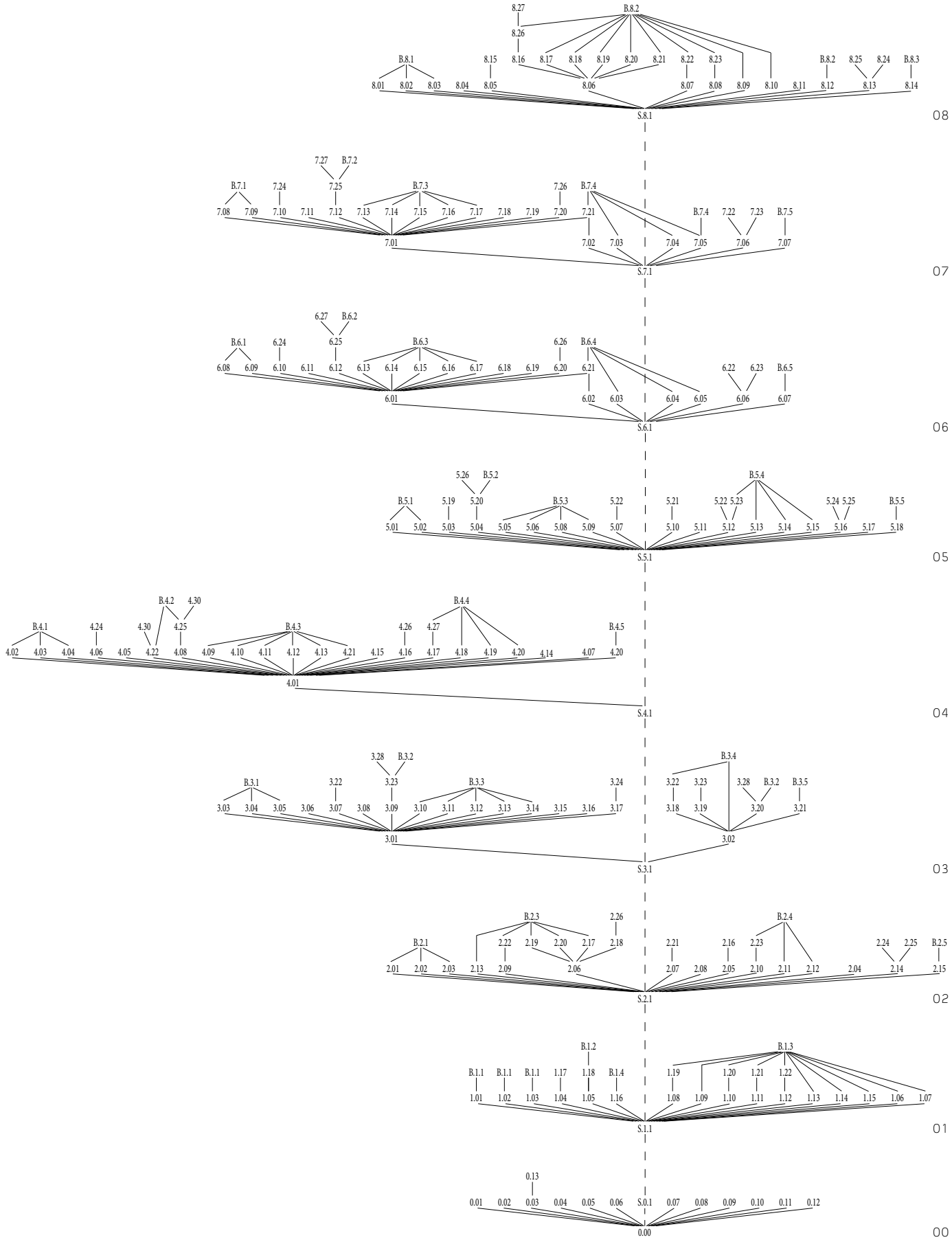
floor 06 - 07, [1/500]



floor 05, [1/500]

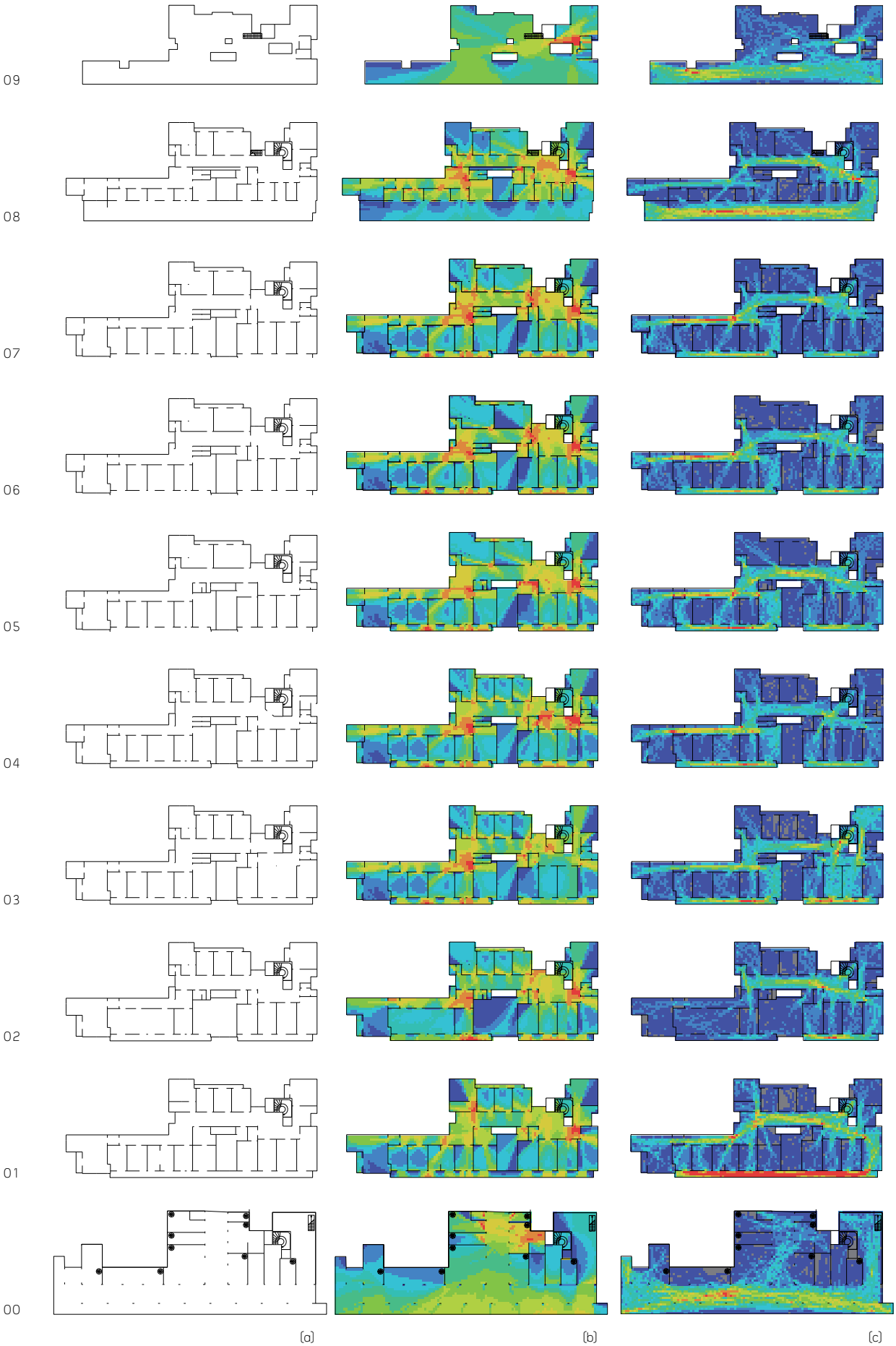


floor 04, [1/500]



J-Graph C03 [figure 16]

5.3.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [fgure 17]

Clustering Coefficient

floor 09
min 0.423777
average 0.747304
max 1

floor 08
min 0.327279
average 0.719328
max 1

floor 07
min 0.324993
average 0.703575
max 1

floor 06
min 0.323874
average 0.71926
max 1

floor 04-05
min 0.316706
average 0.714538
max 1

floor 03
min 0.319511
average 0.726681
max 1

floor 02
min 0.323976
average 0.726344
max 1

floor 01
min 0.314301
average 0.716147
max 1

floor 00
min 0.465288
average 0.768599
max 1

Agents Counts

floor 09
min 1
average 15.1435
max 67

floor 08
min 1
average 17.0893
max 76

floor 07
min 1
average 15.4031
max 91

floor 06
min 1
average 11.2344
max 66

floor 04-05
min 1
average 12.6374
max 79

floor 03
min 1
average 14.2018
max 69

floor 02
min 1
average 10.017
max 70

floor 01
min 1
average 13.1029
max 116

floor 00
min 1
average 10.6243
max 44

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.3.4 Adaptation Analysis

Utilities

floor 00
12 shops

floor 1/2
1 taverna
1 maisonette for each shop

floor 01
8 lawyer's offices
3 medical practices
1 consultants
2 engineer
2 offices

floor 02
5 lawyer's offices
2 medical practices
1 psychologist
2 offices
1 unknown

floor 03
1 language school

floor 04
1 language school

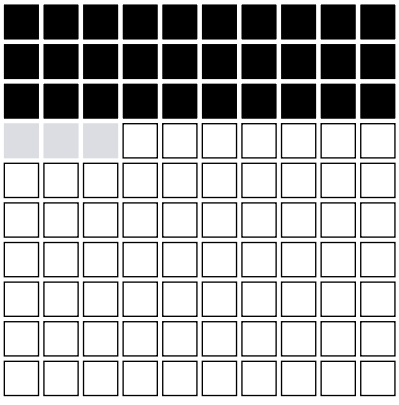
floor 05
1 computer school
5 lawyer's offices
2 medical practices
2 offices

floor 06
9 lawyer's
4 medical centres
1 real estate agency
2 offices

floor 07
6 lawyer's offices
2 medical centres
4 tax adviser's offices
4 offices

floor 08
3 lawyer's offices
5 insurance agencies
2 real estate agency
2 offices

Domain Areas [table 10]



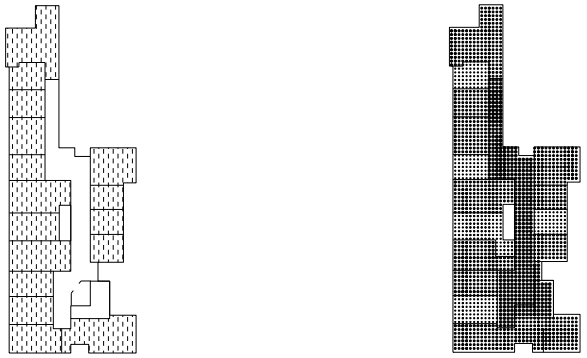
circulation 2567.9m²

private 8.60m²

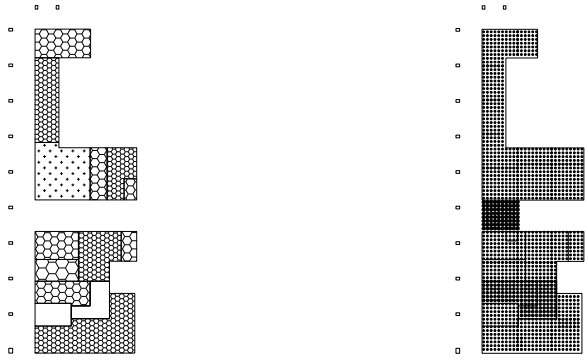
public 283m²

semi-public 5600.30m²

total 8459.80m²



floor 08



floor 00

(a) (b)

office

education

shop

public

private

schematic plans utilities (a), public/private (b), [1/1000] [plan 08]

balcony

back facade

advertisement sign

staircase utility

upper floor utility

upper floor utility

ground floor utility

ground floor utility

ground floor utility

stoa

stoa

gallery

corridor

straircase and elevator

door of flat

straircase and elevator

porter

entrance

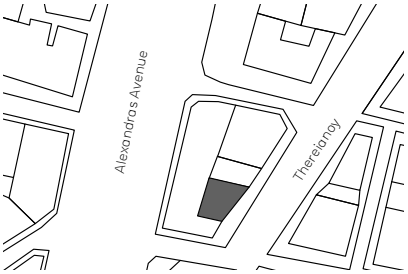
nameplate

gallery

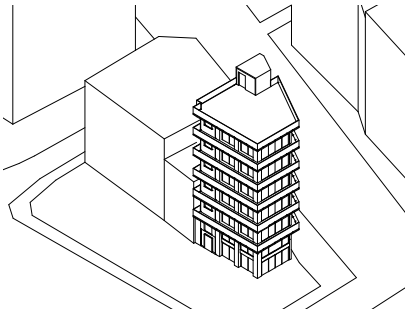
basement gallery

5.4 Alexandras

centre, Gyzi

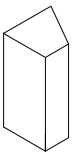


siteplan, [1/2000]



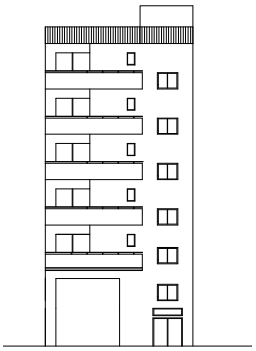
5.4.1 Data Analysis

C 04

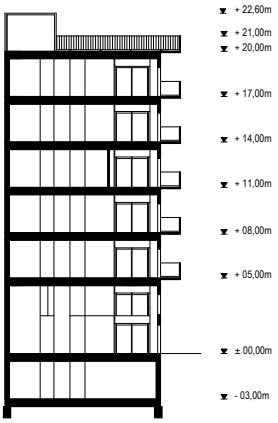


Alexandras

Location Alexandras 31 / Thereianou14
Area Gysi
Year 1982
Type corner building



elevation, [1/500]



section, [1/500]

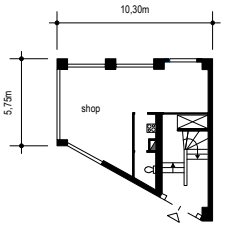
Plot Area 91m²
Site Occupancy Index 0,91
Floor-Space Index 5,6
Built Up Area 83m²
Gross Area 513m²

Number Of floors 6
Dimension 10,30m x 10,70m x 20,00 m
Height Of Ground Floor 5,00m

Units On Each Floor 1 [2 in floor 03-04]
Façade Above Ground 528m²
Total Window Area 175m²
Flats Total 3
Offices total 3
Shops total 1

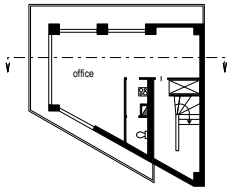

ΝΕΑ ΔΗΜΟΚΡΑΤΙΑ

1 shop [50m2]



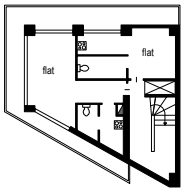
ground floor, [1/500]

1 office [65m2]

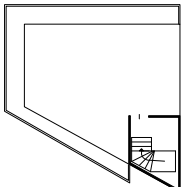


1st - 2nd and 5th floor, [1/500]

2 flats [27 - 40m^2]



3rd - 4th floor, [1/500]

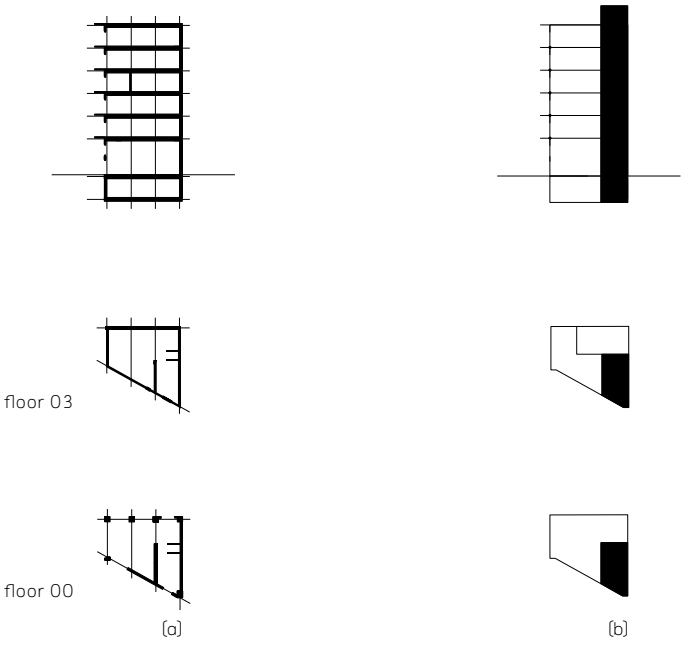


6th floor, [1/500]

Description This polykatoikia adapts precisely its plot, which is situated on an inclined plane at the front of a block. Being confronted with the traffic of a main street, which is connecting the city with the peripheries in the east, the building is by its heights and form out standing among its neighbour buildings. Like a wedge-shaped tower, simple in its structure, the polykatoikia does mark the beginning of the centre and presents with its piled up floors and lined up balconies a visible layering of different utilities.

The shop towards Alexandras Avenue has two levels and can be accessed over a expanded display area for goods from the street. The gallery serves as a storage room for tiles. The entrance for the upper floors is in the backside of the polykatoikia. A winding staircase and an elevator are leading to the floors. The staircase is well illuminated by windows. One or two doors are on each floor in a narrow corridor. The office on the first floor was for rent, while the other units are occupied. The owner of the polykatoikia is one person.

One flat is subdivided into two parts, which is inhabited by immigrants. One floor is used as an office of a government party. A civil engineer has his office on the top floor. Full-size glass fronts open the inside to the outside on each level. The advertisement signs along the balconies indicates the utilities for the by-passing cars and pedestrians.

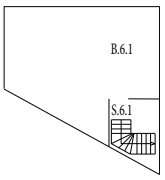


schematic plans of construction (a) and public/private (b), [1/1000] [plan 09]

5.4.2 Spatial Configuration Analysis

J-Graph Properties

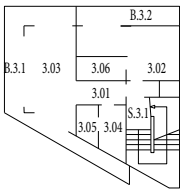
floor 06
premises 2
space steps 1
symmetric 100%
non-distributed 100%



floor 06, [1/500]

floor 05
premises 5
space steps 3
symmetric 50%
non-distributed 100%

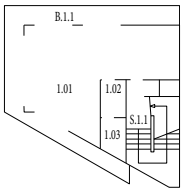
floor 04
premises 9
space steps 3
symmetric 75%
non-distributed 100%



floor 03 - 04, [1/500]

floor 03
premises 9
space steps 3
symmetric 75%
non-distributed 100%

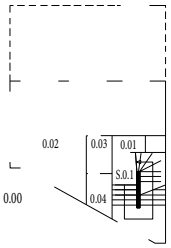
floor 02
premises 5
space steps 3
symmetric 50%
non-distributed 100%



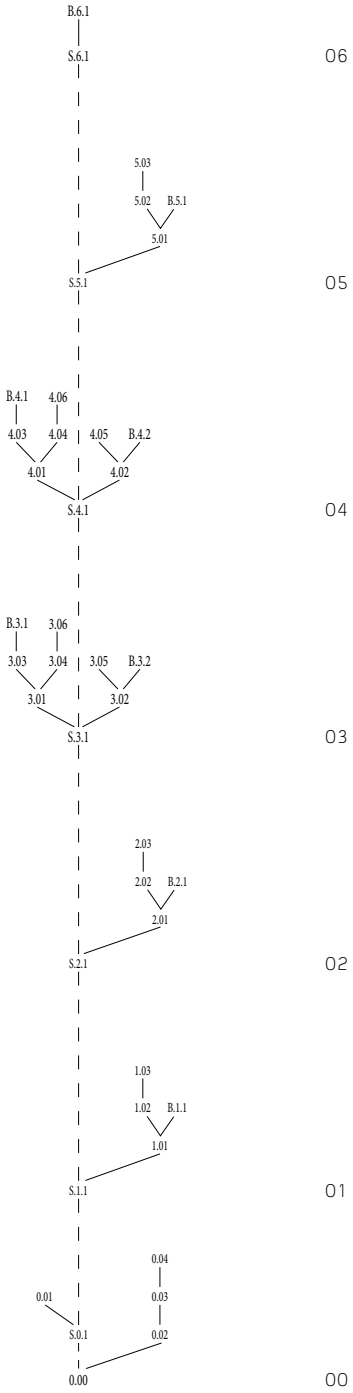
floor 01 - 02, [1/500]

floor 01
premises 5
space steps 3
symmetric 50%
non-distributed 100%

floor 00
premises 6
space steps 3
symmetric 40%
non-distributed 100%

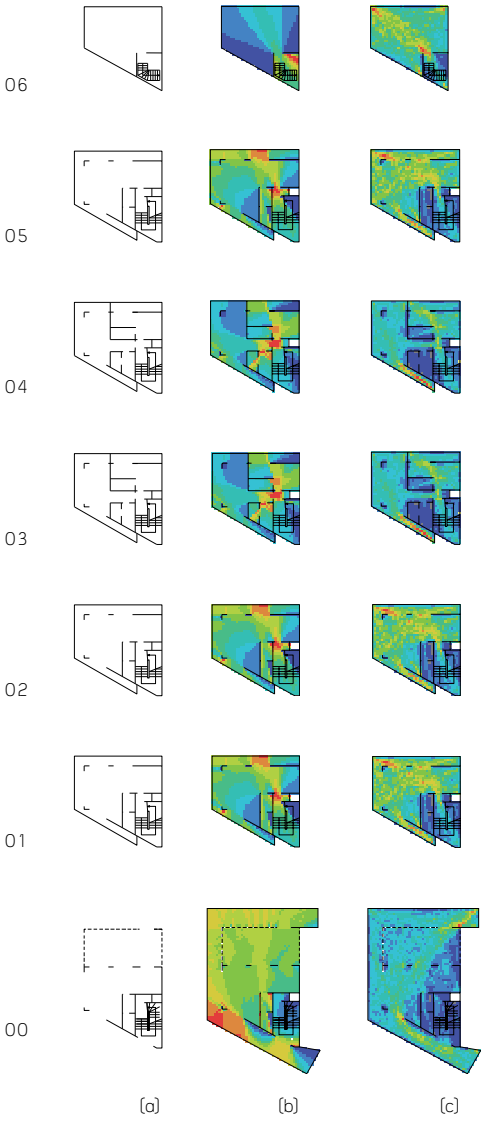


floor 00, [1/500]



J-Graph C04 [figure 18]

5.4.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 19]

Clustering Coefficient

floor 06
min 0.572656
average 0.901787
max 1

floor 05
min 0.565321
average 0.818277
max 1

floor 04
min 0.390051
average 0.789969
max 1

floor 03
min 0.390051
average 0.789969
max 1

floor 02
min 0.565321
average 0.818277
max 1

floor 01
min 0.565321
average 0.818277
max 1

floor 00
min 0.498701
average 0.720292
max 1

Agents Counts

floor 06
min 2
average 55.3685
max 130

floor 05
min 1
average 35.0944
max 88

floor 04
min 1
average 36.0339
max 134

floor 03
min 1
average 36.0339
max 134

floor 02
min 1
average 35.0944
max 88

floor 01
min 1
average 35.0944
max 88

floor 00
min 1
average 22.4665
max 85

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.4.4 Adaptation Analysis

Utilities

floor 00
1 shop

floor 01
1 office [to rent]

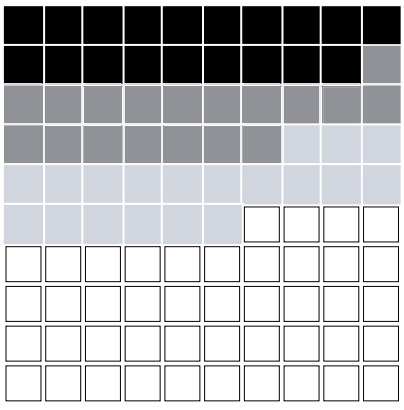
floor 02
1 office of party 'New Democracy'

floor 03
2 flats

floor 04
1 flat
1 construction company

floor 05
1 civil engineer's office
1 real estate agency

Domain Areas [table 11]



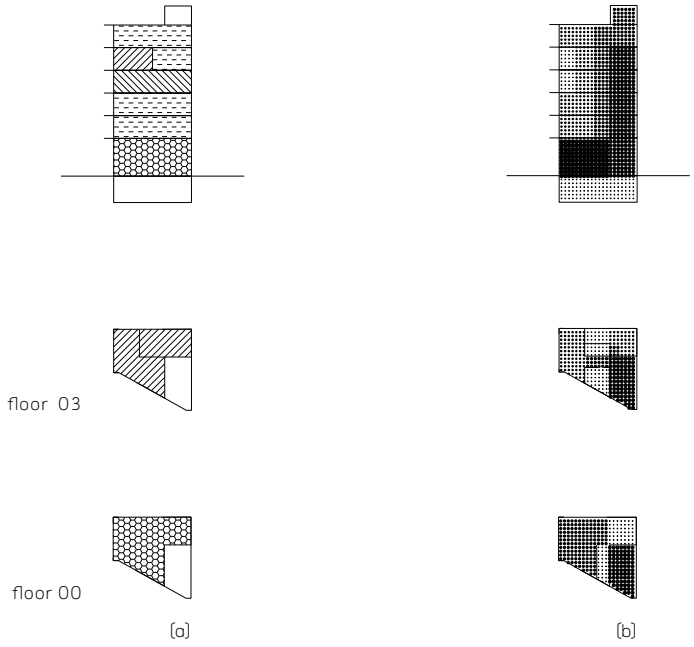
circulation 132.07m²

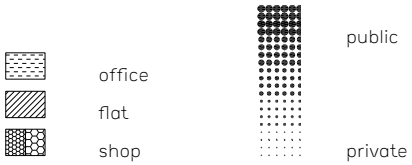
private 127.56m²

public 131.24m²

semi-public 308.33m²

total 699.20m²





schematic planss of utilities (a), public/private (b), [1/1000] [plan 10]

balcony

back facade

advertisement sign

upper floor utility

upper floor utility

upper floor utility

ground floor utility

ground floor utility

stoa

corridor

door of flat

straircase and entrance

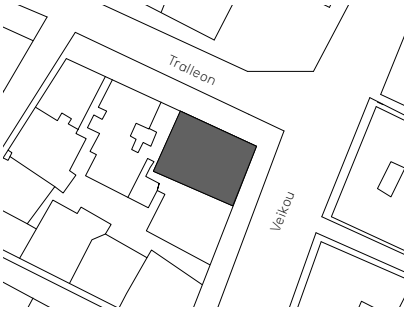
nameplate

entrance

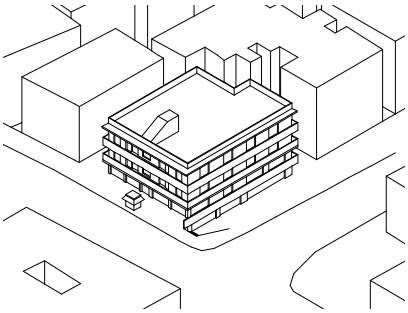
entrance

5.5 Veikou

semi periphery, Galatsi

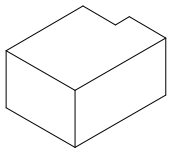


siteplan, [1/2000]



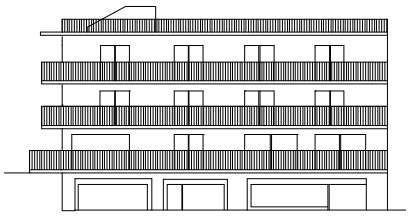
5.5.1 Data Analysis

S 05

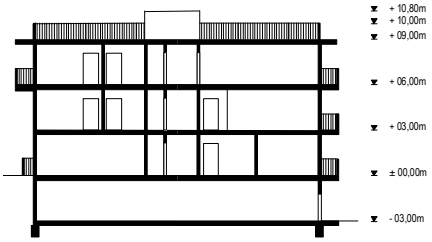


Veikou

Location Veikou 67 / Tralleon
Area Galatsi
Year 1966
Type corner buidling



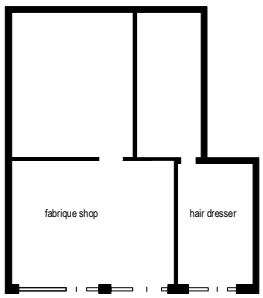
elevation, [1/500]



section, [1/500]

Plot Area 386m²
Site Occupancy Index 0,87
Floor-Space Index 3,0
Built Up Area 336m²
Gross Area 1149m²

Number Of Floors 4
Dimension 19m x 16,76m x 12m
Height Of Ground Floor 3,00m

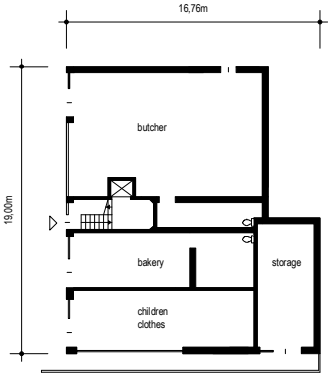


2nd ground floor, [1/500]
2 shops [84 to 99 m²]

Units On Each Floor 2-3
Façade Above Ground 433m²
Total Window Area 161m²
Flats Total 2
Offices Total 1
Shops Total 5
Medical Pratice Total 1
Extra 1 driving school

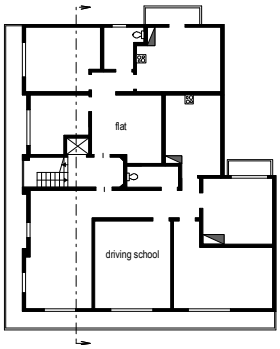

ΚΡΕΟΠΩΛΕΙΟ

4 shops [39 to 105m^2]



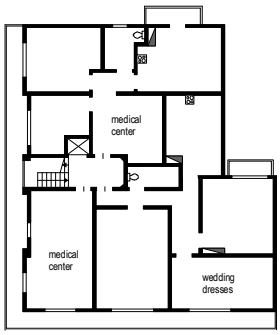
groundfloor, [1/500]

1 flat [94m2]
1 driving school [165m2]

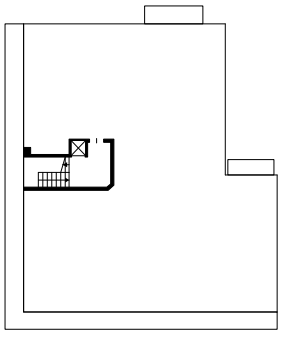


1st floor, [1/500]

1 flat [98m2]
1 office [41m2]
1 medical practice [124m2]



2nd floor, [1/500]

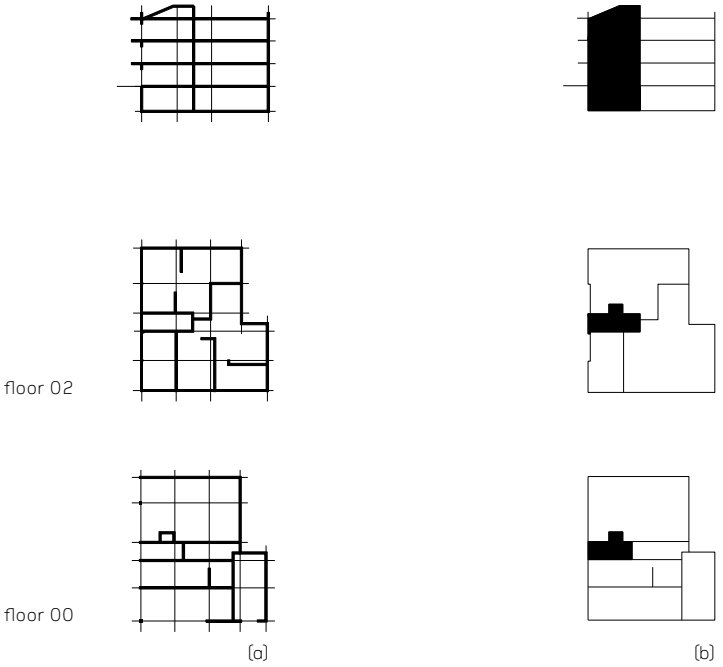


3rd floor, [1/500]

Description This polykatoikia is situated in the semi-periphery of Athens along a main street and junction. By its stepping back from the street the polykatoikia leaves space for a kiosk and a wide sidewalk; presenting itself as a stocky detached building with vital facades of colourful awnings and advertisement signs. It offers space for several shops, flats and other utilities.

The basement becomes a second ground floor in the back of the building since the Tralleon Street has a different level than the Veikou Street. The lowest level can be accessed from the street without stairs and contains shops as the other ground floor on the level of the Veikou Street.

