Author: Stöger, Johanna

Title: Rethinking Ostia : a spatial enquiry into the urban society of Rome's imperial port-town

Issue Date: 2011-12-07

Rethinking Ostia:
A Spatial Enquiry into the Urban Society of Rome's Imperial Port-Town

Archaeological Studies Leiden University
is published by Leiden University Press, The Netherlands

Series editors: CC. Bakels and H. Kamermans

Cover design: Joanne Porck
Layout: Japes, Amsterdam
Illustrations: Hanna Stöger, Jolanda Lee, Joanne Porck

ISBN 9789087281502
e-ISBN 9789400600683
NUR 682

ARCHAEOLOGICAL STUDIES LEIDEN UNIVERSITY 24

Rethinking Ostia:

A Spatial Enquiry into the Urban Society of Rome's Imperial Port-Town

Proefschrift

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof. mr. P.F. van der Heijden,
volgens besluit van het College voor Promoties
te verdedigen op woensdag 7 december 2011
klokke 13.45 uur

door

Johanna Stöger

geboren te Übersee am Chiemsee
in 1957

Promotiecomissie

Promotor: Prof. Dr J.L. Bintliff

Co-promotor: Dr L.B. van der Meer
Dr H. Kamermans

Overige Leden: Dr J. DeLaine, Oxford
Prof. Dr F. Lang, Darmstadt
Prof. Dr R. Halbertsma
Prof. Dr L. de Ligt, Leiden
Prof. Dr N. Sojc, Leiden

To Mario and
Samira

Introduction

This study developed over several years. It began with my research into Ostia for an MA thesis; ever since, my interest into this remarkable site has grown over the years, developing into the larger research project of this doctoral thesis. My initial unassuming enquiries into the spatial organisation of Ostia through its monumental house entrances grew into an extensive spatial assessment of Ostia's built environment. In the course of my endeavours I built up a keen interest in theoretical approaches to space and the related human use of space.

This thesis comprises nine chapters, including the conclusion. It will take the reader along the route of a spatial enquiry into the Roman city of Ostia, through which I intend to shed completely new light on the society of this port town. This survey begins with a stock-take of the works of various scholars of Ostia who have contributed to a better understanding of the city's urban development. Naturally such an assessment needs to be selective: only works which relate to the formation and development of the urban fabric were examined; these studies share a heightened awareness of the importance of urban space in structuring social activities. The critical assessment of earlier work helps us define the research objectives of this study, clearly identifying the lack of studies which combine data-driven theoretical analyses with the results of archaeological investigations to provide a more detailed account of the built environment.

The second chapter concentrates on Roman urban studies outside of Ostia. Pompeii has always been the prime site where novel ways of looking into the ancient city have been pioneered. What can be learnt from studies of other Roman cities like Pompeii and Empurias? Chapter two looks into contributions from some of the most influential scholars of Roman urbanism which developed out of Pompeian research (Zanker, Wallace-Hadrill and Laurence), but also at the innovative work from a new generation of researchers who have promoted analytical methods for urban analysis. Among the studies examined there are quite a few protagonists of a methodology known as Space Syntax (Laurence, Grahame and Kaiser), and it is, above all, their work which has inspired this thesis.

As a result, chapter three is dedicated to Space Syntax. It aims at explaining the theoretical underpinnings of the method, but also provides a brief overview of Space Syntax studies in archaeology. The common assumption shared by most other theoretical approaches termed 'spatial analysis' is that space acquires significance through some other agency or social process which gives it its shape and its meaning. Hence spatial forms, or in Hillier's words the 'patterns of shaped and interlinked spaces of everyday life' should be studied only in the light of their social causes.[1] Such a clear preoccupation with the dominant role of human agency in spatial transformation leads to a methodological problem in archaeology, in that material culture appears deprived of influence on human life. However, archaeological knowledge of past urban life can be retrieved from the highly materialized form of the social life of encounter and place. Therefore the material forms in themselves will be of central interest and worthy of study, making past urban space an object of investigation and an entity of theoretical interest in its own right.

There are also far wider implications to the 'spatial turn' in the history of urban studies. Space Syntax prioritises the role of the built environment in structuring and giving occasion to social encounters. The incorporation of Space Syntax into any study of wider perspectives offers insights that reach beyond observations made only from building

1. Hillier (2008a: 223).

plans and visible structural remains. Space Syntax's methods not only provide evidence for the intricate organisation of urban space, but also investigate the active role of space in the constitution of society, through considering the ways in which social processes map into built form. Studying Ostia from a 'spatial' perspective entails more than singling out one of several possible thematic choices (e.g. urban planning, economy, household archaeology); a spatial approach is rooted in archaeology itself. In pursuing a spatial approach our study takes us immediately into a much wider theoretical field where space and its implications play a key role in the analysis of all social and economic processes.

Chapter four will lead us to the archaeological methodologies followed in this study and takes us to the technicalities of applied Space Syntax. This chapter discusses the methods and techniques used for data capture, processing and analysis. It explains all the preparatory work needed before methods of spatial analysis can be applied to the archaeological record, when we try to apply it to a site which is beset with problems.

Surprisingly, although Ostia's built environment has been attracting wide-ranging research interest in recent years, nonetheless the city's spatial organisation has remained a neglected field of study, with only limited attention given to formal methods of spatial analysis. Before being able to apply spatial analysis, however, it proves necessary to undertake a major work of re-mapping the city, incorporating a critical review of the excavation history and the forms of recording applied to the city and the strength and limitation of the available data. We shall show that excavation techniques and restoration methods reflect the bias of the excavators. Moreover, Ostia's history of excavation is intimately associated with Italian national history.

Having clarified the potential of the maps and textual information for the built environment of Ostia, our analysis proceeds through a sequence of increasing spatial scales, with a central emphasis on the active role of the built environment in constraining and enabling social behaviour. We begin in chapters five and six with individual houses and their enclosing neighbourhoods (Insula IV ii), moving next, in chapter seven, to the street network and the public places of the city. Finally chapter eight focusses on a building type located across the whole urban fabric – the guild seats. A common theme elaborated in the context of the street system and the guild seats is the 'movement economy', where spatial behaviour is strongly conditioned by the opportunities and limitations for human mobility imposed by the physical structure of the city's traffic infrastructure.

The heart of this scalar analysis is the complete re-working of the archaeological evidence and its interpretative potential for one city block comprising 14 buildings in the south-eastern inner suburbs of the city (Insula IV ii), which has never been published in its entirety. This part of the thesis, we hope, will form in itself a major contribution to Ostian studies beyond the value of the Space Syntax analysis we have carried out for this and other parts of the city.

The final chapter summarises what has been achieved in the thesis and the future potential of such an approach for archaeological studies of past urban environments. A particular point which will be stressed here is the non-destructive nature of such investigations, to which we can add their ability to operate over entire cities as well as in different urban contexts regardless of time and place. Indeed, Space Syntax has been primarily developed from the analysis of recent and contemporary cityscapes but has proved to be extremely valuable for nucleated communities stretching back into later Pre-history, as well as for historical cities of the more recent past.

Ostia – a brief introduction to the site (Fig. 0.1)

In Antiquity Ostia was located at the mouth of the Tiber on the Tyrrhenian coast, about 25 km southwest of Rome. The course of the river changed over time and its estuary silted up, gradually moving the shoreline seawards. Today Ostia is located about 2 km inland, but still near the Tiber, where the ancient site is found on the southern bank of the river.

Earliest activities in the area have been connected to salt processing, probably dating back to the Middle and Late Bronze Age. An archaic road system leading from the mouth of the Tiber to Rome and the Etruscan cities in the north of Rome seems to have been linked to the transport of salt. Ancient writers have assigned the area close to the mouth of the river to salt processing;[2] even Late Roman textual sources still referred to the area as the 'campus salinarum Romanorum'.[3] However, no secure archaeological evidence for the ancient salt pans has been identified and their exact location remains an open question, while the existing salt pans have been dated to the Medieval and modern periods, when salt was processed under the papal government.[4] Surface pottery, dating to the 7th or 6th century BC, gives support to the idea that a small settlement predating Ostia might have existed in the south-east of the later city, presumably also linked to the salt production.[5]

Ancient writers attributed the foundation of Ostia to the fourth King of Rome, Ancus Marcius,[6] who, according to tradition, ruled in the late seventh century BC. This long-established view was kept alive and even further reinforced by the second century AD city, when Ostia commemorated her foundation as the first Roman colony by placing a marble inscription in honour of the event.[7] So far no archaeological evidence has been retrieved which could support such early dates for the foundation of the city. The earliest settlement that can be identified is the so-called Castrum, a rectangular military structure (195 x 125.7 metres) with four gates, built with large tufa blocks. The foundation dates for Ostia's Castrum are not securely established, while the most likely dates point to 300 – 275 BC, based on pottery finds from the foundation layers.[8]

Owing to its presumed military character, Ostia's Castrum has been associated with a series of 'Coloniae Maritimae' which were established along the Tyrrhenian coast. They were built with a concern for the protection of the coastal lands and hence colonists were dispatched to Antium in 338 BC, Terracina in 329, to Minturnae and Sinuessa in 296, and at an unknown date to Pyrgi,[9] and also to Ostia. Various scholars have tried to establish a link between the foundation of Ostia's colony and historical events, e.g. the advancing Carthaginian fleet which reached Ostia in 278 BC, or when the *duumviri navales*, the two officials in charge of the Roman ships in 311 BC, were appointed.[10] There is however no specific mentioning of the foundation year of Ostia's colony. In 267 BC Ostia became the seat of one of the quaestores classici (officials taking care of the fleet), and served primarily as a naval base. During the Republican period the city developed from a colony with presumed military character, administered from Rome, into a small civic town with its own local government. Concurrently a shift from a naval base to a commercially oriented port town took place, primarily focused on supplying Rome, but also supporting Ostia's growing urban population. Towards the end of the Republican period Ostia had already grown into a city of considerable size and received new city walls enclosing an area of about 70 ha. In the Early Imperial period Ostia's urban character was further developed, featuring new public buildings including a temple dedicated to Rome and Augustus and a theatre built by Agrippa.11 Already in the Augustan period the city was supplied with fresh water by an aqueduct. A few warehouses developed, marking the growing importance of Ostia as a harbour serving Rome. However, all in all until the Early Imperial period the city showed a normal pace of urban progress and, although possibly lagging behind other prosperous cities like Pompeii, Ostia's growth still developed along parameters which were not too different from other cities of the same period.

2. Livy i. 33.9: 'silva Maesia Veintibus adempta, usque ad mare imperium prolatum et in ore Tiberis Ostia urbs condita, salinae circa factae.' (Translation in Meiggs (1973: 16-17): 'The Maesian forest was taken from Veii: Roman rule was advanced to the sea, and at the mouth of the river a city was founded, and salt-beds established near by.')
3. Pavolini (2006: 283).
4. Pavolini (2006: 4-5).
5. Pavolini (2006: 4).
6. Ennius (Ann. Ii, fr. 22) is the first of a long line of writers who attributed the foundation of Ostia to Ancus Marcius, others followed: Livy i.33.9; Dion. Hal. iii. 44.4; Cic. De Rep. ii. 5 and 33; see Meiggs (1973: 16).
7. See Meiggs (1973: 16).
8. Martin (1996: 19-38).

9. See Meiggs (1973: 23) and Von Hesberg (1985: 129-173).
10. Warsenburg (1998), and Zevi (1996: 69-89).
11. Cooley (1999: 173-182).

Ostia's big urban transformation started at the end of the first century AD, and particularly during the first half of the second century, when the city's development seems to have accelerated in a way that was unparalleled in the ancient world.[12] The vast urban expansion was related to the construction and extension of the port facilities at nearby Portus, and the subsequent increase in trading volume. Ostia and Portus became Rome's principle ports, bringing supplies to the city of Rome, but also trading with the Roman provinces. The increased port activities brought prosperity to Ostia as well as an influx of new residents. During the first half of the second century AD Ostia's built up areas expanded far beyond the Late Republican city walls, extending the city's boundaries in all directions. New public buildings were added to Ostia's urban landscape including the impressive Capitolium in the northern extent of the *forum*, as well as the barracks of the fire-fighters and large public baths, and above all numerous warehouses and storage facilities. In the second half of the second century new building development slowed down, while existing buildings were modified and embellished. While Ostia still enjoyed prosperity during the 3rd century AD, the urban boom which was experienced during Ostia's commercial heyday had, however, ebbed considerably. Furthermore, the city also lost its political autonomy and came once more under the control of Rome who placed Ostia under the authority of the prefect of the grain-supply (*praefectus annonae)*, who was the curator of the harbours.[13]

The fourth and fifth centuries saw a turn to punctuated luxury with several pockets of lavishly decorated Late Roman *domus* distributed over wide areas of the town, while other parts gradually fell into decay. Ostia was slowly abandoned and eventually became a quarry for marble and building material which was reused in Medieval buildings in the nearby Borgo. An interest in the site developed once again when the earliest excavations started in the 18th century when Ostia was part of the papal property.

A glossary providing brief definitions of the Latin terms, as well as technical or culture specific terms used in the study is found at the end of the book. The chronology of the imperial periods is also found at the end of the book. The Access data base which manages all structural data of Insula IV ii is available upon request.

12. Heinzelmann (2002: 105).
13. Meiggs (1973: 84, 186).

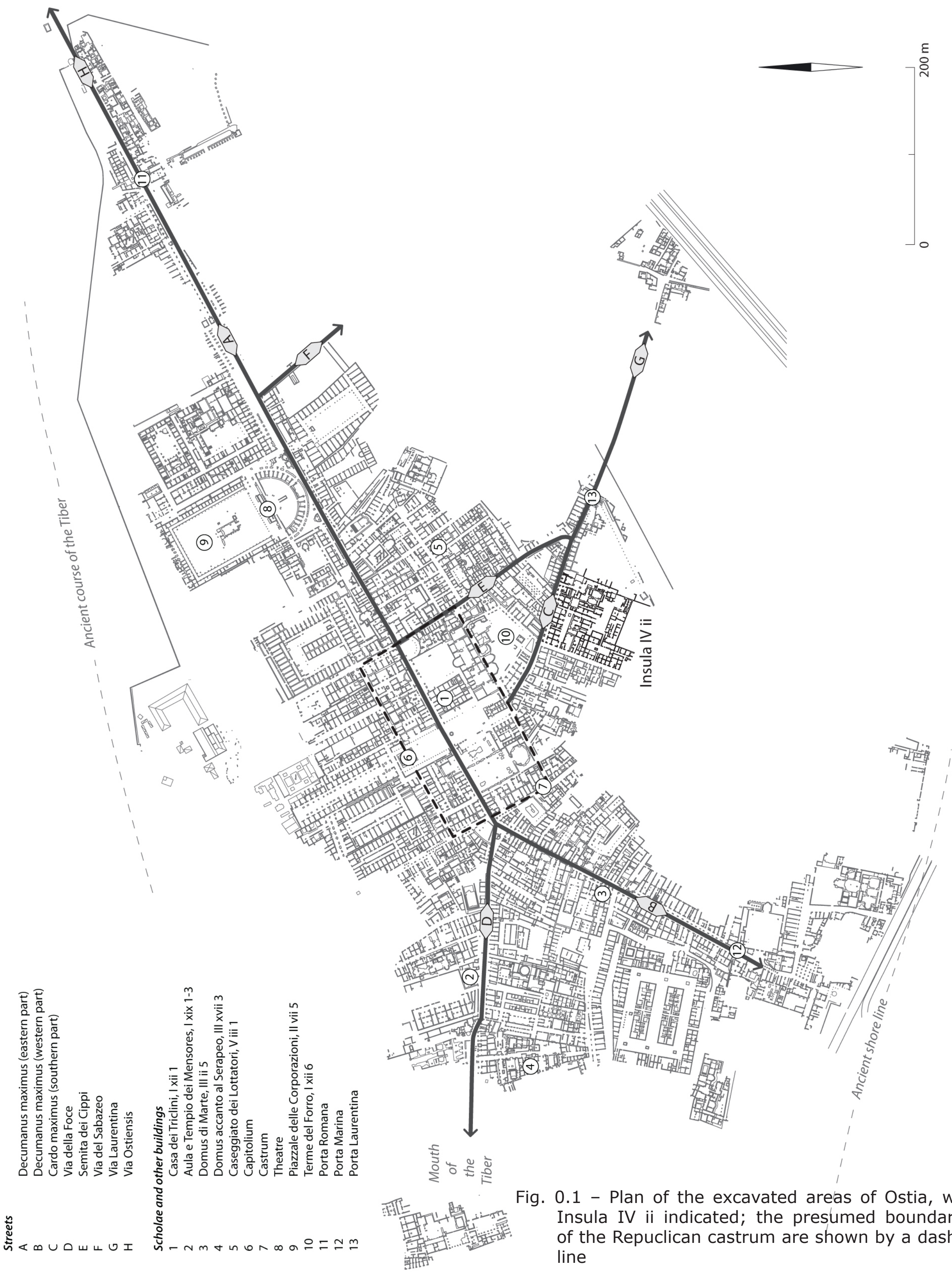


Fig. 0.1 – Plan of the excavated areas of Ostia, with Insula IV ii indicated; the presumed boundaries of the Repuclican castrum are shown by a dashed line

1 – Research in Ostia

Until the early 1990s Ostia was still considered to be one of those sites, which had been largely excavated but not equally well studied or published.[1] Over the last twenty years research activities in and around Ostia have substantially increased, involving a large number of Italian as well as foreign researchers and research teams. Most of all, the results of the intensive DAI project, based on geophysics and targeted excavations carried out in the unexcavated areas, have extended the city's boundaries far beyond expectations.[2] In this way the DAI project has not only provided new data for land-use and the organization of space in the suburban areas,[3] but also contributed to a change of focus: from an inward oriented research tradition based on monuments and architectural structures, new projects developed with a focus on Ostia's extra mural territory and the city's wider context.

Russell Meigg's indispensable, monumental work *Roman Ostia*, published in 1960 and revised in 1973, remains the landmark in historical research.[4] A re-evaluation of Ostia's urban development integrating the results of the last 40 years of archaeological and historical research is still to be written. Large-scale archaeological projects that aim at the incorporation of a multitude of data are still not well represented in Ostian research.[5] Some smaller projects however have attempted to link their specific research to the overall development of the city.[6]

Research at Ostia is generally carried out under the auspices of the *Soprintendenza per i Beni Archeologici,* which manages the site and approves research projects.[7] The majority of projects currently under study are concerned with a particular building or a group of buildings for which the *Soprintedente* grants specific research permits. In this way individual projects are registered with the *Soprintendenza* and possible overlaps can be avoided. At the same time this administrative procedure seems to have influenced the way in which the site has been studied. As a result, research has been very compartmentalized and fragmented, dealing with one or a few aspects of the site at a time.

The way in which the established research tradition in Ostia was formed is not an isolated case; until the mid 1990s, fragmentations by subject boundaries are also well reflected in literature on ancient urbanism and architecture. Classical archaeologists have tended to focus on architectural details, often neglecting the social and political context. Likewise historians have been inclined to use examples from past building activities as evidence for the interpretation of economic or political trends, and have neglected the built environment itself. Only recently have historians and archaeologists attempted to come to terms with concepts of looking at urban space as a means of studying past urban societies. Within the considerable number of recent publications on Ostia, although to a large extent still dealing with specific

1. Kockel (1990: 99, note 2).
2. The Deutsches Archaeologisches Institut in Rom (DAI) carried out research in Ostia between 1996-2001. The project concentrated on the unexcavated areas; s. section 1.3 below.
3. See Heinzelmann (1998a: 183); Bradford (1957: 242-248) and Meiggs (1973: 473-474); Chapter Six of this study discusses Ostia's streets in the periphery.
4. Meiggs (1973).
5. DeLaine's urban project (DeLaine forthcoming) aims at a new evaluation of Ostia's urban development, concentrating on specific topics: the formation of urban identity; the nature and mechanics of urban change; the social structure of urban space; and the economics of urban life.
6. E.g. the Texas University project project studying Ostia's Synagogue; the Kent/Berlin project directed by Gering and Lavan, examining Ostia in Late Antiquity.
7. Since 2009 the Soprintendenza of Ostia has been joined to the Soprintendenza of Rome and is now referred to as *Soprintendenza Speciale per i Beni Archeologici di Roma, Sede di Ostia*.

aspects of the site, a shift in perception can be noted.[8] Gradually the city and its surroundings are being perceived as inhabited space rather than a collection of monuments.

In the following chapter a selection of ´Ostian studies´ will be examined. All of them have synthesized and analysed recent information and excavation data, or have looked at already existing data with new research questions. The selection is focused on approaches related to urban formation and development, and above all, these studies show a heightened awareness of past urban space as a significant factor in urban development.. These studies will be examined on how they conceptualize and analyse urban space, and will be evaluated in terms of their contribution to a better understanding of the overall organisation of the city.

1.1 HERMANSEN: ASPECTS OF CITY LIFE, BUILDING-TYPES AND URBAN FORMATION

The starting point for this discussion is Gustav Hermansen's *Ostia: Aspects of Roman City Life,* published in 1982. Hermansen entered the scene when Ostia was only sparingly published. He investigated Ostia's 'little ephemeral material' that did not appeal to scholars as much as the grand marble sculptures and mosaics. The publication concentrates on the material culture of everyday life in the light of literary sources. The discussion is exploratory and selective with an emphasis on apartment living, the guilds, and the taverns of Ostia, thus providing a glimpse into the life and the living spaces of the majority of Ostia's population. The study sets out with a number of pertinent questions concerning Ostia's urban development. From the very beginning, Hermansen expressed doubts about Ostia's *'Golden Age'* in the 2nd century AD, which occurred at a time when one might have expected that the city's usefulness had been largely taken away by Portus, the new harbours of Claudius and Trajan. According to Hermansen, Ostia was doomed before its development was completed. In 1982 Hermansen wrote that this paradoxical fact has never been discussed or explained.[9] Recent research in the Portus area and in Ostia has shed new light on the peculiar relationship between Portus and Ostia.[10] Some of the questions Hermansen raised have been answered by the results of the new research projects; others have to be addressed through a radical re-reading of the existing evidence.

Hermansen's work is of specific relevance to the study of Ostia's urban formation as it pioneers straightforward ways of reading urban space. Already in the 1970s Pompeian studies applied methods of urban geography, and recognized the significance of urban space and the built environment for revealing the socio-economic structure of the town plan. In contrast, urban studies in Ostia, had not been influenced by urban geography and had not yet applied analytical approaches to past built space. In Pompeii systematic urban research had started with Eschebach's town plan, providing information on the function of each building.[11] Raper's sociological examination of Pompeii's urban space took Eschebach's information further and classified land use into twelve categories, and devised a grid system to obtain percentile land use data.[12] As far as Ostia

8. Current work has been presented at international Ostia colloquia held in Rome between 1996 and 2001, partly published in Gallina Zevi and Claridge (1996), Mols and van der Laan (1999), Descœdres (2001) and Bruun and Gallina Zevi (2002). Furthermore in both of the 105th (2004) and the 106th (2005) Annual Meetings of the Archaeological Institute of America a session was dedicated to current projects and recent research in Ostia. The 105th meeting, named Ostia, Port City of Imperial Rome, dealt with two broad categories: topography and monuments and society and culture. The 106th meeting was conceived as a sequel and counterpart to the previous session and focused on Ostia '*fuori le mura*': research in the Ostian territories.

9. Hermansen (1982: 2, 11).

10. See Keay *et al*. (2005); the Portus project has been conducted collaboratively by the Univ. of Southampton (S. Keay) and the Univ. of Cambridge (M. Millett). Starting in 1998 a geophysical survey has now been completed covering 128 ha of the port complex at Portus. The study offers new insights into the development of the imperial harbours and their surroundings. The Portus project forms part of the larger Tiber Valley Project.

11. Eschebach (1970); with an appendix to the Pompeian city plan, providing a functional category (land-use) for all excavated buildings, however, often misleading.

12. Raper (1977: 207-208; 1979); see chapter three this study, in particular the section on Kaiser (2000).

is concerned, Hermansen's work demonstrates the beginning of an analytical approach to urban space: he grouped buildings, and identified that specific buildings, i.e. taverns (pubs and inns) and guild seats, were found at certain locations within the town plan. Unfortunately he did not further investigate this phenomenon to establish whether the detected patterns of distribution relate to urban zoning, or whether they reflect concentration, dispersion or even a balance of commercial activities. Nevertheless he observed that taverns have a tendency to be situated on street corners, and he established that about one-fifth of all taverns identified in Ostia are located on street corners, constituting a high proportion for one type of land-use. He also noticed that there was only one district within the city where a real concentration of taverns was found: nearly one-third of all Ostian taverns are located along the western *decumanus* with a slight concentration in or outside the *Porta Marina*. Hermansen claimed to recognize a trend and concluded that taverns respond to travellers and their needs for refreshments as soon as they enter the city.[13]

Hermansen´s conclusions remain too superficial, and are not even borne out by his observations. He seems to have ignored the fact that Ostia´s major access roads reflect different patterns of land-use, resulting in different densities of taverns: along the eastern *decumanus*, in the area of the Porta Romana, where travellers from Rome enter the city, far fewer taverns are found than on the western *decumanus*. Moreover, in the vicinity of the Porta Laurentina on the *cardo maximus* only a small concentration of taverns provided service to travellers coming from *Lavinium*. Yet the highest concentration of taverns is found around the Porta Marina, the city gate towards the sea-shore and coastal region of Ostia.[14] This seems to suggest that factors other than arriving travellers and their need for refreshment are at play. It appears that the area in and outside the Porta Marina enjoyed added recreational value due to its proximity to the seashore. The area must have attracted local citizens as much as residents from the outlying areas along the seashore where large-scale villas had developed from the early imperial period onwards;[15] hence the popularity of the area might account for the large number of taverns.

Even though Hermansen presented his observations without further analysis of the spatial relationships of buildings with similar utility, still his study betrays an acute awareness of the significance of space within the urban context. This is evident throughout his work and is clearly expressed in his approach to Ostia's guild seats: "*To find a guild, then, one must look for the sanctuary and the facilities for meetings and banquets, a good water supply in the immediate neighbourhood is also necessary, both for ritual purposes and for consumption*."[16] His brief descriptions of Ostia's guild seats are complemented by a separate plan of every individual site.[17] Unfortunately such practice isolates the buildings from their context, and by ignoring the guild buildings' neighbourhoods, he neglected a decisive factor otherwise acknowledged throughout his work. Considering the degree of importance Hermansen's work dedicates to urban space, it is difficult to understand why his survey does not utilize larger sections of Ostia's maps to illustrate his observations, all the more so since his approach calls for the use of maps, and the help of visual tools to provide a link between location and archaeological data.

Nevertheless, to this date Hermansen's work is a major contribution to the better understanding of Ostia's guilds.[18] He investigated the activities of the guilds in the light of inscriptions, assessing their economic and social aspects. His textual evaluation is corroborated with information gleaned from the built property of Ostia's guilds.[19] Hermansen applied

13. Hermansen (1982: 185-186).
14. A thorough study of Ostia's *tabernae* (pubs and inns) has been conducted by A. Kieburg, as part of her PhD research (Univ. of Bonn) and will be published shortly.
15. The Laurentine shore project, directed by A. Claridge, Royal Holloway.
16. Hermansen (1982: 60).
17. Hermansen (1982: 63-87, figs. 12-32).
18. See Hermansen's survey of Ostia's guilds (1982: 55-89); see chapter eight of this study for a spatial assessment of Ostia's guild buildings.
19. Hermansen was the first to identify four distinct categories of guild buildings in Ostia. His categories are confirmed by Bollmann's study that took all guild seats of Roman Italy into consideration (Bollmann 1998:30). Hermansen's classifications are based on commonalities

the Roman laws related to buildings as a guideline for the evaluation of the property of the guilds. He took up the challenge to measure Ostia against these laws. His starting points are the building laws introduced by Nero after the fire of 64 AD, recorded in Tacitus' *annales*. These laws proclaim that there should be no common single walls, paries communis, between neighbouring buildings, but each should be contained by its own walls.[20] Hermansen claims that by appraising the guilds' attitude toward the adjoining property – whether they respect it or violate it - information about potential ownership could be gained. His method is based on the assumption that the guilds owned the adjacent buildings in those cases where flagrant violation of neighbouring property occurred.[21]

Hermansen's approach received considerable criticism from scholars specialising in Roman building law, and experts in guilds, notably Bollmann.[22] Her intensive study of Roman guilds combines the vast body of inscriptions and the archaeological evidence relevant to guild seats in Roman Italy.[23] Furthermore detailed structural studies carried out in selected areas of Ostia seem also to disprove Hermansen's method of establishing the presence or absence of *pareis communis* as valid property markers.[24] Although the rules of the *pareis communis* are followed in most Ostian buildings, there are exceptions.[25] Private agreements between owners, as well as court cases dealing with violations of building rules, testify to various exceptions.[26] Bollmann therefore argues that there is not enough conclusive evidence to ascertain that legal categories allow assumptions to be made with regard to common ownership or the division of property.[27] At the same time Bollmann's work does not disprove Hermansen's thesis, and these exceptions could actually prove the rules.

Whether Hermansen's deductions are borne out by the existing architectural evidence is outside the remit of this thesis. Still, despite Bollmann's critique, Hermansen's approach has stimulated a re-evaluation of guild seats and their respective properties, which will be in part addressed in Chapter Eight of thesis. Regrettably Hermansen's study was still very much concerned with questions about the individual building-types or location and distribution and misses out on questions concerning the integration of the buildings into the overall organization of the city. Nevertheless his observations relating to Ostia's taverns and their spatial distribution raised attentiveness towards the spatial properties of the city's past urban environment. Thus Hermansen's surveys paved the way for later studies concerned with the functional organisation and distribution of commercial space in Ostia, some selected studies of which will be discussed in the following sections.

1.2 KOCKEL: PUBLIC SPACE IN TRANSFORMATION

With a focus on urban space and changes in the urban structure of the 2nd century AD city, Kockel's *Beobachtungen zum Wandel eines Stadtbildes* take the urban discourse a step further.[28] Following Zanker's work in Pompeii and Rome,[29] Kockel adds a new analytical component to Ostian research: the concept of 'visual imagery'. He moves away from the genre-specific direction of previous research and looks at the city in its totality. Kockel traces Ostia's development from Republican times to the Julio-Claudian period and looks at the Campanian cities for a comparative benchmark.[30] Although the two

between the built structures. Category 1: Guild sites of monumental character where the effect of the sanctuary is enhanced by the frontal axiality of the plan. Category 2: Buildings where the sanctuary is replaced by a tablinum-type stateroom. Category 3: Sanctuaries with their surroundings not arranged with an artistic and architectural intent. Category 4: Buildings which condense all guild functions within one single room (Hermansen 1982:74; Bollmann 1998:20).

20. Tacitus, *Ann*. XV 43.
21. Hermansen (1982: 95-96).
22. Bollmann (1998).
23. Bollmann (1998); see also chapter eight of this study for an overview of research on Ostia's guilds, including Bollmann's work.
24. Boersma (1985: 214, fig. 202, 234-237).
25. Pavolini (1986: 172).
26. *Dig*. VIII 2, 8; 13 pr. and 1; 19 pr. and 1; 25, 1; 40; see Hermannsen (1992: 92).
27. Bollmann (1998: 213-221).
28. Kockel (1992).
29. Zanker (1988a; 1988b).
30. Kockel (1992: 99).

towns differ radically in history and character,[31] by way of comparing and contrasting Ostia and Pompeii, Kockel attempts to establish the degree of Ostia's 'relative' urban standard reached by the middle of the 1st century BC. His first comparison clearly portrays Ostia as a city of critical urban shortfall.[32] Kockel argues that all later urban changes, including the extraordinary development occurring in Ostia from the time of Domitian onwards, can only be assessed correctly, when judged against the background of these initial shortcomings.

The study follows Ostia's progress into the Imperial period and explores certain aspects of the city's structure to gauge its urban development. The urban elements under study are public space and its design; the significance of public buildings and monuments as visual markers; water as indicator of civilisation; the overall distribution of cult buildings; the guild seats (*scholae),* and the presumed height of buildings, although private dwellings and apartment houses are treated only cursorily. Kockel refers a second time to the Campanian cities for comparison and establishes that at the end of the Julio-Claudian period Ostia's urban standard was still lagging behind.[33] What defined a Roman city seemed self-evidently based on its physical form. By then most cities of Roman Italy would have comprised a colonnaded *forum*, a basilica, temples dedicated to imperial cults, smaller temples to various divinities, a honorific arch, a theatre, aqueducts and fountains. Ostia in contrast was only moderately equipped, as Kockel argues, still lacking urban characteristics like colonnaded halls, arches and fountains.[34]

Ostia's so-called architectural revolution started in the time of Domitian, leading to a marked increase in urban development driven by the activities of Trajan's harbour in Portus. These prompted an enormous influx of people and goods. Building activities under Trajan were mainly concerned with apartment houses and storage facilities, concentrated in the west of the city in the neighbourhood of the *Via della Foce*, one of Ostia's major thorough fares

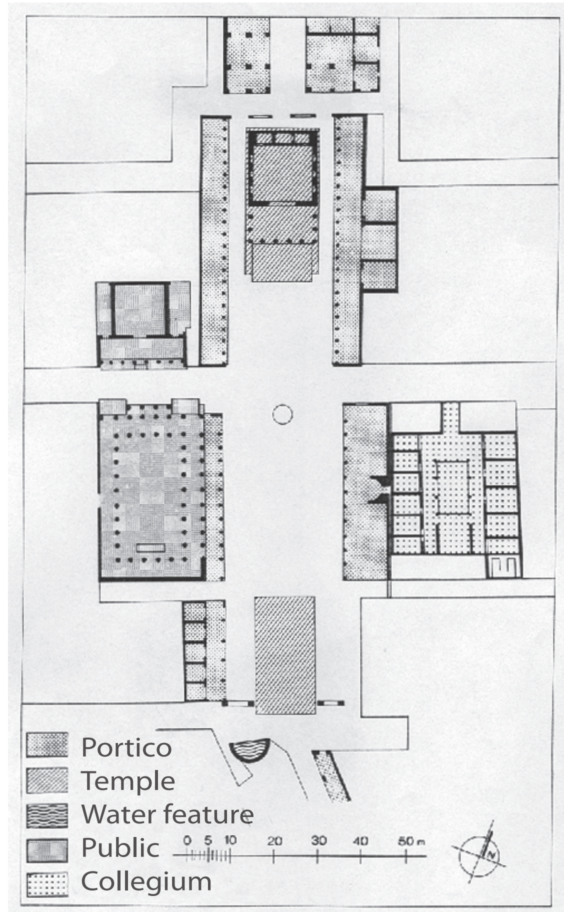


Fig. 1.1 – Functional zones of Ostia's *forum* (source Kockel 1992: 111, fig. 66)

leading to the mouth of the Tiber. Kockel points out that new or rather higher 'standards of living' are evident from the simultaneous construction of five new bath complexes, partly replacing pre-existing houses. These baths are all located in the western part of the city, doubling the total number of Ostian bath complexes,[35] identified within the excavated area.

The largest urban transformation and expansion took place under Hadrian, with a distinct early and a late Hadrianic phase.[36] According to Kockel the entire northeastern part of the city, including the *forum*, was

31. Meiggs (1973: 11-15).
32. Kockel (1992: 104).
33. Kockel (1992: 107).
34. Kockel (1992: 107).

35. Kockel (1992: 110).
36. Pavolini (1986: 22-24).

part of the first large-scale development programme under Hadrian.[37] Although the programme included the construction of storage buildings and apartment houses, according to Kockel the emphasis was on enhancing the representative character of the area.[38]

Kockel breaks new ground in Ostian research by analysing the *forum* in terms of its functional zones (Fig. 1.1). He distinguishes colonnaded porticoes, temples, fountains, public buildings and guild seats. He looks into the overall integration of these single units into a coherent programme for development. From the pattern that emerged Kockel concluded that the re-design of the *forum* was dictated by an overruling desire for representation, and in its conception the new *forum* bears closer similarity to the magnificent imperial *fora* of Rome than to *fora* of other provincial towns of that period.[39] Kockel argues that Ostia's Hadrianic *forum* did not gradually develop in response to its functions, but was turned into an artificially constructed display to flaunt the city's grandeur.[40] However, any such statement labelling the *forum* as being *"als künstlicher Prachtbau inszeniert"* is difficult to maintain. Laurence reminds us that these 'intentional actions' took place within the existing fabric of the city, and one could equally well argue that Ostia's *forum* was altered as the requirements and priorities of the city changed.[41] Lefebvre states that "*an existing space may outlive its original purpose and its raison d'être which determines its form, functions and structures; it may thus in a sense become vacant and susceptible to being diverted, re-appropriated and put to a use quite different from its initial one*."[42]

Kockel extends his investigation to late Hadrianic baths, distributed over most areas of the city. Equally well spread are cultic centres, notably cult-rooms dedicated to Mithras. Kockel reads this city-wide distribution over almost all quarters as a sign of relative independence of Ostia's neighbourhoods.[43] Furthermore, Kockel's study identifies the guild seats as one of the major forces shaping Ostia's urban development during the 2nd century.[44]

Kockel rounds up his urban discourse by exploring the visual impact of the 2nd century city. He states that the first impression the city would have made on its visitors would have been dominated by the remarkable height of many of the buildings. In addition, the ever-present guild seats and storage buildings constituted a faithful reminder of the mercantile nature of the city. Colonnaded porticoes flanked most streets and created long perspectives without focal points; many streets were still lacking visual determinants. Only the ostentatious facades of prominent guild seats offered visual markers in an otherwise monotonous street layout. All in all, 2nd century AD Ostia, as Kockel perceives it, seems to have overcome its urban shortcomings and appears to have grown into a well-equipped urban centre. Kockel's interpretations have been challenged by a more recent urban study of Ostia, drawing on new archaeological data and a vastly extended new site-plan, which will be examined in the following section.

1.3 HEINZELMANN: THE 'BOOMTOWN MODEL' AND URBAN SHORTCOMINGS

Between 1996 and 2001 the *Deutsches Archäologisches Institut* in Rome,[45] dedicated a large-scale interdisciplinary project to the investigation of unexcavated areas of Ostia.[46] By combining the use

37. Cf. DeLaine's assessment (2002) established late Trajanic dates for the north-eastern part of the city.
38. Kockel (1992: 112).
39. Kockel (1992: 112).
40. Kockel (1992: 112).
41. See Laurence on urban change and the production of urban space (2007: 185-186).
42. Lefebvre (1991: 167), as quoted in Laurence (2007: 185).
43. Kockel (1992: 114).
44. Bollmann gives credit to Kockel's work as one of the first studies to recognise the full significance of guilds within Ostia's urban structure (Bollmann 1998: 11, note 1).
45. The DAI project was conducted in co-operation with the American Academy in Rome, Bayerisches Amt für Denkmalpflege, Munich, Geographisches Institut der Universität Bonn, Institut für Photogrammetrie und Fernerkundung, TU Munich, and the Sorpintendenza Archeologica di Ostia.
46. Non-invasive geophysical survey of Ostia's periphery; see Eder *et al*. (1997); Heinzelmann (1998a); Bauer and Heinzelmann (1999a); Bauer and Heinzelmann (1999b); Bauer *et al*. (2000); Heinzelmann and Martin (2002); Heinzelmann (2002: 105-108); the final publication of the

of geophysical surveying, systematic evaluation of aerial photography and selected stratigraphic trial trenches, the project was able to contribute extensive additions to the existing city plan.[47] Previously unknown large structures like the Constantinian Episcopal Church and the river harbour with its *navalia* and temple could be located; in addition the project managed to establish the extent of the developed urban areas and the city's outlying zones.

The joint research project, though primarily concerned with peripheral, unexcavated areas of Ostia, sought to address the city's general urban formation, and gain a deeper insight into its long-term development, and the city's economy until the final abandonment in the 7th-8th century AD. Based on the project's results, and prior to the publication of the final report, Heinzelmann, the director of the project, presented a preliminary interpretation of Ostia's urban development in the 2nd century AD.[48] His focus was on the city's formative processes at a very crucial moment in time, when the city experienced its vastest urban expansion and the biggest changes in its social structure. His assessment made use of survey data from the unexcavated areas, as well as archaeological evidence from the excavated parts of the city.

The period in question only spans a few decades when large quarters of Ostia were flattened, the street and occupation levels artificially raised, and finally large areas re-developed. Within this period the city's population multiplied through massive immigration, not only outnumbering but also '*outclassing'* the local inhabitants. By touching all levels of society these social changes seem to have caused a profound destabilization of Ostia's social structure.[49] The changed social composition of the population finally led to a wider representation in office of families that were predominately of freedmen descent and not of Ostian origin.[50] Heinzelmann stresses that the impact of these population changes could not have been more severe, and he underlines that the consequences can hardly be overestimated.[51]

1.3.1 Controlled development versus private enterprise

The typical 2nd century AD townscape of residential and commercial *insulae* and warehouses has always been interpreted as largely the result of prosperity connected to the imperial ports and/or deliberate imperial strategy to upgrade the city. Whilst Kockel's reconstruction, discussed above, still fits into this general picture, Heinzelmann, being finally in a position to evaluate the entire extent of the city,[52] develops a different image of Ostia's urban dynamics.[53] Contrary to Kockel, who concluded that the second-century city had finally overcome its urban shortcomings, Heinzelmann sees the city's infrastructure, in particular during the first half of the 2nd century AD, still lagging behind in terms of public places, streetscapes and theatres, and in no way matching the vast urban growth. He perceives the city as having all characteristics of a typical 'boomtown', marked by weak public institutions on one side, and a highly competitive private economy on the other.[54]

Heinzelmann's investigations are concerned with the major urban changes occurring during this process of transition. By taking Ostia's 'missed opportunities' as a point of departure, he claims that any urban restructuring of such immense scale would have provided the city with the unique opportunity to re-organise its layout and enhance its urban qualities. Judging by the extent of the existing development, Heinzelmann argues that the city seemed to have been in a financial position to accomplish any major project. Thus Heinzelmann tries to identify possible factors that had hampered urban development.

project's result is still awaited.

47. The site-plan of Ostia, *SO I* (Calza 1953) concentrates on the centre of the city and covers only the excavated areas; the latter account for less than half of the total extent of the city.
48. Heinzelmann (2002).
49. Heinzelmann (2002: 106, note 19).
50. Meiggs (1973: 203-204).
51. Heinzelmann (2002: 106).
52. Heinzelmann (2002: 107, fig. 1) Ostia: site plan of the city's maximal expansion during the 2nd century AD.
53. Heinzelmann (2002: 103, note 1).
54. Heinzelmann (2002: 119).

1.3.2 Defining indicators for regulatory intervention

Without explicitly defining his theoretical and methodological approach, Heinzelmann seeks answers for Ostia's urban disparities by drawing on spatial concepts of Roman urbanism, similar to those which have been reflected in the work of Laurence and Perring.[55] Hence Heinzelmann examines Ostia's urban space under the premise that the spatial organisation of the city ought to shed light on its social organisation. Therefore Heinzelmann is not overtly concerned with Ostia's urban performance in comparison to other centres of Roman urbanism, instead he is interested in the city in its own right, however, assessed in the light of the new survey data. The study concentrates on identifying indicators for regulatory public or imperial interference, implying that pre-determined urban planning would point towards controlled intervention. Within this context Heinzelmann's study investigates selected areas of the city, focusing on streets and open places, commercial facilities, housing and buildings of public use.

Streets and public places

Streets and public places in Roman cities normally fell under the authority of the municipality.[56] Being of interest to every citizen, public space is expected to reflect a concern for unity, expediency and public appeal.[57] Heinzelmann observes that in Ostia hardly any attempt was made to achieve these urban qualities. The irregular street grid offers Heinzelmann a case in point. He claims that the city missed an excellent chance to regulate the pre-existing irregular street pattern when extensive efforts were made to raise and flatten the terrain of the city in preparation for large-scale development.[58] In the course of these major earth movements the levels of the existing network of streets were also raised and all streets received new pavements. Heinzelmann wonders why Ostia's streets remained within their original, rather unsystematic street pattern. He reckons that it was foremost private landownership, which shaped urban space and the city's network of streets, determining not only the course of the streets but also their width.[59] He notices that even major through routes respond spontaneously to projecting and recessing building frontages and display varied street widths; together leading to Ostia's unsettled and inconsistent street picture.[60]

Heinzelmann detects similar shortcomings concerning public places.[61] In the 2nd century the *forum* in the centre was reconstructed and enlarged. Despite the enlargement, the *forum* still remained slightly smaller than the one of Pompeii. More importantly, in proportion to the immense growth of the city in the 2nd century AD, the *forum's* dimensions appear remarkably modest. Only one additional public place was created just outside the Porta Marina, the so-called *Foro di Porta Marina*.[62] Its function has not been securely established. It might have served as a public *porticus* or a sanctuary or possibly both. Other than that, an already existing *porticus*, the so-called *Piazzale delle Corporazioni*,[63] along the northern part of the theatre was altered and adapted to meet the requirements of the urban community.

Based on the DAI survey data from the unexcavated areas, Heinzelmann was able to exclude the existence of other open places for the outlying areas. Thus with only three public places, Ostia seems surprisingly poorly equipped.[64] Not only the number of public places but also their architectural design in

---

55. Laurence (1994); Perring (1991); Laurence's approach is discussed in the next chapter.
56. See Robinson (1992: 59-61) on the responsibility of magistrates for urban streets, public spaces and porticoes.
57. Moughting (1991:153-159).
58. Only the northern side of the *cardo maximus* along the northern side of the *forum* points towards a planned municipal or imperial intervention due to its homogeneous design (Heinzelmann 2002: 108). DeLaine's detailed assessment (2002: 64-71) suggests a sequence of construction over a period of 6-10 years. According to DeLaine the sequence in itself does not rule out that all buildings are part of a single project. The project however underwent some revision during the early Hadrianic period (DeLaine 2002: 64).
59. R. Mar (1991) studied Ostia's network of access roads and streets and their impact on the city's urban development. Heinzelmann refers to Mar's study, but appears not to take much of Mar's observations into consideration.
60. Heinzelmann (2002: 108).
61. Heinzelmann (2002: 110)
62. Reference according to Calza (1953): IV viii 1.
63. Meiggs (1973: 285-287); Pavolini (1983: 67-69).
64. Heinzelmann (2002: 110).

general and the facades of buildings flanking them appear equally unimpressive to Heinzelmann. His overall assessment of the *forum* leads to different conclusions than Kockel's earlier ones.[65] Contrary to Kockel's claim for a coherent *forum* programme, Heinzelmann, by looking closer into architectural details detects a rather piecemeal development with too little consistency to speak of a homogenous design conceptualized as a unit.[66]

Porticoes

Ostia's porticoes flank the *decumanus* and the major through roads. Although contributing to a more unified street design, according to Heinzelmann they still lack the spatial integrity of continuous street frontages. The street design along the Via Epagathiana provides a suitable example to support Heinzelmann's claim.[67] This street corresponds to the former outer boundary of the castrum, leading north from the western gate to the shore of the river. Along the Via Epagathiana, it looks as if the decision as to whether to build a *porticus*, as well as its design, was in the hands of the individual property owner, with little or no public interference. Many of the *insula* owners seem to have opted for the expansion of their commercial space at the expense of a jointly used colonnaded portico. With commercial space extending right to the edge of the pavement, or directly to the curb of the street, much of Ostia's street design gave way to the taste and practical needs of the property owner. The results were often narrow corridor streets flanked by commercial outlets on both sides. In addition, the substantial height of Ostia's buildings increased the corridor effect.

Heinzelmann is completely taken aback by the overall lack of concern for street unity. To him it appears that there was neither a concern for the spatial harmony of their own street shared by individual *insula* owners, nor was there a communal desire to improve the unity of the streets and thereby further the spatial integrity of the city. In those instances where property owners opted for a colonnaded portico in front of their shops to allow free flow of movement and protection from the elements, the motivation seemed purely commercial. Accordingly the choice of materials look basic and economical; columns were built of simple brickwork and only in a few cases travertine was preferred. The use of marble was restricted to columns at the public *forum*. To stress his point Heinzelmann refers to Roman cities in the Near East, which contrary to Ostia, demonstrate a leaning towards formal ceremonial streets; with their colonnaded *decumanus* they represent an excellent example of unified street design.[68]

Commercial facilities

Second-century Ostia gives priority to commercial land-use and dedicates a vast amount of urban space to trade related activities. In particular *horrea,* large storage facilities, play a dominant role in Ostia's urban landscape of the 2nd century AD. Fifteen *horrea* are located within the excavated areas,[69] at least 10 further *horrea* have been identified in the unexcavated areas by geo-physical surveying.[70] Within the excavated area *horrea* are mainly concentrated along the *Via della Foce* towards the river port in the west of Ostia's Region III.[71] Also along the northern shore of the Tiber, traces of a number of *horrea* have been discovered, however, the area has not been studied thoroughly enough to ascertain their number and size.

Heinzelmann investigates Ostia's *horrea* for indications of regulatory public or imperial intervention. Judging from the spatial distribution and the architectural form he deduces that they reflect private rather than public operation and ownership. Heinzelmann turns to *horrea* at Portus for comparison to support his deductions. In contrast to Portus where the harbour basin was surrounded by

65. Kockel (1992: 112, fig. 66).
66. A re-evaluation of 'Ostia's *forum*, called 'from the inside out' has been carried out by G. S. Gessert, Hood College, US (unpublished, not seen by the author). Heinzelmann (2002: 110, note 25) describes a gradual building programme, basing his observations on different architectural elements used for different sections of the porticus surrounding the *forum*. These sections vary in depth as well as in column size and intercolumn distance.
67. Heinzelmann (2002: 111).
68. Heinzelmann (2002: 112).
69. Rickmann (1971: 15-86).
70. Heinzelmann (2002: 112).
71. Heinzelmann (2002: 112).

storage buildings of regular and unified design, the *horrea* of Ostia display varied designs and irregular distribution patterns.[72] Whilst many of Ostia's *horrea* are located north of the *decumanus* and north of the *Via della Foce* in close proximity to the river, still a large number are far away from the river, making them less suitable for bulk cargo. Moreover only three of them can be securely identified as grain storage facilities, indicated by ventilation devices.[73] This leads Heinzelmann to assume that bulk cargo, like marble and grain were handled and stored in the imperial *horrea* of Portus; whereas Ostia's predominantly private *horrea* foremost dealt with selected and more profitable goods. Heinzelmann draws attention to the fact that many Ostian *horrea* incorporate commercial premises (*tabernae*) along their street frontages. Conspicuously these *tabernae* are absent from *horrea* in Portus. Their presence in Ostia could indicate that many stored goods were directly retailed from the *horrea*. In addition, several *horrea* are embellished with architectural devices to attract potential and existing customers: monumental entrance arrangements and elaborate inner courtyards. These architectural features seem to emphasize the busy trading side rather than the sober warehousing aspect of many other storage buildings in Ostia and Portus.[74]

Next to Ostia's *horrea* and other commercial or industrial premises, *tabernae* play a leading role in Ostia's streetscapes. *Tabernae* are not only found along the major through routes but also along secondary roads and inside *insulae*, where they form market-like structures. All in all, Ostia seems to displays such a high level of commercial land-use that supplying Rome and fulfilling the consumer requirements of Ostia proper and its rather sparsely populated hinterland can hardly explain it.[75] In fact, Heinzelmann questions whether the *tabernae* at Ostia could have played any major role for goods destined for Rome. He sees their significance rather as trading agencies for goods shipped to other Mediterranean regions of the Roman Empire. According to him Ostia seemed to have carried out a dual function: a supply city for Rome and a central trading post to supply other Mediterranean regions; the latter being largely underestimated and not sufficiently explored in Ostian research.[76] As stated by Heinzelmann, it is precisely this dual function that could explain Ostia's enormous expansion dynamic and its power to attract numerous newcomers.[77]

Residential space

The commercialization of Ostia's urban space radically changed the housing market. During the 2nd century AD multi-storey apartment blocks replaced the traditional private house type of ground floor dwellings with atrium and peristyle. Heinzelmann points to the commercial advantages of these apartment houses, which not only offer a higher residential density but also a variety of land-use along a vertical axis: their ground floor supplying commercial space, the upper stories providing rental space of different size and function.[78] Roman property law only recognizes property that is tied to the ground and the right of ownership was virtually unlimited: '*The owner of the land owns it as high up as the sky*'.[79] These multiple rental units in the centre of Ostia seemed to have offered a highly profitable investment; however, landownership was

72. Heinzelmann (2002: 113).
73. Rickmann (1971).
74. Heinzelmann (2002: 113-114).
75. Heinzelmann (2002: 114).

76. Prior to the Portus project, important contributions to the better understanding of Ostia's commercial activities have been made by Fulford (1987;1991); Fulford's 'Ostia Model' (based on the ratio of local to imported ceramics) sees the port city as the key to the manipulation of the *annona*; Fulford's 'Ostia model' helps to reinforce the interpretation that a state system was responsible for the extended pattern of supply of goods between the Mediterranean and the northern European provinces. The granaries at Ostia and Portus offered the option of storage either for consumption at Rome, for sale at the market, or for redistribution elsewhere. Fulford links Ostia's growth in importance and usefulness through the first and second century to the emergence of the Gaul-Danube route to supply the Danube provinces. According to Fulford the location of Ostia and Rome on the western side of Italy and their proximity to Gaul effectively favoured the Gallic supply route to the detriment of the traditional Adriatic/Danube axis (1991: 297-301).
77. Heinzelmann 2002:114; Heinzelmann does neither refer to Fulford's 'Ostian Model' nor does he acknowledge Vitelli's quantitative study of grain storage and urban growth in imperial Ostia (1980). Vitelli's study links Ostia's urban development solely to the needs of Rome.
78. Heinzelmann (2002: 116).
79. Hermansen (1982: 93).

a prerequisite. During the 2nd century AD landed property in Ostia's centre reached the highest level of commercialization and must have been subject to fierce competition.[80] Only within the context of commercialization and competition can Ostia's housing market be explained as well as the role of the many thriving private developers during the 1st half of the 2nd century AD.[81]

Considering all these traits Heinzelmann begins to inquire about the 'fate' of the former landowners and their urban *domus*.[82] The results of the geophysical survey shed new light on these questions. Several large *domus* and suburban villas of considerable size could be identified in the southern and western periphery of the city.[83] Heinzelmann seems convinced that the owners of these large *domus* and villas at the outlying areas of the city were identical to Ostia's rich landowners. Selective stratigraphic excavations carried out on one specific *domus* confirmed a very large, lavishly decorated building dating to the end of the 1st century AD.[84] The *domus* was in use until the 4th/5th century AD and was built over a preceding structure of the Early Imperial period. The date of the *domus'* construction corresponds to the beginning of Ostia's rapid urban expansion. Heinzelmann's inferences about the whereabouts of Ostia's rich landowners are further strengthened by the fact that the surveyed peripheral areas produced very limited evidence for smaller-scale private houses of the atrium/peristyle type characteristic of the Early Imperial period. Instead the survey data revealed that even the outlying areas were covered with commercial buildings and apartment blocks next to the large *domus*.[85] Bringing all these factors together Heinzelmann concludes that the range of available residential space was evidently unbalanced. Owners of smaller or medium sized land seem to have yielded under the force of Ostia's building boom and the pressure of investment. This picture seems to be confirmed by the constructions in the centre of the city, where large *insulae* blocks were formed by fusing together smaller individual units of land.[86]

Buildings of public use

Finally Heinzelmann turns to public buildings to gauge the level of commitment the town extended toward the citizens and vice versa. To begin with he concentrates on Ostia's theatre. It was built during the period of Augustus and offered space for about 3000 people.[87] Interestingly enough it remained unchanged during its vastest urban expansion. Population estimates for Ostia range from 10,000 to 100,000.[88] Meiggs suggests a population between 50,000 and 60,000 for the Antonine period. His numbers are based on a conservative estimate calculated by Calza for the area enclosed by the city walls.[89] Bearing in mind the expanse of the unexcavated areas these estimates appear very low.

Only at the end of the 2nd century was the theatre adapted to seat about 4000 people. Considering the entire city, the number of seats available to Ostia's citizens seems rather modest; all the more so since the results of the geophysical research allow Heinzelmann to exclude any additional theatre, amphitheatre or circus within the surveyed area of the city. In view of Ostia's capacity, the city's

80. Heinzelmann (2002: 116).
81. DeLaine (2002).
82. Heinzelmann (2002: 116).
83. The concentric zone model of the Chicago school of town-planning (Park, Burgess and McKenzie 1967) should be briefly considered: Burgess (1967: 47-62) perceives the growth of a city as a process that can be best illustrated by a series of concentric circles. These represent the successive zones of urban extension and the types of areas differentiated in the process of expansion. This model brings out the tendency of each inner zone to extend its area by the invasion of the next outer zone. In the Chicago model the residential zone of high-class residential buildings and single family dwellings has gradually moved outward to the city limits. The 'relocation' of Ostia's domus and villas to the peripheral areas of the city indicates similar processes of expansion by succession.
84. The domus is located in region V, still within the city walls (Heinzelmann 2002: 116)
85. Heinzelmann (2002: 117).
86. See DeLaine (1995: 81-84); cf. Mar (1991).
87. Cooley (1999: 173-177) suggests a date of construction between 18-17 BC, based on inscription pointing to the involvement of Agrippa.
88. Storey (1997: 974-975), see also Storey's calculations for population estimates for Rome, based on population densities calculated for Pompeii and Ostia (1997: 973, table 1).
89. Meiggs (1973: 532); Ostia's area inside the so-called Sullan walls is about 69 ha, see D'Arms (2000: 197, note 31) on Ostia's population estimate calculated at the end of the Republic.

commitment to public entertainment appears meager and seems in stark contrast to other Roman cities.[90] Heinzelmann sees a similar pattern emerging from the sparse presence of other public buildings and their rather modest architectural execution.[91] All these buildings date to the end of the 1st century and the beginning of the 2nd century AD. Yet again, based on the results from the geophysical survey, no additional buildings suggesting a public function could be added to the existing group already present in the excavated parts of Ostia.

Ostia's temples and sanctuaries seem to follow a similar trend. Prior to its vast urban expansion the city was already fairly well equipped with sanctuaries and temples. During the major expansion, however, only two larger religious buildings were constructed: the temple in the centre of the Piazzale delle Corporazioni (II, vii, 5),[92] and the Capitolium. Otherwise, Heinzelmann observes that all other building activities concerning sanctuaries were limited to alterations of existing structures.[93] Once more, the survey results did not point to any further temples or sanctuaries built in the outlying areas during the period of Ostia's largest urban growth. As far as the religious climate in the 2nd century AD is concerned, these observations fit well into the general picture of a shift towards Eastern religions and their requirement for more privacy and seclusion. Typically, Ostia's religious landscape of the 2nd century AD is characterized by a dynamic expansion of cult rooms dedicated to Mithras and other smaller sanctuaries, serving a fair number of small communities.[94]

Heinzelmann concludes by stating that despite their obvious decrease in popularity Ostia's traditional cults still retained their solid, physical presence almost unchanged since the Early Imperial period. He adds that this physical persistence is even more remarkable when considering the large-scale urban redevelopment and the enormous expansion of the city's population.[95] However, notwithstanding the city's radical redevelopment, the permanent nature of temples, as defined by Vitruvius as well as their status as res sacra,[96] makes it difficult to remove or deconsecrate a temple. Heinzelmann has largely overlooked these fundamental principles. In this way temples and sanctuaries form a series of fixed points within the structure of the Roman city and are incorporated into the expanding urban formation.[97] Any redevelopment would take these places into consideration. Only exceptional circumstances made a move of a temple possible. The Capitolium was adjusted in the 2nd century AD therefore constituting one of these exceptions. [98]

1.3.3 Heinzelmann's conclusions

Based on the combined evidence from the excavated and un-excavated areas Heinzelmann reached the following conclusions:[99] during the earlier half of the 2nd century AD Ostia largely remained a city of contradictions and infra-structural deficiencies in spite of intensive urban development and constructions. The major driving force behind the city's rapid expansion appears to be private enterprise with little control exerted by public institutions. The causes and mechanisms of Ostia's lop-sided urban development are complex; however, the main reason seems to be the construction of the

90. In comparison, Puteoli, Ostia's rivaling port was equipped with a theatre, two amphitheatres and a large circus (Heinzelmann 2002: 118).
91. The group of buildings with a public function comprise the co-called Curia (I ix 4), the Caserma dei Vigili (II v 1,2), the so-called Macellum (IV v 2), the latter has not been securely identified as macellum, see Kockel (2000: 22) and Kockel and Ortisi (2000: 351-364).
92. Possibly built during the Flavian Period, see Heinzelmann (2002: 118); Rieger (2004: 244).
93. The same observations were made by Rieger (2004: 31).
94. Smaller sanctuaries and premises for the religious gatherings of guilds increasingly emerged at the end of the 2nd century AD; see Heinzelmann (2002: 119).
95. Heinzelmann (2002: 119).
96. Vitruvius *De Architectura* 4.3.
97. Laurence (1994: 73). The sanctuary of Hercules, originally a rural shrine in the fourth century BC, was later incorporated into the expanding city.
98. The construction of the Capitolum was part of the reconstruction project of the *forum*. In the course of the project two earlier temples, probably dating to the late Republican period were flattened, one of them was reintegrated into the Capitolium (Steuernagel 2004: 61, 71, 85, fig. 5).
99. These conclusions are summarised in Heinzelmann (2002: 119-121).

imperial ports and the connected increase of trade volume. Within a short period of time the city turned into a very lucrative location for both investment and residence. Unlike Puteoli, which had time to gradually develop and establish itself as an important port city, Ostia was pressurized into expansion.

Heinzelmann identified the composition of Ostia's population as the major factor shaping the city. Attracted by economic gain the newcomers appear reluctant to show interest in the city itself. In contrast to the Late Republic and the Early Imperial period, only few examples of buildings constructed though private sponsorship are known from the first half of the 2nd century AD.[100] Heinzelmann claimed that the paucity of dedicatory inscriptions and statues of private citizens is striking. The conspicuous absence of euergetism from the early 2nd century Ostia needs to be explained since elsewhere Roman urban culture provides a typical field for private sponsorship.[101] In Ostia, instead, the major part of the urban population seems to lack identification with the city. During the early 2nd century Ostia was transformed into a new city obscuring both its history and its original population. Only gradually did a new sense of belonging developed, allowing Ostia's collegia to flourish with new mechanisms for social integration.

1.3.4 Heinzelmann critically examined

Heinzelmann's research adds new elements to the urban discussion by investigating the city's infrastructural shortcomings against the generally held view of prosperity and imperial intervention. Sole access to the results of the geophysical survey allows him to encompass not only the excavated areas but also the entire city.

At first glance the study presents a seemingly convincing picture of second-century Ostia as a typical boomtown. Heinzelmann supplies fitting examples to support his case, elegantly glossing over his selective and unsystematic approach. Nevertheless his arguments remain only suggestive, clearly demonstrated by his deliberations on streets, porticoes and public places. He objects to Ostia's lack of spatial integrity und unified street design; but this is arguing from the basis of one single street, whilst ignoring long stretches of colonnaded porticoes along the eastern and western *decumanus*.

In addition, the study investigates public places, their quantity and architectural quality. Again, Heinzelmann concludes that Ostia was meagerly equipped. At the same time the study omits the presence of public and/or private baths and their role as social foci. A considerable number of baths dating to the period of Trajan and Hadrian are found in various parts of the city.[102] Later in the course of the 2nd century AD, the most existing baths were eclipsed by the large size of the Terme del Foro, built during the time of Antoninus Pius. Heinzelmann cursorily refers to this bath complex together with other public buildings dating to the mid of the 2nd century AD, and identifies them as indices for increased activities in the field of public buildings and private sponsorship in the later course of the second century.[103]

All of Ostia's baths, and the Terme del Foro in particular, underline their significance as urban determinants. It strikes one like a civic statement, finding the *forum* baths inserted into the existing public space at the centre of the city, joining together three separate spaces of public character in the course of its development. This ambitious project required two secondary roads to be closed off and built over, as well as the possible destruction of an extensive tract of the old wall of the castrum.[104] Whilst respecting its original function of physical education and recreation, the bath complex' progressive development during the Imperial Period led to the accentuation of its urban role. It turned into an 'institution' in the final stages of its evolution. Responding to urban directions in its aspects, the bath complex incorporated rental apartments, a system of *tabernae,* and two temples; altogether it

100. See Jouffroy's survey of public buildings in Italy and Roman North Africa (1986: 112-131).
101. See for example Cornell and Lomas (2003).

102. Meiggs (1973: 418, fig. 30).
103. Heinzelmann (2002: 120).
104. The streets corresponding to the inner and outer pomerium were partically closed off and built over (Mar 1991: 102).

developed the character of a public piazza.[105] At a functional level, large bath complexes were able to assume the role of public places providing various facilities for people to meet.

Any assessment of Ostia's urban development ought to take account of the baths as social and urban focal points. The same applies to the religious topography and the city's street network. Only a systematic spatial examination of Ostia's network of streets and related house frontages and porticoes can bring the results that are required to establish the degree of private or public intervention in actual terms. Furthermore any evaluation of Ostia's land use needs to be conducted in a systematic way. Notwithstanding this, Heinzelmann offers interesting insights and new openings to be investigated. However, the main question whether second-century Ostia was able to accommodate the enormous growth without degrading community life still remains unanswered. This questions needs to be explored with adequate tools, possibly borrowed from today's approaches to urban planning. New planning methods have been devised for cities, which are confronted with enormous urban growth and are expected to accommodate their rapid expansion without deteriorating the cities' infrastructure.

Heinzelmann's article appeared in advance of the expected publication of the results of the DAI/AAR campaign. Hence it remains open whether his awaited final publication will answer all questions raised by his preliminary assessment. It is hoped that the forthcoming publication will approach Ostia's urban development within a clearly defined theoretical framework and apply a systematic methodology. The publication is eagerly awaited since much of the established understanding of Ostia's urban processes requires a re-reading in the light of the new results.

105. Mar (1991: 102-103).

1.4 MAR: THE FORMATION OF URBAN SPACE

Ten years earlier than Heinzelmann's assessment,[106] Ricardo Mar approached the city's urban space from the perspectives of an urban geographer in his La formazione dello spazio urbano nella città di Ostia.[107] The article traces and explores Ostia's transformation processes from the early beginnings until the city's expansion in the 2nd century AD. Mar applied an instrument fundamental to urban analysis: the study of Ostia's 'centuriation' and how the limites, marking the land parcels, have survived in the urban record.[108] In practical terms he approached the city through three levels of interrelated analysis: the course of the roads;[109] the system of parcellation, and the typology of buildings.[110]

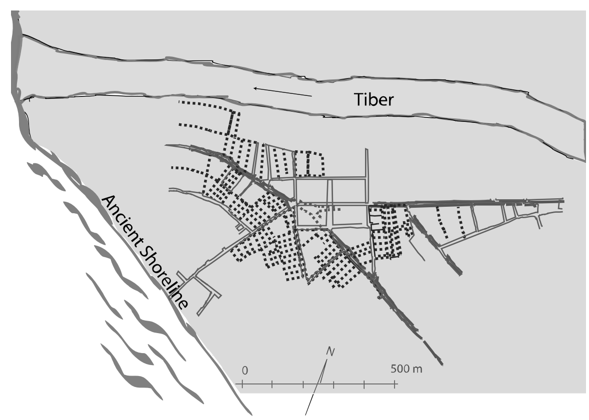


Fig. 1.2 – Land parcellation in the Republican period (after Mar 1991)

106. Heinzelmann (2002: 103, note 1), refers to Mar's work as one of several publications concerned with Osita's urban development. All of Mar's later work echoes his preoccupation with processes of urban formation. His major work in Ostia however concentrates on sanctuaries, exploring them within their urban setting. His research focused on the Serapaion, the sanctuary of Hercules, and the Campo della Magna Mater.
107. Mar (1991: 81-109).
108. Mar (1991: 81).
109. See chapter six on Ostia's streets, including a brief section (6.2.2.) on Mar's research on Ostia's streets.
110. Mar (1991:84, note 16).

The diachronic approach applied by Mar reconstructs the major lines of Ostia's urban transformation following the mechanisms of these changes. The study, although conducted before the extent of the entire city was revealed, still remains highly relevant for the understanding of Ostia's urban language. It accounts for all urban processes, not only those that reflect rapid change as a demonstration of vitality and strategic choices, but also the ones that are discretely active over centuries. It is precisely these long-term processes, which strike one as being unsatisfactorily treated in Heinzelmann's study, e.g. the physical persistence of sanctuaries and the fossilized irregular street-pattern, which seem to Heinzelmann no longer in tune with the requirements of the city's grid-based *insula* layout. Both appear to have outlived their function in second-century Ostia, but still constituted fixed points within the urban texture of the city. Mar claimed that the study of urban structures can only be understood as a historical process, since the reality, or the affirmation of the built structures, is always the product of the preceding situation.

1.4.1 Mar's urban discussion

Given that the main part of Ostia's standing architectural remains date back to the second century AD, at face value they offer little information about earlier phases. Furthermore excavation data pertaining to the Republican and earlier periods are very scarce. Therefore Mar applied a method by which he claimed to reach an approximate understanding of how the earliest road system around the walls of the initial nucleus, the so-called castrum and the surrounding areas were consolidated. He holds that the original Republican cadastral system can still be traced back through the successive reconstructions of the buildings, which in themselves represent a 'fossilized record' of the boundaries of land division; the latter being still reflected in the structural remains of the second-century buildings (Fig. 1.2).[111]

111. Mar (1991: 84-85, fig. 12).

Ostia's road system

The fact that Ostia's irregular street system survived the second-century building boom presented a bone of contention for Heinzelmann, who saw it as a missed opportunity to improve the street network when the city expanded. In contrast, Mar understood the street network as a result of long-term processes, aiming for equilibrium between territorial determinants and urban development. He explained that the streets' physical materialization responds to a particular balance reached between various factors such as settlements, economic interests, and strategic considerations. In the case of Ostia, the foundation of the so-called castrum provoked a noticeable change within the existing 'pre-castrum' situation and resulted in an adjustment based on new factors. From the new balance achieved between the so-called castrum and the new situation, the town's road system developed as we know it today.[112] As maintained by Mar, the entire road system can be explained in terms of a relationship between three topographic landmarks and the gates of the castrum. The mouth of the river, marked by a watchtower, the Tor Boacciana, constitutes the first landmark.[113] In physical terms, the Via della Foce forms the line of movement, leading from the western gate of the castrum to the mouth of the river. The river port with facilities along the banks of the river represents the second landmark according to Mar,[114] while the coastline constitutes the third point of reference. The latter coincides with the area, which successively developed outside the Porta Marina. Having defined the territorial determinants which created Ostia's

112. Mar (1991: 87-88).
113. This point constitutes the original termination of the two 'Salarian' roads; see Mar (1991: 88).
114. In view of the results of the DAI/AAR campaign (Heinzelmann and Martin 2002), Mar's second point of reference, the river port needs to be redefined. The joint DAI/AAR project was able to confirm the existence of a river port consisting of a harbour basin and *navalia*. The location could be firmly established: on the left bank just inside the mouth of the river. Mar's second point of reference seems to relate to port facilities north of the castrum. Various port facilities could have been placed all along the bank of the river. In terms of movement in relation to the castrum, the identified river port coincides with Mar's first point of reference, the mouth of the river. Thus the river port and the mouth of the river share the same line of movement: the *Via della Foce*.

streets system, Mar moved on to investigate the remaining 'empty' space between the lines of communication. Consequently this called upon questions concerning the parcellation of land along the streets of Ostia and the boundary lines marking the original property divisions.[115]

The system of parcellation

After having identified a regular pattern of land division visible in Ostia's plan, Mar attempted to reconstruct the first cadastral system by which the land located between the roads had been subdivided.[116] He noticed two singular situations where these signs of regularity were not respected: the sanctuary of Hercules, and the area delimited by the *cippi* placed by the urban praetor C. Caninius.[117] These areas seem not to follow the rules identified in the rest of the urban area. Then again, a fabric of long and straight land parcels, always perpendicular to the corresponding roads, characterizes the remaining territory. The exceptions, however, made him confident to have applied the correct analysis. Mar identified four sectors within the city, still retaining the original system of land division:[118] First, the zone north of the Via della Foce, where a system of long and straight parcels splits the space in lots. The division is visible in the regular rhythm of buildings, formed by the Terme del Mitras and the adjacent *caseggiati* leading to the Terme dei Mensores. The second block of parcels is found between the Via della Foce and the Via degli Aurighi. These roads are equidistant to each other, between them lies a double system of land parcels. A third zone of systematic land division can be identified along the eastern *decumanus* with a series of long and straight parcels lined up perpendicular to the course of the street leading toward the Porta Marina. Another cluster can be identified lining the *cardo maximus* in the direction of the Porta Laurentina. There are nine lots of the same depth and length; their limits are fragmentarily conserved in the later constructions.[119]

Finally, in the quarters south-east of the castrum, to the south of the *decumanus* maximus, Mar detected another very regular group of parcels. Located between the Semita dei Cippi and the Via del Mitreo dei Serpenti, three orthogonal blocks can be identified, each based on a square modul of 75 m in length, all compartmentalized into four equal lots.[120] Mar points out that this is the only area free of oblique roads, and hence these streets follow the course of the walls outlining the castrum, and not a pre-existing street system. These streets run parallel, spaced at distances created by the grid of the divided land, and consequently leading to a different pattern of urban formation emanating from the castrum itself. He concluded that both the road system and the centuriation trace their origins from outside the city, their roots lying in a communication system preceding the foundation of the so-called castrum.[121] This seems to suggest that the military settlement came to control a significant area of the territory, where already a certain size of population had developed activities of subsistence and production. The castrum therefore produced a restructuring of the preceding system, however, conserving its principle traces, which are still reflected in the later system of roads and the specific character of the corresponding parcellation of land.

1.4.2 Mar's contributions – long-term processes appreciated

In all, Mar presents a lucid case for how multiple processes shaped Ostia's urban layout, stressing the initial correspondence between the pre-existing roads and the division of land. A coherent system of streets grew around the castrum, defined by the exit gates

115. Mar (1991: 88).
116. Mar (1991: 88).
117. Mar (1991: 88-89). The delimited area survived undeveloped until the 1st century BC, respecting the area earmarked by the cippi.
118. Mar (1991: 90-91).
119. Mar (1991: 91); the general structure is visible in the limits of the Campo della Magna Mater, it underlies the Terme del Faro and the Caupona del Pavone.
120. 75 m approximates to twice an actus. An actus was a unit of linear land measurement, equivalent to 35.1-35.6 metres, measuring 120 Roman feet, *pedes monetales*. The value in common use during the Empire was around 35.5 m, giving a value of 710 m for the side of a century of 20 actus.
121. Mar (1991: 91).

and the walls of the castrum. Mar presented a picture that brings clarity into the apparent irregularity of streets evident in the second-century Imperial period. Above all he alerted us to the effect of long-term processes and the interdependency of activities, which at first seem autonomous of each other.

Returning to Heinzelmann's critique related to Ostia's 2nd century AD irregular street pattern one needs to take Mar's approach a step further. This leads to the question: how could such a severe impact as the second-century building boom influence the existing road system to a lesser degree than the foundation of the so-called castrum centuries before? One answer, however only partial, could be that Ostia's vast expansion developed to a large extent vertically by increasing the height of the buildings. In terms of horizontal expansion, the city grew along already existing routes, pushing the city's boundaries outwards. New territorial determinants, which would provoke a change of directions within Ostia's established lines of movement and communication, seem absent. A superimposed grid, against the grain of the established road network would inevitably lead to many dead ends. After all, the urban grid needs to be brought in phase with the major access roads.