The entrance to the upper floors is between a bakery and a butcher. The corridor is less illuminated than the staircase, which is situated central towards the street. The staircase is lively by the visitors of a driving school, medical centre and a wedding dresses shop. The flats are arranged around a middle hall. Long balconies are winding around the outside and are protected by the awnings. The owner is one person and lives outside of Athens.



schematic plans of construction (a) and public/private (b), [1/1000] [plan 11]

5.5.2 Spatial Configuration Analysis

J-Graph Properties

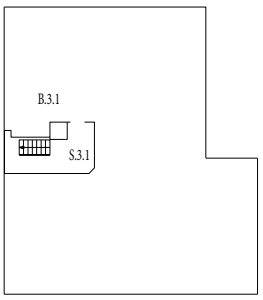
floor 03
premises 2
space steps 1
symmetric 100%
non-distributed 100%

floor 02
premises 21
space steps 4
symmetric 65%
non-distributed 57%

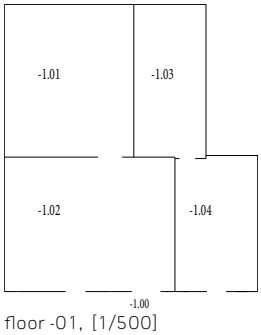
floor 01
premises 21
space steps 4
symmetric 65%
non-distributed 52%

floor 00
premises 8
space steps 2
symmetric 71%
non-distributed 100%

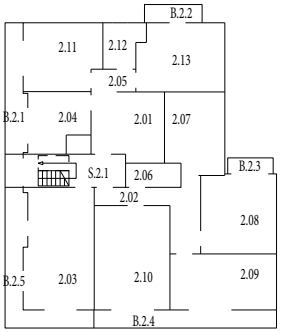
floor -01
premises 5
space steps 2
symmetric 50%
non-distributed 100%



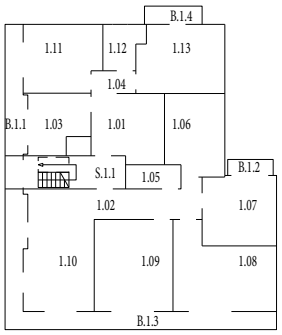
floor 03, [1/500]



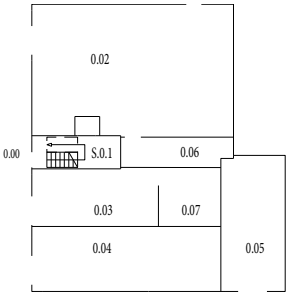
floor -01, [1/500]



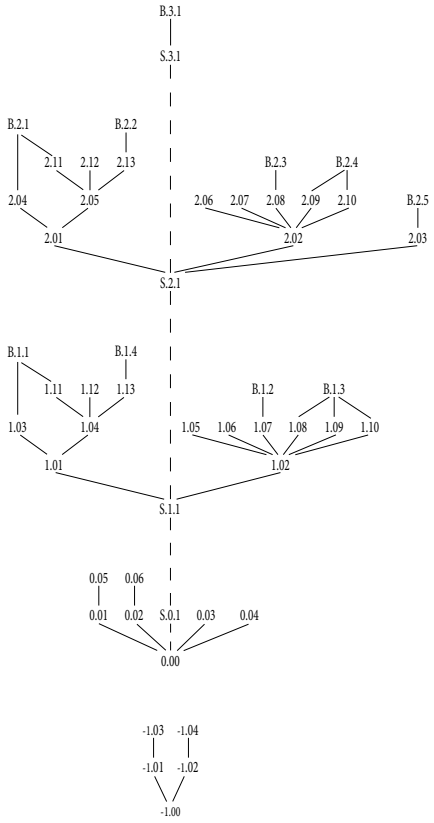
floor 02, [1/500]



floor 01, [1/500]

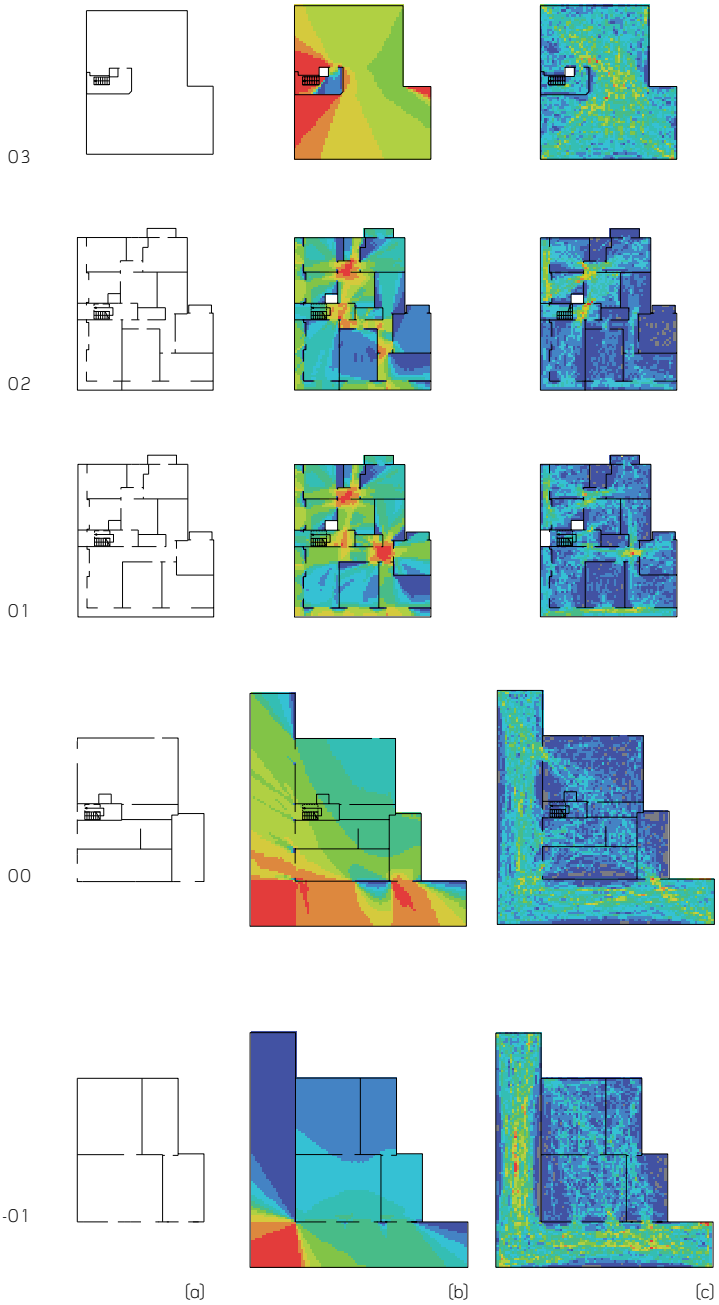


floor 00, [1/500]



J-Graph S05 [figure 20]

5.5.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 21]

Clustering Coefficient

floor 03
min 0.545538
average 0.871591
max 1

floor 02
min 0.306405
average 0.75954
max 1

floor 01
min 0.306987
average 0.718775
max 1

floor 00
min 0.73979
average 0.846304
max 1

floor -01
min 0.537335
average 0.873896
max 1

Agents Counts

floor 03
min 1
average 11.6296
max 34

floor 02
min 1
average 12.2917
max 71

floor 01
min 28
average 416.502
max 1045

floor 00
min 1899
average 5080.14
max 6366

floor -01
min 1934
average 3699.68
max 6054

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.5.4 Adaptation Analysis

Utilities

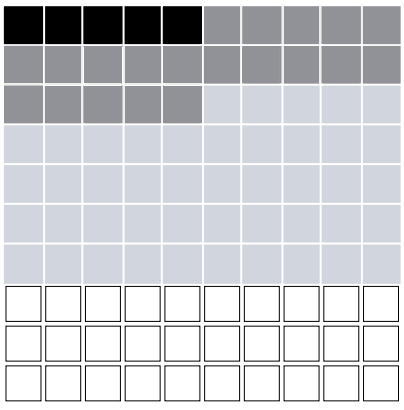
floor -01
1 fabrique shop
1 hairdresser

floor 00
1 butcher
1 child clothing shop
1 bakery

floor 01
1 flat
1 driving school

floor 02
1 flat
2 doctors's parctices
1 office

Domain Areas [table 12]



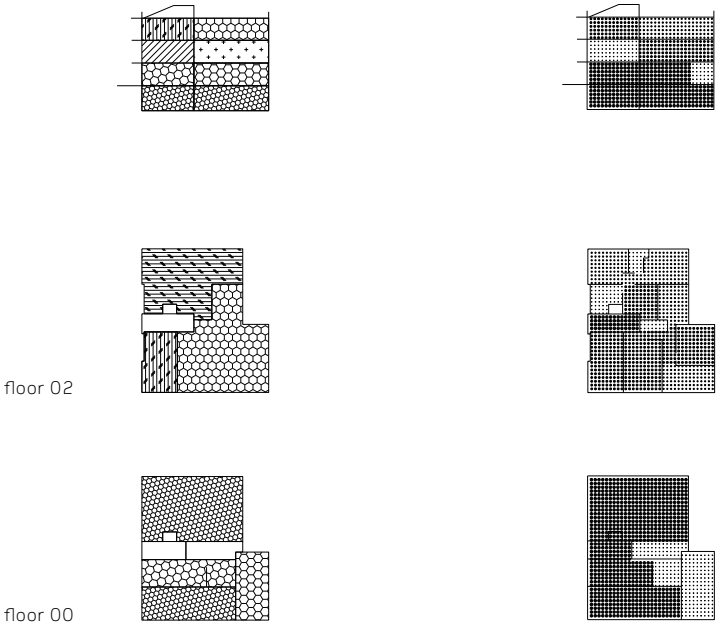
circulation 30.60m²

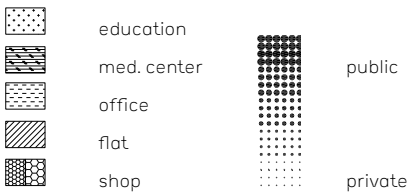
private 95.65m²

public 73m²

semi-public 115.25m²

total 314,50m²





schematic plans utilities (a), public/private (b), (1/1000) [plan 12]

balcony

back facade

advertisement sign

upper floor utility

upper floor utility

upper floor utility

ground floor utility

ground floor utility

ground floor utility

ground floor

ground floor

ground floor

corridor

elevator and door of flat

straircase

nameplate

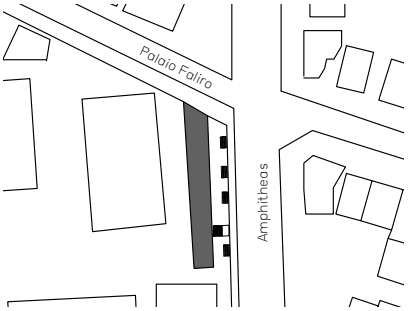
entrance

entrance

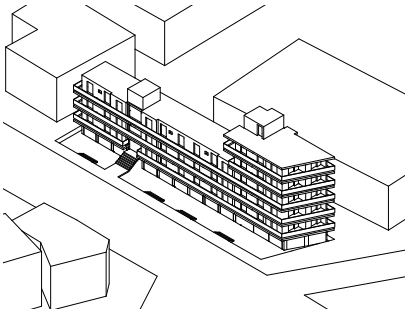
ground floor

5.6 Amfitheas

semi periphery, Palaio Faliro

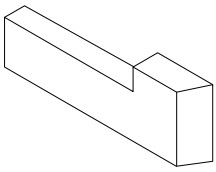


siteplan, [1/2000]



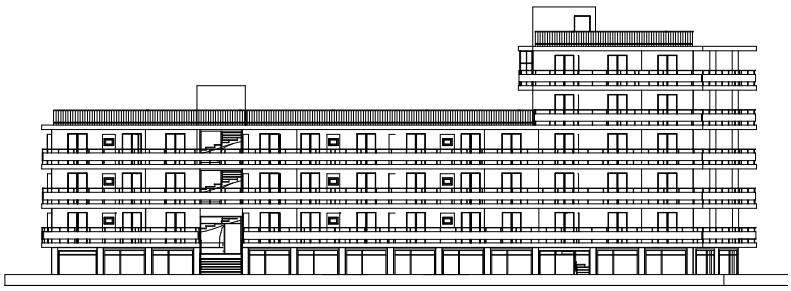
5.6.1 Data Analysis

S 06

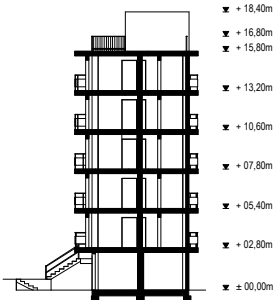


Amfitheas

Location Amfitheas 24-26
Area Palaio Faliro
Year around 1974
Type corner building



elevation, [1/500]



section, [1/500]

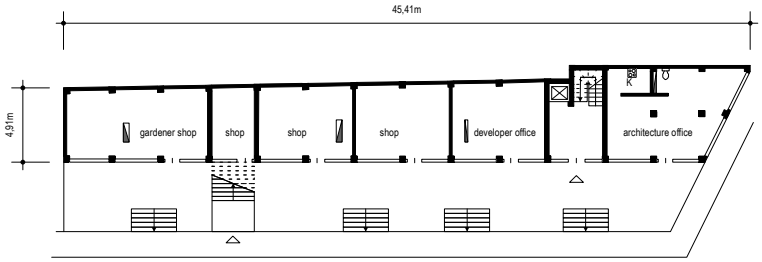
Plot Area 422m²
Site Occupancy Index 0,77
Floor-Space Index 2,8
Built Up Area 324m²
Gross Area 1191m²

Number Of Floors 6
Dimension 45,4m x 7,10m x 15,6m
Height Of Ground Floor 2,80m

Units On Each Floor 2 [A], 2 [B]
Façade Above Ground 576m²
Total Window Area 194m²
Flats Total 12
Offices Total 4
Shops Total 4

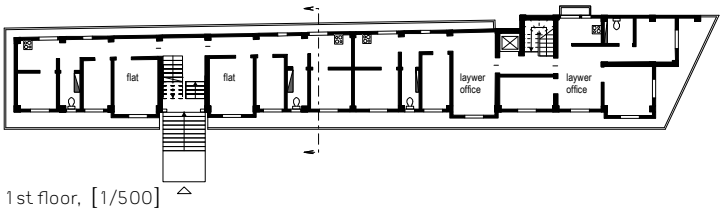

Car Center

4 shops [15 to 42m²]
2 offices [30 - 46m²]



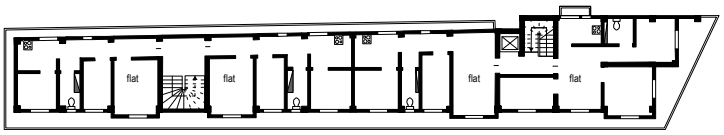
ground floor, [1/500]

2 flats [42 - 49m2]
2 offices [55 - 57m2]



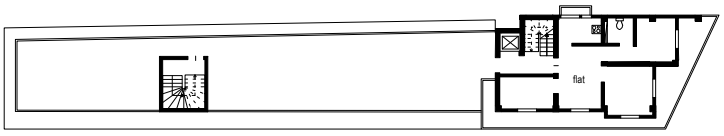
1st floor, [1/500]

4 flats [42 to 66m2]

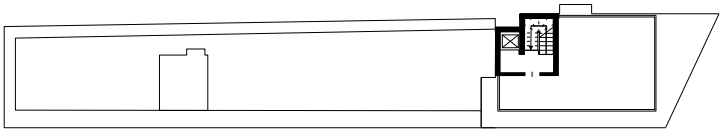


2nd floor, [1/500]

1 flat [53m2]



4th floor, [1/500]



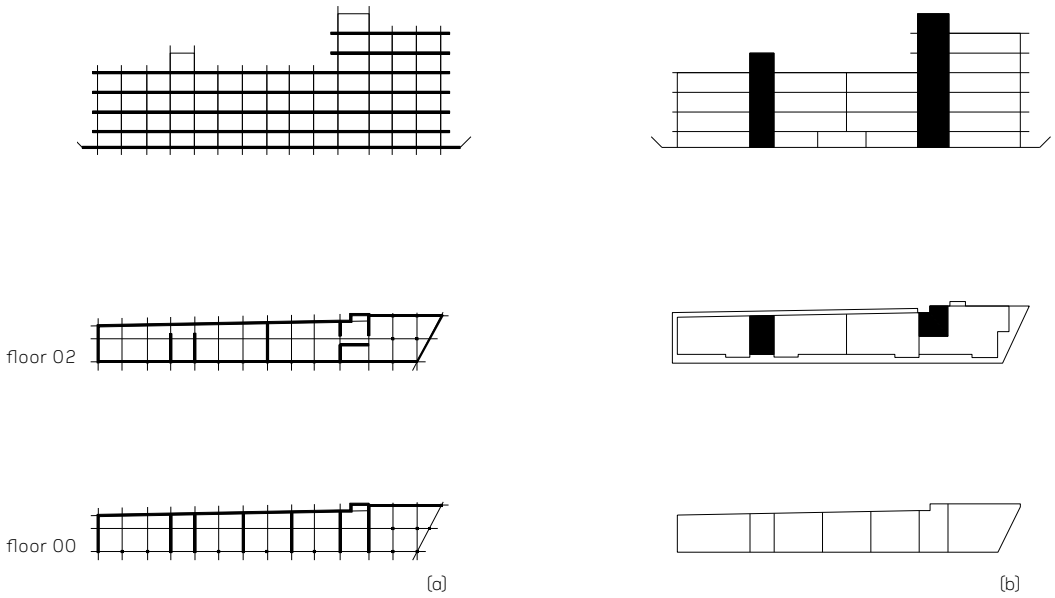
6th floor, [1/500]

Description This polykatoikia is located at a busy exit road towards south in a mixed quarter of residences and enterprises. The area has relatively loose building structure, leaving open spaces and green areas in-between. The form is stretched and slim. The end is emphasized towards the junction with two extra storeys.

The ground floor level is lower than the surrounding street by an extended display field for the existing shops. The visual connection of the ground floor becomes separated from the street by the split-level. The area in front of the shops and offices is connected with wide staircases to the sidewalk.

The balconies along the façade are following the horizontality and are sun- and view-protected by uniformed coloured awnings. The gardener shop is separated to the other shops of the ground floor by a bridge on street level, which is leading to the entrance of the upper flats. The gardener exposes the plants and pots outside of his shop. The staircase is on the street-side of the building and leaves the platform of the staircase on the same axis like the inner corridors of the flats.

The flats are organized along the façade with separated and small rooms. On the backside, accessible from the kitchen, each unit has an extra but narrow balcony. The second entrance for the flats and offices is on ground floor level. The staircase is situated to the back of the building and creates unlike the other staircase a compact distribution area in front of each unit.

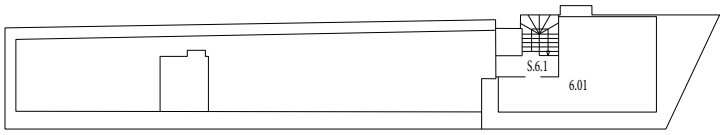


schematic plans of construction (a) and public/private (b), [1/1000] [plan 13]

5.6.2 Spatial Configuration Analysis

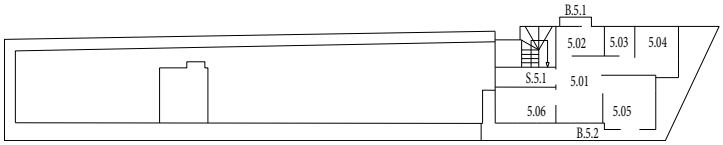
J-Graph Properties

floor 06
premises 2
space steps 1
symmetric 100%
non-distributed 100%



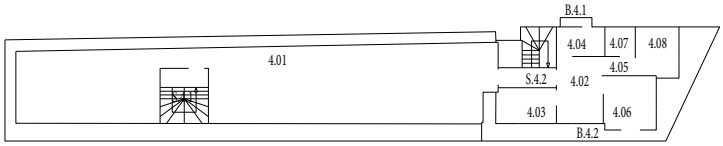
floor 06, [1/500]

floor 05
premises 9
space steps 3
symmetric 63%
non-distributed 100%



floor 05, [1/500]

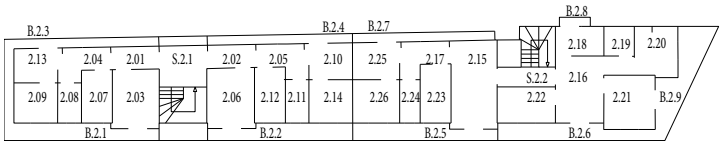
floor 04
premises 12
space steps 3
symmetric 73%
non-distributed 75%



floor 04, [1/500]

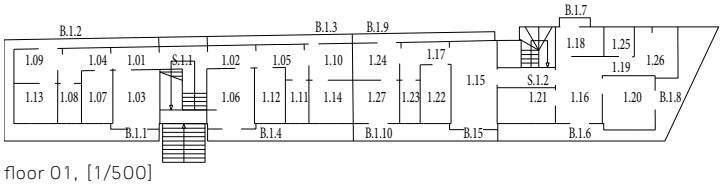
floor 03
premises 37
space steps 4
symmetric 86%
non-distributed 100%

floor 02
premises 37
space steps 4
symmetric 86%
non-distributed 100%



floor 02 - 03, [1/500]

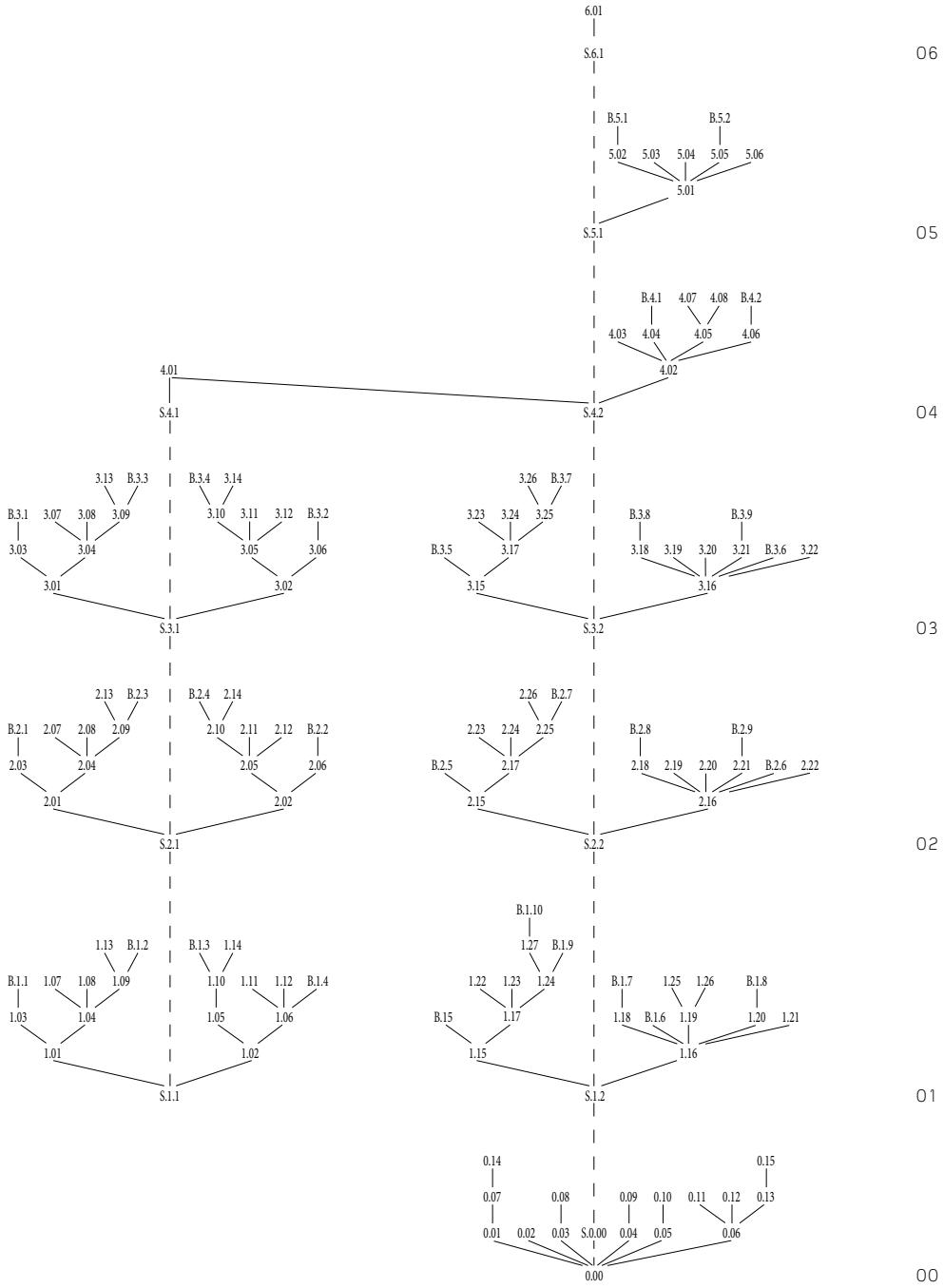
floor 01
premises 39
space steps 5
symmetric 84%
non-distributed 100%



floor 01, [1/500]

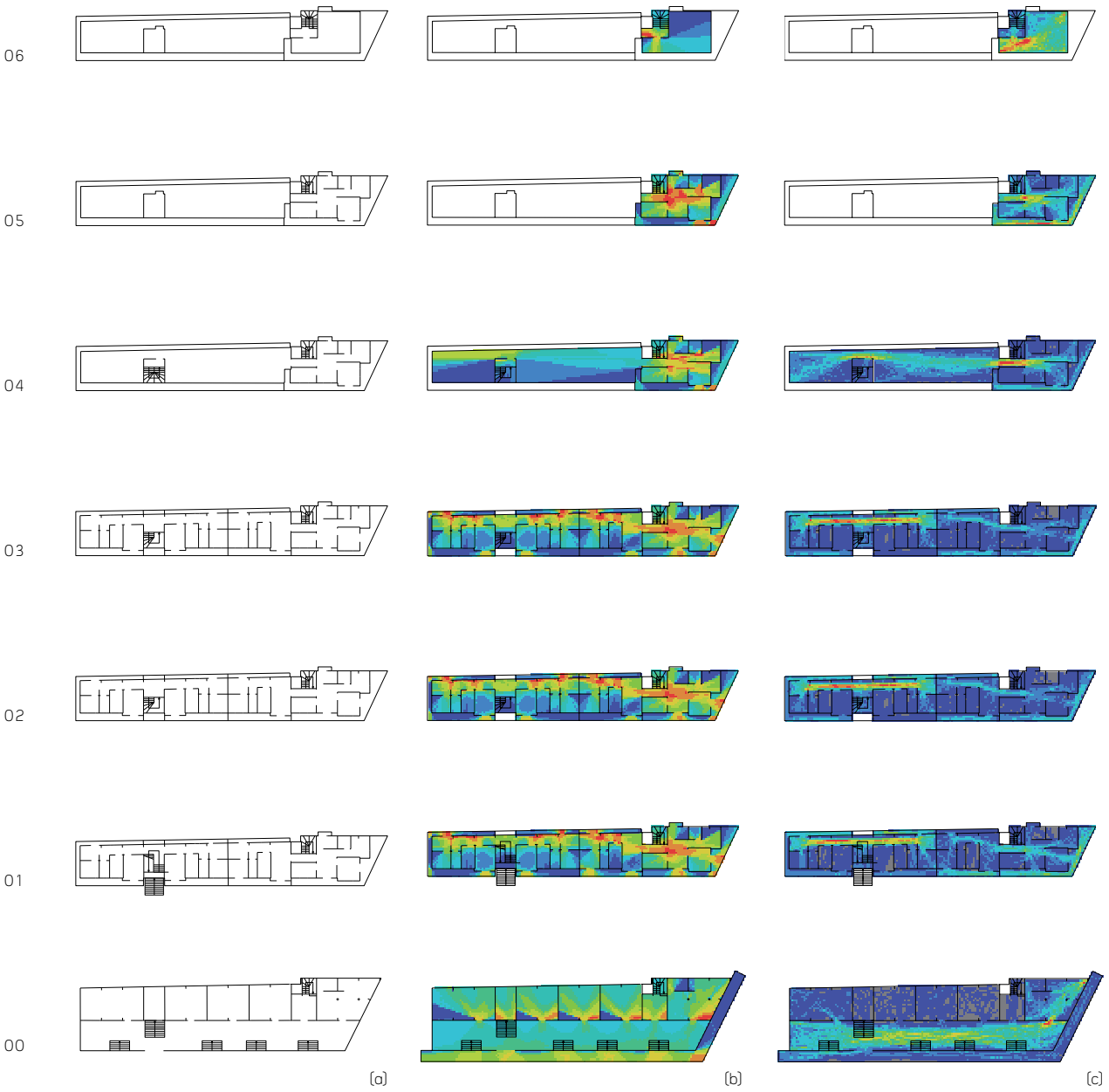
floor 00
premises 17
space steps 3
symmetric 63%
non-distributed 100%

floor 00, [1/500]



J-Graph S06 [figure 22]

5.6.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 23]

Clustering Coefficient

floor 06
min 0.519493
average 0.880895
max 1

floor 05
min 0.457827
average 0.753411
max 1

floor 04
min 0.398503
average 0.82416
max 1

floor 03
min 0.376733
average 0.755475
max 1

floor 02
min 0.376733
average 0.755475
max 1

floor 01
min 0.369601
average 0.751113
max 1

floor 00
min 0.430561
average 0.76307
max 1

Agents Counts

floor 06
min 8
average 63.2977
max 150

floor 05
min 1
average 38.5085
max 149

floor 04
min 1
average 18.1516
max 107

floor 03
min 1
average 16.0752
max 119

floor 02
min 1
average 16.0752
max 119

floor 01
min 1
average 12.2159
max 80

floor 00
min 1
average 8.81023
max 52

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.6.4 Adaptation Analysis

Utilities

floor 00
1 gardener shop
1 developer office
3 shops
1 architecture office

floor 01
2 flats [A]
2 lawyer's offices [B]

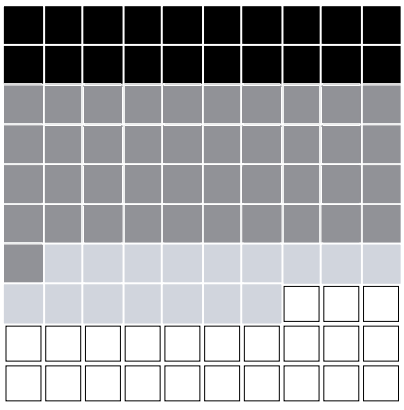
floor 02
2 flats [A]
2 flats [B]

floor 03
2 flats [A]
2 flats [B]

floor 04
2 flats [A]
2 flats [B]

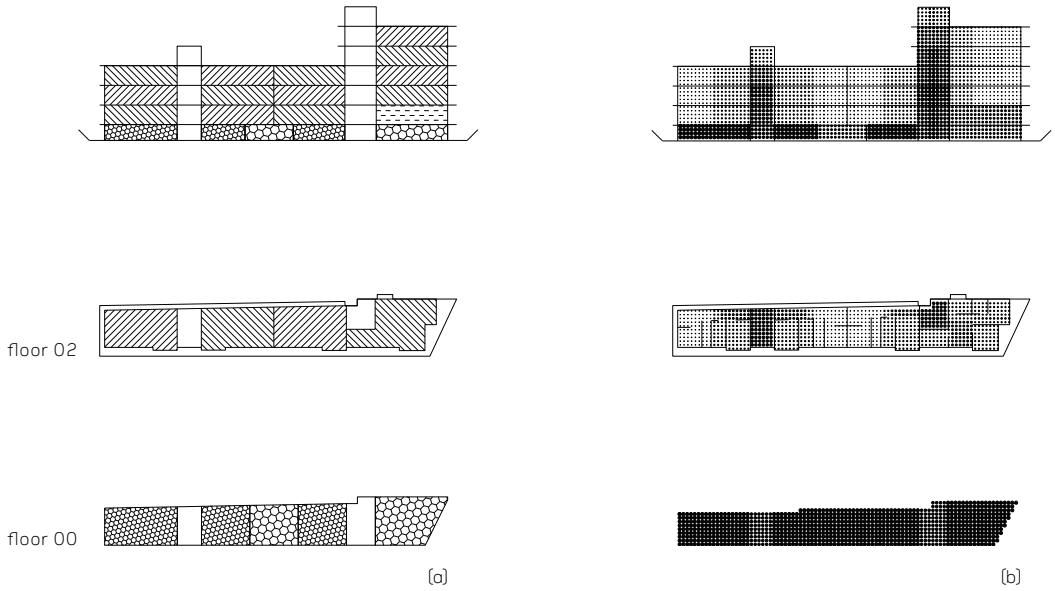
floor 05
2 flats [A]
2 flats [B]

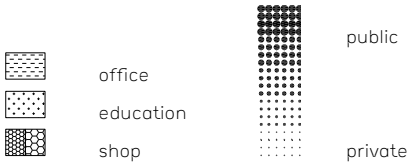
Domain Areas [table 13]



circulation 331.30m²
private 562.70m²
public - m²
semi-public 669m²

total 1563m²





schematic plans utilities (a), public/private (b), (1/1000) [plan 14]

balcony

back facade

roof elevation

upper floor utility

upper floor utility

upper floor utility

ground floor utility

ground floor utility

ground floor utility

ground floor

ground floor

ground floor

corridor

door of flat

straircase

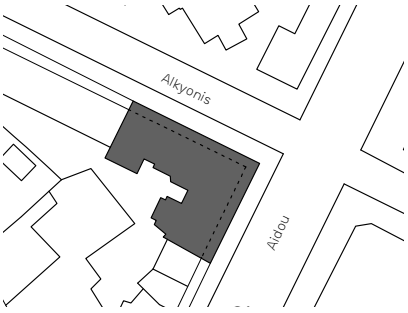
nameplate

entrance

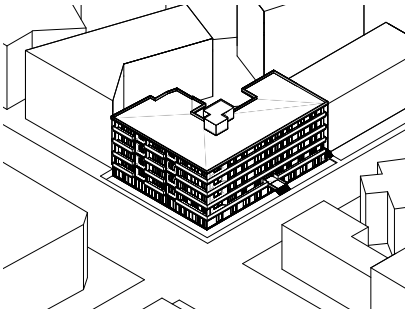
entrance

5.7 Alkyonis

semi periphery, Palaio Faliro

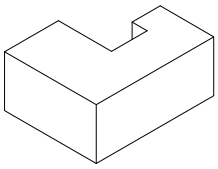


siteplan, [1/2000]



5.7.1 Data Analysis

S 07



Alkyonis

Location Alkyonis 8 / Aidou
Area Palaio Faliro
Year 1963-1966
Type corner building

elevation, [1/500]

section, [1/500]

Plot Area 866m²
Site Occupancy Index 0,91
Floor-Space Index 4,1
Built Up Area 791m²
Gross Area 3551m²

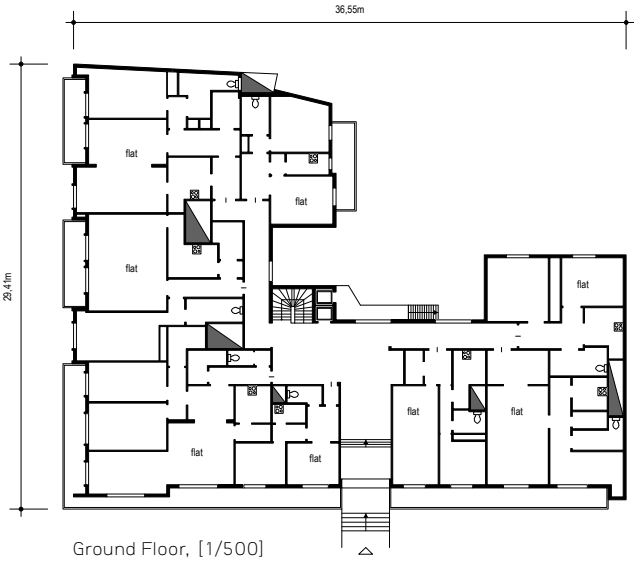
Number Of Floors 5
Dimension 36,50m x 29,40m x 14,50m
Height Of Ground Floor 4,90m

Units On Each Floor 6
Façade Above Ground 1065m²
Total Window Area 257m²
Flats Total 22
Offices Total 7
Shops Total 4
Medical Pratice Total 1
Extra 1 driving center

basement, [1/500]
2 flats [30 - 89m²]
4 shops [53 to 77m²]
1 school [96m²]
5 offices [18 to 38m²]

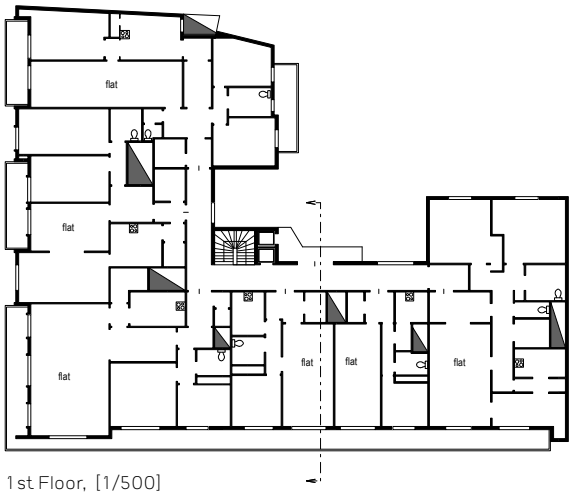

ΣΤΟΙΧΗΜΑ
ΕΞΟΧΕΡ
ΠΡΟΠΟ
ΛΟΤΤΟ
KINO
ΕΘΝΙΚΟ ΛΑΧΕΙΟ

8 flats [45 to 130m²]



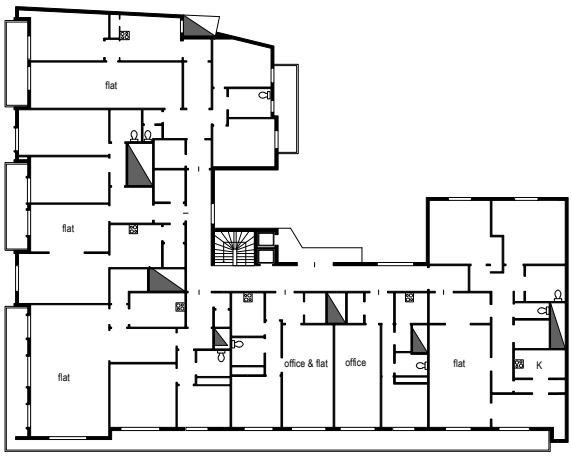
Ground Floor, [1/500]

6 flats [52 to 127m²]



1st Floor, [1/500]

5 flats [60 to 130m²]
2 offices [56 - 66 m²]

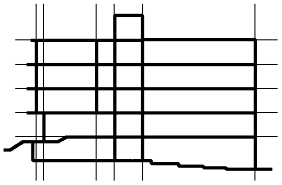


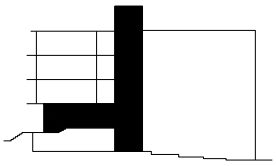
3rd Floor, [1/500]

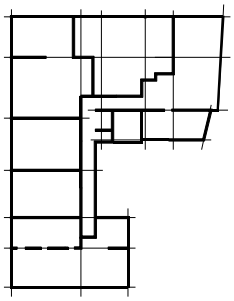
Description This polykatoikia, close to the sea, is L-shaped at an inclined plane at a corner of a block. A gap between the shops on the ground level and the street is created by the steep topography of the surrounding. This separated area in front of the shops is still a part of the building.