It is interesting to note that the rebuilding of London following the great fire of 1666 also presents an example of contrasting viewpoints in terms of city planning.[122] The shortcomings of the old irregularly laid out medieval city had been recognized. Inspired by an enthusiasm for Renaissance city-building, several plans were drawn up of which six have survived, the most famous by Christopher Wren. All plans show a completely new street layout, either grid-based or a combination of grid and radial elements. All these plans were quickly abandoned. The merchants took control, and the city they rebuilt was in its plan identical to the old, although with significant improvements in materials, street widths and administration. They rebuilt a smartened-up version of the old city, which had served them well in the past.[123] Could lessons be learnt from London and could they help to reach a better understanding of processes that were at play in second-century Ostia? Kemp reminds us that in the study of the past there is a tendency to pass favourable judgments upon examples of urban layout possessing a marked degree of regularity. This often leads to under-evaluating the degree to which society has been effectively served by less formal self-organizing schemes. [124] This is certainly something to remember when we will later apply Space Syntax techniques to the street system of Ostia.

1.5 FURTHER MAJOR CONTRIBUTIONS IN OSTIAN SCHOLARSHIP: DELAINE, RIEGER AND PAVOLINI

Rieger explored Ostia's urban development through its changing religious landscape.[125] The study addressed the urban integration of the sanctuaries, their architectural layout, their history of reconstruction, as well as their periods of activities. However, Rieger's most valued contribution lies in her social approach to these sanctuaries: she examined the function of sanctuaries as social and communicative space, and as a provider of identity within the city and its society.[126] DeLaine's research has been contributing to Ostian archaeology through various detailed publications on the building industry, the construction process and the brick industry related to it.[127] However, more relevant to this study are her applications of formal methods of spatial analysis, of which she is a pioneer in Ostia.[128] DeLaine's spatial assessment of Ostia's medianum

122. See Carl *et al*. (2000) for a wider view on ancient city planning. Under the heading whether cities were built as images city planning is analysed from different angles by various authors. Berry Kemp's article 'Brick and Metaphor' makes a case for less formal self-organizing schemes and that their natural strength has been under-evaluated. He refers to the rebuilding of London. Furthermore he draws on comparisons between the distribution of functional buildings in Amarna and late-medieval London (Carl *et al*. 2000: 335-346).

123. Carl *et al*. (2000: 338).
124. See Carl *et al*. (2000: 342-344) for Kemp's comparison between Amarna and London.
125. Rieger (2004).
126. See Heinzelmann (2008) for a review of Rieger's contribution to the better understanding of Ostia's sanctuaries.
127. DeLaine (2002; 2004; 2005; 2008).
128. DeLaine (2004).

apartments is a remarkable example of a fully data-driven examination of Ostia's built environment.

Finally, Pavolini's work on quotidian Ostia is of utmost relevance to everyone who takes an interest in the daily life of the city.[129] His socio-economic perspective on urban life has produced a number of scholarly works centred on the economy of Ostia quotidiana, with his more recent publication on Ostia's changing economic role in the Severan period.[130] Last but not least thanks to Pavolini's outstanding scholarship Ostia can pride itself of having the best archaeological guide book to the city and its buildings.[131] Pavolini's 'Ostia' is far more than a guide book it is the first and foremost point of reference for anyone in Ostia, without we would be lost.

From this appraisal of research in Ostia it should be clear that recent studies have made important contributions to the understanding of urban formation processes and development. However we also conclude that not much attention has been paid to the city's spatial structure as a research focus in itself, let alone the relationship between the spatial organisation und urban society. Moreover, the evaluation has shown that there is a need for more data-driven studies related to the built environment. Next to the pioneer work in Space Syntax by DeLaine, it appears that there is scope for further development within the line of systematic, analytical research, i.e. Space Syntax, and hence this explains why it is applied to the archaeological record of Ostia by this study.

129. Pavolini (1996).
130. Pavolini (2002).
131. Pavolini (2006).

2 – Roman Urban Studies beyond Ostia

This chapter aims to widen the research perspective and bring into the discussion studies in the field of Roman urbanism which developed outside of Ostia, notably in Pompeii. The intention is to take account of the advances made elsewhere, and to learn from the strengths and weaknesses of these earlier studies. A number of works concerned with Roman urban development will be critically examined. These have been selected for their pioneering work and outstanding contribution to the study of the Roman city. They all share a marked concern with urban space. These works will be discussed at some length, thoroughly examining the methods of analyses as well as the results achieved. This is done not only to appraise and contextualise these works, but also to engage with a wider theoretical discussion and to place Ostia within debates about the Roman city.

Roman urban theory comprises a wide field, ranging from ideal-type economic models to the study of individual houses and households. The sheer number of Roman urban studies is impressive, reflecting not only different theoretical approaches but also the confusion in the general theory of the ancient city that pervades the discussion of ancient urbanism.[1] Economic theories in general, and the Weber-Finley consumer-city model in particular as opposed to a 'producer city',[2] dominated the ancient urban discourse into the late 20th century.[3] Almost habitually these economic theories have been taken for a theory of the city itself.[4] As part of the same debate, alternatives to the consumer city have been formulated, addressing urban production, urban services and the role of cities as processors and organisers.[5] Yet again, these approaches sought to explain the economic function of the city by reconciling models of consumer and producer cities, but failed to offer a theory to explain the nature of the ancient city. Consequently researchers have been asking whether theories of Roman urbanism matter at all.[6] Some decided to disregard urban theory altogether and above all dispense with economic models, since these do not provide useful ways of conceptualising the phenomenon of Roman urbanism.[7] As Grahame argued, such abstract concepts bear no reference to the physical reality of the ancient city; instead they separate function from form by conceptualizing 'urban form' as the location rather than the outcome of economic activity.[8] Recently, a more coherent picture of the ancient city has been portrayed in Zanker and Neudecker's *Lebenswelten* (lifeworlds and mentality),[9] discussing the ancient retail and rental markets in combination with aspects of cult and community.[10]

By the 1990s the general paradigm shift from modernism to postmodernism was reflected in the fields of archaeology and urban studies.[11] As a result the economic hold on urban research seemed to have waned, judging by the increasing number of studies that left behind the constrictive framework of economic models and the 'consumer city' debate and instead explored the experiential and phenomenological aspects of the ancient city. Still, escaping economic ties did not seem to occur without difficulties, as Laurence's work demonstrates, and hence a study specifically defined to redress the theoretical balance still seems to carry an economic

1. As stated by Whittaker (1995: 9).
2. Capogrossi Colognesi (2004); Finley (1981); Weber (1958, 1976).
3. Cf. Whittaker (1990, 1995); cf. Mattingly (1997).
4. Grahame (1997: 152).
5. Engels (1990); Hopkins (1980); Jongman (1988).

6. Parkins (1997); Whittaker (1995); Grahame (1997); Mattingly (1997).
7. Whittaker (1995: 9); Grahame (1997: 161).
8. Grahame (1997: 152).
9. *Lebenswelten* can be translated as lifeworlds, or ways of life and mentalities.
10. Neudecker and Zanker (2005).
11. MacKay (1997: 275).

bias.[12] In Laurence's work, although presented with a social twist and with much declared distancing from economic models, the continued use of essentially economic definitions of Roman urbanism comes as a surprise.[13] It might have been an oversight owing to the lack of alternative terminology available in the field of urbanism, or just another sign of the irredeemable confusion that permeates the theory of Roman urbanism. All in all, when considering the amount of critique levelled at the ancient city debate, it seems difficult to imagine that any study could ever address all conceptual difficulties inherent in the urban discussion, and at the same time present a novel approach to the ancient city. Nonetheless a much praised recent reassessment of Weber's work by the Italian legal scholar Capogrossi Colognesi might prompt researchers once more to re-engage with the Weber-Finley model,[14] or re-evaluate Weber's ideal type economic concepts, which after all are at the root of the consumer city debate. As much as new approaches influence the theoretical discussion, a re-appraisal of Weber's work could equally inform and reshape the consumer city debate.

However, any such endeavour is beyond the scope of this study and is better left to ancient historians. Instead, this study looks into some of the approaches that moved the debate 'beyond the Consumer City'. The studies examined pursue a common interest: all focus on the relationship between the physical fabric of the Roman city and the social activities and societal processes taking place within the built environment. Drawing on Social Theory, these studies are based on the assumption of a mutual relationship between space and society. The studies under discussion form part of the recent wave of Pompeian research that has become a paradigm of Roman urbanism in its own right.[15] The scholarly advances made in Pompeian studies have turned the town into a useful source of comparison within the wider debate on urbanism, hence studies concerned with other Roman cities, such as Ostia, should benefit from the "Pompeian Renaissance".

12. Laurence (1994: 141), see also Laurence (2007: 190).
13. Laurence (1994: 133-141), cf. Foss (1996: 352).
14. Capogrossi Colognesi (2004); Deininger (2005).
15. The only exception is Kaiser's assessment of Empurias in Spain (2000).

2.1 ZANKER: THE CONCEPT OF TOWNSCAPES (STADTBILDER)

Paul Zanker's contribution to Pompeian research marks the beginning of a series of studies with a new focus on social and political questions and away from descriptive art-history and archaeological topography. Zanker relates the physical shape of the city to social and cultural changes throughout its history. The strength of Zanker's thesis is his concept of the 'townscape' (Stadtbild) which reflects changes in the attitudes and interests of the city's population through time.[16] For the period between the early second century BC and the destruction of Pompeii, Zanker identifies four different concepts of urbanisation that left their mark on the town.[17] From these townscapes he reconstructs three historical aggregates: The Hellenised Samnite city of the 2nd century BC, the period of rapid change following the founding of the Roman colonia in 80 BC and the new townscape of the early Empire.[18] Zanker contends that in the Hellenised Oscan city of the second century BC there was little concern for civic pride, with only piecemeal construction of Greek-style buildings for leisure and entertainment around the theatre quarters, and commercial structures, basilica and market at the *forum*. Zanker argues that unhindered by political or ideological constraints the city's leading families consumed their wealth in the form of lavish town houses that were strongly influenced by Hellenistic prototypes. Roman 'civic' ideology came along with the founding of the Roman colonia in 80 BC. This inevitably brought a change of direction, resulting in the construction of new public buildings and further development of the *forum* area in response to political demands. From the Augustan period onwards the concern for civic pride intensified as the leading families of Pompeii competed with each other to demonstrate their loyalty to the emperor and the imperial order. This was expressed through the construction of buildings in the *forum* specifically dedicated to the emperor and the imperial family.[19]

16. Grahame (1997: 157).
17. Zanker (1998: 3-5).
18. Zanker (1998: 27-124).
19. Zanker (1998: 78-106); see also Grahame for a brief

2.1.1 The impact of townscapes on the inhabitants

Zanker states that townscapes have a wealth of information to offer on the many anonymous and in part contradictory interests, which find their materialization in the built environment of the city. This is most indicative where urban growth or change was organic and not the purposeful creation of a single autocratic ruler or the result of an ideological programme.[20] According to Zanker the consecutive Pompeian townscapes reflect a largely self-regulating process through which the inhabitants produce a configuration that becomes an unintended self-portrait of their society. He adds that once a cityscape has been established, the effect on the mental outlook of its inhabitants cannot be underestimated.[21] Zanker draws on Kevin Lynch's concepts of urban imagery and place legibility, which provide a methodological outline to assess a city's degree of 'imageability'. The latter is defined as the quality of a physical object that gives an observer a strong, vivid image. A highly 'image-able' city creates a positive city experience, whereby the degree of 'imageability' is dependent on the intelligible composition of distinct parts, typical landmarks and clarity of direction regarding the street network.[22] Despite Lynch's influence, Zanker is far from any formal and systematic assessment of the strength of Pompeii's urban imagery. Zanker remains descriptive and suggestive, neglecting the analytical side of Lynch's approach. Still, Zanker's work reflects a heightened awareness of the influential power of the urban environment on the inhabitants, which according to him can be experienced as socially integrative, stabilizing or even arousing feelings of irritation or insecurity.[23] He reminds us that we only need to think of the antithetical vistas of late Republican and Augustan Rome or the decaying public buildings in the city centres of the Late Empire to understand that cityscapes constitute an integral part of the culture of each period.[24]

summary (1997: 157-158).
20. Zanker (1998: 28); cf. Zanker (1988).
21. Zanker (1998: 28).
22. Lynch (1960: 9-13).
23. See also Favro (1996) and Haselberger (2000).
24. Zanker (1998: 28); cf. Zanker (1988a); Favro (1996) juxtaposes the city images of Republican Rome and Augustan Rome through fictitious city walks; see Chapter Seven this volume on streets and movement.

2.1.2 Urban space as a reflection of society

Zanker's 'townscape' concept relates to urban space as a visible reflection of society.[25] By definition this would reduce the built environment to a passive component only able to mirror the society that produced it. Still, as stated above, Zanker acknowledges the effect of the built environment on the inhabitants, once a cityscape has been established. In this way Zanker seems to deny the impact of the building process and progress, as well as the daily negotiations that are part of incremental changes of the city, and on the whole seems to neglect the 'city in flux'. While Zanker's approach makes allowance for the visual power of architecture, it does not go far enough in explaining the impact of architecture on social relationships. This is not to suggest that Zanker's concept of townscapes is wrong in implying that society shapes urban space to meet its needs and to reflect its conditions and aspirations. However, the concept of urban space as a reflection of society only addresses one side of the role of architecture and identity formation, while the reciprocal relationship between built environment and society remains neglected.

2.1.3 The overall organisation of the city

Zanker is one of the early proponents in Classical Archaeology to investigate the city's total appearance in a particular historic period. He seeks to interpret the city's entire physical and aesthetic configuration and tries to understand how the city's layout, architecture and visual imagery work in conjunction with the daily lives of the inhabitants.[26] His work contributes to a better understanding of the city in total. This holistic approach is clearly outlined in an earlier paper in which Zanker discusses how urban architecture can be studied as an historical source.[27] While he expresses concern about architectural structures and how little they can tell about their function as inhabited space and the activities that

25. The visual aspect of the city is even stronger expressed in the original German term '*Stadtbild*'.
26. Zanker (1988: 28).
27. Zanker (1992: 259-260).

took place therein,[28] he argues that information can be gained from a close investigation of public buildings and their changes from a long-term perspective, including the emergence of new buildings during a certain period, the degree of decoration in connection to specific buildings and the abandonment or appropriation of specific buildings during a particular phase. He stresses that it is "crucial for such approaches to overcome the genre-specific direction of previous research, i.e. we pose questions not only about the individual building types or location and street arrangement, but also about the integration of the building into the overall organisation of a city. Only when we succeed in viewing the different buildings co-existing in space and time and their arrangement as a unity, and begin to consider them in relation to their users, will public space be comprehensible as the stage for a specific kind of public [sphere] (Őffentlichkeit)."[29] This means that Zanker conceptually pioneered a 'configurational approach' to the ancient city, perceiving the city as a unity. However, his case studies remain selective and hence a practical application of his 'holistic approach' is still wanting, or has at least partially been taken up by other scholars pursuing similar objectives. Several of them will be discussed in the following sections of this chapter.

2.2 WALLACE-HADRILL: HOUSES AND ROMAN SOCIETY

Wallace-Hadrill's contribution to Roman urbanism lies in his deep understanding of the societal relevance of private dwellings. His work is generally considered to be an offspring of Zanker's approach.[30] While Zanker was concerned with townscapes, Wallace-Hadrill's research focuses on the ways in which domestic architecture and decoration could be used in constructing the social identity of the inhabitants.[31] By directly addressing social structure and the Roman house, Wallace-Hadrill departs from Zanker's work and opens new perspectives by engaging to a much greater depth with the close ties between domestic architecture and Roman society. To appreciate better where Wallace-Hadrill's methodology reaches beyond Zanker's, this assessment partly draws on a direct comparison between both approaches. First and foremost, the two scholars seem to be schooled by two different currents. Zanker seems to be influenced by the school of thought focusing on the idea of "the public sphere" (die Öffentlichkeit) as defined by Habermas.[32] Wallace-Hadrill appears to represent, or rather 'wrestle' with another tradition centred on the idea of 'separate spheres' of private and public, developed in the study of eighteenth- and nineteenth-century Britain.[33] Both discourses developed in terms specific to the rise of the 19th century nation state, and although distinct, both depended on an idea of the modern industrial economy as requiring means of creating and expressing public opinion to establish a politically stable environment in which long-distance trade could flourish.[34] As far as the commercial outlooks of 19th century society were concerned, it may not have differed so much from Roman society, although the strategies of communication and opinion-making must have been distinctly different.[35] Wallace-Hadrill draws upon the Pompeian domus and its language of luxury as a key means of communication and opinion making. In doing so Wallace-Hadrill appears to be very much in line with the scholarly tradition of English

28. This concern has been expressed many times and has been shared by archaeologists and anthropologists alike; see Donley-Reid (1990) and Allison (1999).
29. Zanker (1992: 260).
30. Parslow (1999: 10.25).
31. This assessment focuses on Wallace-Hadrill's publication of 1994 on houses and society in Pompeii and Herculaneum which combines four articles published between 1988 and 1991, including the article on the social structure of the Roman house (1988), see Heinrich for a review of Wallace-Hadrill (2000: 302-303).
32. Habermas defines the 'public sphere' as a discursive space in which private individuals and government authorities could meet and have rational-critical debates about public matters. These discussions happen in coffee houses, cafes, public squares as well as in the media, in letters, books, drama and art. According to Habermas the modern public sphere is providing a space for a commerce or traffic in ideas among private citizens and hence acts as the locus for the development of public opinion; see for example Davis (1997: 397-426) reconsidering Habermas.
33. See Cooper for a critical discussion of the public-private binary and the analytical weakness of the discourse itself (2007: 19-20).
34. Cooper (2007: 19-20), see also Davis (1997).
35. Cooper (2007: 19-21).

classicists, sharing their interests in class values and class divisions,[36] and one could assume that through this he might have developed a keen eye for class distinction in Roman society. Zanker's outlook on the other hand is shaped by critical social theory as formulated by the Frankfurt School.[37]

2.2.1 Systems of spatial differentiation

Wallace-Hadrill's work is based on a number of principles, which in turn are solidly rooted in a thorough study of ancient literary sources as well as an in-depth study of the archaeological evidence. Firstly, his unit of study is the Roman house as a social unit. He argues that Roman domestic architecture and design were driven by the exigencies of Roman social life, thus houses represent valuable documents of that social life.[38] Secondly, he contends that Roman domestic architecture was 'obsessively concerned' with the distinction of social rank, not only between neighbouring buildings, but also within the social space inside the house.[39] Acknowledging the contributions of anthropology to the better understanding of how domestic space is shaped and the social and cultural significance it holds, Wallace-Hadrill argues that if differentiation within houses is a universal need, variation is found along cultural-specific lines or axes. He maintains that in Roman houses gender and age are not represented as axes of differentiation, making a typical female or male space, or space for children and elderly practically undetectable. In contrast, he identifies rank as the prevailing spatial differentiator within the Roman house.[40]

At the core of Wallace-Hadrill's argument lies Vitruvius' chapter on the social properties of domestic architecture (vi.5), which seems imbued with keen social awareness.[41] When translated into architecture, as described by Vitruvius, Roman social sensibility appears to result in a spatial distinction between private and public, which is not at all clearly defined but full of ambiguity. It is precisely this ambiguous relationship between public and private which Wallace-Hadrill understands as the in-built structure of the Roman house. Hence he clearly distances himself from any antithetical understanding of public and private in terms of excluding polarities.[42] Instead, he approaches the system of spatial differentiation along two contrasting axes, where the axis from public to private is intersected by another axis moving on a scale from grand to humble. Accordingly, domestic space can be found along these axes at various degrees of either scale. Thus an area within a Roman house can be public and grand or private and grand, as well as private and humble or also public and humble (see Fig. 2.1).[43] Hence the third salient principle of Wallace-Hadrill's research lies in his full appreciation of the 'ambivalent association' between public and private spaces, together with his ability to devise a method for a systematic study of this particular relational structure of Roman houses.

36. A recent opinion poll (Guardian/ICM poll 2007) showed that Britain remains a nation dominated by class division, with a huge majority certain that their social standing determines the way they are judged by others.
37. Habermas (1962, 1989 trans.) and Adorno's and Horkheimer's *Dialectic of Enlightenment* (2002 transl., 1st published 1947) are examples of works published by members of the Frankfurt School. Zanker's work has been also influenced by Mitscherlich who addressed the 'inhospitality' of today's cities (1965). Mitscherlich's work intersects with the Frankfurt School's core concerns.
38. Wallace-Hadrill (1988: 47).
39. Wallace-Hadrill (1988: 52).
40. Wallace-Hadrill (1988: 50-52).
41. This statement draws on Vitruvius *De Architectura* vi. 5: Vitruvius does not only speak about a distinction of private and public within domestic space, but also about 'correctness of decor', defining what is considered to be appropriate architecture for citizens of different social rank and specific professions. Thus lawyers and orators should have spacious rooms to accommodate meetings, while the most prominent citizens, those holding magistracies should have spaces outfitted in a manner not dissimilar to the magnificence of public works, for in the homes of these people both public deliberation and private judgments and arbitrations are carried out; see Vitruvius *De Architectura* vi, 5 (translation Rowland and Howe (1991: 80-81).
42. More recent research has moved beyond the 'private-public dichotomy'; the private-public discussion is also not relevant for the study presented here.
43. Wallace-Hadrill (1988: 54-58).

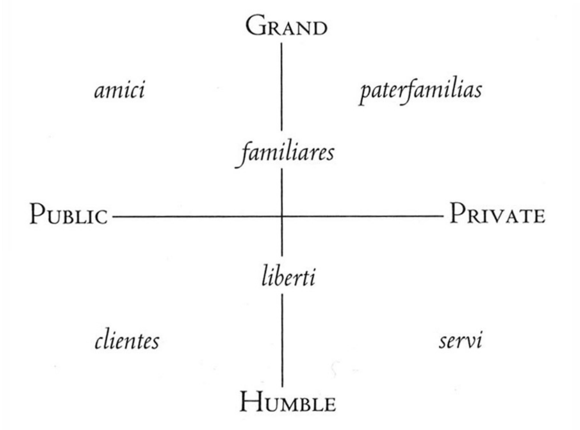


Fig. 2.1 – Axes of spatial differentiation in Roman domestic space (source Wallace-Hadrill 1994: 38)

2.2.2 Methodology: sampling Pompeii and Herculaneum

Prior to Wallace-Hadrill, Zanker had already demonstrated how the language of architecture and decoration was deployed in the construction of social standing. Zanker observed that despite their variety in the shape of living space, quite a few Pompeian houses (or rather their owners), obstinately insisted on the inclusion of a peristyle-courtyard even into the smallest of house-plans. After having convincingly demonstrated in previous work that villa architecture influenced town houses,[44] Zanker concluded that architectural forms and decorative elements seemed to serve the same purpose, namely to support their owners in striving for the illusion of inhabiting a villa, and thus suggesting a fairly lavish lifestyle. In support of his argument, Zanker sampled suitable houses from areas distributed over the entire city-plan of Pompeii, including the odd example from Herculaneum. For easy comparison, he displayed the houses under discussion in a series of 14 ground plans rendered at the same scale.[45] While their seemingly random grouping into comparative ground plans gives the impression that they represent an unbiased cross-section of Pompeian houses, still the houses remain a deliberate selection to prove Zanker's case.

In contrast to Zanker, Wallace-Hadrill's stated intent was to properly isolate a well-balanced sample of all Pompeian houses regardless of their bearing on the argument. To reach such a representative cross section he sampled a total of 234 houses composed of three groups of adjacent blocks (*insulae*) for comparison and control. These groups are located in different areas of Pompeii, reflecting different periods of excavation, as well as uneven conditions of preservation and states of publication.[46] In addition, Wallace-Hadrill included a group of blocks from Herculaneum, firstly to add a level of data control and secondly to make his data-set more widely representative by including aspects of another town for comparison.

2.2.3 Data assessment and interpretation

The complete sample provided Wallace-Hadrill with a range of information suitable for statistical analysis. Based on their quantitative assessment he grouped the houses into four categories, calculating their total plot size and the number of rooms (quartile 1-4);[47] and subsequently examining them with regard to their size, function, architecture and above all wall paintings.[48] From the size of houses and the number of rooms Wallace-Hadrill inferred a direct link to social status; while the varying sizes of houses and their distribution patterns were taken to reflect social contrast within a block. All in all, Wallace-Hadrill demonstrated how the basic structures of the Roman house are determined by the astonishingly public nature of domestic life. Furthermore he illustrated that the architectural forms and decorations imply a social code, which draws constantly on references to public and non-domestic architecture.[49] However, in the light of other studies of Roman domestic architecture and more recent Pompeian studies, Wallace-Hadrill's concepts of public/private as well as his ideas about the influence of public architecture

44. Zanker (1979), Wallace-Hadrill (1994: 169).
45. Zanker (1998: 194-196).

46. Pompeii: 7 *insulae* from the so-called scavi nuovi in Regio I, VI-XII, 8 *insulae* from Regio VI, IX-XVI, Herculaneum III-VI; see Wallace-Hadrill (1994: 67-71).
47. Quartile 1: 10-45 m2, quartile 2: 50-170 m2, quartile 3: 175-345 m2, quartile 4: 350-3000 m2; see Wallace-Hadrill (1994: 81, table 4.2).
48. Wallace-Hadrill (1994: 80-82).
49. Wallace-Hadrill (1994: 18-25).

on Roman domestic houses need to be qualified and required to take notice of other influences.[50] Within the scope of this thesis, a further clarification of the concepts of private and public is not important.

2.2.4 The social language of decoration

Complementing his sociological interpretation of domestic built structures, Wallace-Hadrill applied a ‘systematic contextual approach’ to the use and development of the four Pompeian styles of wall-painting.[51] To this end he examined the wall paintings within their particular spatial setting in relation to the entire house and all its decorations. According to Wallace-Hadrill, art-historians have fundamentally misunderstood Pompeian wall-paintings by treating the four styles as independent entities and by deliberately selecting the best examples of each style according to aesthetic criteria.[52] His working hypothesis was that decorations function to discriminate and to render the house fit for the pattern of social activity within it.[53] He adds that the language of private decoration draws on the idiom of public life and thus reflects on the reception function of the house and its interaction with visitors from the outside.[54] Such an approach, however, allows only a narrow spectrum of activities and possible experiences within the house,[55] and exhibits a bias towards the public function of the house, while contextual artefact studies have shown that reception spaces were also used for domestic activities.[56]

Wallace-Hadrill started his analysis by subjecting the wall decorations of his sample areas to a somewhat coarse quantitative assessment, establishing their absence or presence and the extent of decorations in relation to individual rooms within particular houses. He then attempted to find criteria to approach questions of quality, which he admitted was difficult to achieve.[57] Recognising their specific importance he selected two outstanding features for closer investigation: one being mythological paintings of the Imperial period (fourth Pompeian style), formally constructed in a Hellenizing idiom, and the other being polychrome marble floor mosaics. Wallace-Hadrill sees their significance in their close connection with the luxury world of the Roman elite and their relatively restricted diffusion. Still, their sufficient frequency of occurrence and varied range of elaboration allowed closer examination and tentative comparison,[58] hence qualitative inferences from their patterns of occurrence seemed achievable and informative.[59] While the general analysis concerned the total sample size, Wallace-Hadrill limited the examination of decorations pertaining to the fourth style to Region I. The total data set however was examined to shed light on four specific themes: the pattern of diffusion of decorative features, the relationship of decoration to social and economic activity, changes over time, and the relationship between different social levels.[60]

The outcome of Wallace-Hadrill’s statistical analysis shows that 59 percent of the houses contained at least one decorated room.[61] Moreover, a predictable correlation between house size and richness of decorations could be traced, quite expected since both operated as status markers. Nonetheless, decorations did not always increase in proportion to the number of rooms, nor was there a clear division between grand and richly decorated houses on the one side or undecorated houses on the other side.[62] However, decorations of the first and second Pompeian Style were primarily found in the large houses (quartile 3 and 4). Wallace-Hadrill therefore infers that the decorations of the Republican period may be considered to be luxury objects which

50. Dickmann offers a critique of Wallace-Hadrill’s concepts, considering them too static and not flexible enough to include other persons than the house-owner; and also not able to include different occasions in which the same space can be experienced differently (1999: 44-48).
51. Matching his own dataset, Wallace-Hadrill’s assessment of decoration is based on the official inventory “Pitture e Pavimenti di Pompei” (Brangatini and De Vos *et al*. (1981, 1983/1986), cf. Heinrich (2000: 302-303) for a review of Wallace-Hadrill’s work.
52. Cf. Tanner’s review of Wallace-Hadrill (1995: 217).
53. Wallace-Hadrill (1994: 149).
54. Wallace-Hadrill (1994: 149).
55. Dickmann (1999: 45).
56. Allison (2007: 269-279); see also Van Krimpen-Winkel (2009: 72).
57. Wallace-Hadrill (1994: 150).
58. Wallace-Hadrill (1994: 150-151).
59. Wallace-Hadrill (1994: 152-154).
60. Wallace-Hadrill (1994: 151).
61. Wallace-Hadrill (1994: 151).
62. Wallace-Hadrill (1994: 151-154).

only the elite could afford.[63] Conversely the larger diffusion of the fourth style (mythological paintings) across all house types during the imperial period indicates that these wall paintings were no longer a privilege of the elite but could range from rich to poor.[64] Wallace-Hadrill adds that in the fourth style the decoration of even modest houses draws on the same repertoire as the grand houses. He infers that in this way they may have imported something of the lifestyle of the successful into the home of the poorer groups. Wallace-Hadrill holds that this spread was prompted by the increased prosperity of the Early Imperial period and driven by emulation, not only by internal competition within a circle of elites but also by the aggressive competition from outside the elite. Here he refers to members of socially suppressed groups, particularly ex-slaves whom he considers being equally keen and successful in penetrating the elite and claiming their own place in Roman society.

2.2.5 The Roman power-house

Wallace-Hadrill's thoroughgoing textual and archaeological analyses, as well as his interpretations, have greatly enhanced our understanding of the social structure of Roman domestic space and its societal meaning. Moreover he reminds us that Roman houses not only present a reflection of social realities, but are in themselves one of the means by which the Romans 'constructed their social world'.[65] Within this context, Roman houses played a vital part in establishing their owners' claim to a position in society. Wallace-Hadrill's definition of the Roman domus of the elite as a "power-house" could not have been more to the point. Assessing the built structures and decorations in tandem led him to detect a system of spatial differentiation which he understands as the direct product of Roman social relations, connected with the social system of patronage and clientele.[66] Thus, for Wallace-Hadrill the house became the focus where the network of social contacts that provided the basis for the owner's activities outside the house was generated and set in motion. Consequently, the dominant concern in articulating domestic space was to provide a suitable context for the differentiation of public activities from those of a more private nature, and for activities along the full social spectrum.[67]

Wallace Hadrill's insights into the social language of Roman domestic architecture greatly increased our awareness of the ambivalent nature of the public and private spheres played out within the context of the Roman house. Although Ostia's domestic architecture is not so much in the centre of this thesis, still, some of Wallace-Hadrill's observations and interpretations offer analogies that could be applied to achieve a better understanding of the spatial organisation of some of Ostia's guild houses, in particular those which follow the architectural language of the domus.

The following critical examination concerns Grahame's spatial assessment of Pompeii's domus of Region VI, offering yet another approach to Pompeian domestic architecture and its relationship with Roman society. While Wallace-Hadrill's work largely incorporates the cultural and archaeological context of Pompeian houses,[68] as well as a keen eye, not to say a bias, for class distinction, Grahame's study concentrates on spatial theory and methodology, almost at the loss of Pompeii's cultural context. Nonetheless it provides a challenging contribution to Roman urban studies. In line with Wallace-Hadrill,

63. Heinrich considers Wallace-Hadrill's sample areas not as large enough to reach such strong conclusions. Moreover he points to other studies focused on the first and second Pompeian style, which have shown that even those decorations were found across all house sizes (2000: 203, note 5). While Heinrich's critique seems justified, at the same time it does not make Wallace-Hadrill's research any less important; sample sizes are always difficult topic in archaeological research and they never seem large or mixed enough.
64. Wallace-Hadrill (1994: 196).
65. Wallace-Hadrill (1994: 61).
66. Wallace-Hadrill (1994: 12); see Allison (2007) for a different interpretation of domestic space in Pompeii. Allison's detailed artefact study identified household objects such as storage vessels and loom weights widely distributed within Pompeii's atrium houses. Allison's study suggests that most parts of Pompeii's atrium houses were used for everyday household activities. Hence her conclusions do not fit particularly well with Wallace-Hadrill's concern for status and public display.
67. Tanner (1995: 217).
68. See Tanner's critique on Wallace-Hadrill's under developed cultural analysis which he sees as neglecting the function of the Roman domus as a primary site for the pursuit of cultural practices derived from the Greek World (1995: 217).

the fundamental argument of Grahame's study is that the underlying social structure of Pompeii can be analysed through a study of its domestic architecture.

2.3 GRAHAME: READING SPACE – A SALLY ON THE ROMAN DOMUS

Grahame's syntactical approach to the Pompeian domus, printed in 2000, was preceded by an earlier published critical assessment of Roman urban theory and subsequent call for a radical change of direction in studies of Roman urbanism.[69] Grahame claims that his approach to the built environment of Pompeii promotes a methodology that moves towards a better understanding of the social processes which were responsible for the creation and transformation of spatial forms.[70]

2.3.1 Theoretical framework

Grahame proclaims his study to be a lengthy critique of Goffman's 'dramaturgical analogy'.[71] While the study concentrates on Goffman's model, he engages little with Goffman's writings, instead he take a critical stance and follows Gidden's social theory, and in particular Giddens' comments on Goffman.[72] However, despite all efforts, Grahame's theoretical underpinnings do not fully convince and have been even dismissed as overly ambitious and partly irrelevant.[73] Moreover, despite a prevailing positive attitude towards interdisciplinary approaches, Grahame has been accused of drawing on the ideas of a number of anthropological, sociological and philosophical thinkers who, it is alleged, have only marginal significance for the study of Roman domestic architecture.[74]

Goffman's model understands social life as being analogous to drama with individuals playing their roles.[75] Grahame disapproves of the 'dramaturgical approach', criticising its negative bearing on the role of built space. According to Grahame, Goffman's model completely disregards the active and dynamic role of architecture and demotes buildings to mere containers for human activities. Grahame argues that by extending the dramaturgical model to buildings, they would be reduced to a mere 'theatre' or stage coming to life only with their actors, while they remain meaningless in the absence of the protagonists. In fact, the difficulty of deducing meaning from architectural structures alone, when any other kind of information about social practice and activities within the buildings is lacking, has led to pessimistic views among archaeologists. Grahame refers to Donley-Reid who claims that 'the walls will tell me nothing'.[76] Donley-Reid is not the only archaeologist who is hesitant about inferring meaning from built structures. Some others, like Allison, might admit that such investigations may lead to an understanding of the cultural patterning of space, but seems doubtful that such studies can provide information about those who built and used the spaces.[77] Others again, foremost Barrett, argue that the significance of buildings only emerges as containers of situated practices and does not encode some original meaning.[78]

Leaving behind any of these concerns, Grahame regards buildings to be among the largest artefacts created by society and thus for this very reason they cannot be meaningless.[79] While this is at best a circular argument not contributing much to the discussion, Grahame's expanded search for meaning in architecture appears on the whole also a bit lost and remains cruising around concepts like social structure, identity, political life, all of them too large to be dealt with easily.[80] Within the framework of this assessment it seems sufficient to state that Grahame's

69. Grahame (2000; 1997: 156-162).
70. Grahame (1997: 157-160).
71. Grahame (2000: 1), Goffman's dramaturgical analogy conceptualises social action in terms of 'performances' given by social actors to audiences.
72. Goffman (1959; 1963); Giddens (1984); Grahame (2000: 6-9).
73. George (2002: 239).
74. George (2002: 239).
75. Goffman (1959, 1963), see also Lawrence and Low (1990: 480).
76. Grahame (2000: 1); Donley Reid (1990: 115).
77. Allison (1999: 4).
78. Barrett (1994: 92).
79. Grahame (2000: 1).
80. Cf. George (2002: 239).

aim was to offer an alternative conceptualisation of built space. Other than under Geoffman's concept of 'dramaturgical analogy', Grahame conceives architecture as being an integral part of society and thus should be understood as an instrument that helped create and recreate society. For this reason architectural remains ought to encode a wealth of social information, and therefore, he claims that suitable methods need to be devised to 'decode' buildings.[81]

2.3.2 Searching for a methodology

Grahame's quest for a methodology starts by suggesting that we can perceive architecturally divided space as having properties analogous to those of written texts. He argues that if we want to understand anything that is written we first need to know the language. He aims to achieve a similar understanding by comparing speech and writing with social interaction and architecture. He reasons that in both cases the transient acts of speech or social encounter are preserved accordingly, as either writing or architecture. He argues further that by analogy the act of detecting a spatial activity might be counted as equivalent to the act of reading; consequently he equates movement to reading. From a short digression to Saussurian linguistics he links up with structuralism and finally arrives at Hillier and Hanson's Space Syntax theory.[82] The latter provides him with a ready-to-use method to reconstruct potential movement through space.[83]

Grahame does not offer yet another account of Space Syntax theory; neither does he critically examine other archaeological case studies in terms of the method's suitability for archaeological application.[84] Instead, he takes the reader through the difficult terrain of applied Space Syntax in an almost handbook-like manner and thus offers a truly useful contribution by presenting both theory and method fairly accessibly even to those unfamiliar with the complexity of the theory.[85] With regard to his own case-study he only selects Access Analysis, a topological method which allows him to represent, quantify and interpret the spatial configuration of buildings or settlements.[86]

2.3.3 Case-study: Pompeii and access analysis

Using a sample of 144 Pompeian houses, Grahame's study aimed at a comparison between the conventional views of domestic space based on Roman literary sources and one derived from access analysis. Determined to ensure statistical validity in terms of numbers and variation of house-types, he decided on a large sample area with continuous groups of houses forming *insulae*.[87] In a process of elimination, Pompeii's Region VI emerged as the most suitable area, despite its poor state of preservation and the poverty of recording owing to 19th century excavation. Next he established suitable base-maps relying on a combined use of the maps produced by the Corpus Topographicum Pompeianum (CTP) project and Eschebach's earlier plan. Given that doorways are the crucial element in Grahame's applied Access Analysis, the CTP maps seemed ideal for Grahame's analysis since they systematically mark all doorways that were open or blocked during antiquity.[88]

2.3.4 Data analysis and interpretation

Access Analysis enabled Grahame to compare house-plans of different layouts with each other.[89] He extended the analysis by adding spatial values which allowed him to arrive at estimates for potential social encounter for any room within the configuration of the house.[90] The results of his statistical examination

---

81. Grahame (2000: 23).
82. Space Syntax refers to a set of theories and techniques for the analysis of spatial configurations. It was pioneered by Bill Hillier, Julienne Hanson and colleagues at the The Bartlett, University College London; see Chapter Three this study for a brief introduction to Space Syntax.
83. Grahame (2000: 24).
84. See Chapter Three in this study; see also Thaler (2006: 324-326) for a brief overview of Space Syntax applications in archaeology; see Cutting (2003) for a critical assessment of Space Syntax applied to prehistoric settlements.
85. Grahame (2000: 29-36); George (2002: 239).
86. Grahame (2000: 29).
87. Grahame (2000: 38-39).
88. Grahame (2000: 39).
89. See Grahame's Appendix One providing houseplans and access maps (2000: 101-171).
90. Grahame (2000: 4, 56-73); see Chapter Four this volume on Space Syntax tools and techniques.

led him to conclude that the Pompeian house-plans were highly contingent, whereby the large variety in layouts is understood as the result of factors that operated locally rather than following a common set of rules.[91] These findings seem to challenge Wallace-Hadrill's and Zanker's earlier studies of Pompeian houses, which suggest more standardized, often idealised house-plans, where similar layouts of houses are seen to support comparable patterns of social life.[92] By analysing how dissimilar house-plans shaped interaction differently, Grahame claimed to identify a trend in the social patterns generated by different physical parameters.[93] He noted that the smallest houses usually produced a scattered pattern of interaction, while in slightly larger houses, when there was a courtyard present, interaction was centralised, with encounters converging towards the courtyard. Then again, in houses with multiple courtyards, the patterns of interaction became more segregated as competing spaces for encounter were available. From these findings Grahame concluded that the houses engendered a variety of social patterns in place of fairly standardised patterns of interaction.[94] He relies on his own interpretative framework to be able to translate these results into indicators for social factors. He postulates that such varied social patterns suggest the formation of heterogeneous social identities, which in turn seem to be rooted in the collective identity of a household. Being aware of the apparent opposition between individuality and collective identity he seeks to reconcile these contradictory poles by conceiving of the house as the locus for social hierarchy. Consequently he argues that within this hierarchy each person may hold a specific position and thus maintain a sense of individuality, while at the same time each house seemed to have engendered and contained a defined social hierarchy invested with localized power. He added that the competition necessary to create and sustain hierarchies between houses seems to have produced a mixture of houses of different sizes and diverse spatial organisations, which together form the heterogeneous urban mosaic of Pompeii.[95]

2.3.5 Reading space and beyond

Grahame's rigorous spatial analysis of 144 house plans remains unparalleled in Pompeian research. On the one hand his analysis makes a lucid case for the potential usefulness of Space Syntax applications in archaeology and the need for interdisciplinary approaches.[96] On the other hand, Grahame's study gives ample reason for serious criticism mounted against his neglect of cultural context, and his over reliance on base-maps to the detriment of much needed archaeological investigation, all factors which ultimately compromise the results of his analysis. When it comes to Grahame's interpretations, these are often reduced to descriptions of the statistical results without giving significance to them. Then again he seeks to explain his results within his own interpretative framework, which seems an intricate concoction of hypothesis over hypothesis, and thus defies the analytical rigor he had applied to the analysis in the first place. At times when careful observations would have sufficed, his results do not seem to warrant the exhaustive method of spatial analysis. A case in point is the pattern of distribution of the courtyard houses within Region VI. A simple look at the street layout and its effect on the size and shape of plots would have helped to explain why certain wedge-shaped plots located at the periphery of the city quarters did not permit the construction of multiple or even single courtyard houses.[97] On the whole Grahame's potential contribution to the better understanding of Roman houses and society seemed to be negatively impacted by his over-reliance on theoretical explanation to the exclusion of the cultural context from which the archaeological evidence is derived.[98] This is not to say that his theoretical explications have no value in their own right. In fact, his comprehensible guide to Access Analysis has proved useful to many archaeologists applying

91. Grahame (2000: 4, 88-89).
92. Grahame (2000: 91); in contrast see Wallace-Hadrill (1994).
93. Grahame (2000: 4).
94. See Robinson (1997) for a different model of urban structure in Pompeii. Robinson argued that elite houses were separated form one another, perhaps indicating that the elite house owners controlled the neighbourhoods directly surrounding them.

95. Grahame (2000, 4-5).
96. See George (2002: 239).
97. Grahame (2000: 83-84).
98. George (2002: 239).

spatial analysis to archaeological contexts and in this regard he made a truly valuable contribution. Grahame however was not the first scholar to apply Space Syntax to the built environment of Pompeii. Prior to him, Laurence in his study of space and society applied selected tools of spatial analysis to examine the degree of integration between the street network and Pompeian houses. The following section will give a brief account of Laurence's work and will examine to what extent his engagement with the built environment of Pompeii enhances our understanding of Roman urbanism.

2.4 LAURENCE: SPACE AND SOCIETY

Contrary to the 'house-based' studies above, Laurence's work focused on the spatial organisation of Roman cities. Laurence's work, first published in 1994,[99] is one of the broadest and most challenging studies of Roman Pompeii achieved by a single author.[100] The study concentrates on the mutual relationship between urban space and society. In its theoretical outlook it responds to the main currents, which had influenced Pompeian research as well as the study of Roman urban history in the early 1990s. Above all it developed when the authority of the Weber-Finley conception of the ancient economy had reached its end.[101] Still, the influence of the consumer-city debate is felt throughout the book. Coinciding with the waning dominance of economic models, Pompeii underwent an extensive re-evaluation as an object of study as well as a source of evidence. Zanker's and Wallace-Hadrill's research, as discussed above, are early examples of this new engagement with an already well-known site. Once the city's vast scope for methodological and theoretical studies had been realised, it became necessary to reconsider how to better use the wealth of data the city makes available.[102] Even more so since an increased interest in the social meaning of the ancient city took over, where previously a concern for the ancient economy had been the focal point. Thus the need arose to examine the archaeological data in terms of the underlying social use and significance. This led to literary sources gaining new importance as they were seen to shed light on the 'social rhythms' that underlie material culture.[103]

2.4.1 The 'Spatial Turn' and Pompeii's physical and social contexts

Laurence's work appears largely affected by the 'Spatial Turn' which resulted from the expanding critical debates on the social production of space and human spatiality, attracting the attention of nearly every field in the social sciences and humanities. All spatial disciplines such as geography, architecture, and urban studies, as well as archaeology, have benefitted from the increased interest in 'space' and the widened scope of the spatial debates.[104] The theoretical underpinning of Laurence's study is the inherent mutual relationship between urban space and the activities carried out by the society living within the city. Laurence states that all behaviour has a spatial aspect to it, and adds that all people are born into a spatial world.[105] Throughout his book Laurence analyses urban activities within their spatial and in part temporal contexts. To explore the spatial nature of the ancient city his study draws a synthesis of ancient texts and material culture. Laurence considers ancient texts as representations of practice and thus uses textual interpretations to shed light on the spatial dynamics he observes. His main focus is on the implications of the mutual relationship between urban space and urban society and he claims that by using this specific relationship he will be able to establish a more coherent and encompassing view of the Roman city than has been presented by those using the literary texts only.[106] As the studies discussed before, also Laurence's work constructs a

99. Laurence's second edition published in (2007) has two additional chapters, while other chapters have been expanded and restructured.
100. Cf. Dobbins and Foss' (2007) edited volume which brings together a large number of authors presenting their recent approaches to Pompeii.
101. Laurence (2007: xiii, 10).
102. Raper's (1977) thesis, to be discussed shortly, was ahead of its time and its significance was only appreciated in much later studies Kaiser (2000) and Robinson (1997).
103. Wallace-Hadrill (1988: 48); Laurence (2007: 7-8); see McIntosh (2007: 1) for a review of Laurence.
104. Cf. Soja (2001: 1.6).
105. Laurence (2007: 10).
106. Laurence (2007: 11).

similar foundational argument: the underlying social structure of Pompeii can be analysed through a study of its urban space.[107]

2.4.2 Positivist geography, Space Syntax and Pompeian society

Laurence's book comprises eleven chapters, all of which have a clearly defined spatial direction, while nine chapters explore different aspects of urban space in Pompeii.[108] All of them draw upon concepts of urban geography and architectural studies to map the spatial organisation of Pompeian society,[109] whereas chapters six and seven reach beyond the levels of qualitative description and illustration, and incorporate quantitative methods of spatial analysis derived from Space Syntax and mathematical geography. Since Laurence's analytical approach provides also his most compelling work, these two chapters are of specific interest to this discussion. Although praised for being innovative, Laurence's approach received considerable criticism: stating that the results did not seem to warrant the methodological sophistication,[110] and that the spatial dynamics identified by painstaking analysis seem more than obvious and could be observed by the careful viewer without verification through quantitative and statistical means.[111]

This is a well-known argument, which has been repeatedly used against spatial analysis techniques. In defence of Laurence it needs to be stated that Space Syntax devices are first and foremost contrived as tools to visually and syntactically explore a delimited spatial environment.[112] Thus once these emergent spatial patterns have been made visible, they often appear obvious and almost self-evident. This does not however mean that they would have been detected had it not been for these sophisticated means of analysis. Furthermore, spatial patterning that is self-evident benefits from being subjected to a scientific presentation of quantification and reproducible patterning. Such tools can assist a creative mind like Laurence to identify spatial patterns which then need to be translated into social meaning. Hence what should be critically addressed is not the inappropriateness of the analytical methods or whether the methods themselves determine what could and should be studied, it is rather that Laurence's theoretical explanations fall short in describing the techniques sufficiently.[113] Returning to the methods themselves, Space Syntax and mathematical geography, both tend to conceptualize space exclusively as form or geometry. In line with this conceptualisation Laurence's analysis aptly focuses on configuration and arrangement of physical space, and typically involves statistical description, mapping and correlation of varying spatial patterns, expecting that fundamental and common patterns inherent to these spatial forms might emerge.[114] In the following section some examples will be introduced to explain Laurence's approach; in addition, a short outline of Laurence's chapters six and seven will be presented.[115]

2.4.3 Street activity and public interaction and the 'Production of Space'

Laurence's work deals with a different understanding of public and private spheres than Wallace-Hadrill, who had focused on the Roman houses and how their owners constructed their social world through the means of domestic architecture. Laurence steps outside the Roman houses and is interested in what is happening at the intersection between houses and streets. His chapters six and seven try to explain patterns of urban design and social activity at the intersection of private and public space, i.e., house-

107. See Small's review of Laurence (1996: 430).
108. The second edition (2007) includes two added chapters: chapter 8 considers the possibility of urban land rent and discusses differing property values within the city. Chapter 10 examines the experience of a child becoming an adult, relating this development to the social and spatial structure of the city.
109.See Ulrich's review (1997: 383) of Laurence (1994); see also George's (1995) review of Laurence (1994).
110. Tanner (1995: 218).
111. Ulrich (1997: 383-384).
112. Hillier and Hanson (1984).
113. Laurence (2007: 127-127); see also the review by George (1995).
114. See Soja (2001: 1.3) expressing a critical view of Space Syntax and general mathematical geography and their search for formal orderliness and empirical regularity.
115. This brief review of Laurence's chapters 6 and 7 follows George (1995); Laurence (2007: 127-127).

fronts and the streets that define them.[116] In practical term, his approach centres on doorways in regard to location and frequency of occurrence. In addition, he relates the number and distribution of doorways and the total of graffiti (election notices) to the presumed intensity of activity in a street, i.e. a high number of doors reflects greatest use of street frontage. Laurence applies a formula to the streets and doors, comparing the length of streets with the number of doorways to obtain the occurrence of doors throughout the urban grid. As might be expected, activity is strongest along the great thoroughfares that run between the gates and frame the economic and political core, the *forum* with Region VII, which integrates the city, while other regions were more residential, hence saw less public activity.[117]

Laurence extends this type of analysis in his next chapter, on the production of space,[118] by looking at the connection between the houses within the *insulae* and the streets themselves. He seeks to identify the 'spatial generators' which led to the patterns in doorways and levels of activity he identified in chapter six. He is interested in discovering those local factors which influence the general patterns. Quite rightly he starts off with the grid plan of the street network, identifying the urban grid as one of the determining factors.[119] He thus calculates the percentage of doorways on each side of *insula* blocks in proportion to their length, as a means of determining the *insula*'s dominant facades. He then examines the prevailing location of dominant facades, and in most instances establishes a directional focus towards the access routes leading from the city gates to the centre. Laurence takes this pattern as indication that 'the social relationship to cause the Pompeian spatial configuration was the relationship between inhabitant and people from outside the city'.[120] Other areas however seemed to be affected by a different social relationship; hence Laurence tries to identify the variables which were generating these different patterns. He concentrates on Regions VI and VII, where no clear directional focus could be identified. These regions are near the *forum*, where centrality might play a role, and also the areas have quite different street plans: a regular orthogonal grid defines Region VI, while Region VII has a highly irregular street arrangement. After having assessed the street pattern and the position within the urban grid, Laurence concludes that these are only partially determinate.[121] Hence the question of what was generating this pattern was not fully answered. Consequently he expands his search and turns to the internal structuring of the *insula* blocks to examine whether this would have been another factor influencing Pompeii's spatial configuration. Therefore Laurence seeks a methodology which takes the street patterns as well as the internal structuring of *insulae* blocks into account. By way of demonstration, giving a single example, he applies Space Syntax's Access Analysis to a house-plan.[122] This method of analysis allows him to translate two-dimensional house-plans into relational graphs, whereby all spaces within the structure (building) are defined and justified with regard to the exterior. That is, the study looks at the spatial structure of houses adjoining the streets from the point of view of a person in the street.[123] These so-called j-graphs (justified graph) while being a visual aid to identify structural relationships, also offer Laurence a means of quantitative assessment, based on the calculation of numerical indicators for all spaces within a

116. For critical comments on Laurence's approach see Heinrich (2000), Ulrich (1997), Foss (1996), Small (1996), George (1995), Tanner (1995) and Walthew (1996) for a chapter-by-chapter outline of Laurence (1994).
117. Foss (1996: 352), George (1995).
118. Laurence (1994: 104) and (2007: 117) respectively.
119. See Hillier's (1996b: 149; 2007: 111-137) chapter 4 on cities as movement economies with new insights into the structure of urban grids and the way these structures relate to urban function. See also Hillier and Penn *et al*. (1993) formulating the 'Movement Economy of Cities', claiming that the urban grid itself is the main generator of patterns of movement.
120. Laurence (2007: 122); and (1994: 102) respectively.
121. It seems that there are methodological problems since Laurence worked with one data set, and hence created a circular argument. An independent analysis of the street grid and an independent analysis of the land-use along those streets would lead to two datasets which could then be compared.
122. Laurence (2007: 126-131; 1994: 115-119); the House of the Vettii is used to demonstrate access analysis. See George (1995) for an instructive summary of Laurence's approach; see Hillier and Hanson (1984: 143-241); see Bafna (2003), for a short and more accessible introduction to Space Syntax, see also the section on Space Syntax and Archaeology in Chapter Three of this thesis.
123. Laurence (2007: 127).

given spatial configuration. In turn these numerical results provide a basis for measuring the degree of integration (or separation) between the street and a building within an *insula*. From these statistical results Laurence attempts to reach conclusions concerning the spatial logic through the patterns of doorway occurrence at Pompeii. He detects a system of inverse relationships between the number of doorways and the degree of integration or segregation of buildings and the street front: low occurrence of doors goes along with buildings spatially segregated from the street, while a high occurrence of doors points to shallow buildings, integrated with the street front. These relationships also correlate with property size; lower occurrence of doors reflects larger plot-sizes. Thus Laurence establishes that the properties in Region 6 were considerably larger than in Region 7. In addition, in Region 7 more properties are found that lacked depth, thus these buildings were directly integrated with the street. Finally, his analysis leads him to conclude that property can only be separated from the street in areas where the density of use is not very high. Thus, Region 7 (east of the *forum*) is shown to be a unique locus in the town and one of particularly intense activity, because of which there was pressure to use street frontage to maximum effect.[124] Laurence concludes that the spatial logic that generates patterns in Pompeii stems from the amount of activity and the density of development in an area.[125] Hence these findings conform very well to the principles of the movement economy as defined by Hillier.[126]

2.4.4 What can be learnt from Laurence's encounter with space?

Regrettably Laurence explains his methodological approach very briefly and only in terms specific to Space Syntax, which tends to alienate less space-inclined readers. This has been clearly expressed in various critical reactions to Laurence's 1st edition; the 2007 publication acerbates further this general dissatisfaction. The 2nd edition still fails to supplement the lack of theoretical explications concerning Space Syntax and does not add any substantial information to communicate better the results of the analysis, let alone to explain the inferred social meaning. Sadly, Laurence's use of Space Syntax does not serve spatial theory too well, but rather leaves even the most sympathetic reader with a good deal of apprehension, fearing that the spatial methods applied might have even narrowed the interpretive scope of an otherwise wider contextual analysis. One wonders whether those factors which Laurence vaguely identifies as the generative source of a 'social logic', were actually not a cause but a consequence of other, often unseen and unexamined, social and spatial processes.[127]

It is tempting to suggest that if Laurence had gone all the way and had detached his spatial analysis completely from Pompeii's social and cultural context, and had designed his study as a purely theoretical exercise to test the method, it might have proved spatial analysis more useful. By the same token, Laurence's conclusions concerning Pompeii's social meaning could have gained from a more experimental and explorative approach testing a wider range of spatial determinants. Above all his study of activity related to street fronts would have benefited from a syntactical analysis of the street network, which would have enabled him to compare his results against activity patterns generated by the street network itself. A combined syntactical analysis integrating Access Analysis and a connectivity analysis would have still allowed him to confront his results with what has been established through archaeological and historical analysis. Instead Laurence presents an ill-defined approach somewhere in between, neither embracing the full complexity of Space Syntax theory nor engaging sufficiently with the cultural and archaeological context of the areas studied.

Furthermore, the way in which Laurence's study is presented does not allow for a proper assessment based on the results of his spatial analysis. Firstly he does not make the analysis data available, and secondly he does not offer good enough maps to enable the reader to examine the validity of the study's results. Interestingly enough, although numerous

124. Laurence (2007: 130-133).
125. Laurence (2007: 132) and (1994: 121) respectively.
126. See Chapters Seven and Eight in this study on Ostia's streets and land-use related to the streets.
127. Cf. Soja (2001: 1.3).

schematic maps and tables supplement Laurence's text, both editions fail to provide a detailed map of Pompeii. Thus the individual buildings composing *insulae*, whose spatial configurations are analysed in chapter seven, remain topographically unreferenced unless one is to consult better-illustrated books on Pompeii. The same applies to the numerous streets, which are constantly referred to with regard to occurrence of door openings; again no single map provides information on the location of those streets.

Repeating again what has been said against Laurence's use of formal spatial analysis is not meant to suggest that there is no value in such an effort. Laurence started off with the initial claim that the underlying social structure of Pompeii can be analysed through a study of its urban space.[128] He devotedly took on the task of demonstrating how urban space can be analysed and succeeded in identifying possible factors which might have played a role in generating social activity. Despite all the shortcomings, his pioneering work has proved to be highly influential and gave rise to a number of new studies engaging with Pompeii's urban space and Space Syntax techniques. Grahame's study follows in Laurence's footsteps, although in a more rigorous way.[129] Anderson's work combines methods of GIS and Space Syntax to attempt a functional account of Pompeian domestic space, by revealing the functional uses of architectural space and the social relationships patterned by those spaces.[130]

So far, four different social approaches to Pompeian urban space have been examined, each looking at the city's spatial organisation from a new perspective, applying a different resolution, from individual houses to neighbourhoods and streets, and finally to the entire city as a unit of study. The last assessment presented here concerns Kaiser's analysis of the use of space in the Roman city of Empúries, Spain. However, before leaving Pompeii we should draw our attention to the work which builds the bridge between studies of urban space in Pompeii and Kaiser's work in Empúries. The connection between these studies has its origins in a thesis of the 1970s when Richard Raper, then a geography student, conducted his analysis of the urban structure of Pompeii based on a socio-economic examination of land-use.[131]

2.5 RAPER: THESIS AND ITS IMPACT

Raper cast his eye on Pompeii in the 1970s. Slightly earlier, systematic research had already started with Eschebach's town plan, providing information on the function of each Pompeian building, categorised into 12 classifications of land use. Raper, realising the analytical potential of Pompeii's intact site plan combined with an already established classification of land use, set out to study the urban structure of Pompeii through the function of all buildings across the site. His work is credited as being the turning point in the development of urban research in Pompeii.[132] Raper's techniques found little following, but his conclusions gained wide acceptance for Roman urban sites.[133]

2.5.1 Raper's legacy

A brief outline of Raper's methodology is presented in the next subsection.[134] This is done because Raper's method is part and parcel of his conclusions and in this way has specific significance for Kaiser's 'Urban Dialogue'. Consequently, Kaiser not only challenges Raper's conclusions but critically examines the technical aspects of Raper's approach to demonstrate that Raper's method was not suited for identifying the patterns of urban structure he had initially attempted to seek. As a result, Kaiser modifies and extends Raper's techniques for his own analysis of urban space in Empúries.[135]

128. Laurence (1994: 19; 2007: 19).
129. Grahame (2000).
130. Anderson (2005: 146); see also Fridell Antler and Weilguni's preliminary analysis of Pompeii's networks of streets, applying Space Syntax to investigate the method's analytical ability, and to analyse the potential for movement and social activities within Pompeii's public space (2003: 31-39); see also van Nes (2009).
131. Raper (1977: 189-221).
132. Robinson (1997: 135); Kaiser (2000: 8).
133. Kaiser (2000: 7).
134. Raper (1977: 207-208, figs. 4, 5a and 5b, tables 1-2); Kaiser (2000: 42).
135. Goodman (2001: 6).

Raper's work is synonymous with the straightforwardness of his analytical techniques and the apparent logic of his conclusions. While his methodological approach gained admiration for being innovative and scientific, the value of his theoretical argument appears less appreciated. Thus before looking at Raper's methodology, and to slightly redress the balance, the initial argument of his analysis should be reiterated. Raper wrote: "*In the analysis of land use for Pompeii, the contention is that the distribution of man over space is not haphazard but that man locates by the social activities he creates and sustains through culture.*"[136] Hence Raper's approach to Pompeii's town plan suggests a socio-cultural bias, and the method devised was a test for the clustering or dispersion of structures over urban space occasioned by social/cultural factors.

Raper employed a grid of uniform size, placed over the study area to count the frequency of objects of interest within each grid cell. The data-set comes from Pompeii's town plan and Eschebach's earlier achieved land-use analysis. Taking advantage of Eschebach's map, in which one of the 12 designated categories of land use was assigned to every excavated space in the city, Raper placed a grid over Eschebach's map, dividing the site into regular squares corresponding to 100 x 100 m on the ground at Pompeii. To further increase resolution he placed an overlay equivalent to one of the 100 x 100 m squares and subdivided the superimposed grid into squares each representing 1 sqm on the ground. This enabled him to record all categories of land use present within the 100 x 100 m square. Counting the number of squares with the same use enabled him to obtain percentile land use data. To arrive at data for the entire city he summed-up the percentages per grid which he then divided by the total number of grids needed to cover all Pompeii. Only 39 squares are representative of the city as the excavated sample had to exceed 70 % to qualify for analysis.[137] Each category of land use in turn could be isolated, and its distribution and relationships studied. By looking for the degree of variation from the mean distribution of each land use category, Raper established that there was no significant variation in land use in most parts of the city. Thus he concluded that there was no evidence for patterning, excluding the noted exception of a concentration of public buildings around the *forum* and clustered commercial use along access roads. Raper's results suggest that Pompeii's urban land use was consistent in its diversification, with no evidence for structuring.[138] Raper's conclusion is an expression of absolute confidence in his method of analysis, even more so since he had actually expected space to be structured according to social factors as his foundational statement betrays. Kaiser rightly calls Raper's conclusions 'contra-intuitive',[139] and not only seriously questions them but takes on the challenge to disprove them as we shall see in the following section.

136. Raper (1977: 201).
137. Raper (1977: 208).

2.6 KAISER: THE URBAN DIALOGUE

The approaches to the Roman city discussed above concentrate on the extensive remains of Pompeii, and, with the exception of Zanker's work, all make use of strong data sets applying statistical analysis. Outside Pompeii, such intensive studies have been less easy to pursue, since few other Roman cities are as fully-preserved or extensively excavated.[140] Thus Kaiser's work on Empúries is a powerful case study to demonstrate that other ancient cities besides Pompeii are able of providing suitable data for statistical analysis, and in this sense the study has specific significance for similar work in Ostia. At the same time, the advances made in Pompeian research have been most beneficial to our general understanding of all Roman cities and have influenced and inspired research in other Roman sites, such as Kaiser's study of Roman Empúries.[141]

Kaiser's 'Urban Dialogue' perceives the Roman city as a social phenomenon. His attention turns to the site of Empúries (Roman Emporiae) to examine the city's built environment as an expression of Roman

138. Raper (1977: 216-217); Kaiser (2000: 42).
139. Kaiser (2000: 2).
140. See Goodman's review (2001: 4) of Kaiser (2000).
141. Empúries is located on the Spanish Mediterranean coast, about 100 km north of Barcelona and about 50 km south of the French border. Empúries is the Catalan spelling for the name of the site, it is also known by the Castilian Spanish name of 'Ampurias', see Kaiser (2000: 2).

urbanism. By means of an intensive analysis of the arrangement of space, applying GIS-based statistical analysis, Kaiser seeks to gain an understanding of the city's underlying social meaning as it was experienced by ancient inhabitants and visitors. As suggested by Goodman, perhaps Laurence's data-driven approach to Pompeii has been most significant for the genesis of Kaiser's work in Empúries.[142] Both works draw on Space Syntax, and both rely on the combined evidence of written sources and the past built environment. Both studies argue that urban space was deliberately arranged to reflect and reproduce a Roman social system. However, Kaiser makes a specific case and sets out to contest the so-called Raper thesis. The latter claims that Roman urban space was largely unstructured. Following its acceptance for Pompeii, Raper's thesis was projected to other Roman urban sites and became the paradigm for the use of space in Roman cities.

Kaiser understands Roman society to be very hierarchical and finds it is difficult to accept that in a society where even a seat in a theatre was charged with social meaning the location of buildings and activities within a city could be devoid of meaning.[143] Kaiser claims that the only way to effectively challenge Raper's conclusion is by conducting a similar analysis at another Roman city. At the same time Kaiser had to acknowledge that as far as Pompeii was concerned, Robinson's study of the Pompeian elite domus had already partly disproved Raper's conclusions.[144] Thus moving away from Pompeii and Herculaneum, the traditional focal point for developing models of Roman urbanism, allowed Kaiser to gain a fresh perspective.[145]

2.6.1 Empúries - a case study for spatial analysis

The site of Empúries consists of three interlinked centres of activity. The city started as a Greek trading settlement (Palaiapolis), founded in the sixth century BC, on a small island just off-shore. Quickly the settlement spread to the mainland (Neapolis). During the Second Punic War the Greek city was an important base for Roman military activity and the Roman military fort, built west of the Greek settlement, grew into a Roman city. By the beginning of the first century AD the Roman and Greek parts were combined, destroying the walls that separated them. After a brief period of prosperity, the city quickly declined and much of it was abandoned at the end of the first century AD,[146] never to be reoccupied, while the original Greek trading post (Palaiapolis) has remained occupied up to the present day.[147]

Empúries proves to be a well-suited choice for an investigation into Roman urban space. Firstly, the site's early yet final abandonment preserves it in its first century AD form. Auspiciously, early excavators in the joint Greek-Roman sections decided not to remove the first-century AD layers, despite their keen interest in earlier phases. Thus all visible buildings and streets of Empúries are closely contemporary, and can meaningfully be studied as a group.[148] Secondly, the site has been subject to almost continuous professional excavation throughout the twentieth century, producing excellent stratigraphic records. Almost the entire mainland Greek settlement (Neapolis) and around ten percent of the adjoining regularly-planned Roman city have been uncovered. Above all, the completeness of the plan of Neapolis makes it very well suited for investigating the distribution of different structures across the city.[149]

2.6.2 Kaiser's advanced methodology

In line with Zanker, Wallace-Hadrill, Grahame and Laurence, Kaiser's study examined the use of space to identify insights into the social system that created the urban form of the past city. Other than these earlier Pompeian studies of urban space, Kaiser pioneers GIS techniques to examine intra-site

142. Goodman (2001: 4).
143. Kaiser (2000: 2); in support of his argument Kaiser refers to a number of ancient sources which recount incidents of conflict in theatres when these customs of restricted seating were challenged and subverted (Juv. i.147; Mart. ii.29; Suet. Aug. xiv).
144. Robinson (1997: 143).
145. Kaiser (2000: 2).
146. A possible explanation for the decline could be that the Emperor Vespasian's extension of Roman rights, previously enjoyed only by the few selected *municipia*, to all towns in Spain, led to an erosion of Empúries's special status (Kaiser 2000: 14).
147. Kaiser (2000: 2).
148. Goodman (2001: 5); Kaiser (2000: 15).
149. Goodman (2001: 5).

social phenomena. Kaiser turned to enhanced and alternative techniques, better suited to identify the more subtle patterns of the use of space at Empúries. His analysis concentrates on patterns for dispersion or clustering of buildings of similar use, the nature of streets, as well as visibility, to examine whether these factors played a role in the distribution of land-use.

Unlike Raper, Kaiser could not avail himself of land-use data already established, thus prior to his analysis he had to group the different elements of Empúries's urban fabric into categories. He based his categories on the usage of space rather than building typologies, relying on function rather than form. This allowed him to group the distribution of buildings with similar function together and compare across the site. Any system of categories implies problems of lumping or splitting. To overcome these technical hitches Kaiser assigned four levels of use to each space (internal or external), moving hierarchically from general (public vs. private) to specific (storage, dining).[150] In selecting his own categories, Kaiser followed the structure of Vitruvius' 10 books, dedicated to different genres (types of architecture, materials, rendering etc.). According to Kaiser the internal order of the books reveals much about how Vitruvius and presumably other Romans mentally categorized uses of urban space.[151] Hence Kaiser presumes that these categories should be reflected in the spatial organisation of the city. His hypothesis is that there should be meaningful patterns in the distribution of structures across the site and that these intra-site patterns are meant to represent the underlying 'social structure' of Emporitan urban society.[152]

Having defined his categories, Kaiser created a referential database of the structures at Empúries, assigning functions to them, and linking the database to a digital site plan.[153] Using GIS programmes, which are still rarely applied to urban sites of the Classical period, allowed him to process and to manipulate his data. Similar to Raper's grid analysis, Kaiser used 'quadrat analysis' for measuring associations between structures of a similar function.[154] Quadrat analysis gave him the advantage of using point data, a simpler method than the area data used by Raper.[155] This type of analysis was undertaken for Neapolis only, since only this part of the site is almost completely excavated.[156] A further modification to Raper's approach concerned the applied grid size.[157] This was necessary since weak patterns can be obscured when the size of the grid cell is too large, while strong patterns can be weakened by fragmentation when grid cells are too small.[158] In any case, according to Kaiser, Raper's 100-m square grid was too large and had no relevance to ancient Pompeian spatial concepts. Within Raper's grid each square covers a number of *insulae*, therefore variation within individual *insulae* would not be detected. For this reason Kaiser selected his grid size by averaging the areas of each of the *insulae* in Neapolis, producing a 30 x 30 m grid.[159] Still, this adapted grid posed an arbitrary placement without correspondence to any particular *insulae*, thus Kaiser used the *insulae* themselves as units of measurement for a second run of quadrat analysis. With the help of these modified techniques Kaiser was in fact able to identify patterns in the use of space, most notably that no *insula* contained more than one elite house, and that these houses were consistently divided from one another by non-elite houses and streets,[160] suggesting that *insula*-blocks played a role in the

150. Kaiser (2000: 18-21).
151. Kaiser (2000: 19).
152. Kaiser (2000: 18).
153. Kaiser used the database module available in the GIS programme Idrisi 2.0 for Windows. He created an individual entry for each space, recording the space's categories of use following his designed hierarchy of use. The complete database contained 1050 individual entries (2000: 18-19).
154. See Shennan for general principles of quantitive approaches to archaeological data, see especially chapter 7 on the Chi-Squared Test and Measures of Association (1997: 104-106).
155. See Kaiser (2000: 43) for a detailed description of quadrat analysis.
156. Kaiser (2000: 43) accepts that not enough of the Roman city has been excavated to make this type of analysis feasible.
157. See above 2.5.1 for a description of Raper's techniques to measure spatial distribution.
158. Kaiser (2000: 42) draws on observations made for Roman Silchester (Bates 1983); Bates' study also found Raper's methods inappropriate to detect ancient patterns.
159. Kaiser (2000: 43).
160. Goodman (2001: 6); cf. Robinson (1997) identified a spatial patterning in the distribution of elite houses in Pompeii and argued that they were separated from another, perhaps indicating that the elite houses controlled the neighbourhoods directly surrounding them.

organisation of space at the site.[161]

Kaiser's urban dialogue continued by examining the nature of the streets. In this way it opens up new perspectives for analysis, shifting the focus from the physical form of the built environment to spaces for movement and interaction. Kaiser investigated various aspects of the street network, such as the degree of orthogonal planning, the width of streets, accessibility from outside the city, the proportion of different structures fronting onto them, and the degree of intensity of social interaction along them.[162] The techniques employed reach from circuit analysis, comparing observed and expected values of different categories of land-use located along street fronts,[163] to Space Syntax methods.[164] Finally, Kaiser applied GIS to calculate the area visible from a given point in order to model the visual field which can be commanded from various vantage points in relation to buildings and public space. The central question which Kaiser aimed to answer was whether or not buildings destined for similar uses were positioned along streets with comparable attributes and descriptive statistics. In cases were associations existed, Kaiser assumed that the particular variable being measured had significance to the ancient inhabitants and that it influenced the selection of a certain street as the location for a structure with a particular use.[165]

2.6.3 The 'Urban Dialogue' and Space Syntax

Kaiser's use of Space Syntax statistics is of great interest to this study of Ostia. The successful application to the built urban environment of Empúries makes these tools even more promising for investigating Ostia's urban space. Kaiser's approach integrates a number of Space Syntax's statistical methods. These methods were developed within the framework of Space Syntax theory, and first formulated in Hillier's and Hanson's *The Social Logic of Space*. The theory conceives built space as being determined by two kinds of relationships: the interaction among the occupants (insiders) and between occupants and outsiders.[166] This duality represents a relationship of inequality, which confers 'social power' on built space by way of including or excluding people from certain spaces. Space Syntax acknowledges that architecture is imbued with social power, whereby the integration-segregation dimension emerges as the primary spatial dimension on which cities, or buildings. are organised. Aspects of the integration-segregation dimension have been at the core of the studies previously discussed, explored as private and public spheres in Wallace-Hadrill's approach, or the visitor/residents dynamic in Laurence. Space Syntax developed methods of describing and analysing space in such a way as to make its social origins and consequences a part of that description.[167] Thus relations between these two points of view (insider vs. outsider) can be investigated by analysing spatial interaction both from points inside the system and from outside.[168] Social norms thus are thought to be transferred into the organisation of space; and, as Kaiser and other proponents of Space Syntax claim, by deciphering the patterns of inclusion and exclusion one can begin to understand the underlying social system.[169]

Kaiser started with 'Depth' analysis, which describes and calculates statistical values for urban street networks by counting the number of streets one needs to pass along to reach a destination from any point of origin.[170] This method helps to describe the streets in terms of their implicit resident-to-resident and resident-to-non-resident relations and thus might reveal attitudes between them. Starting from outside the city any street which would be easy to reach has a low depth, while streets with a high depth would have required a number of streets to be passed along before reaching the street of destination. Therefore interaction with non-residents takes place at well integrated places of shallow depth, while those buildings or places the residents did not want

161. Kaiser (2000: 45-46).
162. Goodman (2001: 7).
163. Kaiser (2000: 47-48, 76 appendix D).
164. Kaiser (2000: 48-53).
165. Kaiser (2000: 47).
166. Hillier and Hanson (1984: 15).
167. Hillier and Hanson (1984: 82).
168. Hillier and Hanson (1984: 15-16).
169. Kaiser (2000: 8).
170. Hillier and Hanson (1984: 104).

outsiders to find, would have been located along streets with higher depths.[171] Having established the depth values for the streets, Kaiser correlated these with the results of his previous analysis concerning the distribution of different categories of land-use along street fronts.[172] To increase the significance of his statistics he further included Space Syntax's test for 'real relative asymmetry', which calculates how integrated or segregated a particular street is from the rest of all streets within the network.[173] These results were again correlated with the various land-uses located along the street-fronts. Yet another test was added, the so-called E-value or 'control statistic', a method for testing how much a street controls access to other streets.[174] This test is rooted in the principle that a road which is intersected by many other roads, is more likely to be travelled on as it facilitates movement to many destinations. Hence control statistics describe whether or not a street eases or impedes movement within the city. Once again Kaiser compared the results of the control statistics to the locations of the categories of land-use, and identified a strong correlation between commercial use and streets with high control values. Kaiser's results seem to conform to the principles of the 'movement economy', which are central to Space Syntax and will be discussed in more detail in our Chapter Six (on streets). In any case, one of the most consistent relationships in urban systems is the one between the degree of integration of a street and the amount of pedestrian movement carried by that street: the more integrated the street, the busier it will be, and the more segregated it is the quieter it will be.[175]

Through these various investigations Kaiser reveals a number of interesting correspondences between the nature of a street and the function of the buildings located along its frontage. Some of Kaiser's conclusions confirm principles of Roman spatial organisation which are already established, while others offer new insights. Although not surprising, but interesting in terms of the combined statistical back-up, Kaiser establishes that a concentration of public, religious and commercial spaces were located on streets that had characteristics that made them easily accessible from the outside, and at the same time they were highly integrated thus also easily accessible from the inside. These streets also had high control values, indicating that they were central to movement. In terms of private domestic buildings he could establish that these were located at a medium depth, not too deep as to be difficult to reach and not too shallow as to have been easily accessible from outside. In term of elite buildings Kaiser's analysis could ascertain that they were also located along streets where there was a higher degree of social activity; however, although these residences are found on streets with mid-range depth, they remained generally inaccessible to wheeled transport. Industrial use was generally located along less integrated streets suggesting that ease of transport was no priority for selecting these locations.