The main entrance of the building is at Alkyonis street and leads over this gap by a bridge to offices and flats. The hall is generous in size and decoration. It is leading the inhabitants and visitors to the raised level of the ground floor. A table for the porter is still a leftover out of the original times. The winded staircase and the corridors at the backside of the building are well illuminated.

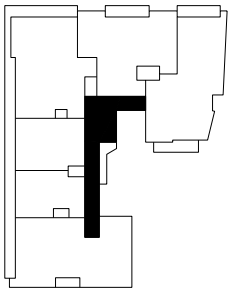
The flats and offices are big and winding. The units at the ends of the corridor are orientated to the front and back of the polykatoikia. The balconies are one side long and stretched and on the other side as well as to the backside single balconies.The backyard is green and well-kept. It offers in the basement level two further flats for the lower income occupants.

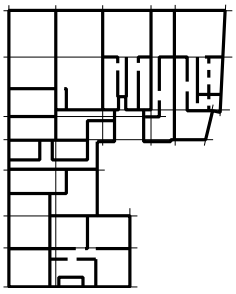






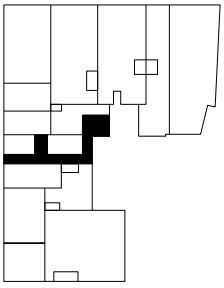
floor 02





floor -01

(a)



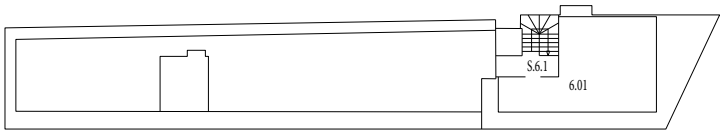
(b)

schematic plans of construction (a) and public/private (b), [1/1000] [plan 15]

5.6.2 Spatial Configuration Analysis

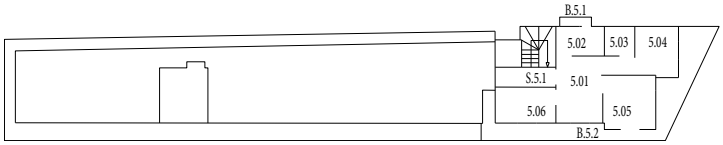
J-Graph Properties

floor 06
premises 2
space steps 1
symmetric 100%
non-distributed 100%



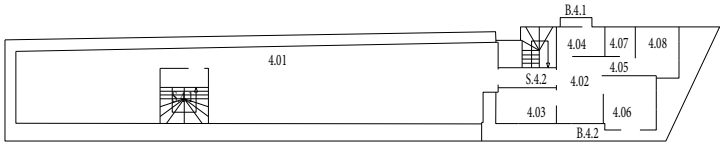
floor 06, [1/500]

floor 05
premises 9
space steps 3
symmetric 63%
non-distributed 100%



floor 05, [1/500]

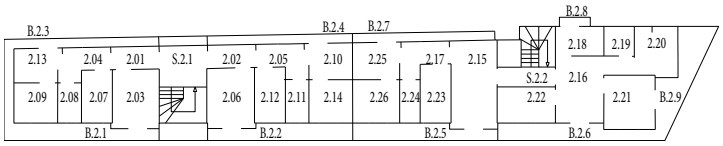
floor 04
premises 12
space steps 3
symmetric 73%
non-distributed 75%



floor 04, [1/500]

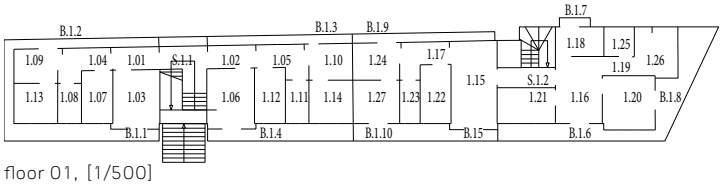
floor 03
premises 37
space steps 4
symmetric 86%
non-distributed 100%

floor 02
premises 37
space steps 4
symmetric 86%
non-distributed 100%



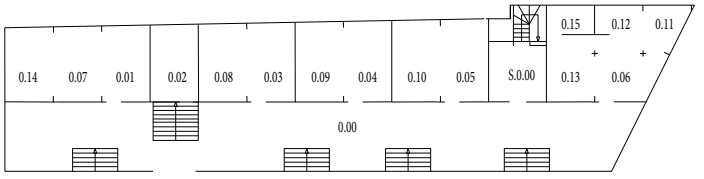
floor 02 - 03, [1/500]

floor 01
premises 39
space steps 5
symmetric 84%
non-distributed 100%

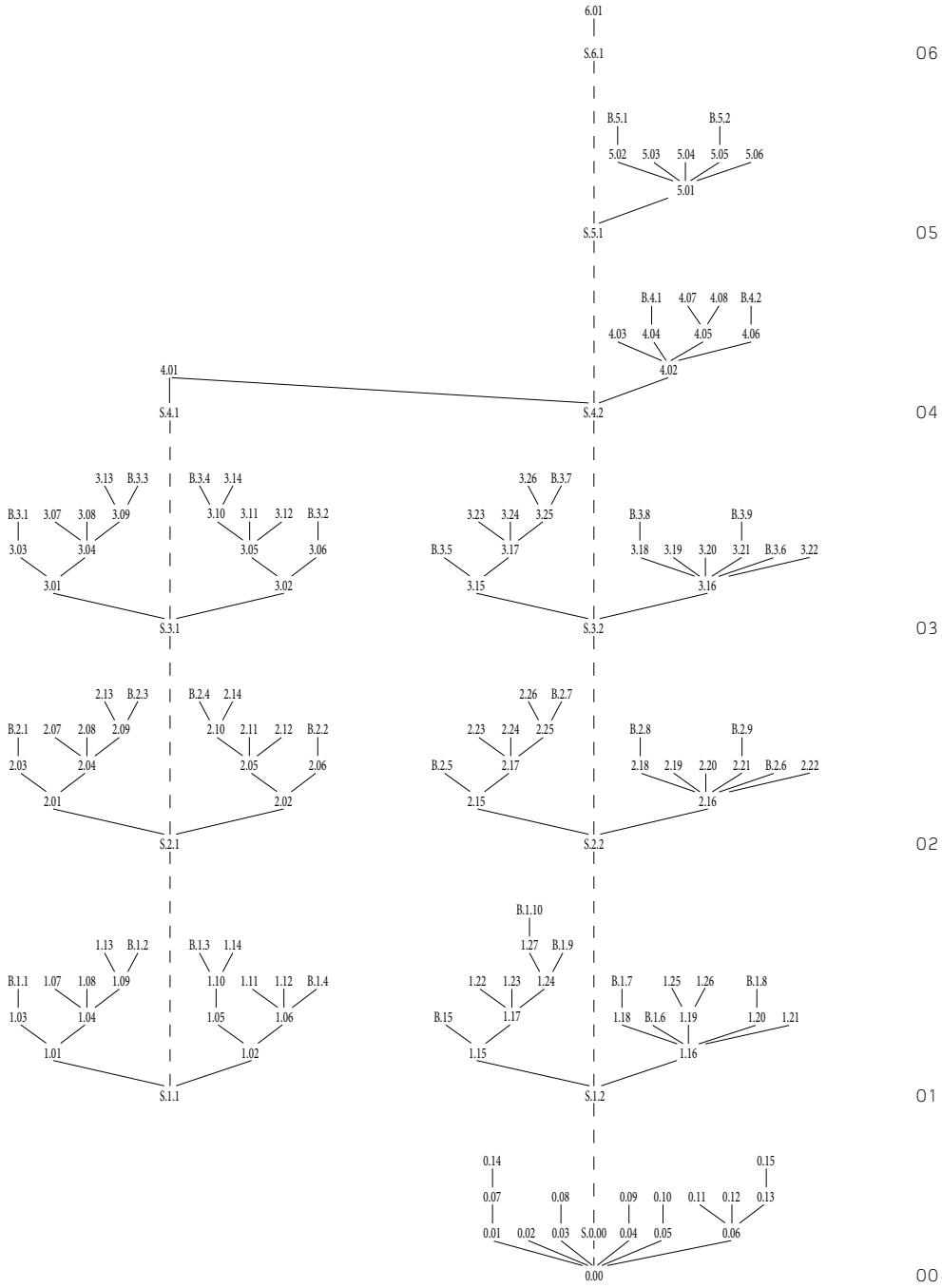


floor 01, [1/500]

floor 00
premises 17
space steps 3
symmetric 63%
non-distributed 100%

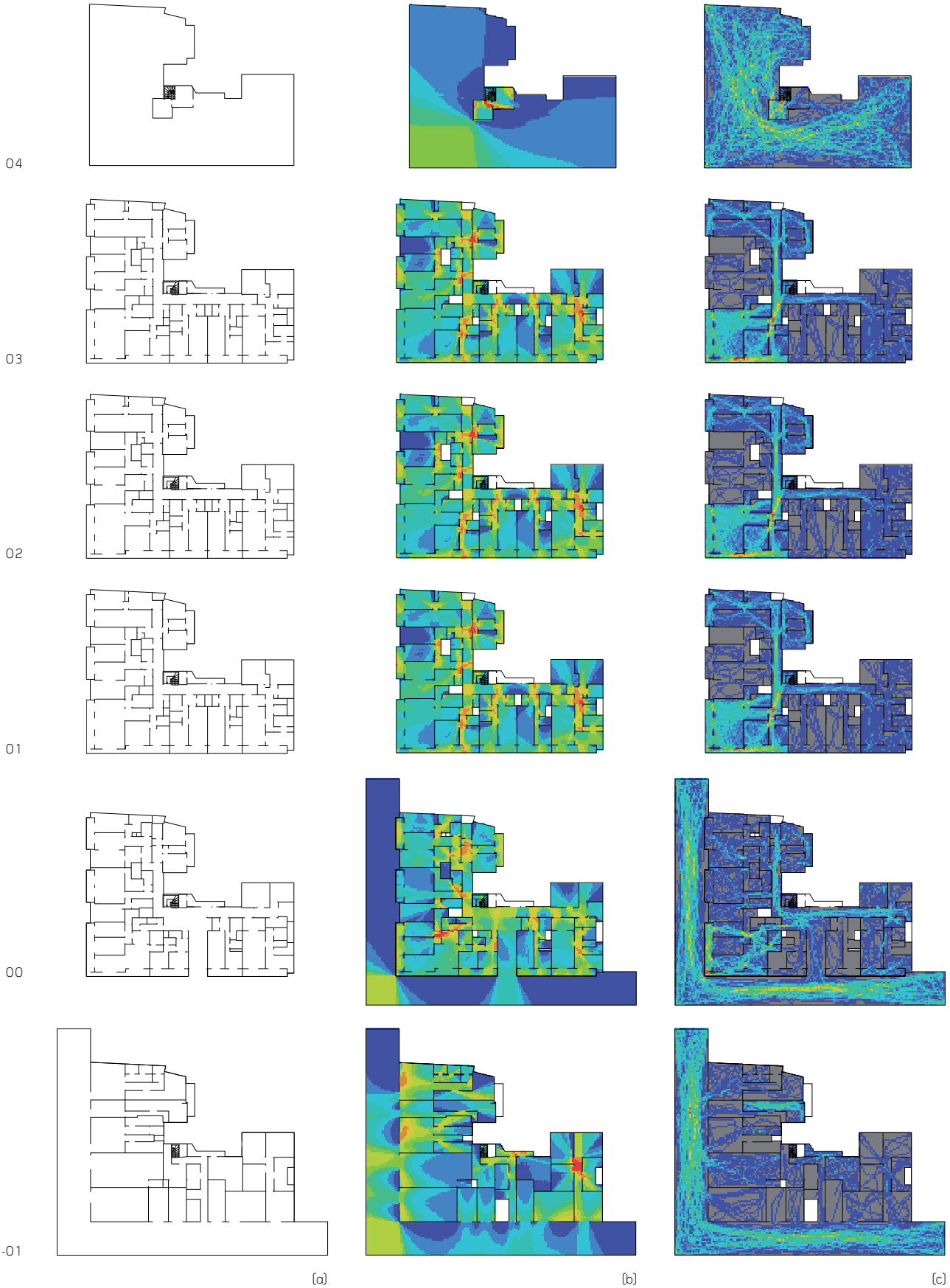


floor 00, [1/500]



J-Graph S06 [figure 22]

5.7.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 25]

Clustering Coefficient

floor 04
min 0.363516
average 0.863479
max 1

floor 03
min 0.277304
average 0.718442
max 1

floor 02
min 0.277304
average 0.718442
max 1

floor 01
min 0.277304
average 0.718442
max 1

floor 00
min 0.296255
average 0.805029
max 1

floor -01
min 0.356953
average 0.80222
max 1

Agents Counts

floor 04
min 1
average 3.82889
max 17

floor 03
min 1
average 5.51805
max 55

floor 02
min 1
average 5.51805
max 55

floor 01
min 1
average 5.51805
max 55

floor 00
min 1
average 3.52844
max 22

floor -01
min 1
average 2.99439
max 23

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.7.4 Adaptation Analysis

Utilities

floor -01
1 flat of caretaker [back]
1 flat [back]
1 driving center [front]
1 pharmacy [front]
1 petshop [front]
1 clothing shop [front]
2 shops [front]
3 offices [front]
1 insurance copmany [front]
entrance to backyard [front]

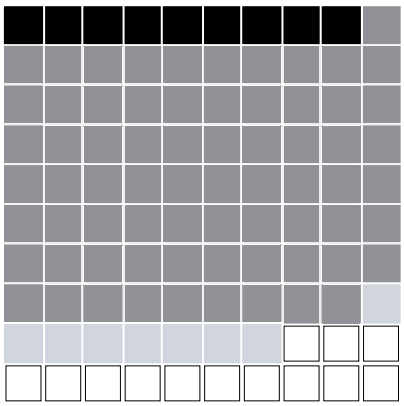
floor 00
5 flats

floor 01
6 flats

floor 02
5 flats
1 flat incl. office

floor 03
4 flats
1 flat incl. office
1 office

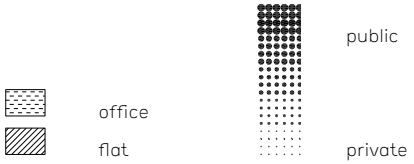
Domain Areas [table 14]



circulation 312.23 m²
private 2361.16 m²
public 265.92 m²
semi-public 434 m²

total 3373.32 m²

(a)



schematic plans utilities (a), public/private (b), [1/1000] [plan 16]

balcony

back facade

upper floor utility

upper floor utility

upper floor utility

basement utility

basement utility

basement utility

basement

basement

basement / entrances

corridor

door of flat

straircase

porter

nameplate

entrance

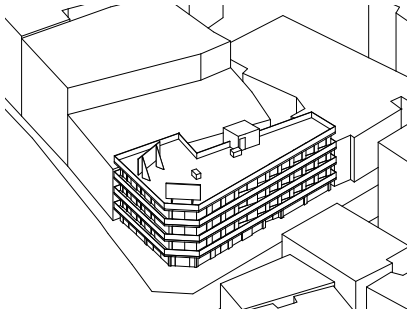
entrance

backyard elevator

5.8 Sarataporou

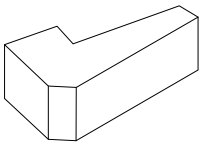
semi periphery, Cholargos

siteplan, [1/2000]



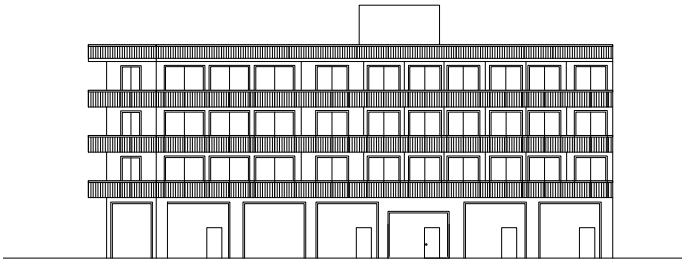
5.8.1 Data Analysis

S 08

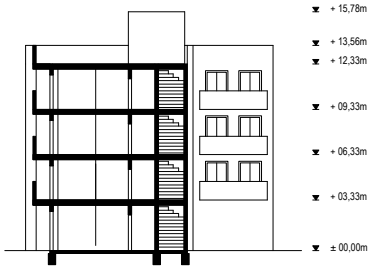


Sarataporou

Location Sarataporou 1 / Mesageion 202
Area Cholargos
Year around 1978
Type corner building



elevation, [1/500]

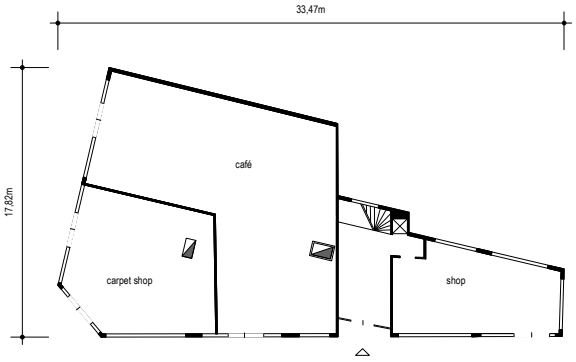


section, [1/500]

Plot Area 458m²
Site Occupancy Index 0,96
Floor-Space Index 3,1
Built Up Area 439m²
Gross Area 1437m²

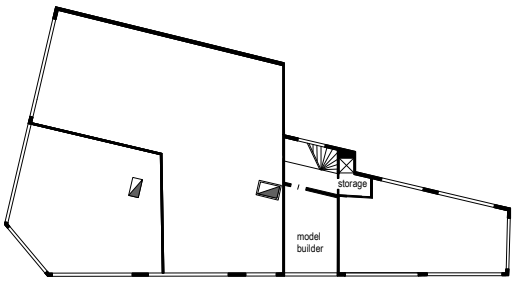
Number Of Floors 4
Dimension 33,50m x 17,80m x 13,60m
Height Of Ground Floor 5,50m

Units On Each Floor 4 [semifloor 1]
Façade Above Ground 677m²
Total Window Area 342m²
Flats Total 8
Offices Total 1
Shops Total 3
Medical pratice total 3
Extra 1 dance school, 1 model builder



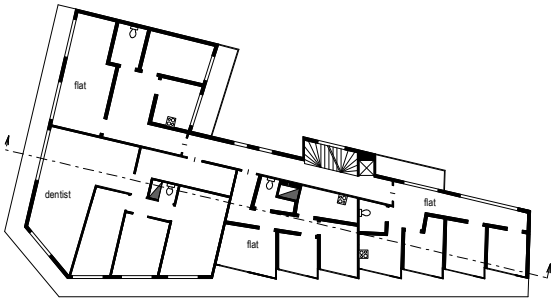
ground floor, [1/500]
3 shops [63 to 186m²]

1 office [20m²]
1 storage [3m²]



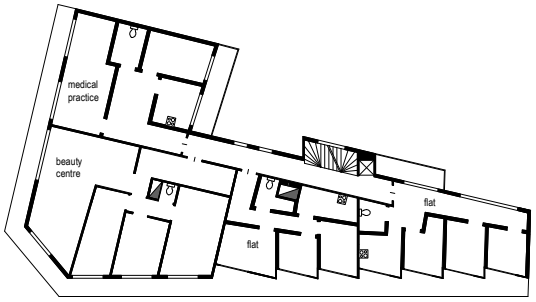
semi floor, [1/500]

3 flats [53 to 70m²]
1 medical pratice [111m²]

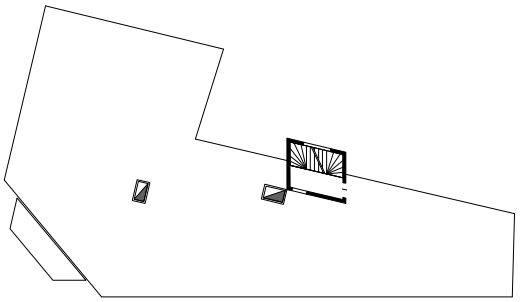


1st floor, [1/500]

2 flats [68 - 82m²]
1 beauy center [135 m²]
1 medical pratice [91m²]



2nd floor, [1/500]

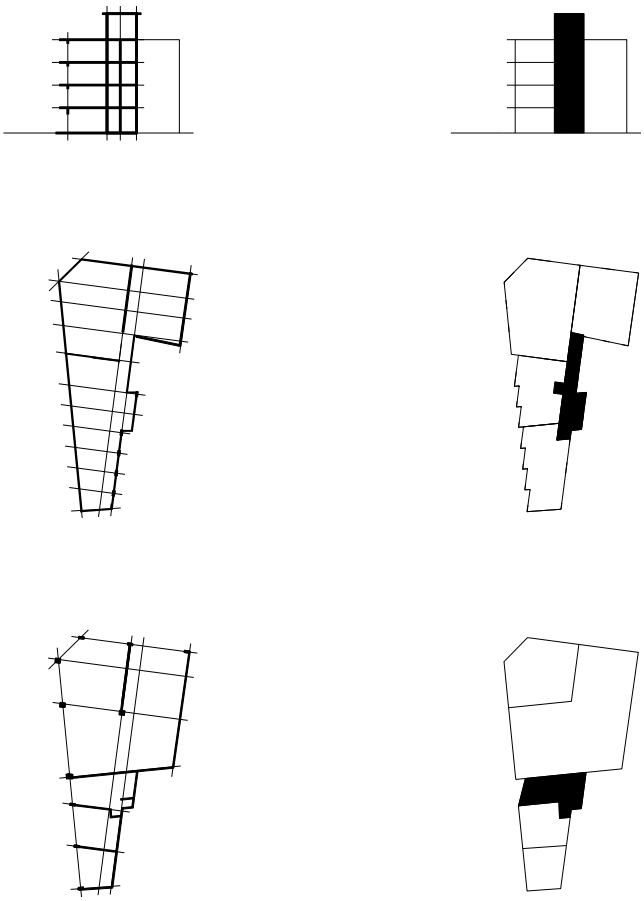


4th floor, [1/500]

Description This case is situated at a corner of a main exit road of Athens and does call for attention among all the other surrounding polykatoikias by oversized advertisement signs on the balconies and roof.

Due to its commercial use, in particular the one on ground level, the polykatoikia depends on car-shopping or regular visitors. The wedge- and L- shaped building gives access to the dwellings at a quieter sidestreet. The hall is wide and a staircase to the back of the building is leading to the utilities of the upper floors. Above the entrance a model-builder is having its studio on the level of the semi-floor.

The units are approached by long corridor on the backside. Most of the flats are orientated taped to the point and one-sided towards the street. Surrounding balconies are sun-protected by awnings. A mixed use in the building for different daytimes guarantees a constant coming and going.



schematic plans of construction (a) and public/private (b), [1/1000] [plan 17]

5.8.2 Spatial Configuration Analysis

J-Graph Properties

floor 04
premises 2
space steps 1
symmetric 100%
non-distributed 100%

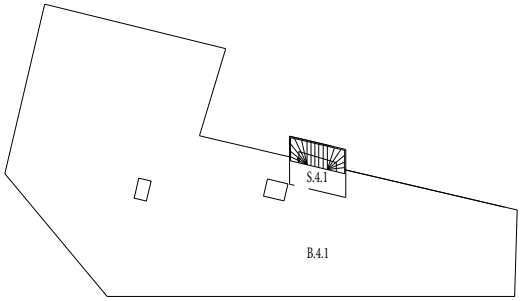
floor 03
premises 30
space steps 3
symmetric 97%
non-distributed 30%

floor 02
premises 30
space steps 3
symmetric 97%
non-distributed 30%

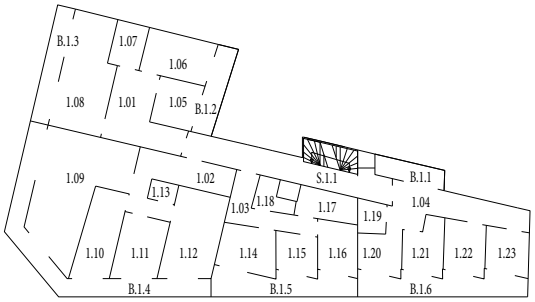
floor 01
premises 30
space steps 3
symmetric 97%
non-distributed 30%

floor 1/2
premises 4
space steps 2
symmetric 67%
non-distributed 100%

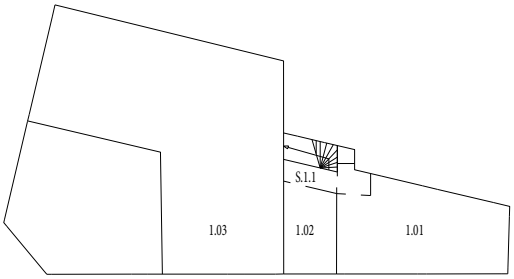
floor 00
premises 5
space steps 1
symmetric 100%
non-distributed 40%



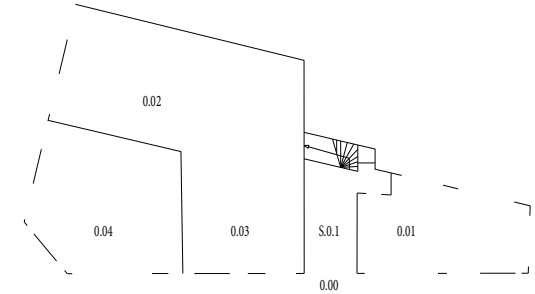
floor 04, [1/500]



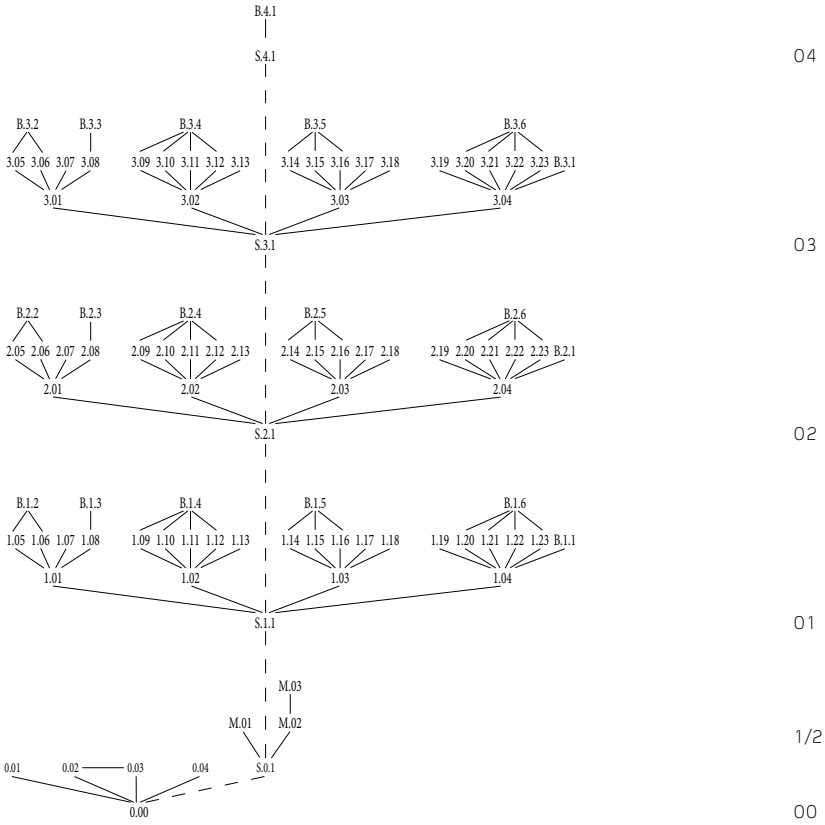
floor 01 - 03, [1/500]



floor 1/2, [1/500]

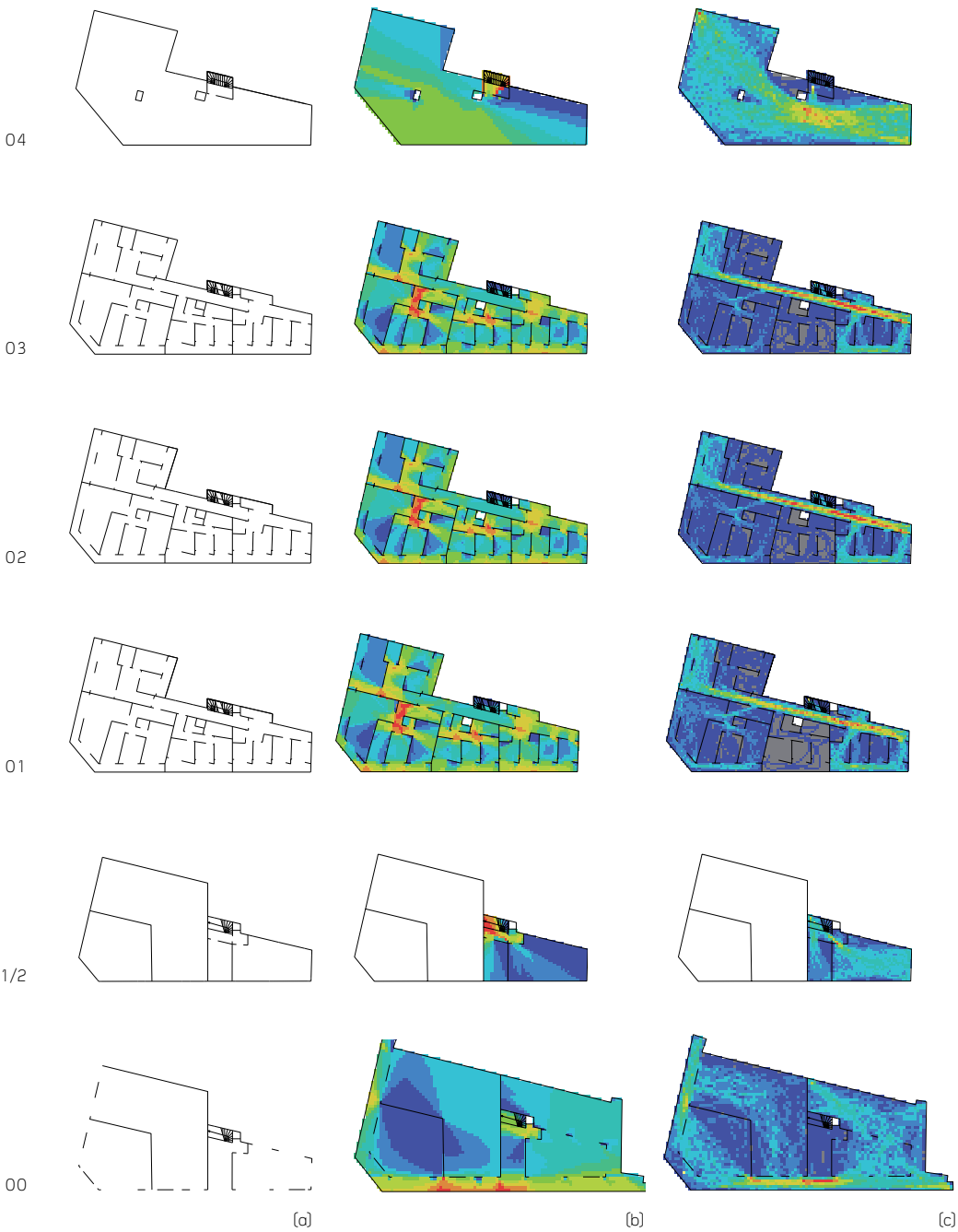


floor 00, [1/500]