Clearly Kaiser's study was able to demonstrate that space in the Roman city of Empúries was highly structured. The definition of new patterns was above all a question of applying appropriate methodologies. By means of Kaiser's combined analysis, urban patterns emerged and these patterns have been interpreted as representing the social norm of the constituents of the city. Kaiser stresses that the physical forms which resulted from these social norms were the consequences of a dialogue between all constituents who used the city. These include the elite, the non-elite, the non-residents and the divine constituents. Thus much of urban space seems to be organised in lines of communication, not simply in terms of clustering.

2.6.4 The extended 'Urban Dialogue'

The real test for Kaiser's methods and results will be once they can be matched at other Roman urban sites.[176] Roman Delos might be a potential candidate owing to the good quality of its site maps and

171. Kaiser (2000: 48).
172. Kaiser (2000: 48-49).
173. Kaiser (2000: 49-53); see Hillier and Hanson (1984: 108-112).
174. Kaiser (2000: 52-53); see Hillier and Hanson (1984: 109).
175. Hillier (1996a), see also Conroy Dalton and Hanson (2010: 208).
176. See Goodman's review of Kaiser (2001: 7).

archaeological record.[177] Roman Ostia is certainly another applicant for testing a selected number of Kaiser's techniques. Still, Ostia might prove to be difficult since its excavated area covers only one third of the site. In addition, Ostia's long period of occupation makes it almost impossible to establish contemporary structural relationships over the entire site for any one period of its use. Hence Space Syntax methods need to be adapted to the specific problems of the site, and also to the research questions one wants to investigate. Furthermore, Kaiser's categories of land-use seem to be problematic, as his own analysis has shown. They might not be transferrable to other sites, but need adaptation to meet the specific character of other cities. Any form of 'categorisation' is inevitable open to debate: Kaiser's categories reflect a number of inconsistencies and do not account for dual or multi-purpose use of space.[178] This might be one of the reasons why his tests could not produce valuable statistics when trying to identify patterns in the location of space devoted to administrative, educational, and entertainment functions. These problems are related to the weak definition of such spaces and the resulting difficulty in identifying them in the archaeological record. In contrast, other land-use categories such as public use and commercial use produced the strongest and most consistent patterns, and conform to spatial patterns known from other Roman cities, where commercial and public use are also found mainly along the most important access roads leading into the city.

Admittedly, these patterns confirm those detected earlier by Raper in Pompeii. This simple fact would have allowed Kaiser for once to give credit to Raper's work. Kaiser fails to acknowledge Raper's pioneering efforts and does not take into consideration that his thesis was conducted as long as 30 years ago, primarily as a spatial exercise applying methods of modern urban geography to ancient cities. Raper's article forms part of a published volume representing work within the interest of David Clarke's version of New Archaeology.[179] Bringing together several spatial studies at particular scales and in particular contexts, the volume sought to stimulate new directions in interdisciplinary approaches, injecting ideas from New Geography into New Archaeology. Considering the unassuming circumstances of Raper's work, hinging Kaiser's Urban Dialogue explicitly on Raper's thesis of 30 years back appears out of proportion. By posing such a challenge to Raper's thesis Kaiser unnecessarily diminishes his own efforts.

Nevertheless, some of Kaiser's methods should be tested in Ostia. Ostia's guild seats (*scholae*) and their location within the street network would certainly benefit from gauging their location in terms of depth and integration considered from within the city and from outside. However, while the spatial principles still apply, Space Syntax analytical tools have advanced since Kaiser's work,[180] as will be shown in Chapters Six, Seven and Eight of this study, where Space Syntax software for spatial analysis has been applied to Ostia's built and non-built environment.

2.7 CONCLUDING REMARKS

Three of the discussed studies have been guided in their spatial investigations by Space Syntax theory and methods. The merits of the methods as well as the difficulties of applying the techniques to past urban space have been extensively discussed and illustrated. In sum, however, the advantages offered by a more rigorous, analysis-driven approach to past built space seem to outweigh the difficulties which arise when a methodology is followed which has its origin in empirical studies of today's urban environment. When applied with caution, Space Syntax methods and techniques can lead to new insights into the past urban space which would not have been available by archaeological investigation only. To gain a better insight into Space Syntax methods and theories the following chapter will introduce the main theoretical principles, and look briefly into a number of other archaeological case studies applying Space Syntax.

177. Trümper (1998).
178. Goodman (2001).
179. Clarke (1977) published posthumously; see also Hodder's preface to Clarke (1977).

180. Kaiser's 2011 publication on Roman streets was not available to the author when this chapter was written.

3 – Space Syntax and Archaeology

This chapter introduces the main principles of Space Syntax, its theory and methods, with the intention of providing the conceptual framework for the spatial approach followed by this study. Space Syntax has enjoyed a lasting, steadily growing popularity within archaeology, reflecting and responding to the 'spatial turn' in social science. Within the domain of Space Syntax, archaeology and its research interest in humans and their spatial framework did not remain unnoticed. In the eyes of Space Syntax archaeology holds an exceptional position within the humanities since it is more concerned with 'real space' than all the other disciplines within the social sciences. Space Syntax perceives archaeology as an inherently spatial discipline, with an interest in space deeply rooted in archaeological traditions and constantly renewed through archaeological practice.[1]

Before introducing the methods and theories of Space Syntax, some earlier thoughts on the relationship between society and the built environment will be addressed. This is followed by a brief review of the links between structuralism and Space Syntax. Next, Space Syntax's own theoretical domain will be described, as well as its methodological framework. Finally, a short summary of archaeological studies applying Space Syntax will be presented.

3.1 THE RELATIONSHIP BETWEEN SOCIETY AND THE BUILT ENVIRONMENT

Academic interest in built space and an anthropological awareness of its significance developed already in the 19th century, when theories of cultural evolution were first formalised. Ever since then, the question about the nature of the relationship between society and the built environment has remained a persistent issue.[2] Over the years the discussion on built space has assigned varying degrees of importance either to the role of the individual or the social context. Explanations ranging from environmental determinism via ecological factors to social evolution have been made use of to describe or to explain how and why people live as they do, or lived as they did in the past.[3] The relationship between society and the built environment has been conceptualised by using a range of formulations: accommodation, adaptation, expression, presentation, and more recently production, reproduction and configuration.[4] Each represents a distinct theoretical perspective and is concerned with its own set of questions. However, despite their diverging approaches most theories agree that from the way people construct, organise and even furnish their living space, inferences can be made regarding the social, cultural, political or symbolic structures which had been informing the spatial responses or choices.[5]

3.2 SPACE SYNTAX AND STRUCTURALISM

The theoretical basis for Space Syntax is partly rooted within structuralism, one of the most consistently developed theoretical approaches which have been adopted in the symbolic analysis of the built environment. Symbolic approaches understand the built environment as an expression of culturally shared mental structures and processes. Hence symbolic explanations often rest on demonstrating how the built environment corresponds to ideal

1. See Hillier (2008a: 223).

2. See Lawrence and Low (1990) for a critical review of research areas, theoretical approaches and literature contributing to the debate on human building activity and society.
3. Cutting (2003: 1-2).
4. Lawrence and Low (1990: 454).
5. Cutting (2003, 3); see also Lawrence and Low (1990: 454).

conceptions of social, political and religious life.[6] Structuralist approaches in particular postulate the existence of an underlying unconscious mental structure combined of binary oppositions that represent universal characteristics of human thought.[7] According to structuralist theory, these unconscious mental structures have the power to generate patterned cultural behaviour. Moreover, the capacity to form patterns is also imparted to space.[8] Space Syntax includes the pattern of spatial inclusion and exclusion into its theoretical framework. However, although Hillier and Hanson agree with the principal ordering aspects of structuralist theories, they recognise other flaws within these approaches to space. They dismiss structuralist anthropologists as being predominantly concerned with 'obvious' cases where a built environment can be identified almost as a projective representation of the social structure of society.[9] Furthermore they disapprove of structuralists for studying space as an external projection of social and mental processes and therefore turning space into a 'by-product of something else and not in itself', which denies space its autonomy.[10]

From these points of critique Hillier and Hanson take the discussion to the level of their own theory building, specifying the requirements a theory of space needs to fulfil: first of all it needs to establish a descriptive autonomy for space. That means spatial patterns must be described and analysed in their own terms prior to any assumption. Furthermore, the theory should account for wide and fundamental variations in morphological type. Finally, a suitable theory must explain basic differences in the ways space fits into the rest of the social system. Hillier and Hanson assert that a theory needs to be open and flexible enough to describe not only systems with fundamental morphological divergences, but also systems which vary from non-order to order, and from non-meaning to meaning.[11] Having set out the parameters required for a suitable theory, Hillier and Hanson devise their own conceptual framework, formulated as the 'Social Logic of Space'. The complete approach is known as Space Syntax and combines theory and method directly concerned with the relationship between society and its architectural and urban forms.

3.3 SPACE SYNTAX'S THEORETICAL FRAMEWORK

Space Syntax takes its starting point from two formal ideas which try to reflect both the objectivity of space and our intuitive engagement with it:[12] space is considered to be an intrinsic aspect of all human activity, and human space is not about the properties of individual space, but the 'configuration of space'. The latter is a concept specific to Space Syntax stressing the simultaneously existing relations of discrete units or parts which make up the whole layout of space of a building or a city. The configuration of space is the means by which space acquires social significance and has social consequences. Depending on the point of view within the layout, the spatial configurations of any building or settlement changes accordingly. Thus, the way in which spaces are linked together affects how people move through and use those spaces.[13] Within any configuration the constituent spaces can be integrated or segregated, depending on the degree to which one must pass through other spaces to go from a particular space to all others.

The social implications of a spatial configuration might best be explained using Bafta's example of boundaries.[14] He reminds us that boundaries create specific spatial relationships of access or visibility among the component spaces; in return these spaces

6. Lawrence and Low (1990: 466); Rykwert (1964) and the much earlier work by Fustel de Coulange (1874) relate to the city as a reflection of religious beliefs, whereby all aspects of city life were dictated by respect for the sanctity of the city, see Fustel del Coulange (1956: 11, 127).
7. First and foremost Levi-Strauss (1963); see Lawrence and Low (1990: 467) for an overview of the theoretical development and various influences.
8. Lawrence and Low (1990: 468); Hillier and Hanson (1984: 5).
9. A 'textbook' example would be a chiefdom society with clearly distinct dwellings according to social rank.
10. Hillier and Hanson (1984: 5).
11. Hillier and Hanson (1984: 5).
12. See Hillier and Vaughan (2007: 207) for an introduction to Space Syntax written for a social science audience.
13. Cutting (2003: 3).
14. Bafta (2003: 18).

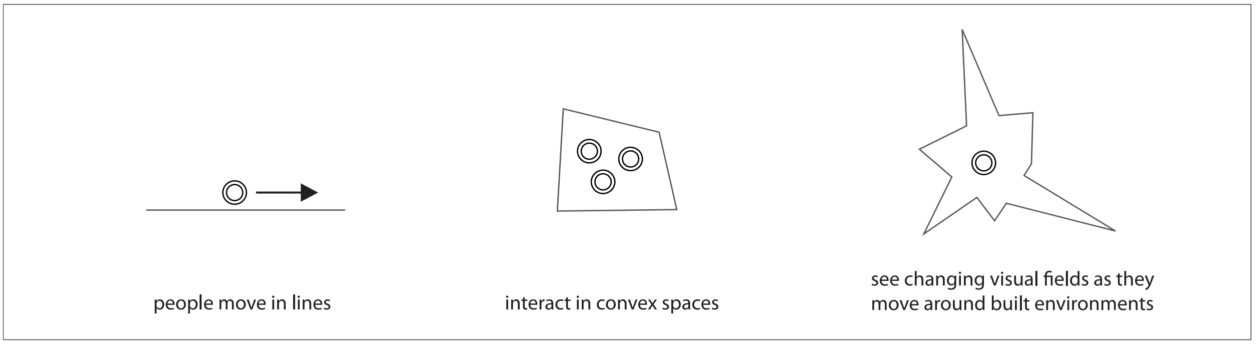


Fig. 3.1 – The ' Human Geometry of Space Syntax': moving through space, interacting with people, or just seeing ambient space, all having a natural and necessary geometry (source Hillier and Vaughan 2007)

generate patterns of movement and encounter. Thus boundaries have an effect on both society and spatial configuration. He adds that certain spatial components within the configuration will offer a higher rate of unplanned encounter (integrated spaces) and others a higher rate of privacy (segregated spaces). Bafta contends that the spatial privileges held by certain members of society, and denied to others, create and maintain levels of social hierarchy and control. Hence built space not only passively expresses social processes but actively directs and shapes those activities which are concerned with social interaction and with controlling behaviour in host-guest or insider-outsider relations.[15] Thus the configuration of inhabited space has a fundamentally social logic, and at the same time social structure is inherently spatial.[16]

3.3.1 Concepts and techniques of Space Syntax

Space Syntax is a collective term for theoretical and analytical techniques to identify, compare, and interpret patterns of spatial configuration. It was pioneered by the architectural and urban morphologists Bill Hillier and Julienne Hanson in the late 1970s and further developed by them and their colleagues at the Bartlett School of Architecture at University College London.

Initially theory and techniques were conceived as planning tools to help architects to simulate the likely social effects of their designs. Space Syntax has been extensively applied in the fields of architecture, urban design, planning, transportation and interior design. Over the past decades, Space Syntax techniques have also been used for research in fields as diverse as anthropology, information technology, urban and human geography, and archaeology.

Just as theory and techniques have been inseparably intertwined from the very beginning, the study of space manifests itself through worked application. From its start the objective of Space Syntax has been to develop strategies of description for configured spaces, ranging from individual buildings, via built complexes to small-scale and large-scale settlements, in such a way that their underlying social structure can be exposed.[17]

Space Syntax regards all human activity as being anchored in spatial geometry (Fig. 3.1): movement is linear, interaction requires a convex space in which all points can see all others, and from any point in space we see a variably shaped visual field, called an *Isovist*.[18] Accordingly Space Syntax's quantitative techniques include axial line analysis, convex spatial analysis and convex *Isovist* analysis. The key to such a description and subsequent analysis was the recognition that the sociologically relevant aspects of configured space can be captured at the level of topological description and represented

15. Lawrence and Low (1990: 470-471).
16. Bafna (2003: 18).
17. Bafna (2003: 18).
18. Hillier and Vaughan (2007: 207).

by way of graphs.[19] The topological description reflects the patterns of accessibility present within spatial systems (building and/or settlement); in other words this is how the arrangement of spatial units and entrances control access and movement.[20] With regard to settlement systems this refers to distributed (more than one point of control) and non-distributed (only one point of control) relations within the parts constituting the settlement.[21] For both buildings and larger spatial settings, Space Syntax distinguishes between symmetry and asymmetry: symmetry exists between spaces that have direct access to other spaces, while asymmetric spaces are those which have to pass through one or more intermediary spaces.[22] These characteristics can be identified, qualified and quantified by means of different graph techniques.

3.3.2 Space Syntax graphs and diagrams

Convex maps together with the derived Access Analysis are among the most applied means of describing and examining spatial configuration within Space Syntax studies.[23] Access Analysis is of special interest to archaeologists since it has proved to be useful in studying the social use of domestic and small settlement spaces.[24] Access Analysis identifies patterns of potential movement and non-movement within spatial configurations to identify the crossing points between the two and give social significance to these statistical values. Access Analysis employs as its basic unit the convex space, which is not formally delineated but intuitively defined as a space within which all parts are visible.[25] One convex space will be linked to another, constituting a subdivided spatial configuration. Based on this configuration a graph can be constructed marking each convex space with a node and each accessible connection between spaces with a link. Subsequently the degrees of control and access between all spaces comprising the configuration can be identified, visualised, calculated and evaluated in terms of its potential social meaning.

In order to move away from a static representation of space, Space Syntax has been exploring ways to gauge the dynamics of movement and the potential for unplanned or unforced interaction and encounters within spatial settings. These spatial properties are best captured by linear or axial maps which are overlaid on top of the convex map. The researcher lays down the longest straight line that passes through at least one permeable threshold between two adjacent convex spaces; this process is repeated until all adjacent convex spaces have been crossed. The resulting network of intersecting straight lines represents the axial map. Initially developed to describe urban areas, its simplicity has made the axial map the preferred method for studies focussed on movement within any spatial settings. Originally the method was based on a notional understanding that the line of sight is the first organising and unifying device in spatial experience, and secondly, the number of distinct turns on a route was found to be more crucial to spatial experience than the actual distance covered;[26] this means that people on their routes avoid turns and would rather walk a longer distance than take too many directional changes, even is this would prove to be metrically shorter.

Space Syntax research has been continuously developing new analytical possibilities, converting these initial notions into solid statistical evidence. By comparing visual integration values with observed movement, a strong statistical correlation between the visual field structure and route path selection was established, implying that movement follows visual lines rather than other attraction powers.[27] Regarding the frequency of turns on a route interesting insights have been achieved by correlating observed movement patterns with results from axial analysis. Contrary to the common assumption that route selection simply relies on minimizing distance, these studies established that the observed movement patterns tend

19. Bafna (2003: 18-21).
20. Hillier and Hanson (1984: 14).
21. Hillier and Hanson (1984: 11-14).
22. Hillier and Hanson (1984: 11)
23. See Bafna (2003: 21-25) for a comprehensive introduction to Space Syntax analytical techniques, which has been largely followed in this section.
24. See Cutting (2003) for a critical survey of Space Syntax techniques applied to prehistoric settlement architecture.
25. Bafna (2003: 23).
26. Bafna (2003: 23-24).
27. Hillier and Vaughan (2007), see also Conroy Dalton (2003).

to avoid turns at acute angles, opt for the least turns, and only in third place select the shortest paths.[28] Bringing these findings to light opens new and better ways of guiding movement within cities, and offers new opportunities for improving existing traffic patterns. Unfortunately, the past built environment and the street networks of archaeological sites do not allow for real time movement analysis and the study of observed pedestrian flows. Nevertheless, some of the simulation tools offered by Space Syntax can help to model predicted pedestrian flows and movement within ancient cities to reach a better understanding of the past spatial experience.

The choice between using a convex map or an axial map for describing the spatial configuration depends on the questions being asked. If the analysis is used to discuss the arrangement of functional spaces within buildings or generative types of buildings within settlements then convex maps seem more suitable. If the analysis is focussed on the understanding of behavioural characteristics of the spatial setting, axial maps seem more useful.[29] Above all, axial maps prove very fitting for analysing the ratio of integration or segregation within urban settings, the so-called "RRA" (*real relative asymmetry*), already mentioned.[30] The RRA is calculated for each space, or each axial line of the entire system in relation to all other spaces.[31] In operational terms, integration represents the average depth of the spatial unit from all other spatial units within a given system, and hence its value is affected by the entire spatial configuration. Within Space Syntax analysis RRA ratios predict the 'global' structure of a spatial system. In terms of analysing 'local' properties, Space Syntax often resorts to calculating the connectivity of a system, which is defined for each spatial unit in relation to the number of spatial units directly connected to it. Other descriptions of local properties include integration up to a small radius, limited to all spatial units within a given depth from the unit analysed (e.g. radius 3 or 5). Space Syntax uses the degree of correlation between connectivity and integration values as a measure of predictability built into the entire spatial environment. It therefore is understood as a measure of the intelligibility of a configured space.[32] These methods result from recent developments within Space Syntax with a new emphasis on spatial cognition and thus are mostly applied within urban planning.

3.4 SPACE SYNTAX AND THE CITY

In the light of today's global urbanisation with ever sprawling mega-cities and urban population outnumbering rural population for the first time in global history,[33] Space Syntax's contributions to a better understanding of urban complexity are of the utmost significance. As outlined above, the aim of Space Syntax is to develop strategies for spatial analysis in such a way as to reveal the underlying social structure. This allows for secondary theories to develop and above all for practical solutions to be found regarding the effects, including adverse effects, of spatial properties on various social or cultural variables.[34] In response to pressing urban problems an increasing number of Space Syntax studies have been directed towards social issues. These are as diverse as mapping the spatial forms of poverty, analysing social segregation and deprivation within spatial systems, as well as studying crime rates and their association with urban topography.[35] Again, other studies are primarily concerned with the economic aspects of space, thus pursuing a more traditional application of Space Syntax.[36]

With reference to urban history and archaeology, Space Syntax studies concerning formative urban processes are of specific interest. By examining the axial maps of a large corpus of city plans, including historical cities, Hillier and colleagues established

28 Hillier and Vaughan (2007).
29. Bafna (2003: 25).
30. For information on RRA see Chapter Four on Space Syntax techniques, and see also section 2.5.5 above on RRA applied in the spatial assessment of Empurias (Kaiser 2000). See also section 2.4.3 in this study on Laurence's Space Syntax approach applied to measure the integration ratios between houses and streets; see Laurence (2007: 127-129).
31. Hillier and Hanson (1984: 108-111).
32. Bafna (2003: 26-27).
33. Mackenzie (2007: 49).
34. Bafna (2003: 18).
35. Some examples are: Vaughan (2007) and Nubani and Winemann 2007.
36. Hillier and Penn *et al*. (1993).

that, despite strong cultural variations in different regions of the world, there are also powerful phenomena shared by most cities regardless of cultural or geographic determinants. These findings postulate a 'common language of cities' from which Space Syntax hopes to build a domain theory for the study of built environments as structural and functional entities. Space Syntax is concerned with the problem of how both cultural variations and invariants can arise from the spatial processes that generate cities. In their pursuit of answers, Hillier and colleagues have outlined a generic process by which spatial configurations, through their effect on movement, first shape, and then are shaped by, land-use patterns and densities. Collectively these finding have led to the formulation of wider theoretical concepts, such as the 'Cities as Movement Economies',[37] and 'Centrality as Process'.[38] Comparative studies of axial maps identify movement as a strong force holding the urban system together, with basic patterns of movement generated by the urban grid itself. Thus the urban grid surfaces as a core urban element which, in spite of its static nature, influences the long-term dynamics of the whole urban system.[39]

Another similarity, which emerged from Space Syntax's comparative analyses of axial city maps is the phenomenon of the so-called 'deformed wheel'. It is characterised by streets which appear like spokes leading in all main directions. The deformed wheel is part of a generic structure of cities that is required to move people into and out of the centre, with quieter residential areas in the interstices of the radial routes of the wheel. This generic pattern was first identified as a deep structure common to many small towns, seeming to occur regardless of topographic differences. As a global pattern the deformed wheel is also found remarkably well in larger cities. Even in mega-cities such as London and Tokyo (which is the largest system ever analysed by Space Syntax), a notable and even more complex version of the wheel is found.[40] Interesting enough, it also emerges in a city under the influence of at least two cultures, as the axial map of Nicosia in Cyprus demonstrates. The differences between the Greek and the Turkish area are clearly visible in the texture of the grid and reflect typical distinctions found between town-planning systems in Europe and in the Islamic world. Still, a typical deformed wheel pattern is evident on top of the geometric differences and the variant degree of integration.[41] The deformed wheel also appears in the axial map of Pompeii.[42] Hillier and colleagues understand the pattern of the deformed wheel as a way to counteract the natural tendency for urban centres to become segregated as the city grows around them, by linking centres to edges, and so accessing visitors to the heart of the system and inhabitants to the edges.[43] The deformity occurs as the long-distance arteries deviate around burgeoning suburbs.

The impressive empirical record of comparative urban studies conducted by Space Syntax research offers a wealth of knowledge, available as guidelines, and a source of inspiration for historical or archaeological research. Needless to say, past urban environments differ from today's inhabited urban space. Ancient cities studied from maps and archaeology appear incomplete and fragmented and have their own set of problems. On the other hand, because of the limited evidence available, archaeology has to make the most of its data and can benefit from incorporating aspects of Space Syntax into the study of ancient urban space.

3.5 SPACE SYNTAX IN ARCHAEOLOGICAL STUDIES

Space Syntax has enjoyed a lasting, steadily growing popularity among archaeologists for the past 25 years. Most of the published and probably even more of the unpublished work has been undertaken at postgraduate level.[44] Early criticism was stridently expressed by Leach,[45] his voice still echoing through a number of ethnographic and anthropological, as

37. Hillier and Penn *et al* (1993) and Hillier (2007).
38. Hillier (1999) and Hillier (2009: 16-35).
39. Hillier (2001: 02.2)
40. Hillier (2001: 02.8)
41. Hillier (2001: 02.9)
42. Fridell Anter and Weilguni (2003: 34).
43. Hillier (2007).
44. See Thaler (2005) for a succinct summary of space syntax studies in archaeology.
45. Leach (1978).

well as archaeological, studies.[46] However, more usually, promoting a pragmatic attitude, archaeology has developed a certain tool box approach towards Space Syntax. Archaeologists often feel the need to explore an additional or a completely new aspect of their research, or simply add a spatial component to an otherwise material culture-driven research agenda. Space Syntax provides tools to think with and offers analytical techniques which are relatively user-friendly. In additions, toolbox approaches seem to have had beneficial effects for archaeological applications since they encourage conscious efforts to integrate Space Syntax with other potentially complementary perspectives.

As a result, a number of archaeological studies incorporate selected aspects of Space Syntax into research with a wider focus, e.g. Fairclough's analysis of historical space in complex high status medieval buildings,[47] or Gilchrist's study of gender domains.[48] Within the field of Classical Archaeology, unsurprisingly, Pompeii has turned into the most syntactically examined site. Laurence's work, already discussed above, studies activity levels in Pompeian streets through the relationship between streets and houses, using only limited aspects of Space Syntax analysis.[49] Fridell Anter and Weilguni apply axial line analysis to Pompeii's street network,[50] while Newsome assesses changing circulation patterns around a specific city block.[51] Van Nes, being an urban planner and not an archaeologist, introduces not only new analysis tools but also a new focus: Pompeii's 'urban plinth', adding statistical data from micro- and macro-scale spatial analyses and agent-based modelling. Van Nes' approach examines the intensity of movement in relation to land-use, and compares the data established for the Roman city to socio-economic empirical knowledge from today's urban contexts.[52]

In contrast, Grahame's syntactical assessment of Pompeii's domestic architecture focuses more narrowly on the tenets of Space Syntax.[53] Anderson's approach,[54] quite the opposite, argues for an adapted version of Space Syntax to identify functional patterns within Pompeii's domestic architecture. DeLaine's pioneer work brings Space Syntax to Ostia; while her early work is concerned with the resident/visitor relation of domestic architecture, her more recent work focuses on Ostia's *medianum* apartments, using Access Analysis to investigate the organisation of space within the apartments and their relation to the outside to reach a better understanding of the occupiers and the socio-economic group they belong to.[55] Kaiser, as discussed above, applied selected analysis tools to the urban environment of Empurias.[56]

Benech integrates an adapted version of Access Analysis into a wider study of domestic dwelling-units at Doura-Europos.[57] He applies Access Analysis to geophysical maps, and subsequently compares and confirms his results with outcomes achieved from fully excavated dwelling-units and thus demonstrates the usefulness of Space Syntax approaches for the interpretations of residential space based on geophysical maps. Staying in the region but moving up in time Chatford Clark applies selected Space Syntax techniques (visibility graph analysis and Isovist studies) to Byzantine churches in Jordan to explore local and regional stylistic variation through the organisation of liturgical space and the placement of liturgical installations.[58] Space Syntax techniques were able to highlight some of the visual patterns possibly experienced by the assembly members with reference to accessibility and visibility.

Brusasco's study of Mesopotamian domestic architecture combines spatial and textual evidence.[59] Thaler integrates Access Analysis within a study

46. Van Krimpen-Winckel (2009).
47. Fairclough (1992).
48. Gilchrist (1988).
49. Laurence (2007), see also Chapter Two of this study for a review of Laurence's work.
50. Fridell Anter and Weilguni (2003).
51. Newsome (2009: 124-125).
52. Van Nes (2009).
53. Laurence (1994, 2007); Grahame (2000); see Chapter Two above.
54. Anderson (2004).
55. DeLaine (2000; 2004).
56. Kaiser (2000).
57. Benech (2007).
58. Chatford Clark (2007).
59. Brusasco (2004; 2007).

of a wider perspective examining the architectural changes at the Late Bronze Age palace of Pylos at two successive points in time.[60] Thaler's results challenge the widely accepted narrative which ascribes changes in the palace architecture to a long-lasting economic decline. The results of his analysis point to a continuous adaptation to functional needs compatible with a still expanding polity. Letesson's study (Late Bronze Age Crete, c.1600-1425 BC) used syntactical methods to analyse Cretan Neopalatial architecture. The study identified a large number of topological and quantitative recurrences within the Minoan architectural landscape.[61] Paliou's research combines an autonomous agent approach and Space Syntax concepts to investigate the Theran Murals of LBA Akrotiri (Thera, Greece). Her study is concerned with intra-site movement and visibility from public space.[62]

Fisher employs syntactical tools in his research into Bronze Age settlements on Cyprus. His case study focused on Enkomi, examining the Ashlar Buildings to shed light on the use of architectural design and embellishment by Late Cypriot elites to express power.[63] Lang's study applied Space Syntax to Archaic Greek houses to investigate structural changes concerning the subdivision in the house layouts. Lang's analysis revealed that in the Early Iron Age most of the rooms in houses were arranged in a linear series, while Archaic houses had a more radial structure with rooms grouped around a central space.[64] Westgate applied a similar analysis to Hellenistic houses from Crete with interesting results regarding the centralising function of courtyards within the houses' spatial organisation.[65] Bintliff has recently integrated these and other space structure studies of ancient Greek housing to illuminate the long-term social and economic trends in ancient Greek society.[66]

Space Syntax also proved to be useful in a number of ethnographic studies. Widlok's study integrates Access Analysis into a broader study of settlements to correlate between social and spatial form.[67] Dawson uses Access Analysis to examine the spatial structure of past Inuit snow houses based on ethnographic records. The results demonstrate that variation in family structure and kinship systems are reflected in the spatial configuration of snow house architecture.[68] A large range of excellent Space Syntax studies have been developed by researchers investigating Native American sites. Ferguson's research into historic Zuni architecture combines the results of the syntactical analysis of Zuni Pueblos with a rich ethno-historic and ethnographic record.[69] Stone's analysis of settlements in the Point of Pine Region of Arizona,[70] as well as Van Dyke's syntactical examination of outlying Chacoan great houses brought surprising results concerning the spatial patterning. Van Dyke's analysis incorporated room function and pueblo layout, and finally these houses could be understood as a group of separate but equal household units accessible primarily through the roof and plaza.[71] Shapiro's work shows how the application of syntactical tools can help the archaeologist in 'discerning unobservable changes in social organisation from observed changes in the spatial configuration of prehistoric settlements' (Arroyo Hondo Pueblo, near Santa Fe, New Mexico).[72]

A few examples of studies focused on Medieval and modern periods should be mentioned. An interdisciplinary cross-cultural study of urban housing in Switzerland took a critical stance to Space Syntax emphasising a range of tacit and explicit regulatory factors that ought to be considered and are not represented in the 'mere act of transforming the two-dimensional representation of a building to a graph'.[73] Craane's use of Space Syntax promoted

60. Thaler (2005).
61. Letesson (2009)
62. Paliou (2008).
63. Fisher (2006).
64. Lang (2005).
65.Westgate (2007).
66. Bintliff (2010).
67. Widlock (1999).
68. Dawson (2002).
69. Ferguson (1996).
70. Stone (2000).
71. Van Dyke (1999).
72. Shapiro (1997).
73. Lawrence (1990: 75).

a more positive attitude towards the method:[74] her study of Medieval trade in the Low Countries and commercial space in Dutch cities combines Space Syntax with other methods from urban historical geography (map regression).[75] Karimi's study expanded the scope of comparative urban research towards a more global understanding of cities.[76] Adopting Space Syntax techniques, Karimi investigates the phenomenon of the 'organic city' to shed light on those factors which define 'organic development'. He selected two groups of oriental (Iranian cities built in the Islamic tradition) and occidental cities (English Medieval towns).

Apart from those Space Syntax studies which make full use of the combination of access graphs and statistical values, there are also a number of applications which implement qualitative rather than quantitative Space Syntax analysis. These approaches exploit the descriptive power of access graphs without the calculation of numerical indicators. A good number of archaeological studies were able to offer new insights into the spatial organisation of their area of research by relying on the information inherent in the graph, without the full numerical calculation of spatial values.[77]

The variety of case studies introduced here demonstrates how well-suited Space Syntax tools are to investigate the spatial aspects of any material record from small scale individual dwelling units to larger settlements, and even regional approaches to human movement. Archaeological studies seem to indicate a preference for Access Analysis; this can be easily explained by the nature of the archaeological record and its tradition in meticulous documentation. The production of detailed site plans and individual house plans are often the very focus of archaeological recording. Space Syntax analysis therefore seems the most logical step to infer meaning from those detailed plans.

Almost all of the studies which have been reviewed for this brief summary praise Space Syntax for providing suitable techniques to discern discrete patterns which would not have been available to careful archaeological observation only. Most of the scholars agree that Space Syntax techniques add a level of objectivity which helps to place their research on more solid ground than subjective analysis based on notions of symbolic or functional characterisations could offer.[78] A number of studies also raise concerns about the quality of their data,[79] i.e. incomplete site plans and sample sizes not large enough to reach statistical viability. This is however a general problem related to the fragmentary nature of archaeological data, and should not be used to resist the application of Space Syntax.

74. Craane (2009).
75. Lilly (2000).
76. Karimi (1997).
77. Foster (1989); Bonanno *et al*. (1990); Fairclough (1992) and Cutting (2003).
78. Fairclough (1992: 348).
79. Cutting (2003).

4 – Methodology: Data Capture, Processing and Analysis

Following advances made in Pompeian studies and elsewhere,[1] this study examines Ostia as an expression of Roman urbanism and explores the ancient city within its own social and spatial context. More specifically, it investigates the mutual relationship between Ostia's built environment and its urban society within the theoretical and methodological framework of Space Syntax.[2] For this reason this study relies on a strong basis in architectural data. This chapter therefore concentrates on the specific methods and techniques that have been applied to collect suitable data sets from Ostia's built and non-built environment for subsequent detailed archaeological and spatial analyses. The second part of the chapter will focus on the methods and techniques which have been selected for the analysis of the spatial data, and will introduce and explain the specific Space Syntax tools used for spatial analysis.

From Ostia's vast archaeological record, particular areas have been selected for closer investigation: Insula IV ii, consisting of 14 buildings, selected guild seats (*scholae)* and Ostia's street network. This selection represents deliberate choices, made to address the ancient city at different scales: the micro-scale of individual buildings (*scholae*), the macro-scale of the entire street system, and the medium scale of the 'local neighbourhood', represented by Insula IV ii. However, the core of this research is a data-based, detailed structural assessment of Insula IV ii and its subsequent spatial analysis. Above all, the Insula serves as a case study to reconstruct urban development during the 2nd and beginning of the 3rd centuries AD, and to examine aspects of the city's spatial organisation, applying selected Space Syntax tools.

1. See Chapter Two of this study reviewing the works of Kaiser (2000), Raper (1977), Laurence (1994 and 2007), Grahame (2000), Wallace-Hadrill (1994) and Zanker (1998).
2. See Chapter Three on the theoretical background of Space Syntax (Hillier 2007; Hillier and Hanson 1984; Hanson 1998).

With this in mind, this research pursues a twofold approach, combining complementary components: an archaeological study, focused on a detailed assessment of sections of Ostia's built and non-built environment, and a syntactical spatial analysis, applied to the archaeological data sets. The two parts are well matched: the Space Syntax analysis demands reliable archaeological data so as not to compromise the results of the analysis through the use of incorrect or deficient data sets. Likewise, the thorough archaeological assessment benefits from the additional analytical component. The combination of both however, moves the study beyond the level of descriptions and cataloguing, and offers new insights into the spatial organisation of Ostia.

Ostia is one of the few Roman sites where the immense archaeological record allows us to explore aspects of Roman urban life. Still, despite the abundance of the archaeological material and vastness of the architectural remains, Ostia's archaeological record is not at all easy to access. The site is beset with many problems; the difficulties resulting from the largely unrecorded excavation campaigns of the 1940s,[3] as well as the undocumented restoration activities, are well known and have often been criticised.[4] Every research project carried out in Ostia is affected by these problems in one way or other. This study is no exception. However, next to problems caused by poor initial documentation and later neglect, the major difficulties encountered concern Ostia's existing site plan and its shortcomings. These 'mapping' issues are crucial since this study includes a systematic GIS-based approach, which ultimately depends on reliable geo-referenced maps to be able to link data to digitized maps.

3. For an outline of Ostia's history of excavation see Lauro (1995: 41-52).
4. Meiggs (1973: 5-7) and Pavolini (2006: 40-41).

4.1 OSTIA'S SITE-PLAN AND THE CO-ORDINATE SYSTEM

One of the drawbacks often encountered when working at archaeological sites with a long history of excavation is inaccurate site-plans. Ostia's general plan was published in 1953.[5] The site-plan developed over a long period of time in a piecemeal fashion,[6] progressing along with the excavations. In the core of the city, within relative proximity to Ostia's established local point of reference,[7] the plan is fairly accurate with minimal divergences between plans and the actual location of the architectural structures. However, the plan reveals substantial margins of inaccuracy in the peripheral areas of Ostia's excavated terrain. These discrepancies were only discovered once advanced methods of recording had been applied. A recent Japanese project, introducing 3D Laser scanning, has studied the plans at the centre of the city and produced interesting insights into the causes of some of these minor divergences, through a comparative study of the 1953 site plans and the results from the laser scanning survey (Fig. 4.1).[8] Interestingly enough, the inaccuracy of the site-plan did not pose noticeable problems for traditional research, concentrating on individual buildings or smaller areas.

However, the site-plans became an issue of concern when recent projects began to examine larger areas, or when studies extended into the periphery of the excavated areas and beyond.

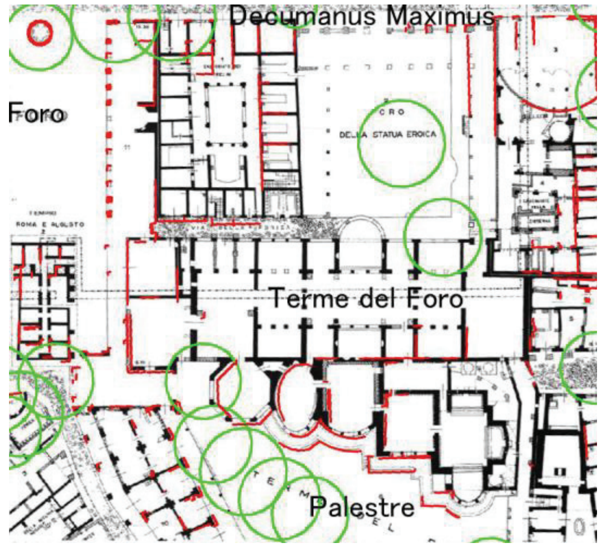


Fig. 4.1 – Divergence between Calza's map and the results obtained from laser scanning (in red) shown on the Terme del Foro; present vegetation (tree coverage) is indicated by green circles (from Hanghai and Hori (2009: 2, fig. 3)

Not only the site-plan's inaccuracies, but also the growing demand for geo-referenced digital maps brought Ostia's 1953 general plan more and more under pressure. At first only a small number of projects, such as the large-scale DAI research, as well as the University of Texas' survey of Ostia's synagogue, employed GIS-based methods of digital recording and data protocols.[9] With a growing interest in intra-site comparative studies and large-scale surveys, the need for computer-based methods of systematic, geo-referenced recording and data-processing has also increased. Hence, in response to research demands as well as current site management requirements, Ostia's Soprintendenza took on the challenge and launched into the production of a new geo-referenced digital site-plan. At the same time the Soprintendenza faced a dilemma, since replacing the 1953 general site plan would mean that an enormous

5. The general site plan was produced by I. Gismondi in 1949, drawn by E. Visca, then published in 1953 in Scavi di Ostia I, Topografia generale (Calza 1953); the general plan has been updated in 1961, see Verduchi (1995: 20, fig. 8).
6. Valieri's plan of 1914 seems to have provided the basis for Gismondi's plan of 1953. Valieri's plan was derived from a 1911 aerial photograph, the so-called 'relievo dal pallone'; for a detailed discussion on the influences of the 'relievo' on subsequent cartographic representations see Shepherd (2006: 15-35).
7. Ostia's local datum of reference was set up by I. Gismondi. The reference point is found in front of the Museo Ostiense, marked on the northern doorstep of the stairs leading into the Museum.
8. Hanghai and Hori *et al*. (2009) revealed minor inconsistencies between the 1953 site plan and the actual positions of buildings; while substantial divergences between site plan and actual location of structures at the peripheral areas were encountered, presumably accumulative error with distance from the established point of reference (personal communication from M. Heinzelmann, DAI project and M. White Texas University project).

9. White (2001); for preliminary reports on the DAI survey see Bauer *et al*. (2000).

amount of embedded information would be lost.[10] The 1953 general plan incorporates a wealth of archaeological and architectural information, reproduced as attribute data, detailing earlier and later building phases and architectural conventions such as wall apertures, discontinued structures, as well as detailed archaeological features. In their efforts to find a workable compromise, the Soprintendenza has been exploring various solutions.

With the production of Mannucci's *Atlante di Ostia antica*, published in 1995, a beginning was made to confront these growing challenges. The *Atlante* offers a new site plan, covering Ostia's extended excavated areas. The new plan is based on aerial photogrammetry,[11] and it is tied to Italy's national co-ordinate system Gauss-Boaga.[12] The *Atlante* aimed at bringing Ostia up to date with modern methods of topographic recording and data management, by offering an updated and updatable site-plan in printed and digital form. The new plan was intended to form the basis for a system of recording and site management that could be adapted to the changing requirements of archaeological research as well as heritage management.[13]

The *Atlante* presents a fairly faithful mapping of Ostia's past built environment, reproduced at a scale of 1:500, and divided into 67 segments of 25 x 25 cm. A double page has been dedicated for every segment, displaying the plans on the left page, matched by a glossy full-colour aerial photograph of the same section on the right side. This dissected way of representation allows full attention to detail, while the coherence of Ostia's site plan is largely neglected. The significance of the complete site plan seems not at all to be acknowledged by the *Atlante*. A representation of Ostia's general plan is found on the inside of the cover, at a scale of 1:5000. This is also where one finds rather casual references to the Gauss-Boaga national co-ordinates,[14] while the detailed plan sections remain without a reference to co-ordinates. Moreover, the new plans are far from containing the amount of information found in the 1953 plans, and also did not follow the established official numerical designations in keeping with the traditional system by Region, Insula, Building, and Room. Altogether these shortcomings compromise the usefulness of the *Atlante*. In fact, the *Atlante* did not succeed in replacing the 1953 site-plans, and on the whole has not found much application.

In a further attempt to remedy the problems posed by the 1953 site-plan and the lack of geo-referenced points, the Soprintendenza introduced a local reference system in 2004/5.[15] This topographic project established 58 local reference points (caposaldi), distributed over the extent of the excavated area. These 'caposaldi' have been cross-referenced to each other and tied to a fixed local benchmark, positioned at the intersection of the *decumanus maximus* and the Via del Pomerio.[16] This local system was intended to enable researchers to reference their own maps to the established points closest to their area of research (Fig. 4.2). Unfortunately, this system proved to be inadequate for a number of reasons: firstly it only offers a local reference system and has as yet not been tied in with the Italian national co-ordinate system (Roma40 Gauss Boaga).[17] Secondly, the concrete blocks which mark the reference points did not prove to be sturdy enough to survive the daily strains of the site. Already after a relatively short time, a number of the concrete blocks used as markers have been destroyed

10. Personal communication from E.J. Shepherd, (formerly Soprintendenza of Ostia).
11. See Ferri and Barreca (1995: 54); see Ferretti (1995: 55) on the technical details of the aerial photogrammetric survey of Ostia.
12. Geo-referenced to IGM reference points (Torre San Michele IV and Ostia antica III).
13. Ferri and Barreca (1995: 53).
14. See Mannucci (1995: 61) "Controllato ai Sensi della legge n. 68 del. 02.02.1960. Nulla Ostia Dell ÍGMI alla Diffusione n. 139 del. 12.04.1994".
15. The topographic survey was jointly carried out by the Università della Tuscia, Viterbo and the École française de Rome.
16. The 0-benchmark is reference point 36 of Ostia local reference system (Ostia antica - maglia caposaldi topografici 2004, unpublished database).
17. The Soprintendenza of Ostia has been involved in long-standing negotiations with the IGM (Istituto Geographico Militare, Firenze) und hopefully will be receiving an official reference datum (punto fiduciale) in the near future.

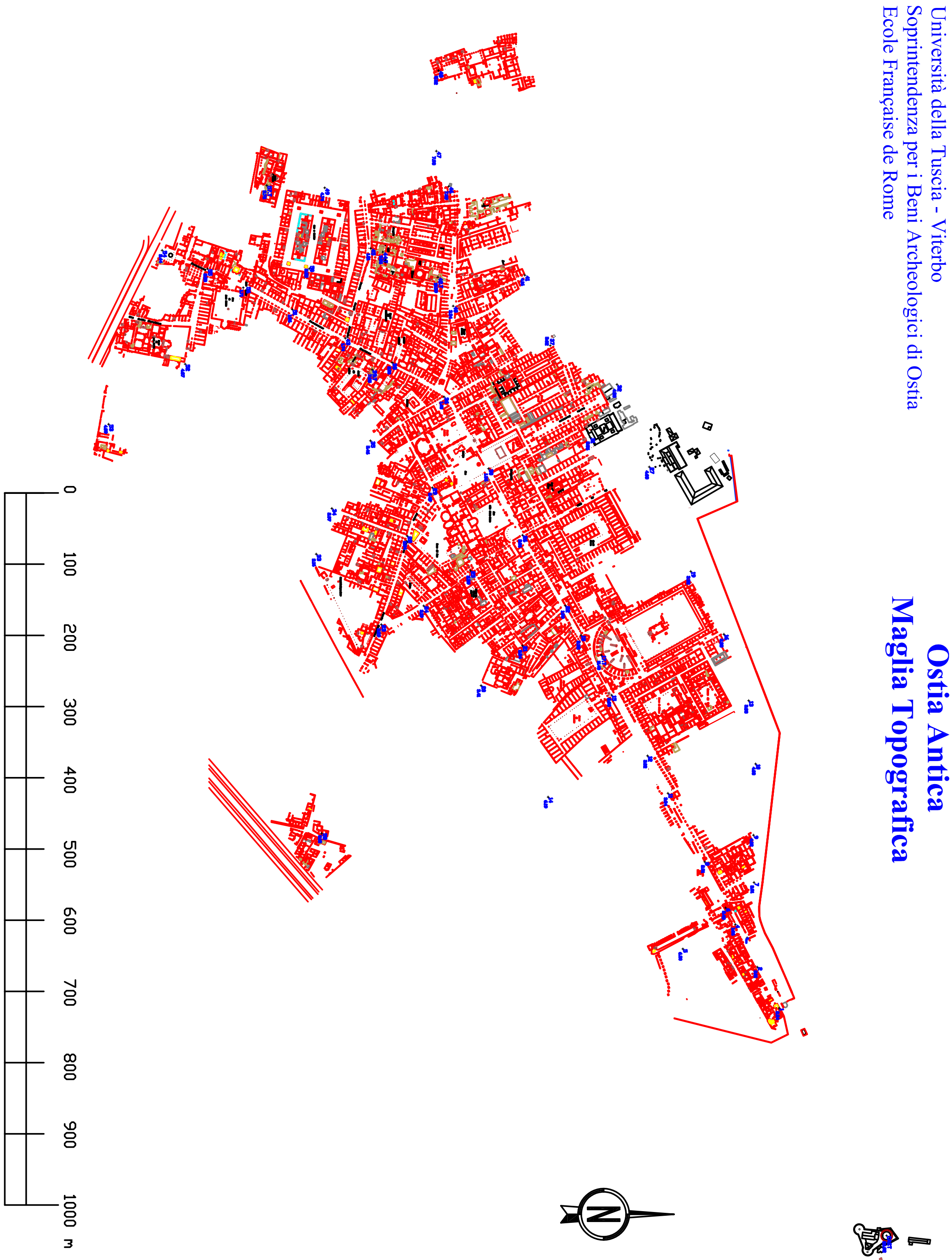


Fig. 4.2 – The local reference system comprises 58 local reference points (marked by consecutive numbers in blue)

or disappeared altogether (Fig. 4.3).[18] Furthermore, a number of reference points seem to have inbuilt error margins: placed at locations chosen for least impact on the archaeological record, and guided by inter-visibility between the reference points, the points themselves have been set up by triangulation using tape measures. In most cases two measurements were taken from corners of architectural structures, while the third point, the reference point itself, marks the spot where the tapes intersect. Naturally, such methods are prone to compound problems of inaccuracy due to human error. At the same time modern surveying equipment, like Differential GPS, almost render a 'local reference system' redundant since readings can be taken on the spot, without the intervention of local reference points. This study was able to employ a Differential GPS (DGPS) and hence the challenges posed by the incorrect site-plan and the lack of co-ordinates could be faced without too many difficulties.

Fig. 4.3 – Local reference points hidden under soil cover, intended for protection from vandalism and amateur excavators

18. In 2006, two years after the local system was set up, H. Kamermans and the author re-measured all 58 reference points with palm-top GPS. This was done to test the equipment and its suitability within an urban context, when difficulties such as high standing walls and vegetation cover (umbrella pines) affect the readings.

4.2 REMAPPING AND GEO-REFERENCING INSULA IV II

In July 2008, in connection and in support of this study, a team from the University of Leiden conducted a limited DGPS survey in Ostia,[19] comprising 229 DGPS readings. The readings were taken at specified topographic points within the excavated area of Ostia. These topographic points were chosen according to the research interests pursued by this study. Hence the DGPS survey concentrated on Insula IV ii and its surrounding area. Significant and clearly identifiably locations have been chosen for these points (e.g. corners of buildings, entrances to buildings). Furthermore, the DGPS survey included control readings taken at a number of Ostia's local reference points, and also at several survey points which had previously been set up by the University of Texas and the DAI.[20]

The high-tech DGPS equipment used by the Leiden team offers geo-referenced positioning with the highest levels of survey accuracy.[21] At the same time the equipment is user friendly and allows positioning surveys to be performed efficiently within a short period of time. DGPS applies 'real-time kinematic technology' (RTK), operating with two receivers, one base station and one rover, which simultaneously record and correct satellite data and atmospheric observations. The two stations communicate via radio, allowing for a flexible and mobile system. The highest levels of accuracy are achieved since the readings are constantly recalibrated and corrected. The method and the technical specification are explained in more detail in the following sections.

19. The Ostia DGPS survey was supervised by H. Kamermans; the DGPS readings were taken by H. Kamermans, E. Mol and D. van de Zande, and the author, and with kind support of G. Offenberg who guarded our base station.
20. See White (2001: 31) for a list of survey points, including DAI survey points.
21. The DGPS survey conducted by the team from Leiden used the TOPCON Positioning System HiPer® Pro; see Hiper Pro Operator's manual for technical specifications.

4.2.1 DGPS Survey – general technical background

Differential Global Positioning Systems use relative positioning techniques, which combine and process the satellite readings received from two or more receivers to calculate the receivers' coordinates with high accuracy. To establish this position, the receiver measures the distance between it and at least 4 satellites. The accuracy of a position depends primarily upon the satellite geometry (Geometric Dilution of Precision, GDOP). The more satellites in view, the stronger the signal, the lower the DOP number, the higher positioning accuracy. When using a single satellite system (GPS or GLONASS), the minimum number of satellites is four, while in a mixed satellite scenario (GPS and GLONASS) the receiver must lock into five satellites to account for the different time scales used by these systems.

With DGPS surveys in the current standard approach, one receiver is placed at a known surveyed location (official position with known co-ordinates) and is referred to as the base station. Another receiver is placed at an unknown location, referred to as the remote receiver or rover. As the base station collects satellite data, it measures the carrier and code-phases to accurately compute and verify its location. Then, the base station receiver transmits this information via radio link to the rover or remote receiver. The rover applies the transmitted measurement information to its observed measurement of the same satellites. Since the position of the base station is known, the rover compares the data it receives from the base station to the data it logs from satellites, and applies correction algorithms to accurately measure a new point. RTK (Real-Time Kinematic) allows a real time communication between base station and the rover via radio signals, whilst any detected signal anomalies or atmospheric disturbances can be directly mitigated against and corrected for to achieve highest positioning accuracy. Furthermore, the data can be recorded and stored for post-processing at a later state.[22]

22. Since DGPS readings not only provide x and y coordinates but also very reliable readings of height (z), 3D terrain models can be calculated and later constructed in GIS programmes.

4.2.2 The Ostia DGPS survey – establishing a base point

The first requirement for a successful DGPS survey is a reliable, well-positioned, known point of reference to 'ground' the receiver base station. As stated before, there is no official IGM point within Ostia's area of excavation. The closest official IGM point is located on top of the Castello Giulio II, in the medieval town of Ostia Antica, outside the excavation area. A number of additional survey points have been set up along the metal fence which encloses the site bordering the access road Via Romagnoli.[23] The additional survey points along the fence have been established by surveyors, but not the IGM; these referential points are triangulated and set up along visual axes. Hence these points are positioned at the edges of fence poles, corners of walls or perched against other physical objects suitable for visual positioning. Since the DGPS base station needs to be exactly placed on top of such a known point of reference, these 'edge positions' make an accurate placing difficult. Therefore the best option for the Leiden DGPS survey seemed the IGM point on top of the Castello Giulio II. However, this reference point proved unreliable since its position had been altered in the course of repair works carried out on the rooftop of the tower, and has as yet not been officially re-positioned by the IGM.[24]

In absence of a 'known' topographic point, the DGPS offers 'auto-positioning', whereby the base station can be located at a chosen point. All the same, the Leiden survey decided to set up the base station on the top of the Castello, since this location ensured a secure placing and allowed excellent satellite communication, and at the same time afforded radio communication over the major part of the survey area. The actual process of auto-positioning requires

23. Information on Italian survey points can be obtained from the website fiduciali.it.
24. Personal communication with Dott.ssa S. Pannuzi, the curator of the Castello Giulio II; the reference point has been re-positioned without IGM readings taken to confirm the exact location. In fact, the Leiden DGPS survey could not confirm the co-ordinates stated for this IGM point (N 4626601,69 and E 2295642,11), and hence decided to auto-position the base point.

some time for the system to establish its own location, based on the received satellite information. These readings are processed and simultaneously calculated, and converted into the pre-selected co-ordinate system, which in the case of Ostia is Roma40 Gauss Boaga, Fuso Est (zone east, oriented on Mt. Mario, Rome).[25]

Once the base point had been established on top of the Castello (Figs. 4.4 and 4.5), the next step was to take a number of control readings within the site using the 'rover'. Then a new base point close to Insula IV ii was set up and the base station was transferred to the new base point at the local reference point 34, located southwest of Insula IV ii. From there the DGPS survey was carried out within and around the Insula. Additional control readings were taken at several local reference points, and specifically at those local points surrounding Insula IV ii.[26]

Fig. 4.4 – Setting up the base point on top of the Castello Giulio II

Furthermore, in order to ensure consistency between the first base point on top of the Castello, and the second base point southwest of the Insula, cross-referenced control readings were taken from both base points; these resulted in divergences smaller than 1 cm, thus more than acceptable for our purposes.

Fig. 4.5 – Castello Giulio II , Ostia Antica

4.2.3 Geo-referencing Insula IV ii

After the on-site DGPS survey of Ostia had been completed, the recorded data were processed back in Leiden. At this point a sufficient amount of topographic data had been collected: a digital site plan of Ostia based on the *Atlante*, the local reference system consisting of 58 cross-referenced points (caposaldi),[27] and above all the DGPS survey (Fig. 4.6), providing 229 geo-referenced positionings converted into the Roma40 Gauss Boaga co-ordinate system. The next step was to geo-reference Insula IV ii. To achieve this, Ostia's digital map has been scaled and rectified in relation to known reference points, using AutoCAD.[28] Next, the stored DGPS readings have been exported in Excel file format and processed in MapInfo. After that, the DGPS readings were projected onto a geo-referenced map, and subsequently aligned to the corresponding known points on the aerial photograph of

25. See Mugnier (2005: 890) on Italian geodesy.
26. Reference point 34 is located southwest of Insula IV ii, reference point 33 southeast, while 28 is at the intersection of the *cardo maximus* and the Via della Caupona, and 23 opposite the entrance to the Campo della Magna Mater.

27. Courtesy of the Soprintendenza of Ostia.
28. Local reference points 28 (intersection *cardo maximus* and Via della Caupona) was used to geo-reference Insula IVii.

Fig. 4.6 – Taking DGPS readings within Insula IV ii

Fig. 4.7 – Aerial photograph of Insula IV ii aligned to the digital map of Ostia

Insula IV ii (Fig. 4.7). In the following stage the aerial photograph was aligned to Ostia's *Atlante* map (digital version), and from the overlay, divergences between the *Atlante* plan and the actual position of the structures could be identified. These problems were resolved in the next step, involving the 're-mapped' plans produced by the author.[29] The new plans have been subsequently digitized and processed using ArcGIS. The procedure will be explained in section 4.4, but first we need to return to fieldwork carried out in the Insula.

4.3 STRUCTURAL ASSESSMENT OF INSULA IV II – FROM WALL TO WALL

To be able to study Insula IV ii in a systematic way, a geo-referenced data-base was set up to form the foundation for the structural analysis of its built environment.[30] During several seasons of fieldwork conducted over five years, the Insula's standing structures have been thoroughly examined and recorded, divided into buildings, and further subdivided into rooms, and finally dissected into individual walls and single units like travertine thresholds or floor pavements. This formal approach has been chosen to meticulously record all structures and to identify consecutive structural changes that occurred during the second century AD and the beginning of the third century AD. The new plans produced by this study are the outcome of several field work seasons and subsequent data processing back in Leiden. It was found necessary to re-map the buildings, as the published plans contain inaccuracies (some features have disappeared since their initial recording in the 1953 plan, while others, especially wall apertures, could at times not be clearly identified as doors or windows). During the process of re-mapping every excavated wall was structurally assessed. This consisted of recording

29. During several fieldwork periods between 2005-2010 all standing structures within Insula IV ii were re-mapped by the author; the new plans have been produced at scales 1:100 and 1:50.
30. ArcGIS has been used for data-base management, with limitless technical support from Jolanda Lee of GeoStar, Leiden.

the dimensions, establishing the building techniques and materials used, as well as recording the surface treatment of walls and floors. In addition, other unpublished information about specific buildings and rooms has been recorded (e.g. interventions due to restoration activities or recent damage). In this way it can be assured that the data sets have a strong basis in the archaeological and architectural data. However, equally important is the fact that the process of re-mapping, since it requires the closest physical relationship between the architectural structure and the archaeologist, was found the best method to reach an understanding of the built environment in the first place.[31]

This systematic study would not have been feasible without well-structured, computer-based data-management. Hence, all architectural and archaeological data have been collected in a methodical way, using data-capture sheets for recording.[32] Subsequently, all field data have been entered into an Access database (Fig. 4.8).[33] Comprising c. 600 individual records, the database forms a coherent body of information. At the same time it is structured in such a way that every individual record can stand alone; this ensures that additional entries can be included at a later point without compromising the coherence of the system. While the data-base allows for data processing and queries, it reaches it full potential only once the archaeological data are linked to geo-referenced digital maps.

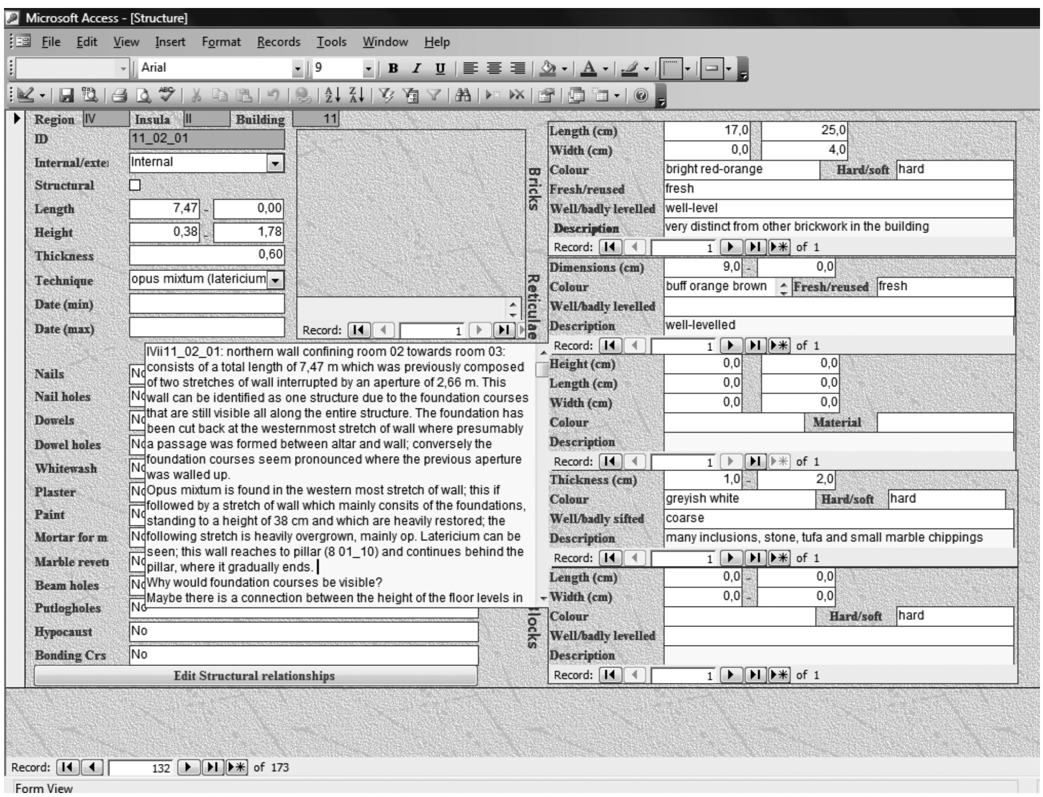
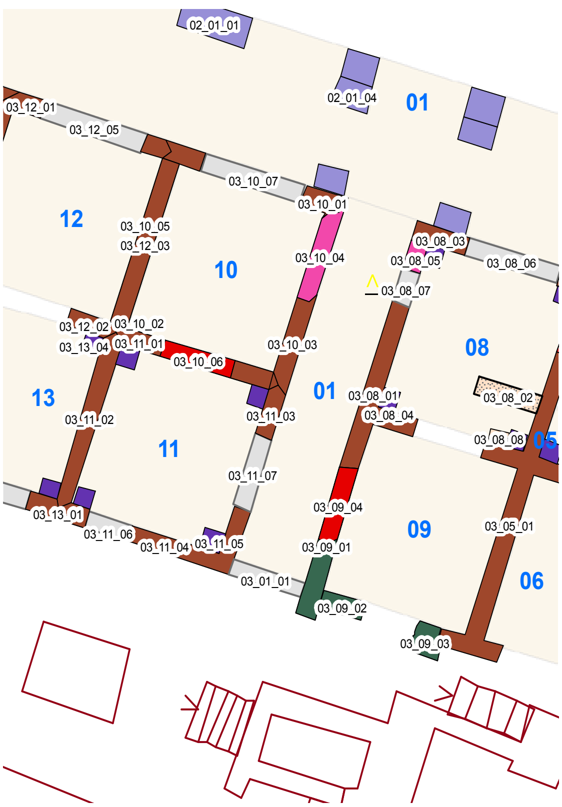


Fig. 4.8 – Access Data-base structure

31. See DeLaine (2008a: 322) for a critical evaluation of different ways of collecting archaeological data. DeLaine reminds us that the resultant record, measured drawing or digital recording, remains essentially an approximation within technically defined limits, not just an objective record.

32. The data capture sheets have been fashioned on P. Rose's Ostia survey, used for a similar structural assessment of Ostia's Regio III and V (Rose 2005).

33. 'Civis' the Access database used by this study has been built with the help of E. Dullaart, IT, Faculty of Archaeology, University of Leiden.



Caseggiato dell' Ercole

DATABASES

ArcGIS shapefile | Civic Access Database

ID	Material	Function	ID*	Technique	Date_min	Date_max
03_08_03		wall	03_08_03	mosaic	200	225
03_08_04		pillar	03_08_04	opus lateric	200	225
03_08_05		wall	03_08_05	opus lateric	175	225
03_08_06	travertine	threshold	03_08_06	travertine	<Null>	<Null>
03_08_07	travertine	threshold	03_08_07	Travertine	150	175
03_08_08		shelf	03_08_08	marble	200	225
03_09_01		wall	03_09_01	opus lateric	175	200
03_09_02		wall	03_09_02	opus lateric	175	200
03_09_03		wall	03_09_03	opus lateric	175	200
03_09_04		door	<Null>	<Null>	<Null>	<Null>
03_10_01		wall	03_10_01	opus lateric	150	175
03_10_02		wall	03_10_02	opus lateric	150	175
03_10_03		wall	03_10_03	opus lateric	150	175
03_10_04		wall	03_10_04	opus lateric	175	200
03_10_05		wall	03_10_05	opus lateric	150	175
03_10_06		door	03_10_06	opus lateric	200	225
03_10_07	travertine	threshold	03_10_07	travertine	150	175
03_11_01		wall	03_11_01	opus lateric	150	175
03_11_02		wall	03_11_02	opus lateric	150	175
03_11_03		wall	03_11_03	opus lateric	150	175
03_11_04		wall	03_11_04	opus lateric	150	175
03_11_05		pillar	03_11_05	<Null>	200	225
03_11_06	travertine	threshold	03_11_06	travertine	150	175
03_11_07	travertine	threshold	03_11_07	travertine	150	175
03_12_01		wall	03_12_01	opus lateric	150	175
03_12_02		wall	03_12_02	opus lateric	150	175
03_12_03		wall	03_12_03	opus lateric	150	175
03_12_04		wall	03_12_04	opus lateric	150	175
03_12_05	travertine	threshold	03_12_05	travertine	150	175
03_13_01		wall	03_13_01	opus lateric	150	175
03_13_02		wall	03_13_02	opus lateric	150	175
03_13_04		pillar	03_13_04	opus lateric	200	225
03_13_05	travertine	threshold	03_13_05	travertine	150	175
03_14_01		wall	03_14_01	opus lateric	150	175
03_14_02		wall	03_14_02	opus lateric	150	175
03_14_03		wall	03_14_03	opus lateric	150	175

Fig. 4.9 – Linking database codes and plan location (ArcGIS)

4.4 LINKING MAPS TO DATABASE

The particular GIS programme used within this study is ArcGIS; it allows one to link digitized maps to a database. The ArcGIS programme does not simply provide for more efficient representation and organisation of the data, it also allows for queries to be performed on the data. ArcGIS permits importing raster data (e.g. scans of plans). For this study the re-mapped plans were imported into ArcGIS and then aligned to their spatially correct position, established with the help of the DGPS control points of our survey. Next, the various elements of the re-mapped plans were digitised into geometrical elements, in our case polygons in a GIS shape-file. Each individual polygon reflects a specific item on the map and is encoded in accordance to the key (id-number) in the 'Civic' Access database referred to above. Hence the ArcGIS database and the Access Data base can be linked together (Fig. 4.9). This system can be expanded to include excavation and restoration data or any site relevant information. In this way it can offer a perfect tool for heritage management. While this is an important consideration, it is not the concern of this study. Instead, this study is interested in the spatial organisation of Ostia's built environment. Hence we now need to turn our focus towards Space Syntax and, since this chapter is concerned with methodology, the selected analysis tools employed within this study will be discussed in the following section.

4.5 APPLIED SPACE SYNTAX

Having discussed the theoretical framework of Space Syntax in Chapter Three, this section introduces the specific Space Syntax tools which have been applied to Ostia's built and non-built spaces by this study. Insula IV ii is one of the data-sets chosen for closer spatial assessment; in addition, a group of individual houses, identified as guild buildings, as well as the street network have been selected for closer spatial examination. As explained in the introduction to this chapter, these particular categories of urban space represent the city at different scales, from individual buildings to the entire street system. While these selected areas are unique and distinguishable spatial entities, they are also members of the city's whole spatial organisation. It is precisely their dual nature, having both local and global spatial properties, which is at the heart of Space Syntax analysis.

From a larger variety of Space Syntax techniques a number of tools have been selected. Their strength and ability to reveal Ostia's underlying spatial signature depend on several factors such as the quality of the data sets, as well as the suitability of the tools chosen. This section will explain the analytical procedures and will explicate how the spatial values are being calculated. However, since theory and techniques are inseparably interwoven, these explanations cannot stand alone without the larger theoretical framework which has been set out in Chapter Three. For the same reason we will find several 'excursions' reverting back to Space Syntax's theory in those chapters which are dealing with the actual spatial analysis of Ostia's built environment, i.e. Chapters Six, Seven and Eight. This was found necessary since theory and method are constantly reinforcing each other, and, although the theoretical framework and the tools have been explained in separate chapters, nevertheless at times the analyses or their subsequent interpretation need to be fully embedded within Space Syntax's theoretical or methodological considerations to reach their explanatory potential.

4.5.1 Space Syntax tools for spatial analysis

The core tools of Space Syntax include access/convex, axial, segment, and isovist analysis, with Depthmap software (UCL) strengthening the analytical toolbox through Visual Graph Analysis (VGA). The latter enriches the results of the Space Syntax analysis through visual analysis. The types of analysis employed by this study will be explained in the following sections. The analyses and calculations have been made with the help of Depthmap software (UCL),[34] and Jass (KHT Stockholm) for Access Analysis.

Convex or Access Analysis

Access Analysis represents the most commonly used type of Space Syntax analysis.[35] It is most suitable for the syntactical analysis of buildings to identify how spaces within a structure are arranged and related to each other. From a building's spatial organisation inferences can be made about its potential to mediate the relationship between its occupants and visitors, but also the movements of permanent occupants. The analytical procedure requires a two step process: first, the building's floor plan is translated into a graph. The second step involves the calculation of spatial values inherent in the graph structure.[36]

The access graph begins with the subdivision of the floor plan into convex spaces (rooms and open spaces). Next, all convex rooms are marked by a node (circle), with access between rooms represented as lines linking them together. The resulting graph is a purely topological representation of the building, bearing no reference to the building's dimensions or type of decoration. The access graph is often justified with respect to the outside space; alternatively any room within the building can be selected to form the root of the graph. When selecting the outside space as the graph's root, all spaces which are directly

34. The Depthmap software is available free of charge for research purposes from the UCL which grants an annual license.
35. In earlier literature it is also referred to as gamma-analysis; see Hillier and Hanson (1984: 143).
36. See DeLaine for a succinct explanation of Access Analysis (2004: 158).

linked to the outside space are placed at one level above the root. This process is continued until all spaces within the configuration are placed on the levels of depth calculated in step-depths from the outside space. While the graph in itself is a powerful visual tool for a first-hand qualitative appreciation of a spatial structure, a number of spatial values can be calculated on the basis of the graph structure. In the following section only those spatial values will be explained which are relevant for the types of analyses used by this study: control values (CV) and integration (RRA).

Control values (CV) measure the degree of control a space brings to bears over its immediate neighbours and hence refers to local spatial properties. The more neighbouring rooms a room has, the more control it will exert. The calculation is as following:[37] each space in the building is assigned a score of 1. The score of 1 is then divided by the number of the neighbouring spaces (1/n) to which it is connected. For example if a room is surrounded by five neighbouring rooms, each will be given a score of 0.2 (1/5). The scores received by each space from its surrounding spaces are totalled. If a space ends up with a CV in excess of 1, it can be considered a controlling space; if control values move towards 0, it will be a controlled space. The higher the CV, the more controlling the space is. Control values are effective measures to identify locations of high local movement mediation within a building.

Integration/Real Relative Asymmetry (RRA) is a ratio calculated for each space to all other spaces measuring accessibility within a building, hence it is a global measure.[38] Accessibility is defined by the number of boundaries that have to be crossed on average, to reach a space from any starting point in the system. If few boundaries need to be crossed a space will be accessible, if many boundaries need to be crossed, it will be more inaccessible. The measure that Hillier and Hansen have developed to quantify accessibility depends on the principles of symmetry and asymmetry, hence the index devised by Hillier and Hanson is Relative Asymmetry (RA). RA is computed by calculating the average depth of each node from all other nodes in the graph.

The calculation involves several steps: first, the graph's mean depth (MD) needs to be calculated (see Fig. 4.10). This is the total depth of all spaces divided by all the spaces present minus one:
MD= Σdk / k-1, where Σdk is the sum of the depth values d for each of the k spaces.
Once the mean depth of a space has been calculated, its Relative Asymmetry may be calculated using the following formula: **RA= 2(MD-1) / k – 2.**

One difficulty with RA values is that if the configuration becomes larger, RA becomes disproportionably smaller. This is quite understandable from the formula, as the number of spaces (k) increases, so the denominator becomes larger and this has a disproportional effect on the resulting RA values. Hillier and Hanson recognise the problem and offer a method for adjusting RA values by introducing the diamond-shaped justified graph.[39] The latter is characterised by an almost 'normal' distribution of nodes across its levels forming a diamond shape, and so has been found to represent a more realistic benchmark for comparing spatial settings of different sizes. To facilitate the calculation, Hillier and Hanson supply a table with standardised D-values for diamond shaped complexes with between 5 and 300 spaces.[40] To standardise RA values one simply needs to look up the D-value for buildings of the same number of spaces and divide the RA by the relevant D-value. The standardized RA is then called RRA, which refers to Real Relative Asymmetry. RRA values range from zero to infinity. The higher the RRA value, the more inaccessible a space will be. The mean of all RRA values is the MRRA value. Current Space Syntax studies typically report integration values, which are the inverse of RRA values (1/RRA). Higher integration values of nodes, therefore, indicate that the node is less deep on the average from all other nodes, or that it is more integrated into the spatial system.[41]

37. Hillier and Hanson (1984: 109), see also Grahame for a detailed explanation (2000: 33-34).
38. Hillier and Hanson (1984: 108-109), Bafna (2003: 25); see Grahame for more detailes (2000: 34-35).
39. See Grahame (2000: 35) and Bafna (2003: 25).
40. Hillier and Hanson (1984: 112, table 3).
41. Bafna (2003: 25).

Calculating axial integration
Mean depth for each axis [MD]:
MD = sum depth/k-1
k = number of axes in a system
sum depth = the topological depth from each axis to all other axes
Dk= diamond value

Calculating the back street axis:
[MD] = sum depth/k - 1 = 50/16 - 1 = 3,33333

Real asymmetry [RA] = 2 [MD-1]k-2 = 2(3,33333-1)/16 - 2 = 0,33333

Real relative asymmetry [RRA] =
RA/DK = 0,33333/0,086 = 3,875968

Integration value of the street 1:
1/RRA = 1/3,8759689922=0,258

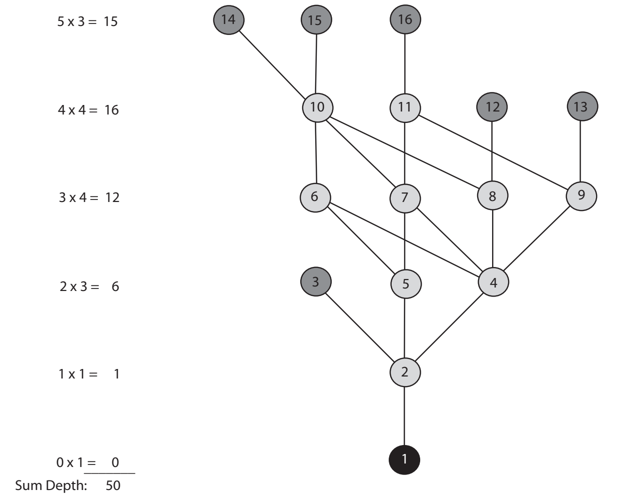


Fig. 4.10 – Steps involved in the calculation for axial integration (after Van Nes' unpublished handbook)

A correlation between Control Values and RRA/ integration offers more nuanced insights into the syntactical structure of a building. Using CV and RRA in tandem allows us to assess which spaces were more likely to have been the spaces for interaction, and which ones most likely offered privacy. This requires that the numerical values are being converted into qualitative indications of local and global interaction potential.[42] The combination of local and global indicators for a particular space gives a reading of its 'presence-availability' in relation to those who used the spaces, inhabitants and visitors. [43]

The Difference Factor offers a further level of analysis, gauging a building's interior-exterior relationship.[44] It is an entropy-based spatial index which quantifies the spread or degree of differentiation among a building's integration values.[45] It can be applied to the whole structure in terms of its interior/exterior relationship, but can be also be used to assess the building's key functional spaces. The calculation is based on each building's RRA measures, using the highest, the lowest and the mean RRA measures. Difference factors closer to 0 indicate differentiated and structured spaces, while values closer to 1 indicate homogenised spaces. The Difference factor is calculated as follows:

H = [a/t In (a/t)] + [b/t In (b/t)] +
[c/t In c/t)]
H* = H – In2 / In3-In2

Axial Line and Segment Analysis

Next to Access Analysis which has been extensively used in this study to investigate the buildings of Insula IV ii and the guild seats, axis analysis has been applied to the city's linear spaces, the principle movement spaces, e.g. the street network and public squares. Axis analysis is best suited to detect potential movement patterns within a system. It is based on the longest straight line that passes through a convex space; this process is repeated until all convex spaces within a spatial setting are crossed by lines, linking all adjacent spaces to each other through intersecting lines. The resulting network of intersecting straight lines represents the axial map. The axial map can be examined for a number of spatial properties, most importantly global and local integration. These measures refer to how each street is interrelated to all

42. The numerical values for local and global interaction potentials are converted into qualitative indications of interaction potential, defining them as low, moderate or high.
43. DeLaine (2004: 158).
44. The difference factor has been included into the spatial assessment of Ostia's guild buildings; see Stoger 2009.
45. Hanson (1998, 30-32); see Hanson (1998: 31) for the formula and calculation.

other streets within the system (global integration), conversely, they indicate how a street is related to its immediate neighbouring streets (local integration). Within Space Syntax the degree of integration does not depend on metrical but on topological distance. This means that the ease of access for a certain street is calculated by the number of directional changes one has to make to arrive at destination. Integration is equivalent to Real Relative Asymmetry (RRA) and hence is calculated in the same way (see above). In terms of visualisation there are several ways to reproduce an axial line graph. The most user-friendly version is the axial graph produced by Depthmap which represents a street network as a colour coded hierarchy, whereby the degree of integration is visually expressed along a spectrum from red to blue, with the most integrated streets in red, and the most segregated streets in blue.[46]

Segment Analysis

This type of analysis adds another analytical perspective, focussed on the line structure of the street network.[47] The units of analysis are the street segments and the distance relation between them is the amount of angular changes from one segment to the other.[48] Segment analysis identifies the paths with the least angular changes, and hence corresponds closely to observed actual movement patterns.[49] The analysis employs two spatial values: integration and choice. These values respond to the principle components of human movement: selecting a destination (integration) and selecting a route (choice). Within this study segment analysis has been applied to Ostia's extended street network. The procedure and the results of the analyses are discussed in Chapter Seven.

46. Depthmap provides all relevant spatial values in table format; these can be exported into excel tables to facilitate a comparative assessment.
47. Instructions on how to use segment analysis are available from The Bartlett School of Graduate Studies; they come in the form of a simple guide produced and circulated by B. Hillier; see Hillier (2008b).
48. A straight connection between two segments is a 0-degree connection, while a series of 0-degree connections will be a straight line.
49. Hillier and Iida (2005).

The most significant findings about street networks which came out of Space Syntax research have been formulated into theories about the city. The relevant ones for this study are 'Cities as Movement Economies' and 'Centrality as a Process'.[50] These concepts will be discussed in connection with Ostia's street network and the related distribution of land-uses, as well as the vitality of an urban neighbourhood (Insula IV ii).

4.5.2 Space Syntax tools for the analysis of spatial perception

Isovists and Visibility Graph Analysis (VGA)

Isovists and VGA are techniques for the representation and analysis of bounded spatial systems, which may also be applied to landscapes. These techniques add yet another perspective to the available Space Syntax tool kit by offering a way of addressing the relationship between the viewers and their immediate spatial environment. An Isovist, or viewshed,[51] refers to the area in a spatial environment directly visible from a location within the space. This makes Isovists an intuitively attractive way of thinking about a spatial environment; Isovists provide a description of the space ´from inside, from the point of view of individuals, as they perceive it, interact with it, and move through it.[52]

Visibility Graph Analysis (VGA) takes Isovist analysis further by integrating a set of Isovist polygons into a single visibility graph. In order to form a visibility graph a grid of many (thousands) points are taken across a space. Each node represents a point location within the open space of the configuration, and these nodes are linked according to one of two rules: the first rule creates a link in the graph between two nodes if they are mutually visible. The second rule requires that a link is only created if the Isovist polygons from each node

50. Hillier and Penn *et al.*(1993), Hillier (2007: 112-137).
51. The concept of isovists has a long history in both architecture and geography; the same idea, but called 'viewshed', has been developed in the field of GIS; on the development of isovists see Turner *et al*. (2001: 103).
52. Turner *et al*. (2001).

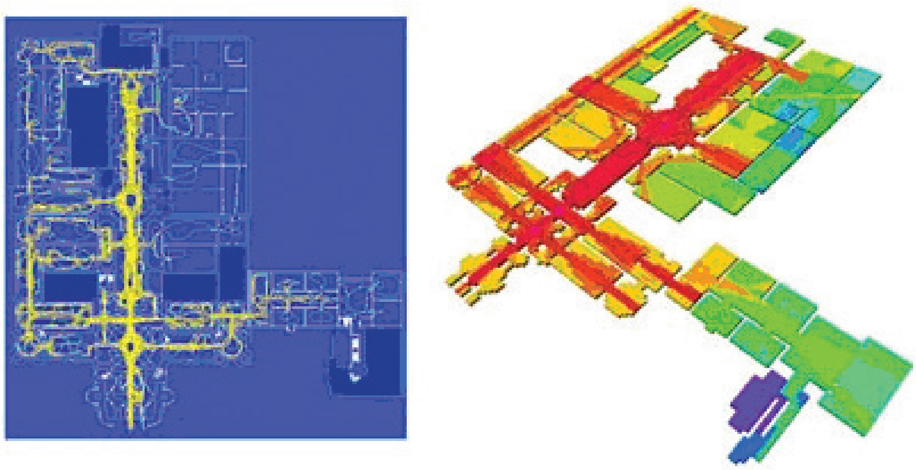


Fig. 4.11 Ten-minute movement traces (left) compared with visibility graph analysis integration of the Tate Gallery (right). Note how most movement occurs in the most visually integrated areas, identified by the analysis (source VGA website, The Bartlett School of Architecture, UCL)

location intersect.[53] Once the visibility graph has been constructed, measures of various features of the graph can be taken. Inspired by Hillier and Hanson's (1984) work, VGA has been concentrating on the integration of a point in the graph. The integration is a normalised (inverse) measure of the mean shortest path from the point to all other points in the system. The study of London´s Tate Gallery was the first application of VGA conducted by The Bartlett School. The study compared the first ten-minute movement trace of people entering the Tate with the pattern of VGA integration for the gallery space. The results were surprising: visual inspection showed that the highest integration values corresponded well with where movement occurred (Fig. 4.11).

Agent-based analysis

Finally, the last analysis which was used in this study is agent-based analysis. Space Syntax incorporated agent-based modelling into the already existing Space Syntax theory about the significance of the spatial configuration in guiding movement and interaction.[54] Space Syntax's starting point was: if configuration is important, how exactly does it affect the way people move around the world? This question was answered with an agent simulationin which the only movement strategy possible was dependent on the configuration of a space. The impetus for the method of analysis is Gibson's theory of natural vision. In natural vision, the subject is drawn through a configuration not by planned decisions, but by the available affordances of objects within it.[55] Space Syntax research has shown that it is possible to simulate human movement by encoding Gibson's principle of affordance in the context of natural movement.

53. Turner and Penn (1999: 3).

54. Turner and Penn (2002: 473-490).

55. Gibson (1979).

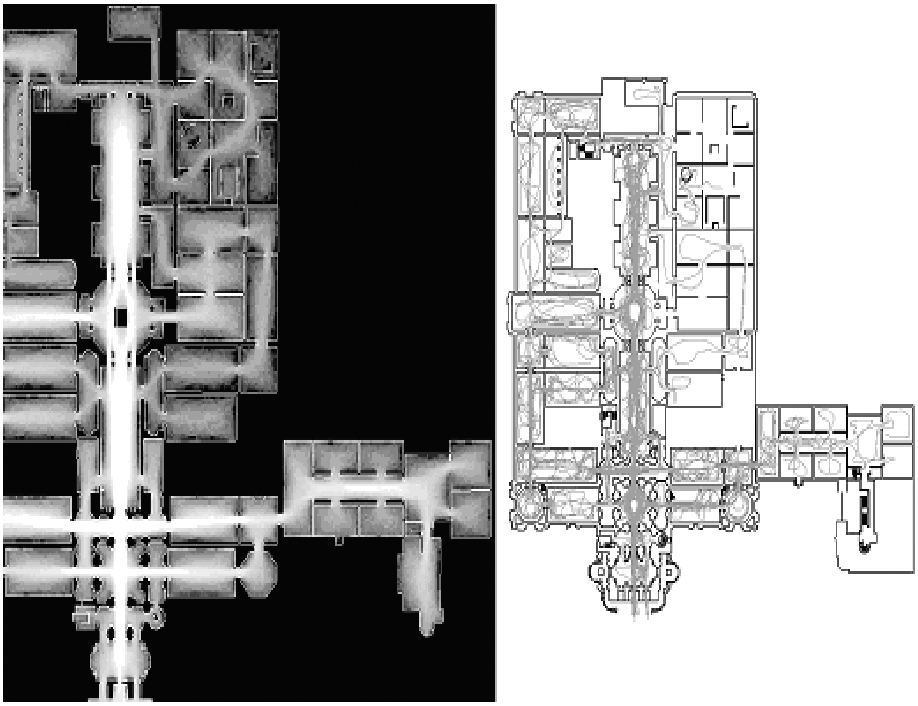


Fig. 4.12 – Tate Gallery London: positive correlation between observed movement and the trails left by computer agents walking through the Tate Gallery (black areas have low counts and light areas have high counts) (source Turner and Penn 2002: 408, fig. 6)

London's Tate Gallery served once more as a case study, and it was found that the actual level of movement observed within the Tate Gallery can be reproduced by agent-based analysis with a correlation coefficient of R2 = 0,76, if only elementary guidance rules were applied. These rules were that destinations may only be chosen from a 170 º visual field from the current heading, and that the destination is reassessed every three steps. Agent-based analysis can make interesting contributions to archaeology since it comes very close to actual patterns of observed movement, and therefore allows insights into the relationship between the built environment and spatial behaviour.

4.5 CONCLUSION

The methods and techniques discussed in this chapter range from re-mapping an archaeological site to a fully embedded spatial analysis. The complexity of Ostia's archaeological record requires a combination of methods. Despite their diversity these methods can be summarised as non-destructive or non-invasive methods of archaeological research. Such approaches have been successful in gaining new insights into sites which have been excavated some time ago. These methods are achieving more and more importance since excavations have become too demanding on both human and financial resources. There is a large potential for integrating old excavation data with standing architecture at sites with a long history of excavations. The added analytical component, employing Space Syntax methods for spatial analysis, however moves the approach followed by this study beyond the conventional recording and data processing and towards a more holistic study of past urban space.

5 – Insula IV ii: the Built Environment

This chapter examines Insula IV ii (Fig. 5.1), concentrating on its urban development during the 2nd and early 3rd centuries AD. To reconstruct the Insula as completely as possible a combination of approaches has been applied. These include a thorough assessment of the standing structures,[1] a critical evaluation of published and unpublished (archival) material, as well as a Space Syntax analysis of the Insula's spatial organisation.[2] The Insula comprises 14 buildings, more than half of which have never been studied, while the others, mainly the better preserved ones, have attracted limited attention in the past. Earlier studies have treated these buildings as isolated units, and as such they have been approached from specific thematic perspectives, e.g. wall-paintings, mosaics, or the architectural constructions typical of a certain period, while none of the buildings has received attention in its own right. There is therefore a considerable amount of material evidence available that has previously been neglected, which allows us to take a fresh look at the Insula and its buildings.

For the first time this chapter brings together the complete Insula, including all its buildings, presenting their research history as well as a new assessment of the material evidence. Already established information and new findings resulting from this research have been combined to present a synthesis of the Insula's built space. The focus is on the Insula as a spatial entity, acknowledging that the Insula is more than the sum of its buildings. The issue addressed is how the group of buildings functioned as a neighbourhood, looking at its internal spatial structure as well as its relationship with public space through the street network in which it was embedded.

1. See Chapter Four above on the technical specifications of this study.
2. See Chapter Four above on the specific Space Syntax tools applied to the Insula, while the Space Syntax analysis of Insula IV ii is found in Chapter Six.

Space Syntax theory and methods have been applied to examine the Insula's spatial properties, and to address questions related to its integrative capacity as an urban neighbourhood.

The term *insula* is here used as a modern label, denoting a city street block. The term provides a mere technical convention, and neither implies that this particular group of buildings was ever called an *insula* in the Roman period, nor refers to the activities that took place therein.[3] The term *insula* is highly ambiguous as it incorporates both legal and architectural definitions.[4] It covers a wide range of meanings from street blocks to small one-room apartment units, and even funerary enclosures. To make it even more complicated, a visibly distinct architectural unit within a city block could also be called *insula* in both ancient literary sources and in today's literature; hence one would find an *insula* within an *insula*. In the following the term *insula* has been used only in the sense of the 'city street block', while complex buildings found within Insula IV ii are always referred to as 'building or caseggiato' and never as *insula*.[5]

5.1 INSULA IV II - TOPOGRAPHICAL LOCATION

Located on the southern *cardo maximus*, near the Porta Laurentina, but still inside the Late Republican city walls, the Insula enjoyed a location that

3. See Allison (2001: 184) for a critical stance on the use of ancient terminology from textual data to interpret material remains.
4. See Storey (2004) for a thorough assessment of Roman documentary sources for residential contexts.
5. In contrast, Calza (1953) refers to complex buildings as '*insula*'; Calza also uses "caseggiato" to describe a more complex building. A caseggiato often comprises various functions, e.g. an apartment building with commercial space at ground levels.

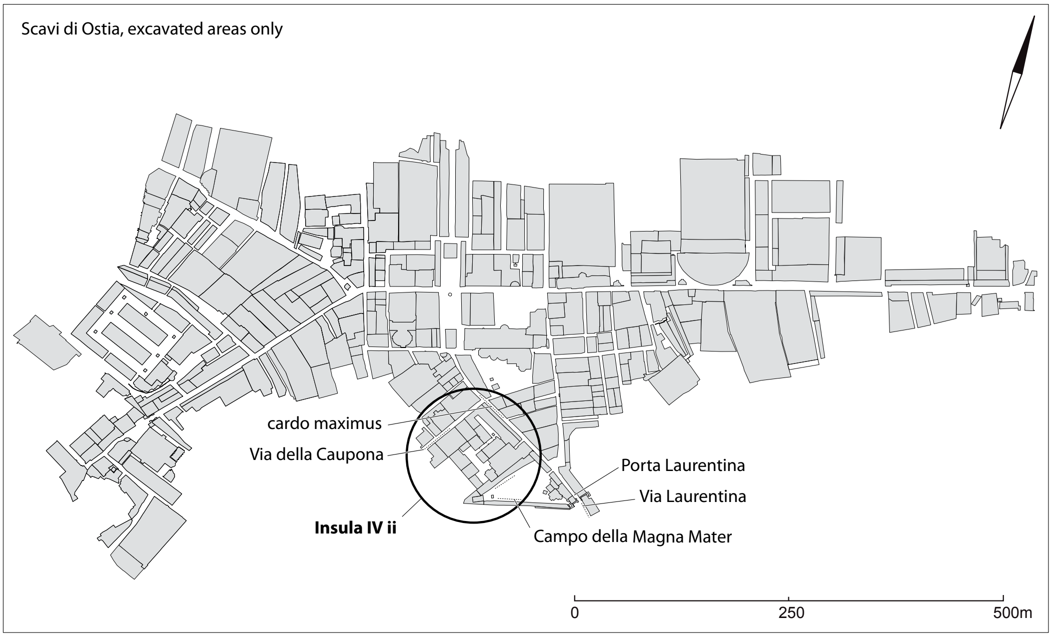


Fig. 5.1 – Ostia's Insula IV ii encircled

benefitted from the relative proximity to the city centre, as well as from the closeness to the city gate (Fig. 5.1). The latter provided a connection to the south-eastern extra-mural areas of Ostia and the area of Laurentum.[6] Placed at the intersection between the *cardo* and the Via della Caupona, a side road south off the *cardo*, the Insula appears well positioned within the urban street network. Towards the east, the triangular area of the Campo della Magna Mater, the sanctuary dedicated to Cybele, the great mother goddess, and one of Ostia's main sanctuaries, delimits the Insula. The northern and western sides are confined by streets, whereas its eastern and southern extent are bounded by retaining walls to a height of about 1.50 - 2.00 m, keeping in place a fill layer presumably placed when the terrain was levelled prior to building development during the Trajanic period (AD 98-117).

The southern boundary of the Insula coincides with the limits of the city's excavated area. In the conventional reading of Ostia, which has been largely conditioned by the 'visible' (excavated) city, the extent of the excavation has at times been associated with the expanse of the city. As far as the Insula is concerned, its 'edge position' has contributed to a perception of it being located at the fringe of the built-up area and thus lacking a 'visible' neighbourhood on the southern side, as in the Gismondi model (Fig. 5.2). However, as has been revealed through geophysical prospection, Ostia's excavated area constitutes only about one third of the city, comprising merely the central areas, while the larger part, including the outlying zones, still remained unexcavated.[7] From the published preliminary results of this survey it becomes already clear that the Insula was fully embedded within a densely developed area. However, it will only be possible to reach a better understanding of its southern neighbourhood once the results of the geophysical survey are available. The same applies to the street which runs south of the Insula, traversing the partly unexcavated area from the city centre to the zone south of the Campo della Magna Mater; the course of the street and its intersections with other streets cannot yet be securely established.

6. See Chapter Six on streets.

7. The final results of the geophysical survey have not yet been published; for preliminary reports see Bauer et al. (1999).

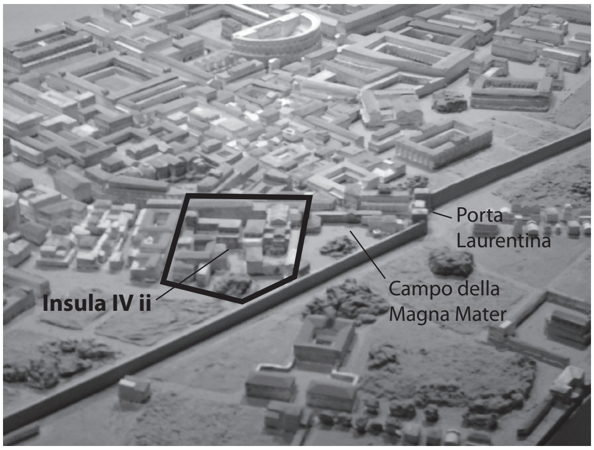


Fig. 5.2 - Gismondi's model of Ostia (Museo Porta San Paolo, Rome) looking at Insula IV ii from the south

5.2 INSULA IV II – BUILT SPACE

Before attempting to understand how the Insula functioned collectively, the buildings comprising the group will be discussed individually. This will be done in the form of a descriptive analysis of the built space and the building's structural history. Whenever possible a detailed treatment of the individual buildings will be presented. The degree of detail seems fully justified since the Insula and its buildings have not received sufficient attention until now, therefore, by 'placing Insula IV ii on the map' this study fills a lacuna in Ostian research. At times, as far as the evidence permits, an identification and function of the buildings have also been suggested together with a description of the material remains. The mixed land-use which seems so overtly apparent might point to various groups of interest present within the locality. This notion will be weighed against the Insula's built environment and spatial organisation, proposing new ideas of how the Insula functioned as an urban neighbourhood. But first of all, a comprehensive survey of the individual buildings (IV ii 1 – 14) will be presented, following the established numbering system introduced in the topographical index of the Scavi di Ostia I (Fig. 5.3).[8]

8. For consistency's sake the established numbering has been followed even though some buildings form a structural unit with another building (e.g. IV ii 7 and 8 as well as IV ii 9 and 13).

5.2.1 Terme del Faro (IV ii 1)

The Terme del Faro (baths) are located on the eastern border of the Insula, adjacent to the Campo della Magna Mater (Fig. 5.4). The baths received their name from the image of a lighthouse (*faro*) depicted on the mosaic pavement found in room (13) to the east of the main entrance (Fig. 5.5).[9] The bath complex covers a total area of about 1542 m^2, reaching deep into the Insula. On the northern side the complex is bounded by the *cardo maximus*; to the west by the Caseggiato dell'Ercole (IV ii 2-3), and to the southwest by building IV ii 5. At the southern end the baths border onto a larger area of open space forming part of the Insula's southern inner courtyard enclosing a small unidentified structure (Fig. 5.6).[10] Their main entrance is located along the *cardo*, while some additional points of access were provided from within the Insula, and at a late period of occupation a direct connection between the baths and the Campo della Magna Mater was established.

Different levels of heights can be observed between the baths and the surrounding terrain. At the northern side, along the *cardo maximus* the baths open at street level, while the terrain slopes down towards the south. The most significant change of levels is found between the baths and the Campo, with a difference in height of about 1.50 - 1.80 m. Since baths require substantial substructures to accommodate service facilities for heating, water and maintenance,[11] the foundation walls of the bathing block would be expected to be at least as low as the floor levels of the Campo. It therefore looks as if the sloping terrain was utilised sensibly: the heated sections of the baths which necessitated substructures seem to have been concentrated in the lower parts towards the south, while the cold rooms and cold water basins are located in the northern part, where added terracing

9. See Becatti's volume on the mosaics of Ostia, especially on the Terme del Faro (1961: 172-176, mosaic nos. 320-323).
10. This small building has as yet not been examined; no reference exists in the topographic index in Calza (1953). The structures are completely overgrown, thus inaccessible. An impression of the remains of the building, when cleared after it had been excavated can only be gained from a photograph at the Archivio Fotografico (ref. 3714) (Fig. 5.6).
11. See Yegül 1992 on baths in general; see DeLaine (1997) on the Baths of Caracalla in Rome.

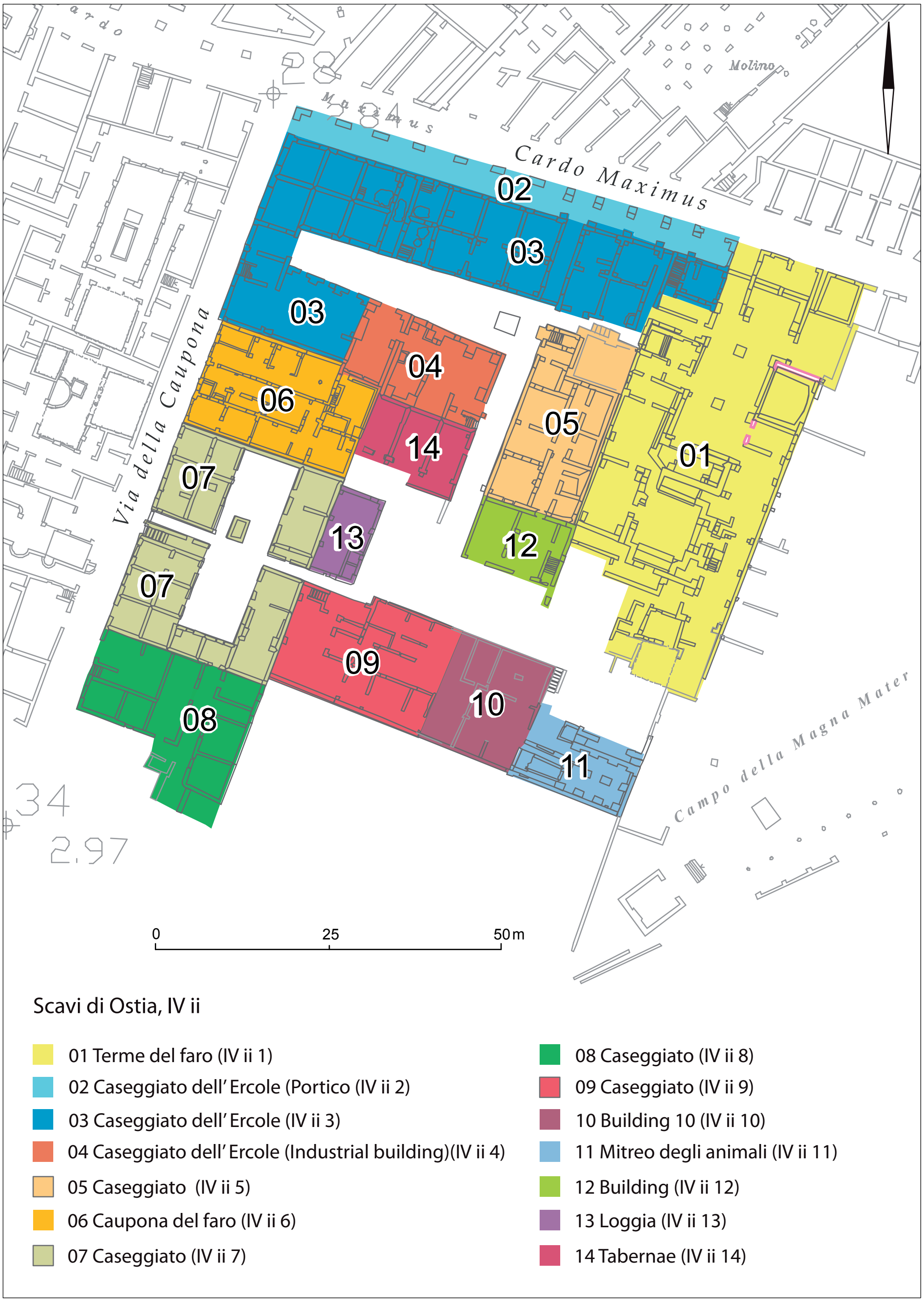


Fig. 5.3 - Insula IV ii Buildings 1 - 14

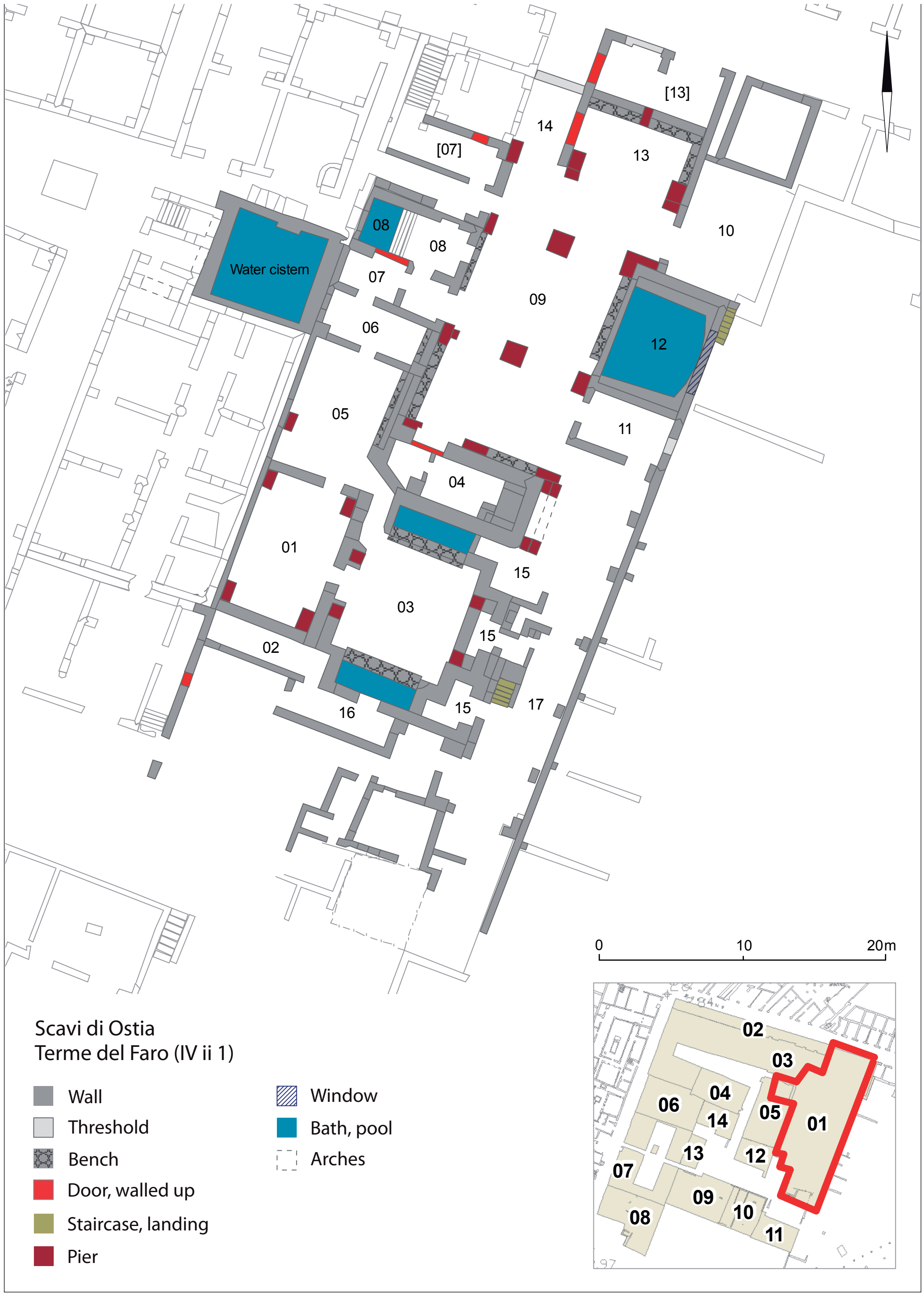


Fig. 5.4 - Terme del Faro (IV ii 1) walled structures and architectural details

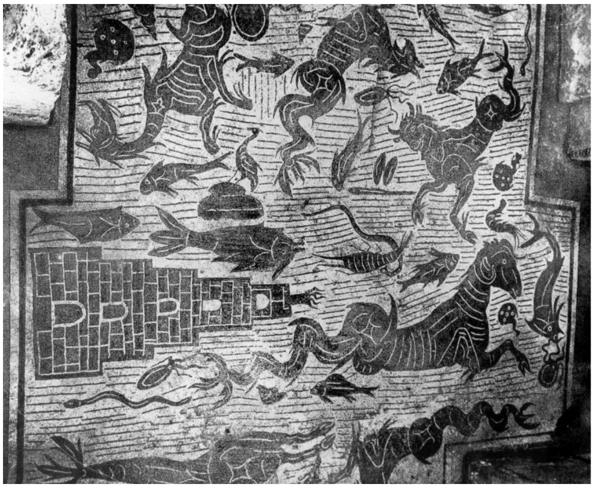


Fig. 5.5 - Floor mosaic in the baths' eastern changing room (apodyterium 13) with lighthouse (Faro) surrounded by fish and sea monsters. The lighthouse is placed at the apodyterium's entrance, emphasising a direction of movement originating from the corridor into the room (photograph from Becatti 1961, No. 320, TAV, CLXIV)

Fig. 5.6 - Remains of a building south of the Terme del Faro (Scavi di Ostia, Archivio Fotografico, ref. 3714)

appears to account for the difference in height between the floor levels of the Campo and the northern sections of the baths.

These levelling activities might explain the presence of the eastern *opus reticulatum* (brick) wall, which seems to have acted as a retaining wall to keep in place the fill layer used for terracing. This wall confines the Insula towards the Campo, extending along the full length of the baths (Fig. 5.7). Hence, the wall not only marks the boundary between the two areas, but also reflects the peculiar relationship between the Campo della Magna Mater and the Insula. Interestingly enough, the Insula, or to be more precise the baths or their preceding building, expanded their area by encroaching onto the 'territory' of the Campo.[12] This can be inferred from the original eastern confines of the Insula, marked by the *interstitium* (space in between *insulae*) on the *cardo* (Fig. 5.8). If a line is drawn from the western side of the interstitium due south, it meets the *opus reticulatum*/brick wall which bounds the Insula at its south-eastern end (Fig. 5.9). Therefore, the area east of this line refers to space which was originally part of the area of the Campo, and becam incorporated into the Insula at some later point. From this, one might be able to infer a degree of interdependence between the Insula and the Campo.

Excavations and history of research

The Terme del Faro have been largely neglected; this applies not only to the baths' state of preservation but also to their study. Their structural development has never been established, and hence the chronology is not at all clear.[13] Moreover, the similarity in name between the Terme del Faro and the Terme del Foro has at times led to confusion in the literature, as well as in the archiving system applied by the Soprintendenza of Ostia.[14] Previous to this study, the most detailed description of the baths was found in Ostia's archaeological guide,[15] while specific aspects,

12. This interesting observation was already made by Rieger (2004: 125).

13. As Pavolini (2006: 206) puts it: '… le cui fasi cronologiche non sono del tutto chiare.'

14. As an enjoyable and rewarding by-product of this study, a number of statues which had been wrongly recorded as coming from excavations of the Terme del Foro, can now be 'repatriated' to their original provenience: the Terme del Faro (Stöger in prep.).

15. See Pavolini (2006: 206-207); the baths are also listed

Fig. 5.7 - Eastern Retaining wall (*opus reticulatum*/brick) marks the boundary between Insula IV ii and the Campo della Magna Mater (seen from the Campo)

such as the mosaic pavements, or the chronology of lead waterpipes and the related change of ownership, have been approached in specific studies.[16] In addition, the relationship between the Campo and the baths has been explored from the perspective of the Campo,[17] whereas the link between the baths and the Insula is still to be examined and will be dealt with in the following sections.

The baths were excavated during Calza's campaign in July 1940; however, the map produced by T. Zappati reveals that the northern part of the baths had already been exposed in 1805 (Fig. 5.10).[18] Nothing is known about the earliest excavations,[19] and not much has been reported about Calza's campaign either. The *Giornale degli Scavi* (Vol. 28, 1938-1943) lists a number of entries, recording and describing statues and fragments of sculptures found during Calza's campaign, while references to the remains of the building itself are lacking.[20] Restoration works

in Nielsen's catalogue (1991); the Terme del Faro have been included in G. Poccardi's study of Ostia's baths (verbal communication, publication forthcoming).

16. On the mosaics see Becatti (1961: 172-176, mosaics nos. 320-323); on lead waterpipes and their proprietors see Geremia-Nucci (2000: 383-409); on unpublished lead water-pipes see Barbieri (1953).

17. See Rieger (2004: 124-126); R. Mar conducted excavations within the Campo dalla Magna Mater in the area of the Temple of Cybele (or Magna Mater, the great mother goddess), but the results have as yet not been published. A preliminary report has been submitted to the Soprintendenza, which is however still embargoed, and was therefore not available to the author for consultation.

18. The earliest site-plans of Ostia were produced by Pietro Holl; an adapted version of Holl's plan was published by Guattani in 1805 in his *Monumenti inediti*; the plan was drawn by the architect T. Zappati. The plan included the excavations by G. Petrini carried out between 1802 and 1804; see Lauro (1995: 42, note 42) on the history of excavations in Ostia.

19. The excavations of the 18th and early 19th century had no scientific agenda, but were carried out to retrieve marble statues and inscriptions.

20. See *Giornale degli Scavi* (henceforth G.d.Sc.), Volume 28, 1938-1943, entry dates 4th and 5th July 1940.

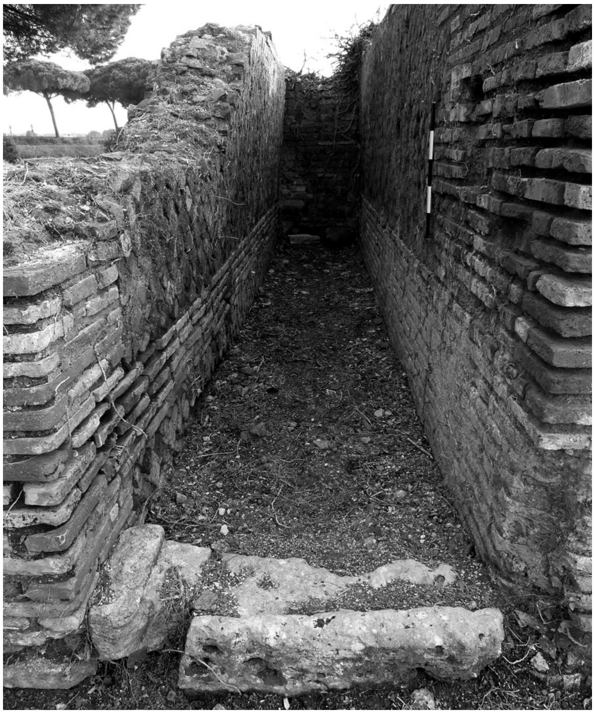


Fig. 5.8 - *Interstitium* between Insulae IV i and ii; seen from the *cardo maximus*

Fig. 5.9 - Presumed original boundary of Insula IV ii (dashed line)

seem to have followed soon after, in the manner typical of Calza's operation.[21] Later, between 1956 and 1961, major restorations were conducted within the Insula. As far as the baths were concerned these concentrated on the mosaic pavements and the water drains. During clearing a number of small objects were retrieved, most of which reflect what one would expect to find in baths: several metal screws to close water taps, a spoon made of bone, small clay vases, oil lamps and coins, but also a cache of 23 bronze coins cemented into the compressed floor of one of the service corridors.[22] Some of the finds, notably two bronze coins from the 5th century AD, could point to the longevity the baths have enjoyed.[23]

In July 1964, F. Zevi and I. Pohl excavated a few trenches within selected areas to gain a better understanding of the baths' building sequence.[24] One trench was opened in room (1), where the hypocaust had partly caved in, and the mosaic layers had been detached from their support. The excavations ascertained that the mosaic floors rested on a hypocaust which had been constructed during the period of Caracalla (211-217 AD); the dating is firmly based on brickstamps found on the pavement

21. G.d.Sc. Vol. 28, lists under the 18th of September 1941 that fragments of a (funerary) inscription came to light during restoration work; another fragmented inscription was encountered on the 18th December 1941, when the water drains which diagonally traverse the large *frigidarium* (09) were cleared (see floor plan Fig. 5.4).

22. See G.d.Sc. Vol. 32 (1956-61), entry dates between 17th and 22nd of Oct. 1958, while the 23 coins were found on 5th of February 1959.

23. See G.d.Sc. Vol. 32 (1956-61), entry date 29th May 1959, p. 104; see also Geremia-Nucci's comment on the long life of the baths, indicated by the use of funerary inscriptions in secondary contexts (2000: 404, note 106).

24. See G.d.Sc. Vol. 33 (1961-65), pages 105-108; entry dates 13th to 17th July 1964; the results have been published in Notizie degli Scavi (1970: 41-42); a drawing of the *suspensurae* (scale 1:20), ref. 955, by A. Pascolini is kept at the Archivio Disegni of Ostia.

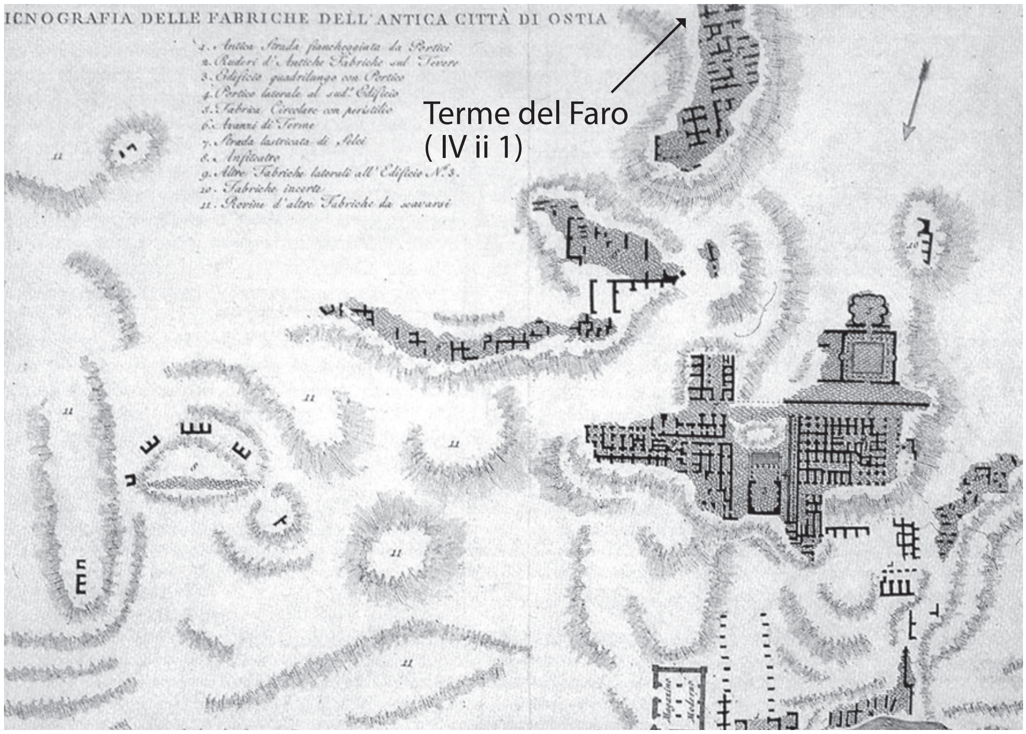


Fig. 5.10 - Plan by Zappati/Holl of 1804 (section only) indicates that parts of the Terme del Faro had already been excavated at the beginning of the 19th century

(bipedales),[25] upon which the *suspensurae* (pillars of stacked brick) had been placed (Fig. 5.11).[26] Therefore, secure dates for the reconstruction of the heated rooms during the Severan period have been established; these activities included the renewal of mosaic floors and the rendering of stucco decorations (Fig. 5.12).[27]

A further trench was opened in the centre of room (01), with the intention of investigating the layers below the Severan pavement. A wall (c. 0.75 m wide) belonging to the preceding building came to light under the compressed fill which supported the pavements of the Severan hypocaust. The walls' alignment was found to comply with the directions of the later walls of the baths. On the western side of the earlier wall, remains of earlier floor levels with white mosaic tesserae were revealed. Unfortunately the excavation report does not supply any further information, and hence, while secure dates for the Severan reconstruction have been provided, the baths' earlier phases remain uncertain. Notwithstanding this, some observations based on the author's survey of the standing structures can be offered, and these, together with a synthesis of the published studies, shed new light on the development of the baths and the changes that occurred over time.[28]

25. Bipedales conform to about 2 Roman feet square (c. 58-59 cm2).
26. The Notizie degli Scavi (1970: 42) provide a list of the 17 brickstamps with their respective reference to CIL and their inventory numbers.
27. Drawings to scale (plan and section, 1:25) of the Severan wall-decorations have been made by M. Bedello; these have not been published, but are kept at the Archivio Disegni of the Soprintendenza of Ostia.

28. The plans of the Terme del Faro, presented here, form a hybrid between Calza's 1953 plan and the results of a re-mapping project carried out by the author with the help of H. Kamermans, E. Mol, D. v. d. Zande and G. Offenberg; the ArchGIS work is by J. Lee of GeoStar, Leiden.

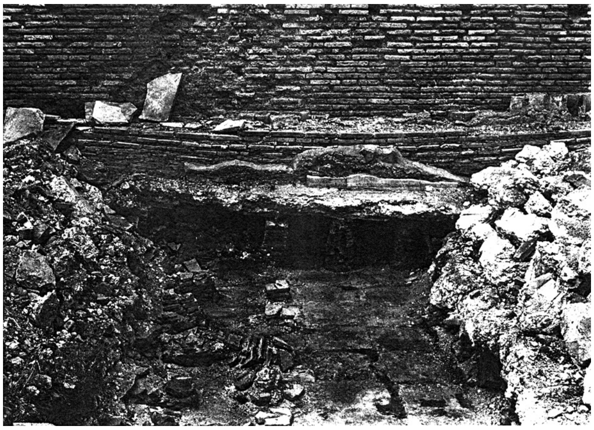


Fig. 5.11 – Excavation in room 01 (1964) exposing the hypocaust; suspensurae are visible in the background (Archivio Storico, Soprintendenza Archeologica di Roma e Ostia, Giornale di Scavi Ostia Vol. 33, 1961-1965)

Building phases

The initial development of the area, prior to the baths, appears to have coincided with the construction of the Campo della Magna Mater, dated to the Early Imperial period.[29] Calza's phase plan for the Augustan and Flavian periods shows traces of early buildings existing within the Insula; these were mainly concentrated along the *cardo maximus* (Fig 5.13). Furthermore, Calza refers to the existence of other early structures, some of which have been integrated into the later buildings.[30] In fact, early *opus reticulatum* wall (*tufo* quoining) are still extant in the northern part of the baths, incorporated into the later structures (Fig. 5.14).[31] In addition, an intriguing feature, also preceding the baths, is presented by a travertine door frame of 'monumental dimensions' (Fig. 5.15).[32] It provided access to a room constructed in *opus reticulatum* (brick) (room 08). This room had been incorporated into the baths, and, in its new role it accommodates a cold water basin of modest dimensions. In fact, when put to its new use, the wide door opening was constricted, thus adapted to its new function, reflecting a much humbler scale.

Only a few traces of the preceding structures can be identified, and while the scarcity of the evidence would not permit a reconstruction of the original development, still these can help us to understand change and adaptation. The first major reconstructions of the area seem to have occurred towards the end of the 1st century AD and the beginning of the 2nd century; the *opus reticulatum*/brick walls of the *tabernae* (13) along the *cardo*, and the eastern *opus reticulatum*/brick wall along the Campo, can be attributed to this phase. However, there is no evidence that the building had been transformed into a bath complex already during this period;[33] above all there is no secure proof for water pipes supplying the building. The first reliable evidence for lead water pipes comes from stamped *fistulae* providing the names of their proprietors.[34]

Fig. 5.12 – Terme del Faro (IV ii 1), stucco decoration (Severan Period), room 06 southern wall

29. Rieger (2004: 125).
30. Calza (1953: 108), see also Calza's phase plan (1953, fig. 30).
31. The early date can be inferred from the *tufo* quoining and from the presence of putlog holes at levels often lower than 1.0 metres. The latter would suggest that the wall has its foundation at least 1.0 – 1.5 metres below today's floor levels.
32. See Calza (1953: 108).
33. Calza (1953: 127) and Meiggs (1973: 418, fig. 30) suggest that the baths were constructed during the period of Trajan.
34. Geremia-Nucci (2000: 386).

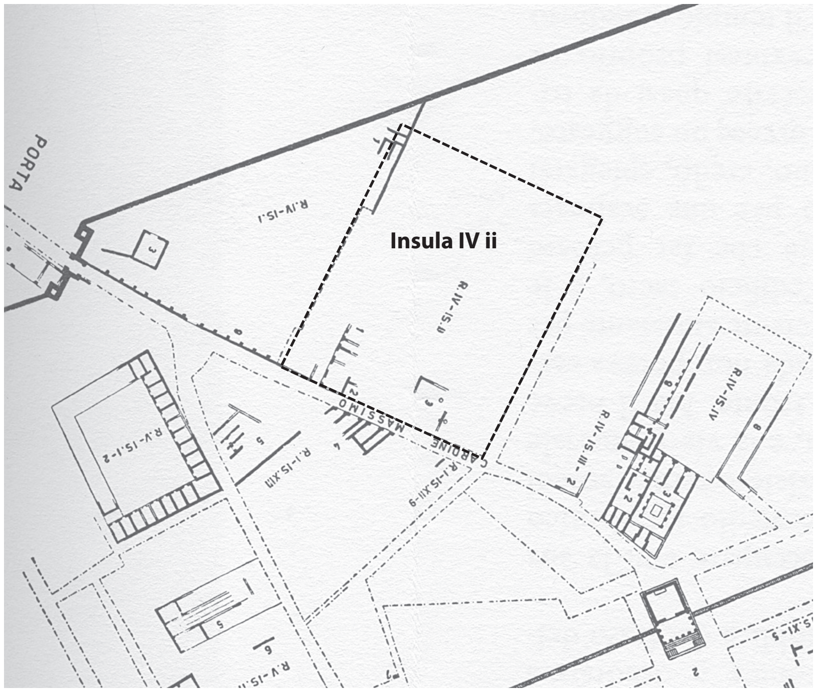


Fig. 5.13 - Early Imperial development in Insula IV ii: only few strucutal remains were identified and marked on Calza's phase plan for the Augustan/Flavian Period (Calza 1953: fig. 30)

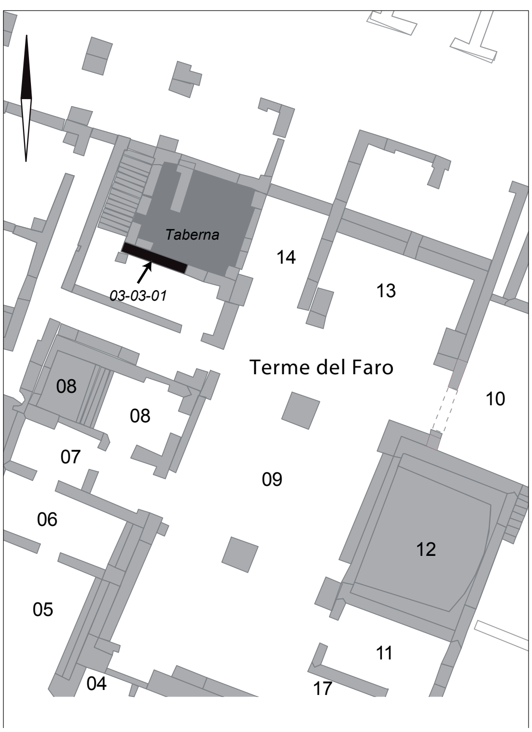


Fig. 5.14 - An *opus reticulatum* (*tufo*) wall, part of the preceding structures, divides the northern taberna from the rooms belonging to the Terme del Faro

Fig. 5.15 - Travertine blocks forming the arched door opening of the preceding building, integrated into room 08 which served as a small *frigidarium* of the later baths

The earliest identifiable lead pipes have been connected with the name *Cornificia*, and have been dated to the middle of the 2nd century AD. The female person whose name was stamped on the fistula, was first thought to be the sister of the emperor Marcus Aurelius, but was later identified as being the daughter of the emperor, who was also called *Cornificia*.[35]

Most scholars tend to agree that the baths were installed during the mid-2nd century AD; the construction in brick (latericium) typical for the period seems to lend support, and, more importantly, the established brickstamp chronology has supposedly provided reliable dates.[36] The argument hinges heavily on Bloch's assessment of brickstamps, which has been followed by all later scholars. Bloch lists several brickstamps for the Terme del Faro, most of which come from a secondary context, however one stamp (*CIL* XIV 422), dated to around 150-160 AD, was claimed to have been found in situ in the arch of a window of the '*forica*' near the *cardo maximus*.[37] Therefore, a reliable date for the latericium construction of the Terme del Faro seemed available. However, no such *forica* near the *cardo* forms part of the Terme del Faro. Instead it seems more likely that this particular find spot points to the Terme del Foro, with its latrine along the *cardo*. In this case the similarity between the names of the two bath complexes seems responsible for the wrong attribution of this particular brickstamp. As such, the absence of brickstamps does not necessarily invalidate the mid-second century AD dates which have been proposed for the building's transformation into a bath complex. The actual bathing block, constructed in *opus latericium*, seems to fit well into this period, while later activities, concerning the reconstructions of the hypocausts, have been firmly dated to the Severan period. A third and last rebuilding, identified by earlier studies,[38] seems to concern activities involving the *tabernae* along the *cardo*; these interventions have been dated to the last quarter of the 3rd century AD. All in all, this would account for three major rebuilding phases during the long life of the Terme del Faro.

Still, we should keep in mind that baths, by their very nature, require a considerable degree of maintenance. Temperature fluctuations and high levels of humidity put constant stress on building materials, as well as on the structural strength of the walls. Therefore, next to larger reconstructions, which can be roughly grouped into building stages, a series of smaller interventions took place during the baths' long period of occupation; however, these cannot be treated with much attention, since the aim here is to present an overall picture. Instead, this study is more interested in those alterations and reconstructions which also impacted on the baths' neighbouring buildings. Such 'bilateral' activities not only capture the baths' internal dynamics, but can also shed light on the relationship between the Terme del Faro and the rest of the Insula. The links with neighbouring buildings will be examined in the following sections, but before that, the baths' general layout will be explained.

Layout and decoration

The Terme del Faro have been classified as of the angular row type, and, owing to their relatively moderate size, the baths fall into the category of *balneum*.[39] The baths, as they have been preserved in their final stage, comprise 17 spaces functionally linked to each other (Fig. 5.16). The complex does not include an area of open-air space which could have functioned as a *palaestra*. The main entrance was located on the *cardo*, from there the fauces (14) in the form of a passage flanked by *tabernae*, led directly into the baths' amply proportioned *frigidarium* (09).

35. Geremia-Nucci (2000: 386, note 17) and Barbieri (1953: 158).
36. Pavolini (2006:206), Geremia-Nucci (2000: 385).
37. Bloch (1953: 226).
38. Heres (1983: 91 and 94) complies with Calza's chronology (1953: 226).
39. This classification has been suggested by Nielsen (1991 II: 5); contra DeLaine (1993: 348-358); Nielsen's catalogue reference to the Terme del Faro is C.26.

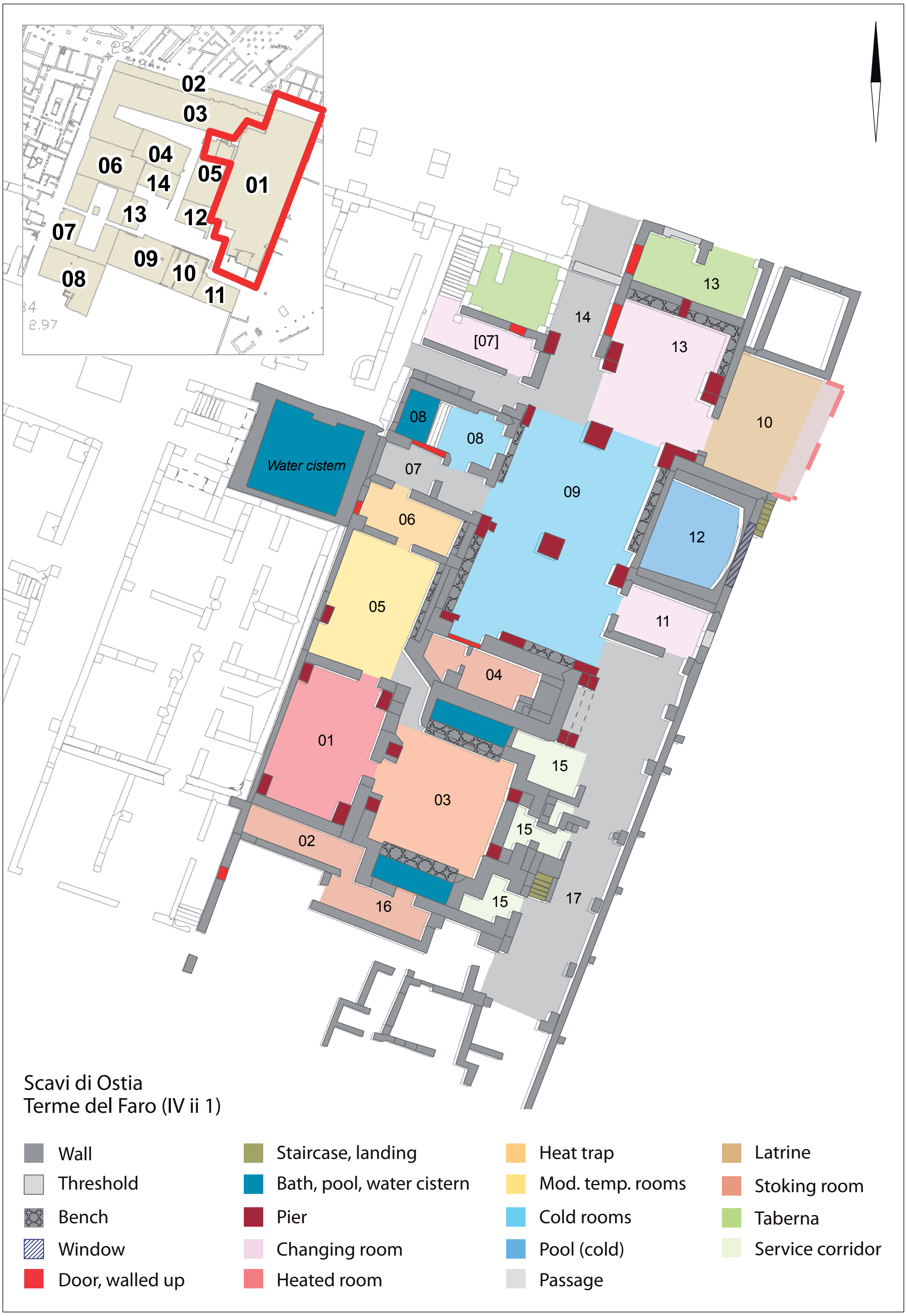


Fig. 5.16 – Terme del Faro (IV ii 1) functional zones of the baths

Just before the *frigidarium* was reached, a sizeable room (13) (apodyterium) opened to the east, which featured the mosaic floor with the lighthouse (faro), surrounded by sea creatures and sea monsters (see Fig. 5.5).[40] During a late phase of occupation, a connection was opened to the easternmost room, where a latrina (10) was installed. By then the baths had also established a 'physical' link to the Campo della Magna Mater, with walled stairs bridging the difference in height.

The *frigidarium* consisted of a vaulted structure supported by two central brick pillars; these had their eastern and western counterparts built against the walls of the surrounding rooms. The southern pillars were placed against the earlier walls, which confined the northern service tract (04) of the bathing block (03). Solid walled benches lined the outer walls of the frigidarium. The large cold-water basin was located on the eastern side of the frigidarium, placed against the wall which separates the Insula from the Campo. A wide window opening is found in the eastern wall. The window faces east, overlooking the Campo, being the direction suitable to allow the morning sun to enter and warm up water and air.[41] Opposite the large basin across the *frigidarium* is room 08, which contains a small cold water-tub; the walls behind the water-tub still preserve a series of wall paintings, depicting mythological scenes fitting the context of aquatic display (Venus in a shell, a Nereid and Triton, and the Rape of Europa by Zeus as a white bull).[42] From the passage (07) a range of heated rooms can be reached. The remains of tubuli are still found in rows placed against the walls of rooms (06, 05, 03 and 01); some are preserved to a considerable height. In addition, remains of large nails are still visible in the walls, suggesting that the walls were clad with marble revetments; remains of marble veneer are still visible in some sections, often found close to the floor levels, where they seem to have been best preserved. Rooms 06, 05, 01 and 03 had hypocausts. Room 03 formed the proper bathing block centred on a room of square proportions, with a heated plunge pool on its northern and southern side. Service corridors with praefurnia (stoke holes) were located on both sides behind the heated water pools. Suggested by the layout of room 03 and supported by clues offered by the structural remains,[43] it seems that the original design might have included another plunge-pool on the eastern side.[44] The opening was later walled up, and a niche was placed there at eye-level, presumably decorated with a statue or an ornament befitting the aquatic context.

The bathing block proper (03 and 04), with the surrounding service-rooms appears to have been a self-contained unit, which could have initially functioned as a small balneum, with just one or two adjacent rooms to form the core structure of baths: caldarium, tepidarium and frigidarium. It seems very possible that the baths were gradually enlarged, including first the western section, and extending later to the northern cold-rooms. In their complete version the Terme del Faro represent a fairly handsome bathing establishment. The fragmented mosaics, which are still found, scattered in single tesserae, or in larger sections attached to concrete supports and carelessly piled up in room (01) (Fig. 5.17 and 5.18), are a sad testimony to their former appeal.

40. An interesting parallel for a similar mosaic is reported from the so-called Palazzo Imperiale at Ostia, where a mosaic with a pharos (lighthouse) surrounded by sea-creatures was found in one of the northern rooms, the mosaic also included the text 'FELIX FAMILIA'; its discovery was reported by Visconti on the 20th May 1862 in the *Giornale di Roma*.
41. Vitruvius *De Arch* 5 on public buildings offers advice on the directional aspects of baths in order to benefit from sun and natural daylight; ideally daylight and solar heat should enter the heated rooms in the afternoon, which was the most common time for bathing (1999: 72).
42. Pavolini (2006: 207) suggests Severan dates, based on the composition of the paintings; similar work is found in the Terme dei Sette Sapienti (III x 2).
43. An interesting detail is offered by the walls which formed the rectangular recesses to accommodate the heated plunge pools. Interestingly enough, all corners on the inner room side have rounded edges to facilitate movement in and out of the recesses constructed for the pools. These rounded edges are also found at the corners of the eastern walls, and therefore seem to indicate that the space, which was later walled-up and filled by the niche, was probably open and either served as a plunge pool or as a passage.
44. Ideally such a suggestion needs to be confirmed by information which can only be gained through a small excavation.

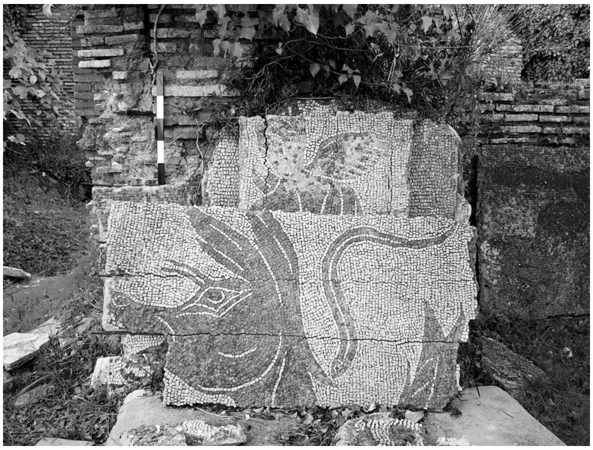


Fig. 5.17 – Fragments of the mosaic floors 323 found in room 01; today they are stored in the baths' room 03

Not much can be said about the surface decoration and the statues and ornaments employed to embellish the baths. From the surviving fragments of stucco plaster, marble revetments and mosaics, we can assume that the baths' walls and floors were treated according to their function. At the same time, the materials were not only chosen for their functional qualities, but were as much a symbol of wealth und luxury as they were attractive elements appealing to the senses.[45] This also applies to the display of water, which was not only articulated through the embellishment of individual pools and tubs, but also through the strategic placing of pools and basins:

Fig. 5.18 – Aquatic theme, mosaic 323 found in room 01 (Becatti 1961: Tav. CXLVIII)

45. See Yegül on general ideas about the decoration of baths (1992).

the largest pool was placed on the eastern side of the frigidarium, and was therefore not directly visible upon entering the baths.

However, the pool became a visual focal point when leaving the heated rooms (Figs 5.19 and 5.20). A rectangular field of black and white mosaics, depicting sea creatures, was placed in front of the basin to further emphasise its position and promote a frontal approach. The mosaic probably reached from the pool's western edge to the central pillars, while the remaining floor of the *frigidarium* was covered in white tesserae.[46] The contrast created between the larger white area and the dark mosaic in front of the pool not only expressed a division of functional space, it must have also added a degree of visual excitement. The surviving mosaic floors conform to the same aquatic genre, representing sea creatures and sea monsters, all figures were twisted and turned, creating a busy, dynamic sphere full of movement. Such themes seem to have been popular and mosaics rendered in the similar style are found in several baths, e.g. the Baths of Caracalla in Rome (Fig. 5.21). The figurative mosaics were executed in black and white tesserae, framed within black borders,[47] while the remaining floor surfaces were covered in white tesserae, with some black tesserae thrown in randomly. The changing pattern between light and dark floor sections, as well as the alternations between ornate and plain surfaces, must have reinforced the spatial structure of the rooms, and helped guide the flow of movement through the different sections of the baths.

Fig. 5.19 – Cold water pool (12) on the eastern side of the cold area *(frigidarium* 09)

Fig. 5.20 – Visual field upon entering the large cold room (09) from the vantage point of the small corridor 07, when coming from the heated rooms

Fig. 5.21 – Terme di Caracalla (Rome) fragments of aquatic floor mosaics

46. See mosaic No. 321 in Becatti (1961: 174-175); Becatti reports that only two fragments of 1.0 x 2.5 and 1.5 x 3.0 m survived from the mosaic placed in front of the pool.
47. The uniformity of the artistic rendering suggests that they were produced by the same workshop (Becatti 1961:173). Becatti's survey identifies four floor mosaics (No. 320-323): while mosaics 320 and 321 can be clearly attributed to their rooms (320 in the eastern apodyterium [13], 321 in the frigidarium in front of the pool), 322 seems to have been located in the heated room (05), judging from Becatti's mentioning of the damage caused by the collapse of vaults, while mosaic 323 seems to have been located in the heated room (01), based on the mosaic's dimensions (10.0 x 5.0 m) which could only fit there, see Becatti 1961: Tav. CXLVIII. The mosaic of the caldarium (03) was completely destroyed according to Becatti (1961: 173).

Several patches of painted wall plaster remain preserved in protected locations within the northern cold rooms (Fig. 5.22);[48] these help us to develop an idea about the decorative treatment of the inner walls. It seems that the lower parts of the walls which composed the *frigidarium*, and the adjacent eastern and western apodyteria, were covered in plaster with a layer of dark-red paint. From the remains it can be inferred that the painted plaster formed a high dado of about 1.7 m, finishing with a bevelled edge. The plaster continued above the dado's edge as a much thinner layer; from the dado upwards the walls were covered in white paint with faint traces of red lines still visible; the latter seems to have delineated rectangular fields.[49] The available evidence of surface materials creates the impression that the baths' decoration was based on a restricted yet dramatic colour scheme of black and white floors and dark-red walls for the cold rooms, while the heated rooms had partly monochrome (white and grey) marble cladding, and partly stucco decoration (see Fig 5.12).

In addition to the surface decorations, a number of statues and ornaments were employed to embellish the rooms; these statues formed part of an iconographic programme which not only conveyed aesthetic values but also symbolic meaning.[50] The sculptures which came to light during Calza's excavation have never been examined within their proper setting;[51] instead a number of them have been wrongly attributed to the Terme del Foro.[52]

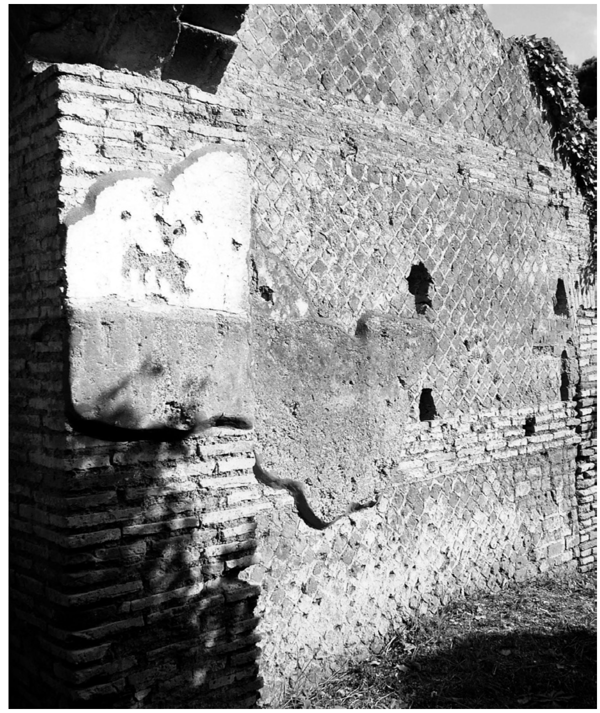


Fig. 5.22 – Painted plaster remains in northern changing room (*apodyterium* [07])

The surviving statues from the Terme del Faro form a small group which adhere to traditional themes such as the 'water gods', the 'healing powers of water', and the 'physical joys of life' reflected in the association between bathing and bodily pleasures.[53] Two fragmentary female statues identified as Venus and Amphitrite (Figs. 5.23 and 5.24),[54] as well as the fragmented body of a presumed Dionysus or Apollo fit these contexts.[55]

48. Patches of plaster can be found in the north-western apodyterium, on the pillar placed against the northern wall; and in the frigidarium on the south-western pillar.
49. This style of surface decoration seems typical of the 3rd century AD and has also been identified in the Caseggiato dell'Ercole, Building IV ii 5, and IV ii 14, see Liedke 2003.
50. See also Valeri's (2002) examination of sculptural programmes displayed in Ostian baths (other than the Terme del Faro).
51. Geremia Nucci (2000: 403-404, note 103), by way of footnote refers to the entries in the G.d.Sc. which are concerned with the sculptures found during excavation, but she does not relate them to the decoration of the baths.
52. As stated above, the similarity in name between the Terme del Faro and Terme del Foro led in some instances to wrong entries in the records of the Soprintendenza; many thanks to E. Angeloni and M. Seno from the Archivio Fotografico who helped in retrieving the images. The complete group of statues that came to light in the excavation of the Terme del Faro will be the subject of a separate publication (Stöger in prep.).
53. See Manderscheid (1981) for general information on the statuary equipment of baths of the Imperial period; see DeLaine on the iconographical programme of the Baths of Caracalla in Rome (1997: 78-80).
54. G.d.Sc. Vol. 28 (1938-1943) entry date 4th July 1940: 'Tronco della statuetta di Venere nuda del tipo Capitolina.', ref. 958; Sc.St. 292.
G.d.Sc. Vol 28 (1938-1943) entry date 4th July 1940: 'Bel torso d'una statuetta muliebre semidrappeggiata…faceva forse parte d' un gruppo (Anfitrite con delfino?)..', ref. 956; Sc.St. 290.
55. G.d.Sc. Vol. 28 (1938-1943) entry date 5th July 1940: 'Figura acefala minor del vero dell'Apollo di Citarredo'; ref. 976, Sc.St. 289.

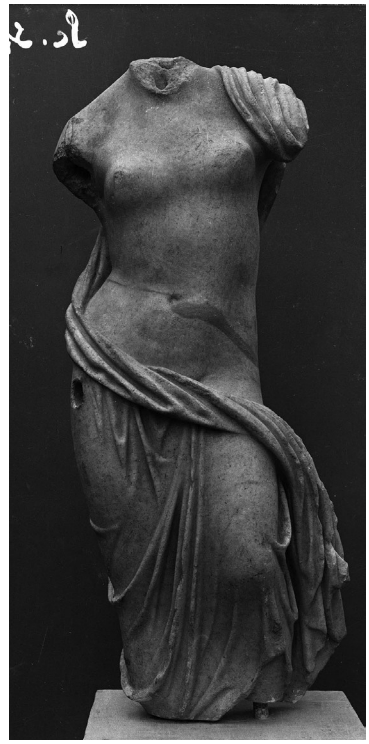


Fig. 5.23 – (left) Female statue of Type of the Venus Capitolina (Sc.St.292, h 0.61 m), found in the Terme del Faro during Calza's excavation in July 1940
Fig. 5.24 – (right) Female statue, semi-draped; part of a group, possibly Amphitrite with a dolphin (Sc.St. 290, 0.70 m); found during Calza's excavation of the Terme del Faro in July 1940

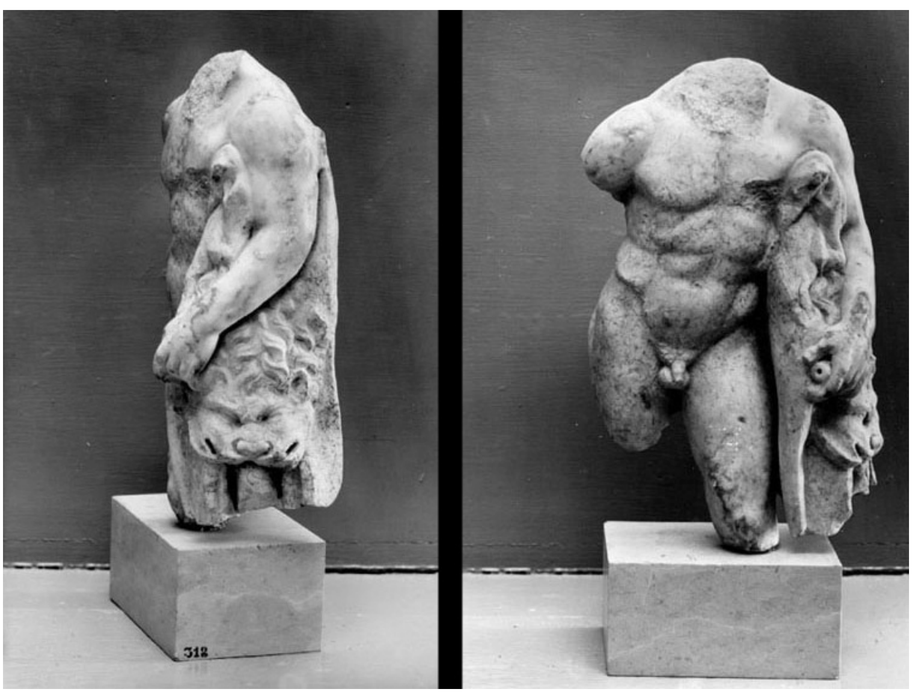


Fig. 5.25 – 'Weary' Hercules, Farnese Type, excavated in 1940 from the Terme del Faro, (ref. 318, Sc. St. 288, h 0.30 m, white marble), probably part of the decoration of a fountain

Even more interesting is the statue of Hercules (Fig. 5.25), retrieved during the 1940s excavations.[56] It is a small-scale version of the 'weary Hercules', reminiscent of the Farnese type which had its original place in the Baths of Caracalla.[57] Hercules was considered a figure with varied symbolic potential in the environment of baths,[58] and plays a frequent role in their statuary equipment.[59] In imitating the design and the decoration of the grand imperial baths in Rome and Ostia, the small private baths in Ostia and elsewhere could demonstrate that they were able to keep abreast with tastes and trends promoted in Rome.[60] Furthermore, in the specific context of the Terme del Faro, where is seems very likely that high high-ranking personalities from the Imperial families were involved as investors or proprietors of the baths,[61] one cannot be sure at all but it could be possible that a statue of Hercules was placed there not only to adorn the backdrop of a fountain, but also to allude to the Severan imperial house, which had Hercules as one of its patron deities.[62]

All in all the baths appear to have been well-equipped and decorated to appeal to the taste of their visitors. Since they did not cover a large area, the use of space had to be well thought-out to maximize the baths' spatial and 'thermal' efficacy. The long history of the Terme del Faro points to a successful management, apparently securing enough (paying) visitors to make the baths a sustainable enterprise worth of investment over a long period of time. The baths kept functioning for almost 400 years, from the mid 2nd century AD to the early 5th century AD, (when the last change of ownership was documented), and probably longer, as the late 5th century coins suggest. During these centuries of use several reconstructions occurred; the ones which also affected the neighbouring buildings will be examined in more detail since they allow us to gain an insight into the relationship between the baths and the Insula.