J-Graph S08 [figure 26]

5.8.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 27]

Clustering Coefficient

floor 04
min 0.555447
average 0.827181
max 1

floor 03
min 0.325784
average 0.718345
max 1

floor 02
min 0.330957
average 0.718607
max 1

floor 01
min 0.328936
average 0.72178
max 1

floor 1/2
min 0.449529
average 0.894187
max 1

floor 00
min 0.370859
average 0.811185
max 1

Agents Counts

floor 04
min 1
average 24.4705
max 78

floor 03
min 1
average 9.93882
max 77

floor 02
min 1
average 13.9273
max 104

floor 01
min 1
average 9.49419
max 69

floor 1/2
min 2
average 39.3194
max 178

floor 00
min 1
average 12.4886
max 64

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.8.4 Adaptation Analysis

Utilities

floor 00
2 shops
1 fastfood

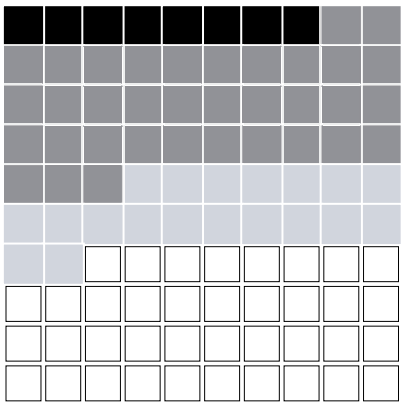
floor 1/2
1 model builder
1 storage

floor 01
2 flats
1 beauty center
1 doctor's parctice

floor 02
2 flats
1 spa
1 office

floor 03
2 flats,
1 dance school
1 office

Domain Areas [table 15]



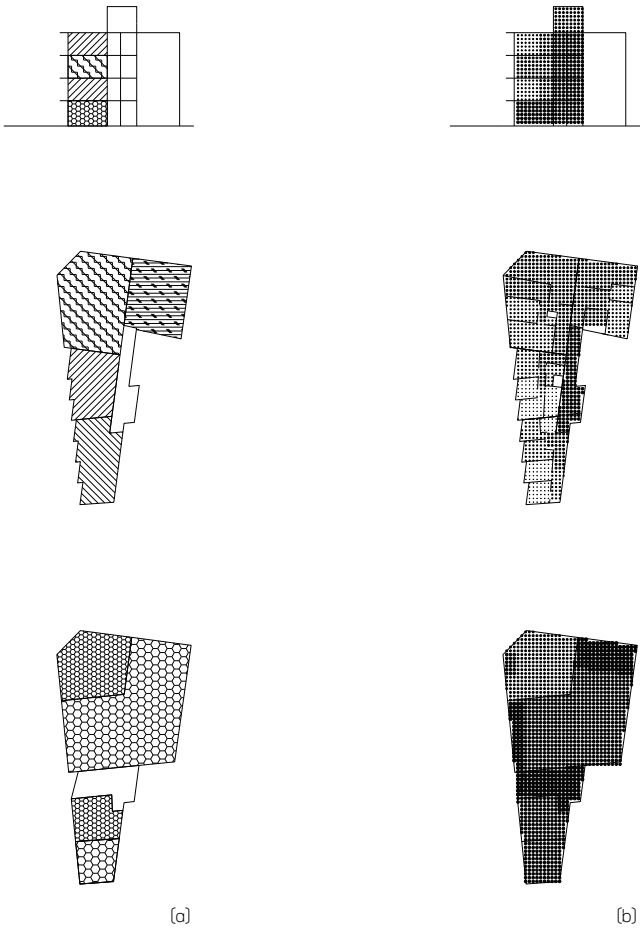
circulation 140.20 m²

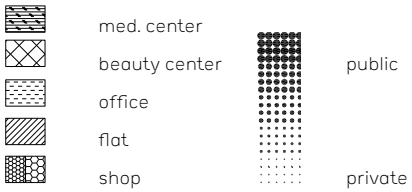
private 631.90 m²

public 335.50 m²

semi-public 667.40 m²

total 1775 m²





schematic plans utilities (a), public/private (b), [1/1000] [plan 18]

balcony

back facade

advertisement sign

upper floor utility

upper floor utility

upper floor utility

ground floor utility

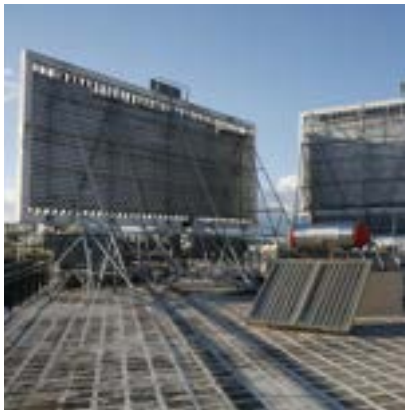
ground floor utility

ground floor utility

ground floor

ground floor

ground floor



roof advertisment

corridor

porter

straircase

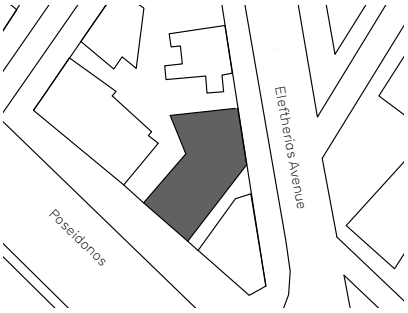
straircase

nameplate

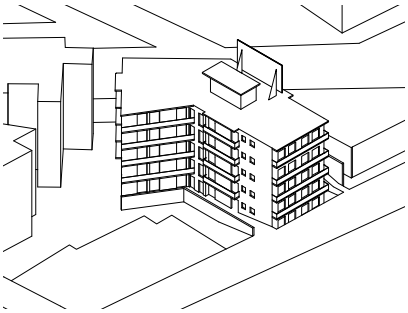
entrance

5.9 Poseidonos

periphery, AlimoS

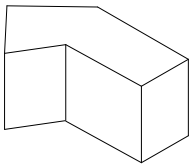


siteplan, [1/2000]



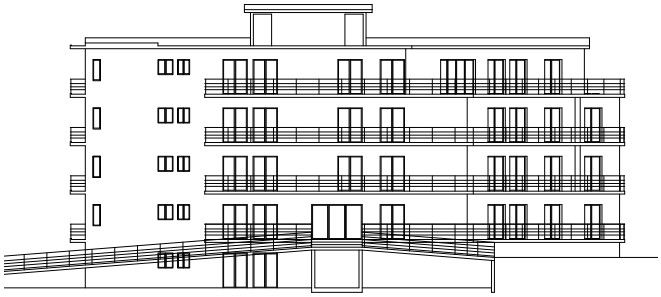
5.9.1 Data Analysis

P 09

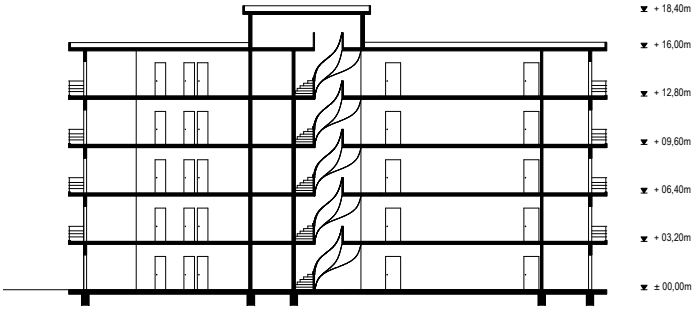


Poseidonos

Location Poseidonos 21 / Eleftherias Ave.
Area Alimos
Year 1960
Type detached building



elevation, [1/500]

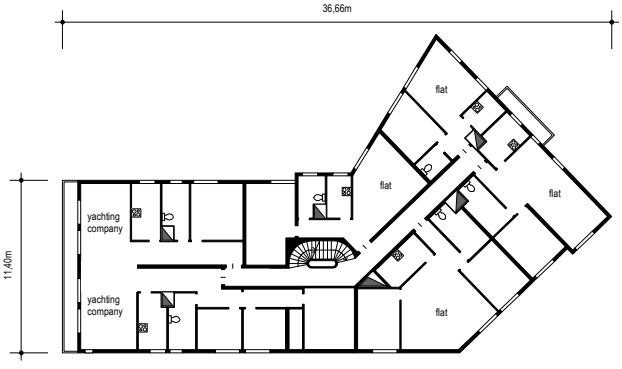


section, [1/500]

Plot Area 530m²
Site Occupancy Index 0,93
Floor-Space Index 4,5
Built Up Area 492m²
Gross Area 2368m²

Number Of Floors 5
Dimension 36,70m x 11,40-16,70m x 16,00m
Height Of Ground Floor 3,20m

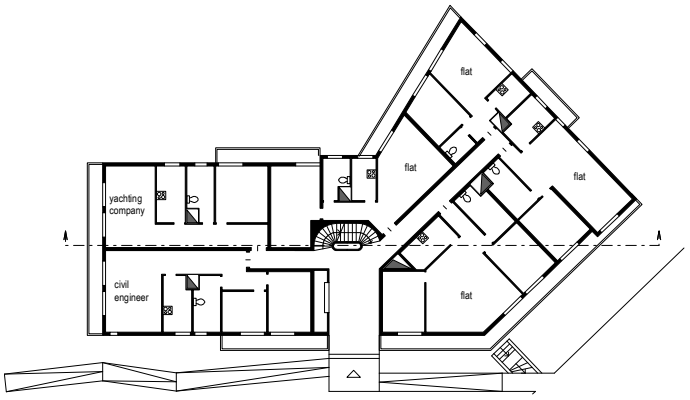
Units On Each Floor 6
Façade Above Ground 903m²
Total Window Area 261m²
Flats Total 19
Offices Total 2
Shops Total -
Extra 2 yachting companies



ground floor, [1/500]
1 office [128m²]
4 flats [38 to 86m²]

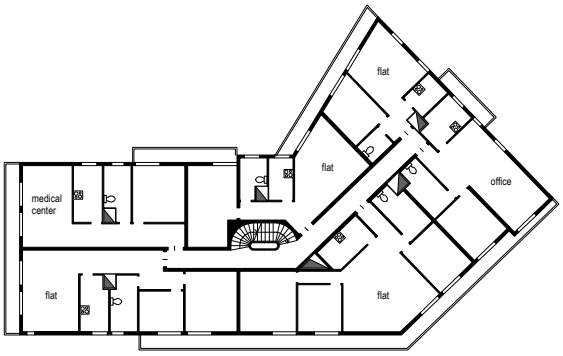

ΟΤΕ
Η πιο σταθερή μας σχέση

4 flats [38 to 86m²]
2 offices [56 - 128m²]



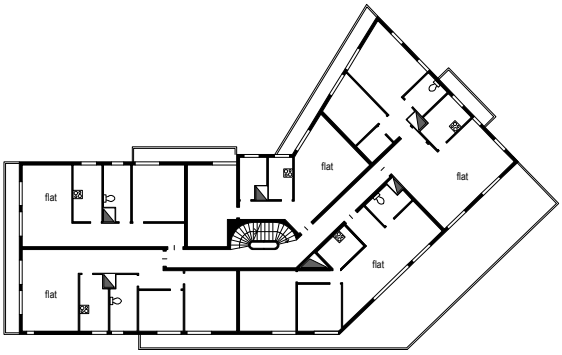
1st floor, [1/500]

4 flats [41 to 90m²]
1 office [56m²]
1 medical center [59m²]

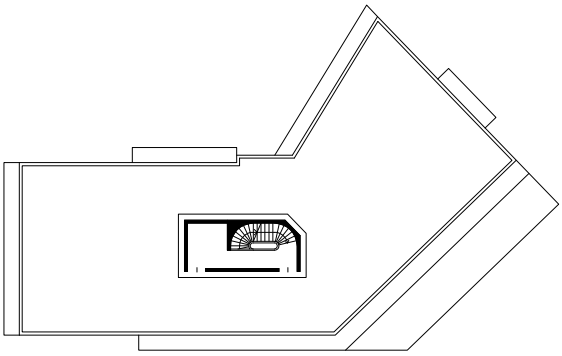


3rd floor, [1/500]

5 flats [54 to 95m2]



4th floor, [1/500]

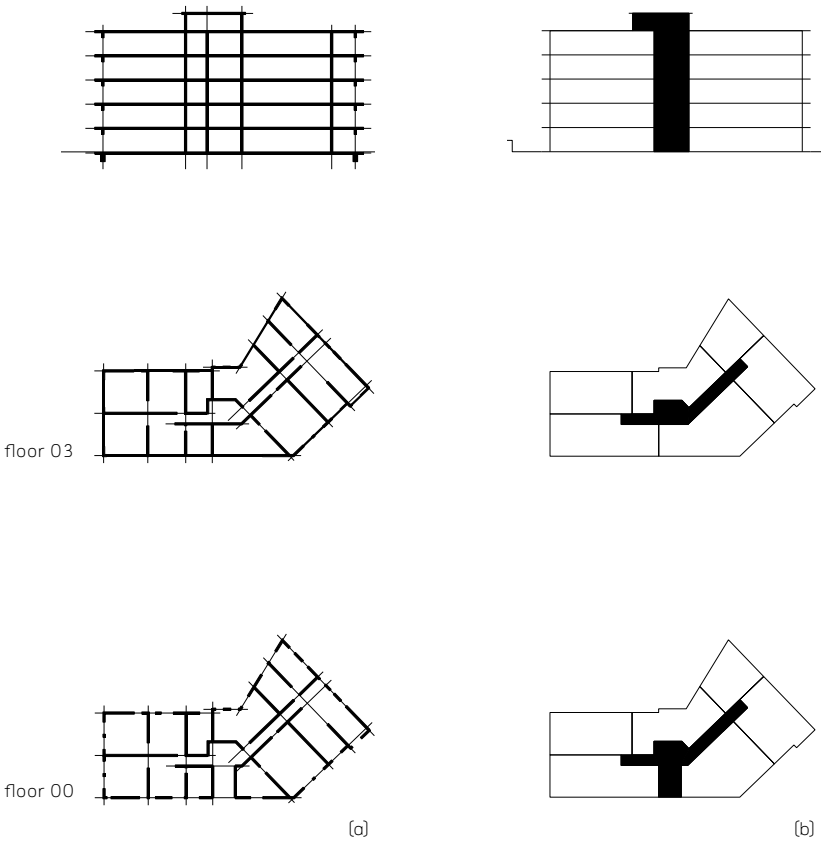


5th floor, [1/500]

Description This polykatoikia is situated between two main exit roads along the seaside. An oversized advertisement sign on the roof attracts the attention of the car-drivers as the still existing wall painting from the original time used to do.

By is detached situation to the neighbour buildings the polykatoikia is surrounded by balconies on all sides over the four levels. The two front sides of the building are linked by a unique angled shaped ramp.

The entrance hall, with a desk for a porter, is wide and points straight to the staircases in the middle of the house. The ground level is lower than the street level and creates a gap between building and plotline. The units on the ground floor and first floor towards the sea are offices for companies. The other storeys are a mix of flats and offices.

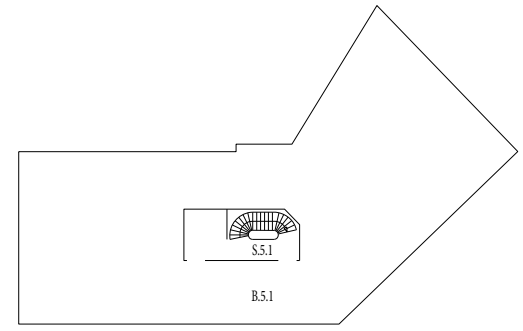


schematic plans of construction (a) and public/private (b), [1/1000] [plan 19]

5.9.2 Spatial Configuration Analysis

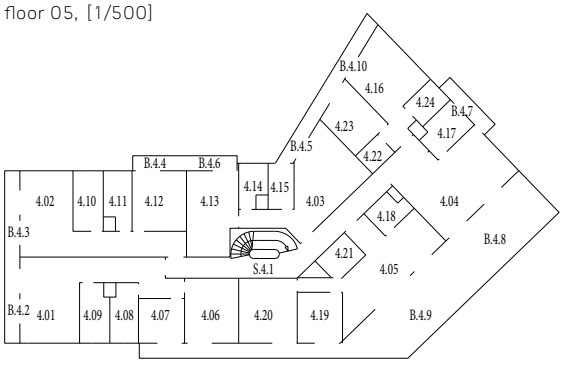
J-Graph Properties

floor 05
premises 2
space steps 1
symmetric 100%
non-distributed 100%



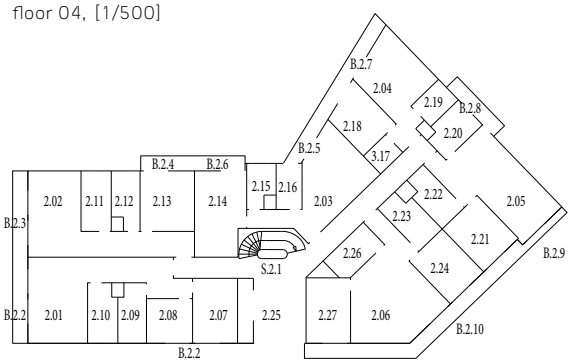
floor 05, [1/500]

floor 04
premises 39
space steps 3
symmetric 87%
non-distributed 72%



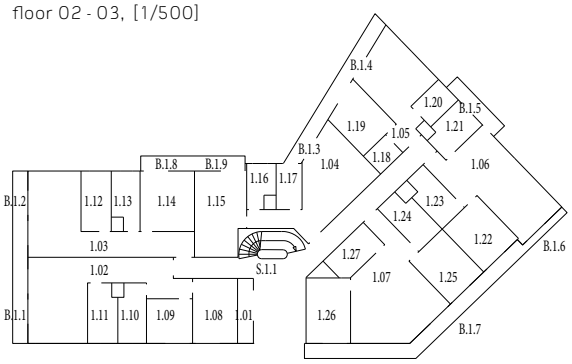
floor 04, [1/500]

floor 02
premises 38
space steps 4
symmetric 95%
non-distributed 53%



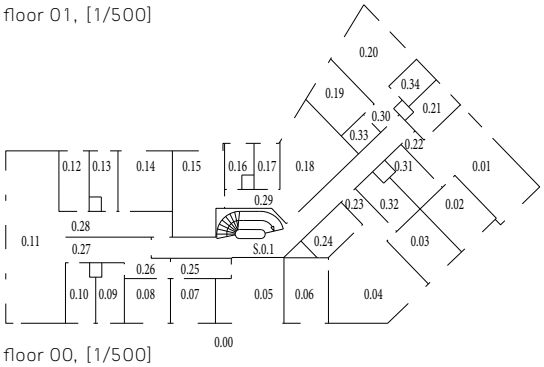
floor 02 - 03, [1/500]

floor 01
premises 36
space steps 3
symmetric 94%
non-distributed 58%

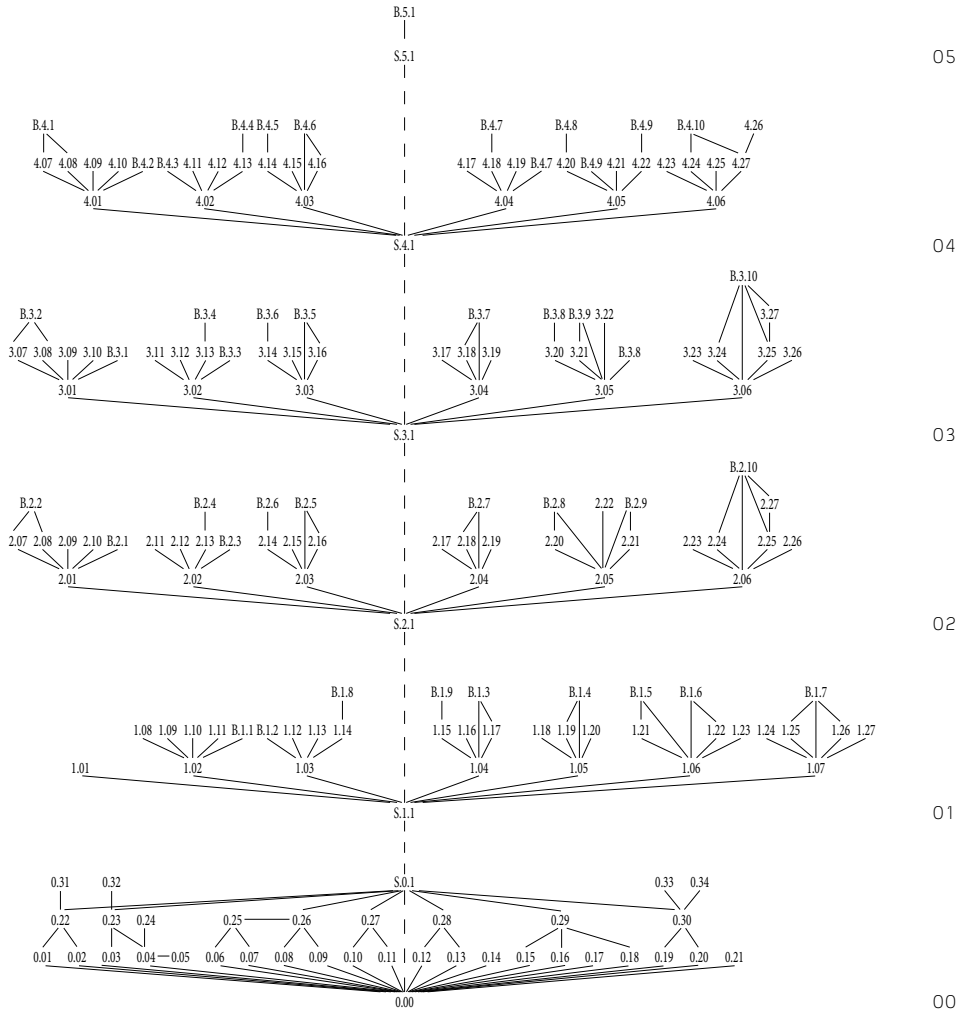


floor 01, [1/500]

floor 00
premises 37
space steps 3
symmetric 86%
non-distributed 27%

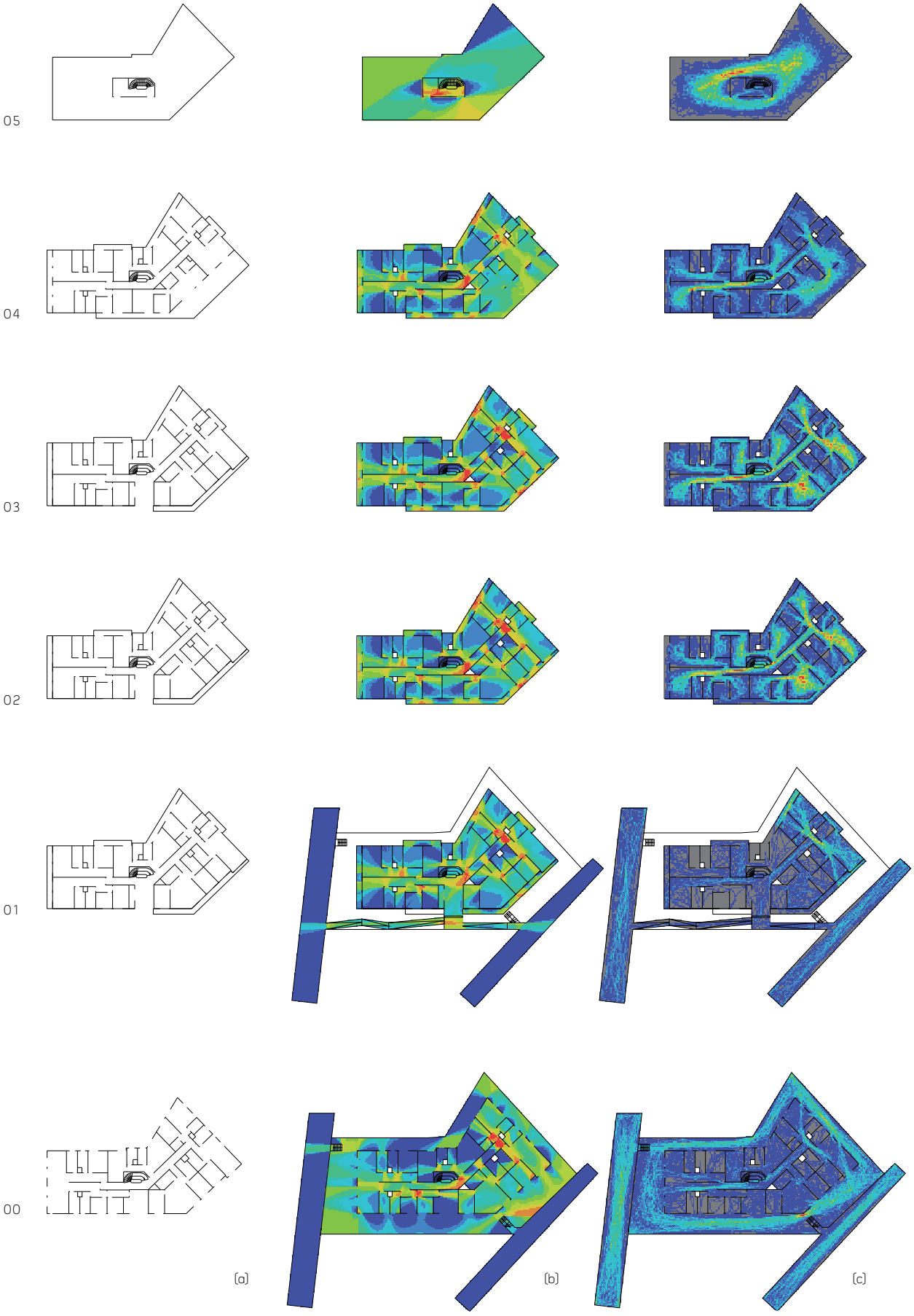


floor 00, [1/500]



J-Graph P09 [figure 28]

5.9.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 29]

Clustering Coefficient

floor 05
min 0.476806
average 0.770769
max 0.999463

floor 04
min 0.321046
average 0.728016
max 1

floor 03
min 0.321046
average 0.745374
max 1

floor 02
min 0.321046
average 0.745374
max 1

floor 01
min 0.330961
average 0.82119
max 1

floor 00
min 0.438601
average 0.838337
max 1

Agents Counts

floor 05
min 1
average 10.5177
max 67

floor 04
min 1
average 9.53574
max 78

floor 03
min 1
average 8.17968
max 44

floor 02
min 1
average 8.17968
max 44

floor 01
min 1
average 6.44765
max 37

floor 00
min 1
average 6.23859
max 43

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.9.4 Adaptation Analysis

Utilities

floor 00
1 yachting company

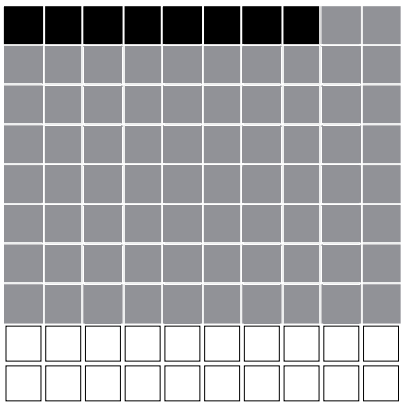
floor 01
4 flats
1 yachting company
1 civil engineer's office

floor 02
4 flats
1 office

floor 03
4 flats
1 office
1 medical centre

floor 04
5 flats

Domain Areas [table 16]



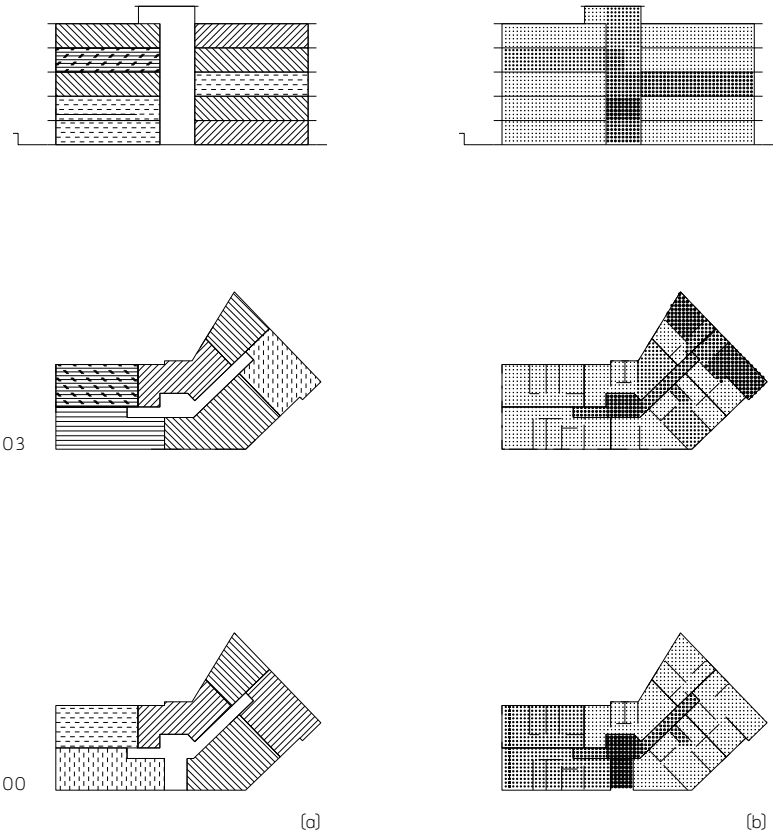
circulation 185.87m²

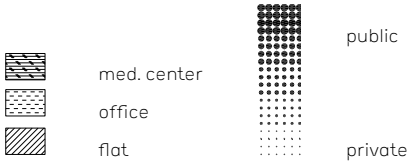
private 1549.92 m²

public - m²

semi-public 409.35m²

total 2145.13m²





schematic plans utilities (a), public/private (b), [1/1000] [plan 20]

balcony

back facade

roof advertisement

ground floor utility

ground floor utility

ground floor utility

ground floor

ground floor

ground floor

door of flat

straircase

porter

nameplate

entrance

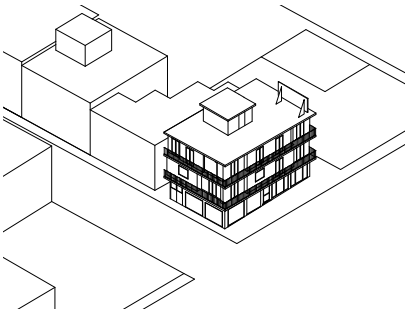
entrance

entrance ramp

5.10 Sof. Venizelou

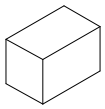
periphery, Ilioupoli

siteplan, [1/2000]



5.10.1 Data Analysis

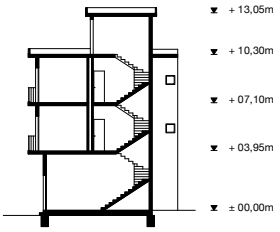
P 10



Sof. Venizelou

Location Sof.Venizelou93/Androutsou Od.
Area Ilioupoli
Year 1960
Type corner buildging

elevation, [1/500]



section, [1/500]

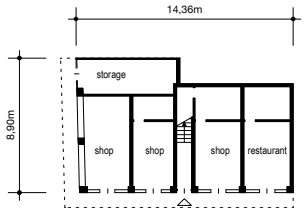
Plot Area 144m²
Site Occupancy Index 0,96
Floor-Space Index 2,6
Built Up Area 138m²
Gross Area 371m²

Number Of Floors 3
Dimension 15,00m x 7,20-9,80m x 10,30m
Height Of Ground Floor 3,00-3,50m

Units On Each Floor 2
Façade Above Ground 231m²
Total Window Area 70m²
Flats Total 2
Offices Total -
Shops Total 4
Extra 1 private school

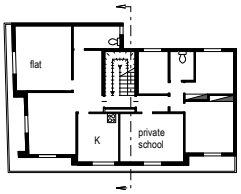

ΦΡΟΝΤΙΣΤΗΡΙΟ
ΓΚΙΚΑ
Τηλ. 9921228
ΚΑΤΕΥΘΥ
ΛΥΚΕ
ΓΥΜΝΑ
ΦΡΟΝΤΙΣΤΗΡΙΟ
ΓΚΙΚΑ
ΔΕΣΜΕΣ
ΛΥΚΕΙΟ
ΓΥΜΝΑΣΙΟ
ΤΗΛ 992 228
ΟΛΑ 3,00€

1 restaurant [20m^2]
3 shops [16 to 20m^2]
1 storage [15m^2]



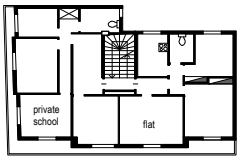
ground floor, [1/500]

1 school [48m^2]
1 flat [51m^2]

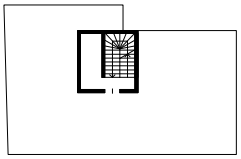


1st floor, [1/500]

1 school [48m^2]
1 flat [51m^2]



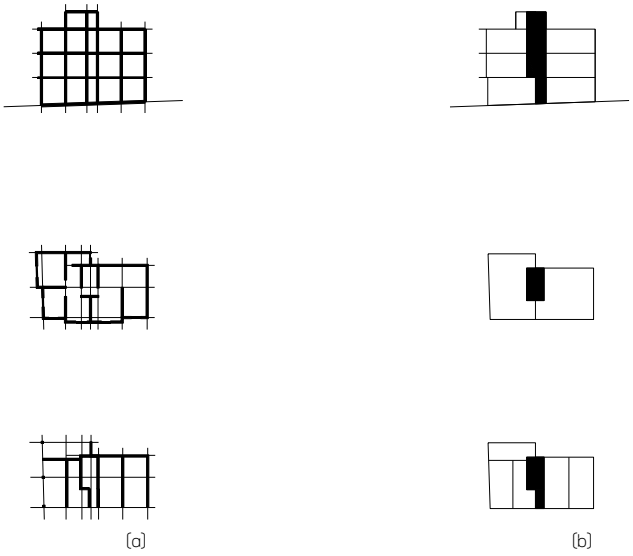
2nd floor, [1/500]



3rd Floor, [1/500]

Description This polykatoikia is situated next to a traffic roundabout of a suburb in periphery of Athens. The polykatoikia, in a shape of a box, is decorated with surrounding balconies. The entrance to the upper floors is narrow and leads to a long staircase in the back of the building.