Links to the neighbouring buildings

On their western side the baths interlock with building IV ii 05. There are no direct party walls shared between these buildings, and yet several activities occurred which reflect an ongoing 'dialogue' between them. Two walled up doors are telling (Fig. 5.26): one is found at the southern end of the eastern wall (*opus reticulatum*/brick) of building IV ii 5. It betrays a former connection between building IV ii 5 and the space to the east, later to be occupied by the baths' heated room (01). The door's usefulness ended when the western wall of the baths was constructed against the earlier (*opus reticulatum*/brick) wall of building IV ii 5.

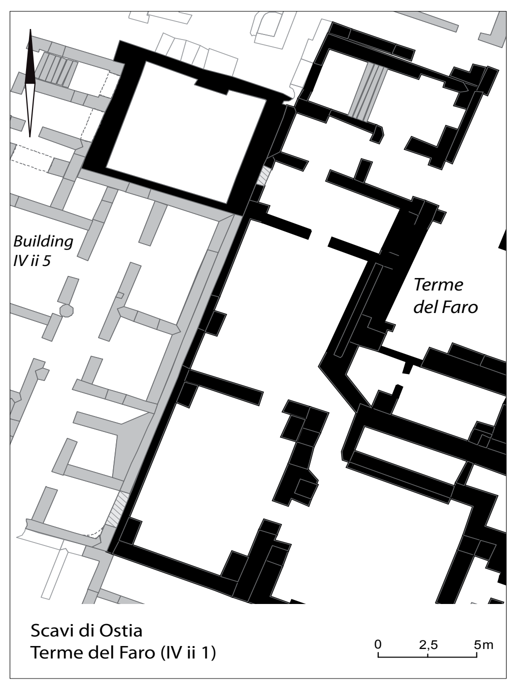


Fig. 5.26 – Earlier links to neighbouring buildings were blocked (hatched), probably due to the Severan reconstructions

56. G.d.Sc. Vol. 28 (1938-1943) entry date 5th July 1940: 'Statuetta acefala di Ercole s'appoggia con braccio sinistro…', ref. 318, Sc.St. 288.

57. See DeLaine (1997: 80-81).

58. DeLaine (1997: 80).

59. See Manderscheid's list of the frequency of occurrence of specific statues in imperial baths (1981:34).

60. The similarity of style observed in the floor mosaics is also suggestive of the influence of the large imperial baths on smaller establishments.

61. Geremia Nucci's (2000) study reveals that the baths remained attractive property as well as an interesting sector for investment for Roman imperial and senatorial personalities from the 2nd until the 5th century. The last documented proprietors were Valerius Faltonius Adelfius and Anicia Italica; see also a brief summary in Geremia Nucci (1999:36-37).

62. See DeLaine (1997: 80) on the Severan dynasty's association with Hercules, and specifically Caracalla with the Farnese-type Hercules.

Likewise, a door opening in the western wall of the baths (room 06) (Fig. 5.27), once provided access to the open space to the west, and became redundant when the space was occupied by the baths' large water cistern. Any interventions which cancel existing connections between buildings should require at least an agreement between the property owners, or they might even point to a joint ownership between the baths and the adjacent building (IV ii 5). Moreover, since the water cistern clearly curtailed the open space behind the eastern part of the Caseggiato dell' Ercole (IV ii 2-3), we have to presume that such a measure would require an agreement between all property owners concerned, including the dell'Ercole complex.

Fig. 5.27 – Walled-up door connecting room 06 to the space west of the baths, presumably walled up when the outside space was occupied by the water cistern

At the north-western side, along the *cardo*, there are several points of intersection between the baths and the Caseggiato dell'Ercole (IV ii 2-3). These betray a close, albeit changing relationship between the buildings (Fig. 5.28). The transformations that took place over time are best reflected in the alterations that occurred in *taberna* (03) of the Caseggiato dell'Ercole (see Fig. 5.35 for a site plan of the Caseggiato dell'Ercole). The *taberna* is located to the northwest of the baths' main entrance and the adjacent western *apodyterium* (baths [07]) (changing rooms). First of all, a structural link existed between the buildings, which can be established from the shared party wall: the Caseggiato's easternmost wall constitutes the *apodyterium*'s western wall. The shared wall extends from the portico to the water fountain east of the caseggiato's inner courtyard. The evidently close link between the Caseggiato and the baths is further emphasised by a door opening, directly connecting the Caseggiato's easternmost corridor to the space which served as changing room. This connection remained intact throughout the building's history; even though the apodyterium was subdivided into two narrow rectangular rooms, and was further separated from the baths during a late phase of use.

The changing relationship between the buildings is also indicated by the successive interventions that occurred within the Caseggiato's *taberna* (03), whose southern wall is shared with the baths' north-western *apodyterium* (changing room [07]). The wall in question (*opus reticulatum* wall 03_03_01, see Fig. 5.14) belongs to the building's earliest construction phase (*opus reticulatum* with *tufo* quoining), predating the baths. The early wall remained preserved within the later structures, while the western wall, which is shared between the *taberna* and the staircase (Caseggiato 02) was built against it,[63] pointing to a somewhat later activity. Again at a later point, when the Caseggiato and its portico were constructed, the portico's façade was structurally joined to the pre-existing western wall (Fig. 5.29).

63. See the site plan of the Caseggiato dell'Ercole (IV ii 2-3) (Fig. 5.35) for the location of the stairs (03) and the *taberna* (02).

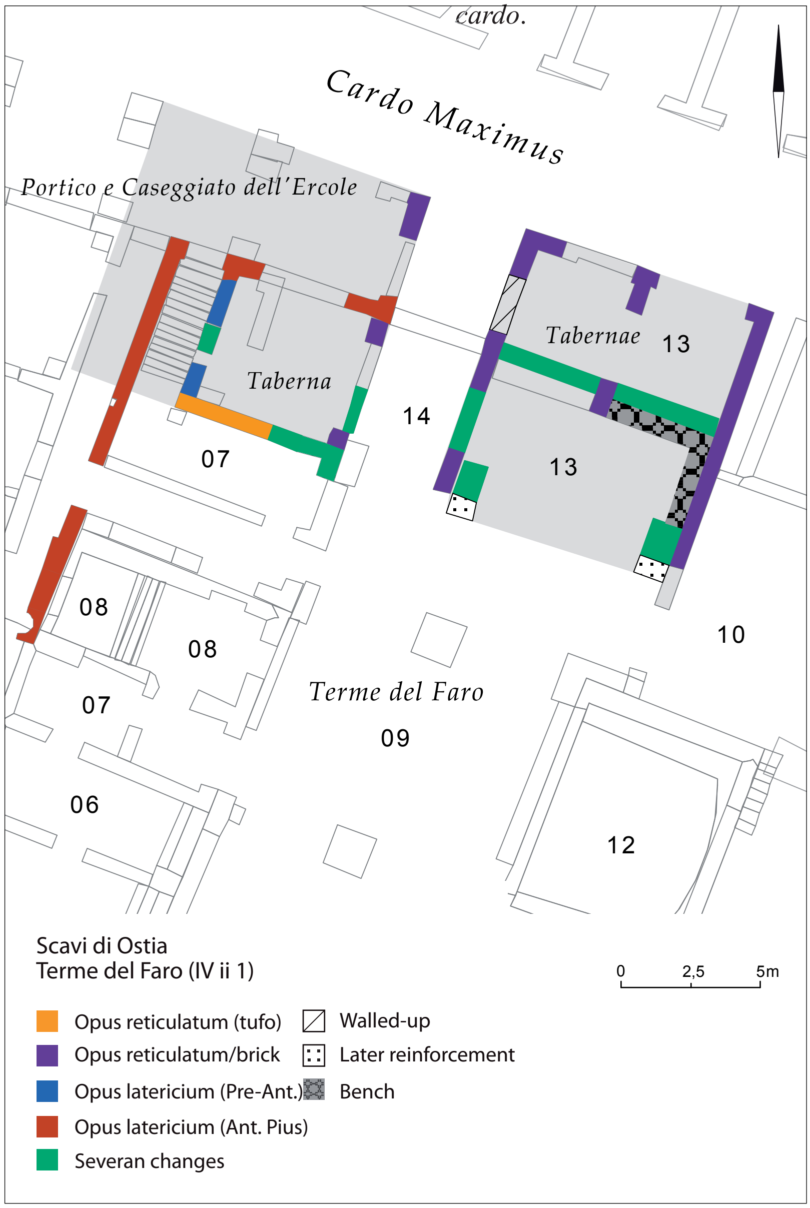


Fig. 5.28 – Reconstructions taking place in the *tabernae* on the *cardo* and the northern section of the baths

In order to create a coherent public façade, the Caseggiato's portico was extended until it reached the entrance to the baths, thereby bringing *taberna* (Caseggiato 03) fully into the realm of the Caseggiato, while the Caseggiato's first structural wall is only found west of the *taberna*. It can be noted that the depth of the Caseggiato's portico followed the alignment of the baths' eastern *tabernae*, creating the impression of a unified street frontage along the

The early *opus reticulatum* (*tufo* quoining) wall (03_03_01), which was shared between the *taberna* and the *apodyterium*, was adapted to its new use in several stages. Being part of the earliest construction phase, the wall's foundation levels are probably found about 1.50 m below the later occupation levels of the *taberna* (Fig. 5.30). The walled-up door provides a telling detail about the changing levels, since the original lintel was lower and was cut back

Fig. 5.29 – The facade of the Portico dell"Ercole (IV ii 2) was built against an earlier *opus latericium* wall

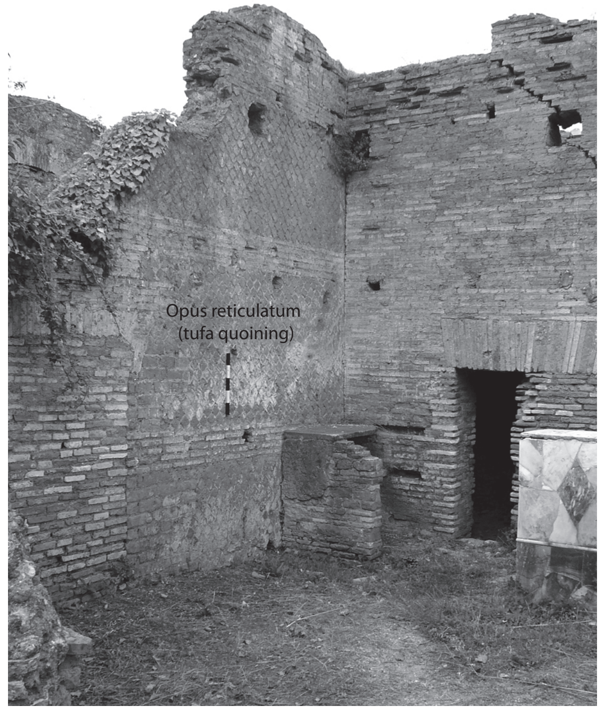


Fig. 5.30 – Earlier *opus reticulatum* wall integrated into the later structures; the walled-up door opening (left) had its lintel cut back to fit the higher floor levels (south-western corner of *taberna* 03, s. plan of the Caseggiato dell'Ercole Fig. 5.35)

At a later point the door was walled up, blocking the direct connection between the *taberna* and the baths' *apodyterium*, while an informal link was still maintained through a passage crossing from under the stairs. These changes can be attributed to a late period, when a series of reconstructions occurred in the baths' northern part.[64] These included the door opening between the *taberna* and the baths' entrance corridor becoming restricted. Collectively these interventions led to an almost complete separation between *taberna* (Caseggiato 03) and the baths.

It seems therefore very plausible that these transformations were related to changes in ownership, which consequently redefined the connection between the baths and the Caseggiato dell'Ercole and its *taberna* (03).[65]

A series of changes also occurred in the rooms located on the eastern side of the baths' entrance corridor. The original size of the space was delimited by the eastern (IVii01_13_04) and western walls (IVii01_13_06), which were part of the initial *opus reticulatum*/brick construction, preceding the baths. The spacious area was later subdivided into a northern and southern part; these interventions seem to have occurred in the course of reconstructions which concentrated in the northern section of the baths, associated with the range of unheated rooms and cold water pools. To divide the large room, two partition walls (IVii01_13_08 and IVii01_13_11) were

64. Heres dates the latest reconstructions to the last quarter of the 3rd century AD (1983: 91 and 94) without specifically explaining the dating framework; Heres' dates support Becatti's chronology (Calza 1953: 226).

65. The almost complete separation of the *taberna* from the baths could be related to the last change of ownership, which if Geremia-Nucci (2000:387) is right, is associated with the stamped fistula of Valerius Faltonius Adelfius and Anicia Italica (Barberi 32); and could therefore suggest that the Terme del Faro had then become property of Anicia Italica and her husband Valerius Faltonius, dating to the early 5th century AD; see Meiggs (1973: 213).

Fig. 5.31 - Partition wall placed against earlier *opus reticulatum* (brick) walls; the partition wall subdivides room 12 into *tabernae* on the *cardo* and changing rooms serving the baths

Fig. 5.32 - Painted plaster remains are still visible behind the partition walls

crudely placed against the outer walls and the central pillar (IVii01_13_09) (Fig. 5.31). Plaster patches with layers of dark-red paint are still visible on the outer eastern wall, preserved behind the attached partition wall (Fig. 5.32). This indicates that no effort was made to anchor the new partition walls to the side walls, and therefore not much structural 'responsibility' was conferred to the inserted partitions. Walled benches were placed against them on the baths' side, some remains of which are still visible. As part of the same phase of reconstruction the southern door opening, connecting to the entrance corridor, was walled up (IVii01_13_07).[66] These changes signify a clear division between the *taberna*e and the southern room. The latter was completely redirected towards the baths, serving as the baths' eastern *apodyterium*.[67]

66. The material used seems similar in brick size and quality of walling.

67. The partition walls created the space necessary for the apodyterium, therefore, if the Severan dates for the mosaics are correct for all mosaics, then these interventions occurred in connection with the Severan reconstructions. Becatti suggests later dates for the mosaics, he places them into the mid-3rd century AD, on purely stylistic criteria.

Fig. 5.33 - Connecting door between baths and Campo; the difference in height was probably overcome by wooden stairs; the beam holes could be connected to a ramp or some other temporary consturction

In contrast, the *tabernae* saw their attention redirected fully onto the streets, suggesting that the *tabernae* were rented out independently of the activities of the baths. Faint traces of stairs which had been built against the north-eastern side of the partition wall can still be identified.[68] These indicate that the *tabernae* had access to a mezzanine floor or a pergola, and were therefore a self-contained rental unit, including its own up-stairs living space.[69]

Finally, we should draw our attention to the links between the baths and the Campo della Magna Mater. The baths' initial intrusion into the Campo's territory has already been identified in the course of the eastern *opus reticulatum*/brick wall which delimits the Insula against the Campo (see above). While the original *opus reticulatum*/brick wall did not make provision for door apertures, two door openings were added during later periods of occupation: room (11), which presumably served as an *apodyterium*, became connected to the Campo through a door opening (Fig. 5.33), broken into the *opus reticulatum*/brick wall.[70] On the side of the Campo we find a rectangular space built against the *opus reticulatum*/brick.[71] In this way an enclosed space was created within the Campo which seems functionally linked to the baths, serving as an entrance hall to provide access to the eastern changing room (11).[72] At the same time the enclosed

68. Calza's 1953 plan of the Insula (section 13) indicates stairs which were built against the partition wall; these can no longer be identified.
69. See Pirson on rented *tabernae* inclusive of living space at the *mezzanine* level (1999: 19-20).

70. The difference in height was presumably overcome by wooden stairs since no traces of stairs can be identified on the facing of the *opus reticulatum*/brick wall.
71. Rieger (2003: 120-121, fig. 90 a-d) illustrates the transformation of the Campo della Magna Mater from the early imperial to the Severan period, including the changes which occurred in response to the baths. However some incorrect details seem to compromise her interpretations, the most striking one being the window opening behind the cold water pool which Rieger understood as a wide door opening.
72. The enclosed space consisted originally of a square outlined by pillars; the inter-pillar spaces were walled up in connection with the enclosure for the latrine.

Fig. 5.34 - Stairs and extension built for the construction of the latrine

space functioned as a transitional area placed between the Campo and the baths. At a later period, probably linked to the last changes in the northern part of the baths, a sizeable latrine was installed in room 10. This required the creation of an extension stretching out into the Campo (Fig. 5.34), and the construction of stairs to overcome the difference in height. Therefore once again the Insula encroached upon the territory of the Campo. On the side of the Campo, the area surrounding the stairs was generously closed-off, delineating a large space which seemed functionally connected to the latrine. It is worth mentioning that the latrine could be accessed from the Campo without entering the baths, and from the baths without setting foot onto the Campo, and could therefore be shared by both. All in all these reconstructions and mutual infringements bear witness to a dynamic long-term dialogue between the baths and the Campo, where both sides lost and gained at the same time.

Conclusion

The close examination of the Terme del Faro's structural remains has allowed us to reconstruct the baths' development over a period of about 400 years. Their long period of use proves them successful not only in securing investment but also in attracting sufficient numbers of clients to sustain their long-term occupation. This seems even more of an achievement when considering the high density of Ostia's baths, with several of them located within a radius of 400 m.[73] The proximity to the Campo della Magna Mater and to the city gate must have offered a location which benefited from high levels of traffic of people

73. Terme del Foro (Antoninus Pius), Baths IV iv 8 (4th century), Terme dell'Invidioso, V v 1 (dated to the Julio-Claudian period, reconstructed in the time of Antoninus Pius and again in the first half of the 3rd century AD, see Pavolini 2006: 222); Terme delle Sei Colonne, IV v 11, (dated to the period of Trajan); the so-called Perseus baths outside the city walls, reduced and altered in the 4th century AD (Ricciardi and Scrinari 1996 I: 183).

moving in and out of the city. The Terme del Faro experienced the most striking changes during the Severan period, when the hypocausts were renewed and the cold rooms in the northern part installed. In fact, the Severan mosaic pavements and decoration programme remained in use throughout the rest of the baths' life. Since the premises were on the smaller side, efficient use of space and well-functioning movement flows seem critical for the successful running of the baths. It appears that the baths' decorative treatment was employed to good effect; it underlined the hierarchies of functional spaces and helped in creating a stimulating environment, despite limited movement patterns.[74] Clearly, the baths must have appealed to their visitors. Since the baths could not target the broad public, but still needed a certain number of well-paying guests to keep the business going, they might come close to a 'niche product', maybe comparable to a 'boutique spa' to modern eyes.

The installation of the water cistern, which probably occurred in connection with the Severan reconstruction, must have been indispensable for the procurement of the baths' water supply, while the cistern's negative effect on the baths' neighbouring buildings cannot be ignored. We can therefore identify a priority which the baths assumed over neighbouring buildings, subordinating them to the prospering of the baths. Surely the enlargement of the baths increased water consumption, but this was not the only reason why the cistern was installed. From the Severan period onwards the city's water supplies had come under serious pressure: private and public water consumption had increased significantly; along Ostia's streets an orchestrated public water display took place including a substantial number of fountains and nymphaea.[75] Since Ostia's public water supply could barely cope with the high demand, many baths were compelled to install their own water cisterns to avoid a water shortage during their opening hours, by filling up their water tanks overnight. The Terme del Faro fit well into the general 'water culture' prevailing in Ostia during the Severan period; the implications for the Insula will be clearer once we have established how all its buildings functioned as a group.

5.2.2 Portico and Caseggiato dell'Ercole (IV ii 2 - 3)

The large building complex consists of several units, including the Portico (IV ii 2) and the Caseggiato dell'Ercole (IV ii 3) (Fig. 5.35),[76] as well as the industrial building (030) (Fig. 5.48). The buildings cover a total area of 1170 m^2,[77] grouped around a long trapezoid courtyard with a fountain house (Fig. 5.36). The Caseggiato and its portico extended along the *cardo maximus*, and represent the Insula's commercial frontage. To the southwest the complex borders on the Caupona del Pavone (IV ii 6), and is confined by the Via della Caupona to the west, while its eastern side is bounded by the Terme del Faro. The main doorway opens on the Via della Caupona, leading through an entrance passage into the inner courtyard. Three additional entrances are found along the *cardo*, providing a link between the street space and the internal courtyard. All points of access, located along the *cardo* and the Via della Caupona, open at street level.

Excavations and history of research

The Caseggiato was excavated during Calza's large-scale campaign of the late 1930s and early 1940s, when most buildings within the Insula were brought to light. Interestingly enough, earlier excavations seem indicated on Zappati's plan, which reveals that some rooms had already been excavated in 1805 (see Fig. 5.10 above). The Giornale degli scavi remain silent about Calza's excavations;[78] however,

74. As we shall see in Chapter Six when the baths' spatial organisation is analysed.
75. See Ricciardi and Scrinari (1996 II: 258-259) on Ostia's water supplies in the Severan period; see also Gering (2004: 363, note 143).

76. The Caseggiato dell'Ercole received its name from a small *tufo* figurine of Hercules, probably originating from a keystone (Calza 1953: 145), presumably found during the excavations.
77. The areas: caseggiato and portico (IV ii 3) 1110.75 m2; industrial wing (IV ii 3) 228.90 m2; and the adjacent industrial building (IV ii 04) 258.10 m2.
78. G.d.Sc. III (Vol. 28, 1938-1943), p. 134-136, reports the fragments of an inscription found during the excavation of the courtyard behind the caseggiato (ref. numbers: 431-32-35).

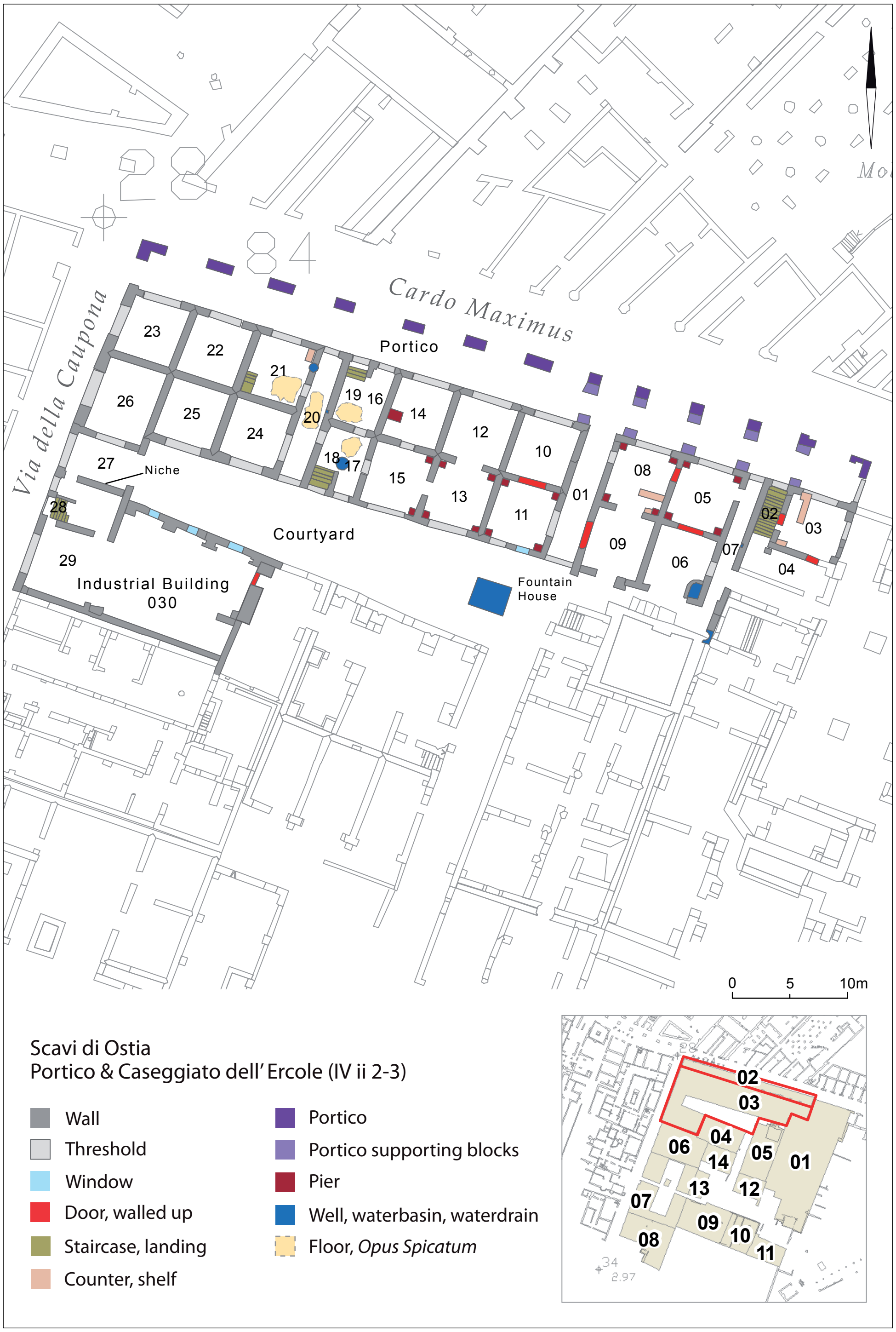


Fig. 5.35 – Caseggiato and Portico dell'Ercole (IV ii 2-3)

Fig. 5.36 – The Caseggiato's courtyard seen from within the Insula (Scavi di Ostia, Archivo Fotografico, ref. B 3037)

Fig. 5.37 – Excavation in process: the courtyard is still under excavation, dated March 7th 1940 (Scavi di Ostia, Archivo Fotografico, ref. B 2901)

Fig. 5.38 – All traces of the walled-up door were removed by the excavators (former connection between rooms 05 and 06) (Scavi di Ostia, Archivo Fotografico, ref. B 2913)

the photographic documentation allows us to establish an approximate period of excavation between December 1939 and July 1940.[79] The work seems to have progressed swiftly along the *cardo*, and from there further into the Insula (Fig. 5.37). As stated before, Calza's excavations were accompanied by the immediate restoration and consolidation of the built structures. In the case of the Caseggiato dell'Ercole, the photographic records offer an interesting glimpse into this practice, which at times got out of hand and allowed walls to be removed during restoration (see Fig 5.38), without keeping any record of their existence.[80]

In the 1960s a thorough examination of the Caseggiato was conducted by Packer.[81] He surveyed the complex as part of an extensive study of Ostia's multiple dwellings, which aimed at establishing urban living conditions and estimates of population densities for Ostia and Rome. Packer's room by room description long remained the most detailed assessment of the Caseggiato's architecture, while the building also received attention in Blake's assessment of Roman construction.[82] Girri's survey of Ostia's *tabernae*, written 10 years earlier, includes a brief description of the Caseggiato, classifying its *tabernae* according to typologies,[83] while Hermansen's survey covers the Caseggiato's three bars or inns.[84] The buildings' water facilities have been explored within the wider study of Ostia's water culture.[85] In addition, a recent study of Roman wall-paintings included a few examples originating from the Caseggiato,[86] providing mid 3rd century AD dates for these paintings (Fig. 5.39).[87]

79. Archivio Fotografico at Ostia: beginning of excavation c. 21.12.1939 photo reference B2888-2892.
80. The room as it is preserved today shows a regular door opening; the 1953 site-plan (Calza 1953) indicates a door opening..
81. Packer (1971: 109, plan 31, 187-190).
82. See Blake (1973: 226-227) for a brief description of the Caseggiato dell'Ercole (IV ii 2-3).
83. See Girri (1956: 29).
84. Hermansen (1982: 162-165), taverns 26-28, figs. 99-105.
85. Ricciardi and Scrinari (1996 I: 45-46; 1996 II: 133-136).
86. Liedke (2003) offers a contextualised approach, studying wall decorations within their architectural setting; the focus is on 'Nebenraumdekorationen' (wall decorations found in side rooms), thus dealing with the 'more modest' end of Roman wall decorations.
87. According to Liedke (2003: 96-97) the wall paintings

Fig. 5.39 – Wall painting dating to the mid-3rd century from the Caseggiato dell'Ercole (IV ii 2-3), dispute over a broken amphora, scene from a court case (photograph, courtesy of Ostia website)

In the literature the Caseggiato and its portico have been considered to be one of the commercial/residential buildings typically found in Ostia;[88] moreover, the building's architectural structure has been described as homogenous and 'organic'.[89] However, the Caseggiato might not be as organic as hitherto believed; on the contrary, as revealed by this study, the building has undergone quite a few modifications and interventions. The description presented here moves beyond Packer's earlier observations and presents the author's on-site study. The plans have been produced by the author;[90] for the sake of keeping consistency with already published work, Packer's numeric reference system has been followed.

from the caseggiato have been part of the decoration found at mezzanine level; hence they were part of the private area, presumably the dwelling of the *taberna* tenant. The paintings concerned have the inventory numbers 10097, 10098 and 10099; they depict togated figures which have been interpreted to be part of court scenes; see Calza and Floriani Squarciapino (1962:105-106, 168, fig. 59).

88. Girri (1956:29).

89. Calza (1953: 145) and Girri (1956:29).

90. With the unlimited support by J. Lee of GeoStar, Leiden.

Building phases and layout

There seems to be a general agreement on the construction dates for the Caseggiato and the portico: most scholars suggest c. 160-170 AD.[91] Once again, the dates rest on brickstamps.[92] As far as preceding buildings are concerned, Calza refers to the structures of a Republican domus, found underneath the Caseggiato (see Fig. 5.13 above).[93] Two wells, originally part of the Republican domus, remained in use and were integrated into the later Caseggiato.[94] Moreover, the easternmost pillar structures seem to belong to an earlier structure, dating to the end of the first century AD/beginning of the 2nd century, and became incorporated into the later portico built during the second half of the 2nd century AD.

The Caseggiato can best be described as a commercial-residential building. *Tabernae* (commercial outlets of various functions) occupy the greater part of the ground floor, while an industrial complex takes up the west wing. The thickness of the walls (c. 0.60 m) suggests that the building had several storeys. The Caseggiato's street front along the *cardo* was shaded by a long portico (65 m) (Fig. 5.40), supported by 12 pillars and paved with bipedales; for ease of communication the portico was probably repeated as a corridor on the upper floors.[95] On the Via della Caupona, a sidewalk of two rows of bipedales follows the full length of the Caseggiato,[96] and comes to an abrupt end at the point where the Caupona del Pavone begins (Fig. 5.41). Being restricted to the Caseggiato only, the sidewalk seems to denote private property, tied to the Caseggiato through ownership and liability.

The Caseggiato proper consists of a double row of rooms, subdivided into three sections by passageways and stairwells. Nine rooms open onto the portico (03, 05, 08, 10, 12, 14, 21, 22, 23), whereas two (23, 26)

91. Packer (1971: 190); Pavolini (2006: 206) and Girri (1956: 29).

92. Bloch (1953: 226).

93. Calza (1953: 108).

94. Ricciardi and Scrinari (1996, Vol. 1: 45-46, figs 51-54).

95. See Packer (1971: 190).

96. Several of the bipedales which compose the sidewalk still preserve brickstamps; see Bloch (1953: 226).

Fig. 5.40 – The portico of the Caseggiato dell'Ercole (IV ii 2), facing east towards the Porta Laurentina

Fig. 5.41 – Via della Caupona, the Caseggiato's pavement stops where the Caupona del Pavone begins

connect directly to the Via della Caupona. Five rooms are interconnected (05-06, 08-09, 10-11, 12-13 and 14-15),[97] and therefore have both an opening to the portico and to the courtyard, while the others are either directed towards the outside, or the internal courtyard. The ground floor plan seems to have been replicated on the mezzanine upper floors: the remains of door openings of the upper floors are still preserved, and are visible on top of the lintels of the ground floor doors (Fig. 5.42). From the position ofthe stairways, the possible arrangement of the upper storeys can be reconstructed.[98]

Fig. 5.42 – Door openings on the mezzanine upper floors are still preserved and are visible above the ground floor doors

97. Rooms (5-6, 8-9, 10-11 and 12-13) are interconnected by means of wide door openings without (travertine) thresholds; hence no closing of these doors was intended. Conversely rooms 14-15, as well as 15 and 13 are interconnected, however, the door is narrow and has a travertine threshold still preserved. The passage spaces 16 and 17 have not been listed since they seem functionally dedicated to passage only.
98. See Packer 1971:190; the present study cannot verify all of Packer's suggestions; some structures which seem to have been still present at the time of Packer's survey have disappeared in the meantime (e.g. stairs within room 10), cf. Packer (1971:109, plan 31).

The Caseggiato's initial layout was defined by openness, affording access between *tabernae* and their backrooms, as well as *tabernae* and the adjacent corridors. During successive interventions various doors have either been blocked or restricted (see plan Fig. 5.35). These changes occurred mainly in the easternmost group of *tabernae* (05, 06, 08 and 09) closest to the Terme del Faro. The doors between rooms (05-08) and (05-06) were walled-up (see Fig. 5.38 above), and consequently room (05) was cut-off from the internal communication, while its focus was redirected towards the portico. Likewise, room (06) was affected, its communication restricted, and its direction turned towards the inner courtyard. Room (09) was originally not only connected to room (08), but also to passage (01) by means of a wide door opening.[99] This door was walled up in the course of interventions which concerned the reconstruction of the south-western corner of room (09), adding a reinforcing buttress at the corner, as well as restricting and strengthening the southern door towards the courtyard. These latter interventions could have been a response to structural damage. It is also possible that these changes occurred in connection with a restructuring of the northern part of Building IV ii 5, just south of the Caseggiato dell'Ercole.[100] Whatever the cause may be, the Caseggiato seems to have experienced a number of structural problems: to counteract these, walled pillars were placed into the corners of several rooms, functioning as reinforcing buttresses. The rooms concerned are (05) and (08) on the northern side (along the portico), as well as (11, 13 and 15) on the southern side (on the courtyard); while a single pillar of larger dimensions is found in room (14). Furthermore, structural damage seems to have prompted the reconstruction of a larger section of the eastern wall of room (10) (see Fig. 5.43). In addition, the eastern part of the portico has been reinforced, doubling the outer pillars and adding a row of corresponding buttresses along the Caseggiato's northern wall.

99. Passage 1 corresponds to Packer's 8A (1971: 109, map 31).
100. Similar brick work (brick size and mortar beds) as well as bonding courses can be observed in the corresponding northern wall of building IV ii 5; therefore this seems a reasonable suggestion since changes in building IV ii 5 could have affected the caseggiato's section on the courtyard side.

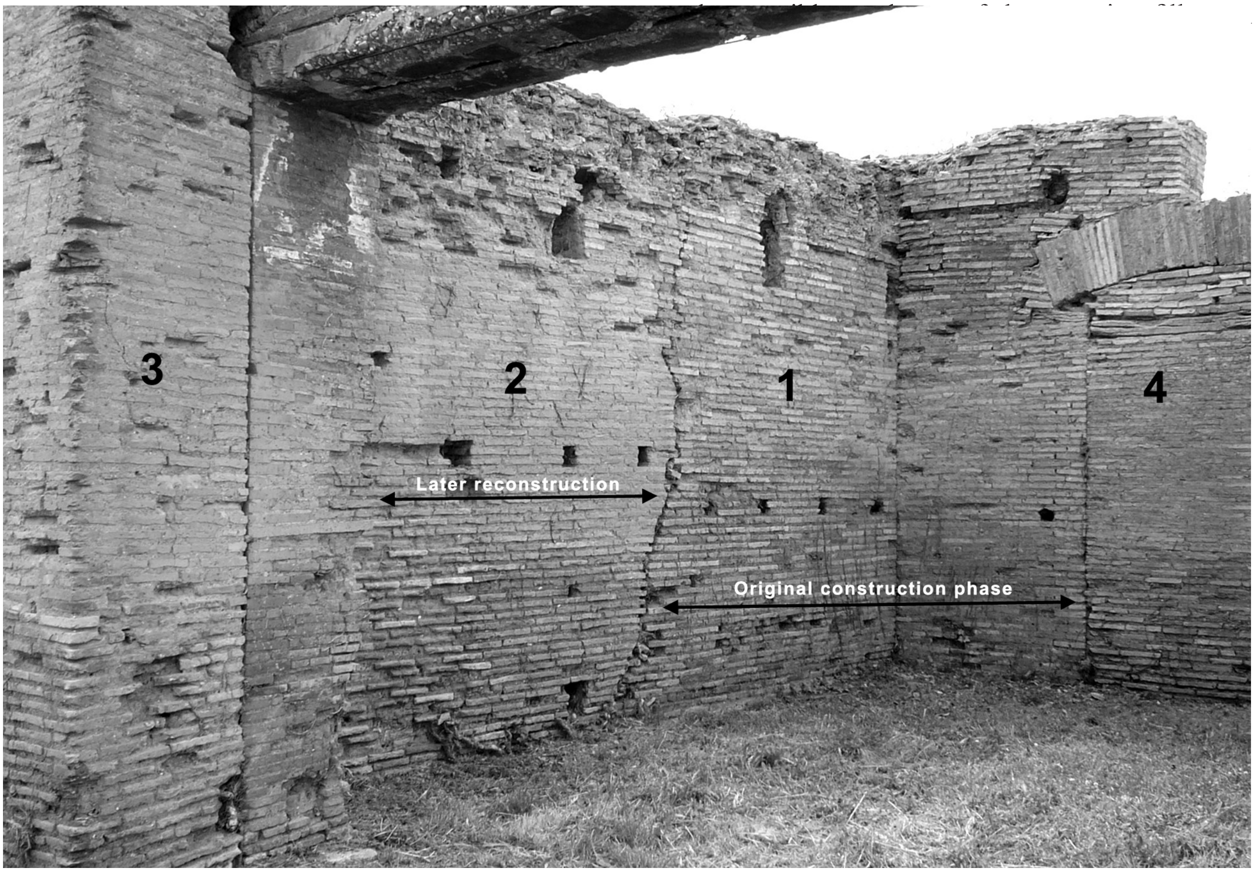


Fig. 5.43 – Room 10: 1) The original caseggiato walls (putlog holes at h 1.25 m; on top of bonding courses); 2) A later intervention, with putlog holes at h 1.50 m; 3) Reinforcement of the portico; 4) Walled-up door

It has been suggested that these interventions might testify to structural damage caused by earthquakes.[101] Seismic activities are not unusual in the region, moreover, destruction deposits, which clearly point to the impact of earthquakes, have been identified in various other buildings in Ostia.[102] However, while an earthquake scenario might be very likely, still we have no secure evidence, and thus it remains impossible to draw a direct link between cause and effect. Alternatively, one could think of structural problems caused by the overload of the upper floors

101. See the description of IV ii 2-3 in the topographic directory of the Ostia website: http://www.ostia-antica.org/regio4/2/2-3.htm

102. See DeLaine and Wilkinson (1999: 19) on evidence from Ostia's Insula I iv, revealing severe damage possibly caused by an earthquake, suggested dating 150-175 AD. Gering (2002: 120) encountered structural damage and subsequent reinforcement in the Case a Giardino (III ix) dating to around the same period.

Notwithstanding these unresolved questions, there are some other 'oddities' within the building which need to be addressed. These concern the westernmost section, comprising rooms (21) to (26). The walls of this part remain preserved to a much greater standing height than the central part of the Caseggiato (Fig. 5.44).[103] No reinforcing pillars are present in this section; no structural interventions can be identified; instead, the group of rooms appears to be structurally homogeneous, with its walls solidly keyed to each other at the corners, and with regular bonding courses adding consistency. However, a distinct break in the structural unit can be noted,

103. The westernmost section preserved walls to a standing height of c. 6.50 m which marks the top of the vaults, while the spring of the vaulting is at 4.20 m height; in contrast, the central section preserves walls to a height of c. 4.0 m.

Fig. 5.44 – The westernmost part of the Caseggiato dell'Ercole (IV ii 2-3) is preserved to a greater standing height than the central and the eastern parts of the building

occurring at the intersection of rooms (25/26) and the wide entrance passage (27).[104] Here, the break line clearly divides two different walls: discontinuity is evident from the quality and size of the bricks, as well as the mortar beds (Fig. 5.45).[105] The same break is visible at the opposite corner along the Via della Caupona. This strongly suggests that the unit comprising rooms (21) to (26) was built against already existing structures, and was therefore not part of an initial 'organic' programme, but a later insertion, presumably replacing the original section. The existing earlier walls formed part of the entrance corridor, and continued further in the entrance to the Caseggiato's western industrial wing. Interestingly enough, the earlier walls bear a close similarity to the walls constituting the easternmost section near the Terme del Faro. In view of the reconstruction of the westernmost section, an earthquake scenario should not be excluded as a possible cause for the destruction of the westernmost part and its subsequent reconstruction.

Next to the structural differences noted in the westernmost section (rooms 21 – 26), we can also observe a difference in the spatial organisation of these rooms. Here, no interconnections exist between the individual *tabernae*: they either open to the courtyard or to the public street space, while a connection between both, responding to the inside as well as to the outside, seemed not desired for this part of the Caseggiato. Instead, we find the corner room (23) with a pronounced outward focus, opening to the *cardo* (through the portico) and to the Via della Caupona. This suggests that external dynamics should be taken into consideration, and we should think of the Terme del Foro (Forum baths) located just across the cardo, as a possible outside influence. The 'mega bath complex', which takes up the entire eastern quadrant of Ostia's city centre,

104. Room 26 is slightly larger than the other rooms, exceeding the caseggiato's southern wall by 1.50 metres. Inside room 26, at the corner where room 25 ends, there is a visible break in the brick work.
105. Detailed information on all walls can be obtained from the author's database; available upon request.

Fig. 5.45 – Room 26: discontinuity is visible in the corners which meet the entrance passage (27)

was constructed c. 160 AD,[106] while the same construction dates have been suggested for the Caseggiato, or to be more precise, the western section of the Caseggiato.[107] Considering their proximity in time and space, it is not at all surprising that we find the western section of the Caseggiato directed towards the Terme del Foro, possibly aiming to benefit from the vicinity of the new focal point of social activity.[108]

Functional space

The premises of three 'bars' were located along the Caseggiato's façade, occupying *tabernae* 03, 08 and 21, and underlining the Caseggiato's image as the Insula's commercial front.[109] All three bars were situated on the portico side and therefore open towards the *cardo*. Their equipment identifies them as bars: all have counters placed in different positions to attract clients coming from different directions. The easternmost bar is closely linked to the Terme del Faro; the position of the counter is directed towards visitors coming from the Porta Laurentina (Fig. 5.46).

In contrast, the counter in *taberna* (08) was placed at the rear part of the room (Fig.5.47), further removed from the portico, possibly responding to visitors both from outside and from inside the Insula. *Tabernae* (08) and (09) were interconnected through a door opening, however, without threshold and visible locking device between these rooms. *Taberna* 21 followed a different direction: a walled stepped shelf was placed in its north-eastern corner, next to the door, and was therefore best visible for customers coming from the city centre; *taberna* 21 also incorporated the water well, which had been part of the preceding building of the Late Republican period.[110]

106. See Pavolini (2006: 107-108).
107. The brickstamps which have been dating the construction of the Caseggiato to the period of Antoninus Pius, have been mainly found in the western section; while several brickstamps found on the bipedales of the sidewalk date to the 3rd century AD, see Bloch (1953:226); a small number of brickstamps have been spotted by the author on the bipedales of the staircase (18) and the landing on the 2nd floor (above the spaces 19 and 18).
108. The corner shop did not only use the inside space, but also utilised parts of the portico to display merchandise. Slots for shelves, chiselled into the outer walls, can be found between rooms 23 and 22.

109. Ostia's 'taverns' have been studied by Anna Kieburg (publication forthcoming).
110. See Ricciardi and Scrinari (1996 I: 45, figs. 52).

Fig. 5.46 – Taberna 03, best visible for visitors approaching from the Porta Laurentina

The Caseggiato's portico (IV ii 2) played an important role in creating not only a unified, but also a protected street front along the cardo. In this sense, the Caseggiato responded to the city's infrastructural demands: the Terme del Foro and the Caseggiato dell'Ercole jointly offered an almost continuous sheltered passage under their porticos, reaching from the city centre to the Campo della Magna Mater. The Caseggiato's portico started where the one of the Forum baths ended. In terms of its architectural effect, the Caseggiato's portico acted like a screen composed of a row of pillars, creating physical and visual links between the public space outside and the inner Insula space. It enjoyed a dual nature, both static and dynamic: static in that it defined the line of a wall, and dynamic, in that it allowed passage through it. Interestingly enough, a closer inspection of the portico reveals that the distances between the pillars were not regular.[111] The placing of the pillars on the eastern side and in the centre betrays a direct 'one-to one' relationship between the pillars and the corresponding walls of the Caseggiato, creating a structural and visual connection between the open spaces between the pillars and the door openings of the *tabernae*.[112] In contrast, the westernmost pillars, which relate to *tabernae* (21 to 23), are all placed off-centre, slightly shifted to the west. This has led to a break in the visual line between inter-pillar space and the door openings of the western *tabernae*, partially obscuring the western side of the *taberna* opening. The inconsistency seemed to have occurred in response to a reconstruction of the westernmost part, and the construction of the narrow passage corridor (20), which was almost completely obscured behind the portico's pillar.

Fig. 5.47 – Taberna 08, the counter is withdrawn from the street front

111. The most obvious difference is found in the eastern part, where the pillars confirm to a smaller dimension and have been reinforced at a later point. This indicates that the eastern part of the portico is earlier than the centre and western part.
112. One would expect that the pillars are placed to address structural requirements, i.e. strengthening the walls which divide the *tabernae*.

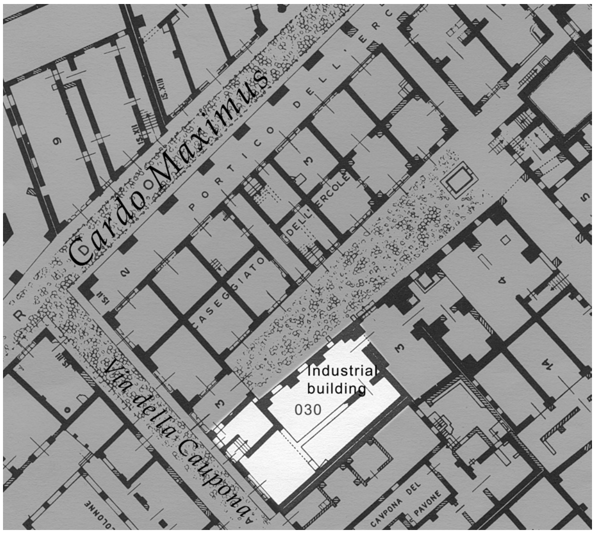


Fig. 5.48 – Caseggiato dell'Ercole (IV ii 2-3) industrial building 030; Calza's 1953 site plan indicates partition walls, today no longer visible

The links between the Caseggiato and the Insula

The Caseggiato's relationship with its immediate neighbourhood is defined by contact with the Caupona del Pavone to the southwest, and the Terme del Faro (baths) to the east. As far as the boundary with the Caupona is concerned, it can be established that the Caseggiato's southern *latericium* wall (industrial wing) was built against the pre-existing wall (*opus reticulatum*/brick) of the Caupona. This allows us to establish a chronology, if relative, between these buildings, as the Caseggiato was built later than the Caupona's initial *opus reticulatum*/ brick phase. In contrast, the link between the Caseggiato and the baths appears more complex and reflects several points of intersection. It indicates a changing relationship in the course of the baths' long period of use, which seems to point to a change of ownership of the baths, which consequently redefined the connection between the baths and the Caseggiato.

5.2.3 Caseggiato dell'Ercole: western 'industrial' wing (IV ii 3)

The western section (030) of the complex forms a separate, yet structurally linked spatial unit (Fig. 5.48). It offered premises suitable for industrial use at ground floor level and habitation space on the upper floors, and therefore contributed to the multi-functionality of the dell'Ercole complex. The section covers an area of 228.9 m^2, forming a rectangular, slightly trapezoid shape. It is separated from the Caseggiato's row of *tabernae* by the internal courtyard to the north. The building was physically connected to and divided from the Caseggiato through the entrance passage (27) on the Via della Caupona. On its southern side the industrial space is bounded by the Caupona del Pavone, whereas on its eastern side it abuts Building IV ii 4. Its narrow end is located on the Via della Caupona, while the longer side extends deeper into the Insula. The unit can be accessed from the Via della Caupona, where we find a wide door opening which preserves a travertine threshold still *in situ*. Two further points of access are located on the Via della Caupona: one leads directly to the staircase (28) connecting to the building's upper floors, while the other leads to the 'under stair' space connecting between entrance (27) and the industrial space. Two additional entrances existed from within the Insula.

Calza's 1953 site-plan indicates subdivisions within the ground-floor spaces (Fig. 5.48), the traces of which are no longer visible, and could only partially be verified by this survey.[113] According to the 1953 site-plan the unit was subdivided into four distinct spaces, one of which is the stairs mentioned before (28). The remaining space was divided into a large *taberna*-like room, opening to the Via della Caupona (29), and two long rectangular rooms dividing the eastern part of the building. The size of the *taberna* is significant since it conforms to the depth of the Caseggiato's western *tabernae* (23 and 26), and therefore structural continuity was maintained along the entire façade on the Via dell Caupona. Once we have identified the spaces along the Via della Caupona (26, 27, 28 and 29) as a structural entity,[114] the development of the western wing can be

113. The pavements are overgrown; the subdivisions can only be reconstructed from the scarce remains, still visible where the partition walls intersected with the outer walls.
114. See above on *tabernae* (21to 26); the block of *tabernae* seems to have been built against already existing structures, i.e. the porch (27) and the south-western rooms (28 and 29) along the Via della Caupona.

understood more clearly, since the entrance passage and the *tabernae* along the Via della Caupona were built earlier than the eastern 'industrial' part. The long wall on the courtyard side had been placed against the already existing north-eastern corner of the entrance passage (Fig. 5.49).[115] The 'courtyard wall' continues into building IV ii 04, where it terminates against a pre-existing *opus reticulatum*/brick wall.[116] In addition, the wall which confines the building on the southern side had also been built against an earlier *opus reticulatum*/brick wall of the Caupona del Pavone.[117] All in all this suggests that the space available for the construction of the industrial unit was largely determined by pre-existing structures.

The 'courtyard wall' features a row of windows overlooking the open space of the courtyard, as well as a door opening, connecting the courtyard to the westernmost room of building IV ii 04. At a late period of occupation the door leading to the courtyard (Fig. 5.50) amd the door between space 030 and building IV ii 04, were been walled-up.[118] Nevertheless, from a structural point of view, space 030 and the western room of building IV ii 04 remained a continuum, while no party walls were shared between the Caupona and the western industrial space.[119]

Fig. 5.49 – The northern wall confining the industrial building (030) towards the courtyard)

The entrance passage on the Via della Caupona acted as the main entrance to the Caseggiato; inside the passage, on its southern wall we find a narrow door opening, leading to a small room next to the stairs; the room provided access to the adjacent rooms of the industrial wing. The southern wall of the passage features a niche at eye level, which still preserves

115. A relative sequence between the courtyard wall and the porch's eastern wall can be inferred from the fact that the porch's eastern wall has a number of putlog holes which reach through, suggesting that the wall was standing free when it was constructed. The courtyard wall was built perpendicular to it, covering the first putlog hole.
116. See Building IV ii 14 and its structural relationship with building IV ii 4.
117. A small stretch of *opus reticulatum* can be identified near the north-eastern corner of building IV ii 04, pointing to an earlier *opus reticulatum*/brick wall which was integrated into the building's northern wall.
118. The technique applied was *opus vittatum*, typical of later periods (c. mid 2nd to end mid 3rd century AD).
119. Points of contact exist between the Caupona and the building's central room: the central room's southern wall confined the Caupona's courtyard.

Fig. 5.50 – The entrance leading to the industrial spaces IV ii 3 (030) and IV ii 4 was blocked during a late period of occupation

Fig. 5.51 – Niche inside the entrance passage (27)

its plaster layer (Fig.5.51).[120] Presumably it housed the Caseggiato's protective deity; the niche's location seems to lend support to such a function. Every person, coming and going, had to pass under the watchful eyes of the deities who protected the Caseggiato. A scatter of black tesserae was found near the southern wall of the passage, however not enough to confirm mosaic floors for this part of the Caseggiato. The passage still preserves a travertine threshold, suggesting that access to the Via della Caupona could be closed.[121] Calza's 1953 site plan indicates that the Caseggiato's courtyard has a pavement of basalt blocks. Since the courtyard is completely overgrown, this study could not confirm the presence of basalt floors, however, some single basalt blocks can be found at the eastern end of the courtyard, close to Building IV ii 5.

5.2.4 Building IV ii 4

Building IV ii 4 is located in the centre of the Insula (Fig. 5.52). On its western side it borders the industrial wing of the Caseggiato dell'Ercole, while it meets a range of *tabernae* (IV ii 14) on the southern side. On its eastern extent it is bounded by a passage which connects the Caseggiato's courtyard with the inner open space in the south of the Insula. The building covers a rectangular area of 258.1 m^2, offering rooms which appear suitable for industrial use. While the building's southern and western sides are bounded by neighbouring buildings, it boasts façades on its eastern and northern sides, facing the Insula's internal open spaces (passage and courtyard). The main point of access is found on the building's northern side, where a door opening was reached from the centre of the Caseggiato's courtyard. A secondary entrance connected it to the eastern passage, where we also find a staircase leading to the upper floors; an additional access point was provided by an internal connection linking Building IV ii 04 to the Caseggiato dell' Ercole's industrial wing (IV ii 03).

Although no specific mention of the building was made in the excavation reports, it can be assumed that building IV ii 4 was excavated during Calza's campaign (c. 1940). We come across a reference to the building as late as 1960, when it was restored as part of the extensive conservation and restoration activities which took place within the Insula. In the course of these works a number of finds came to light, retrieved when the walls were cleaned before being consolidated. The finds consist of a scatter of coins, and a brickstamp, as well as marble and amphora fragments;[122] however they do not allow us to draw any conclusions in terms of the building's function.[123] On the other hand the brickstamp might help us to develop a dating framework, suggesting the late Hadrianic/early Antonine periods into which we can place the construction of Building IV ii 4.[124]

120. Already recorded in Bakker (1994: 90).
121. The travertine threshold preserves grooves.

122. G.d.Sc. Vol. 32; entry date 06.05.1960, Building IV ii 04; during the restoration of a wall the head of a figurine in red marble came to light, (described as 'ermetta' , a herm, by the excavators); its preserved dimensions are c. 12,5 cm; very damaged, Hellenistic type (no inventory number provided);
- 1 coin of emperor Trebonianus Gallus encrusted (Coh. V. n 124) [the excavators refer to the catalogue of Roman coins compiled by Cohen in 1880].
G.d.Sc. Vol. 32; entry date not legible, but close to 06.05.1960;
Building IV ii 4; during restoration the following objects were found:
- 1 GP (sestertius) probably of Nero, both sides illegible;
- 1 MB (dupondius/as) from the Severan dynasty, but illegible, very corroded and encrusted;
- a small amphora with a conic body, the rim is missing, two handles, of which the remains are attached to the shoulders and to a point on the body; made of yellowish clay, h. ca. 25 cm, max diameter 18.5 cm;
- a small amphora with flat shoulders, body enlarged, red clay, c. 19 cm, max diam. 13 cm.
123. In addition to the small finds, the cleaning activities also revealed a brick stamp in situ: on a fragmented brick of the dimensions 29 cm long and 2 cm thick, which was found on a projecting ledge (aletta sporgente), with circular stamp: EX PRAEDIS STERTINIAE BASSVLAE/OFICINA LICINI DONATI/M (CIL XIV 2205).
124. Steinby (1977: 15, note 1) provides late Hadrianic/early Antonine dates for the production of this brick, which comes from the estate of Stertinia Bassula, the wife of Ti. Iulius Iulianus. One brickstamp might allow us to suggest only a *terminus post quem*, assuming that it was found in a primary context. During the author's survey another brickstamp was discovered (room 031, in the southwestern wall, where it intersects with the southern wall which confines the space against the Caupona); the brickstamp has as yet not been studied, but will be examined by E. Rinaldi in the near future.

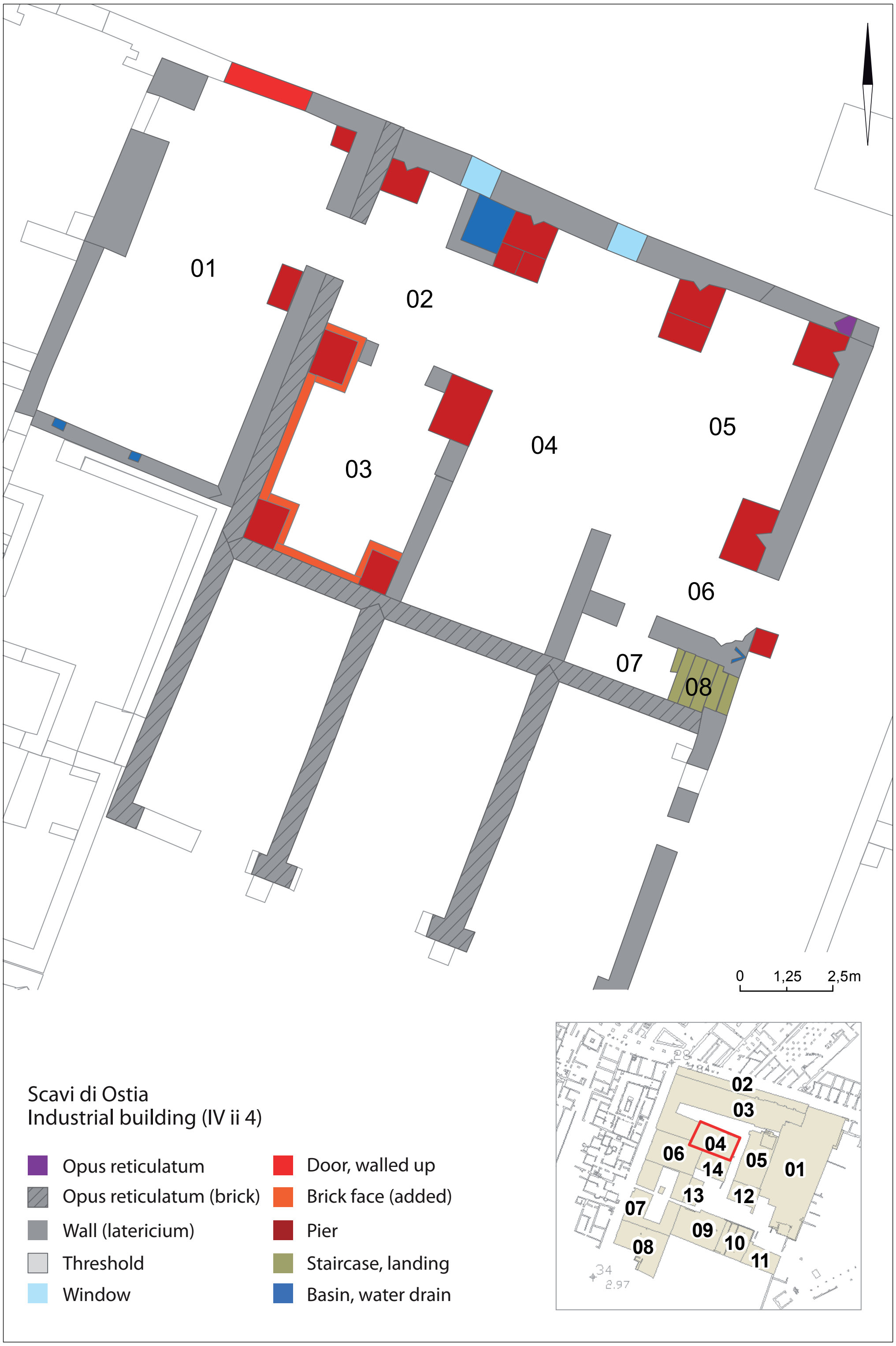


Fig. 5.52 – Industrial Building (IV ii 4)

The unit has hitherto not received much attention; it features in Packer's survey of Ostia's multiple dwellings destined for industrial use.[125] It is included in Calza's topological and chronological indices.[126]

Fig. 5.53 – The walls of the industrial building (IV ii 4) were reinforced with buttresses

Layout and construction phases

Building IV ii 04, as many of these 'industrial' establishments or 'factories', was solidly built. The walls are buttressed by heavy piers which increase the thickness of the walls in several places to 1.50 m. The building was constructed against two pre-existing *opus reticulatum*/brick walls, which constitute an integral part of *tabernae* IV ii 14. In this way the factory and the *tabernae* shared party walls: the *tabernae*'s northern confining wall formed the factory's southern wall, while the *tabernae*'s westernmost wall continued due north to delimit the factory toward the western industrial wing (030) of the Caseggiato dell'Ercole. By making use of already existing walls, the building was completed by adding the eastern and the northern buttressed walls, and a row of central piers which corresponded to their southern and northern counterparts. These carried a series of intersecting arches which supported the cross vaults (Fig.5.53). The piers also helped in subdividing the space into smaller areas. Subsequent reconstructions can be identified in the south-western space which received an additional brick-face, cladding the piers and the western *opus reticulatum*/ brick wall. During a later intervention, the northern buttresses were reinforced, and some of the rooms were further subdivided as well. In the north-western corner a water basin of rectangular shape was installed (Fig.5.54), emphasising the industrial use of the premises.[127] This is further underlined by the remains of single basalt blocks scattered within the factory, pointing to floor pavements which allowed heavy use. The south-eastern corner was taken up by the stairs, a door opening provided access to the room under the stairs from inside the industrial premises, while the stairs were reached from the outside passage; hence entry to the upper floors remained independent of the activities of the factory's ground floor space.

Fig. 5.54 – A water basin was built against the north-western corner of Building IV ii 4 (Scavi di Ostia, Archivio Fotografico, ref. 3703)

From the assessment of Building IV ii 04 and the Caseggiato's western wing (030) it can be established that these two 'factories' were functionally connected spaces. Although the two premises did not share party walls, they still shared a common main entrance, reached from the Caseggiato's courtyard leading to the central room (01). The central room (01) proves critical since it was structurally linked to the Caseggiato's industrial wing, and, equally

125. See Packer (1971: 14).
126. Calza (1953: 232, 238); Calza suggests that the building was reconstructed during the 2nd half of the 3rd century, this could possibly refer to the added brickface in the southwestern room, as well as some additional pillars (1953: 238).

127. See Ricciardi and Scrinari II (1996: 135-136, fig. 240) who date the water basins to the 3rd century AD.

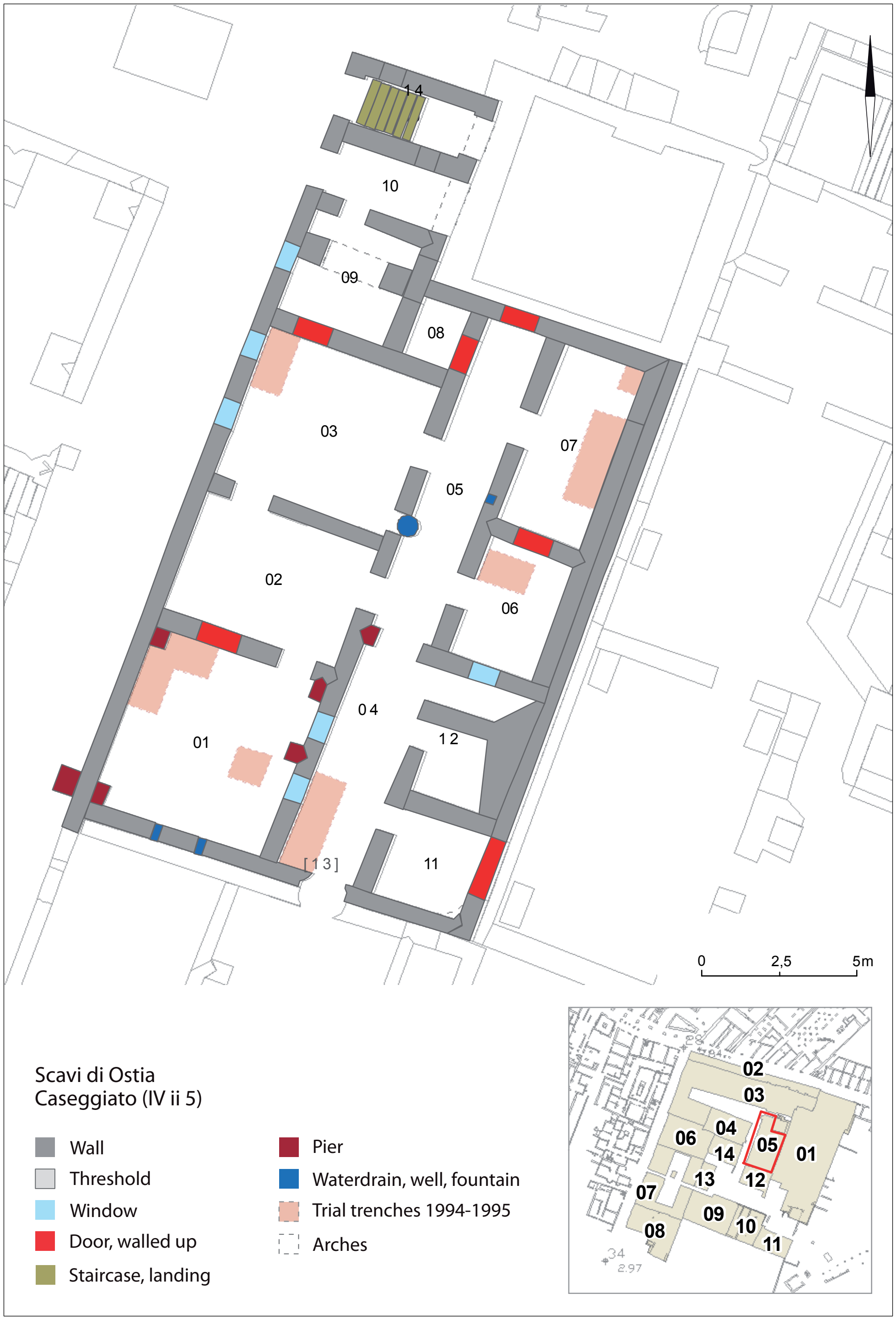


Fig. 5.55 – Caseggiato IV ii 5

important, its southern latericium wall delimited the Caupona's courtyard, and apparently even encroached upon the Caupona's courtyard to increase its own space. It seems very likely that the construction of the factories was connected to a larger reconstruction project, concerning *tabernae* IV ii 14, IV ii 04, and Building IV ii 5,[128] and to a limited extent also the Caupona del Pavone (IV ii 6).

5.2.5 Caseggiato IV ii 5

Caseggiato IV ii 5 belongs to the lesser known structures located in the centre of the Insula (Fig. 5.55). It is rectangular in shape and seems of residential character; it covers an area of 309.3 m^2. Its eastern neighbour is the Terme del Faro, while to the south it is bounded by building IV ii 12. On the western side it is separated by a passage from the range of *tabernae* (IV ii 14), while to the north it is confined by a water cistern serving the baths, which came to occupy a former open space behind the Caseggiato dell'Ercole. Originally the main entrance of the Caseggiato IV ii 5 was located at its northern side, leading to the open space of the courtyard behind the Caseggiato dell'Ercole. The building's layout points to several phases of reconstruction. These reconstructions even involved the relocation of the main entrance (Fig. 5.56); all in all the many interventions make it difficult to judge the building's original plan. Different ground levels can be observed within the building's plan: whilst the northern part largely complied with the street levels dictated by the *cardo* and the Caseggiato dell'Ercole,[129] the southern part is located about 1.0 m lower, responding to the Insula's sloping terrain. A row of seven relieving arches, placed at regular intervals are a conspicuous feature visible at the bottom of the building's western wall (Fig. 5.57).[130] The arches were presumably employed to counteract the sloping ground and to strengthen the structure.

Fig. 5.56 – Former door leading to the open space in the north, closed by the water cistern serving the baths

Fig. 5.57 – A row of arches reinforces the western wall and counteracts the sloping terrain

128. This issue will be further discussed in connection with the development of Caseggiato IV ii 5.
129. Already here a slight difference in levels can be noted: the northern door opening integrates a door step of c. 0.30 m height; presumably needed to level out the difference in height between the open space to the north and the level of the inner corridor (5).
130. See Blake (1973: 226).

Fig. 5.58 – Structures of unknown function (12 and 13) were built into the internal courtyard (04). The corner visible in the foreground froms part of room (06)(Scavi di Ostia, Archivio Fotografico, ref. 3711)

Excavations and history of research

A brief entry in the *giornale degli scavi* informs us that a building with painted walls '*pareti dipinte a fondo bianco*',[131] had been brought to light to the 'north' of the Terme del Faro.[132] Once again we can locate the period of excavation within Calza's large-scale campaign in the year 1940. The next time we hear about the building is when a series of restorations were carried out as part of a larger project that swept through the Insula in the late 1950s and early 1960s. During these activities several walls within the building were restored; modern bricks bearing the year 1960, inserted into the restored brickwork, mark these interventions. In addition, the *Giornale degli Scavi* reports that a number of small objects had been found during cleaning, when the structures were prepared for conservation.[133] After a long break the building once again attracted the attention of the Soprintendenza: in 1994 five trial trenches were excavated to study

131. See Liedke (1995: 15, note 37) for the complete text of the entry in the G.d.Sc.
132. The direction 'north' was used by the excavators to provide a rough indication and does not reflect the actual location, which would be northwest of the baths.

133. Since the objects were retrieved during cleaning, they do not come from a stratigraphic context, neither do the finds appear very specific, they rather seem to represent what could be found in any domestic or commercial building; see G.d.Sc. Vol. 32, entry date 26.04.1960, Caseggiato, Reg. IV ii 5; list of objects: a fragmented base of a glass vase, transparent in colour, rather oxidised; - fragment (one half) of a stone disc (diam. 5.5 cm; thickness 1.2 cm) with radial incisions; a clay vessel, in the shape of an olletta, with a single handle; light clay, lime incrustations (dimensions: h 11.1 cm, diam. body 8.1; rim: 5.5).
On the 03.05.1960, the G.d.Sc. Vol 32 report the following finds:
- coin of emperor Gordianus Pius (238 - 244 AD) (obv. IMP GORDIANUS PIVS (PF?) laureated draped bust; (rev.) S/C P.M. TR.P IIII COS II PP; emperor with lance and globe, standing; 241 AD (Coh. V n. 255) [Cohen 1880];
- oil lamp (clay) fragmented, the spout is missing as well as a part of the body, decorated with a half moon, parts of which are still visible.

the relationship between the existing structures and the building's preceding phases;[134] the results have not yet been published.[135]

As far as published research is concerned, the building received limited attention in Blake's survey of Roman construction,[136] whereas a more detailed description of the built structures followed almost three decades later, when it was studied for its wall-paintings by Liedke.[137] The building's wall-decorations remained the major focus for subsequent studies: Falzone's volume on wall-paintings from Ostia (Scavi di Ostia XIV) dedicates a section to the Caseggiato IV ii 5, including a brief description of the architectural structures. Falzone draws on Liedke's earlier survey, but also adds insights gained from the excavations she had conducted herself.[138] The description of Caseggiato IV ii 5 presented here utilises Liedke's and Falzone's earlier work, but contributes new information gained by the author'son-site study.[139]

Building phases and layout

The building is preserved in its later stage, constructed in *opus latericium*. It has been ascribed to the period of Marcus Aurelius (161-180 AD).[140] However, a brickstamp found in situ on a bipedalis suggests earlier dates between 123 and 155 AD.[141] Furthermore, the building incorporates sections of *opus reticulatum*/brick walls belonging to the preceding building phase, attributed to the Hadrianic period. Therefore earlier dates seem more likely, and the possible date for the building's reconstruction should be pushed back to the period of Antoninus Pius (138-161 AD). The earlier *opus reticulatum*/brick walls are only found in the building's outer walls (southern confining wall and on the eastern side along the Terme del Faro), while none remained preserved within the building.[142] Liedke therefore suggested that the reconstruction involved a total removal of the core of the earlier building, which led to a complete redesign of the internal division of the later building.[143] Liedke offers an interesting observation, which is however difficult to prove: she suggests that the preceding building had formed a continuous unit with buildings IV ii 14 and IV ii 4. She noted that the passageway between buildings IV ii 14, 4 and IV ii 5 confirms to the same dimensions as the width of the *tabernae* of building IV ii 14, which led her to assume that the preceding building consisted of a continuous row of *tabernae*, probably extending from the Caupona del Pavone to the Terme del Faro.[144] We shall however see in the next chapter that there are spatial and visual considerations which would speak against such a continuous building.