The polykatoikia inhabits next to flats and shops on the ground floor a language school for English over the last 15 years. Before that, it was entirely used for dwellings. A stimulating arriving and leaving of people turns the staircase into a meeting area for the pupils and inhabitants. The awnings of the ground floor are marking the area of the shops with the displayed goods. All three sides and the roof of the building are by the detached situation marked with oversized advertisement signs.

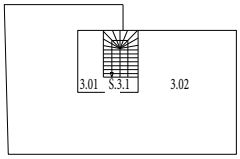


schematic plans of construction (a) and public/private (b), [1/1000] [plan 21]

5.10.2 Spatial Configuration Analysis

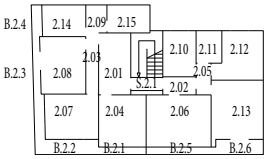
J-Graph Properties

floor 03
premises 3
space steps 1
symmetric 100%
non-distributed 100%



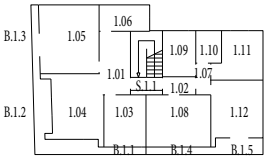
floor 03, [1/500]

floor 02
premises 22
space steps 5
symmetric 71%
non-distributed 100%



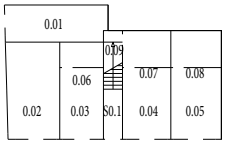
floor 02, [1/500]

floor 01
premises 18
space steps 4
symmetric 71%
non-distributed 100%

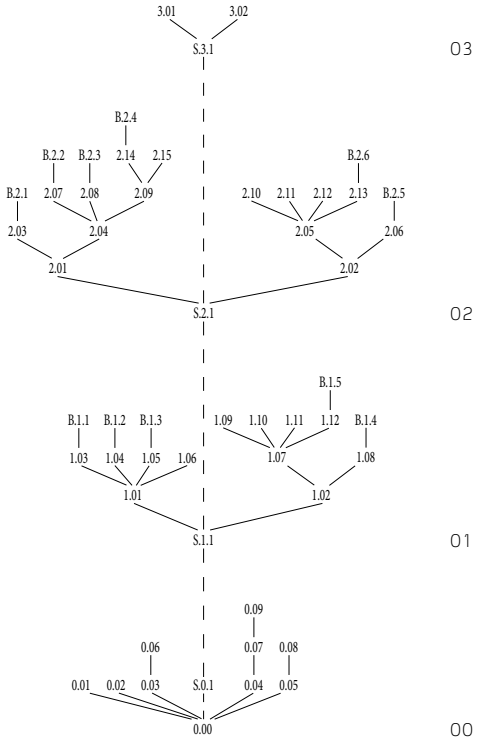


floor 01, [1/500]

floor 00
premises 11
space steps 3
symmetric 60%
non-distributed 100%

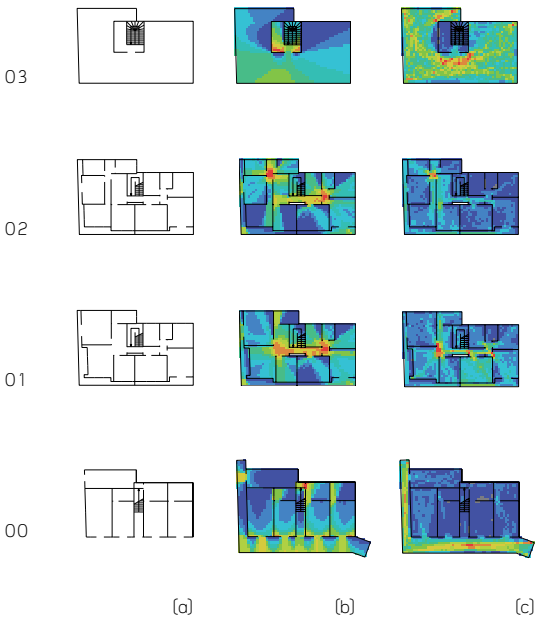


floor 00, [1/500]



J-Graph P10 [figure 30]

5.10.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 31]

Clustering Coefficient

floor 03
min 0.408193
average 0.830768
max 1

floor 02
min 0.259501
average 0.779367
max 1

floor 01
min 0.265529
average 0.768788
max 1

floor 00
min 0.408811
average 0.832486
max 1

Agents Counts

floor 03
min 1
average 24.0579
max 56

floor 02
min 1
average 28.9439
max 188

floor 01
min 1
average 26.5766
max 118

floor 00
min 1
average 23.6535
max 120

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.10.4 Adaptation Analysis

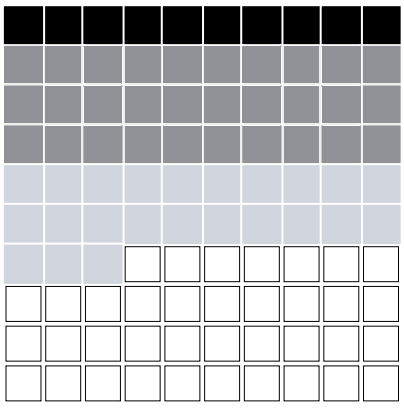
Utilities

floor 00
3 shops
1 restaurant
1 storage

floor 01
2 flats [until 1975]
1 private school [since 1975]
1 flat [since 1975]

floor 02
2 flats [until 1975]
1 private school [since 1975]
1 flat [since 1975]

Domain Areas [table 17]



circulation 30.60m²

private 95.65m²

public 73m²

semi-public 115.25m²

total 314.50m²

floor 02

floor 00

(a)

(b)

office

flat

shop

public

private

schematic plans utilities (a), public/private (b), (1/1000) [plan 22]

balcony

back facade

advertisement sign

upper floor utility

upper floor utility

upper floor utility

ground floor utility

ground floor utility

ground floor utility

ground floor

ground floor

ground floor

corridor

corridor

straircase

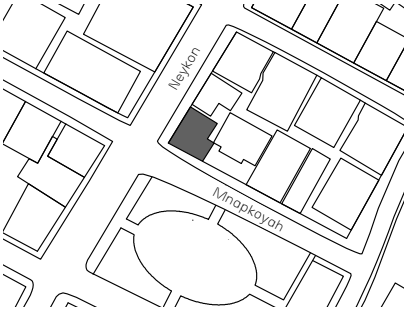
nameplate

entrance

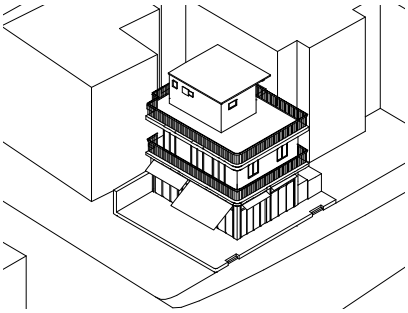
entrance

5.11 Peukon

periphery, Nea Ionia



siteplan, [1/2000]

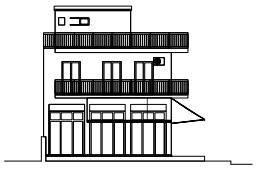


5.11.1 Data Analysis

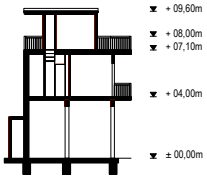
P 11

Peukon

Location Peukon / Barkouli
Area Nea Ionia
Year 1973
Type corner building



elevation, [1/500]



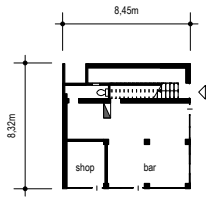
section, [1/500]

Plot Area 102m²
Site Occupancy Index 0,86
Floor-Space Index 1,6
Built Up Area 88m²
Gross Area 161m²

Number Of Floors 3
Dimension 8,50m x 8,30m x 7,10m
Height Of Ground Floor 4,00m

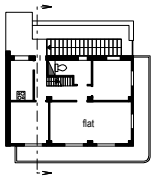
Units On Each Floor 1
Façade Above Ground 143m²
Total Window Area 45m²
Flats Total 2
Offices Total -
Shops Total 1
Extra 1 bar

1 shop [8m²]
1 café [44m²]



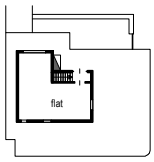
groundfloor, [1/500]

1 flat [63m²]



1st floor, [1/500]

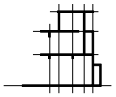
1 flat [20m²]
1 terrace private [16m²]

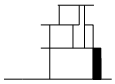


2nd floor, [1/500]

Description This polykatoikia is shaped like a sugar-cube. It steps back from the street, leaving the originated and raised forecourt for tables and seats of the bar in the ground floor. Situated along a green square of a suburb, it attracts the visitor by the full-sized glass front of the bar enabling a view into the scanty furnished inside.

Its overhanging awning is marking the imaginary extension of the café towards the street. The building consist of only two floors, that makes it the smallest in the block. Next to the bar is a kiosk, packed with cigarettes and small goods. The upper floor consists of an apartment. At the back of the building is an outside staircase leading to the flats on the upper floors. By the fairly low height of the polykatoikia the roof terrace becomes visible with its wooden pergula.





floor 01

floor 00

(a)

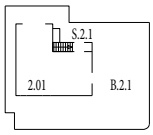
(b)

schematic plans of construction (a) and public/private (b), [1/1000] [plan 23]

5.11.2 Spatial Configuration Analysis

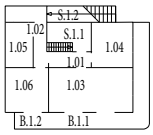
J-Graph Properties

floor 02
premises 4
space steps 2
symmetric 67%
non-distributed 100%



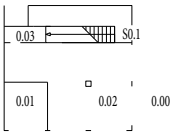
floor 02, [1/500]

floor 01
premises 9
space steps 3
symmetric 50%
non-distributed 100%

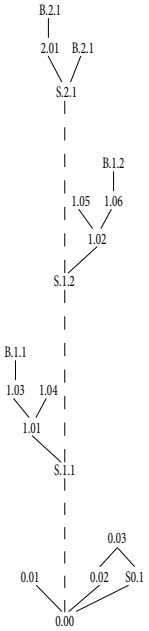


floor 01, [1/500]

floor 00
premises 5
space steps 2
symmetric 80%
non-distributed 20%

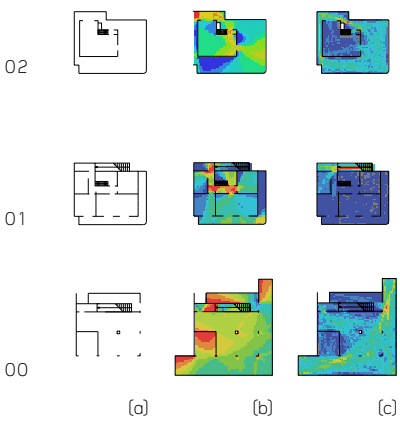


floor 00, [1/500]



J-Graph P11 [figure 32]

5.11.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), [1/1000] [figure 33]

Clustering Coefficient

floor 02
min 0.398664
average 0.758921
max 1

floor 01
min 0.382588
average 0.792435
max 1

floor 00
min 0.416642
average 0.782852
max 1

Agents Counts

floor 02
min 1
average 22.0505
max 96

floor 01
min 1
average 27.3956
max 327

floor 00
min 1
average 18.3023
max 70

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.11.4 Adaptation Analysis

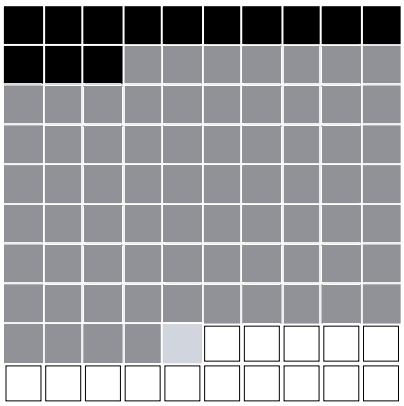
Utilities

floor 00
1 kiosk
1 café

floor 01
1 flat

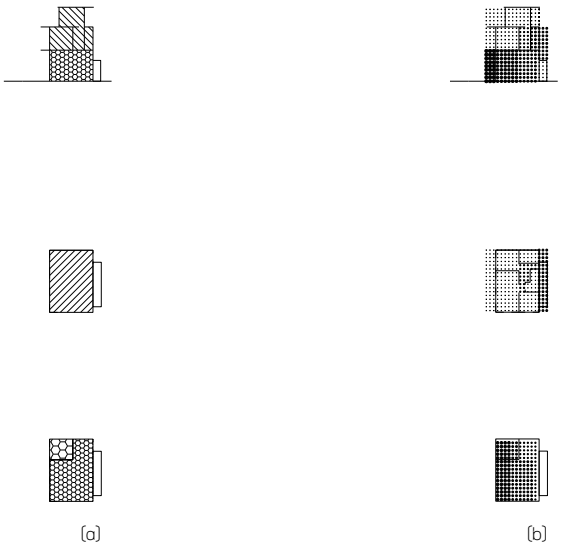
floor 02
1 flat

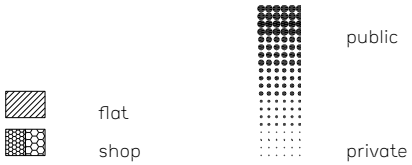
Domain Areas [table 18]



circulation 35.70m²
private 200.50m²
public 43.70m²
semi-public 2.50m²

total 282,40m²





schematic plans utilities (a), public/private (b), (1/1000) [plan 24]

balcony

ground floor utility

ground floor utility

ground floor

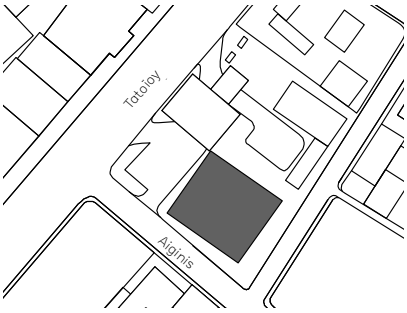
straircase

groundfloor utility

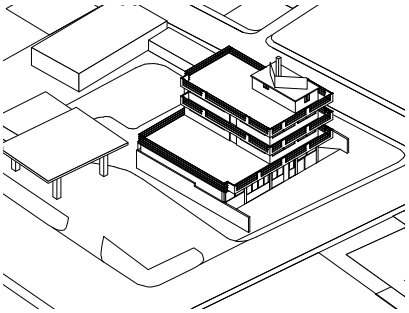
groundfloor

5.12 Aiginis

periphery, Nea Ionia

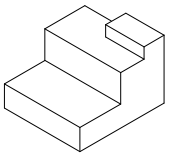


siteplan, [1/2000]



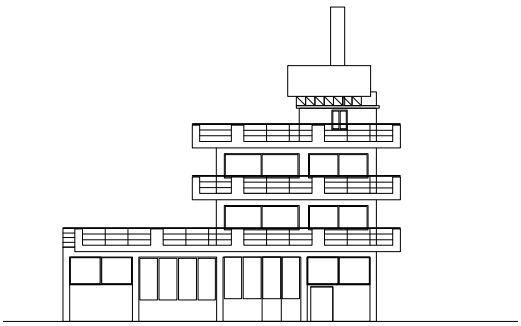
5.12.1 Data Analysis

P 12

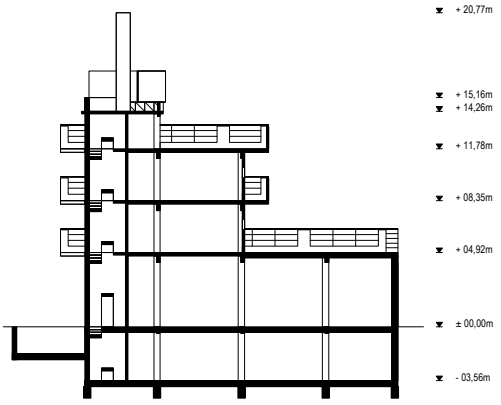


Aiginis

Location Aiginis 3 / Tatoiou
Area Nea Ionia
Year 1970
Type detached building



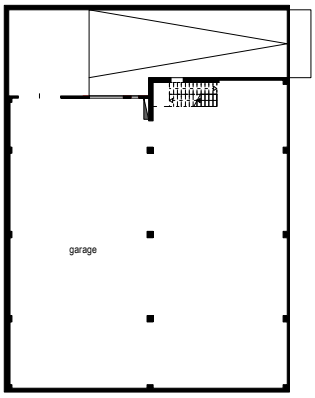
elevation, [1/500]



section, [1/500]

Plot Area 556m²
Site Occupancy Index 0,92
Floor-Space Index 2,4
Built Up Area 513m²
Gross Area 1342m²

Number Of Floors 4
Dimension 25,60m x 18,90m x 14,30m
Height Of Ground Floor 4,90m

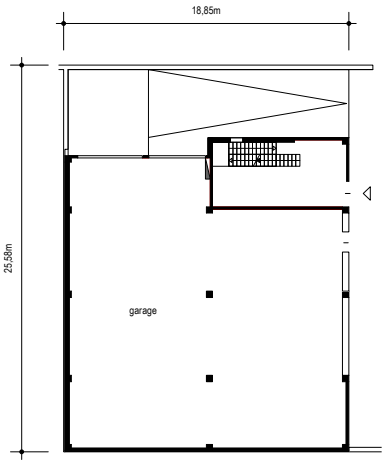


basement, [1/500]
1 garage [365m2]

Units On Each Floor -
Façade Above Ground 820m²
Total Window Area 158m²
Flats Total -
Offices Total 1
Shops Total -
Extra 1 garage

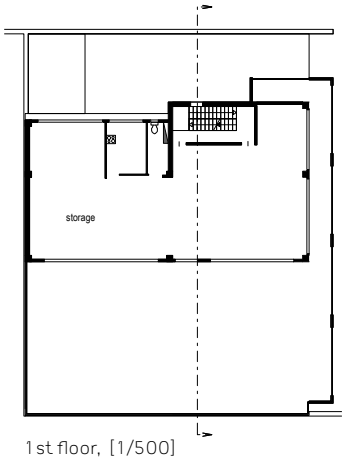

ΑΝΤΑΛΛΑΚΤΙΚΑ
ΑΥΤΟΚΙΝΗΤΩΝ
ROVER

1 garage [365m2]



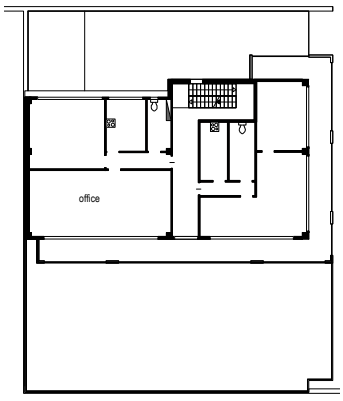
groundfloor, [1/500]

1 storage [158m2]

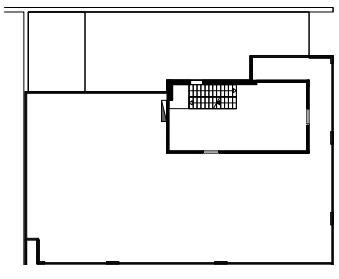


1st floor, [1/500]

1 office [158m2]



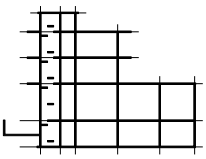
2nd floor, [1/500]

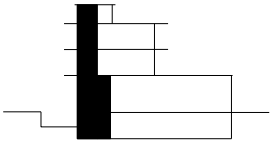


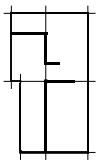
3rd floor, [1/500]

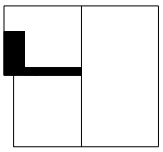
Description This case is situated in a craft area at the edge of Athens, but the polykatoikia seems to have been planned for trade in the ground floor and housing on the upper floors. It is flanked by a petrol station and parking lots; it's a detached building.

The step backs of the building are leaving as a leftover two terraces. An outside ramp leads to the basement. Impressive are the indicators of the current use which are distributed all over the building: pieces of car bodies. An oversized advertisement sign on the roof is asking for attention.



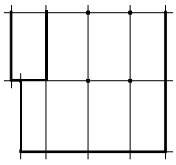


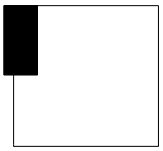




floor 02

floor 00





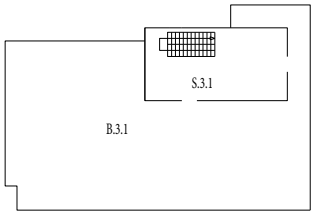
(a) (b)

schematic plans of construction (a) and public/private (b), [1/1000] [plan 25]

5.12.2 Spatial Configuration Analysis

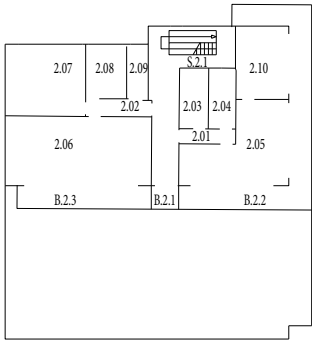
J-Graph Properties

floor 03
premises 2
space steps 1
symmetric 100%
non-distributed 100%



floor 03, [1/500]

floor 02
premises 15
space steps 4
symmetric 86%
non-distributed 100%

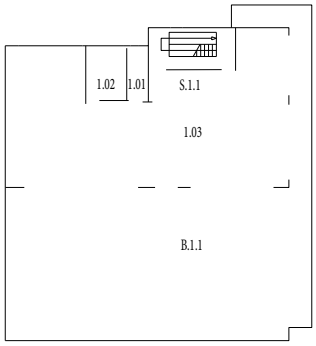


floor 02, [1/500]

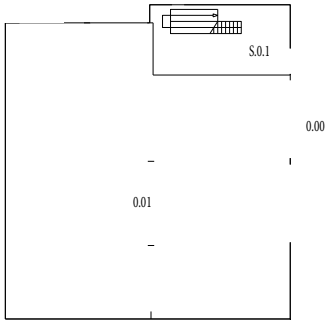
floor 01
premises 5
space steps 2
symmetric 75%
non-distributed 100%

floor 00
premises 2
space steps 1
symmetric 100%
non-distributed 100%

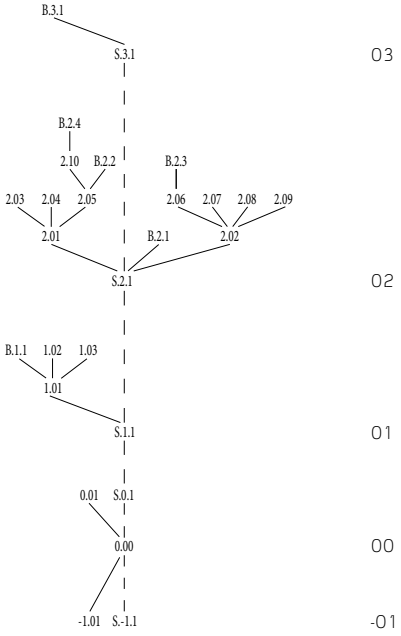
floor -01
premises 2
space steps 1
symmetric 100%
non-distributed 100%



floor 01, [1/500]

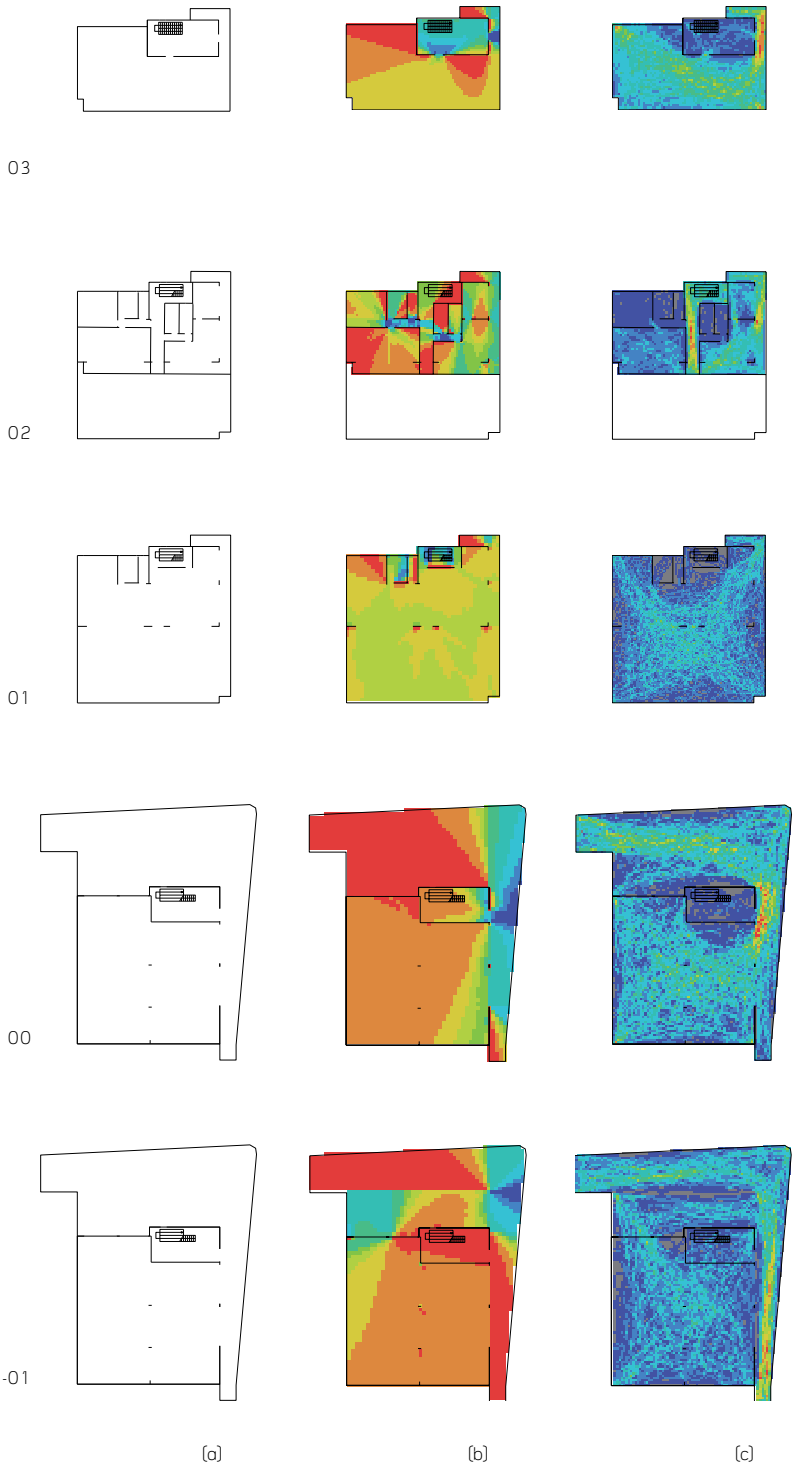


floor 00, [1/500]



J-Graph P12 [figure 34]

5.12.3 Visibility Graph Analysis



schematic plans (a), clustering coefficient (b), agent (c), (1/1000) [figure 35]

Clustering Coefficient

floor 03
min 0.510223
average 0.864846
max 1

floor 02
min 0.397646
average 0.82141
max 1

floor 01
min 0.329945
average 0.860338
max 1

floor 00
min 0.575428
average 0.838615
max 0.99909

floor -01
min 0.44848
average 0.886464
max 1

Agents Counts

floor 03
min 1
average 19.5687
max 66

floor 02
min 1
average 15.3285
max 69

floor 01
min 1
average 4.19314
max 17

floor 00
min 1
average 13.7704
max 52

floor -01
min 1
average 6.0197
max 29

depthmap set up

grid 0.3
doors open
balcony doors open
stairs hidden

clustering coefficient
isovist properties 0%
global measures radius 0%
visibilty realtionships 100%
local measures 100%
metric relationships 0%
angular relationships 0%

agent analysis
analysis length 10000
release rate 0.1
release any location 100%
release selected locations 0%
field of view 10
steps before turn decision 10
timesteps in system 1000

5.12.4 Adaptation Analysis

Utilities

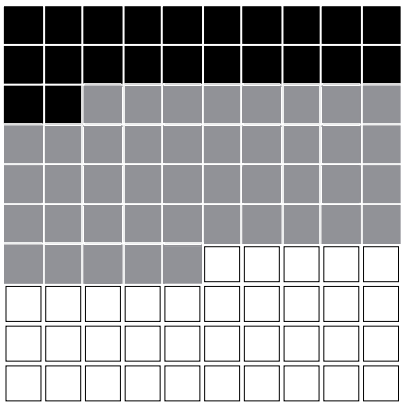
floor -01
1 storage of garage

floor 00
1 garage

floor 01
1 storage of garage

floor 02
1 office

Domain Areas [table 19]



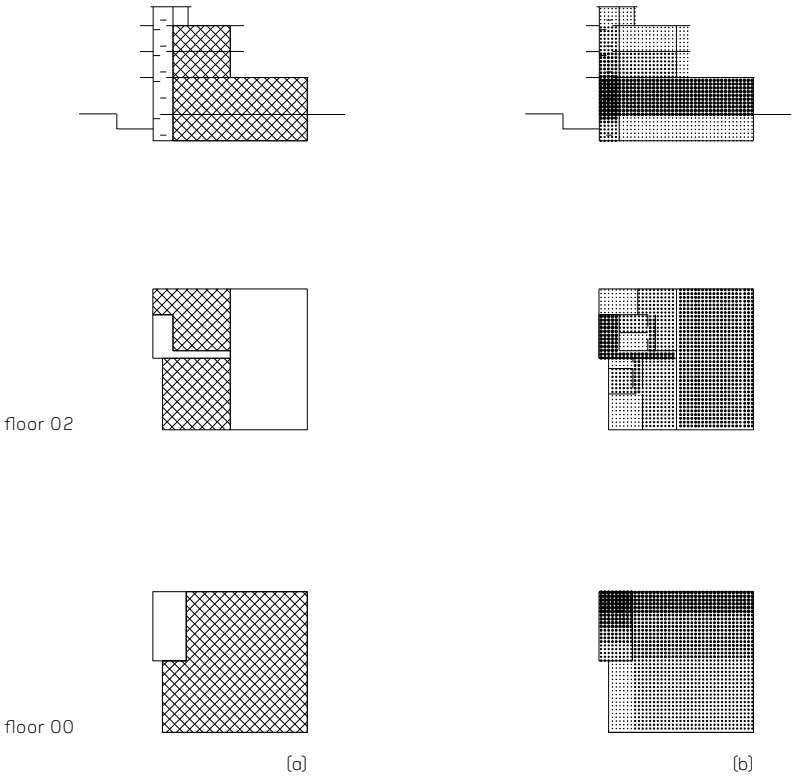
circulation 331.30m²

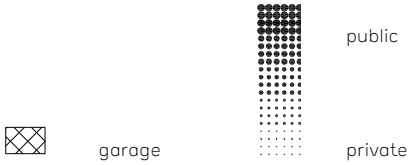
private 562.70m²

public - m²

semi-public 669m²

total 1563m²





schematic plans utilities (a), public/private (b), (1/1000) [plan 26]

balcony

back facade

advertisement sign

ground floor utility

ground floor

ground floor

roof advertisment

6.0 Research Interpretation

The analysis results in an interpretation, pointing out the significance for the research question. Each dimension of the analysis will be evaluated and interpreted within the general context. In closing, the summary leads into an conclusion about a possible application of the gained knowledge.

6.1 Discussion of the Outcomes

Data

The average value of the site occupancy index [0,91] and of the floor space index [4,58] proves that the polykatoikia is one of the densest typologies according to European standards [table 01]. Summarizing the analysed data, we see that the chosen cases also have, as already mentioned, genotypical floors, with an emphasized ground floor of 4.23m height [centre 5.28m, semi-periphery 5.50m, periphery 4.90m] and 5 further upper floors of 3.00m height. Further genotypical elements are visible in the construction grid, the centralized infrastructure, flat roof, balconies, setbacks, and occasionally stoa.

Spatial Configuration

All the buildings researched so far have, in spite of their variety in form and function, two generic features:

First, they all possess the spatial elementary relation between inhabitant and visitor, in the sense that the inhabitant is in the deeper, often non-distributed parts of the building, and interfaces with the visitor through the shallower, often distributed parts of the building that form its principal circulation system.

Second, they are based on formalistic logic of axialty or convextity and horizontal or vertical orientation. The interpretation of the analysis, outlined in this section by use of j-graph-analysis, will focus on these two dimensions, their inter-relations, and outcomes. With other words, the self-contained 'laws of space' cause effects ranging from the local physical design decisions to global configurational consequences and also the linked field of 'natural movement' and its boundaries.

Shallovv or Deep

Looking at the j-graphs in figure 12, drawn from the outside, we can see that despite geometrical differences in the houses there are strong similarities in the configurations. This can be seen most easily by concentrating on the space marked 0.00 which is the pedestrian walkway, by which each inhabitant or visitor enters the building. In each case, we can see that the outside links directly to a commercial use and entrance hall in the ground floor — that is, it is at depth one in the complex — and acts as a link between the outside and various semi-public and private spaces in the inside. 0.00 also has a more fundamental property, one which arises from its relation to the spatial configuration of the house as a whole. If we count the number of spaces we must pass through to go from the 0.00 to any other spaces, we find the general form of this measure, called integration. It can be applied to any space in any configuration: the less depth from the complex as a whole, the more integrating the space, and vice versa.

There are generally two kinds of j-graph 'bushes' as comparing the floors of the polykatoikias.

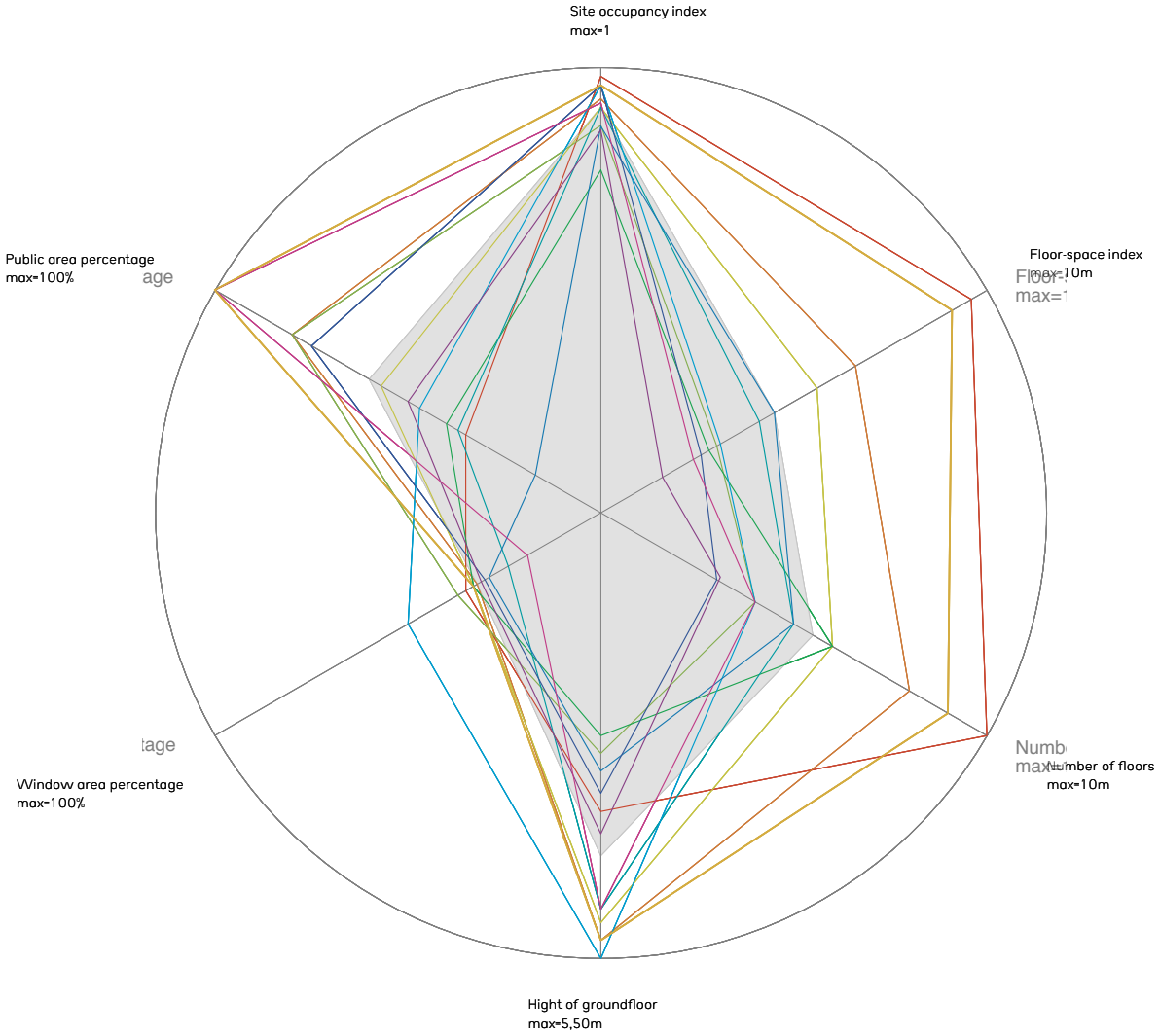
One has many "branches" from "the space step number one", which is the stoa or generally ground floor. The other kind has fewer "branches" from the entrance on "step one", which is mainly the staircase respectively corridor on the upper floors.

If we now consider those two kinds of bushes as labels, or more precisely the relation of the various labels within the space configurations, we can begin to detect certain regularities in terms of the relations between syntactic positions within the complex and the way in which labels are assigned to spaces. For example, the space labelled as GF [figure 12: C01, S07 or P05] or less frequently 1F [see C01 and C03] is always shallow, whereas space CF [figure 12: C02, S05 or P10] is always as deep as it is possible to go from the outside [figure: 13]. Spaces GF [figure 12: S08, P09 or P11] and CF [figure 12: C03, S07 or S08] sometimes have a ring-shape.

Lavvs of Space

Relative symmetry or asymmetry in j-graph-analysis will articulate the relations of the space, that is, of the category embodied by the space; and ringingess - i.e. distributedness - in a j-graph will articulate the relations of the boundary, that is the relations of control on the category.

Like Hillier and Hanson [1984] note, the more descriptions are symmetrical, then the more there will be a tendency towards integration of social categories [such as the categories of inhabitant and stranger], while conversely the more they are asymmetrical, then the more there will be a tendency towards segregation of social categories. Simultaneously, the more descriptions are distributed, then the more there will be a tendency towards the diffusion of spatial control, while nondistributedness will indicate a tendency towards a unitary, superordinate control.



01 Stournari

02 Kaningos

03 Veranzerou

04 Alexandras

05 Veikou

06 Amfitheas

07 Alkuonis

08 Sarataporou

09 Poseidonos

10 Venizelou

11 Peukon

12 Aiginis

data summary [table 08]

Symmetry or Asymmetry

Investigation of the range of different polykatoikias in this way eventually suggests certain general principles for the analysis of polykatoikias as spatial patterns and their consequences of local physical design moves to global configurational effects.

First, the space in general is intelligible if it is understood as being determined by two kinds of relations, rather than one: the relations among the occupants and the relations between occupants and outsiders. Both these factors are important determinants of spatial form, but even more so is the relation between these two points of view in the case of the polykatoikia. It is exactly the difference between these points of view that are investigated by analysing the relation of boundaries both from points inside the system and from the outside.

Second, there seemed to be certain consistencies in the way in which the relation of spaces, symmetric or asymmetric dimensions of the syntax model, are related to social factors. The dimension of asymmetry is, it appears, related to the private and public domains of categories. For example, a flat is a space that normally is unimportant in public life, but of considerable importance as a social category of space, for very private use. As a result, it is relatively segregated from the principal areas of everyday living of a polykatoikia, and this had the effect of giving it a high relative asymmetry: it is, of all the major spaces in the house, the least integrated [figure 11: CF of C01, 1F of S06 and CF of P10]. But in contradiction it shows that the most integrated are the once with highest symmetry, as the stoa, the area of the ground floor and the corridor [figure 11: 1F of C03, GF of S07 and GF P05]. Or even a flat like the first floor of the case C02 turned into an office in the third floor, changing the asymmetric dimension into symmetric [figure 11 & table 10].

Distributed or Nondistributed

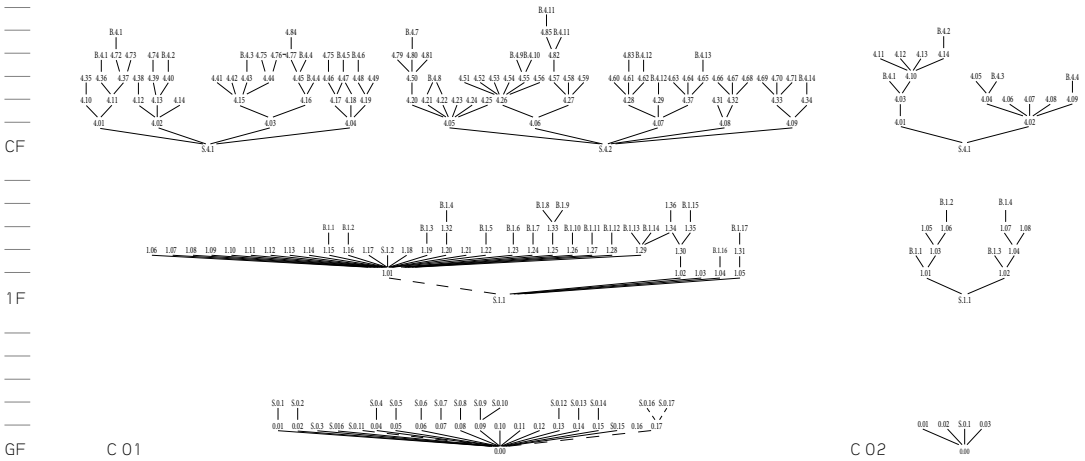
The distributed-nondistributed The distributed-nondistributed properties of the pattern, on the other hand refer to the kind of controls that are in the system. The distributed-nondistributed dimension are also be quantified [table 11]. Since the existence of distributed relations in a polykatoikia result in the formation of rings of spaces, then quantification can be in terms of how any particular space related to the rings formed by the pattern.

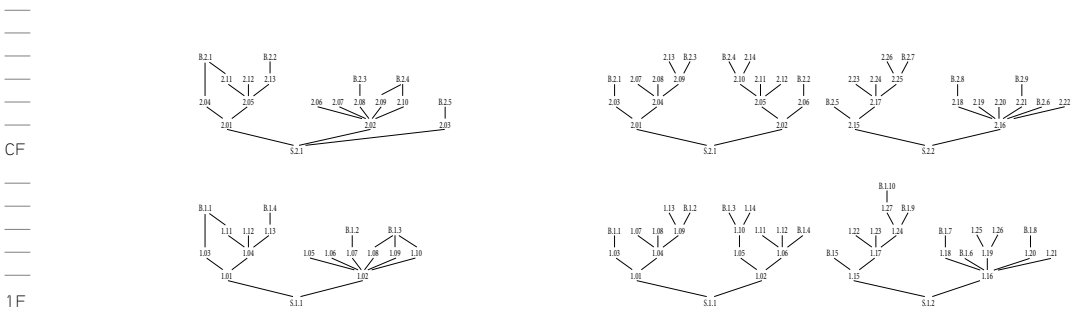
Looking at figure 11 at S06 we can immediately see that 00 is a 'shallow tree' form, and 1F a 'deep tree' form. By 'tree' we mean that there is one link less than the number of cells linked, and that there are therefore no rings of circulation in the graph. All trees, even two as different as in the two in the figures, share the characteristic that there is only one route from each space to each other space — a property that is highly relevant to how polykatoikia layouts function. However, where 'rings' are found [figure 11: 1F of C03, S05 and P05], the justified graph makes them as clear as the 'depth' properties, showing them in a very simple and clear way as what they are, that is, alternative route choices from one part of the pattern to another. For example the opening a wall changed the connection from space 0.11 to space 0.12 in P09 from a non-distributed one into a distributed one.

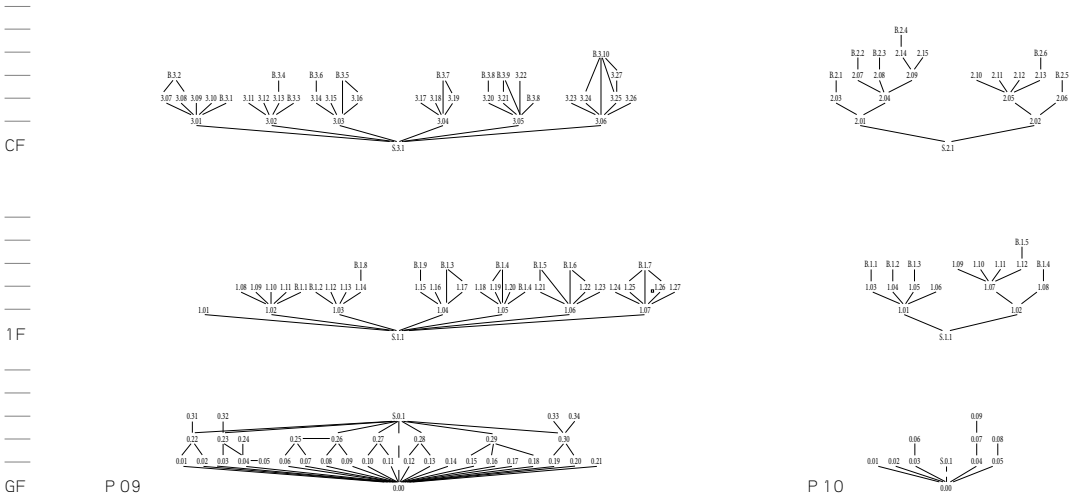
Judging from the j-graphs of the cases we can state that the integration of the ground floor is generally high. And in the other floors we find a decrease of integration from the staircases to the deepest spaces of flats. The spatial domains of the cases are in conformity to this observation. The stoa and most of the staircases are open to the visitors while the permeability of the linked spaces is depending on its spatial positioning within the pattern. The relation from the corridor towards the flat or e.g. medical centre is more symmetric and thus integrated than the relation from the flats, hall, or reception of the doctor towards the more private rooms.

Boundary

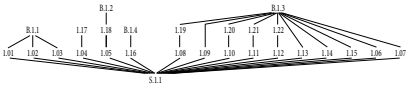
The boundary of the polykatoikia is soft and permeable. The vertical openings in the façade are the colonnades, full-sized glass fronts and balconies. Its horizontal openings are the staircases and their connection to ground floor. Thus the reversal of space that occurs naturally at the boundary of the polykatoikia generates a dualism in the principles of solidarity that can relate society to space. An analysis of spatial patterns internal of the polykatoikia, and those relating the interior to the exterior, must therefore aim to capture the spatial correlates of these bifurca

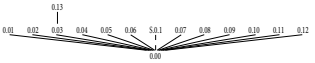






summary of J-Graph's [figure 11]





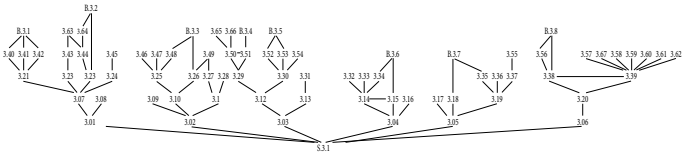
C 03

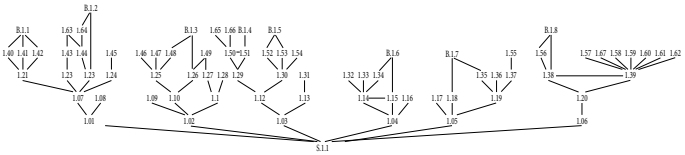
C 04

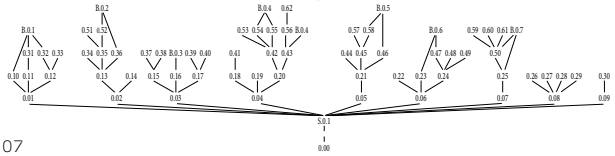
CF

1F

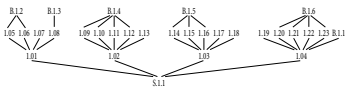
GF

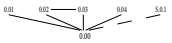






S 07



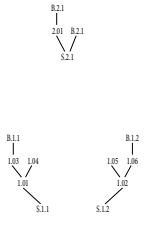


S 08

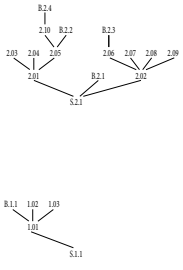
CF

1F

GF



P 11



P 12

CF

1F

GF

ting principles. This will be possible because the dualism reflects only the dual nature of the boundary, which at the same time creates a category of space - the interior - and a form of control - the boundary itself. This dualism is invariably omnipresent in spatial patterns within polykatoikia.

The boundary of the polykatoikia has an extra significance, as it lies between the two spheres of public domain and private property, in a mediating, defining role. It reflects a system of power relations, as it is a line drawn in space to separate the territory into two spheres. Through creating barriers, it is used to shape behaviour, control access and manage different social groups. Polykatokia building is partly a boundary setting exercise, subdividing space and creating new functions and meanings, establishing new relationships between the home and the street.

The way the boundaries are established, articulated and related to the private or public spheres often has a major impact on the character of each side. The boundaries are simultaneously means of separation and communication. Colonnades, front porches, semi-public gateways and foyers, elaborate facades and courtyards are some of the ways the boundary between the public and private is articulated to allow interaction and communication between the two realms. This dialogue between the two realms, rather than rigid walls, promotes a civilized ambivalence, which enriches social life. At the same time, there are pressures to separate the two clearly, such as the need for the protection of a person's private sphere from public gaze. It becomes the task of a multiplicity of boundaries to express and shape this coexistence of ambiguity and clarity. This means combining legal and political clarity while allowing for practical and social flexibility, with a degree of permeability that facilitates interaction and communication.

In order to sketch a general evaluation on the relation of the boundaries we must return to the most elementary concept of a building. The elementary cell is, as Hillier and Hanson [1984] recall, a closed cell with a permeability defining a contiguous open cell. This structure is also the elementary building, seen from the point of view of the abstract model. The open segment of space is the distributed component and the closed cell is the nondistributed component. The closed cell is the domain of the inhabitant alone, while the open cell is the locus of the inhabitant-visitor interface. The traditional shop, for example in the polykatoikia, which during the day lays out its goods in the space in front of the open cell and at the same time makes the interior of the open cell as continuous as possible with the outside space, is exploiting the basic potential of this structure.

At night, all the goods are put inside the closed cell and the permeability is sealed. The whole structure as it were becomes the closed cell alone. During the day the opposite occurs. The disposition of goods in the open cell and the opening of the closed cell implies that as far as possible the whole structure becomes the open cell alone. The elementary structure appears not because of an inherited tradition, but because of structural necessity: a shop has a very definite spatial model. It must maximise the probability of random visitors at its interface and minimise the controls over them as far as is consistent with the control of the removal of its goods. The structural isomorphism of the shop is equal with the internal structural necessities of the polykatoikia realising itself in physical form. Judging from the mean nondistributed values of the chosen cases [figure 15], we record that the ground floor is in general less nondistributed than the rest of the building. Assuming the polykatoikia as a cell, the described elementary structure of the shop is regenerated all over the building. It gives the openness and diffusion of spatial control in the ground floor towards its surrounding, while in the upper floors the control of the inhabitants to the visitors is higher in conformity to the permeability of the boundaries. Therefore we can state that the logic of the circumstances of the polykatoikia dictates the maximising of random encounters without losing a minimal spatial control.

Formalistic Logic

The structure of those labelled spaces mentioned above needs to be considered not only from these three points of spatial view [shallow or deep, symmetry or asymmetry, distributed or nondistributed], but also in terms of their formalistic logic: its axiality and its convexity, its centralized and its linear form, its horizontal and its vertical form, considered separately and in relation to each other.

Axiality or Convexity

We can identify by these j-graphs [figure 11] that the ground floor has in its stoa, as in the ground floor of C01, or as in P10, its general ground floor façade and as in S08, the upper floors by its corridors or balconies axiality. On the other hand the upper floors have, as in C02 or S05 convexity at their staircases or flats. Insofar as axiality refers to the maximum global extension of the system of spaces unified linearly, whereas convexity refers to the maximum local extension of the system of spaces unified two-dimensionally, the sociological referents of axiality and convexity for the polykatoikia follow naturally. Axiality refers to the global organisation of the system and therefore its organisation with respect to the public space, or in other words to movement into and through the system; whereas convexity refers more to the local organisation of the system, and therefore to its organisation with respect to private space or, to put it another way, to its organisation from the point of view of those who are already statically present in the system.

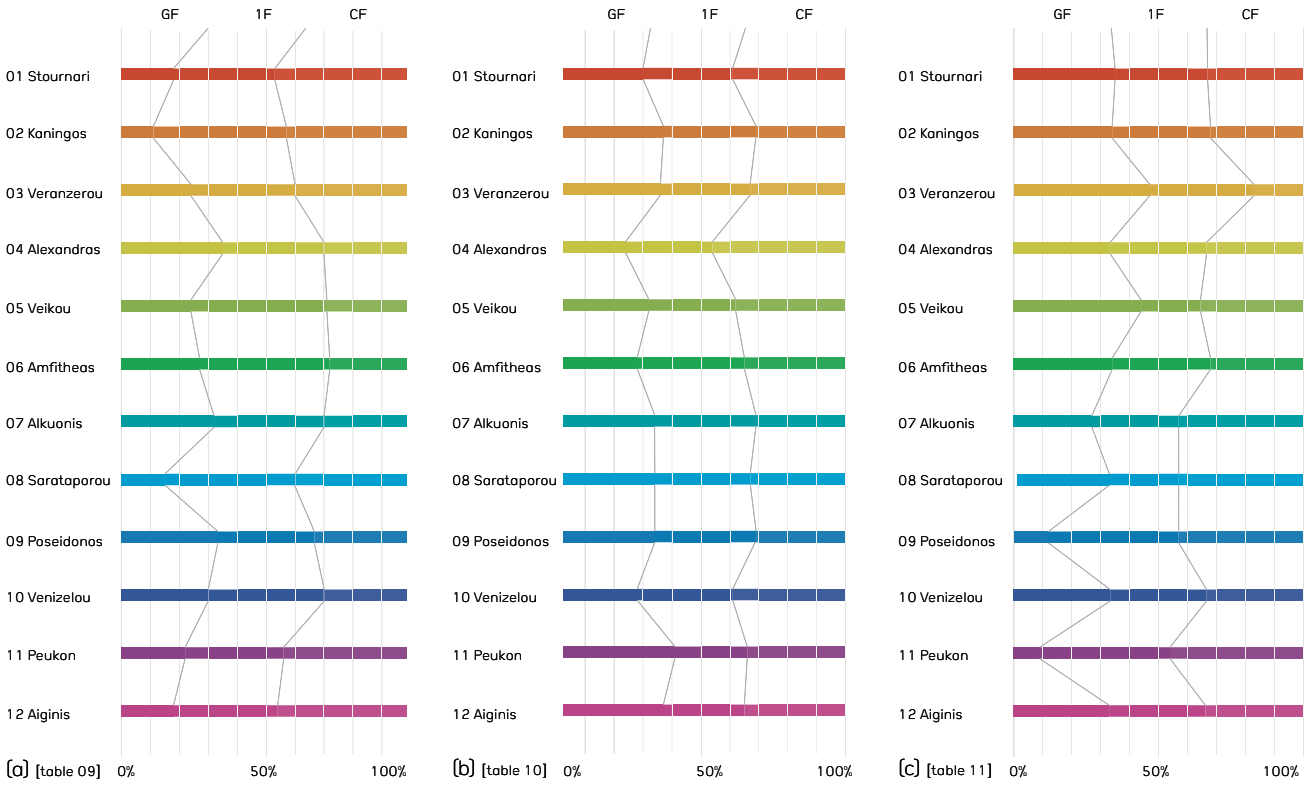
Centrality

Along with the axiality and convexity, we come across another supporting aid for the dualism of a polykatoikia: the paradox of centrality with the centralized staircase and its corridors – comparable to a circular form – and a stoa, stretched beyond the ground floor – comparable to the linear form. In a circular form, integration runs from centre to edge, with the greatest integration in the centre, and the least at the edge. This prioritises the centre from the point of view of known effects of integration on the functioning of a spatial system. For example, more movement along shortest paths will pass through the central area than anywhere else, if movement is from all points to all other points, or if origins and destinations are randomised.

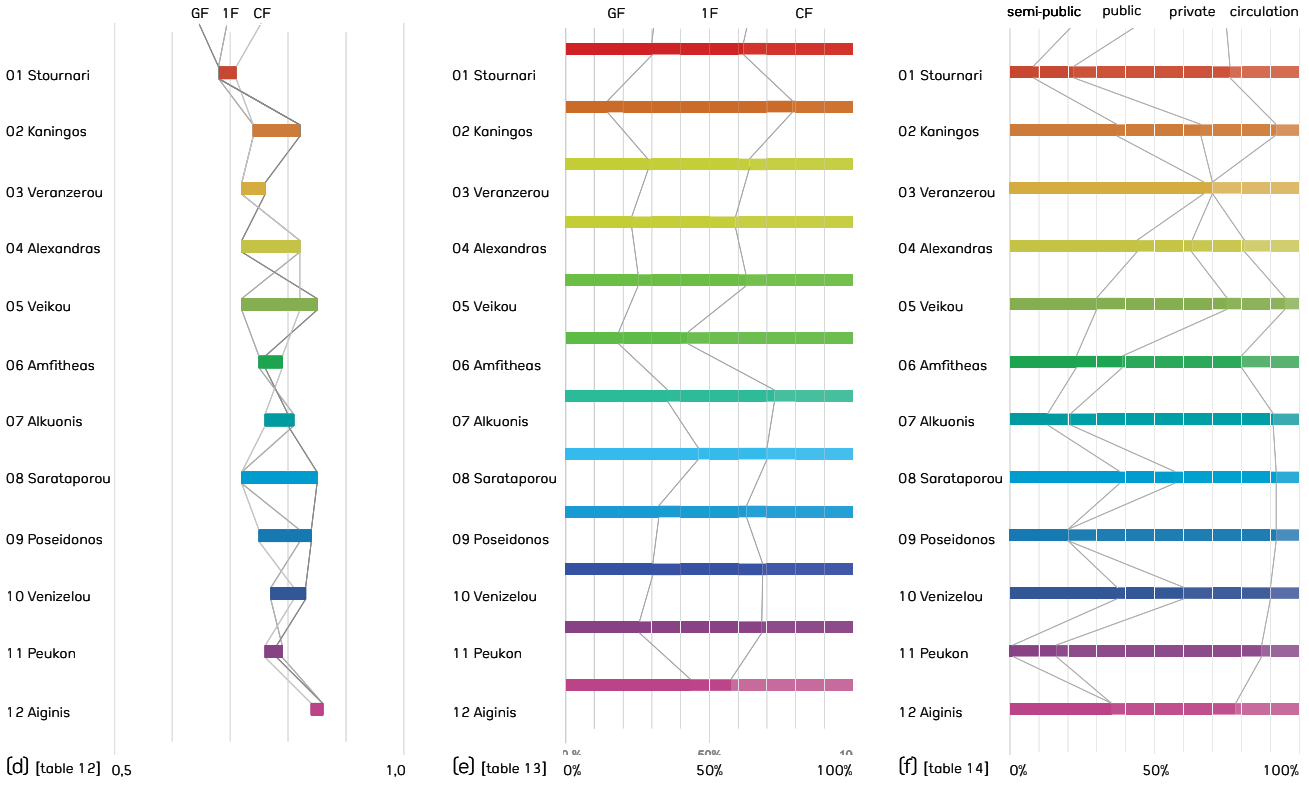
However, all this is only the case if we consider the polykatoikia on its own, in terms of its interior relations on the upper floors. As soon as we consider its external relations, say to the street and other settlements, or even simply to the space outside the system, then the centre-to-edge-distribution of integration no longer applies. In fact, the more form is integrated — that is the more it is in proximity to the centralized staircase — then the more its most integrated internal zone is maximally segregated from the external world, and, by definition, from any other aggregates that are to be found in the vicinity of the system. In other words, maximising internal integration also maximises external segregation. This is the 'paradox of centrality'.
Conversely, as we move from a centralized staircase towards the most linear form of a stoa or stretched outside of the ground floor, that is the single line of cells, or the least probable shape in a growing aggregate, then we find that the most linear form, which is the least integrated in itself, is the most integrated to the outside or to other systems in the region, since each of its constituent cells is by definition directly adjacent to the space outside the form. In short, the circular form is the least integrative with the space outside the form for the same reason that it is the most integrative internally: it has the least peripheral cells for the maximum interior cells. The converse is true for the maximally linear form which has the most peripheral cells compared to internal cells.

Horizontal and Vertical

Looking at the adaptation of the Looking at the adaptation of the available space, it seems that the aligned elements of the ground floor are rather similar to each other, and the upper floors are rather variable. For the ground floor it can be said e.g. that the use is commercial, the height is up to 5,50m, the façade is glazed, the ground level is connected to an existing gallery by a staircase in the back, and the goods are displayed in the shop windows. In the upper floors the differences can be such as the use – either a flat or office or shop – and the doors can be transparent or made of wood. The rooms can be opened for the views from the other side of the street or not, and the balconies to the front can be covered with advertisement signs or remain simple in their appearance. By this sectional observation of the polykatoikias, Hillier's statement [2007] is proved that on one hand a vertical form in effect runs vertically from integration to segregation. On the other hand, in the horizontal form, and insofar as elements like shops are horizontally related, they will tend to become more similar to each other, by virtue of their closeness to the earthline. This corresponds to the suggestion that the more shapes are aligned along a surface, the more equal they become. In contrast, the vertical dimension stres



summarized valeus of space steps (a), symmetry (b) and non-distribution (c)



summarized values of clustering coefficient (d), agent counts (e) and domain areas (f)

ses difference, in that the relations of above and below are asymmetrical. Horizontality, we may say, equalises and integrates, while verticality segregates and differentiates. Consequently, following Hillier's observation, we can say with the proof of the polykatoikias [cases C03, S08 and P10], that the more the upper floors are linked with a popular staircase or corridor to the horizontality of the public ground floor, the similarity of the elements increases to the same degree. In particular the case C03, Veranzerou, makes it obvious that an increase of the 'publicness' in the staircase amplifies the process of similarity in the spatial configuration and adaptation; all utilities are public domain and open to visitors. To the extent that there are the above mentioned commonalities in the sequence of inequalities, we can say that there is a common pattern apparent in the way in which different functions receive their spatial equivalent in the house. Hillier [1984] calls such common patterns 'inequality genotypes', because they refer not to the surface appearances of forms but to deep structures underlying spatial configurations and their relation to living patterns.

Visibility

These results stem from an analysis of space-to-space permeability. But what about the relation of visibility, which passes through spaces? We use the clustering coefficient and agent counts to analyse the twelve cases. Table 12 shows the mean clustering coefficient values produced for the interior spaces of the polykatoikias. The figures of the visibility analysis of each case shows that the most public spaces, such as stoas and corridors, are highly clustered, whereas units such as the flats and offices on each floor offer low clustering cooefficient values, hinting - without intruding on - the range of the more private spaces. Further we can see that these lower clustered areas possess a certain potential for interaction, whereas a junction of corridors provides numerous, but different, opportunities to form intervisible links. Therefore the agent is corresponding to the clustering cooefficient values: high clustering cooefficient values are equal to many agent trails and vice versa. This proves by employing different means that the most shallow and symmetric spatial domains, such as the stoa, hall, corridor, or balconies are the most integrated spaces. On the other hand, the rather deep and asymmetric spaces such as the offices or even flats are less integrated spaces. In other words, the spatial and functional differences between spaces that we find through the analysis of permeability in the cases also appear in the analysis of visibility. But we see that the transition from integrated to less integrated is always gradually as long as permeability is guaranteed. Furthermore, an interesting observation is the feature that the agent trails like the corners of floors, which would offer by that an ideal location for public-related utilities.

Spatial Activity

This type of method allows us to retrieve configurational properties from polykatokia plans that relate directly to the social and cultural functioning of the house. In other words, culturally determined patterns are embedded in the material and spatial 'objectivity' of buildings through spatial configuration. By the analysis of spaces and functions in terms of their configurational relations within the building, and the search for common patterns across samples, we can see how buildings can transmit common cultural tendencies through spatial form. We must now ask what follows from it for the adaptation of space?

The result of the very frequent presence of small shops on the local scale on the ground floors and the micro-spaces of everyday life, such as offices, medical centres or flats, which permit loose alignments distributed over the whole building, the polykatoikia and its surroundings are supplied with an absence of zoning. Characteristic for this is the stoa, one of the most constituent elements. Despite a certain anonymous kind of monumentality the neutral urban facade of the polykatoikia is linked to the city at ground-floor level by means of an open colonnade. It is an autonomous structure in the city, and in a sense a monumental one, the monumentality of which is generic. The visitor or simply the person who is passing by is within an in-between space of city and building. A threshold, protecting from sun and rain, allows the potential visitor to enter the building with ease, since the full-size glass fronts of the entrance doors and shops allow a view deep inside the building. Typology is used here not to lend expression to an autonomous form that is tied to the locus, but to assemble generic architectural elements. The stoa

works with the design principle that people walk to and from city functions everywhere - in particular where the functions within a building can profit from opportunities to come outdoors. Good connections between indoors and outdoors combined with resting places of bars and restaurants in front of the buildings are a matter of course. Such an extension of opportunities for outdoor uses exactly where everyday activities take place will almost without exception be a valuable contribution to a given function and to life between polykatoikias.

A summary of observations and investigations [Gehl 2006] shows that people and human activity are the greatest object of attention and interest. Even the modest form of contact of merely seeing and hearing or being near to others is apparently more rewarding and more in demand than the majority of other attractions offered in public spaces of cities and residential areas. Life in polykatoikias and between polykatoikias seems, in nearly all situations, to rank as more essential and more relevant than the spaces and polykatoikias themselves.

Human movement is by nature limited to predominantly horizontal motion at a speed of approximately 5 kilometers per hour [Gehl 2006], and the sensory apparatus is finely adapted to this condition. The senses are essentially frontally oriented, and one of the best developed and most useful senses, the sense of sight, is distinctly horizontal. The horizontal visual field is considerably wider than the vertical. If one looks straight ahead, it is possible to glimpse what is going on to both sides within a horizontal circle of almost ninety degrees to each side.

The downward field of vision is much narrower than the horizontal, and the upward field of vision is narrower still. The field of upward vision is reduced further because the axis of vision when walking is directed approximately ten degrees downwards, in order to see where one is walking. A person walking down a street sees practically nothing but the ground floor of buildings, the stoa, and what is going on in the street space itself. Therefore the mass of the building is aligned with elongated balconies which extend the privacy of the residence towards the city and into public urban space, while office blocks are covered with advertisement signs along the balconies and roofs, designed to signify the use and to lure people inside. Wherever there are people - in buildings, in neighborhoods, in city centers, and so on - it is generally true that people and human activities attract other people. People are attracted to other people. They gather with and move about with others and seek to place themselves near others. New activities begin in the vicinity of events that are already in progress.

Summary

A distinct quality of the polykatoikia is its ability to adapt to a variety of uses within a small volume and within the same structure. During the process of this PhD-thesis it became clear that the urban benefit of this mixture of uses is a continuous and lively public space on the inside as well as outside of the polykatoikia. In Athens there are no designed public spaces. The direct transition between the polykatoikia and the city ensures continuity of spatial domains by manifesting form in the public domain as an abstraction, and literally adjusting the public domain into the building as an autonomous structural element.
The duality of inside and outside of a polykatoikia adds a specific dimension to this relation between social solidarity and space. According to Hillier and Hanson [1984] and their definitions of the two different social solidarities, the polykatoikia is a transpatial and spatial solidarity. The asymmetric and non-distributed areas of the polykatoikia, like the flats in the upper floors, are defined as a transpatial solidarity to the extent that it develops a stronger and more homogeneous interior structuring of space and, in parallel, emphasises the discreteness of the interior by strong control of the boundary. The emphasis in the rather private domains of the polykatoikia is on the internal reproduction of a relatively elaborate model of flats. Words like ritualised and conformist might well be applied to such types of organisation. The essence of such transpatial solidarity lies in the local reproduction of a structure recognisably identical to that of other members of the group. One flat looks similar of other flats. The stronger and more complex the structure, therefore, and the more exactly it is adhered to, the stronger will be the solidarity. Such solidarity requires the segregating effect of the boundary to preserve the interior structure from uncontrolled incursion. Soli-

darity means in this case the reproduction of an identical pattern by individuals who remain spatially separated from each other, as well as from the surrounding world. Transpatial solidarity is solidarity of analogy and isolation: that is of analogous structures realised in controlled isolation by discrete individuals.