Building IV ii 5, as it has been preserved, has an attractive layout with only a few similar floor-plans found in Ostia.[145] The floor plan bears a slight resemblance to the Caupona del Pavone (IV ii 6): a conspicuous feature found in both buildings is a fenestrated courtyard at the rear part of the building. The building's rectangular ground plan is divided by a central wall into an eastern and western section. The western section is subdivided into a range of interconnected rooms (1, 2, 3, 8, 9, and 10), of which rooms (9) and (10) form part of the stair well leading to upper floors. The building's eastern part comprises

134. G.d.Sc. Vol. 74 (1994-95) contains the preliminary excavation reports from the trial trenches opened within IV ii 5 (1994); the excavations were directed by A. Pellegrino and conducted by P. Olivanti and S. Falzone; plans produced in connection with the excavations are available for viewing at the Archivio Disegni at the Scavi di Ostia.
135. See Falzone (2004: 119).
136. Blake (1973: 226-227).
137. Liedke (1995).
138. See Falzone (2004: 119-126).
139. The floor plan of building IV ii 5 has been re-mapped by the author and produced in ArcGIS (GeoStar, J. Lee and the author).
140. Calza (1953: 237).
141. Blake (1973: 226) mentions a brickstamp bearing the name of Lucilla, found in situ; Blake (1973: 226, note 152) makes a vague reference to the brickstamp listed in CIL, col. 15 (1), p. 273; she further states that *CIL* suggests 123-155 AD as the period of use for Lucilla's stamp; Steinby (1977: 52) also states between 123 to 155 AD as the period of use for Lucilla's stamp.

142. Falzone (2003: 120) refers to a longitudinal wall within room 01 which had been razed to the ground presumable to prepare for the reconstruction of the early Antonine period.
143. Liedke (1995: 14).
144. Liedke (1995: 14).
145. The Insula delle Volte dipinte (III v 1) comes to mind, but also other buildings with a central corridor and ranges of rooms on both sides, e.g. III xvi 4.

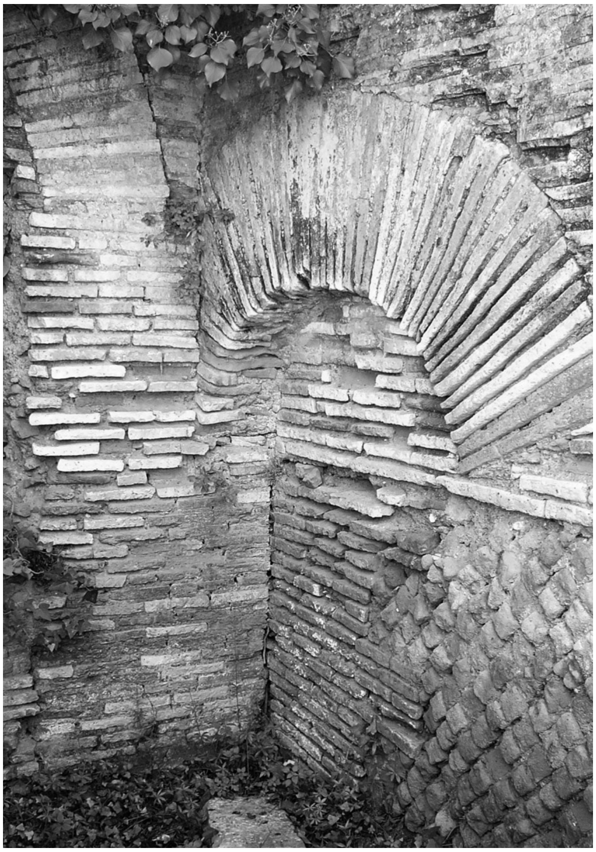


Fig. 5.59 – Reinforcing arch placed to strengthen the joint between the earlier *opus reticulatum* (brick) and the later *opus latericium* walls

an internal courtyard (4) and a corridor (05), as well as rooms (06) and (07).[146] Corridor (05) leads from the northern entrance (later walled up) to the internal courtyard (04) on the southern end of the building, connecting to all rooms but room (01). Rooms (06) and (07) are located on the north-eastern side, along the wall bordering onto the Terme del Faro. Rooms (06) and (07) received light and air only from the corridor and the courtyard.[147]

146. Rooms 6 and 7 have been identified as cubicula by Liedke (1995) and Falzone (2003), the reason being that these rooms did not have any direct sources of light, and were of moderate dimensions.

147. Rooms 6 and 7 preserved several wall-paintings, and have therefore been studied in detail by Liedke (1995) and later Falzone (2003). Liedke dates the decorations in room 6 into a Pre-Severan phase, hence they must have been applied before the northern entrance had been walled-up (Liedke 1995: 15).

Construction considerations: light, air, access and building sequence

'Light and air' seemed to have been a major concern, and have influenced various construction decisions in observable ways. There are no windows in the building's eastern wall, since it abuts a pre-existing wall, confining the Caseggiato IV ii 5 against the baths. However a number of window apertures are found in the western wall along the passage; they remained open in room (05), whereas the windows had been walled up in rooms (01) and (02). These windows, although included in the original design, had already been blocked during the original building phase. As a result of the these changes, room (01), which was one of the largest rooms within the building, was left with only two windows in the eastern wall, opening to the courtyard. Hence the courtyard remained the only source of light and air for room (01), while room (02) only received light from the corridor and the other rooms. Throughout the building's lifetime the open courtyard (04) kept functioning as the most important light and air well for the majority of the rooms. During a later phase of occupation, two small rooms (11) were built into the courtyard (04) (Fig. 5.58). Their function is not at all clear. Liedke suggests that they could have been the substructure of an internal staircase which had been built into the courtyard at a late point of occupation. In any case, by inserting these rooms, half the size of the courtyard was taken away, reducing it to a corridor. However, despite these overall constrictions, the added structures still respected the window which brought light into room (06). This is evident from the skewed angle of the buttress-like structure, which had been placed against the eastern wall of the courtyard (04). Moreover, since the later reconstruction seems responsive to the needs of air and light in room (06), this illustrates that room 06 was still in use at a late period of occupation.

Turning our attention once more to the courtyard (04), it seems to reveal a number of clues about the building's different stages of reconstruction: almost all major changes that occurred within Caseggiato IV ii 5 are reflected in the courtyard's walls. The eastern wall which confines the courtyard against the Terme del Faro still preserves the *opus reticulatum*/

brick of the Hadrianic building phase.[148] In contrast, the courtyard's western wall (shared with room 01) and the northern wall (shared with room 06 and the corridor) belong to the major reconstruction in the Antonine period (*opus latericium*), which gave the building its existing layout. The southern wall is of specific interest since it not only includes in its lower parts stretches of *opus reticulatum*/brick from the preceding building phase, it also offers some indications about the link between building IV ii 5 and its neighbouring building IV ii 12: an interesting feature is a projecting arch (constructed in *opus latericium*). It was placed into the southeastern corner to reinforce the southern wall at a critical point of intersection with the eastern wall (Fig. 5.59). The corner represents a crucial spot where three buildings meet,[149] and it is easy to imagine that constructions which took place in one building would affect or even compromise the structural stability of the neighbouring buildings. Hence the supporting arch might have been a device to counteract structural stress caused through works carried out in the Terme del Faro, which affected the Caseggiato IV ii 5, and also building IV ii 12.

The courtyard's southern wall runs back to back with an *opus reticulatum*/brick wall of building IV ii 12, hence no party walls were shared between the Caseggiato IV ii 5 and its southern neighbour.[150] Today the structural remains show a large aperture broken into the *opus reticulatum*/brick wall of building IV ii 12, connecting through to the southern wall of building IV ii 5 (Fig. 5.60).[151] It is difficult to determine whether a proper doorway, linking them physically and functionally, ever existed between these buildings.[152] However, there are a number of indications which would support such a view.[153] The issues under concern are the points of access to building IV ii 5. As stated before the main entrance was originally located at the northern side, but was blocked when the baths' water cistern was installed, which occurred most probably in the Severan period. Two additional entrances, placed in rooms (09) and (10 stairwell), were connected through room (09) to the western range of rooms, and through room (08) to the corridor (05). Rooms (09) and (08) were successively blocked off, and as a result the ground floor became disconnected from the upper floors, and from the northernmost part of the building. Most of all, these interventions seem to have left the building's ground floor without direct access to the outside space.[154] Liedke concluded that the building in its later phase did not have a separate entrance at ground floor level any longer, and therefore suggested that the ground floor was only accessible from upstairs via the presumed stairs (rooms 11) inside the courtyard (04).[155] This seems rather unlikely, and we should think of alternatives and hence consider a possible connection between the courtyard (04) and building IV ii 12. This however implies that we have to reconsider the relationship between these neighbouring buildings.

Caseggiato IV ii 5 and its neighbours

At the core of the discussion is the connection between the Terme del Faro and its neighbouring buildings; again and again we see how changes in one building affect the others. As discussed earlier, the changes that occurred in the northern part of the Caseggiato IV ii 5 were related to the construction of the baths' water cistern; therefore we should assume a close link, and probably a shared ownership

148. Here we find the blocked door opening (mentioned above) which earlier provided a connection to the space which later became occupied by the heated rooms of the Terme del Faro (see Fig. 5.26 above).
149. The Terme del Faro, building IV ii 12 and building IV ii 5.
150. The *opus reticulatum*/brick walls have been attributed to the Hadrianic period, hence they belong to the preceding building phase.
151. It would not be too far off the mark to attribute such a radical intervention to the 1940s excavators.
152. The 1953 site plan does not identify a door opening but indicates missing walls; see plan section 13.

153. The southern wall ends with a straight edge slightly short of the eastern side of the large aperture; rooms 11, which were added at a later stage still confirm to a size which assures that a passage of about 2.5 m wide remains clear, hence transforming the courtyard into a passageway.
154. Gering's suggestion that the building had been completely abandoned during the late 3rd century (2004; with colour-coded site plan attached) is both difficult to maintain and to refute; his suggestion seems to rest on the fact that the building did not have an entrance at ground floor level.
155. Liedke (1995: 13).

Fig. 5.60 – *Opus reticulatum* structures of the adjacent Building IV ii 12

between the baths and the Caseggiato IV ii 5; a common ownership was probably also extended to building IV ii 12. The latter consists of a relatively simple ground floor layout, however, on its eastern side it features a substantial flight of stairs, which, if it had to serve only the upper floors above building IV ii 12, would have seemed rather out of scale, and one would have to put its usefulness into question. However, if seen in connection with building IV ii 5, it would make a valuable addition, as it would allow access to the upstairs spaces independently of the building's northern staircase. Two independent staircases would provide a structured access to the upstairs spaces, which could have been split up into several units and be rented out independently, serving different rental requirements.

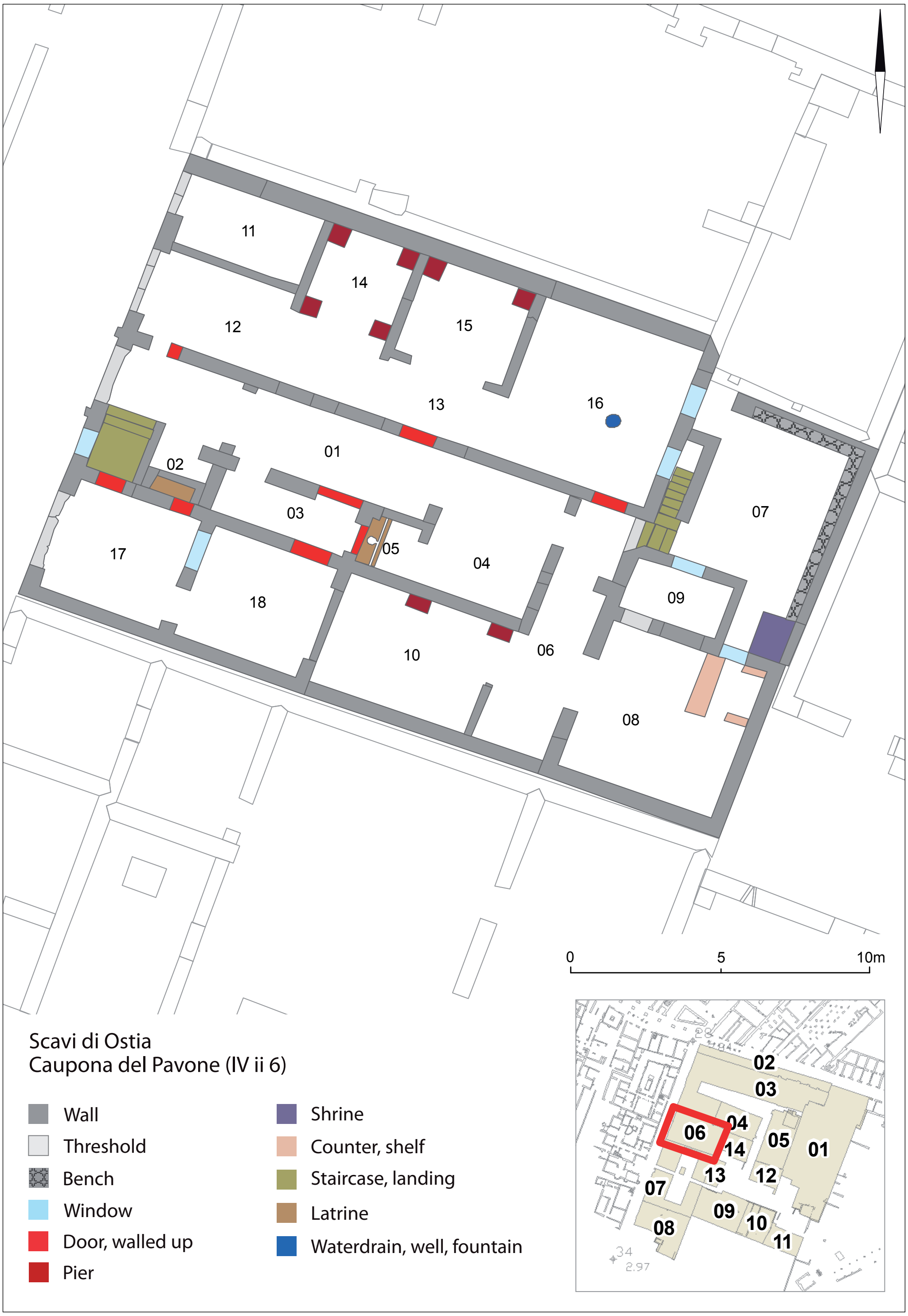


Fig. 5.61 – Caupona del Pavone, IV ii 6

5.2.6 Caupona del Pavone (IV ii 6)

The Caupona del Pavone (Fig. 5.61) is located in the western part of the Insula,[156] positioned on the Via della Caupona which was also named after the same building.[157] It occupies an almost rectangular area of about 385 m^2 (c. 16 x 24 m). On its northern side the Caupona is flanked by the industrial wing of the Caseggiato dell'Ercole (IV ii 3), to the east by building IV ii 14, and to the south by Caseggiato IV ii 7. The Caupona's only façade is along the Via della Caupona; here we find the only points of access: four door openings in a row, all directly connected to the street.

The building was excavated in the first days of July 1940, forming part of Calza's large-scale excavation campaign. A series of photographs is available which were taken during the excavations to document the building's condition. These photographs reveal that the walls were only preserved to a relatively small height (c. 1.50 m); however they still retained substantial remains of painted plaster and wall paintings still intact.[158] Conservation works commenced immediately after the excavations, as the stability of the walls seemed compromised in several locations.[159] Since the protection of the wall-paintings took priority, specific attention was paid to the walls of the internal rooms. It was decided to restore the walls to a height of three metres to stabilize them, and to mount supports using reinforced concrete.

156. The Caupona del Pavone, 'The Hostel of the Peacock", received its name from a painting of a peacock found in the niche of the *aedicula* placed in the outer courtyard (07). In this study the term caupona refers to a 'hostel'; although the use of the terms is debatable, a discussion of terminology is not within the remit of this study. See Hermansen (1982: 192) for a discussion of the various terms caupona, deversorium, hospitium and stabulum which all denote what modern language would call hotels.
157. The Caupona del Pavone will be referred to as 'Caupona'. However we have to keep in mind that the building remained a private domus until the Severan period and served as a caupona (hostel) only in its late stage of occupation.
158. See Gasparri (1970: 6, fig. 2); the photographs are kept in the Archivio Fotografico of the Soprintendenza of Ostia (Soprintendenza di Roma sede Ostia).
159. The Caupona's restoration was directed by I. Gismondi; see Gasparri (1970: 5).

Fig. 5.62 – The main entrance to the Caupona, closed for visitors; the arch is a later intervention to provide structural support; the corridor is paved with *opus spicatum* (small tiles laid in herringbone pattern)

In addition, several other walls in the entrance area were restored, re-using original building material which had been retrieved during the excavation.[160] Hence, the state of the Caupona, as we observe it today, is to a large extent the result of Gismondi's interventions, as well as other subsequent restoration activities.[161] The Caupona is inaccessible to Ostia's visitors, a precaution taken to protect the wall-paintings; a special permit is required to get past the modern iron-gate which bars the main entrance (Fig. 5.62) while the front rooms, directly linked to the street, have remained open to visitors. Different levels of height can be observed between the front and the rear of the building: the entrances on the Via della Caupona open at street level, whereas the courtyard in the rear is located about 0.90 m lower, and was reached by descending four steps (Fig. 5.63).

160. See Gasparri (1970: 5).
161. Restoration activities were carried out between 1965 and 1968, and in July 1969, see Gasparri (1970: 5).

Fig. 5.63 – Difference in height between the Caupona's floor levels (corricdor 06) and the rear courtyard (07)

Owing to its well-preserved wall-paintings, the Caupona has received considerable attention, and has been referred to in several publications on Ostia; the most complete treatment is Gasparri's monograph.[162] Although primarily focused on wall-paintings, it dedicates one chapter to the building's structural development.[163] The brief description presented in the next section combines Gasparri's observations with the author's own on-site study. For this purpose Pascolini's site plan has been redrawn (see Fig. 5.61 above), and his reference systems adapted to the numeric reference system used by this study.[164]

162. Gasparri (1970); see also Pavolini (2006: 203-206) for a general description; see Hermansen's survey of the Caupona (1982: 167-168); see Calza and Becatti (1971: 49); see Becatti (1961: 176-177, fig. 64, mosaics 324-326); see Calza (1953: 145, 226,237) on the building's dating sequences; see Ricciardi and Scrinari (1996 Vol. I: 46-47, 136-137) on the building's water facilities; see also Falzone on wall-paintings (2007: 134-141).
163. Gasparri (1970: 7-14).
164. For the study of the Caupona it was not necessary to draw a new site plan. The available plan, drawn by A. Pascolini, published in Gasparri (1970: 5, fig. 1) includes detailed information on different structural phases based on building techniques; Pascolini's plan (inv. 443) is kept in the Archivio Disegni (Soprintendenza Roma, sede Ostia).

Building phases and spatial layout

The building has undergone various phases of transformation. Initially it was a private domus and was only transformed into a caupona (hostel) during the late period of its occupation. The original core of the building, dated to the early Hadrianic period,[165] is still preserved in the *opus reticulatum*/brick walls.[166] Major changes took place in the Severan period, when the building still served as a comfortable private dwelling. The existing wall-paintings and mosaic pavements have been attributed to this phase.[167] The building developed its identity as a caupona at a later stage, when the counter (bar) and the walled shelves were installed in room (08). Since these had been placed not only against the existing wall-paintings,

165. A pre-existing building, dated to the Augustan period might be suggested by the earliest and deepest phase of the well, whose well head is visible above in room XVI, see Ricciardi and Scrinari I (1996: 46-47).
166. See Gasparri (1970: 12-13); *opus reticulatum*/brick walls are found in room 8, courtyard 7, as well as in sections of the northern and eastern walls confining the spaces 16, 15, 14 and 11.
167. Gasparri (1970: 13).

but also against the somewhat later renewed plaster socle, a *terminus post quem* could be established for the building's last transformation, dating these activities to the first half of the 3rd century AD. Most of all, by preserving the exquisite decorations, which were evidently still in good state, the elegant style of the previous building was transferred onto the Caupona. In contrast, the interventions which were introduced during the period of the Caupona proper were of a rather modest kind, e.g. the solidly walled benches added to the walls in the courtyard (07), and possibly the cocciopesto socle in the inner courtyard (04), as well as the new counter and the shelves in room (08). Ultimately, the Caupona, as all other buildings in Ostia, was abandoned. It was reported that during the excavations a huge heap of mosaic tesserae was found in room (03), stripped from the pavements and apparently collected with the intention to be taken away and possibly used elsewhere.[168] This clearly documents the phase when the Caupona became 'spolia' like the rest of Ostia.[169]

The Caupona's internal layout is organised along a central corridor (1), leading from the main entrance into the inner part of the building (see plan Fig. 5.61). The corridor forms a central axis, dividing the building into a distinct northern and southern part. The internal division is also reflected in the access points found along the street front. Accordingly, the building's main entrance is flanked by two additional door openings to the north, and one to the south. The first entrance gives access to a separate, rectangular room of modest proportions (11), directly accessible from the street; the second door leads to a series of rooms (12, 13, 14, 15 and 16) annexed to the building. Both entrances have travertine thresholds preserved in situ, but do not present any traces of locking systems. In contrast, the fourth and last entrance, leading to a *taberna* (17), has a travertine threshold still in situ, with the locking devices typical of *tabernae*. The central entrance (the third opening) was clearly emphasised as the most important one: pilasters are found on both sides of the door, which probably supported a triangular pediment.[170] The main entrance preserved its travertine threshold, with locking devices still visible. Between the main entrance and the fourth entrance (*taberna*), there is a window opening at the height of 2 m, bringing light into a stairwell (02). From the height of the façade, preserved to a maximum of c. 2.50 m, not much can be inferred. However, the presence of stairs proves the existence of an upper floor, which, given the modest plan of the stairs, was probably also the only upper floor present.[171]

The central corridor (01) leads into the inner part of the building; interestingly enough, all doors (except for one), which once connected the corridor to the northern part have been blocked,[172] whereas on the southern side a number of utility rooms have been installed. Upon entering the building, immediately to the right are the stairs leading to the upper floor; in the small space under the stairs (02), a drain was discovered, embedded in *cocciopesto*, probably used as a *latrina*. Directly after the division by an arch,[173] a room of rectangular form (03), paved in *bipedales*, is found. Judging by the modest dimensions and the lack of a window, it could have been used as a storage or service room. Further into the building, the corridor opens into a small courtyard (04) of squarish shape; the presence of two drain holes indicates that the area was unroofed and served to collect rain water; in addition, the open space also brought light and air into the inner rooms of the building. The courtyard is covered in mosaic, rendered in large *tesserae*, with a central white area, surrounded by a black border. From the south-western corner of the courtyard, a small room (05) opens, assigned as a *latrina*, with a drainage channel and pavement in *cocciopesto*.

168. See Becatti (1961: 156).
169. Gasparri (1970: 14).
170. On Ostia's monumental entrances see Stöger (2007: 347-363).
171. Gasparri (1970: 8).
172. Some of these doors seem to have been walled-up already during the initial building phase since there are no lintels present, and instead the regular wall just continues once the apertures had been filled; a similar 'change of plan' can be observed in various other buildings, e.g. VI ii 5, where several windows had been walled up already during the original building phase.
173. The arch is a late intervention judging by the *opus vittatum*, probably Severan period; incidentally it is also the place where the modern iron-gate has been placed.

Fig. 5.64 – The Caupona's counter was placed against Severan wall paintings (courtesy of Ostia website)

The door at the back of the courtyard leads to a traversing corridor (06) paved with mosaics in alternating black and white semi-circular patterns.[174] From this corridor a number of rooms can be reached, most notably room (08), where the Caupona's counter had been placed (Fig. 5.64). In the building's earlier phase, room (08) probably assumed the function of a reception room. Corridor (06) also connects to room (10) and to the outside courtyard (07), located at the rear part of the building. The door leading to courtyard (07) is of special interest: is opens in a skewed angle so as to facilitate movement between corridor and courtyard. This odd situation developed when the small room (09) had been added to room (08). Prior to this intervention, the opening to the outside corridor was presumably as wide as corridor (01), thus corresponding to the main entrance on the street front. This correspondence gives us an indication about the building's initial layout: a central corridor, with a door opening on each end, flanked by large spaces on either side, which had been subdivided into smaller rooms by partition walls.[175] While the central corridor seems to have remained functioning throughout the building's history, the internal rooms have been re-organised in the course of its occupation, responding to different needs at different times: the northern and southern parts have been rearranged by either blocking existing door openings or by subdividing rooms into smaller units.

The outside courtyard (07) was reached from the traversing corridor (06) by descending four steps (see Fig. 5.63 above). The courtyard's original form was rectangular until the south-western corner was sacrificed for the construction of room (09). A *lararium* in aedicula-shape, constructed in *opus vittatum* (Fig. 5.65) with a triangular pediment in *opus latericium*,[176] was built against the eastern confining wall. The shrine seems to predated room (09), when room (09) was added the shrine's surrounding space was considerably restricted. The Caupona's rear courtyard is bounded in the east by building IV ii 14; and in the north by buildings IV ii 3 and 4. In fact, the Caupona's courtyard shares party-walls with these buildings; a latericum wall

174. See Becatti (1961: 176, mosaic no. 324).
175. Casparri (1970: 12-13) alerts us to this particular building type, not uncommon in Ostia; an example can be found in Reg III xvi 4.

176. The shrine features a niche with a painting of a blue peacock spreading its tail-feathers (the peacock gave the building its name); see Bakker for a detailed description (1994: 230, catalogue entry no. 67).

Fig. 5.65 – The aedicula-type niche located in the south-eastern corner of the Caupona's courtyard; walled benches were placed against a crude wall; the latter was built against the *opus reticulatum* (brick) wall of building IV ii 14

Fig. 5.66 – The backdrop to the northern bench was built against the courtyard's northern wall shared with buildings IV ii 3 and 4

belonging to buildings IV ii 3 and 4, confines the courtyard to the north, while a well-constructed *opus reticulatum*/brick wall, which constitutes a structural part of building IV ii 14, confines the eastern side of the courtyard. Furthermore, a range of windows in the eastern wall (*opus reticulatum*/brick), placed at a height of c. 2.50 m, allows light to enter building IV ii 14; hence the Caupona's courtyard serves as a light well not only for room 16, but also for the westernmost *taberna* of Building IV ii 14. All this suggests that there must have been some tacit agreement between the owners of Building IV ii 14 and the Caupona. Even more so since at the time when the building functioned as a hostel or inn, a very crude wall was placed against the *opus reticulatum*/ brick (decorated plaster is still visible behind the crude wall), and against the northern *latericium* wall (Fig. 5.66). The 'crude' wall served as a back-rest for solidly walled benches placed against the wall to offer seating for the Caupona's patrons and lodgers. Upon entering the courtyard, immediately to the left (north) of the entrance, there is a flight of narrow stairs, leading to an underground 'inspection chamber', also constructed during the phase when the building functioned as a caupona, when it was apparently necessary to have better access to the walled shaft of a well, which communicates with the well-head placed in space (16) above (Fig. 5.67).[177]

Last but not least we should turn our attention to the Caupona's northern section, comprising rooms (11, 12, 13, 14, 15 and 16), and to the southern tract where we find a *taberna* (17) with an adjacent retrobottega (18) (backroom). These parts seemed to have experienced an independent development from the rest of the building. Both sections are directly linked to the street space, while completely or partially disconnected from the internal part of the building. Various dating sequences have been proposed for the development of these rooms, however there seems little agreement.[178] In terms of their function rooms 14 and 15 have been interpreted as cubicula,[179] while spaces 11 and 17/18 probably served as *tabernae*, dedicated to commercial activities. It can be established however that during the phase of the Caupona proper, both sections had already been cut off from the core of the building. Therefore, these relatively independent parts might have allowed the Caupona's owner to respond to the different requirements of his customers, ranging from lodgers for a single night to long-term tenants. The *tabernae* (17/18) allowed direct access and might have been rented out to long-term tenants independently of the Caupona.

The Caupona's most striking characteristic is its outwards focus: all points of access are concentrated along its 16 metres of street front. Within the Insula the Caupona forms an exception: it is the only building within the group which does not interact with the inner part of the Insula. Furthermore, it does not share party walls with its northern and southern neighbours. The Caupona's fairly isolated position vis-à-vis the Insula and its pronounced outward focus could have various reasons. One of these seems to be rooted in the plot-size typical of the *domus* with its narrow end on the street front, providing individual access to the street space. The building remained a private dwelling until the Severan period, when it was eventually turned into the Caupona. During its entire period of use the building held on to its conservative layout, while its immediate neighbourhood had already been transformed into multi-storey commercial/residential buildings starting from the Late Hadrianic/Early Antonine periods. During these transformations the Caupona's field of negotiation seems restricted to its inner courtyard which shared party walls with *tabernae* IV ii 14 and the central

177. Ricciardi and Scrinari I (1996: 46-47) identify four phases during which the well was adapted to the building's successive transformations: the lowest part of the well is dated to the Augustan period; the next changes occurred in the Hadrianic period; a further extension was added in the mid-3rd century AD, when the floor levels were raised; while the last phase included the construction of the 'inspection chamber' which was accessible from the outer courtyard (07).

178. Ricciardi and Scrinari I (1996: 44-46) propose that rooms 11, 14 and 15 re-use reticulate walls dated to the Augustan period, while Van Dalen (1991: 263) proposes Severan dates for parts of the walls in the north-eastern section of the Caupona, suggesting a 'late use of *opus reticulatum* in Ostia'; Ricchiardi and Scrinari's suggestion can be ruled out since these rooms have been built against the existing *opus reticulatum* (brick) wall of Hadrianic date, which provides a *terminus post quem* for the partition walls in o*pus reticulatum.*
179. Gasparri (1970: 11).

Fig. 5.67 – Room 16, the well head communicates through a shaft to the chamber below which can be accessed from courtyard (07)

room of the factories related to the Caseggiato dell'Ercole (IV ii 3 and 4). Within the small world of the Caupona's rear courtyard we are allowed a glimpse into the gains as well as the concessions made by the Caupona's owners, striving to adapt to an ever changing neighbourhood. The Caupona's outward focus seems to have suited both the earlier domus and the later caupona function. During the late phase of occupation when the building functioned as a *caupona*, the outward focus seemed appropriate and reflects a response to external dynamics, related to the Caupona's commercial focus, attracting visitors and customers from outside the Insula.

Fig. 5.68 – Caseggiato IV ii 7

5.2.7 Caseggiato IV ii 7

Positioned at the western side of the Insula, the Caseggiato IV ii 7 (Fig. 5.68) is located on the Via della Caupona, with its western façade facing the street, while the other three sides are bounded by neighbouring buildings: the Caupona del Pavone to the north, buildings IV ii 13 and IV ii 9 to the east, and building IV ii 08 to the south. The latter forms a structural continuation of building IV ii 07;[180] notwithstanding this, Ostia's topographical index lists the buildings as independent entities.[181] The Caseggiato IV ii 7 has a commercial-residential character, and covers an area of 535 m^2. All access points along the Via della Caupona open at street level; they link the building to the city's public space, while a secondary entrance connects the building also to the internal courtyard inside the Insula.

Excavations and history of research

The *caseggiato* is one of the lesser known buildings within the Insula, and has hardly attracted any scholarly attention. It received limited consideration in Van Dalen's survey of constructions in *opus reticulatum*.[182] The building's history of excavation cannot be reconstructed; however we have reason to assume that it was excavated during Calza's campaign, although no reports are available. As mentioned before, there was no concern for any standard documentation to record the excavation process, unless any special finds were made. Nevertheless, a series of photographs is available from the archives; these offer information on the state of preservation of some of the building's walls prior to their restoration (Fig. 5.69). In 1960 when the large restoration campaign was carried out within the Insula, several walls of the *caseggiato* were consolidated and partly reconstructed. A number of small finds were retrieved during cleaning in preparation for these interventions.[183] Although the objects are of no specific character, five bronze coins came to light, ranging from the time of Nerva (96-98 AD) through Severus Alexander (222-235 AD) to the 4th century AD, which therefore suggests a long period of use for the *caseggiato*.

Layout and building phases

The Caseggiato IV ii 7 is organised around a rectangular inner courtyard (01), separated into a northern and southern part by a central passage way (corridors 15 and 05). The corridor leads from the Via della Caupona into the building's courtyard and from there further into the Insula's open inner courtyard. Rows of *tabernae* (09, 10, 12, 16, 18 and 19), some connecting to back rooms, are located along the Via della Caupona, while ranges of rooms are found on the sides of the rectangular inner courtyard (02 and 03, 08 and 11, 06 and 07, as well as 22 and 23). The corridor is flanked by a staircase (14) leading to the upper floors. A walled water basin is located in the northern section of the courtyard (Fig. 5.70).[184]

The south-western section of the building IV ii 7, of which IV ii 8 is an integral part, seems to have been constructed earlier than the north-western and eastern parts.[185] The south-western part was built in *opus reticulatum*/brick, while the eastern section us

180. The total area of both buildings amounts to 942 m2.
181. Calza (1953: 236).
182. See Van Dalen (1991) proposing a new chronology for the late use of *opus reticulatum* in Ostia. Van Dalen's study set out to challenge the conventional dates for *opus reticulatum*/brick constructions as established in Calza's chronological index (1953: 234-237).
183. G.d.Sc. Vol. 32 (1956-1961) entry date 22.02.1960; during cleaning in preparation for the restoration of IV ii 7, the following finds have been retrieved in the layer between surface and mosaic tesserae:
a) decorated base of a vase made of marble: decoration in bas relief; motif: bacchiale; preserved dimensions: h 0.10 m diameter at the base 0.14 m, diameter of the body 0.18 m. From the decoration only the legs and feet of female figures are preserved.
b) 5 bronze coins: - 1 MB (dupondius/as) of Nerva (Coh. II n. 110); - 1 MB (dupondius/as) hardly legible of Alexander Severus (imp. SEV. ALEXANDER AUG); - 1 PB (as) of Maximinus Thrax (Hercules-type) (Coh VI, 56); - 1 PB (antoninianus) of Gallienus (Coh V, 24); - 1 PB (a small bronze coin) from the 4th century, illegible (obv: bust of imperator with diadem; rev.: standing figure not identifiable); in addition, another object was found: a small lump of vitreous paste, hemispheric, with a diameter of 1.5 cm of light blue colour (inv. 5836).
184. Ricciardi and Scrinari II (1996: 137, fig. 244), suggest 3rd to 4th century dates for the construction of the water basin, presumably based on construction material and technique (i.e. tufa blocks).
185. See Van Dalen's plan of Building IV ii 07 suggests a tentative chronology for its building phases (1991: 239, fig. 3).

Fig. 5.69 – Caseggiato IV ii 7, hall 06-07, north-western corner prior to restoration (Scavi di Ostia, Archivio Fotografico, ref. 1768)

Fig. 5.70 – Caseggiato IV ii 7, fountain placed in the northern section of the courtyard (01) (Scavi di Ostia, Archivio Fotografico, ref. 1168)

Fig. 5.71 – Caseggiato IV ii 7, northern wall abutting the Caupona del Pavone (IV ii 6); walling technique employs quoining with tufa and brick; traces of a former perpendicular division are still visible

uses a combined technique of *opus reticulatum* (brick/blocks) and *opus vittatum* (alternating courses of tufa-blocks and brick). This combination seems noteworthy since internal and external wall-facings are treated differently: the inner wall-facings are constructed in *opus reticulatum* (brick/block), with a distinct variation as the corners were reinforced employing quoining in *opus vittatum* (Fig. 5.71). In contrast, the eastern outer wall-facings (confining the building against IV ii 13 and 9) were constructed in *opus vittatum*. Such combinations are not uncommon at Ostia and are found in different variations whereby the techniques for the outer wall facing and the wall facing on the inside are different from each other.

The *caseggiato* has undergone a few stages of reconstruction and a number of minor interventions occurring during a late occupation phase: these concern the closing off of former door openings (19 and 20, as well as 17 and 13), as well as the reinforcement of the eastern and western walls in room (07), and the partition between rooms (06) and (07). In addition, the building's original layout included an additional room placed along its northern wall (against the Caupona), where traces of a perpendicular wall are still visible, which was connected to the southern wall of room (20) (Fig. 5.71).

Although the *tabernae* along the Via della Caupona open to the street space, their door openings (ranging from 1.20 to 2.00 m) are not quite as wide as often found in *tabernae*; most of the rooms along the street preserve their travertine thresholds still *in situ*. In contrast, the rooms which open to the inner courtyard have narrow door apertures and would therefore not really suggest a commercial use. While the rooms in the south-western section of the courtyard still preserve their travertine thresholds, the north-eastern rooms (02 and 03) lack thresholds altogether and instead preserve a course of bipedales. The latter would suggest that these rooms were not locked, or the thresholds have been removed. It is difficult to put forward an idea about the function of the interconnected rooms (02 and 03). The archival photograph shows a large quantity of marble fragments piled up in room (03) (Fig. 5.72),[186]

186. Archivio Fotografico (Soprintendenza Roma sede Ostia) Inv. No. 1770.

Fig. 5.72 – Concentration of marble fragments in room (03) (Scavi di Ostia, Archivio Fotografico, ref. 1770)

presumably the remains of marble revetments used in wall decoration, while a concentration of black and white tesserae is still found in the northeastern corner of room 02.[187] To the south of room (03) there is a narrow space (04) which served as a latrina (Fig. 5.73).[188] This makes the Caseggiato IV ii 07 the only dwelling within the Insula which integrated toilet facilities within the building.[189]

Across the corridor, on the south-eastern side we find a sizeable rectangular space (Fig. 5.74), originally constructed as a single hall, which was later subdivided into rooms (06 and 07).[190] This space allows insights into the development of the *caseggiato*, since all stages of reconstruction which occurred over time seem reflected in hall (07/06). Its southern wall is shared with building IV ii 8 and preserves the *opus reticulatum*/brick which constitutes the early phase of the building, dated to the Hadrianic period. In contrast, the eastern wall, shared with building IV ii 9, comes from the slightly later phase and is constructed in a combination of *opus reticulatum*(brick)/*opus vittatum*. The eastern wall's counterpart on the courtyard side is a stretch of wall constructed in *opus vittatum*. Built against the north-eastern corner of room (23), presumably to close a former door opening similar to the one still present in room (08), the piece of wall integrated a pier, serving as a buttress to stabilise the walls. Its corresponding pier is found in the eastern wall. To further strengthen the structure, two larger pillars were placed against the eastern and western buttresses, and at a later point, the walls were reinforced once more by placing stretches of *opus vittatum* against the eastern and western walls.

187. The presence of mosaic floors is also indirectly confirmed by the G.d.Sc., which document that several finds were made when the surfaces of the mosaics were cleared; see G.d.Sc. Vol. 32 (1956-1961) entry date 22.02.1960.

188. The identification of room 04 as latrina rests on the assessment of the excavators; today the space is completely overgrown and cannot be examined.

189. In contrast, the latrina of the Terme del Faro seems to be an addition that occurred during a late phase, turning a back-room of a *taberna* into a latrine.

190. Remains of the partition wall have only been preserved where it joins the eastern confining wall, while hardly any traces are visible of its continuation. The photograph in Fig. 5.74 (Scavi di Ostia, Archivio Fotografico, ref. 3764) clearly shows the former course of the partition wall.

Finally, at a late period of use a partition wall was inserted, running across the space to divide the hall into a larger southern (07) and a smaller northern room (06). Both spaces could be accessed separately, while only the door opening to room (06) retained fragments of a travertine threshold.

Across the inner courtyard, almost diagonally opposite room (06/07), we find room (17), which seems conspicuously dedicated to water. In the centre of the northern half of room (17), a walled block (*opus vittatum*) was placed, containing clay water pipes on its western side, and a vertical water drain on its southern side.[191] The feature might be associated with running water; however, this needs to be further investigated. Along the entire length of the southern wall we find a low walled ledge, forming a bench-like structure. The door opening to the courtyard was walled up at some point, while an entrance was crudely broken into the southern wall, connecting to the passage. The function of this room is not at all clear, but it seems related to water. Room 17 is completely overgrown; a detailed survey would require the removal of layers of vegetation.

Relative chronology

The *caseggiato*'s most striking feature is the specific construction technique which combines *opus reticulatum* (brick/tufo) and *opus vittatum*. It is represented in the building's eastern and northern confining walls, while the southern and south-western sections preserve the earlier *opus reticulatum* (brick) walls. It therefore appears that the reconstruction activities cut diagonally across the building, preserving all earlier *opus reticulatum/*brick walls which were directly or indirectly linked to Building IV ii 08, while the rest was built (or rebuilt) slightly later in a different technique. These activities allow us to suggest tentatively a relative chronology for these construction phases: all sections in the south and southwest retaining the *opus reticulatum*/brick suggest Hadrianic dates; while the northern and northeastern parts, which feature *opus reticulatum* (brick)/*opus vittatum*, imply

Fig. 5.73 – The caseggiato's latrine (04) on the northern side of the corridor (05) (Scavi di Ostia, Archivio Fotografico, ref. 3707)

Fig. 5.74 – Hall (06/07) in the south-eastern corner, partition wall is clearly visible in the foreground (Scavi di Ostia, Archivio Fotografico, ref. 3764)

somewhat later dates, possibly Late Hadrianic to Early Antoninus Pius. From a practical point of view it seems that the later building phase started from the eastern part of the building and moved towards the Via della Caupona, terminating at the northern wall of passage (15), which still formed part of the earlier *opus reticulatum*/brick construction.

A relative chronology between the Caupona and the abutting section of Caseggiato IV ii 7 can be suggested from the northern wall (code IVii07_01_02) of Caseggiato IV ii 7. The latter was built against the pre-existing Caupona wall,[192]

191. Dimensions of the walled block structure: 1.20 x 0.95, h = 1.40 m.

192. This can be established since the putlog holes of wall

and hence the northern section of Building IV ii 7 was built later than the Caupona. The relationship between Caseggiato IV ii 7 and its eastern neighbour is again different; here we find the western structures of Building IV ii 13 placed against the earlier *opus reticulatum/opus vittatum* wall of Caseggiato IV ii 7. The same relative chronology can be established between Building IV ii 7 and its eastern neighbour IV ii 9: the western walls of Building IV ii 9 were built against the already existing eastern confining wall of Building IV ii 7 (Fig. 5.75), hence Building IV ii 7 predates its eastern neighbours IV ii 9 (western section only) and 13. While we can establish a relative chronology between these neighbouring buildings, it is still interesting to note that the eastern walls (*opus reticulatum* (brick/tufa)/ *opus vittatum*) were built without any door apertures (except for the passage). This could suggest that they were built against existing structures, which were then later replaced by Buildings IV ii 9 and 13.

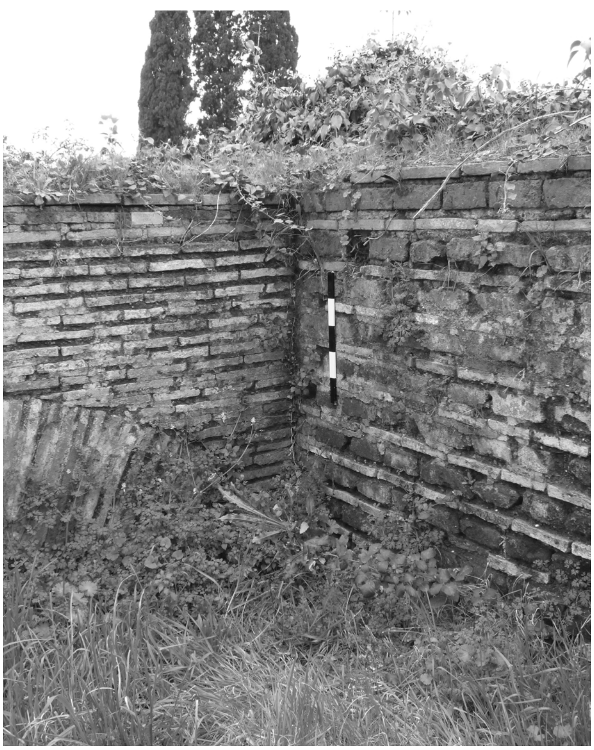


Fig. 5.75 – The south-eastern wall of the Caseggiato IV ii 7 precedes Building IV ii 9; photograph taken within Building IV ii 9 in its south-western corner

(IVii07_07_01_02) do not reach through, but are relatively shallow, and open only on the side of Building IV ii 7.

5.2.8 Building VI ii 8

Being structurally linked to the Caseggiato IV ii 07, Building IV ii 8 (Fig. 5.76) constitutes the southern wing of the joint building. Calza considered the building as independent and hence it received its own distinct reference. It is bounded by the Via della Caupona on its western side, while on its eastern and southern sides it is delimited by open (unexcavated) space. Building IV ii 8 is L-shaped and covers an area of c. 406 m^2. It features façades on two sides: on the Via della Caupona; and towards the east, overlooking the 'open' (unexcavated) space. On its northern side it shares a common wall with the Caseggiato IV ii 7, and was also internally connected to it by means of a corridor. Building IV ii 8 has access points to the city's street system on the Via della Caupona, while on its southern side it seems connected to a courtyard-like space which was only partially excavated.

In terms of its excavation and subsequent restoration Building IV ii 8 shared the fate of most other buildings within the Insula, and hence no reference is found in the 1940s excavation reports. In 1960 when the building was restored, the discovery of a small fragmented head, sculpted in marble (*giallo antico*) was reported.[193] The photographic records available at the Soprintendenza allow an impression of the built structures at the time when they were cleared and presumably prepared for restoration (Fig. 5.77). At present, Building IV ii 8 is largely overgrown and covered in layers of vegetation obscuring the walls, which make most of the rooms inaccessible.

Layout and construction phases

Building IV ii 8 is composed of an eastern and a western section divided by a corridor; the latter connects IV ii 8 to IV ii 7; the corridor ends at room 23, which seems to have played an intermediary role, allowing movement from one part of the building to

193. G.d.Sc. entry date 29.04.1960, reports for IV, Is. II 8: amidst the conglomerate of a wall, a small head in coloured marble was found (giallo antico). The right part of the face is completely missing; it probably represents a woman with a slightly elongated face (preserved dimension ca. 12 cm); no inventory number is provided.

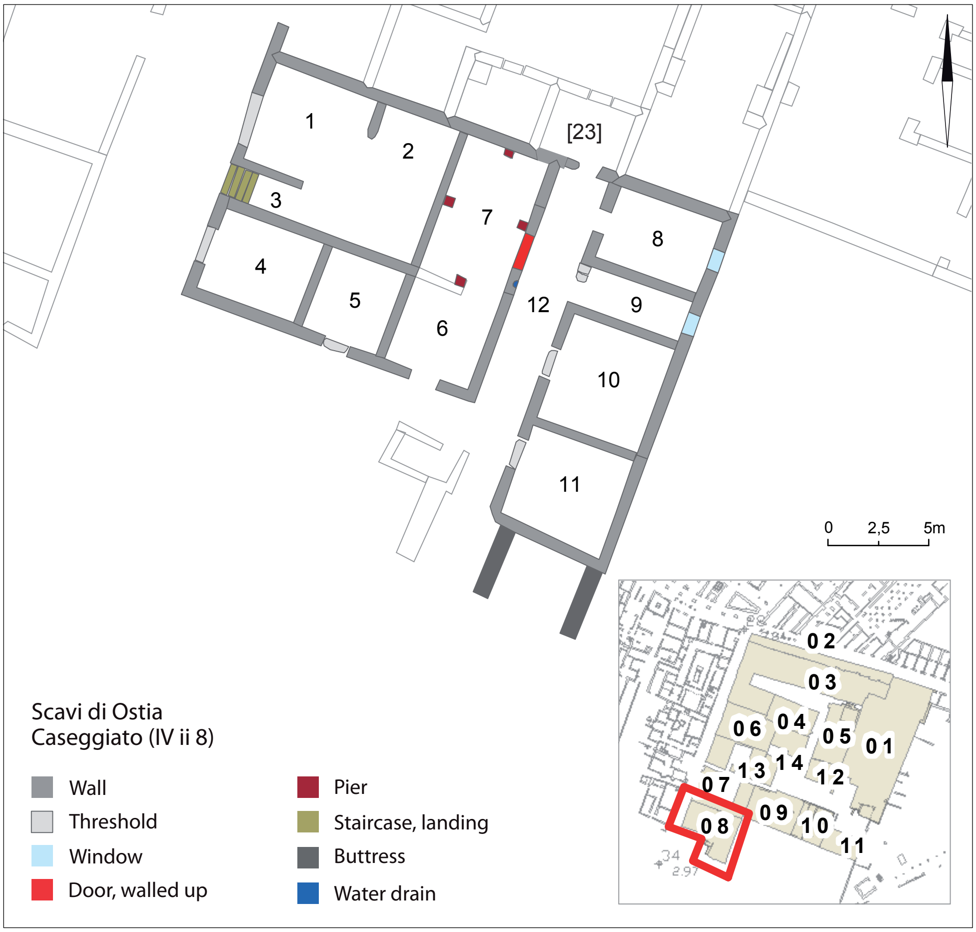


Fig. 5.76 – Building IV ii 8, forms a structural unit with Caseggiato IV ii 7

the other. The building's eastern section comprises a row of rooms, all lined up along the hallway, with only a single door opening, linked to the corridor; the doors still preserve the travertine thresholds. On their eastern side the rooms have window-openings (Fig. 5.78), overlooking the open space to the east. The western section is organised completely differently; all rooms are linked to the outside space, while no internal links, connecting the rooms with each other, existed. On the side of the Via della Caupona, a staircase, directly reached from the street space, leads to the building's upper floors. The spacious room west of the corridor was originally connected to the corridor and the door was walled-up during a later phase of use, while the room's only remaining door was connected to the open space in the south.

The building's original structures are built of *opus reticulatum*/brick of the Hadrianic period. This includes the common wall shared between IV ii 07 and IV ii 08, which runs in an east-west direction through the entire width of the building. This wall is crucial since it acted as the building's spine from which all perpendicular walls of the northern part (IV ii 7), as well as the southern part (IV ii 8) emanated, forging a structural unit. Along the southern façade some alterations occurred; these concern the outer walls, where *opus latericium* seems to have replaced the earlier *opus reticulatum*/brick façade.[194]

194. The walls along the street front and the south-western corner are largely restored, making an assessment difficult if not impossible.

Fig. 5.77 – Building (IV ii 8), view from room (5) looking toward the open space in the east (Scavi di Ostia, Archivio Fotografico, ref. 1171)

Fig. 5. 79 – Building (IV ii 8), reinforcing pillars in room (7), (Scavi di Ostia, Archivio Fotografico, ref. 1769)

Fig. 5.78 – Building IV ii 8, window in room (8) overlooking the open space to the east

Among the later interventions we can also include the placement of reinforcing pillars in the room west of the corridor (Fig. 5.79). The doors along the Via della Caupona preserve their travertine threshold; judging from the width of the door openings (1.95 – 2.70 m) the rooms seem suitable for commercial use. In contrast, the door openings on the southern side, measuring only 1.40 m, would therefore not really promote a commercial function for these rooms. Moreover, the undefined rectangular walled structure located in front of the southern rooms,[195] adds further uncertainty concerning the possible function of this part of the building. Furthermore, at the building's southern frontage three independent stretches of wall were placed perpendicular to the southern confining wall; these seem to function as buttresses, presumably positioned to provide structural support.[196]

195. The structure might represent a water cistern or basin.
196. A similarity in technique and material used can be observed between the buttresses placed against the southern frontage of Building IV ii 8 and the southern confining wall of Building IV ii 9 can be observed.

5.2.9 Caseggiato IV ii 9

The Caseggiato IV ii 9 (Fig. 5.80) is situated on the Insula's southern limits. Covering a rectangular area of 378.9 m^2, it is sandwiched between buildings IV ii 7 in the west, and IV ii 10 in the east. Its northern side is bounded by the Insula's inner courtyard, while it is confined by the Insula's southern boundary wall towards the open (unexcavated) space to the south. The southern wall is of specific interest since it served as the building's as well as the Insula's confining wall; furthermore it functioned as a retaining wall (Fig. 5.81). Analogous to the Insula's eastern border with the Campo della Magna Mater, its southern boundary too is characterised by a difference in height: the Insula's occupation levels are about 1.0 – 1.2 m higher than the floor levels of the open area to the south. The differences in height seem to be a result of terracing, placed there prior to the development of the Insula's southern area during the Trajanic period (98-117 AD). The southern confining/retaining wall runs in an east-west direction, extending from the border with the Campo della Magna Mater to the western corner, where the Insula takes a 90 degree turn, and building development (Building IV ii 8) continued towards the south. The southern wall consists of several sections all constructed in *opus reticulatum*/brick, except for the westernmost part which was built in *opus latericium*. This is significant since it not only gives us a relative chronology for the 'piecemeal' development of the boundary wall, but it also demonstrates that the western section of the Caseggiato IV ii 9 was not only a modification of existing structures, but involved profound reconstruction of the area including the retaining wall. The latter was structurally reinforced by an arch to counteract the thrust from Buildings IV ii 7 and 8 (Fig. 5.82).

Building phases and layout

The Caseggiato IV ii 9 consists of distinct western and eastern parts. The eastern part still preserves the original *opus reticulatum (tufo* quoining*)* structures dating to the period of Trajan,[197] while the western part was completely rebuilt during the end of the 2nd or the beginning of the 3rd century AD.[198] The building's only façade opens on the Insula's inner courtyard, where the points of access are found: one door opening leading to the western part, and a further door linking to the eastern part. It remains unclear whether there was an internal connection to its southern neighbour Building IV ii 10.

The western section of the Caseggiato IV ii 9 forms a unit with Building ('loggia') IV ii 13;[199] this is not only reflected in building material and technique but also in the architectural traits. Both structures are based on a system of pillars framed by walls on the northern and southern sides. The pillars conform to the same distance; therefore a common outline can be followed across both buildings. A chronological sequence (relative) can be established from the relationship with the neighbouring buildings: the two western pillars have been placed against the existing eastern wall of Building IV ii 7; whereas the section is delimited by an *opus reticulatum* wall (with *tufo* quoining) of the Trajanic period towards the building's eastern part. The *opus reticulatum* wall belongs to the original core of Caseggiato IV ii 9 and most likely confined the western side of the original building, extending from the northern courtyard to the southern confining wall. The western section of Building IV ii 9 is characterised by openness, while the later subdivisions make use of the central pillars with subsequent partition walls placed perpendicular to the eastern *opus reticulatum* (*tufo*) wall. During the building's late phase the rectangular room, framed by the central pillars and delimited by the eastern wall, was further subdivided into a central room (6) and the northern corridor (7), from where a door opening connected to the building's eastern part (Fig. 5.83). The division appears to have more clearely defined the central room (6), and this might have promted the owner to dedicate more attention to the

197. Calza (1953: 235).

198. A relative chronology can be established for this section since structures belonging to buildings IV ii 13 and 9 have been placed against the existing eastern walls of the Caseggiato IV ii 7.

199. To follow the reference system laid down in the Scavi di Ostia, Vol. I (Calza 1953) Building IV ii 13 has been described separately, although buildings IV ii 09 and IV ii 13 form an entity.

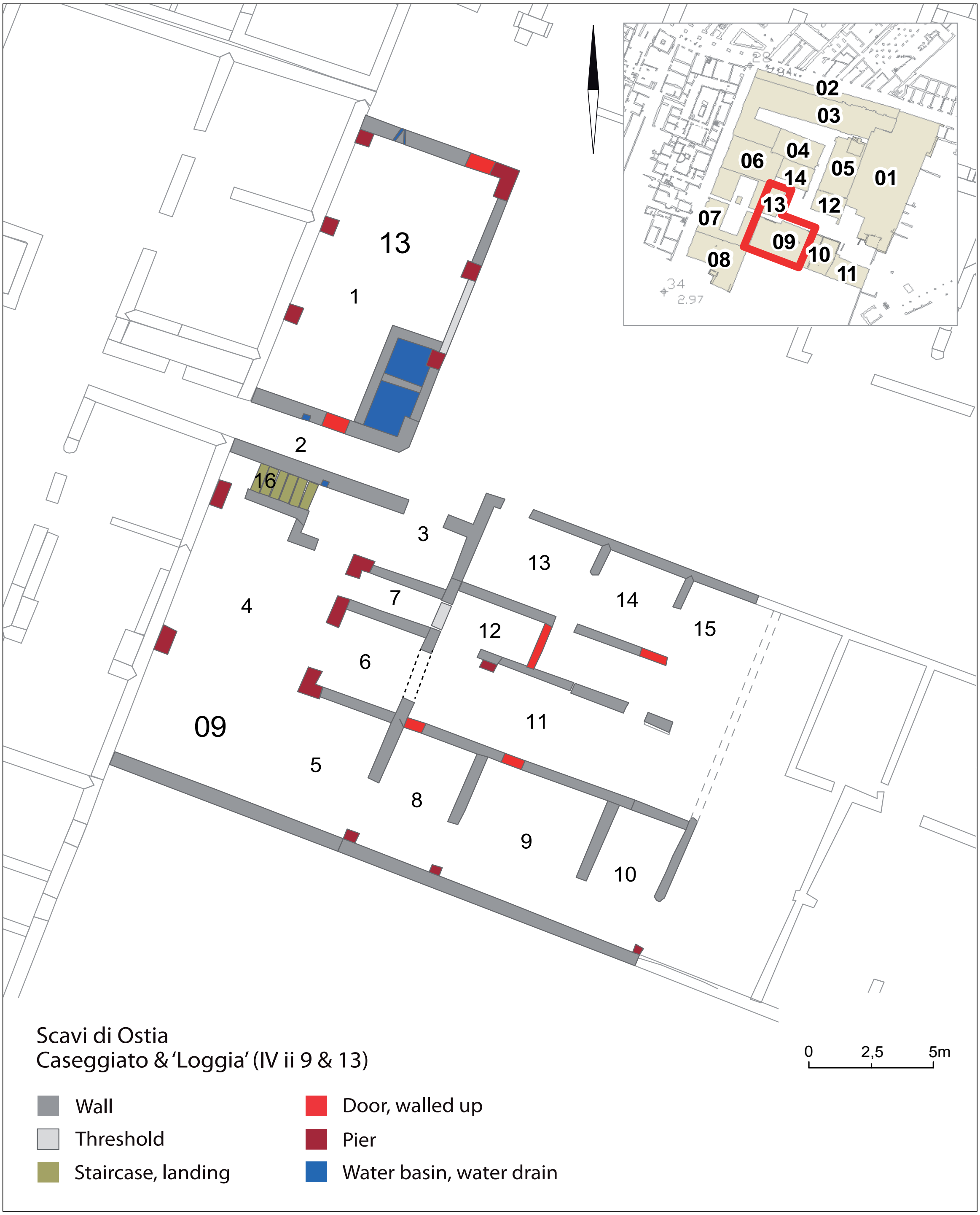


Fig. 5.80 – Caseggiato IV ii 9 and ' Loggia' IV ii 13

Fig. 5.81 – Caseggiato IV ii 9, retaining wall towards the southern 'open' space; the arch reinforces the construction against the Caseggiato IV ii 7

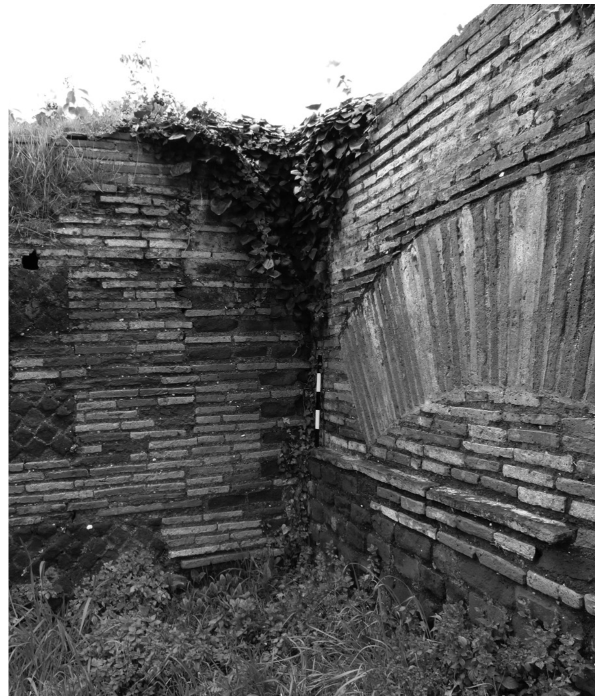


Fig. 5.82 – The later confining wall of Caseggiato IV ii 9 meets the earlier wall of the Caseggiato IV ii 7

room's surface decorations: patches of mosaic floor and single tesserae are generously distributed within the space, suggesting mosaic pavements within the central room. Today the room's eastern wall has a large aperture, opening to the building's eastern part, most likely broken in at a late stage of use and not part of the original design. Another possible connection between the western and eastern parts existed along the southern confining wall, where a range of interconnected rooms (8, 9, 10) was lined up, forming a relatively independent subsection, similar in layout to a *medianum* apartment.[200]

The eastern section of Building IV ii 09 is difficult to assess. It has undergone considerable reconstructions and is in a sad state of preservation. The original *opus reticulatum* (*tufo* quoining) walls can be identified

Fig. 5.83 – Passage corridor (07) provides the connection between the eastern and western part of Caseggiato IV ii 9, travertine threshold still *in situ*

200. Ostia's so-called medianum apartments are often luxuriously appointed apartments following a common plan. The key feature is a hall or corridor (the medianum) around which the remaining rooms are grouped; see DeLaine (2004: 147).

on the courtyard side and on the southern side, where *opus reticulatum* (*tufo*) walls subdivide the 'medianum' space (rooms 8-10). The central part of the building consists of *latericium* walls, forming a central corridor connected to rooms on either side; however most of the former door openings were restricted and walled-up. While no secure building phases can be established, still the many reconstructions point to a dynamic history of the building and to a long period of use, most probably into the 4th century (Fig. 5.84). In terms of the building's function, the state of preservation makes it difficult to draw inferences. However, the clear division between the eastern and western parts suggests a functional division along the same lines. A more residential character can be identified in the eastern part, possibly including *medianum* apartments at ground floor level. The western part instead is characterised by an open layout, suitably for multiple purposes, while commercial use does not seem to be the best option since the space lacks a public interface. A staircase (16) reached upon entering the western part suggests that upstairs levels were available, possibly offering residential space at the upper floors.

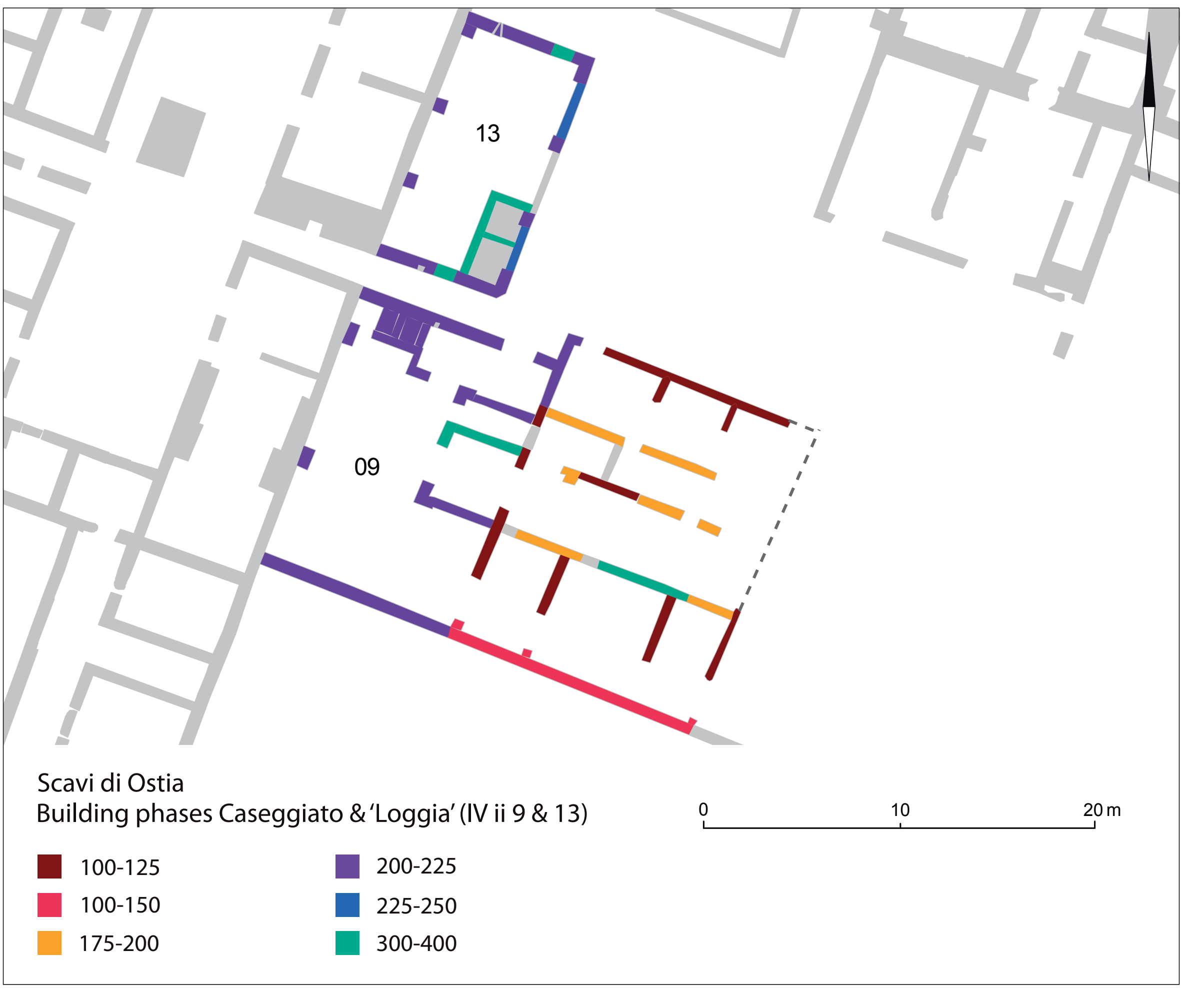


Fig. 5.84 – Phases of reconstructions in Caseggiato IV ii 9 and Building IV ii 13

5.2.10 Building IV ii 10

Building IV ii 10 is found to the west of the *mithraeum* (Mitreo degli Animali, IV ii 11) (Fig. 5.85); its southern border is delimited by the retaining wall which divides the Insula from the open area to the south, and serves as the building's southern wall at the same time. The building's western side is shared with IV ii 09, without defining a clear boundary, while its northern side fronts the Insula's inner courtyard. Building IV ii 10 covers an area of 239.9 m^2 and conforms to an almost quadrangular shape. It is largely overgrown and a structural assessment is unattainable. A first-hand impression of the structural remains can be gained from a photograph taken after the excavations (Fig. 5.86). A few additional observations can be offered, however not enough to understand the building's history or its layout.[201]

.

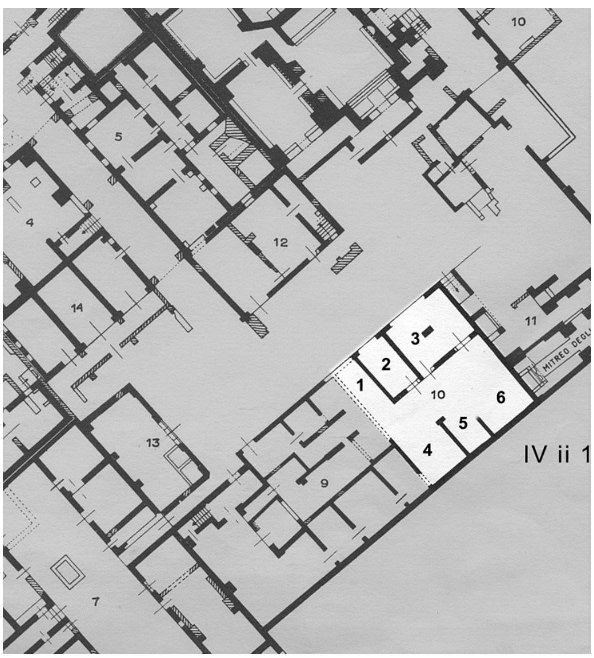


Fig. 5.85 – Building IV ii 10 between the Mitreo degli Animali (east) and building IV ii 9 (west); Calza's site plan (1953)

201. During a brief period in 2007, when the Soprintendenza cleared parts of the vegetation, the easternmost rooms were accessible to allow for a preliminary study of the structural remains.

The building has not attracted any research interest in the past.[202] Even Calza's 1953 site plan suggests that not much attention was paid when the building was mapped: the partition wall which subdivides the eastern room is missing on the plan. The building's core structures consist of *opus reticulatum*/brick attributed to the Trajanic period (98-117 AD).[203] When examining the southern wall from inside the eastern room which borders the *mithraeum*, the wall gives the impression as if an earlier *opus reticulatum*/brick wall had been shaved to a unified height, and then a *latericium* wall was placed on top, indicating a new phase of construction which integrated the pre-existing walls. This impression is even strengthened by the presence of a continuous bonding course of bipedales across the entire extent of the southern wall, upon which the latericium courses were resting. Continued use of earlier walls in later construction phases is not unusual. Of specific interest are the remains of the room's floor levels which are found about 0.60 m above the excavation levels (Figs. 5.87 and 5.88). This is quite significant since the excavation levels seem to have followed the floor heights of the *mithraeum*, which had already been excavated when the

Fig. 5.86 – Building IV ii 10, room 3 with central pillar (Scavi di Ostia, Archivio Fotografico, ref. 1782)

202. It is however included in Calza's topographic and chronological indices, Calza (1953: 232, 235).
203. Calza (1953: 235). It is however difficult to determine whether the southern wall was constructed entirely in reticulate, or whether it is *opus reticulatum* (brick) of which the latericium fields are missing. The wall's southern face is largely eroded.

Fig. 5.87 – Southern wall (room 6) which confines Building IV ii 10 against the open space to the south; remains of floor levels are indicated by a course of *bipedales* and traces of mosaics preserved in the corners

Fig. 5.88 – Building IV ii 10, detail: remains of floor mosaics preserved in the south-eastern corner of room 5

neighbouring building IV ii 10 was brought to light. In fact, the actual floor levels of the eastern rooms of building IV ii 10 were located 0.60 – 0.70 m higher than the *mithraeum*, and therefore seem to have been 'undercut' by the excavators. In contrast, higher floor levels were retained only in the western part of Building IV ii 10 (Fig. 5.89). The floor levels might have some implication for a possible connection between the *mithraeum* and building IV ii 10. In any case it would exclude a straightforward link between the buildings, and if there was ever a door between them, this would have required a few steps inside building IV ii 10 to overcome the difference of c. 0.70 metres. Considering all the evidence, this seems to speak against a connection between Building IV ii 10 and the *mithraeum*. As far as the building's external points of access are concerned, Calza's plan indicates two apertures on the building's northern side connecting to the Insula's courtyard.

Fig. 5.89 – Building IV ii 10, higher floor levels are only preserved in the western rooms 1 and 4

5.2.11 Mitreo degli Animali, IV ii 11

The *mithraeum* (Fig. 5.90), a cult room dedicated to Mithras, is located at the south-eastern corner of the Insula, close to the Temple of Magna Mater (Cybele). It is nestled into the corner of intersecting *opus reticulatum* (brick) walls which preceded the *mithraeum*.[204] It covers an area of 173.4 m^2, including its associated rooms. The *mithraeum*'s floor levels are about 0.70 m lower than the levels of its neighbouring building (IV ii 10) to the west, but c. 1.0 m higher than the open space to the south. The entrance to the *mithraeum* remains a bit of a mystery; different access points have been suggested during its long history of research. It is however clear that the *mithraeum* had no direct access to public street space and was only reachable through the inner courtyards within the Insula. It received its name from the mosaic pavements with a series of animal depictions rendered in black and white *tesserae*.

Excavations and history of research

Unlike the other buildings within the Insula, which share the same history of excavation in being part of Calza's campaign in 1940, the *mithraeum* was excavated already 75 years earlier by P.E. Visconti, who was the papal *commissario delle antichità*.[205] From 1864 to 1869 the pontifical excavations in Ostia directed their attention to the south-eastern areas, unearthing the Porta Laurentina, sections of the Via Laurentina, the Temple of Magna Mater (Cybele), and the adjacent *mithraeum*. Due to its proximity to the temple, the *mithraeum* was then identified as a '*sacrario metroaco*', functionally related to the cult of Magna Mater.[206] At the time of Visconti's excavation the understanding of the cult area was still based on an incomplete picture. The 19th century excavations had only revealed a fraction of the monuments which comprise the Campo della Magna Mater (Fig. 5.91),[207] while the Insula remained unexcavated, except for its south-eastern corner where the *mithraeum* was discovered. Judging from the limited view available at that time, a functional as well as spatial nexus between the temple of Magna Mater and the *mithraeum* seemed very likely. Today, both the Campo della Magna Mater and Insula IV ii have been fully excavated and, based on the existing architecture, a structural connection between the *mithraeum* and the temple of Magna Mater can be securely excluded.[208]

The first accounts of Visconti's work in the area of the Campo della Magna Mater appeared in the *Giornale di Roma* soon after the excavations had taken place.[209] On the 26th of May 1867 it was reported, together with other results, that a new 'mitreo' had been found.[210] One year later C.L. Visconti published a substantial description of the buildings and monuments comprising the Temple of Magna Mater, considering them as a functional group dedicated to the cult of the Phrygian deity, and hence the buildings were collectively called

204. The eastern *opus reticulatum* (brick) wall confines the Insula against the Campo della Magna Mater, while the southern *opus reticulatum* (brick) wall served as a retaining wall, marking the Insula's southern boundary.
205. P.E. Visconti and his nephew C.L. Visconti conducted the papal excavations in Ostia. Ostia was the property of the Holy See until 1870; afterwards it became part of the newly formed Italian state. Consequently the position of the papal 'Commissario delle Antichitá' was substituted by the 'Soprintendente per gli Scavi e i Monumenti di Roma'. See Marini Recchia et al. (2002: 263) on excavations in Ostia during the 19th century; see Paschetto (1912: 537-538) on the Viscontis' excavations in the southeast of Ostia; see also Rieger (2004: 93, notes 472, 473) on the history of excavations of the Campo della Magna Mater.
206. Although Visconti recognised similarities in layout to other mithraea, he still decided to link the building to the Cult of Magna Mater; see Visconti 1868: 402; see also Ross Taylor (1912: 84-85) on a reassessment of Visconti's interpretation in the light of Cumont's Mithraic studies (Cumont 1902).
207. Due to the political upheavals connected to the Italian Unification, excavations which had been initiated by the Viscontis were not continued; excavations in the area only resumed later in the 20th century under a new political agenda, resulting in Calza large-scale excavation campaign.
208. See Becatti (1961: 177); see also Rieger (2004: 126-127).
209. The Giornale di Roma printed monthly updates from the meetings of the Pontificia Accademia Romana d'Archeologia reporting the progress of the papal excavations, including brief announcements of specific finds (statues and inscriptions) or the discovery of important buildings.
210. *Giornale di Roma* (26th May 1867): "Si è trovato un nuovo Mitreo col pavimento a musaico esprimente figure proprie di quel culto e dell'altro di Silvano." Soon afterwards the discovery of the *mithraeum* was reported once again on the 8th June 1867 (*Giornale di Roma*).