In contrast, the ground floor or public domains in the upper floor are defined as a spatial solidarity, which builds links with other members of the group not by analogy and isolation, but by contiguity and encounter. To realise this it must not stress the separateness of the interior, but the continuity of interior and exterior. Movement across the boundary, which would undermine transpatial solidarity, is the fundamental condition of existence for spatial solidarity. In such circumstances, an elaborate and controlled interior cannot be sustained, but nor is it necessary. Encounters are to be generated, not limited, and this implies the weakening of restrictions at and within the boundary. A spatial solidarity will be undermined, not strengthened, by isolation. In a spatial solidarity, therefore, the weakening of the boundary is associated with a weaker structuring of the interior. Informality rather than ritual must prevail if the principles of the system are to be sustained.

The role of public space then becomes, simultaneously, a medium of promoting pedestrian movement, a location for social interaction, a tool for urban management, a showcase, a selling point for the developer, a system of signs to assert different identities. In a sense, the establishment of neighbourhoods can extend the private realm by creating a semi-private, semi-public realm, where a smaller number of urban residents may be aware of each other and of their differences from the rest of the citizens. The public space here then serves a variety of purposes, all of which appear to create some distinction and interpersonal exchange in the midst of impersonal urban world, which can only be maintained by devising tools for the exclusion of those who do not belong, such as the porter or the observant neighbourhood. By their nature, therefore, these spaces are not meant to be accessible to all, and hence are less public than those in the impersonal city centres. As elite, marginalized or communitarian spaces, these are conditioned spaces, providing advantages for some and reducing access for others.

6.2 Conclusion

The polykatoikia is based on the genotypes in construction, infrastructure, floor heights, flat roof, balcony, setbacks and stoa. In addition it contains a generic spatial and formalistic logic. As a probabilistic osmosis of public and private spaces the polykatoikia is subject to three types of law. First, there are the self-contained 'laws of space', which take the form of implications from local physical design moves to global spatial configurational effects. Second, there are laws which link the field of possibility created by the first type of law to 'natural movement', that is, to basic intelligibility and functionality the relation of boundaries. Third, which is the most specific one, there are laws by which social and functional formations, and the patterns of rule-governed spatial activity they give rise to, make use of these two types of law to give a picture of themselves in customized architecture, and through this to give rise to the sense that polykatoikias are in some far-reaching sense, an osmosis of public and private spaces, and as such important to society, and even, in some sense, part of it. What we find in polykatoikias with a plurality of such spaces is that all three laws are used to reinforce each other. It seems an unavoidable inference that, at a localised level, polykatoikias pursue integration in the emergent urban context by using all three laws of achieving it to reinforce each other. This thesis can then be quite precise as to the respective roles of human agency and objective laws. The human agency is in the physical shaping, locating and orientation of the built forms of polykatoikias. The laws are in the emergent spatial effects consequent on those physical decisions. The built forms of the polykatoikia are shaped, located and oriented by human agency, but in the light of laws which control their effects.

Now we know how important the thesis original question was: if the passage from the vernacular of the polykatokia to architecture is taken into reflective thought, how can the non-discursive, or configurational, aspects of space and form in this building type be transmitted from thinking with to thinking of polykatoikias.

The answer is simple and fundamental: The only alternative form of knowledge is the theoretical knowledge of the polykatoikia. Theoretical knowledge is by definition the attempt to make the non-discursive discursive, that is, an attempt to acquire knowledge of non-discursivity. Like all theorisation it is of course liable to error. But its orientation towards the explicitness of non-discursive knowledge means that its errors cannot be so easily perpetuated as are the errors institutionalised in solution typologies. Theory is the precondition of the liberation of architecture from the social knowledge which dominates vernacular design and which continually threatens architecture with bureaucratic extinction through typological guidance. Architecture as we know it necessarily oscillates between these two poles of theoretical and social knowledge, sometimes not knowing when it is informed by one and by the other. One thing is clear. It is only through the theoretical study of the architecture of the polykatoikia that we can begin to become truly aware of when we are being creatively free in the realm of its non-discursivity.

The mystery of the social nature of the polykatiokia now becomes clear. Manifestly a physical object, its essential nature is to give form to an abstraction, and through this to give that abstraction the manifestation which enables it to be projected through time and space. The polyaktoikia does not reflect the particular materialisations of society that occur at any moment in time, but aspects of the generic abstractions which constitute the Greek society itself. It is these abstractions rather than any particular realisation of them that need to be transmitted through time. Other buildings make this doubly powerful by building these genotypes into the very materiality of our existence, and at the same time, through the omnipresence of configuration, rendering these same social 'things' non-discursive.

This PhD-thesis found that the spatial systems of the polykatoikia tend to organise themselves according to certain genotypes, that is, common patterns that often cross seemingly quite different cases. It is clear that such systems are not indeterminate. Nor are they altered in their structure by minor changes. On the contrary, their structures are highly robust, and can usually absorb quite significant modifications without undergoing great changes in structure. In this sense, it can be said that polyaktoikias have a great deal of redundancy. This redundancy, and the consequent robustness in the structural outcome, can only arise from consistencies of some kind

in the way that objects are placed, that is from the Greek local rule following behaviour in the placing of objects.

One of the main themes that can be identified in the relationship between the public and private spheres in and around a polykatoikia is that they are interdependent and largely influence and shape each other. This is best exemplified in the relationship between the building and the direct surrounding, which lies at the heart of commercialization. Another theme is that the separation of the public and private spheres and spaces is a continuous normative process. Speaking for the polykatoikia, public and private spaces are a continuum, where many semi-public or semi-private spaces can be identified, as the two realms meet through shades of privacy and publicity rather than clearly cut separation. In seeking spatial strategies for the network city, we intend to focus on a sharp definition of boundaries and sizes of domains, in order to explore the various gradations of collective use. In my view, the polykatoikia is an urban building that relates to the public domain via overlapping domains, while retaining its architectural autonomy. Instead, the polykatoikia mediates via the small-scale collective domains, between the private and the public domain. The polykatoikia enables transitions between domains to be gradual rather than abrupt, but to be designed as such; rather to be adapted by the users as such. In this way each spatial domain can be assigned a specific place. The adoption of a different unit as the basic element of the city implies a fundamentally different relationship between urban planning and architecture, between the public and private domains, between planning and development.

The permanence of the polykatoikia is expressed architecturally in the distribution of spaces, the design of the volume and facades, and the relationship to the public domain. The polykatoikia, with its distributive and architectural indifference and its overlap between domains, has great potential to create urban dynamics in the future development of European cities.

7.0 Outlook

Technological change, larger populations, and increasing interest in urban living are causing significant activity in the planning and building of urban housing; architects are currently designing the future homes for a huge number of people.

As the households and the living preferences become more diverse, a closer look at the capability of domestic space for handling a plurality of needs and preferences is of both architectural and public interest.

The polykatoikia has hardly changed since its first appearance in the beginning of the last century. Philippides foresaw in 1978 that this apartment house is so tightly knit with contemporary Greek life as to become an integral part of urban society both reflecting and shaping its social organization. Today we can wonder whether there might slumber in this city and landscape of Athens a priceless cultural concept based on the polykatoikia, an as yet undiscovered intellectual programme, which needs only to be unwrapped and to be applied with great success in times after post-Modernism.

The polykatoikia is available for undifferentiated and continuous use. The simplicity of a polykatoikia as the basic motif might be an answer for future development of western cities by its expression of pluralism as mentioned before. Maybe it is not a model for our location, but maybe one could transform the approach to the challenges of the polykatoikia in a different way and come back again.

It is extraordinary that unplanned growth should produce a better global order than planned redevelopment, but it seems undeniable. The inference seems unavoidable that traditional systems like the polykatoikia work because they produce a global order that responds to the requirements of the dual [inhabitants and strangers] interface, while modern systems do not work because they fail to produce it. The principle of urban safety and liveliness is a product of the way both sets of relations are constructed by space. Strangers are not excluded but are controlled. As Jane Jacobs [1961] noted many years ago, it is the controlled throughput of strangers and the direct interface with inhabitants that creates urban safety. I would state this even more definitely: it is the controlled presence of passing strangers that polices space; while the directly interfacing inhabitants police the strangers. For this reason, 'defensible space', based on exclusion of strangers and only on surveillance of spaces by inhabitants can never work.

The polykatoikia reflects something of a utopian attitude to contemporary housing practice. The notion that there is such a thing as a critical size in the design and development process is effectively a proposal to break with existing traditions of architecture and urban planning and the culture of large-scale development in western housing. This utopian vision is justified by using those and further references and makes prior assumptions about self-organisation of the collective domain in society and bottom-up planning methods. In this sense, the polykatoikia gives the notion of utopia a different connotation than it has in customary modernistic approaches, and one that may be more in keeping with the workings of the contemporary city: Giving shape to potential new communities would appear to be a new utopia for the network city. However, one major difference between this and modernist utopias is that this new network city will have to grow from the bottom up in new constellations of collectivity. This way of thinking is in keeping with the current emergence of a society in which there is not just one public domain but several, each with its own marked identity and limited private goals.

8.0 Bibliography

Aesopos, Y. & Simeoforidis, Y.,1999. *Landscapes of Modernisation: Greek Architecture 1960s and 1990s*. Athens: Metapolis Press.p. 115-153.

Aesopos, Y. & Simeoforidis, Y., 2000. *Mutations – Athens*. Barcelona: Actar. p. 404-425.

Aesopos, Y. & Simeoforidis, Y., 2001. *Metapolis 2001*. Athens: Metapolis Press.

Aesopos, Y. & Simeoforidis, Y., 2001. *Metapolis 2001*. Athens: Metapolis Press. p. 21-201.

Alexander, C., Neiss, H., Anninou, A. & King, I., 1987. *A New Theory of Urban Design,* New York: Oxford University Press.

Alexander, C., 1995. *Eine Muster-Sprache*. Wien: Löcker.

Alexander, C., 1979. *The Timeless Way Of Building*. New York: Oxford University Press.

Alexander, C., 1964. *Notes on the Synthesis of Form*. Cambridge, MA, and London, GB: Harvard University Press.

Alexander, C., 1988. A City Is Not a Tree – Part 1. In Thackara, John, ed. *Design After Modernism: Beyond the Object*. London: Thames and Hudson. p. 67-84.

Altman, I., 1975. *The Environment and Social Behavior: Privacy, Personal Space, Territory, crowding*. Monterey, CA: Brooks/Cole.

Amourgis, S., 2001. In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press. p. 77-81.

Angellidakis, A., 2001. In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press. p. 217.

D' Arcy, T., 1973. *Über Wachstum und Form*. Frankfurt am Main: Suhrkamp Taschenbuch Wissenschaft.

Atelier Bow-Wow, 2001. *Made In Tokyo*. Tokyo: Kajima Institute Publishing Co..

Atelier Bow-Wow, 2002. *Pet Architecture Guide Book*. Tokyo: World Press Photo.

Atelier Bow-Wow, 2006. *Bow-Wow from Post Bubble City,* Tokyo: INAX Publishing.

Bachelard, G., 1960. *Poetik Des Raumes*. München: Carl Hanser Verlag.

Baecker, D., 1990. Dekonstruktion der Schachtel. In Luhmann, Niklas , ed. *Unbeobachtbare Welt: über Kunst und Architektur*. Bielefeld: Verlag Cordula Haux. p. 90-102.

Banham, R., 1976. *Megastructure*. London: Thames & Hudson.

Banham, R., 1966. *The New Brutalism – Ethic or Aesthetic?*. London: The Architectural Press.

Behne, A., 1998. *Der moderne Zweckbau*. Berlin: Gebr. Mann Verlag.

Bell, P., Green, T., Fisher, J. & Baum, A., 1996: *Environmental Psychology*, 4th ed. Forth Worth: Harcourt Brace College Publishers.

Benn, S.I. & Gaus, G.F., 1983. *Public and Private in Social Life*. London: Croom Helm, St Matin´s Press.

Benjamin, W., 1983. *Charles Baudelaire: A Lyric Poet in the era of High Capitalism*, London: Verso.

Bijlsma, L. & Groenland, J., 2006. *The Intermediate Size – A handbook for collective dwellings*. Amsterdam: SUN Publishers.

Bonnes, M. & Secchiaroli, G., 1995. *Environmental Psychology: A Psycho-Social Introduction*. Translated by Montagna, Claire. London: Sage.

Boyer, M., 2006. The Urban Question in the 21st Century: Epistemological and Spatial Traumas. In Graafland, Arie, Kavanaug & Leslie Jaye, eds. *Crossover Architecture Urbanism Technology*. Rotterdam: 010Publishers. p. 313.

Brain, D., 1997. From public housing to private communities: The discipline of design and the materialization of the public/ private distinction in the built environment. In J.Weontraub & K.Kumar, eds. *Public and Private in Thought and Practices: Perspectives on a grand dichotomy*. Chicago: University of Chicago Press.

Brand, S., 1994. *How Buildings Learn,What Happens After They're Built*. New York: Viking Penguin, A Division of Penguin Books USA inc..

Broadbent, G., 1978. *Design in Architecture*. 3rd ed. Chichester, New York: John Wiley & Sons.

Bru, E., 2001. In Aesopos, Y. &

Simeoforidis, Y., *Metapolis 2001*. Athens: Metapolis Press. p. 113.

Bruckhardt, L. & Förderen, W., 1968. *Bauen ein Prozess*. Teufen: Artur Niggli AG.

Bucci, F., 1991. *Albert Kahn – Architect of Ford*. New York: Princeton Architectural Press.

Burckhardt, L. 2004. In J. Fezer & M. Schmitz, *Wer plant die Planung? – Architektur, Politik, Mensch*. Berlin: Martin Schmitz Verlag.

Burns, C. J. & Kahn, A., 2005. *Site Matters. Design Concepts, Histories, and Strategies*. New York: Routledge.

Busquets, J., 2001. In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press. p. 69.

Chermayeff, S. & Alexander, C., 1999. *Gemeinschaft und Privatbereich im neuen Bauen*. Mainz: Florian Kupferberg Verlag.

Christofellis, A., 1979, The petit bourgeois epic of modern architecture. *Design in greece*, 10, p. 34-44.

Colenbrander, B., 1999. In Y. Aesopos, & Y. Simeoforidis. *Landscapes of Modernisation: Greek Architecture 1960s and 1990s*. Athens: Metapolis Press. p. 29-35.

Colquhoun, A., 1989. *Modernity and the Classical Tradition*. Cambridge: MIT Press.

Condaratos,S., 1999. In S.Condaratos & W. Wang, Wilfried, *20th-centrury architecture Greece*. Munich: Prestel Verlag. p. 41.

Christiaanse, K., 2001. In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press.p. 75.

Deplazes, A., 2005. *Architektur konstruieren / vom Rohmaterial zum Bauwerk / Ein Handbuch*. Basel: Birkhäuser.

Denzin, N., 1970. *The research art in sociology*. London: Butterworth.

Dimitrakopoulos, A., 2007, *Frontage Showcase And The Post-Urban Uncanny*. [Online]. Available at: http://www.greekarchitects.gr/index.php?act=rn&newid=39&lang=en [accessed 12 December 2007]

Doumanis, O. B., 1978. *Architecture In Greece*. Athen: Orestis B. Doumanis.

Dovey, K., 1999. *Framing Places – Mediating power in built form*. London and New York: Routledge.

Doxiades, T., 2001. In Y.Aesopos, & Y.Simeoforidis, *Metapolis2001*. Athens: Metapolis Press.p. 125-127.

Dragonas, P., 2004. *Contemporyra Architecture in Athens.* [Online]. Available at: http://www.dumabyt.cz/Files/Obrazky/ProOdbroniky/2004/Stavba/5_04/26-55.pdf [accessed 24 March 2007]

Drewe, P., 2006. Introduction. In Graafland, Arie, Kavanaug & Leslie Jaye, eds. *Crossover Architecture Urbanism Technology*. Rotterdam: 010Publishers. p.42.

Eisenhardt, K.M., 1989. *Buildings theories from case study research*. Academy of Management Review, 14[4], p.532-550.

Fatouros, D., 1999. In Y. Aesopos, & Y. Simeoforidis, *Landscapes of Modernisation: Greek Architecture 1960s and 1990s*. Athens: Metapolis Press. p. 285-286.

Fester, M. & Kraft, S., 1983, Raum für soziales Leben. *Arch+*, 68, p. 25-28.

Frampton, K., 2001. In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press. p. 67.

Feldtkeller, C., 1989. *Der Architektonische Raum, Eine Fiktion - Annäherung an eine Funktionale Betrachtung*. Braunschweig: Vieweg.

Fezer, J. & Heyden, M., 2004a. *Hier entsteht - Strategien partizipativer Architektur und räumlicher Aneignung*. Berlin: b_books Verlag.

Fezer, J., Reichard, K. & Wieder, A. J., 2004b. *Marttin Pawley's Garbage Housing with Preconsumer Waste and the 2CV Fourgonette Construction System, Chile 1972*. Berlin: Vice Versa Verlag.

Fingerhuth, C., 2004. *Learning from China*. Basel: Birkhäuser.

Friedman, Y., 1974. *Meine Fibel - Wie Stadtbewohner ihre Häuser und ihre Städte selber planen können*. Düsseldorf: Verlagsgruppe Bertelsmann GmbH/ Bertelsmann Fachverlag.

Friedman, Y., 1975. *Toward a Scientific Architecture*. Cambridge, GB: The Massachusetts Institute of Technology Press.

Fulton S. J. & IDEO, 2005. *Thoughtless Acts? Observations on Intuitive Design*. San Francisco: Chronicle Books.

Galbraith, J. K., 1977. *The Age of Uncertainty*. Boston: Boston Houghton Mifflin.

Gehl, J.,2006. *Life Between Buidings, Using Public Space*. Copenhagen: The Danish Architectural Press.

Gaupp-Kandzora, R. & Merkel, H., 1978. *Flexible Wohnungen: Nutzererfahrungen*. Stuttgart: Karl Krämer Verlag.

Giakoumakatos, A., 2003. *Geschichte der griechischen Architektur im 20.Jahrhundert*. In greek. Athen: Nefeli Verlag.

Giedion, S., 1967. *Space, Time and Architecture: The growth of a new tradition*. 5th ed. Cambridge: Harvard University Press.

Guiton, J., 1981. *The Ideas of Le Corbusier on Architecture and Urban Planning*. New York: George Braziller.

Habraken, N.J., 1971, *Supports: An Alternative to Mass Housing*. London: The Architectural Press.

Habraken, N.John, 1998. *The Structure of the Ordinary: form and control in the Built Environment*. Cambridge, MA: The Massachusetts Institute of Technology Press.

Habraken, N.J. & Lüchinger, A., 2000, *Die Träger und die Menschen / 2-Kompenenten-Bauweise*. Den Haag Arch-Edition.

Hall, E. T., 1990. *The Hidden Dimension*. 2nd ed. New York: Anchor Books Editions.

Hammersley, M. & Atkinson, P., 1983, *Ethographic: principles in practice*. London: Routeledge.

Harriehausen, C., 2007. Immobilien, Neue Wohnungen braucht das Land. *Frankfurter Allgemeine Sonntagszeitung*, 49, p V15.

Heider, F., 2004. *Das Leben eines Psychologen*. Weinheim: Beltz Gmbh Verlag.

Henn, W., 1955a. *Bauten der Industrie, Band 1*. München: Verlag Georg D.W.Callwey.

Henn, W., 1955b. *Bauten der Industrie, Band 2*. München: Verlag Georg D.W.Callwey.

Henn, W., 1962. *Industriebau – Internationale Beispiele*. München: Verlag Georg D.W.Callwey.

Hertzberger, H., 2000. *Space and the Architect - Lessons in Architecture 2*. Rotterdam: 010 Publisher.

Hill, J., 1999. *Occupying Architecture, Between the Architect and the User*. 2nd ed. London & New York: Routledge.

Hill, J., 2003. *Actions of Architecture, Architects and Creative Users*. New York: Routledge.

Hillier, B. & Hanson, J., 1984. *The social logic of space*. Cambridge: Cambridge University Press. p1-22.

Hillier, B., 2007. *The common language of space*. [Online]. UCL, London. Available at: http://www.spacesyntax.org/publications/commonlang.html. [accessed 09 December 2007]

Hillier, B., 2007. *Space Is The Machine*. [Online]. UCL, London. Available at: http://eprints.ucl.ac.uk/archive/00003848/01 [accessed 09 December 2007] SpaceIsTheMachine_Part1.pdf. p.2-341.

Hillier, B., 1996. *Space Is The Machine, A Configurational Theory of Architecture*. Cambridge, MA: Cambridge University Press.

Hillier, B. & Hanson, J., 1984. *The social logic of space*. Cambridge, MA: Cambridge University Press.

von Hippel, E., 2005. *Democratizing Innovation*. Cambridge, MA: The Massachusetts Institute of Technology Press.

Holl, S., 1998. *Pamphlet Architecture 1-10*. New York: Princeton Architectural Press.

Howell, S. & Vana, T., 1989. Domestic privacy: Gender, culture and development issues. In Setha M. Low & Erve Chambers, eds., *Housing, Culture, and Design, a comparative perspective*. Philadelphia: University of Pennsylvania Press. p. 281-300.

Hughes, J. & Sadler, S., 2000. *NON – PLAN, Essays on freedom participation and change in modern architecture and urbanism*.

Oxford: Architectural Press.

Husserl, E., 1965. *Phenomenology and the crisis of philosophy*. London: MacMillan Press Ltd..
Institut Francais d'Architecture, 2000. *Les Frères Perret - L´oeuvre complète*. Paris: Editions Norma.

Jacobs, J., 1961. *The Death and Life of Great American Cities*, New York: Vintage Books.

Kaplan, B. & Maxwell, J.A., 1994. Qualitative research methods for evaluating computer information systems. In J.G. Anderson, C.E. Aydin & S.J.Jay, ed. *Evaluating Health Care Information Systems:Methods and Applications*. CA: Sage, p.45-68.

Jencks, C., 1973. *Le Corbusier and The Tragic View of Architecture*. Cambridge, MA: Harvard University Press.

Kendall, S. & Teicher, J., 2000. *Residential Open Building*. London: E & FN Spon.

Kidder, L. & Judd, C.M., 1986. *Research methods in social relations*. 5th ed. New York: Holt, Rinehardt & Winston.

Kirsan, C., 2005. Graph Isomorphism and Genotypical Houses. In Van Nes, Akkelies ed. *A Study on the Interior Space Apartments, 5th International Space Synthax Symposium Vol.I*. Amsterdam: Techne Press. p. 16-19.

Koolhaas, R., 1980. *Delirious New York*, New York: Oxford University Press.
Koolhaas,Rem, 2000. *Mutations*. Bordeaux: ACTAR.

Kostika, Eleni, 2001. In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press. p. 163.

Kostof, S., 1999. *The City Shaped*, London: Thames & Hudson Ltd..

Krämer, J. & Kunze, J-O., 2004. *Design Code*, Berlin: Technische Universität Berlin. p. 14-55.

Krausse, J., 2000. *Your Private Sky - R.Buckminster Fuller - Design als Kunst einer Wissenschaft*. Zürich: Verlag Lars Müller.

Krier, R., 1979. *Urban Space*. London: Academy Editions.

Kroll, L., 1987. *CAD-Architektur. Vielfalt durch Partizipation*. 2nd ed. Karlsruhe: Verlag C.F.Müller GmbH.

Lamugnani, V., 2006. The city of tolerant normality. In Graafland, Arie, Kavanaug & Leslie Jaye, eds. *Crossover Architecture Urbanism Technology*. Rotterdam: 010Publishers. p.295-303.

Lawson, B., 2005. *The Language of Space*. 3rd ed. Oxford: Architectural Press.

Le Corbusier, 1985. *Towards a New Architecture*. London: Dover Publications.

Le Corbusier, 1971. *The City of Tomorrow, and its Planning*. London: The Architectural Press.

Lefèbvre, H., 2000, *Production of Space*. Oxford: Blackwell Publishers.

Lefèbvre, H., 2000. Die Produktion des städtischen Raums. *Strategien für Kreuzberg*, ARCH+34, p 55-57.

Leupen, B., 2006. *Frame and generic space – A study into the changeable dwelling proceeding from the permanent*. Rotterdam: 010 Publishers.

Lévi-Strauss, C., 1991. *Das wilde Denken*. 8th ed. Frankfurt am Main: Suhrkamp Taschenbuch Wissenschaft.

Lévi-Strauss, C., 1998. *Traurige Tropen*. 11th ed. Frankfurt am Main: Suhrkamp.

Lindner, W., Steinmetz, G., 1927. *Die Industriebauten in guter Gestaltung*. Berlin.

Lüchinger, A., 1981. *Strukturalismus in Architektur und Städtebau*. Stuttgart: Karl Krämer Verlag.

Lukez,P., 1986. *New Concepts in Housing: Supports in the Netherlands*. Cambridge, MA: The Massachusetts Institute of Technology Department of Architecure, Design and Housing Programm.

Lynch, K., 1960. *The Image of the City*. Cambridge: MIT Press.

Lynch,K., 1990. *What Time Is This Place?* 6th ed. Cambridge, MA: The Massachusetts Institute of Technology Press.

Madanipour, A., 2003. *Public and Private Spaces of the City*. New York: Routledge.

Madanipour, A., Cars, G. & Allen, J., 2000. *Social Exclusion in European Cities – Processes, experien-*

ces, and responses. London: The Staionary Office.

Maloutas, T. & Karadimitriou, N., 2001. *Vertical Social Differentiation in Athens: Alternative or Complement to Community Segrgation?*. International Journal of Urban and Regional Research Press, 25 [4].

Manum, B., 2005. Generality versus Specificity. In Van Nes, Akkelies ed. *A Study on the Interior Space Apartments, 5th International Space Synthax Symposium Vol. II*. Amsterdam: Techne Press. p. 03-11.

Marmaras, M., 1991. *Die bürgerliche Polykatoikia während der Kriegsjahre in Athen*. In greek. Athen: Kulturstiftung ETBA.

Meisenheimer, W., 2006. *Das Denken Des Leibes Und Der Architektonische Raum*. 2nd ed. Köln: Wolfgang Meisenheimer and der Buchhandlung Walther König.

Meteofrance, 2003. *Statistique Athènes* [*Grece*]. [Online]. Available at: http://www.meteofrance.com/FR/climat/tabl_athenes.jsp [accessed 09 January 2007]

Morris, L., 1999. *The Un-Private House*. New York: The museum of Modern Art.

Myers, M.D., 1997. *Qualitative research in information systems*, MIS Quarterly, 21[2], p. 241-242.

Nagel, T., 1998. Concealment and Exposure. Philosophy and public affairs, 27[1]. p. 3-30.

National Statistical Service of Greece, 2001 [Online]. Available at: http://www.statistics.gr/Main_eng.asp [accessed 08 February 2008].

Neumeyer, F., 2002. *Quellentexte zur Architekturtheorie*. Munich: Prestel Verlag.

Neumeyer, F., 2007. Die Augen des Hauses, Das Fenster als architektonische Form.*Werk, bauen + wohnen* 94./61, p 36-40.

O.M.A, Koolhaas,Rem & Mau, Bruce, 1995, *S,M,L,XL, Typical Plan*. New York: The Monacelli Press.

Oxford English Dictionary. 1989. Oxford: Oxford University Press.

Papamichos, N., 2001. In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press. p. 82-85.

Paschou, A., 2001. *Gebäudetypologie der Grossstadt, eine Analyse der griechischen Metropole Athen*. [Online]. ETH, Zurich. Available at: http://e-collection.ethbib.ethz.ch/ecol-pool/bericht/bericht_275.pdf. [accessed 04 November 2006]

Penn, A & Turner, A., 2008. *Space Synthax Based Agent Simulation*. [Online]. UCL, London. Available at: http://www.vr.ucl.ac.uk. [accessed 28 January 2008]

Peponis, J. & Bellal, T., 2005. In Fallingwater: Spatial structure at the scale of quasi-sychronic perception. In Van Nes, Akkelies ed. *A Study on the Interior Space Apartments, 5th International Space Synthax Symposium Vol.I*. Amsterdam: Techne Press. p. 66-70.

Pevsner, N., 1997. *A history of building types*. 5th ed. Princeton: Princeton Univ. Press.

Philippides, D., 1974. In Doumanis, Orestis B., eds. *Architecture In Greece*. Athens: Architecture in Greece Press. p. 103.

Porphyrios, D., 1984. *Neoelliniki Acrhitektoniki*. Athen: Melissa Verlag.

Pope, A., 1996. *Ladders*. New York : Princeton Architectural Press.

Porphyrios, D., 1999. In Aesopos, Yannis & Simeoforidis, Yorgos, *Landscapes of Modernisation: Greek Architecture 1960s and 1990s*. Athens: Metapolis Press. p. 291-293.

Provoost, M., 2003. *Hugh Maaskant – Architect van de vooruitgang*. Rotterdam: 010 Publishers.

Project Russia 20, 2003. *The Free Plan – Russias shell-and core apartment buildings*. Moskau & Amsterdam: A-Fond Publishers.

Rebois, D., In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press. p. 91-95.

Reichen, B., 2001. In Y. Aesopos, & Y. Simeoforidis, *Metapolis 2001*. Athens: Metapolis Press. p. 161-163.

Remenyi, D., Williams, B., Money, A. & Swartz, E., 1998. *Doing research in business and management, an introduction to process*

and method, London: Sage Publications.

Robson, C., 2004. *Real World Research*, 2nd ed. Oxford: Blackwell Publishing.

Ronner, H., 1994. *Zahn der Zeit - Baukonstruktion im Kontext des architektonischen Entwerfens*. Berlin: Birkhäuser.

Rossi, A. & Ghirardo, D., 1982. *Architecture of the City.* Cambridge: MIT Press.

Rowe, C. & Slutzky, R., 1997. *Transparency: Literal and Phenomenal*, Basel: Birkhäuser.

Rudofsky, B., 1964. *Architecture without architects : a short introduction to non-pedigreed architecture*. Garden City, NY : Doubleday.

Sachs-pfeiffer, T., 1983, Raum für soziales Leben. *Arch+*, 68, p. 32-34.

Sarkis, H., 2001a. *Le Corbusier's Venice Hospital*. München: Prestel Verlag.

Sarkis, H., 2001b. In Aesopos, Yannis & Simeoforidis, Yorgos, *Metapolis 2001*. Athens: Metapolis Press. p. 155-156.

Schroer, M., 2006. *Räume, Orte, Grenzen, Auf dem Weg zu einer Soziologie des Raumes*. Frankfurt am Main: Suhrkamp taschenbuch
Scoffier, R., 2000. *La ville sans dehors*. Athen: Futura.

Schwartz-Clauss, M. & von Vegesack, A., 2002. *Living in Motion – Design und Architektur für flexibles Wohnen*. Weil am Rhein: Vitra Design Stiftung.

Sennett, R., 1976. *The Fall of Public Man*. Cambridge: Cambridge University Press.

Sennett, R., 1994. *Flesh and Stone*. London: Faber & Faber.

Sennett, R., 2000. Reflections on the Public Realm. In Bridge, Gary & Watson, Sophie, eds., *A Comparaison to the City. Oxford*: Blackwell. p. 380-387.

Sennett, R., 2000.*Der flexible Mensch – Die Kultur des neuen Kapitalismus*. 3rd ed. Berlin: Berlin Verlag.

Sennett, R., 1976. *The Fall of Public Man*. New York: Alfred A. Knopf, Inc.

Sert, J., 1944. *Can Our Cities Survive?, An ABC of urban problems, their analysis, their solution*. Cambridge: Harvard University Press.

Shamiyeh, M., 2005. *What people want, Populism in Architecture and Design*. Basel, Berlin, Boston: Birkhäuser.

Silver, A., 1997. *Two different sorts of commerce, friendship and strangership in civil society, in Public and Private in thought and Action: Perspectives on a grand dichotomy*. Weintraub, J. & Kumar, K., eds. Chicago: Chicago University Press, p. 43-74.
Simeoforidis, Y., 2001. In Y. Aesopos, & Y. Simeoforidis, ed. *Metapolis 2001*. Athens: Metapolis Press. p. 102-104.

Sommer, R., 1969. *Personnal Space: The Behavioural basis of design*. New Jersey: Prentice-Hall, Engelewood Cliffs.

Spencer-Brown, G., 1973. *Laws of Form*. New York: E.P.Dutton.

Thackara, J., 2005. *In the Bubble, designing in a complex world*. Cambridge, MA: The Massachusetts Institute of Technology Press.

Theocharopoulou, I., 2005. The housewife, the builder, and the desire for a polykatoikia apartment in postwar Athens. In Heynen, Hilde & Baydar, Gülsüm, *Negotiating domesticity: spatial productions of gender in modern architecture*. Abingdon: Routledge. p.66-79.

Turner, J. F.C., 1977. *Housing by People – Towards Autonomy in Building Environments*. New York: Pantheon Books.

Turner A., Doxa M., O'Sullivan D. & Penn A., 2001. From isovists to visibility graphs: a methodology for the analysis of architectural space. *Environment and Planning B,* 28[1], p.103-121.

Turner A., 2001. *Depthmap: A program to perform visibility graph analysis*. 3rd International Symposium on Space Syntax, p.1-8. Available at: http://www.vr.ucl.ac.uk/publications/depthmap.pdf

Turner A., 2003. *Analysing the visual dynamics of spatial morphology*. London: Environment and Planning B: Planning and Design, volume 30. p657-676.

Turner A., 2004. *Depthmap 4 - A*

Researcher's Handbook. 3rd International Symposium on Space Syntax, p.1-16. http://eprints.ucl.ac.uk/2651/1/2651.pdf [accessed 04 June 2007]

Turner A., 2007. *UCL Depthmap 7: From Isovist Analysis to Generic Spatial Network Analysis*. In Turner, A., ed., *New Developments in Space Syntax Software*. Istanbul: Technical University. p. 45. Available at: http://www.vr.ucl.ac.uk/events/syntaxsoftware07/turner.pdf. [accessed 04 June 2007]

Turner A., 2007. *Visibility Graph Analysis*. [Online]. UCL, London. Available at: http://www.vr.ucl.ac.uk/research/vga/. p.1-3. [accessed 04 June 2007]

Turner A., 2008. *UCL Depthmap: Spatial Network Anaylsis Software*. [Online]. UCL, London. Available at: http://www.vr.ucl.ac.uk/research/evas. [accessed 04 June 2007

Turner A., 2008. *Pedestrian Models: Exosomatic Visual Architecture*. [Online]. UCL, London. Available at: http://www.vr.ucl.ac.uk/depthmap. [accessed 06 June 2007]

Tzonis, A., 2001. *Le Corbusier, the poetics of machine and metaphor*. London: Thames & Hudson Ltd..

Van Maanen, J., 1998. *Tales of the field: on writing ethnography*. Chicago: University of Chicago Press.

Vogt, A.M., 1996. *Le Corbusier, der edle Wilde – Zur Archäologie der Moderne*. Braunschweig, WI: Friedr. Vieweg & Sohn Verlagsgesellschaft.

Wacks, R., 1993. Introduction. In Wacks, Raymond, ed., *Privacy, Volume 1, The International Library of Essays in Law and Legal Theory*. London:Dartmouth, Aldershot. p. xi-xx.

Watts D.J., 1999. *Small Worlds*, Princeton: Princeton University Press.

Wright, F. L., 1963. *Frank Lloyd Wright Schriften und Bauten*. München: Verlag Müller.

Zeidler, E. H., 1983. *Multifunktionale Architektur im städtischen Kontext*. Stuttgart: Karl Krämer Verlag.

Zevi, B., Barry J.A. & Gendel, M., 1957. *Architecture as Space: How to Look at Architecture*. New York: Horizon Press.

Credits

Unless otherwise indicated, all drawings, diagrams, computer generated images and photographs by Richard Woditsch and the students of LIA.

Photograph Credits

Andreas Gehrke: p.80, p.94, p.95, p.98, p.100, p.110, p.111, p.114, p.128, p.129, p.132, p.134, p.144, p.145, p.148, p. 150, p.160, p.161, p.164, p.160, p.176, p.177, p.180, p.182, p.192, p.193, p.196, p.198, p.208, p.209, p.212, p.214, p.224, p.225, p.228, p.230, p.240, p.241, p.244, p.246, p.256, p.257, p.260, p.262, p.272, p.273

Google: p.77

kali-tea.com: p.68

Appendix

Methode

Fieldwork Duration and Areas

Fieldwork 1 [24.03. - 03.04. 2006]
centre: Ermou, Exharia, Gasi, Gysi, Ilissia, Kolonaki, Neapolis, Plaka
semi-periphery: Aghios, Cholargos, Galatsi, Dimitrios, Halandri, Holargos, Vironas
periphery: Alimos, Glyfada

Fieldwork 2 [28.05. - 04.06. 2006]
centre: Exharia, Gysi, Kypseli, Metaxourgio,
semi-periphery: Cholargos, Dafni, Galatsi, Nea Smyrni, Palea Faliro
periphery: Alimos, Iliopouli, Nea Ionia

Fieldwork 3[18.03. - 30.03. 2007]
centre: Exharia, Gysi
semi-periphery: Cholargos, Palea Faliro
periphery: Alimos, Iliopouli, Nea Ionia

Fieldwork 4 [09.03. – 15.03.2008]
centre: Exharia, Gysi
semi-periphery: Cholargos, Galatsi, Palea Faliro
periphery: Alimos, Iliopouli, Nea Ionia

The interviewee of Research

Suzana Antonakakis, architect
Stephan Buerger, architect
Panos Dragonas, architect
Dimitris Fatouros, architect
Mimi Koumantanos [Aktena Ltd.], builder
Socrates Mousakis, Doxiadis As-

sociates, developer
Anastasia Paschou, researcher
Dimitris Philippidis, architect
Alexandros N. Tombazis, architect
Panayotis Tournikiotis, architect
Maria Valsamakis, architect

Interviewv questions for users

Since when do you live here?

What were the reason for chosing this Polykatoikia or flat?

Do you own this space?

How do you use this space? [appartment, flat+office, shop etc.]
What kind of use was in [appartment, shop etc.] as you moved in?

Did you change anything since your have moved in concerning the usage of space?

Do you like your polykatoikia?

If you could, what would you change?

How would you describe the condition your polykatoikia is in?

How would you describe the profile of the occupant of your polykatoikia? [old, rich, pofession etc.]

Has this profile of these occupants changed over the time? If so, which would you say are the differences today than let's say 20 years ago?

One characteristic of the polykatoikia is the intermixture of the polykatoikia and its utilities into the city and the urban life interfering into the uses of the polykatoikia. One could describe it as a contradiction of the reclusive domestic life and the exposed city in one building. How is the social influence of both – the polykatoikia and the city – among each other?

Do you have any documentation of this building? [plans, photos etc.]

Data collection template

location:
year:
architect/company:
investor:
type:
modification:
plot area:
gross area:
gross volume:
total height:
total width:
total depth:
other dimensions:
number of floors:
number of proper floors:
height of ground floor:
height of upper floors:
appartments total:
units on each floor:
utility basemnet:
uitility ground floor:
uitility 1st floor:
uitility 2nd floor:
uitility 3rd floor:
uitility 4th floor:
uitility 5th floor:
uitility 6th floor:
uitility roof floor:
uitility floor:
type of construction:
material:
column grid:
column:
load-bearing wall:
construction area:
vert. supply + sanitation:
max. supplied units / string:
extra tech. extension:
entrance / porter:
distribution:
net floor area:
building service area:
used area:
public thoroughfare:
free plot area:
light well:
street width:

Manual for the use of UCL Depthmap

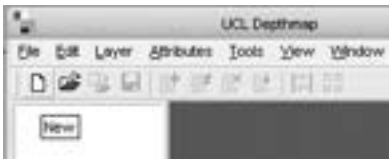


fig. XX

Importing the Diagram

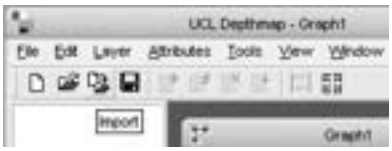


fig. XX

Basic Settings in UCL Depthmap

Analysis

-Isovist
-Visibility Integration
-Clustering Coefficient
-Agent Analysis

fig. XX

Importing the Diagram

-create a new graph in UCL Depthmap
see fig. XX

-Import the .dxf-file
see fig. XX

fig. XX

Basic Settings

- first a grid must be set. click on set grid and choose the spacing
see fig. XX

- for site plan diagram 0.5 is recommendet, for building diagram 0.125
note: smaller grid -> higher resolution -> more calculation -> more time
see fig. XX

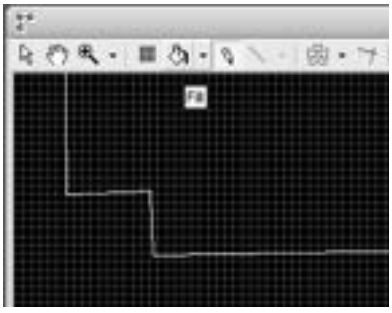
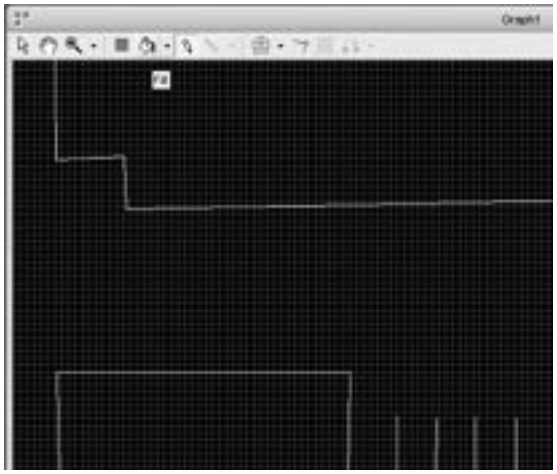
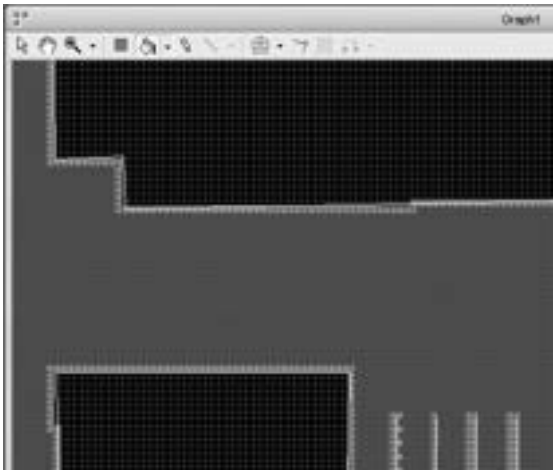


fig. XX

- now the area which needs to be analysed must be filled
note: drawing Layers can be switched on and off on the left



in this case the inner field is the street connected to the building...



street and main building are filled at once because there is no seperation.

side

switch layers on/off to close/ open windows and doors

see fig. XX

- after the area is defined by the filling, a Visibility Graph will be created

see fig. XX

- leave options in dialogue box unchecked

see fig. XX

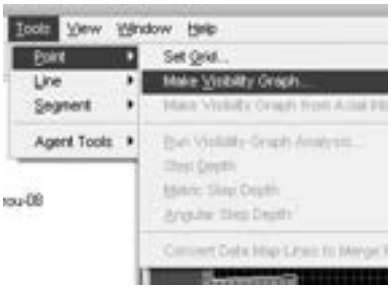
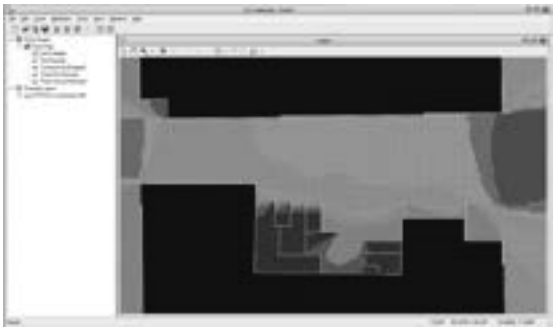


fig. XX



Visibility Graph

fig. XX

note: any of the following analysis with UCL Depthmap need Visibility Graph as a base

- background colour and foreground colour can be changed and grid can be shown or hided

- this does not effect the analysis of UCL Depthma
but it will matter later in the layout...
see fig. XX

Analysis

- after a basic Visibility Graph is made these will be processed into deeper analysis
see XX - XX

Isovist Analysis

- proceed as shown in:
fig. 09 and fig. 10

- calculation will need some time

- after the calculation is done there will appear different maps to choose on the left side of the window. the focus is on the Isovist Area.
fig. XX

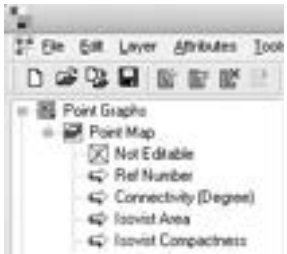
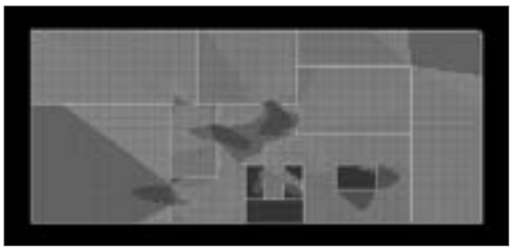
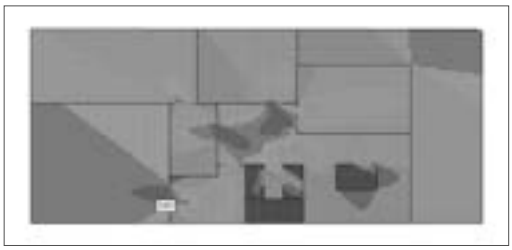


fig. XX



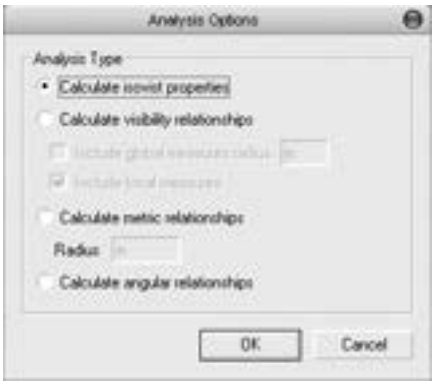
black background <-> white foreground

fig. XX



white background <-> black foreground

fig. XX



note: calculation 3.2 and 3.3 take a lot of time, so it is recommendet to first set the grid bigger to get used to it

fig. XX

Visibility Integration [HH]

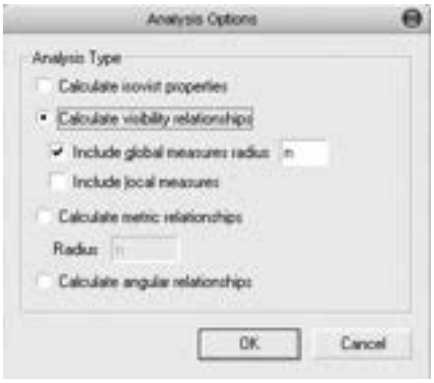
- proceed as shown in:
see XX - XX

- calculation will need some more time than in 6.1
note: smaller grid -> higher resolution -> more calculation -> more time

- after the calculation is done there will appear different maps to choose on the left side of the window. the focus is on the Visual Integration [HH].
see fig. XX

fig. XX

fig. XX



note: It is possible to include local measures also. To show which analysis creates which map, here it is shown one by one. („include local measures" will process a „clustering coefficient" map [6.3])
fig. XX

Clustering Coefficient

- proceed as shown in:
see XX - XX

- calculation will take a lot more time than in 6.1

- after the calculation is done there will appear different maps to choose on the left side of the window. the focus is on the Clustering Coefficient.
see XX

fig. XX

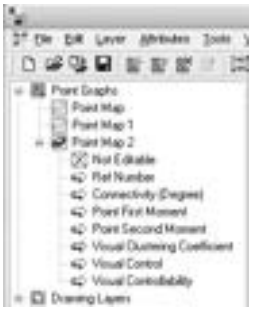


fig. XX

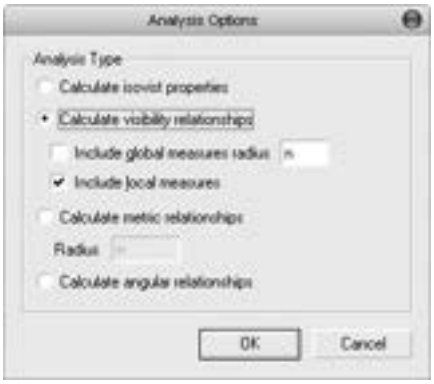


fig. XX

Agent Analysis

- proceed as shown in:
  fig. 17 and fig. 18

- calculation will be fast

- agent analysis is different to the other methods. Agents actually will walk around, so visible but not accessable windows need to be closed [make 'diagram_window' layer invisible].

- size matters... the area will have a great effect on the result, because agent density varies

> so set first analysis setting as shown in fig. 18
> after first result change 'Analysis Length'
> increase if the result has not enough traces or is all blue.
> decrease if map is too dense with information or too monotone

- any useful change of the setting needs to be documented by a screenshot

- Agent Analysis in upper floors
>mark the inner part of a staicase [selection tool]
>set agents to 'release from selected locations'
>start analysis [agents now walk from there]

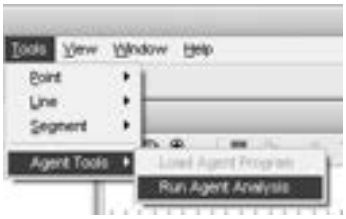
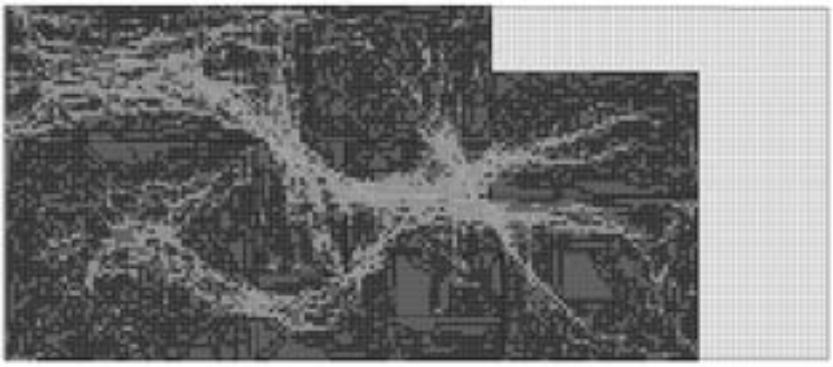


fig. XX

choose for GF
choose for upper floors

fig. XX



example [fig. XX]

Manual for the use of YED Graph Editor

Creating a j-graph with the yed graph editor preliminary

Export

- hide or delete all doors from the plans
- export floorplans from vectorworks as image file (jpeg)
export imagefile as shown in
fig. 01

fig. XX

Import

- open a new file in yed graph.
load the jpeg file into the new file as a background-image.

>file/preferences/background/more...
then choose the image of the plan.
it should look like in
fig. 02

fig. XX

Dravving a graph

- drag the circle from the palette into the board or select it and left-click into the board to place the automatically numbered circle
  see fig 03

- repeat this for all rooms visible on the floorplan

Settings

- select a circle some informations will be shown on the right side, here you can edit the objects

- use the following setting:

text:

- groundfloor	0.00-0.xx
- 1st floor	1.00-1.xx
- 2nd floor	2.00-2.xx
- staircase	s.01-s.xx
- balcony	b.01-b.xx
- ...	
- x	15
- y	15
- fill color	black
- font color	black
- font size	7

fig. XX

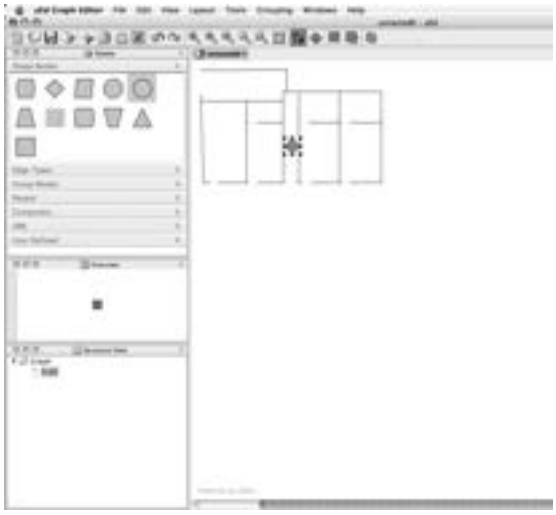


fig. XX

Drawing conventions

- the red dot represents the public area. from here you start connecting to each circle
  see fig. 05

- the numbering order is counterclockwise

- connect the rooms first which you can enter with one step
  see fig. 06

- save a copy from this numbering order

- when you start dragging a circle without having selected it, an arrow appears. do not release the mouse button right away!
Release the mouse button on top of the cicle you want to connect with.
  see fig. 07

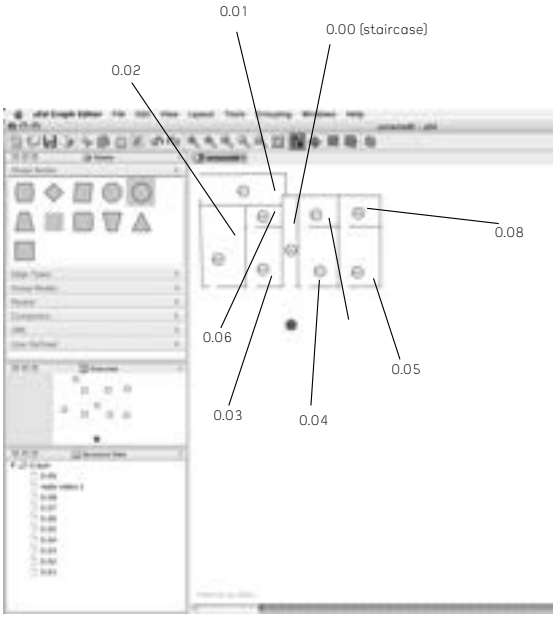


fig. XX

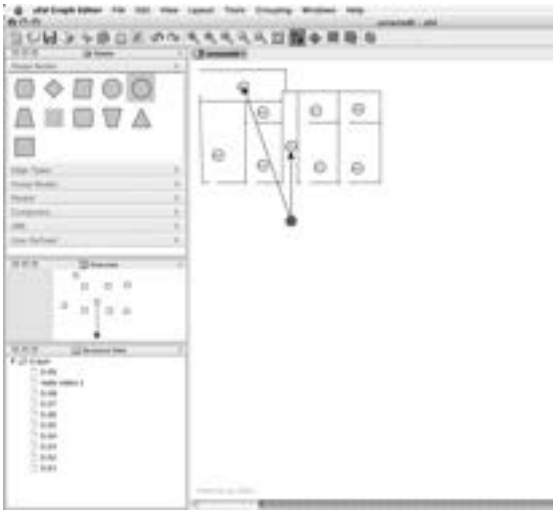
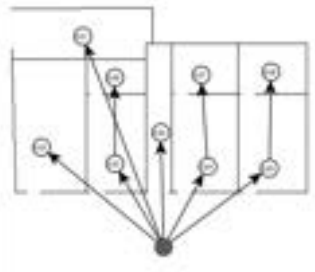


fig. XX



Creating a j-graph

- now to create a j-graph, go to:
>layout/hierarchical/classic
press "dock"
see fig. 08

- the window will be integrated in your left palette area
see fig. 09

- use following settings:

>minimal node distance
>45
>minimal first segment length
>30
>orientation
>bottom to top
>node placement
>tree
>edge routing
>polyline

- by pressing the green play button the graph will be formatted

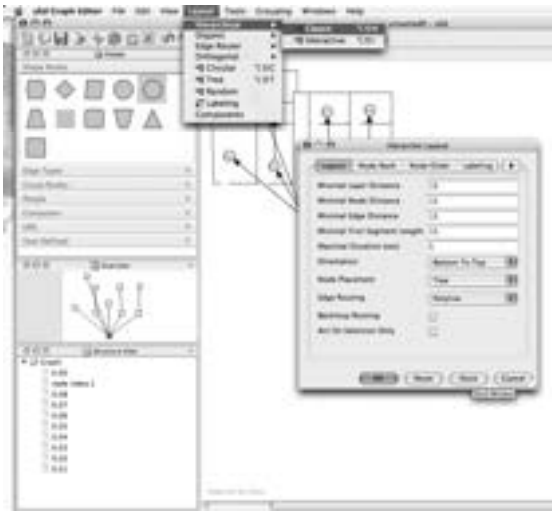


fig. XX

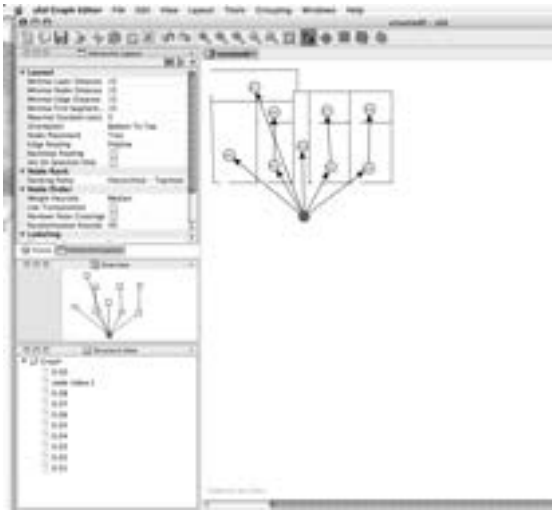


fig. XX

- select all arrows and change them into a simple line in the properties window
- set the grid system to 15
  see fig. 11

- you can also manually move the graph on the grid lines

- the horizontal and vertical distance between nodes are 15.
  see fig. 12

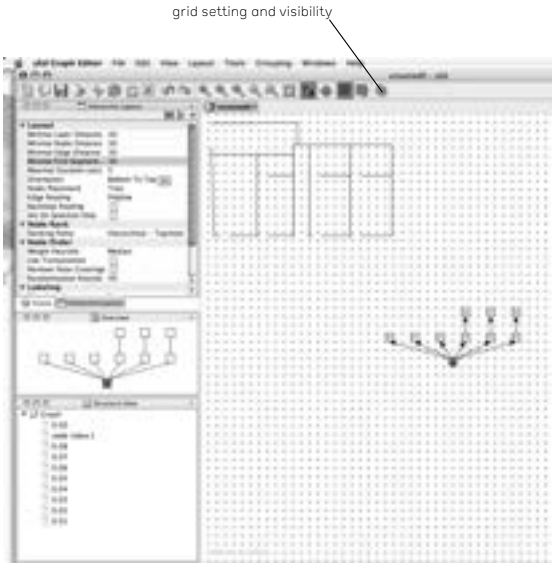


fig. XX

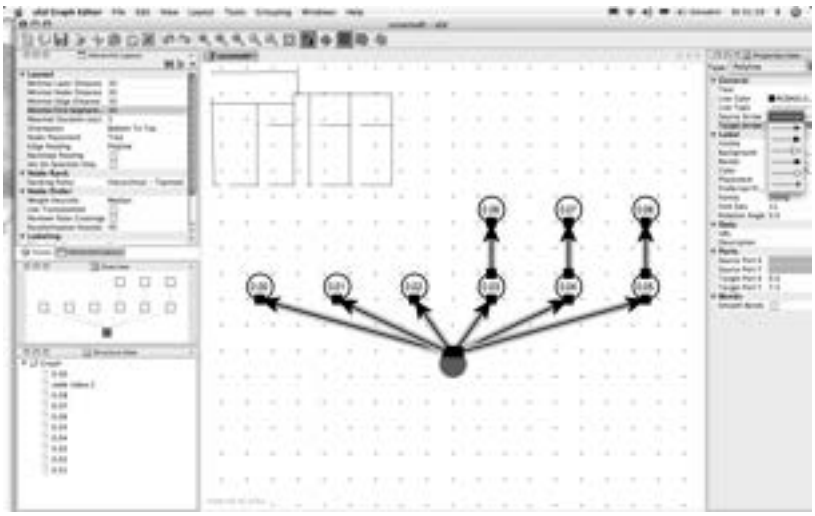
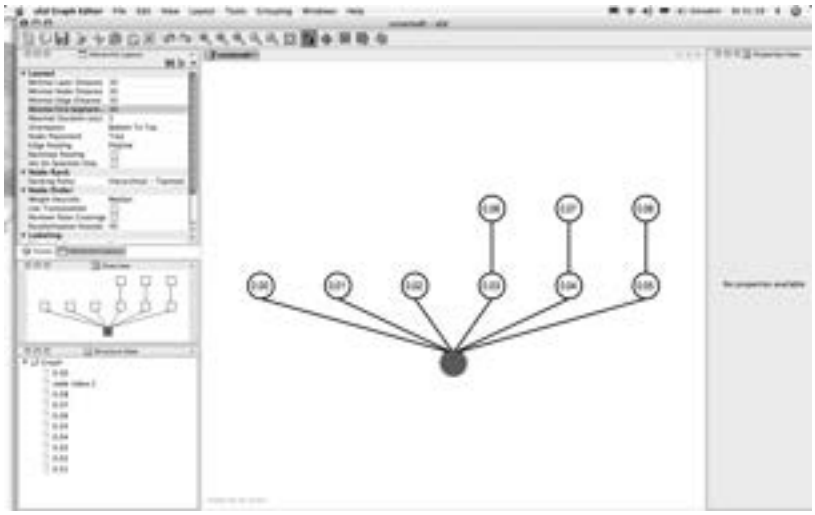


fig. XX

- generate the graphs for each floor

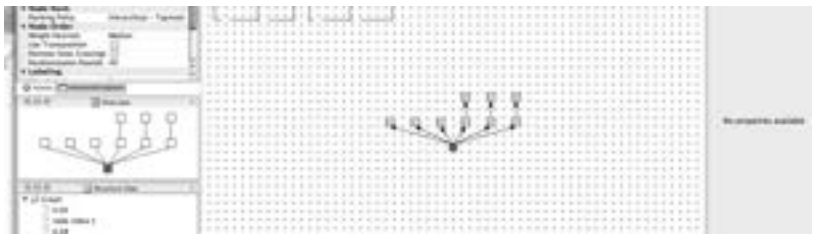
- for the next floor create a new file and copy / paste the other graph into it



groundfloor [fig. XX]

1st floor [fig. XX]

2nd floor [fig. XX]



3rd floor [fig. XX]

- manually place the graphs in the right order and position.

- mind the distance of vertical 30 and horizontal 45.

- the staircases s.01, S.01, S.02, etc. has to be connected alligned.

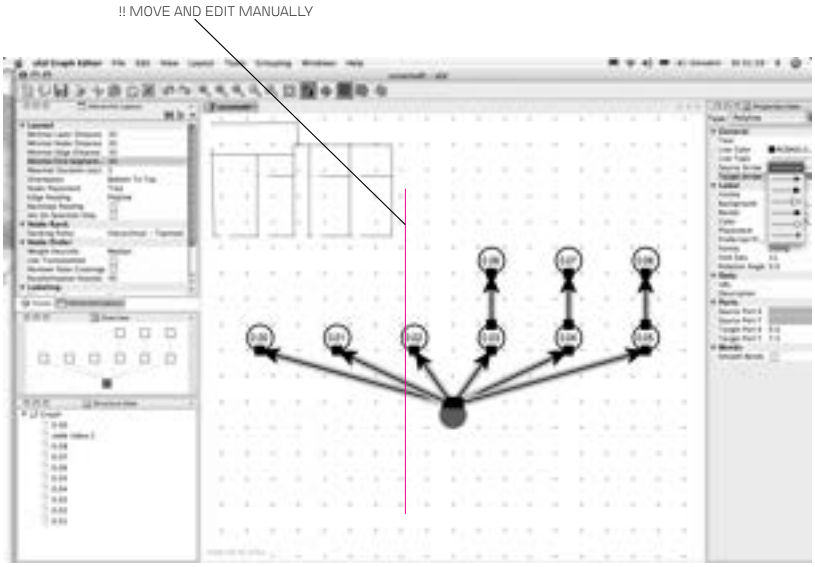


fig. XX

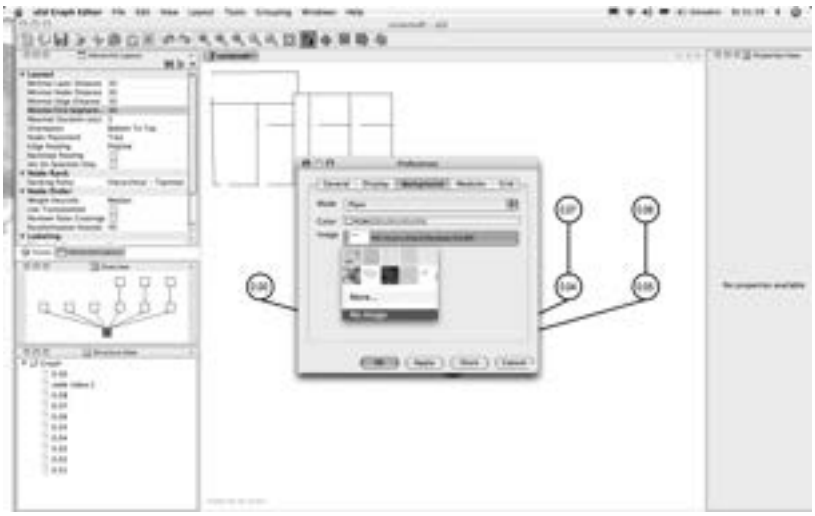


fig. XX

Graphic attributes

- change arrows into line, give the staircase line eventually a different coloring to make the graph more readable.
see fig. 19

- add numbers on the left side of the graph with distance 45 and numbers 0 for public area, -1, -2, -3,....
These indicate the total depth integration.

- layout should look like shown on in fig. 20

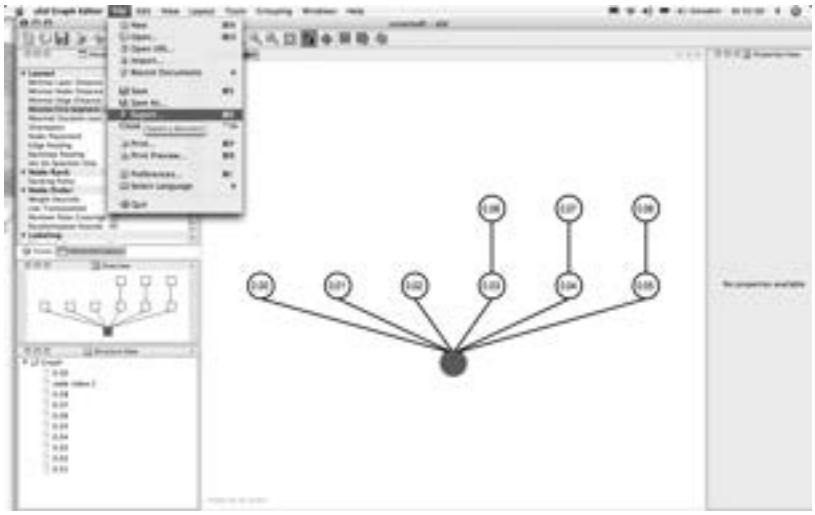


fig. XX

Export

-for exporting the file delete the background and the grid.

Go to:
>File/preferences/background
Select
>No image
Switch off the grid
Export file as jpg
Scale 1.0 [Or bigger afterwards the image have to be set to the same size, manually]

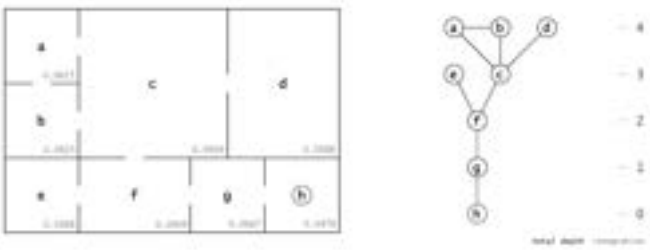


fig. XX

Please hand in
1 Graphs for each floor
With depth indicator.
2 The complete graph, each floor connected.
3 A print out of the layout, showing the floorplans and the complete graph.

the download-link for yed-graphediter can be found through google-search.