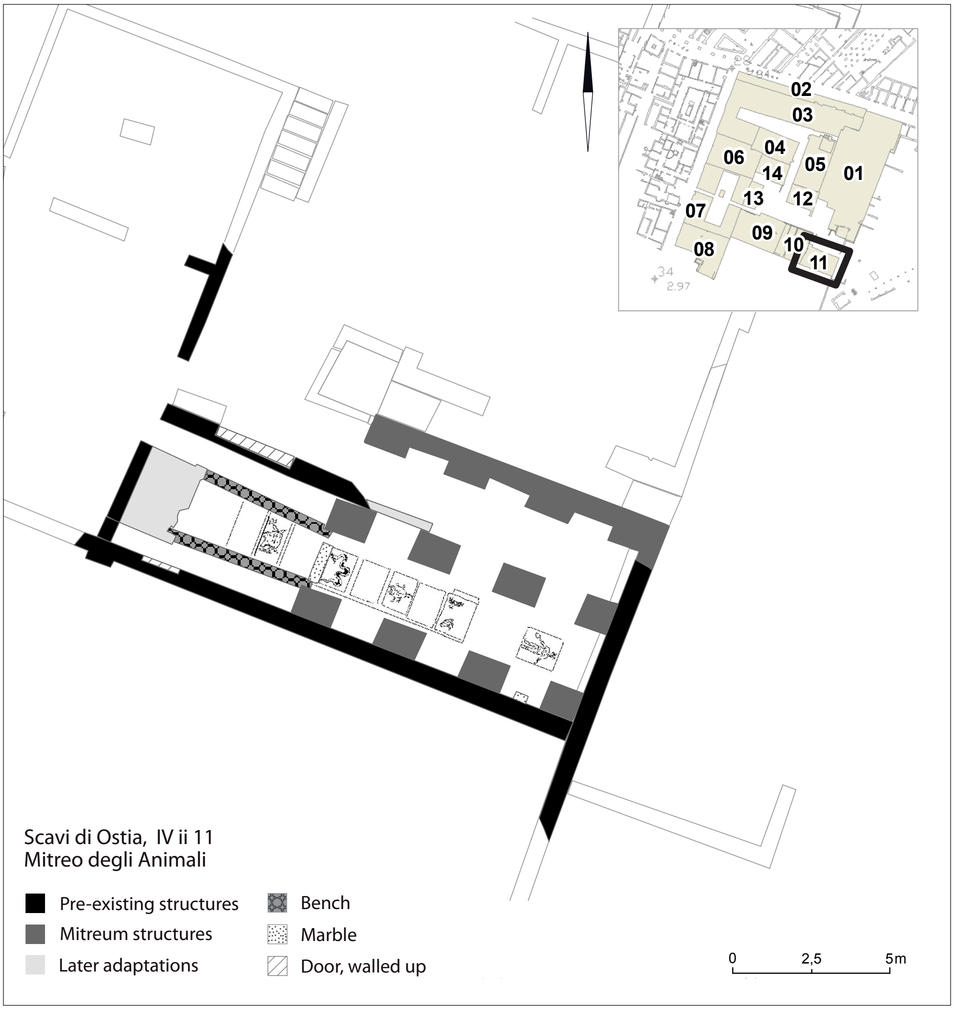


Fig. 5. 90 – Mitreo degli Animali (IV ii 11)

the '*Metroon Ostiense*'.[211] Nevertheless Visconti's article dedicated specific attention to the 'mitreo',[212] providing a detailed description together with a plan to scale (Fig. 5.92), as well as a discussion of its possible function. However, as stated above, the *mithraeum* was then understood to be a cult-room linked to the cult of Magna Mater and not an independently operating *mithraeum*.

Almost 30 years after its discovery the functional nature of the building was re-assessed by Paschetto, who still left the question open whether it was a *mithraeum* or a '*sacrario metroaco*'.[213] However later, in 1954, Becatti published the volume on Ostia's 'mitrei' including the 'Mitreo degli Animali';[214] Becatti understood the sanctuary in the light of the 1940s excavations and clearly identified the space as a *mithraeum*.[215]

211. Visconti (1868).
212. Paradoxically it was already called a 'mitreo' in the earliest reports, while it was identified as a 'sacrario metroaco', see above.

213. Paschetto (1912: 374-375).
214. Becatti (1954: 87-92).
215. Becatti provides a detailed description and a new site plan (1954: 87-92); see also Pavolini (2006: 208-209) for a concise description of the mitraeum.

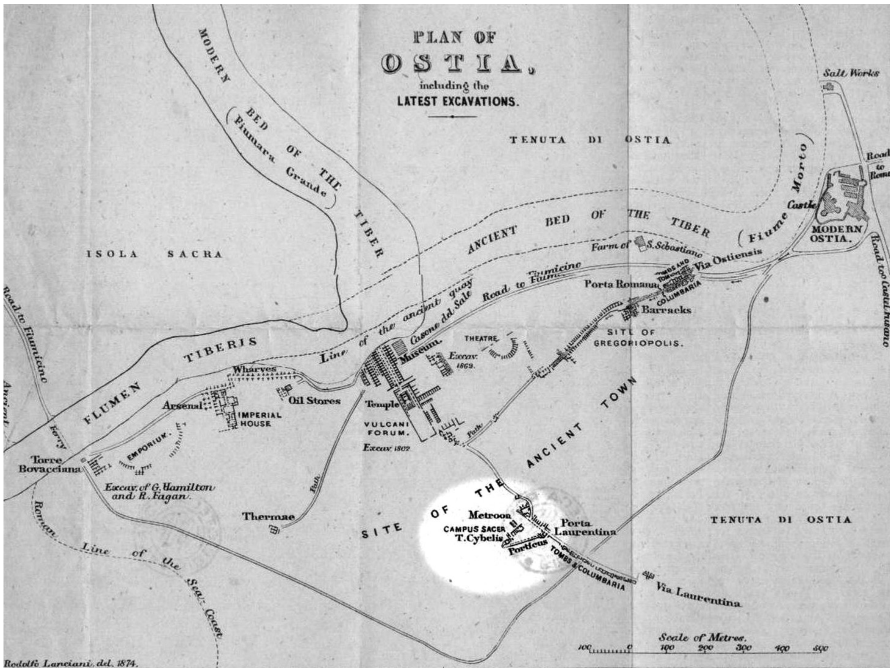


Fig. 5.91 – Lanciani's map of the excavated areas of Ostia, dated 1874: several structures within the Campo della Magna Mater have already been excavated, including the Temple of magna Mater (Cybele), as well as the Mitreo degli Animali, and various other remains

From the very beginning the 'Mitreo degli Animali' attracted significant scholarly interest, which continued over the years.[216] In contrast, there has been little sustained attention paid to its material remains since their discovery. As early as 1908, R. Finelli, the assistant curator in charge, commented on the sad state of repair of its walls and mosaics. The mosaics had suffered from root action and exposure to the elements ever since they came to light, therefore interventions became necessary at a very early date.[217] In 1958, in the course of the large restoration campaign, the *mithraeum* and its mosaics were restored a second time. Despite these attempts, the mosaics have remained unprotected, while the interventions carried out to consolidate the walls created their own set of problems: in many instances the 1958/60s restorations obscure the original walled structures and make their assessment difficult and at times impossible.

During the long history of its study, the *mithraeum* has been re-mapped several times. Every new site-plan seems to reflect the research interests of the time. Visconti's 1887 plan focussed on the mosaics, while it neglected the walls (see Fig. 5.92 above). Pascolini's plan provided details on the walled structures (Fig. 5.93);[218] however, it disregarded the *mithraeum*'s associated rooms. In addition to the published plans a further set of plans has been produced; these concentrate on identifying the different building techniques represented in the walls of the *mithraeum* (Fig. 5.94).[219] Unfortunately, these plans, although expertly rendered, fail to distinguish between original and restored walls; moreover they seem to have been generated by architects with little attention paid to archaeology. Hence, this study produced a new sit plan, drawn in 2007, which not only includes the neighbouring structures, but also

216. See for example Groh *et al.* (1967) on Mithraism in Ostia.
217. G.d.Sc. Vol. 1, entry dates 1st to 15th March 1908.

218. Published in Becatti (1954: 89, fig. 19).
219. Courtesy of Ostia's Archivio disegni: inv. 4721 (plan), inv. 4722 (southern section) and inv. 4723 northern section; the plans have been produced by the architects M. Lilli, P. Pasquali, P. Pinna and F. Caccianiga; no date.

identifies different construction phases (Fig. 5.91).[220] From the re-assessment of the material evidence, some new observations can be offered.

Building phases and layout

The *mithraeum* was built against pre-existing *opus reticulatum* (brick) walls,[221] utilising them as its eastern and southern confining walls (Fig. 5.95). The eastern *opus reticulatum* wall delimits the Insula against the Campo della Magna Mater.[222] The southern wall defines the insula's boundary towards the open space to the south. To the west, the *mithraeum* is bounded by another *opus reticulatum* (brick) wall, shared with building IV ii 10.

A walled-up door can be identified in the southern wall, idicating a former connection to the southern 'open' space.[223] When the area was occupied by the *mithraeum*, or even before, the floor levels were raise at least by 1.0 m. The former door opening is a good indicator for the change in levels: only the top part of the door (c. 0.75 m) remained visible above the occupation levels of the *mithraeum* (Fig. 5.96). By utilising already existing walls, the construction of the *mithraeum* required only a simple pillar formation and one wall to close the building against the open space to the north, the only side not bounded by earlier walls.

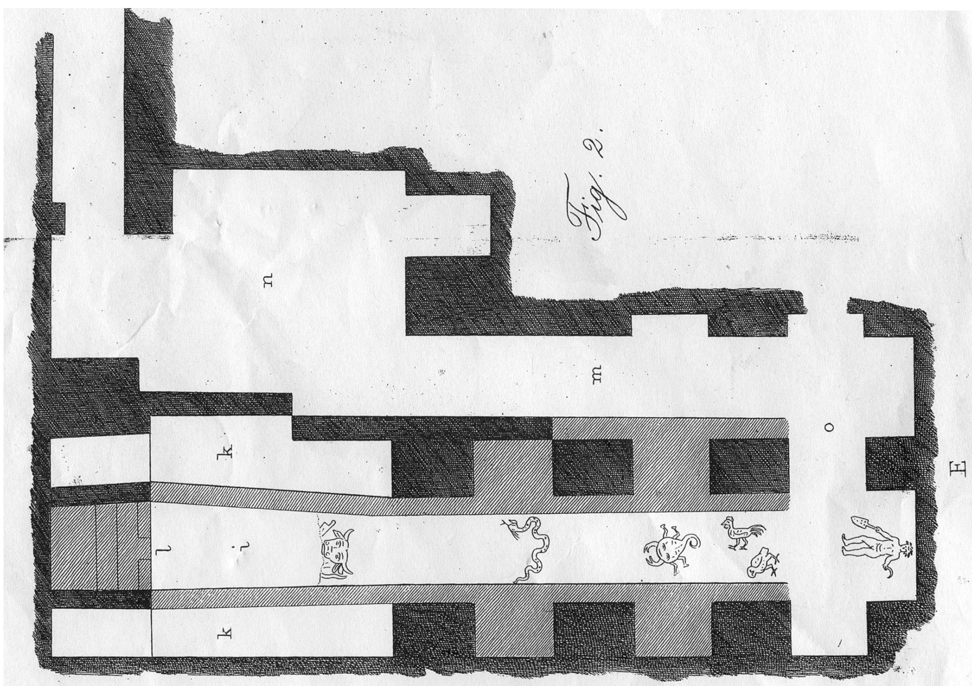


Fig. 5. 92 – Visconit's plan of the Mitreo degli Animali (1887)

220. The new plan (1:20) of the Mitreo degli Animali was produced by the author with the help of MA students from the University of Leiden (M. Berkhout, R. Bonnie, M. Boonstra, A. Koenis, E. Mol, and C. Ochsman), reproduced here in ArcGIS (courtesy of J. Lee, GeoStar).

221. Dated to the period of Trajan (98-117 AD), see Calza (1953: 235).

222. See above on the relationship between the Terme del Faro and the Campo della Magna Mater.

223. The open space has as yet not beeen excavated; the long-awaited results from the DAI survey (geophysical prospection) should shed new light on the state of development in this area.

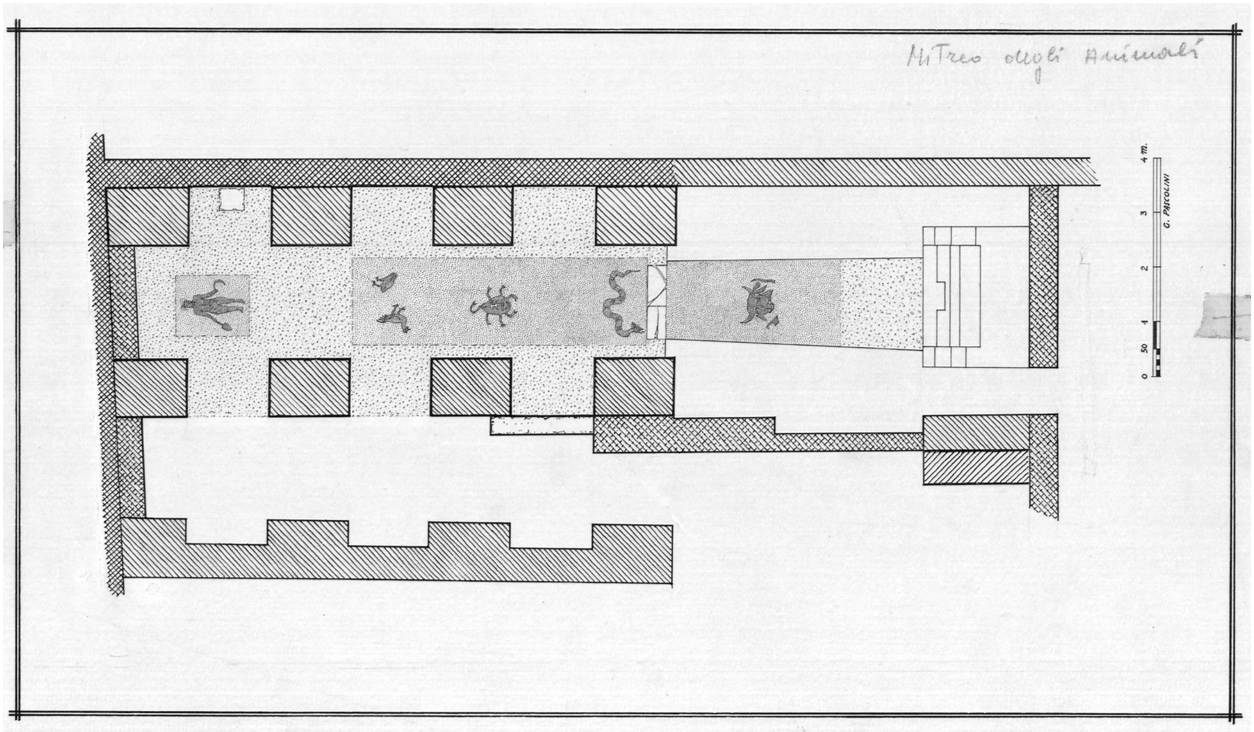


Fig. 5.93 – Pascolini’s plan published in Becatti 1954 (Scavi di Ostia, Archivio Disegni, ref. 99)

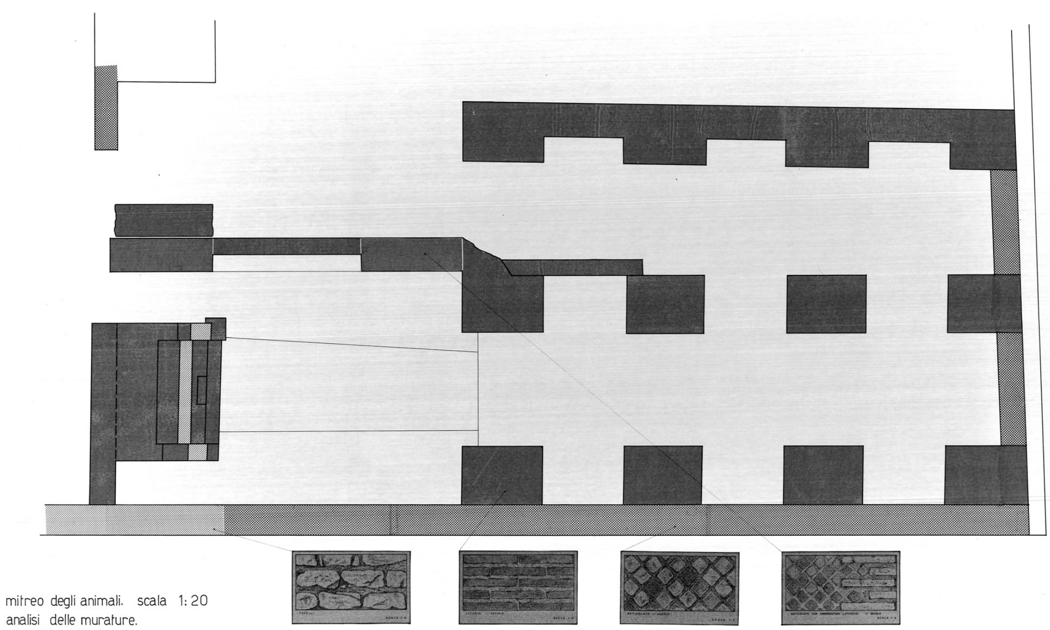


Fig. 5.94 – Schematic plan of the Mitro degli Animali (Scavi di Ostia, Archivio Disegni, ref. 4721)

Fig. 5.95 – The Mitreo degli Animali (IV ii 11) viewed from the Compo della Magna Mater: the *mithraeum* was built against pre-existing *opus reticulatum* (brick) walls

The *mithraeum* (*c*. 4 x 16 m) consists of two parallel narrow halls divided by rows of pillars. The southern room constitutes the *mithraeum* proper, while the northern room seems to have functioned as an entrance corridor. Four pillars habe been placed against the pre-existing southern wall: these are matched by four pillars in the centre; while the central pillars also correspond to the northern space where they have their counterparts, these are four pillasters integrated into the northern wall. The *mithraeum* proper (southern space) is subdivided into two separate parts: the eastern side served as a passage leading to the cult room, while the western side was occupied by the cult room proper which had an altar-like structure at its western end and very possibly a podium on each side of the passage. A marble threshold marked the division between these functionally distinct spaces. The pillars associated with the *mithraeum* have been built in *opus latericium*, dated to *c*. 160 AD, while the altar seems to be a later construction, added during the mid-3rd century AD.[224]

Fig. 5.96 – A former door opening in the *mithraeum*'s southern wall betrays an earlier connection to the open space in the south

224. See Becatti (1961: 177).

The floor pavements feature five fields of black and white mosaics;[225] four depict faunal motifs associated with the cult of Mithras,[226] while one represents a human figure (Fig. 5.97).[227] The latter is placed at the eastern end of the passageway. The motifs and their sequence symbolize the fundamental elements of the sacrifice of the bull,[228] and hence allude to grades of initiation as well as to rituals performed within the cult. The fifth mosaic field is located in the western cult room, placed midway between the marble threshold and the altar. It depicts the head of a bull, facing the altar, and an axe on the northern side of the bull's head (Fig. 5.98). The 'cult-room' seemed to have functioned as a communal place, where the sacrifice of the bull was symbolically celebrated. It is very likely that the lateral walls were lined with podia.[229] The podia could have served as couches where the members of the cult could recline, celebrate their communal meals and perform activities related to the cult. To the north of the cult room, separated by a partition wall, a rectangular water basin can be found, sunken into the floor level. The room in which the water basin was located suggests that it served as an antechamber, where cult members would gather before they entered the inner space of the *mithraeum*. This brings us to the next questions concerning access to the *mithraeum*, and movement within its spaces.

Points of access and movement

The location of the entrance to the *mithraeum* is not at all clear. The earliest site-plan of Visconti, published in 1867, suggests two openings: one on the north-eastern and one on the north-western side,

Fig. 5.97 – A human figure identfied as 'Mytes' (according to Becatti 1954) (photo courtesy of Ostia website)

Fig. 5.98 – The head of a bull and an axe symolising the sacrifice of the bull (photograph courtesy of Ostia website)

while no connection to Building IV ii 10 seems to have existed. Then again, Becatti's reconstruction of the *mithraeum* included a connection to Building IV ii 10, providing a secondary entrance reserved for the priest.[230] Consequently Pascolini's plan, published in 1954,[231] indicates that the *mithraeum* was connected to Building IV ii 10 through a passage between the altar and the partition wall (*opus reticulatum*/brick). In contrast, Ostia's site plan of 1953 clearly closes off the *mithraeum* against the neighbouring building IV ii 10.[232] Today it is impossible to judge whether

225. See mosaic no. 327 in Becatti (1961: 177-179).
226. See Becatti (1961: 178-179) on the symbolic meaning of the motifs depicted in the Mitreo degli Animali.
227. The identification of the human figure has been very much debated (suggestions are Leo, Saturn, Silvanus); Becatti's interpretation seems very plausible, he suggests that the figure was a Mystes, an initiate being instructed in the cult of Mithras (1961: 178).
228. See Becatti (1961: 179).
229. Remains of substructures, walled in coarse tufa blocks, are still present. They have been built against the pillars, and therefore seem a later addition. The lateral walls still show remains of thick plaster layers and some nails, indicating that the walls had been covered with marble revetments.

230. Becatti (1954: 87).
231. Published in Becatti (1954)
232. See Calza 1953, plan section 13.

Fig. 5.99 – The 1958 rstoration obscures whether the wall behind the altar continued and closed off the cult area towards Building IV ii 12

a door opening to Building IV ii 10 ever existed, or whether the clearly pronounced aperture is a result of the 1958 restoration activities (Fig. 5.99).[233] Despite these uncertainties it seems most plausible that the *mithraeum* was accessed from the north-western side, connecting the antechamber to the open space between the *mithraeum* and the baths.

Movement within the *mithraeum* would have been structured according to the specific activities performed: different functional spaces seem indicated through partitions. The *mithraeum* proper was reached through the opening between the westernmost pillars, leading to the passage with the first mosaic field showing the human figure (*mystes*); from there the cult members would have proceeded towards the cult room. The cult room proper was not closed off physically, although a clear architectural change can be noted: while the eastern part was defined by four pairs of columns forming a passage, the cult room started west of the last pair of pillars and widened into a rectangular room. In addition, the division between these rooms was visibly marked by a marble threshold.

As stated before, no physical connection existed between the *mithraeum* and the Campo della Magna Mater, nonetheless a link between these two cult places has been suggested, based on the proximity between the Temple of Magna Mater and the *mithraeum*, and also on the affinity between both cults.[234] However there is no binding evidence which would allow us to conclude that these cults were linked in this particular location.[235] We should therefore appreciate the *mithraeum* within its own spatial setting, which is clearly defined by the Insula of which it forms a structural and functional part.

233. Rieger argues against a connection between building IV ii 10 and the *mithraeum*, since the passage between altar and partition wall would lead directly onto the presumed reclining podia (2004: 126, note 631).

234. See Becatti (1954: 92); see also Rieger (2004: 127) for a discussion of the links between the cults.

235. There is one reference which might point to the involvement of a person in both cults; the inscription comes from the context of the *Schola dei Dendrofori*, which was located on the southern side of the Temple of Cybele and southeast of the Mitreo degli animali. The reference concerns a certain M. Cerellius Hieronymus who is referred to as '*pater et sacerdos*'. His name is found on an inscription listing the members of the *Schola dei Dendrofori.* The combination of '*pater et sacerdos*' could suggest that M. Cerellius Hieronymus was involved in both cults, 'pater' was typically used by followers of the cult of Mithras; see Rieger for a detailed discussion (2004: 127, 171 fig. 140).

5.2.12 Building IV ii 12

Located in the centre of the Insula, Building IV ii 12 (Fig. 5.100) measures 141.8 m^2 and is of rectangular shape. It stands wall on wall against the southern side of Caseggiato IV ii 05, while it faces open space on all other frontages. Points of access are found on all three façades: the building opens to the Insula's central passage to the west, and to the inner courtyard on its southern front. Towards the east it communicates with the open space south of the Terme del Faro, betraying a link to the baths. The building has as yet not received much research interest;[236] brief references to it are found in Blake,[237] and Liedke when discussing the adjacent Building IV ii 05.[238]

Building phases and layout

Building IV ii 12, as it has been preserved, displays a straightforward layout: it was subdivided into two rectangular rooms (01 and 02) of large dimensions, whereas a staircase of substantial size was added to the building's eastern side (Fig. 5.101). The building's northern wall was placed back-to-back with the southern wall of Caseggiato IV ii 05. These walls are *opus reticulatum* (brick) structures of the preceding buildings, which were integrated into the later building (Fig. 5.102). All later walls (*latericium* or crudely walled with tufa blocks) have been built against the *opus reticulatum* (brick) (Fig. 5.103); hence a relative chronology for the building's reconstruction phases can be suggested. The *opus reticulatum* (brick) has been dated to the Hadrianic period,[239] whereas the later reconstructions seem connected to the rebuilding of IV ii 05.

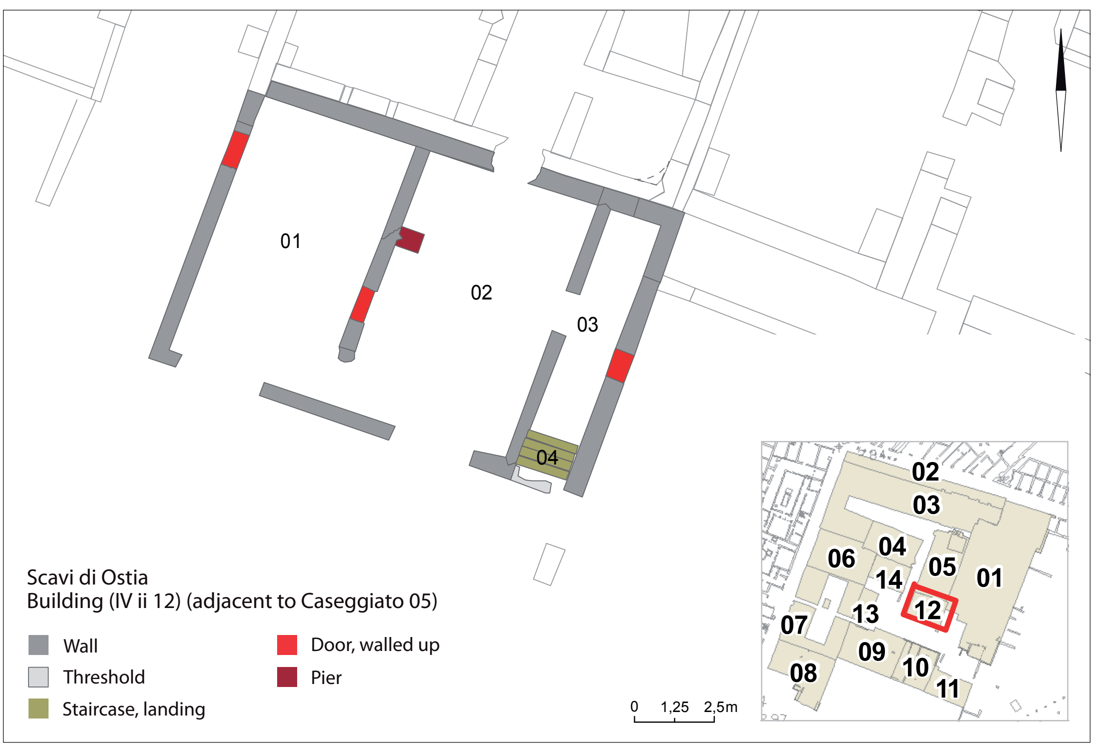


Fig. 5.100 – Building IV ii 12

236. Reference to the building was made in Calza's topographic and chronological indices (1953: 232, 236).
237. Blake (1973: 197-198).
238. Liedke (1995: 13).

239. See Calza (1953: 236).

This concerned the transformation of the larger area, as we have seen earlier. In this context it is also interesting to note that the eastern wall of the staircase forms a structural unit with the baths' south-western wall (Fig. 5.104). The latter encloses the baths' service corridor to the south of the western *caldarium*. From the shared wall a connection between IV ii 12 and the baths can be inferred.

Fig. 5.101 – Staircae (04) on the eastern side of Building IV ii 12

Fig. 5.103 – Building IV ii 12: north-eastern corner of room 01; partition wall between rooms (01) and (02)

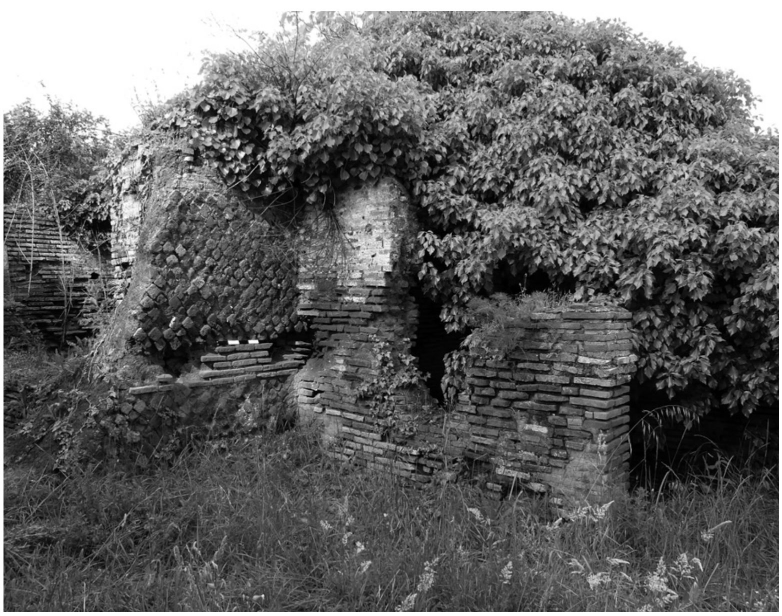


Fig. 5.102 – Building IV ii 12: partition wall between room 02 and the room behind the eastern staircase (03), the wall was built against the earlier *opus reticulatum* (brick) wall

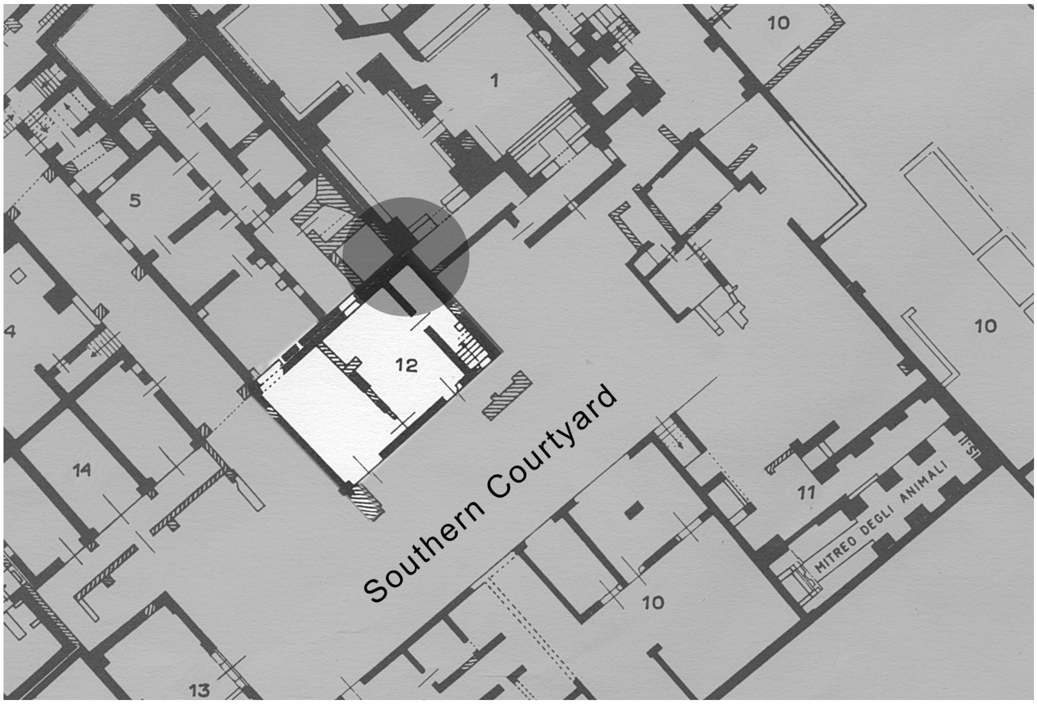


Fig. 5.104 – Building IV ii 12 and its links with the Terme del Faro (IV ii 1) and the Caseggiato IV ii 5 (site plan Calza 1953)

Building IV ii 12 underwent several minor alterations during a late period of occupation, when the existing door openings were walled-up or restricted (Fig. 5.105). However, during their entire period both rooms (01 and 02) retained their wide door openings towards the southern outside space, suggesting that the building could have served as commercial premises. As suggested already in the context of Caseggiato IV ii 5, during a late period of use, buildings IV ii 12 and 5 might have been connected at ground level, allowing access to Building IV ii 5 by passing through Building IV ii 12. Furthermore, the staircase on the building's eastern side might have served not only Building IV ii 12 but also Building IV ii 5. Therefore Building IV ii 12 receives significance in connection with its immediate neighbourhood, and the transformations which occurred within Caseggiato IV ii 5 and the southern section of the baths. It seems very likely that buildings IV ii 5, 12 and the baths belonged to the same owner.

Fig. 5. 105 – Door opening between room 01 of Building IV ii 12 and the passage west of the building was walled up during a late period of use

5.2.13 Building ('loggia') IV ii 13

The 'loggia' IV ii 13 is located east of the Caseggiato IV ii 7.[240] It is of rectangular shape and measures an area of 85.7 m^2. Built 'back-to-back' with Building IV ii 7, or rather against the pre-existing eastern wall of Building IV ii 7, it forms a functional unit with the western section of the Caseggiato IV ii 9 (see Fig. 5.80 above), from which it is divided by a corridor. The corridor forms part of the same passage which connects Building IV ii 7 to the Insula's internal courtyard. The loggia's southern wall confines the passage, while the eastern and northern sides face the open space of the Insula's courtyard. The original construction included door openings on three sides, whereas the building, as it has been preserved, features only a single point of access, facing east, linking the 'loggia' to the Insula's open courtyard.

No reference is found to the building's excavation; however, it can be assumed that it came to light during Calza's campaign. Later restorations are indicated by modern brick stating the year 1960. The building has not been studied as yet. In Calza's topographic index it is listed as an independent entity, implying that its connection to the western section of Building IV ii 09 had not been identified by the excavators.[241] Forty years later, Van Dalen's survey recognised the similarity in building material and construction technique, and concluded that the loggia (IV ii 13) and the western part of Building IV ii 9 were part of the same rebuilding phase.[242]

Fig. 5.106 – A travertine threshold marks the entrance to Building IV ii 13 ('Loggia"); the northern corner of the water basin is visible

240. The descriptive term 'loggia' has no official status, it is simply a term used by the author to refer to the building's pillar-based open structure of the initial design.

241. Calza (1953: 232).
242. Van Dalen (1991: 263).

Building phases and layout

The building's architecture seems noteworthy since it was transformed from a pillar-based open structure into one with closed walls. The original 'loggia-like' premises had three door openings on the southern façade. Only the central entrance remained in use and preserved a raised travertine threshold,[243] while the other openings were walled up. The former doors on the southern and northern sides were walled up too. After the building had been turned into a closed space, presumably linked to a functional change, a large water basin (4.40 x 2.15 m, h 0.50 – 0.60 m) was installed in the south-eastern corner (Fig. 5.106);[244] it was later subdivided into two basins. The northern wall accommodates a water channel (Fig. 5.107); it is difficult to determine whether a concern for water was already part of the initial design, or the water channel was a later alteration in connection with the water basins.

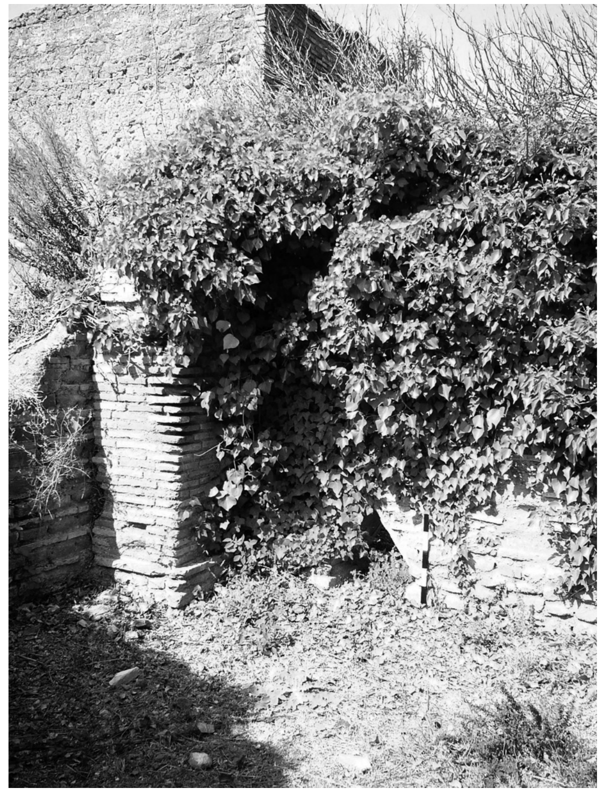


Fig. 5.107 – North-western corner within the 'Loggia' with a water channel constructed from *bipedales*

A functional link between Building IV ii 13 and the westernmost section of Building IV ii 09 can be inferred from the shared corridor and the way the passage space had been designed to facilitate movement: the edge of the south-eastern corner of Building IV ii 13 was cut so as to increase the space available for moving in and out of Building IV ii 09. In addition, the width of the passage takes account of the northern confining wall of Building IV ii 09. The actual passage appears to lie at the core of the connection between buildings IV ii 07, 09 and 13. All buildings concerned evidently agreed to some 'right of innocent passage' which allowed inhabitants and visitors to enter and pass through various buildings on the route from the Insula's inner courtyard to the outside space on the Via della Caupona. The passage was maintained throughout successive building phases and demanded concessions on the part of the property owners.

243. The threshold rests on a foundation of coarse walling (restored in 1960), raising the threshold to about 0.35 m above floor levels. This seems to comply with a general rise in floor levels within the central part of the Insula.
244. The basin was constructed using a mix of re-used materials (reticulate, brick and tufa blocks). Thick layers of remnant plaster are still visible in the corners of the basin.

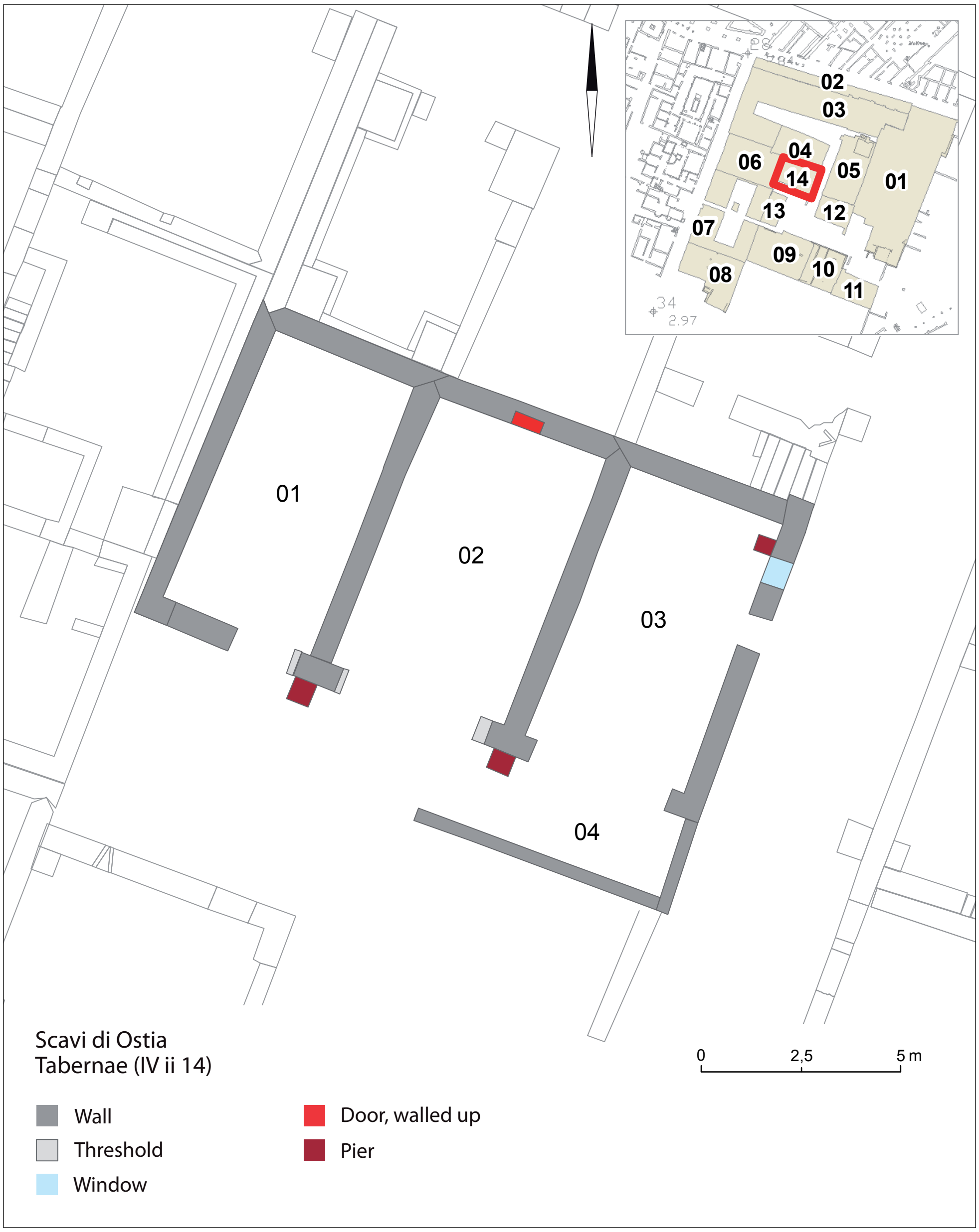


Fig. 5.108 – Building (Tabernae) IV ii 14

5.2.14 Building (*Tabernae*) IV ii 14

The Tabernae IV ii 14 (Fig. 5.108) are found in the centre of the Insula, located at the rear side of the Caupona del Pavone. The Tabernae's westernmost wall confines the Caupona's courtyard; while the northern wall is shared with Building IV ii 4. The building comprises three *tabernae* in a row, all facing south. The Tabernae are individually connected to the Insula's courtyard, while the eastern *taberna* was also linked to the Insula's central passage which leads from the Caseggiato dell'Ercole to the Insula's innermost courtyard. The building covers an area of 153.6 m^2 including a small enclosure in front of the eastern *taberna* (Fig. 5.109).[245] In its original design the building comprised a larger unit. It has been suggested that it possibly formed a continuous row of *tabernae* from the Caupona del Pavone to the Terme del Faro.[246] Today's structures are the result of many changes. The Tabernae seem to represent the three remaining rooms of a larger complex, sections of which have been separated and subsequently reconstructed, involving not only structural change but also a change of function.[247]

Building phases

The group of *tabernae* preserve to a large extent the original *opus reticulatum* (brick) walls, which have been attributed to the Hadrianic period.[248] The three rooms conform to nearly equal size (c. 7.40 x 4.20 m), with standing walls up to a height of c. 2.5 m. The *opus reticulatum* appears to be of very good quality: rectangular fields of *reticulatum* (c. 90 cm h) alternate with horizontal bands of five courses of brick (*latericium*), while the corners are anchored with *latericium* quoining (Fig. 5.110). The building's southern façade is constructed in *latericium*, and is characterised by wide door openings (ranging from 3.5 to 3.9 m) suitable for commercial interaction.

The building underwent a number of reconstructions: these include the replacement of the easternmost *opus reticulatum* with a *latericium* wall,[249] and the constriction of the western *taberna*'s door to about half of its original width with *opus vittatum*.

fig. 5.109 – The row of *tabernae* (IV ii 14) seen from the southern courtyard

245. Calza's 1953 site plan includes also the western part of the enclosure, traces of which are no longer visible, and could not be ascertained by this study.
246. See Liedke (1995: 14).
247. See Building IV ii 4 above, which seems to have been dedicated to industrial use.
248. Calza (1953: 236).
249. The eastern *latericium* wall sits on a high foundation upon which one course of *bipedales* has been placed, jutting out, flush with the foundation wall, while the wall itself continues recessed by 10 cm (the *bipedales* are visible inside the room).

Fig. 5.110 – *Opus reticulatum* with regular fields of reticulatum; corners are reinforced with quoining in *opus latericium*; a former door opening betrays a link to the neighbouring building to the north

The eastern latericium wall includes a window aperture and a door connecting to the central passage which runs through the Insula. This intervention seems to be linked to the reconstruction of Building IV ii 05 in the early Antonine period, which brought about the formation of the passage which divides Buildings IV ii 05 and IV ii 14.

In the northern wall of the central room a walled-up door opening betrays a former connection to Building IV ii 04.[250] The aperture is about 0.80 m wide and reveals only the top part of the door, reduced to a 'visible' height of merely 0.70 m above today's floor levels.[251] The Tabernae's floor levels were raised by about one metre in the course of their period of occupation.[252] Still, a difference in height of about 0.50 m can be observed between the floor levels of the Tabernae and the higher occupation levels of the eastern passage. During a late stage in the Tabernae's life, additional door openings were broken into the *opus reticulatum* (brick) walls to interconnect all rooms to each other (Fig. 5.111), thereby directing the focus of the Tabernae more towards the eastern corridor. In the easternmost room patches of floor mosaics (black tesserae) are still present, while smaller scatters of mosaic are also found in the enclosure in front of the eastern *taberna*. Wall paintings of two phases of decoration have been identified in the Tabernae, of which several patches are still preserved, although detached from the walls and mounted on plaster boards (see Fig. 5.111).The wall decorations have been dated to the Severan period.[253]

250. The door still partially preserves the original tufa door posts. Within building IV ii 4 no traces of the former door opening are visible; the brickface of the wall was probably restored.
251. The presumed height of the door reached the first courses of the latericium band at a height of ca. 0.70 m above today's floor levels. The door's height corresponds to the height of the first putlogs, which suggests that the original floor levels were about one metre below present day floor levels.

252. The height of the original floor levels can be estimated from the height of the first row of putlog holes. These are placed about 0.75 m above the present floor levels. The latter conform to the last occupation levels since they comply with the height of the threshold fragments.
253. Liedke (2003: 105-106).

Fig. 5.111 – Door openings were broken into the *opus reticulatum* wall to interconnect all tabernae

The presence of wall-paintings and mosaic floors offer us a glimpse, if fragmentary, into the decorative treatment of the Tabernae's interior surfaces. This allows us to develop an idea about the efforts that were made to keep up with contemporary tastes, while assuring sustained development at least as late as the Severan period. In this respect the three 'surviving' *tabernae* are a testimony to a changing urban landscape; one which still however allowed some pockets to continue on a smaller scale and maybe slower pace.

5.3 CONCLUSION

The close examination of the buildings has allowed us to gain insights into the Insula's development over the first three centuries AD. The structural remains bear witness to a dynamic environment which afforded continuous change involving all buildings to various degrees, reflecting not only the larger building booms which shaped Ostia's built environment, but also periods of less pronounced activity. Through our detailed assessment structural changes could be identified and a chronological sequence, although relative, could be established for the development of the buildings (see Table 1). For the majority of the buildings it could be demonstrated how closely they were linked to their neighbouring buildings and how changes in one building affected the others. Not a single building existed within the Insula which did not in one way or other interfere with its next-door neighbour.

Evidence for early building phases, attributed to the Late Republican/Early Imperial periods (ca. 50 BC – 50 AD) has been identified in a few isolated structures integrated in later buildings, e.g. the northern part of the Terme del Faro and *taberna* 03 of the Caseggiato dell'Ercole. Traces of the Trajanic/Hadrianic phase are still preserved in single walls within the preceding buildings. However, a number of buildings also remained preserved in various section of the Insula, notably in locations embedded inside the Insula or on its southern extent, not directly linked to public street space (Fig. 5.112). The most substantial structural changes occurred however during the mid 2nd century AD. In the early Antonine period the Insula's public face developed when the large Caseggiato dell'Ercole was built with its portico. The portico was a direct response to the city's infrastructural demands enhancing the Insula's commercial as well as its public appearance. The last period during which we can identify building activities was the Severan period (Buildings IV ii 9 and 13). All later activities seem restricted to undemanding interventions or maintenance carried out to upkeep the existing built environment, although evidence for continuous occupation is found until the 4th/5th centuries.[254]

On the whole the Insula's structural remains confirm the general picture which has been established for Ostia's built environment. However, one important phase typical of Ostia is absent within the Insula: none of the buildings was ever converted into a Late Antique private luxury *domus*, as can be observed in other *insulae* of the surrounding area. Several reasons could account for this. The most plausible one seems to be that since the buildings remained operational into the 4th and some even into the 5th century, they were not vacant and therefore not susceptible to functional change, i.e. being converted into luxury dwellings. Another reason could be that the individual buildings were too interdependent and interwoven and therefore not attractive for new owners, who would have had to single out individual plots for luxury development while the remainder of the Insula would stay unchanged.

Although construction decreased after the Antonine period, the Severan period emerges as the most significant for the Insula. Only one building, which was also the last one to be constructed within the Insula, was actually built during the Severan period. What seems more important however is the fact that the existing buildings appear to be at the height of their productivity: the baths were renewed and enlarged during the Severan period, the Caupona was converted into a hostel; and a number of earlier buildings received new surface decorations. The Insula's commercial front and the buildings within the Insula seem fully functional, and several of them were refurbished during the Severan period. In this way the Insula almost becomes a textbook example of Ostia's new role in the Severan period which saw a shift from the boomtown to a 'consumer city'.[255] The economic implications would deserve a study on its own; within the remit of this research it is sufficient enough to establish that the 'Severan Insula' is the only possible 'time slice' which can be selected for the Space Syntax analysis, since all existing buildings maintained a spatial and functional relationship during that period. Spatial continuity throughout a certain period of use is a pre-condition for Space Syntax's spatial analysis, which will presented in the following chapter.

254. See Gering's (2004, fig. 49) interpretation of Ostia in the later 3rd and 4th centuries; according to Gering building IV ii 05, and a section of building IV ii 09 had been abandoned. Unfortunately Gering is not very specific about the archaeological evidence supporting his interpretations.

255. See Pavolini's (2002: 325-352) assessment of Ostia's shifting commercial landscape from an outward oriented to an inward focussed 'consumer city' in the early 3rd century AD.

TIMELINE	- 100	100 - 125	125 - 150	150 - 175	175-200	200 - 250	250 +
Terme del Faro IV ii 1	Preceding structures	*Tabernae* on Cardo	Baths	Baths		Reconstr. hypocaust	Adapt.
Portico dell'Ercole IV ii 2	Preceding structures		Portico	Portico			
Caseggiato dell'Ercole IV ii 3	Preceding structures		Caseggiato	Caseggiato		Surface Decor.	Adapt.
Industrial wing IV ii 3			Industrial construction	Industrial Construction			
Industrial Building IV ii 4		Preceding Building	Industrial Building	Industrial Building			
Building IV ii 5		Preceding Building	New Layout	Reconstr. Internal div.			
Caupona del Pavone IV ii 6	Preceding structures	Core unit				Recon-structions	
Caseggiato IV ii 7		Northern part	South-eastern part				
Caseggiato IV ii 8		Core Unit		Adaptations			
Building (west. part) IV ii 9						Structure	Alteration
Building (east. part) IV ii 9		Core Unit				Recon-structions	
Building IV ii 10		Core Unit	Adaptations	Adaptations			
Mitreo d. Animali IV ii 11		Preceding Structures		*Mithraeum*			Altar
Building IV ii 12		Core Unit				Reconstr.	
Building IV ii 13						Structure	
Tabernae IV ii 14		Core Unit	Recon-structions			Surface Decorat.	

Table 5.1 – Insula IV ii – development 1st to 3rd centuries AD

Fig. 5.112 – Insula IV ii, early construction phases indicated by *opus reticulatum* walls

6 – The Spatial Organisation of Insula IV ii

Since Ostia's insulae came to light in the large-scale excavations of the late 1930s/early 1940s, they have attracted widespread research interest, reaching from architectural studies to attempts claiming ideological continuity between Roman imperial and Italian fascist architecture.[1] Current approaches examine the infra-structural capacity of *insulae* and value their ability to adapt to dynamic urban processes;[2] again other studies view particular insulae as short-lived material manifestations of architectural dreams, which were quickly modified in response to demographic and economic change.[3] Earlier work concentrated on typological and cultural-historical explanations,[4] whereas more recent approaches follow advances made in Pompeian studies, partially integrating concepts of today's urban planning and urban geography into archaeological research.[5] With reference to Ostia, these studies incorporate aspects of the insulae's spatial organisation into research deploying a wider social focus relating to status and ownership.[6]

Space Syntax's methods of spatial analysis add a new perspective to the current *insula* discussion. Space Syntax techniques not only provide evidence for the intricate organisation of space within the Insula, but also investigate the active role of spatial characteristics, considering the ways in which built and non-built spaces themselves function to pattern the social interaction taking place within them.[7] According to Space Syntax theory the spatial structure of built space embodies knowledge of social relations,[8] from this follows that a better understanding of the Insula's spatial organisation will allow us to gain insights into the Insula as a lived space. Insula IV ii serves as a case study,[9] while various other Ostian *insulae* equally warrant a detailed spatial analysis. Still, Insula IV ii is of particular interest since a number of spatial features, consisting of interlinked courtyards, render Insula IV ii a very appealing dataset for spatial analysis.

The basic principles of Space Syntax have been introduced in chapter three above, while general trends and problems in the archaeological application of Space Syntax methodology have been thoroughly discussed elsewhere.[10] Perhaps it is still useful to emphasise once more that Space Syntax has helped to redress a conceptual imbalance in archaeological research wherein highly dynamic space of past urban landscapes, settlements, and individual houses has remained predominantly studied from fractured, isolated and static positions.[11] Space Syntax offers techniques of analysis which form the bases for interpretations that are configurational, dynamic and experiential; it allows us to pursue methods for the reconstruction of past movement patterns, and through this enables us to 'retrodict' past interaction spaces. Nevertheless, this study still shares with more conventional archaeology the difficulty of having to draw on essentially inanimate resources, in our case the built and non-built spaces of Ostia's Insula IV ii, and to breathe life into them by systematic analysis and interpretation.[12]

1. See for examples Bauers (1999: 26) structural assessment of Ostia's Insula dell'Ercole Bambino and Insula del Soffitto Dipinto, II vi 3-6; see Kockel (2001: 66-72) on Calza's influence on architectural interpretation.
2. Scaliarini-Corlàita (1995); Steuernagel (2001).
3. Gering (2002).
4. Packer (1971); Pasini (1978).
5. Laurence (2007).
6. DeLaine (1999; 2004) and Gering (2001).
7. Cf. Anderson (2005).
8. Hillier and Hanson (1984:184-185).
9. The first results of a Space Syntax study of Insula IV ii have been published previously; see (Stöger 2007).
10. Thaler (2005: 324-326); Cutting (2003).
11. See Stöger (2010: 57).
12. Cf. Hanson (1998: 49).

The spatial analysis builds on the archaeological study presented in the previous chapter. From the assessment of the standing remains this study established that all existing buildings within the Insula were in use during the early 3rd century AD, forming a simultaneously existing spatial association, which is a crucial pre-requisite for spatial analysis. Selecting the early 3rd century as a time-slice for analysis places the spatial discussion within two major urban developments: on the one hand Ostia's 2nd century AD urban expansion which is widely understood as a 'boom-town' phenomenon,[13] and on the other hand Ostia's changing role during the early 3rd century which saw a transformation from a commercial hub with an outward focus to a 'consumer' city responding to the needs of an increasingly local clientele.[14]

In the following chapter the Insula's spatial structure will be analysed. The first part examines the Insula's spatial characteristics which are readily apparent; this is followed by a discussion of the physical form and the size of the built and non-built spaces and how they relate to land-use categories. Next, the Insula's topological and visual patterns are analysed and their spatial relations calculated, using Space Syntax methods; this forms the main part of the analytical approach to the Insula's spatial structure. Finally, a summary of the Insula's spatial organisation will be presented together with an evaluation of how it relates to the Human Use of Space and how the Insula functioned as an urban neighbourhood.

6.1 THE INSULA'S SPATIAL PROPERTIES

The Insula covers a total area of 7321 m² comprising 14 buildings, characterised by diverse land-uses. It represents a built environment that potentially accommodated commercial (shops and storage), industrial (workshops and small scale production), recreational (baths and inns), sacred (*mithraeum*), and communal (open courtyards, entrance passages and portico) as well as habitation space (ground floor and upstairs dwellings) within its confines.[15] These spaces were not only linked functionally, but also through a spatial relationship provided by shared common spaces. A number of the Insula's spatial characteristics are readily apparent. Commercial space was predominantly located along the street fronts, maximising the potential for interaction at the Insula's interface with public space. Industrial space in contrast seems to have reached deeper into the Insula, with the narrow end of the plot along the street front. The southernmost corner of the Insula, the area least accessible, was dedicated to the Mitreo degli Animali. Several buildings provided dwelling units at ground floor level, while the majority of habitation spaces were located on the upper floors. Five staircases are linked directly to the public domain of the street space;[16] they offer access to the upstairs areas independent of the inner space of the Insula. Seven additional staircases are present in buildings inside the Insula, linking those upstairs areas closer to the Insula's internal communication (Fig. 6.1).[17]

The Insula's interaction with Ostia's public space, the street network, appears in part similar to today's gated communities; the latter are defined as a residential social system that closes itself off from other areas through a form of social or physical mechanism.[18]

13. See chapter two above, especially the section on Heinzelmann's 'boomtown' model (2002, 2005).
14. Gering (2004: 303) considers the Severan period as the starting point for fundamental structural changes in Ostia's urban landscape; see Pavolini (2002) for an examination of Ostia's urban economy during the Severan period; see also Boersma (1985) for a diachronic approach to Ostia's Insula V ii, which provided the case study for Pavolini's socio-economic assessment.

15. See section 6.2 below for information on the land-use categories identified within the Insula.
16. The staircase leading to the upper floors of the Caupona del Pavone, IV ii 06 can only be reached from within the building, and was thus not accessible from the public street space.
17. The indicated upper floors are only hypothetical; some buildings could have had three to four upper storeys, which is very likely for the Caseggiato dell'Ercole. The stairs in the baths' service area presumably gave access to service related space, but not to dwelling units on the upper floors.
18. See Bert Lott (2004) on Augustan neighbourhoods; see also his section on neighbourhoods in modern contexts, including gated communities (2004: 18-23).

Fig. 6.1 – Stairs to upper floors accessible from the outside and from within the Insula

Although a comparison to today's gated communities might not be fully adequate, still, today's communities offer us some insights into everyday life within confined spaces,[19] and therefore might allow us to look at the Insula with more critical eyes. In their modern form, gated communities are a type of residential community containing strictly-controlled entrances for pedestrians and vehicles, and are often characterized by a closed perimeter of walls and fences. A closed perimeter would only apply to the Insula's eastern and southern boundaries, which are indeed confined by walls: a 162 m long closed boundary is found along the eastern and southern confines, closing-off the Insula against the Campo della Magna Mater and the unexcavated space to the south. In contrast, 212 m of open boundaries mark the Insula's western and northern sides fronting onto the Via della Caupona and the *cardo maximus* (Fig. 6.2). The sides which open to the streets were as open as possible, with every room located along the street front having individual door openings directly connected to public space. At the same time, every single entrance to the street could be closed off; travertine thresholds are still present *in situ*. In addition, the portico along the *cardo maximus* could be screened off, adding a further boundary, if discreet, between the Insula and the public domain. It seems that the Insula could close itself off from the street network, and could still keep internal movement in flow. Today's gated communities often consist of small residential streets and include various shared amenities. For smaller communities this may be only a park or other common areas. For larger communities, it may be possible for residents to stay within the complex for most of their daily activities. As far as the Insula is concerned, the diversity of land-use which seems present might have allowed the residents to remain within the boundary for most day-to-day activities, while the internal courtyards might have functioned as common areas.

6.2 PHYSICAL FORM AND SIZE OF SPACE

As a starting point, the most straightforward approach to space is the physical size and the form of spaces. This seems already quite informative: the Insula's total area measures 7321 m^2, of which open space covers 1544 m^2 . Comparing the Insula's covered (built-up) spaces to its open spaces leads to a ratio of 5:1, which means that about 21 % of the total area remained open (see Fig. 6.2).[20] This accounts for only 6 % less than the area dedicated to commercial space (*tabernae* and storage), which covers about 27.7 % (Fig. 6.3).[21] It is equally interesting to note

19. See Low (2001: 45-58) for a critical view on today's gated communities in the context of urban fear and how gated communities are producing new forms of exclusion and residential segregation.

20. Included are passage corridors which are strictly speaking not open space, but they are movement space providing access to the open spaces.

21. The land-use categories listed here are suggestions based on the observed spatial properties of the buildings (Fig. 6.3); in addition, functional categories, such as industrial and religious land-use have been suggested only as far as the archaeological evidence permits. The following tentative land-use categories have been made: commercial (shops and

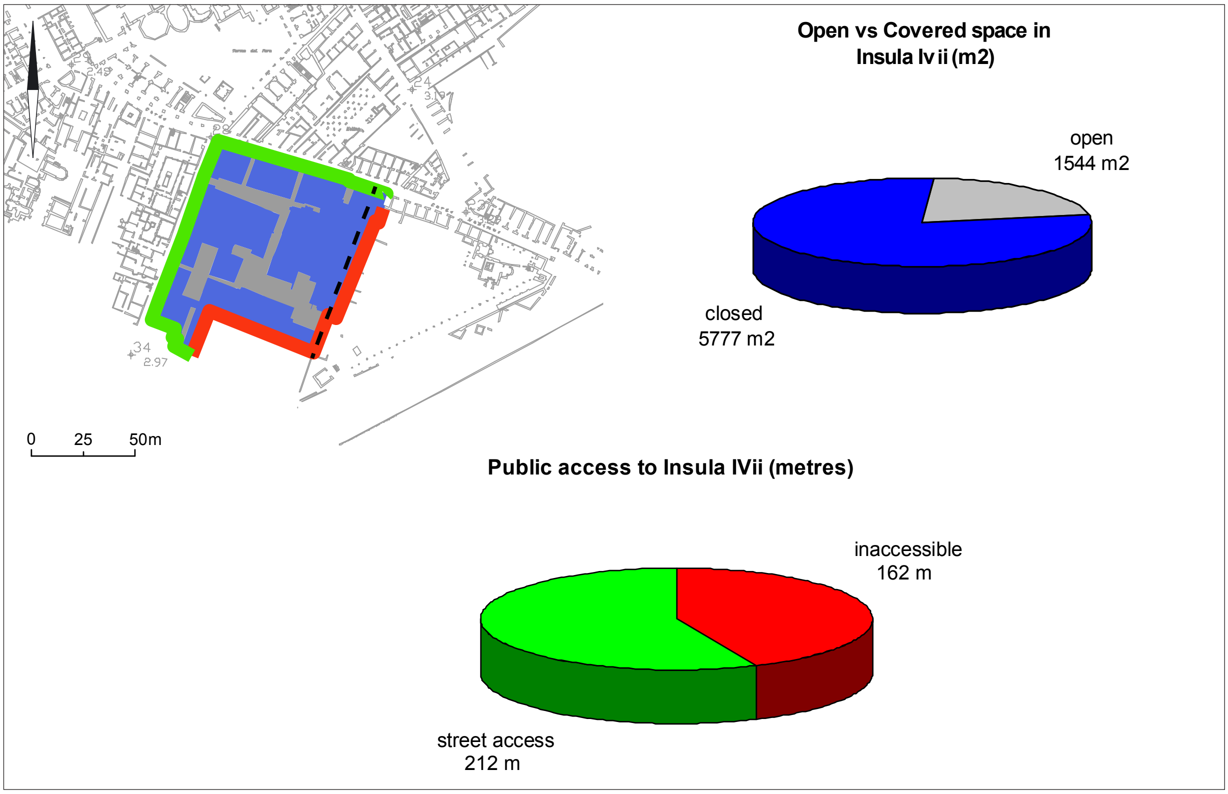


Fig. 6.2 – Insula IV ii, public access to the Insula along the *cardo maximus* and the Via della Caupona

that the Insula dedicated about 26 % to recreational land-use (baths and bars/inns). This means that space earmarked for 'pleasure' seems to have ranked as highly as the Insula's commercial spaces. Habitation space is difficult to assess since it was mostly located on upper floors no longer extant (see Fig. 6.1 above), therefore this calcuation takes only ground floor spaces into account. Nevertheless from the generous distribution of open spaces and the diversity of land-use some assumptions relating to the 'quality of life' within the Insula can be made. Today's urban theory postulates that next to a lively mix of land-use and building types, also particular qualities of the physical city are needed to provide for a good neighbourhood.[22]

These physical qualities include doors directly entering the streets, small 'walkable' blocks and the opportunity for pedestrians to turn corners frequently; all of these features are present within Insula IV ii. Above all, the spaciousness of the open areas points not only to a generous attitude towards space, but it also indicates that numerous activities could have taken place simultaneously within the courtyards. One of these activities was fetching water. Fountain houses are found in two courtyards (see Fig. 5.36 above);[23] located in very central spots the fountains also had a social role to play, and apart from their obvious function they presumably served as meeting points for those who lived in the Insula.

storage), recreational (baths and inns), industrial (factories and industrial spaces) religious (*mithraeum*), habitation (domestic dwellings at ground floor and upstairs) as well as interaction (open spaces and passages between buildings).
22. See Jacobs (1961).

23. Fig. 5.36 above shows the fountain house in the courtyard of the Caseggiato dell'Ercole.

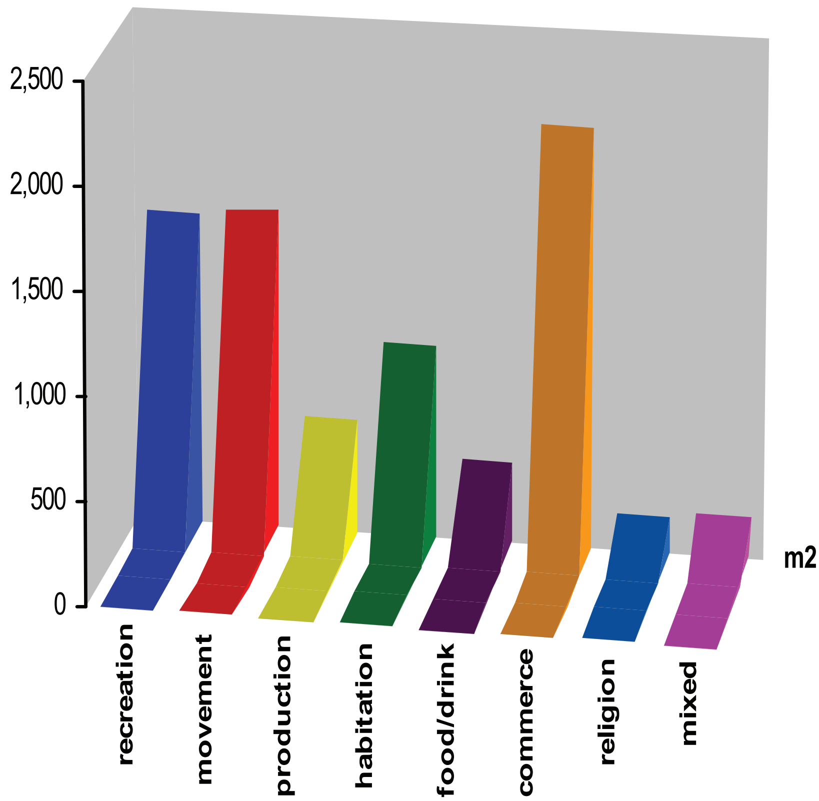


Fig. 6.3 – Insula IV ii, ground floor space dedicated to different categories of land-use (in m²)

6.3 SPATIAL ASSESSMENT AND SPACE SYNTAX

Descriptive qualitative methods seem often beneficial, and even more so when spatial characteristics give the impression of being self-evident. However, description sometimes substitutes for a real understanding of the spatial laws of interaction and movement, and often fails to comprehend the significance of generative spaces for social activities.[24] By exploring different ways of quantitative spatial assessment, a better understanding of the Insula's spatial organisation and its significance for social activities can be achieved. Hillier and Hanson, the pioneers of Space Syntax, stress the importance of the term 'exploring'. They argue that it is impossible to establish in advance which spatial dimensions are likely to be the most relevant,[25] and thus it becomes the researcher's task to discover which representation and which measure captures the logic of a particular system.[26] This study fully embraces the idea of exploring space through various analytical approaches, however at the same time it aims to ensure an approach as comprehensive as possible. Therefore, the three-way-approach suggested by Hanson is followed throughout this study.[27] According to Hanson space should be examined through its three principal aspects: its convex or two-dimensional organisation (convex spaces like rooms and buildings), its axial or one-dimensional structure (lines of movement) and its visual fields. Accordingly, the appropriate Space Syntax tools have been applied: convex or Access

24. Cf. Clark (2007: 85).

25. Hillier and Hanson (1984: 122-123).
26. Cf. Thaler (2005: 326).
27. See Hanson (1998: 38).

Analysis , axial analysis and visibility graph analysis or Isovists. Hanson's approach assures that each type of analysis relates to an aspect of how inhabitants and visitors experienced and used space. In the following sections Insula IV ii will be investigated through its convex spaces (buildings), its axial structure (movement related spaces including passages and courtyards) and its visual fields (inter-visibility between spaces). These different ways of looking at the Insula can be seen as layers of spatial structuring which co-exist within the Insula's plan, each layer with its own contribution to the Insula's accessibility and spatial lucidity.[28]

6.4 THE INSULA'S CONVEX OR TWO-DIMENSIONAL ORGANISATION (ACCESS ANALYSIS)

Access Analysis is a promising starting point when applying Space Syntax to past built environments. Access Analysis applied to the individual buildings provides insights into their spatial organisation, while the examination of the complete Insula allows a better understanding of the relationship between buildings and Insula, drawing on the 'local-global' interplay which is at the heart of Space Syntax analysis. Two interrogative tools have been used for the analysis of the Insula's built space: access diagrams and spatial values. The diagrams are a translation of a two-dimensional site plan into a graph. The graphs visualise the topological connections between the rooms (convex spaces) and enable us to calculate spatial values. A quantitative assessment requires a calculation of numerical indicators for all spaces, while a qualitative description of the access diagram, the so-called J-graph,[29] would allow already a deeper understanding of the Insula's spatial organisation. The spatial values applied here comprise two independent Space Syntax measures: control values and real relative asymmetry (RRA). These respond to the 'local' and 'global' spatial properties of the Insula and its buildings, and therefore indicate how central or peripheral a given space is within the total movement flow within the Insula. Access data offer indications about those spaces potentially destined for interaction, and those which were more likely to have provided privacy, both 'Insula-wide' and at the level of the individual buildings. All buildings have been analysed twice, individually and collectively as part of the Insula's total configuration.[30]

The analytical strategy chosen is to examine the spatial configuration of the individual ground plans to identify the potential 'hotspots' for interaction within every building.[31] The analysis is based on the structural assessment presented above, and takes into account reconstructions and alterations made until and during the early third century AD.[32] Tables 6.3 to 6.14 list the most significant spatial values for each individual building, while the complete access data can be found in Appendix 1. The selected values either indicate spaces characterised by very high or very low levels of global or local interaction potential; furthermore, those spaces where we find most consistency or discrepancy between local and global interaction potential have also been identified. They

28. See Hillier (2007: 116).

29. J-graph stands for justified graph; in this case justified with respect to the outside space, alternatively any other selected space within the configuration can be placed at the root of the graph and the graph can be justified accordingly.

30. Access Analysis has been performed using Jass analysis software, designed and developed by the KTH Stockholm. Concerning the graph figures presented in this study, as far as possible there is consistency in the system of numbering: the room numbers found on the individual house plans in chapter 5 are followed, but at times nodes are added. Regarding the Insula's total configuration the sequence of numbering cannot follow the individual house, and instead reflects only the sequence of numbers placed in the course of the analysis. There is therefore no consistency between the node numbers of the individual buildings/space and the node numbers attributed to the spaces within the total configuration.

31. There is no doubt that a larger sample size consisting of a greater number of individual houses or even a number of different *insulae* would strengthen the analysis. Nevertheless the fourteen buildings which compose the Insula constitute a coherent sample since they form a distinct spatial unit. Due to the strong variation between the types of buildings, a comparison across the buildings through specific rooms or distinct spaces is difficult to achieve. See Hanson (1998: 38) for studies which apply Space Syntax to large data sets of similar buildings, searching for invariants in the spatial pattern and investigating the relation of labels (function or use) to spaces.

32. The structural analysis presented in Chapter Five forms the basis for the interpretation by which the early 3rd century Insula is defined.

are of particular interest, since they indicate specific rooms by which buildings are often functionally defined.[33] All values have been calculated in relation to the exterior space (the public street space), or the Insula's internal courtyards for those buildings which have no direct access to the public carrier space, but can be reached by passing through the internal spaces. To facilitate comparison between buildings, all integration values for the buildings' 'exterior' (street space or internal courtyards) are shown in a separate table (Table 6.1); these values offer information on how the individual buildings potentially related to visitors from the 'outside'.

As Table 6.1 shows, only five of the Insula's buildings have direct access to public street space. Surprisingly, those buildings prominently located along the *cardo maximus*, the Terme del Faro as well as the Caseggiato dell'Ercole, attribute only moderate levels of interaction potential (presence availability) to the outside carrier space. Quite the opposite can be observed for the buildings located along the Via della Caupona: the Caupona del Pavone as well as Buildings 7 and 8 (IV ii 7-8) dedicate high levels of interaction potential to the outside street space.

Exterior Outside 0.0 Inside 0.0	No	Depth	RRA	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
Terme del Faro IV ii 1	26 Ext.	0.0	1.308	Moderate	Moderate	1.667	Moderate
dell'Ercole IV ii 2-4	36 Ext.	0.0	0.429	Moderate	Moderate	2.979	Moderate
Industrial bld. IV ii 4	9 Int.	0.0	0.909	High	High	1.833	High
Building 5 IV ii 5	15 Int.	0.0	1.869	Low	Moderate	1.500	Low/mod
Caup./Pavone IV ii 6	21 Ext.	0.0	0.672	High	High	2.000	High
Building 7 IV ii 7	24 Ext.	0.0	0.561	High	High	5.833	High
Building 8 IV ii 8	14 Ext.	0.0	0.288	High	High	5.167	High
Buildings 9&13 IV ii 9 and 13	17 Int.	0.0	1.415	Moderate	Moderate	1.583	Moderate
Building 10 IV ii 10	7 Int.	0.0	0.725	High	High	1.833	High
Mitreo degli animali, IV ii 11	5 Int.	0.0	2.841	Low	Low	0.500	Low
Building 12 IV ii 12	7 Int.	0.0	0.725	High	High	2.583	High
Building 14 IV ii 14	5 Int.	0.0	0.287	High	High	3.333	High

Table 6.1 – Integration values and control values for the buildings' exterior spaces

33. Cf. DeLaine (2004: 158).

By making their street fronts highly permeable, these configurations seem vastly affected by the way the buildings relate to the exterior. Conversely, the spatial configuration of the baths seems principally organised so as to structure interior relations, giving only moderate interaction potential to its link with the outside street space. Then again, the Caseggiato dell'Ercole displays a different spatial organisation altogether, its portico and entrance passages providing various choices to form different circulation paths; these allow for a differentiated spatial experience for visitors and residents.

Along the *cardo maximus* the Caseggiato's portico acts like a filter between the building and public space, while along the Via della Caupona, the Caseggiato's spaces are directly linked to the street space. In total however, the Caseggiato's configuration attributes only moderate levels of interaction potential to exterior space, while its portico 35 and its interior courtyard 34 have not only high integration values but also high control values and hence hold key positions within the Caseggiato's spatial organisation.

The buildings located inside the Insula have their points of access linked to the Insula's inner courtyards or passages connecting them. Buildings IV ii 4, 10, 12 and 14 dedicate high integration values to the courtyards from where they can be reached. Quite the opposite can be observed for the Mitreo degli Animali: it attributes low integration values to its outside space. The *mithraeum*'s spatial organisation seems structured so as to focus on its interior spatial relations, while outside space remains marginal. This demonstrates that the *mithraeum* not only occupies a segregated location within the Insula, but also its spatial structure communicates a closed attitude vis-à-vis its primary access space. Neither the *mithraeum*'s location nor its spatial organisation seems to encourage chance encounter. This suggests that the *mithraeum* depended on knowledgeable or invited visitors. Then again Buildings IV ii 5 and 9/13 show only moderate to low integration values for their access spaces. Both buildings seem to be more of a residential or partially residential nature and hence moderate or even low interaction potential for their 'outside' spaces seem in line with their possible function. A further step of analysis would take the public outside carrier into account and calculate the topological distance (in depth-steps) from the buildings located inside the Insula to the outside street space. However, since the courtyards and passages have been included in the Access Analysis of the complete Insula, this part of the analysis will not be repeated for the individual buildings. The significance of the internal courtyards and passages for movement flows within the Insula is easily recognisable. When viewing the courtyards from the perspective of the individual buildings the former seem to act as 'commons' or in-between areas created by collective use of space; nevertheless it remains difficult to establish whether they were shared property or they belonged to certain buildings and passage was negotiated between the residents.

Mean integration values (MRRA)

Mean integration values (MRRA) allow a first hand impression of the buildings' spatial structure and facilitate comparison between the buildings (see Table 6.2). MRRA values express how shallow or deep on average the spaces in the buildings are from one another.[34] This helps to formulate ideas about the use of space and the potential function of buildings. Within the group of buildings the Caseggiato dell'Ercole has the lowest mean integration value (0.562), which means that the building is well integrated.[35] This is not at all surprising since its shallow ringy structure affords greater integration between all its spaces. In contrast, the Mitreo degli animali shows the highest MRRA (1.893), its unilinear sequence of rooms being the most segregated configuration within the Insula. The MRRA values for the other buildings range between 0.7 and 1.5; Buildings 7 and 8 are also fairly shallow and hence configurationally more integrated than other buildings with deeper tree-like structures like the Terme del Faro (MRRA 1.195) or Building 5 (MRRA 1.218). The mean integration values allow only a rough understanding of the buildings, whereas specific spatial characteristics will be discussed in the

34. Hanson (1998: 26).
35. Integration values (RRA, real relative asymmetry) range from 0 to infinite, they average around 1.0; low values (moving towards 0) indicate higher integration, while high values (above 1) refer to low integration.

following section when the buildings are examined individually, based on their access graphs and the spatial values calculated for every building.

Insula IV ii	MRRA	Depth-steps
Terme del Faro, IV ii 1	1.195	8.0
Caseggiato dell'Ercole, IV ii 2-3	0.562	4.0
Building 4 (Indus. building), IV ii 4	1.218	3.0
Building 5, IV ii 5	1.218	6.0
Caupona del Pavone, IV ii 6	1.110	4.0
Building 7, IV ii 7	0.725	4.0
Building 8, IV ii 8	0.837	2.0
Buildings 9 and 13, IV ii 9 and 13	1.333	7.0
Building 10, IV ii 10	1.523	3.0
Mitreo degli Animali, IV ii 11	1.893	4.0
Building 12, IV ii 12	1.015	3.0
Building 14, IV ii 14	0.907	2.0

Table 6.2 – Mean integration values for all buildings within Insula IV ii

6.4.1 Syntactical assessment of buildings IV ii 1 to 14

The Terme del Faro, IV ii 1

The baths have a deep tree-like structure (Fig. 6.4), centred on two nodal spaces: the large *frigidarium* 9 and the service corridor 17. These spaces have typically high integration potential since all movement passes through them; at the same time they are controlling spaces protecting the links to all rooms surrounding them (Table 6.3). The baths seem to be divided into functional zones along these nodal points: the *frigidarium* 9 forms the hub for the section which was open to visitors, while the service corridor 17 links up with all spaces that are needed to operate the baths. In addition, the service corridor 17 connects with the Insula's interior southern courtyard, where we find a secondary entrance to the baths. This suggests that access to the baths was structured, allowing personnel to enter the baths from the rear entrance, while visitors would use the front entrance on the *cardo*. The actual bathing block with the heated rooms can only be reached by passing through a series of rooms. Interestingly enough, the heated rooms are the only spaces within the baths which allowed for movement to circulate: Rooms 1, 3 and 5 are linked in a loop, whereby the flow of movement seems to almost reflect the thermal flows. The heated pool areas, 22 and 23, in the baths' caldarium 3 emerge as the most segregated spaces within the configuration, located eight depth-steps away from the outside space; they provided cut-off areas affording high levels of privacy. All in all, the baths' spatial organisation seems very lucid and functional, and it can be assumed that it was instrumental in sustaining the baths' long period of use.

Terme del Faro, IV ii 1	No.	Depth	RRA (MRRA 1.195)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
Frigidarium	9	3.0	0.569	High	High	3.083	High
Passage	17	4.0	0.803	High	High	4.133	High
Heated pool	22	8.0	1.864	Low	Low	0.250	Low
Heated pool	23	8.0	1.864	Low	Low	0.250	Low
Outside space	26	0.0	1.308	Moderate	Moderate	1.667	Moderate

Table 6.3 - Spatial values: Terme del Faro, IV ii 1

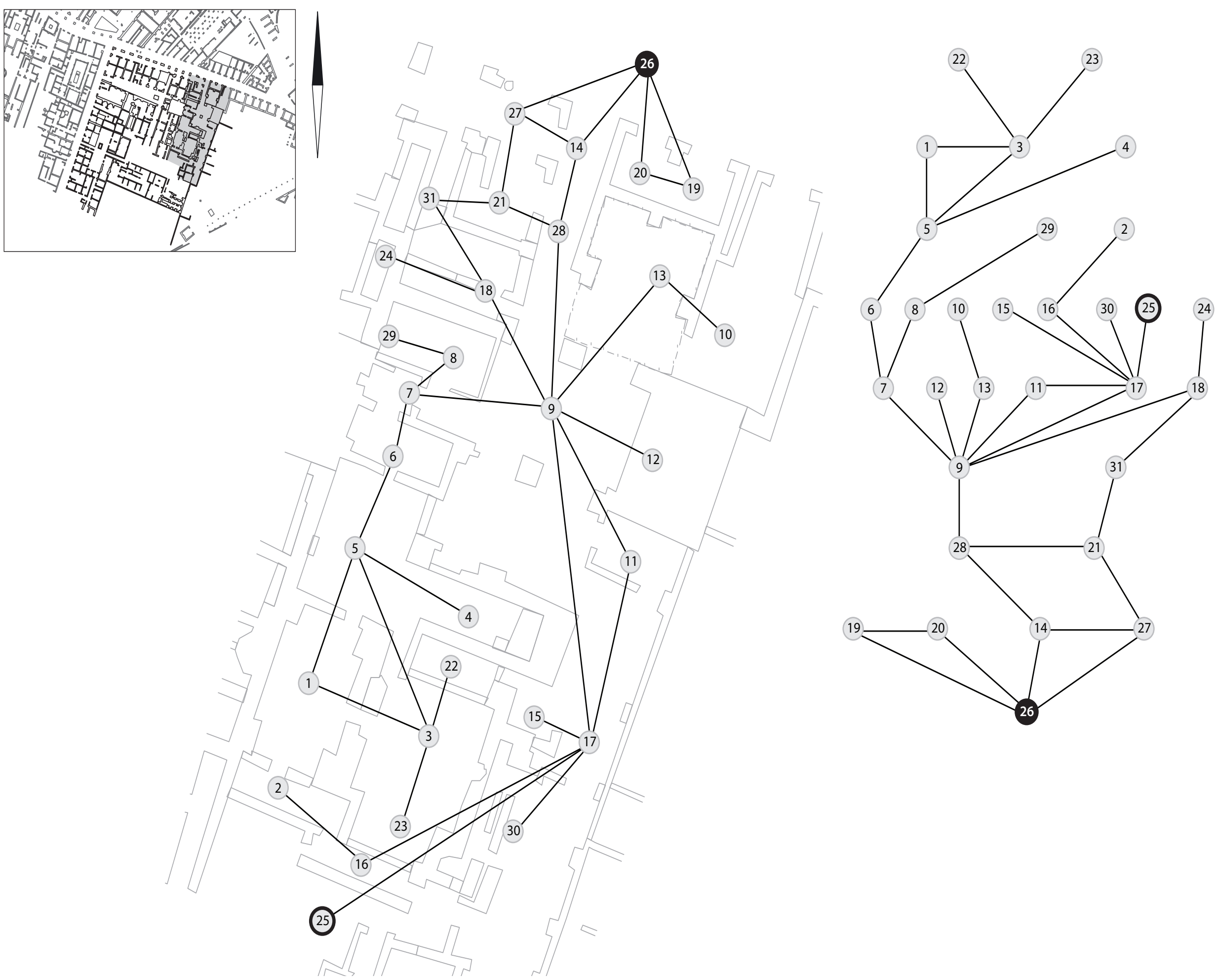


Fig. 6.4 – Terme del Faro, IV ii 1, topological graph (26 = outside carrier); J-graph Terme del Faro, IV ii 1 (root 26 = outside carrier)

Caseggiato and Portico dell'Ercole, IV ii 2-3

The access graph of the dell'Ercole building complex displays a shallow bush-like structure (Fig. 6.5), with two major spatial pivots on which the Caseggiato's movement and interaction hinges: the portico 35 and the interior courtyard 34. Both areas have high levels of integration and control (see Table 6.4). The most striking features of the building complex are the circulation choices provided by its spatial configuration. Apart from the passage corridors which directly link the portico to the courtyard, there are five *tabernae* with back-rooms (5 and 6, 8 and 9, 10 and 11, 12 and 13 as well as 14 and 15), connecting the portico with the courtyard through the *tabernae*. The Caseggiato's easternmost passage 7 connects with its eastern neighbour, the Terme del Faro, and offers a circulation loop passing through the baths to the exterior. Two further passage corridors, 1 and 20, tie the portico to the courtyard and at the same time offer a variety of circulation options. These passages allow access to the inner part of the Insula independent of the *tabernae*, while a combination of routes passing through *tabernae* and passages offer a great variety of paths in and out of the Caseggiato, including the outside street space on the Via della Caupona, as well as routes passing through the industrial western wing of the Caseggiato, consisting of rooms 30, 32, 39 and 40. Passage 1 is of particular interest since it leads not only to the Caseggiato's courtyard but continues deeper into the Insula leading to the southern courtyard. In its late state the Caseggiato had turned into a structure that was partially directed outwards towards the *cardo*, and partially inwards towards the courtyard and the inner Insula, while the connection between the outside and the inside had been largely disrupted. Since the route choices had been reduced, the intensity of movement and interaction within the Insula must have been negatively affected. The Caseggiato's westernmost section does not offer connections through the *tabernae*; unsurprisingly within this section we find the most segregated *taberna* 25, typically with very low control and integration values; *taberna* 25 is closely followed by *taberna* 23 on the portico side. Both *tabernae* are only connected to one neighbour, while all other *tabernae* within the Caseggiato have two or more connections to neighbouring spaces. Having just one single entrance could have positive and negative effects on the *tabernae*'s accessibility to customers. If the *tabernae* are too open they will lose their capacity to 'capture' customers and instead might be reduced to serving as through passage for visitors to reach locations within the Insula. On the other hand if they are too closed they will not promote accidental encounters since their spatial structure will not draw in passing visitors. In this context it is worthwhile to recall some interesting results from the structural assessment discussed in section 5.2.2 above. We could see a transformation in the development of the Caseggiato from a pronounced open to a fairly closed structure: the westernmost part, which is configurationally less integrated than the eastern part was built later than the eastern part, while the eastern part was gradually transformed into a more segregated structure by walling-up door openings between *tabernae* and between *tabernae* and passage corridors.

Caseggiato dell'Ercole, IV ii 2-3	No.	Depth	RRA (M R R A 0.562)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
Portico	35	1.0	0.267	High	High	8.093	High
Courtyard	34	2.0	0.286	High	High	7.199	High
Stairs	2	2.0	0.609	Moderate	Low	0.063	Mod/low
Taberna Comm.	25	3.0	0.629	Moderate	Low	0.067	Mod/low
Mixed (baths)	04	3.0	0.838	Low	mod	1.000	Low/mod
"porter house'	30	1.0	0.619	Low	Low	0.726	Low
Outside Space	36	0.0	0.429	Moderate	Moderate	2.979	Moderate

Table 6.4 - Spatial values: Caseggiato and Portico dell'Ercole, IV ii 2-3

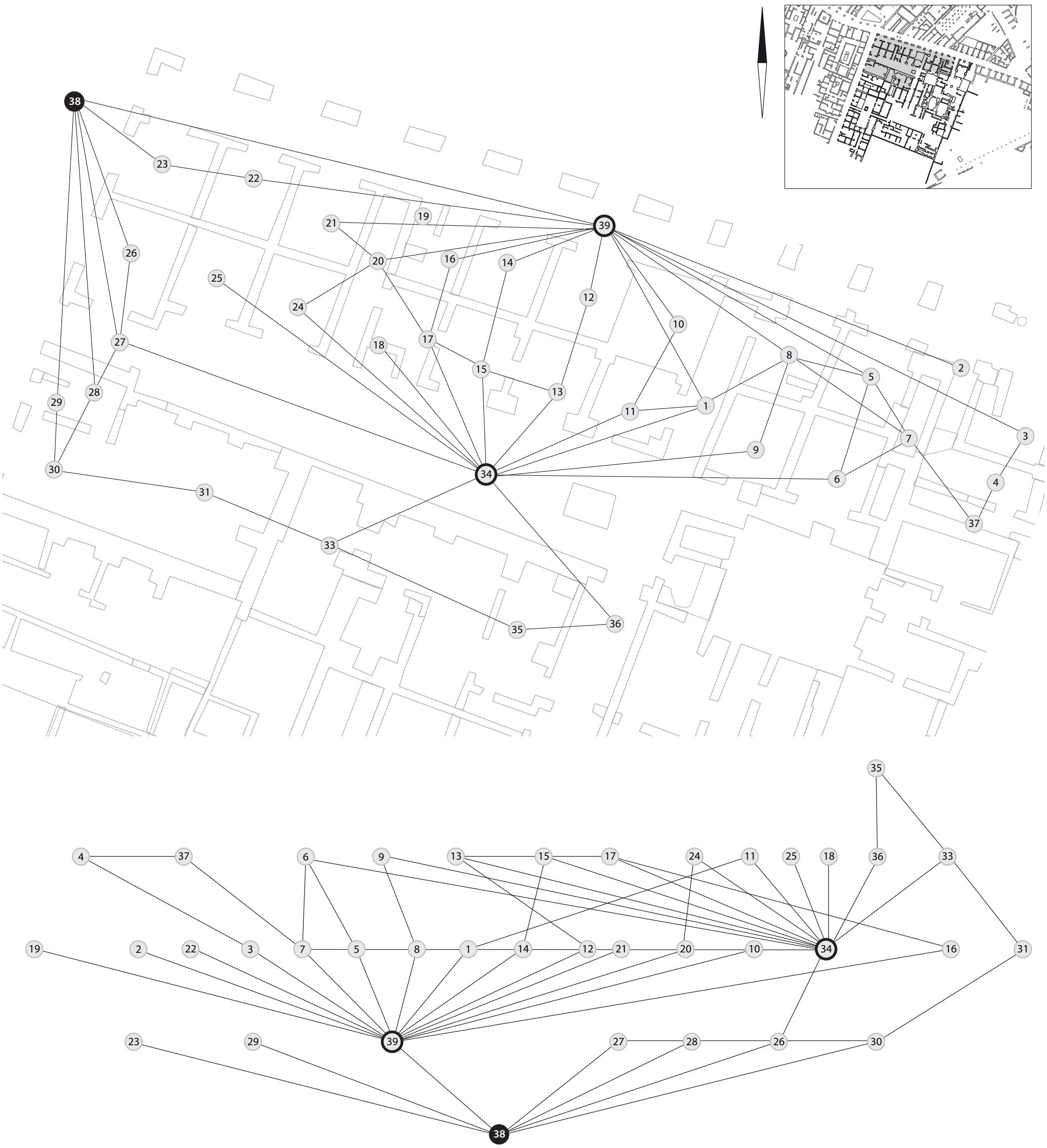


Fig. 6.5 - Caseggiato and Portico dell'Ercole, IV ii 2-3, topological graph (38 = outside carrier), J-graph (root 38 = outside carrier space)

Building IV ii 4

The configuration of Building 4 is characterised by a sequence of spaces joining each other without clear architectural definition of their boundaries (Fig. 6.6). Room 3 stands out since its walls are clearly defined. Entrance space 6 and passage 9 emerge as the most integrated spaces, and as the spaces with the highest levels of control (see Table 6.5). Quite differently, although predictable, the stairs which can only be accessed from outside the building (passage 9), and the under stairs 7, only reachable from the entrance area 6, are the most segregated spaces. They are not at all integrated into the movement flow which joins all other rooms within the premises. All other spaces are linked up into a sequential order which suggests a circular movement loop by entering the building from the passage 9 and leaving it from room 1, or the other way round; optionally the movement flow could be extended to include the western wing of the Caseggiato dell'Ercole and then leaving or entering the buildings through the access points on the Via della Caupona. The interlinked spaces of Building IV ii 4 lend themselves very well to different working zones required when a production or a work process consists of a sequence of defined steps, each occupying a certain area according to the spatial and temporal order of the work process. Based on the assessment of its spatial structure, industrial use seems strongly suggested for Building IV ii 4, which is also supported by archaeological evidence such as the basalt pavements, and the water basins placed in room 2, however at a late period of use.

Fig. 6.6 - Building IV ii 4 (industrial building) topological graph and J-graph (root 10 = courtyard)

Building, IV ii 4 (Industrial building)	No.	Depth	RRA (M R R A 1.218)	Global interaction potential	Local int. Potential	Control Values	Potential presence availability
Entrance space	6	2.0	0.909	High	High	1.833	High
Under stairs	7	2.0	1.636	Low	Low	0.333	Low
Stairs	8	1.0	1.636	Low	Low	0.333	Low
Passage (internal Insula)	9	1.0	0.909	High	High	1.833	High

Table 6.5 – Spatial values: Building IV ii 4 (industrial building)

Caseggiato IV ii 5

The building's spatial structure comes out as a rather deep tree-like graph of 6 step-depths (Figs. 6.7 and 6.8)[36]; the graph reveals that the building is divided into syntactically distinct parts: a unilinear sequence of spaces, 10, 9 and 3, leading from the entrance 10 to the nodal areas formed by corridor 5 and courtyard 4, which constitute the second and deeper part of the building. Corridor 5 and courtyard 4 emerge as the spaces with the highest consistency between integration and control values (Table 6.6); hence they represent the areas around which the building's movement and integration patterns are structured. It is only in the deeper part of the building that route choices are offered and circulation rings allow movement to flow between the rooms. Although Building 5 is difficult to assess since its original entrance arrangement was altered when the baths' water cistern was placed there, still some observations can be offered. It is noteworthy that regardless of the rearrangement of the entrance the building's core structure, centred on corridor 5 and courtyard 4, remained fully intact and only became a few steps more remote from the outside when the building's main access point was transferred to room 10 next to staircase 14. The unilinear path which leads into the building suggests that there were no specific arrangements made where visitors and residents could interface. Only when room 3 was reached, were some movement options offered, allowing the residents to withdraw into the building by using different paths than the visitors. The apparent absence of a formal reception area for visitors, together with the sequential ordering of rooms 1, 2 and 3, point to a so-called *medianum* apartment which is typically found in Ostia.[37] In general these types of apartment did not place much emphasis on reception areas since their residents seemed to expect few casual visitors. This could also explain why there was little importance placed on the building's main entrance, and why it was possible to transfer it so nonchalantly to the side. Another interesting aspect of the building is found in rooms 6 and 7. Their spatial values reveal moderate to low integration and control potential, suggesting higher levels of privacy for these rooms. In earlier literature these rooms have been referred to as bedrooms (*cubicula*).[38] This was suggested since they have no source of light and air other than through corridor 5 and courtyard 4 to which room 6 was connected through a window. The spatial values seem to support the proposed function. These rooms are found in a part of the building relatively cut off from the main interaction spaces; however, their segregated location is a result of the blocking of the former main entrance. It therefore seems that these rooms became only suitable as *cubicula* after the Severan reconstruction, when the water cistern was constructed; whereas before the reconstruction this portion of the building had been located right next to the main entrance. Once the entrance was blocked these rooms received higher levels of privacy. However, we cannot relate the wall decorations which remained preserved in rooms 6 and 7 to a change in function since they seem to pre-date the Severan reconstruction and therefore were already present before the rooms became more segregated.[39]

Caseggiato IV ii 5	No.	Depth	RRA (MRRA 1.218)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
Courtyard	4	5.0	0.807	High	High	3.667	High
Corridor	5	4.0	0.595	High	High	3.867	High
Cubiculum	6	5.0	1.147	Moderate	Low	0.167	Mod/low
Cubiculum	7	5.0	1.147	Moderate	Low	0.167	Mod/low
Stairs	14	1.0	2.422	Low	Low	0.500	Low
Passage Insula	15	0.0	1.869	Low	Moderate	1.500	Low/mod

Table 6.6 – Spatial values: Caseggiato IV ii 5

36. Fig. 6.8 shows the building after rooms 12 and 13 have been added and a possible connection to Building IV ii 12 was made.

37. See DeLaine (2004) for a syntactical assessment of a group of Ostia's *medianum* apartments; Caseggiato IV ii 5 is not included in the data set.

38. See Liedke (1995) and Falzone (2003).

39. See Liedke on dating the wall paintings in rooms 6 and 7 (1995:15).

Fig. 6.7 – Caseggiato IV ii 5, topological graph (root 15 = courtyard) and J-graph, (root 15 = courtyard) ; spatial structure before rooms 11 and 12 were inserted into the courtyard (4) and without a conncetion to Building IV ii 12

Fig. 6.8 – Caseggiato IV ii 5, J-graph, (root 15 = courtyard) and topological graph (15 = courtyard, 13 = neighbour Building IV ii 12)

Caupona del Pavone, IV ii 6

The Caupona (hostel) has a bush-like graph-structure, with four spaces, 1, 11, 12 and 17, linked to the outside street space (Fig. 6.9). Corridor 1, which is directly connected to the public carrier, emerges as the most integrated area within the building, revealing both high levels of control and interaction potential (see Table 6.7). Two further nodal points are provided by the corridors 13 and 6; most rooms fan off from the corridors 1, 6 and 13. Interestingly, the Caupona's spatial organisation does not promote any circulation of movement. Except for the corridors, most rooms are dead-end spaces with a single point of access and exit. This type of spatial structure has the advantage that it allows different activities to occur simultaneously, using different rooms or sections of the building without interfering with each other. However, the disadvantage is that such a configuration tends to promote fragmentation, and consequently rooms and whole parts can easily become disconnected from the rest of the building. Through its 'dead-end' or terminal structure the Caupona seems to have deprived its residents and visitors of different route choices: those who used the building would have to enter it in a certain way and leave it in the same way. The route would be determined at the point of entrance into the building; whereas the presence of interconnected spaces would have allowed the same configuration to be modulated into a different spatial experience for residents and visitors. Moreover, route choice would have enabled those who used the building to transfer from one section to another without leaving the building. As the configuration stands, the choice as to which part of the building one wanted to reach had to be made already outside the building.[40] This is quite significant, since through this mechanism the outside space became one of the Caupona's main interaction areas. In fact, the building attributes high levels of interaction and control potential to the outside carrier, the public street space. In contrast, the most segregated areas of the building are rooms 9 and 18. It is quite revealing that room 9 was a later addition to the building; it was attached to room 8 to add a further degree of privacy. The room is rather unique through its high quality of wall paintings. Room 18 instead suggests a more mundane function as it served as the back-room of *taberna* 17 and was only accessible through 17. The Caupona's overtly outward focus has already been highlighted in section 5.2.6 above; the syntactical analysis confirms the observations made, and above all adds new insights about the building's conspicuous 'terminal structure' which seems primarily concerned with drawing people into the building. The exterior interaction space and the building's corridor-based structure seem to have co-operated congenially in supporting the building's function as a *caupona*.

Caupona del Pavone, IV ii 6	No.	Depth	RRA (MRRA 1.110)	Global interaction potential	Local interaction potential	Control Values	Potential Presence availability
Corridor	1	1.0	0.479	High	High	2.833	High
Corridor	13	2.0	0.959	Moderate	High	3.333	Mod/high
Storage room	3	2.0	0.959	Moderate	Low	0.167	Mod/low
Passage to latrine	4	2.0	0.887	Moderate	Low	0.167	Mod/low
Small room	9	4.0	1.558	Low	Low	0.500	Low
Back-room	18	4.0	1.534	Low	Low	0.500	Low
Outside space	21	0.0	0.672	High	High	2.000	High

Table 6.7 - Spatial values: Caupona del Pavone, IV ii 6

40. The only connection between corridor 1 and the northern section is provided by a small door opening right next to the main entrance (see Fig. 5.61 above).

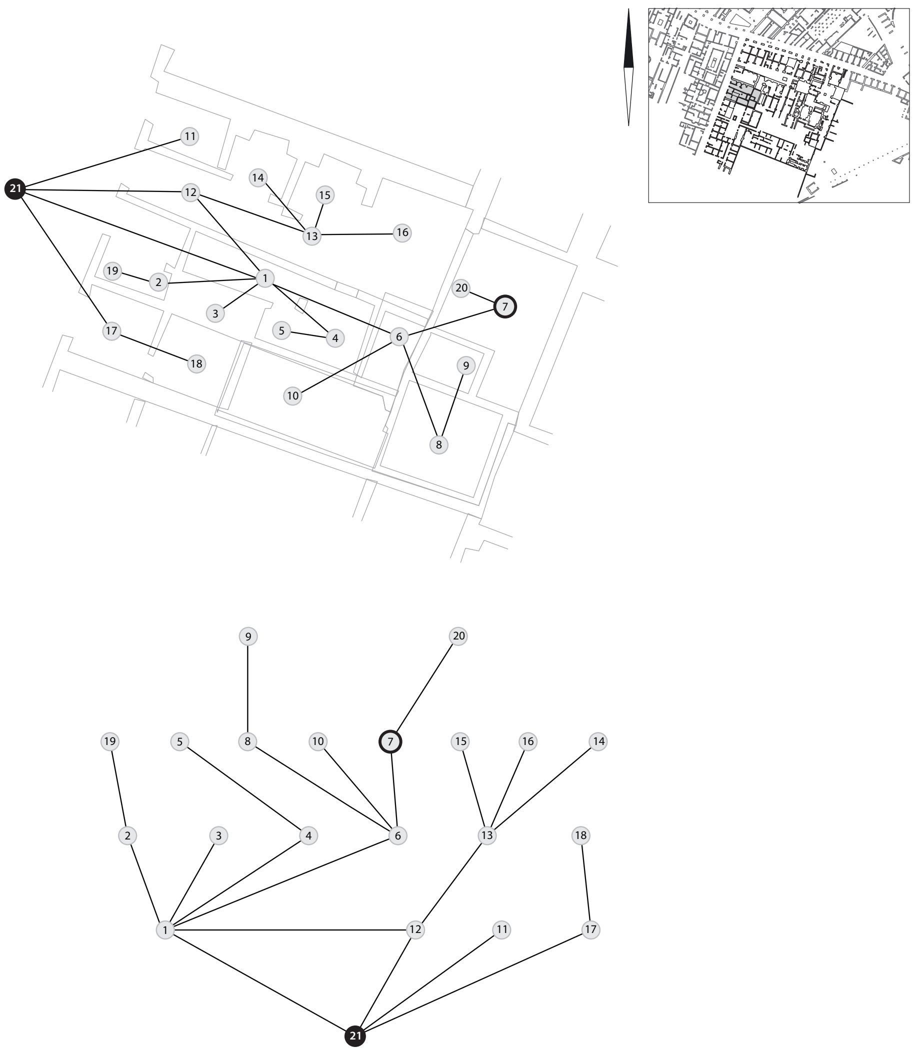


Fig. 6.9 – Caupona del Pavone, IV ii 6, topological graph (21 = outside carrier); J-graph Caupona del Pavone, IV ii 6 (21 = outside carrier)

Caseggiato IV ii 7	No.	Depth	RRA (M R R A 0.725)	Global interaction potential	Local interaction potential	Control Values	Potential Presence availability
Courtyard	1	2.0	0.272	High	High	9.667	High
Corridor	5	3.0	0.646	Moderate	Moderate	1.567	Moderate
Stairs	14	1.0	0.970	Moderate	Low	0.125	Mod/low
Taberna comm.	9	1.0	0.969	Moderate	Low	0.125	Mod/low
Neighbour IVii8	25	4.0	1.055	Moderate	Low	0.333	Mod/low
Neighbour IVii9	26	4.0	1.038	Moderate	Low	0.333	Mod/low
Outside space	24	0.0	0.561	High	High	5.833	High

Table 6.8 – Spatial values: Caseggiato IV ii 7

Caseggiato IV ii 7

Buildings 7 and 8 form an architectural unit; however, the spatial connection between the buildings appears contradictory. To keep the error margins as low as possible, Buildings 7 and 8 have been examined as separate syntactical units, however including one neighbouring space within each configuration (i.e. room 23 of building 7 is space 13 of building 8). Building 7 has a rather shallow, well integrated spatial structure (Fig. 6.10). The configuration centres on its internal courtyard 1; the latter is the building's most integrated space, and has the highest levels of control potential. Along the Via della Caupona all rooms open directly onto the street, hence the building attributes high levels of integration potential to the public carrier 24 (Table 6.8). Since the configuration is fairly well integrated, there are no spaces which stand out as being either distinctly segregated or more integrated than all other spaces.

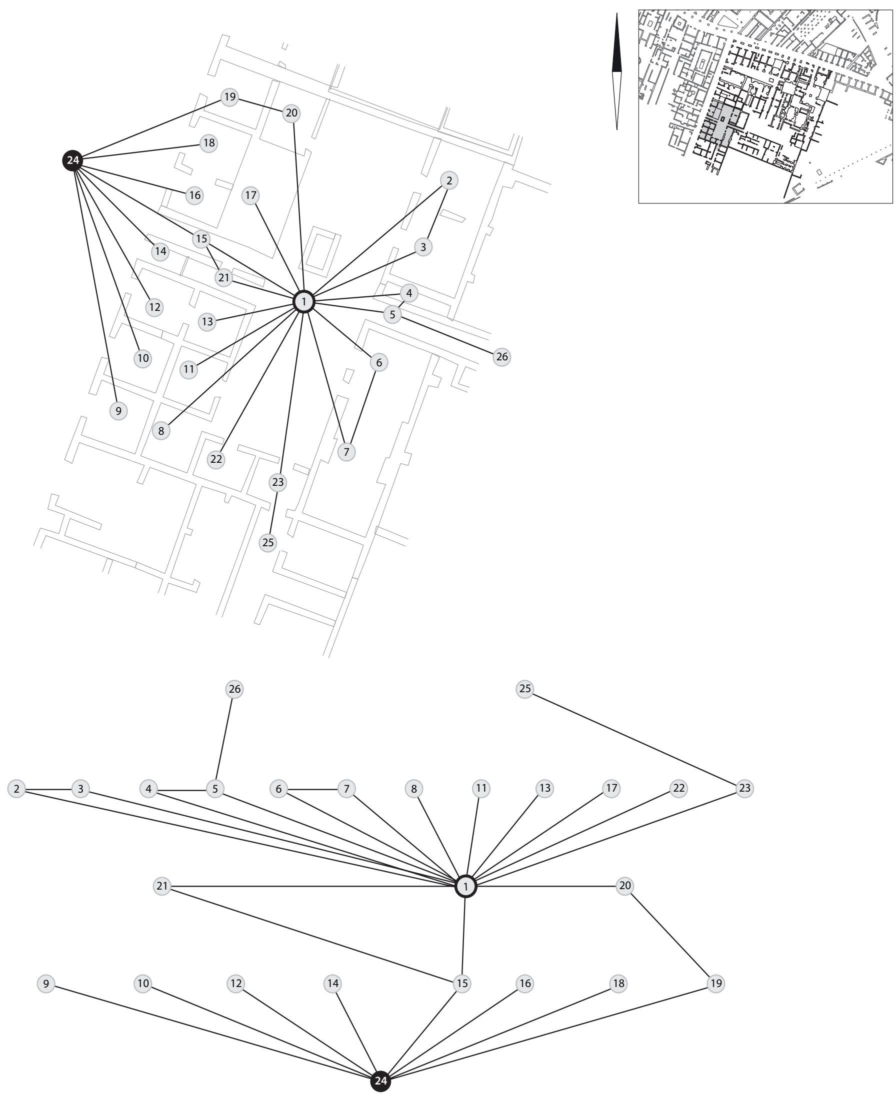


Fig. 6.10 – Caseggiato IV ii 7, topological graph (24 = outside carrier); J-graph (root 24 = outside carrier)

Tabernae 9, 10, 16 and 18 are only open to the street space; predictably, their integration values are relatively low (RRA 0.951 – 0.969), since they are not connected with any other spaces within the structure. Their outward focus makes them most accessible to customers from the street space. Rooms 2 and 3 on the other hand open to the inner courtyard. They are interconnected and hence enable movement to pass between the rooms, and through the courtyard; this allows for a slight differentiation in their use, since the rooms could be closed off from the courtyard and still be interconnected internally. Room 23 plays a specific role within the overall configuration since it connects buildings 7 and 8. Being linked to both buildings, room 23 assumes the role of a controlling space (Control Value 1.067). However, the relationship between Buildings 7 and 8 is not very clear. While a structural connection exists through shared walls, the spatial association between the buildings does not really convince. The buildings are internally connected through a passage which allows informal access between the buildings without passing through exterior space. Interestingly, Building 7 does not seem to promote its link to Building 8, but rather plays it down by hiding the connection behind room 23; from the courtyard side room 23 appears just like any other room lined up along the inner courtyard. The situation is markedly different on the side of Building 8, where corridor 12 leads into room 23, whilst the original door aperture was constricted at a later point (see Fig. 5.76 above).

Building IV ii 8

Building 8 is difficult to assess since it is structurally connected to Building 7, and more importantly, it is not clear whether Building 8 has been completely excavated. It is therefore impossible to determine whether spaces 5, 6, 12 and 11 opened to the street space, or whether they were connected to a courtyard. The spatial values presented here can only be tentative since they are based on the current state of the excavations (Table 6.9). As far as the building can be assessed, the configuration appears shallow and fairly well integrated (Fig. 6.11). Passage 12 and the outside carrier 14 emerge as the most integrated spaces. Rooms 8, 9 and 10 reveal only moderate integration and low levels of control; this could suggest that the rooms were more suitable for habitation than for commercial use. The range of rooms is topologically and metrically as close to Building 7 as it is to the commercial premises of Building 8. The rooms could be reached from Building 7 without passing through outside space, which makes them a suitable apartment for someone who had business premises in Building 7; while they could be also fit the needs of a tenant from Building 8.

Building IV ii 8	No.	Depth	RRA (MRRA 0.837)	Global interaction potential	Local interaction potential	Control Values	Potential Presence availability
Passage	12	1.0	0.384	High	High	4.643	High
Room	8	2.0	0.961	Moderate	Low	0.167	Mod/low
Room	9	2.0	0.961	Moderate	Low	0.167	Mod/low
Room	10	2.0	0.961	Moderate	Low	0.167	Mod/low
Back-room	3	2.0	1.345	Low	Low	0.500	Low
Outside space	14	0.0	0.288	High	High	5.167	High

Table 6.9 – Spatial values: Building IV ii 8

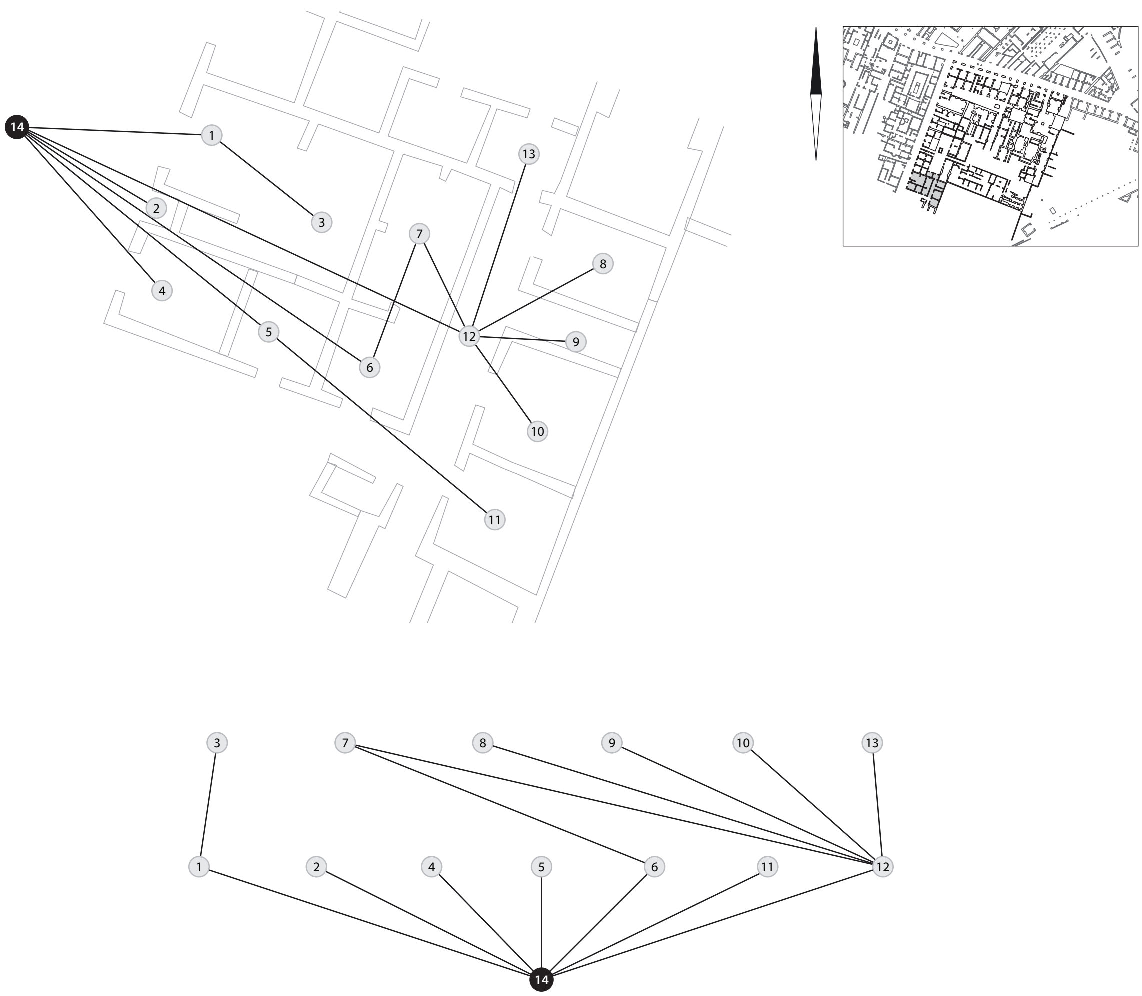


Fig. 6.11 – Building IV ii 8 (sub-section of Caseggiato IV ii 7) topological graph (14 = outside carrier); J-graph (14 = root, outside carrier)

Buildings IV ii 9 and 13

Building 13 and the western part of Building 9 form an architectural unit, whereas the eastern part of Building 9 belongs to an earlier building phase. Despite being composed of three distinct parts, the sections form a unity through their common spatial structure.[41]

Nonetheless, the three distinct parts are individually connected to the Insula's southern courtyard 17. Passage 2 holds a key position. Placed in-between Buildings 13, 9 and 7, the passage has low integration values since it was not embedded within the structure, but reveals high control values since it controls access to all other spaces (see Table 6.10). The access graph for Buildings 9 and 13 shows a deep spatial structure composed of two separate paths leading into the buildings (Fig. 6.12); the paths converge only in the deeper part of the building, where corridor 7 provides the connection between the eastern and western sections of Building 9. Room 4, located in the western portion of the building,

41. The buildings are also architecturally linked through a common wall shared between the eastern and western portions of Building 9.

emerges as the most integrated room of the entire configuration, while Room 14 ranks also high in terms of potential integration and control. Room 14 seems to function as the central space of a range of rooms, possibly forming a *medianum* apartment, a type of dwelling typically found in Ostia.[42]

Buildings IV ii 9 and IV ii 13	No.	Depth	RRA (M R R A 1.333)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
Room IVii9	4	5.0	0.792	High	High	2.333	High
Room IVii9	14	2.0	0.962	High	High	1.833	High
Room IVii9	10	6.0	1.811	Low	Low	0.333	Low
Room IVii9	15	3.0	1.443	Moderate	Low	0.333	Mod/low
Room IVii9	16	7.0	1.358	Moderate	Low	0.333	Mod/low
Neighbour IVii7	18	2.0	2.292	Low	Low	0.500	Low
Room IVii9	10	6.0	1.811	Low	Low	0.583	Low
Passage 2	2	1.0	1.811	Low	High	1.917	Low/high
Southern courtyard Insula	17	0.0	1.415	Moderate	Moderate	1.583	Moderate

Table 6.10 – Spatial values: Building IV ii 9 and IV ii 13

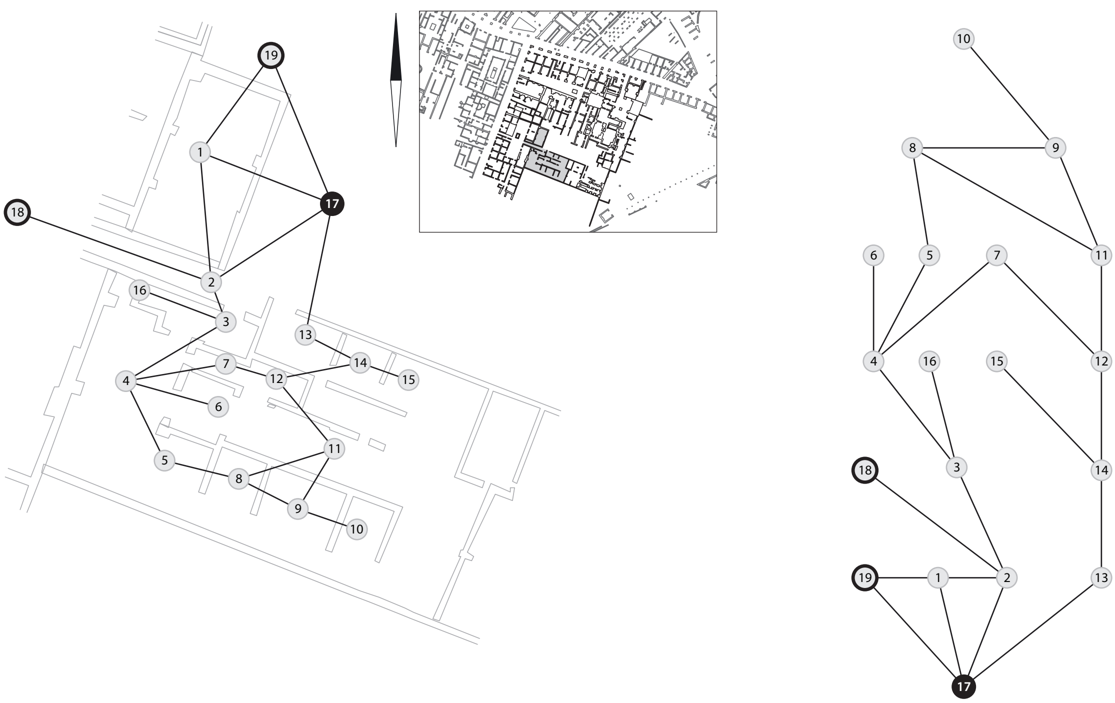


Fig. 6.12 – Buildings IV ii 9/13, J-graph and topological graph (root 17 = southern courtyard)

42. Apart from Building IV ii 9 where we find a northern and a southern range of rooms which presumably formed medianum apartments, an additional one can be found in Building IV ii 5.

Building IV ii 10

The Space Syntax data obtained for Building 10 can only be regarded as preliminary since the archaeological investigation could not produce a reliable ground plan. Nevertheless, a tentative spatial assessment has been made for completeness sake, accepting the limitations of the ground plan. The access graph displays a simple graph structure, with three spaces directly linked to the outside courtyard 1. Room 3 emerges as the most integrated space with the highest levels of control (Table 6.11 and Fig. 6.13).

Fig. 6.13 – Buildings IV ii 10, topological graph and J-graph (root 7 = southern courtyard)

Building, IV ii 10	No.	Depth	RRA (MRRA 1.523)	Global int. Potential	Local int. Potential	Control Values	Potential presence availability
Room	3	1.0	1.015	High	High	2.333	High
Room	5	2.0	1.885	Low	Low	0.333	Low
Room	6	2.0	1.885	Low	Low	0.333	Low
Stairs	8	1.0	1.595	Moderate	Low	0.333	Mod/low
Room	1	3.0	2.465	Low	Low	0.500	Low
Southern courtyard (common)	7	0.0	0.725	High	High	1.833	High

Table 6.11 – Spatial values: Building IV ii 10

Mitreo degli Animali, IV ii 11

The *mithraeum* is characterised by a sequenced single-entry plan, where one room leads into the next without providing alternative route options. The unilinear graph is an unswerving representation of the *mithraeum*'s spatial structure (Fig. 6.14); hence the spatial values are not at all surprising (Table 6.12). Corridor 2 emerges as the most integrated room, with high interaction potential and moderate control function, while cult room 4, located at the end of the sequence of spaces, reveals typically low integration and control values, making the space very suitable for activities which require more privacy than other rooms.

When we consider the *mithraeum*'s cultic function it is interesting to observe how cult practice seems to have been translated into spatial structure. We would not really expect centralising rooms within any *mithraeum,* but still it is striking to see how radically the cults' emphasis on consecutive processes is reflected in this unilinear sequence of rooms. One can think of the cult's religious initiation steps, as well as social promotion along a linear path following the hierarchic order of the cult society. On the same note, it does not surprise us to see that the building marginalised the role of its outside space: it creates low integration and control values in the southern courtyard 5 from where it can be reached. The spatial values strongly suggest that the *mithraeum* did not at all promote interaction with casual, uninvited visitors.

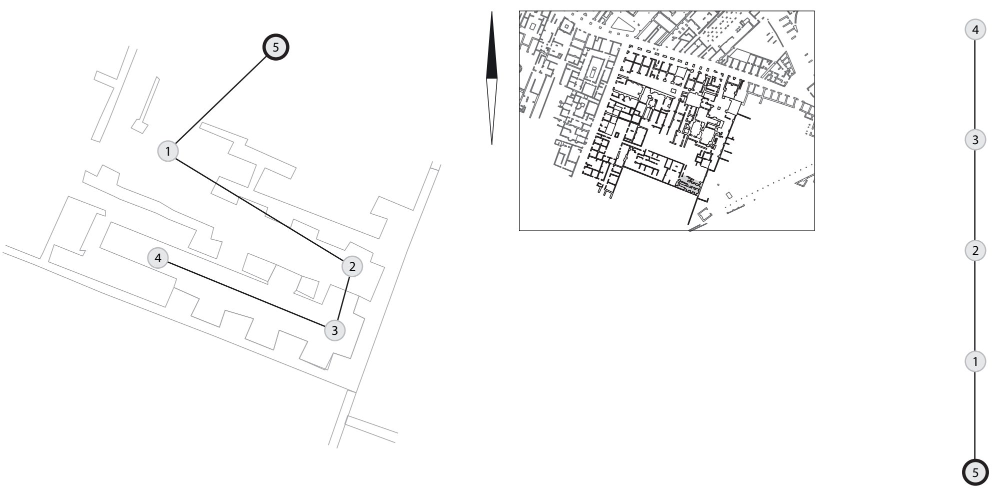


Fig. 6.14 – Mitreo degli Animali, IV ii 11, J-graph and topological graph (root 5 = courtyard)

Mitreo degli Animali, IV ii 11	No.	Depth	RRA (MRRA 1.893)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
Corridor	2	2.0	0.947	High	Moderate	1.000	High/Mod
Entrance	1	1.0	1.420	Moderate	High	1.500	High/Mod
Approach	3	3.0	1.420	Moderate	High	1.500	High/Mod
Cult room	4	4.0	2.841	Low	Low	0.500	Low
Southern courtyard common	5	0.0	2.841	Low	Low	0.500	Low

Table 6.12 – Spatial values: Mitreo degli Animali, IV ii 11

Building IV ii 12

Building 12 is characterised by a multiple-entry graph: rooms 1 and 2, as well as the stairs 4 are directly accessible from the Insula's southern courtyard 7 (Fig. 6.15). However, the building not only communicates with the courtyard to the south of it, but also with passage 8 on the western side, as well as the eastern courtyard 5 which is associated with the Terme del Faro, IV ii 1. Strictly speaking Space Syntax only accepts one single exterior space; however, in this specific case passage 8 and the eastern courtyard 5 have been included as distinctively defined exterior spaces, which link the building to different spatial 'territories' (thus the eastern courtyard 5 was associated with the Terme del Faro, while passage 9 formed part of the spatial area of Buildings 14 and 5). In addition, space 8 has been included, marking the building's connection to its northern neighbour Caseggiato IV ii 5.[43] The access data reveal that room 2 has the highest integration and control potential, closely followed by the external space, the Insula's southern courtyard (Table 6.13). The multiple-entry structure makes the building very accessible to the exterior, which seems to suggest that the rooms were well suited for commercial use.

Fig. 6.15 – Building IV ii 12, J-graph and topological graph (root 7 = southern courtyard)

Building, IV ii 12	No.	Depth	RRA (MRRA 1.015)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
Room	2	1.0	0.435	High	High	2.033	High
Stairs	4	2.0	1.595	Low	Low	0.600	Low
Neighbour	6	2.0	1.305	Low	Low	0.250	Low
Southern courtyard common	7	0.0	0.725	High	High	2.583	High

Table 6.13 – Spatial values: Building IV ii 12

43. Based on the structural assessment of Building IV ii 5 (see section 5.2.5 above) there is good reason to suggest that Buildings IV ii 5 and 12 were interconnected.

Building IV ii 14

The spatial structure of Building 14 shows similarities to Building 12, and can also be characterised as a multiple-entry building (Fig. 6.16). *Tabernae* 1, 2 and 3 are individually connected to the exterior, while *taberna* 3 is also linked to passage 6, as well as to the enclosed space 4 located in front of *taberna* 3. Unsurprisingly, the courtyard to which all spaces are connected emerges as the most integrated space with the highest integration and control levels (Table 6.14). The building's strong outward focus suggests commercial use.

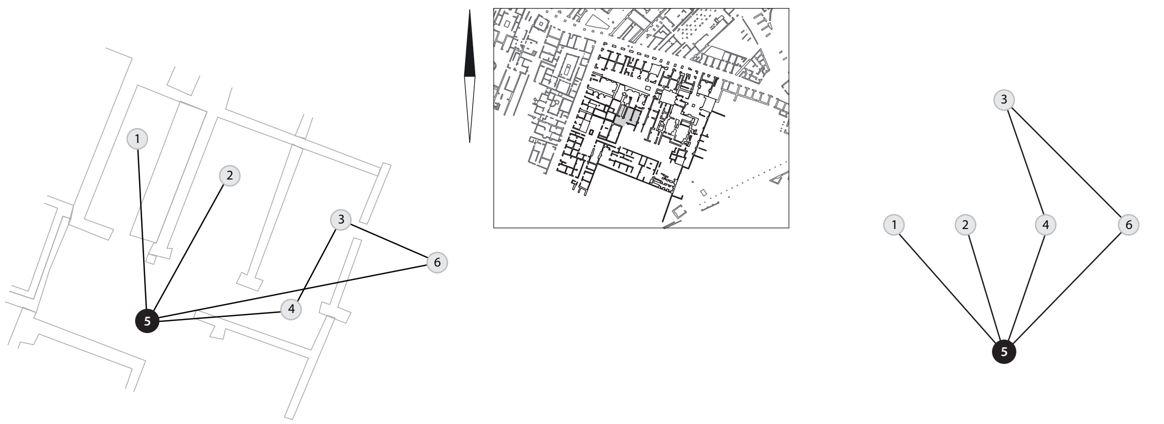


Fig. 6.16 – Building IV ii 14 (*tabernae*), topological graph (root 5 + courtyard)

Building, IV ii 14	No.	Depth	RRA (MRRA 0.907)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
Taberna	3	2.0	0.573	High	High	1.000	High
Southern courtyard (common)	5	0.0	0.287	High	High	3.333	High

Table 6.14 – Spatial Values: Building IV ii 14

The syntactical assessment of the individual buildings using Access Analysis provided a number of important indications about the buildings' potential for interaction between residents and visitors, and in terms of the functional use of the buildings and their rooms. Ideally this type of spatial assessment should be expanded by a more detailed analysis focused on specific spaces to which a functional label can be attached. These function-specific rooms could then be compared across all buildings to establish whether these rooms were differently embedded within the configuration of the individual buildings. However, the diversity of buildings within the Insula renders such an analysis difficult since hardly any two buildings conform to the same type, not to mention the occurrence of distinct function-specific rooms in all buildings. Nevertheless, one of the few functional spaces which were indeed present in most buildings is staircases. They seem an area worth exploring since they allow insights into the accessibility of the upstairs areas in relation to the ground floor spaces. Staircases have been included in the Access Analysis of the individual buildings and the total Insula, and will be briefly discussed in the following sections (see Table 5.17 below).[44]

44. A more detailed analysis of the staircases would require adapting the graph structure by placing the root of the access graphs on the staircase. For the analysis presented so far, the graphs have been justified to the outside space.

6.4.2 The 'collective' Insula

The Insula's configuration has been examined as a single spatial unit to establish to what extent the individual buildings were affected by the larger spatial entity, and to better understand the functioning of the Insula's collective spatial structure. The total configuration comprises 183 individual spaces, including the outside carrier space of Ostia's street network, which counts as one space. Of particular interest are the 'commons', the internal courtyards and passages, which were held in shared use by all buildings within the Insula. These spaces performed as major integrators and distributors stirring movement into and within the Insula, and were essential for providing access to those buildings which were not connected to the exterior public carrier space.

Access Analysis applied to the Insula's total ground plan has produced a graph structure, calculated from the perspective of the outside space (Fig. 6.17), as well as spatial values for a comparative quantitative assessment.[45] The graph structure can be described as a broad multiple-entry graph with 28 spaces connected to the public carrier space; the mean integration value (MRRA) for the total unit is 0.937, pointing to a moderately-well integrated spatial structure.[46] Following the same approach as used for the individual buildings, the Insula's spatial 'hotspots' were identified on the basis of their spatial values (RRA and Control Values). These have been ranked and compared to each other to develop an understanding of the configuration's spatial logic. The graph structure alone already discloses some insights: the Insula reveals a structure of 10 depth-steps, measured from the outside carrier to the topologically most remote spaces. A comparison

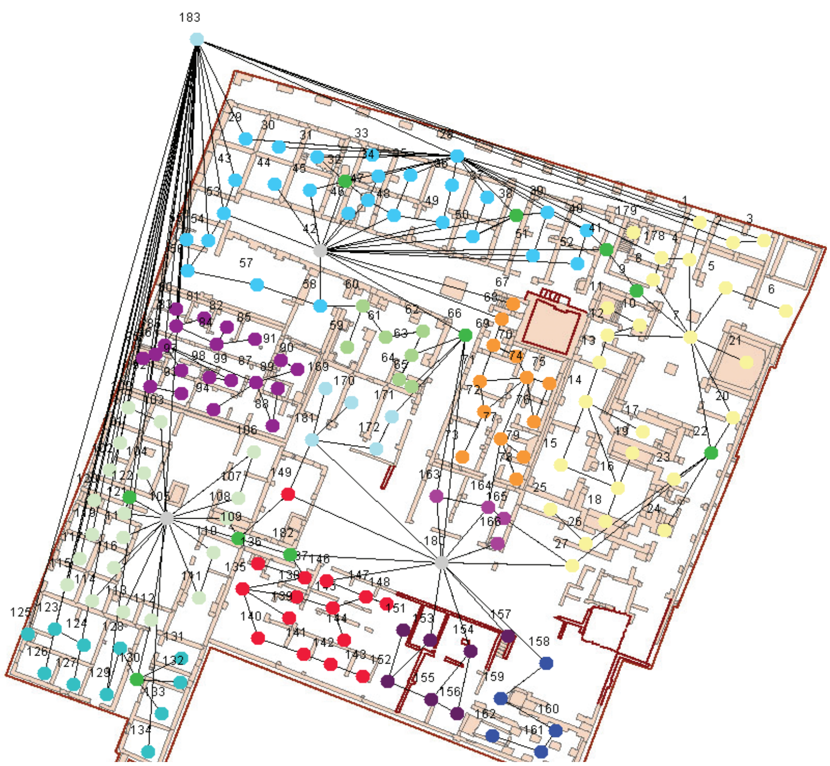


Fig. 6.17 – Insula IV ii, topological graph of the total configuration (183 = outside carrier; 42, 105 and 180 = courtyards, 28 = portico)

45. See Appendix 2 for a complete list of the Insula's spatial values.

46. A comparison with the mean integration values for the Insula's most integrated building, the Caseggiato dell'Ercole (MRRA 0.562) and the least integrated building, the Mitreo degli animali (MRRA 1.893) might help to put the Insula's total structure into perspective.

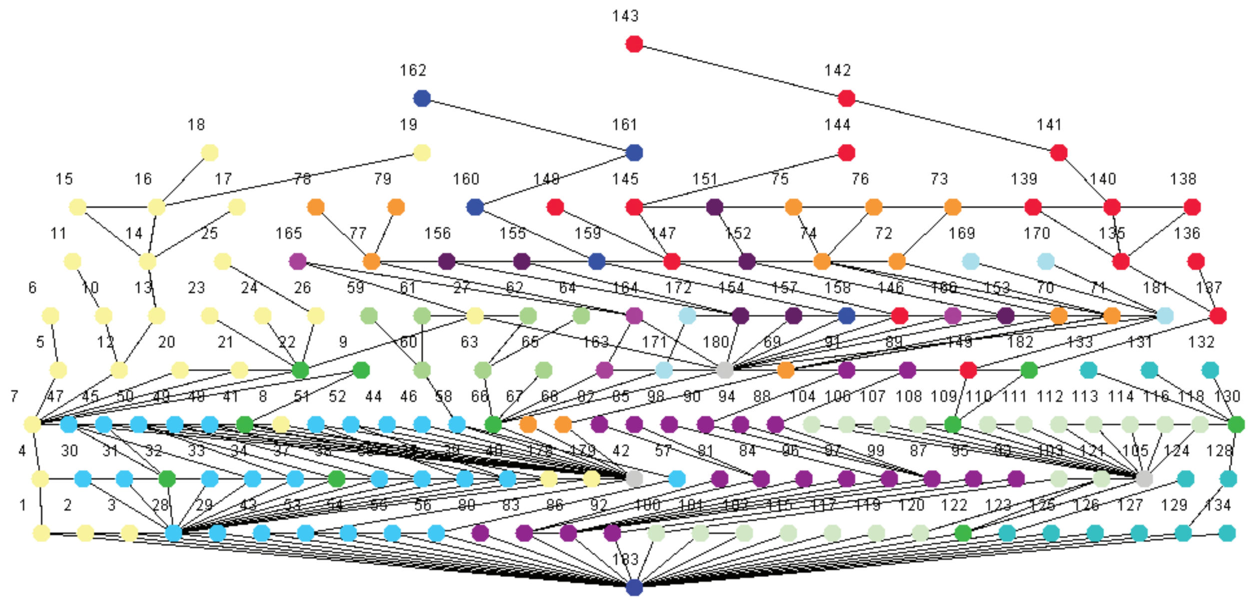


Fig. 6.18 – J-graph Insula IV ii (root 183 = outside carrier)

between the graph structure of the individual buildings and the Insula's structure is informative: while most individual buildings have an internal depth of 4 to 6 depth-steps, the Terme del Faro is the deepest building, boasting 8 depths-steps, nearly reaching the Insula's full extent of 10 depth-steps which is reached by the Mitreo degli animali, the most remote location within the Insula.

From the total configuration (Fig. 6.22) a number of spaces emerge as the areas with the highest levels of integration and control, and with highest consistency between local and global integration values (Table 6.16). Comprising the portico 28 and the courtyard 42 of the Caseggiato dell'Ercole, as well as the outside carrier space 183, these spaces are dedicated to movement and interaction and form the Insula's interface with visitors. Together with the inner courtyards, 105 and 180, they provide the principal circulation system. It is worth noting that all spaces which serve a common use are located in the shallower, well integrated parts of the Insula, relatively close to the outside space, mostly 1 to 2 step-depths, but not more than 4 step-depths away from the outside carrier space. In contrast, all spaces which are residential or more private in nature are located in the deeper, less integrated portion of the Insula, at 5 to 10 depth-steps away from the public outside space. This suggests that through its collective structure the Insula was able to generate one feature common to most types of domestic architecture: it incorporates the elementary relation between the inhabitant/resident and the visitor, in the sense that the inhabitant is in the deeper, often less integrated parts of the Insula, and interfaces with the visitor through the shallower, often well-integrated parts of the Insula.[47] If we take this observation a step further we might be able to say that at a collective level the Insula still upheld an inherently domestic structure, while at an individual level some of the buildings had lost their elementary inhabitant/visitor dynamic. This observation seems to receive even more significance when considered within the wider context of the Insula's evolving configuration, which at an earlier point in time experienced the loss of the *domus,* which had served as the urban 'base-unit' until the earlier Trajanic period.

Next to the Insula's most integrated spaces (Table 6.15), the most segregated spaces are equally instructive about the functioning of the configuration (Table 6.16). Those rooms which have been identified as the most isolated spaces within the collective

47. See Hillier and Hanson (1984: 183).

configuration confirm largely the spaces which have previously been earmarked with the same property for some individual buildings. As already mentioned in the discussion of the baths' spatial structure, the areas of the heated plunge pools, 18 and 19, emerge as the most segregated rooms of the baths. This is unquestionably related to the function of these pools as discussed in sections 5.2.1 and 6.4.1 above. The two other rooms, 143 and 162, which come into view from the assessment of the collective structure, have also been identified at the level of the individual buildings: unsurprisingly, the *mithraeum*'s cult room 162 emerges as one of the most segregated rooms within the entire Insula, superseded only by room 143, which ranks as the most segregated space of the total configuration. The range of rooms including 141, 142 and 143 is noteworthy; the rooms seem to form a *medianum* apartment located at the Insula's southernmost edge. Facing south, unobstructed by direct neighbours, these rooms might have provided an excellent apartment appealing to the upper end of the rental market. Its segregated location might have even enhanced the value of the apartment; due to its 'remoteness' it provided higher levels of privacy than any other ground floor dwelling available within the Insula.

Building	Room/ function	No.	Depth	RRA (MRRA 0.937)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
IV ii 2	Portico	28	1.0	0.622	High	High	7.652	High
IV ii 3	Courtyard	42	2.0	0.558	High	High	7.699	High
IV ii 6	Corridor	86	1.0	0.733	Moderate	Moderate	4.035	Moderate
IV ii 7	Courtyard	105	2.0	0.703	Moderate	High	9.416	Mod/High
common	Southern courtyard	180	4.0	0.617	High	High	5.783	High
common	Outside carrier	183	0.0	0.562	High	High	165.386	High

Table 6.15 - The Insula's 'hotspots', the circulation spaces with highest levels of local and global integration potential (RRA 500-650 = high, 650-950 = moderate, 950 += low)

Building	Room/ function	No.	Depth	RRA (MRRA 0.937)	Global interaction potential	Local interaction potential	Control Values	Potential Presence availability
IV ii 1	Heated pool	18	8.0	1.693	Low	Low	0.250	Low
IV ii 1	Heated pool	19	8.0	1.693	Low	Low	0.250	Low
IV ii 9	Room	143	10.0	1.851	Low	Low	0.500	Low
IV ii 11	Cult room	162	9.0	1.605	Low	Low	0.500	Low

Table 6.16 – The Insula's most segregated spaces with lowest global and local integration potential

A number of interesting observations can be added from an examination of those spaces which have contradictory values, in the sense that they have high integration values and low control values or the other way round. A good example comes from room 139 located in Buildings 9/13. It has moderate integration values (RRA 1.259) but low control values (CV 0.250); hence moderate to low levels of presence availability. This allows for the possibility of segregation, which predestines this room for specific use, possibly reserving access to specific people. This notion seems to be strengthened by the archaeological assessment which found room 129 to be distinct from the surrounding rooms by its floor mosaics.[48]

Staircases have been mentioned previously as one of the few function-specific categories of space which can be examined across the entire Insula (Table 6.17). Within the Insula's collective configuration the staircases are moderately integrated since most of them are reachable from the outside space or the interior courtyards or passages; in most cases they are accessible independent of the ground floor space of the buildings they form a part of. An exception to the rule is staircase 136 within Building 9/13, which is indeed only reachable from inside Building 9, and hence a closer connection between activities on the ground floor and those on the upper floors can be assumed.[49]

Building	Room/ function	No.	Depth	RRA (MRRA 0.937)	Global interaction potential	Local interaction potential	Control Values	Potential Presence availability
IV ii 1	Stairs	24	5.0	0.987	Moderate	Low	0.167	Mod/low
IV ii 1	Stairs	179	2.0	0.824	Moderate	Low	0.063	Mod/low
IV ii 3	Stairs	33	2.0	0.824	Moderate	Low	0.063	Mod/low
IV ii 3	Stairs	46	3.0	0.759	Moderate	Low	0.059	Mod/low
IV ii 4	Stairs	65	4.0	0.819	Moderate	Low	0.167	Mod/low
IV ii 5	Stairs	67	3.0	0.759	Moderate	Low	0.059	Mod/low
IV ii 6	Stairs to well	91	4.0	1.326	Low	Moderate	0.500	Mod/low
IV ii 6	Stairs	95	2.0	0.935	Moderate	Low	0.143	Mod/low
IV ii 9	Stairs	136	6.0	1.080	Low	Low	0.333	Low
IV ii 10	Stairs	157	5.0	0.819	Moderate	Low	0.077	Mod/low
IV ii 12	Stairs	166	5.0	0.819	Moderate	Low	0.077	Mod/low

Table 6.17 – Staircases accessible from within the Insula

48. Scatters of *tesserae* of floor mosaics are still present in room 130; See section 5.2.9 above with a description of Building IV ii 9 and its spaces.

49. As far as the technical side of the analysis is concerned, the Access Analysis presented here does not include upper floors as spatial units. This seems to have a somewhat negative impact on the control values presented in Table 6.17; their low control values seem to be partially the result of the exclusion of upper floors. DeLaine's analysis included upper floors as a single spatial unit. She argues that this would at least allow the general impact of upper floors to be assessed (see DeLaine 2004: 160, note 39). Upper floors are a difficult issue, however to deal with them as a single spatial unit seems a sensible way, and will be considered for further Space Syntax endeavours into Ostia's past built environment.

The Insula's circulation spaces including portico, entrance corridors, internal passages and internal courtyards (see Table 6.18) compose another group of spaces to which a function label can be attributed. The group includes the Insula's 'hotspots', identified as the most integrated spaces. The courtyard system, consisting of courtyards 42, 180 and 105, plays a significant role since all movement inside the Insula is channelled through them. The southern courtyard 180 is the only one directly connected to all other courts by means of passage corridors. The presence of three courtyards could potentially engender a sense of fragmentation within the Insula, yet this seems balanced by the fact that the southern courtyard acted as a centre for the entire layout. On the other hand, the different route options offered by the various passages and courtyards might have helped in counteracting a sense of disintegration since they unite the Insula through movement. The wide range of movement choices enabled those who used the Insula, both residents and visitors, to explore the spaces in different ways, generating routes according to specific functional requirements, or to simply stroll through the Insula wherever their fancy took them.

Building	Room/ function	No.	Depth	RRA (MRRA 0.937)	Global interaction potential	Local interaction potential	Control Values	Potential presence availability
IV ii 1	Entrance	1	1.0	0.682	Moderate	Low	0.432	Mod/low
IV ii 1	Corridor	4	2.0	0.745	Moderate	Low	0.793	Mod/low
IV ii 1	Frigidarium	7	3.0	0.735	Moderate	Low	0.500	Mod/low
IV ii 1	Passage	9	4.0	0.838	Moderate	Low	0.458	Mod/low
IV ii 1	Passage	22	4.0	0.784	Moderate	High	3.458	High/mod
Common	Courtyard	27	5.0	0.757	Moderate	Low	0.759	Mod/low
IV ii 2	Portico	28	1.0	0.622	High	High	7.652	High
IV ii 3	Corridor	32	2.0	0.658	Moderate	Moderate	1.371	Moderate
IV ii 3	Passage	38	2.0	0.659	Moderate	Low	0.705	Mod/low
IV ii 3	Passage	41	3.0	0.694	Moderate	Low	0.809	Mod/low
IV ii 3	Courtyard	42	2.0	0.558	High	High	7.699	High
IV ii 3	Passage	47	3.0	0.742	Moderate	Moderate	1.009	Moderate
IV ii 3	Entrance	53	1.0	0.602	High	Low	0.928	High/low
Common	Passage	66	3.0	0.617	High	Moderate	2.302	High/mod
IV ii 6	Corridor	86	1.0	0.733	Moderate	High	4.035	High/mod
IV ii 7	Courtyard	105	2.0	0.703	Moderate	High	9.416	High/mod
IV ii 7	Passage	109	3.0	0.724	Moderate	Moderate	1.233	Moderate
IV ii 7	Passage	122	1.0	0.663	Moderate	Low	0.602	Mod/low
IV ii 8	Passage	130	3.0	0.973	Moderate	High	4.000	High/mod
Common	South. courty.	180	4.0	0.617	High	High	5.783	High
Common	Fronting 14	181	5.0	0.783	Moderate	High	2.910	High/mod
IV ii 13	Passage	182	4.0	0.699	Moderate	Low	0.660	Mod/low
Common	Outs. carrier	183	0.0	0.562	High	High	165.386	High

Table 6.18 – The Insula's movement spaces: spaces directly connected to the outside space are marked in light grey (1, 28, 53, 86, 122, and 130), while all internal courtyards (42, 105, and 180) and the outside carrier (183) are marked in darker grey (RRA 500-650 = high, 650-950 = moderate, 950 + = low)

6.5 THE INSULA'S LINE STRUCTURE (AXIAL ANALYSIS)

To explore the *dynamics* of the Insula's internal space structure we need to move away from Access Analysis and select Space Syntax techniques specifically suited to capture movement. This requires also a methodological shift from built spaces to open spaces, thus moving away from the Insula's buildings to its open courtyards and passages. Hanson's three-way-method, as discussed above, advocates that space should be studied through all its aspects. Conforming to Hanson's approach the Insula's axial structure and its visual fields have been examined using Space Syntax's axial analysis and visibility graph analysis (VGA).[50] Both are analysis tools specifically geared to capture movement by linking spatial and visual properties.[51] A good look at the Insula's internal space structure already shows that it is distinctly broken up into convex spaces (the courtyards), and into lines (entrance corridors and passages) which interlink the convex spaces (Fig. 6.23). The spatial dynamics which might have been active are best captured by axial graphs and visibility graphs (see Figs. 6.20 and 6.23). The graphs are based on the longest visual lines and their integration, identifying those spaces which are visually most integrated or segregated within the Insula's entire movement spaces. The fewest and longest lines that cover the open spaces form the Insula's potential route matrix. The lines are hierarchically ranked following a colour-coded scale from red for the most integrated lines to blue for the least integrated lines.

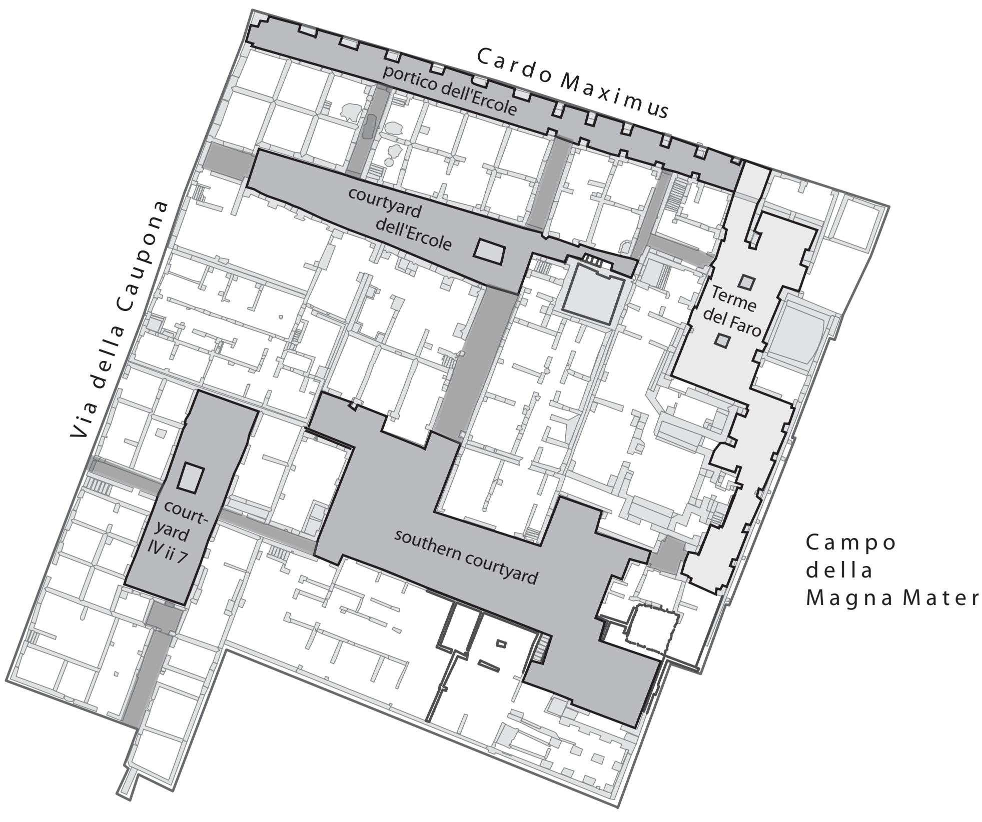


Fig. 6.19 – The Insula's internal space structure: all movement-oriented,interconnected spaces including the Terme del Faro, IV ii 1.

50. The graphs and analyses have been produced with Depthmap 7.12.00d; developed at the VR centre for Built Environment, Bartlett, UCL.

51. See chapter four of this volume on Space Syntax theories and methods; see Hillier and Vaughan (2007) on the positive correlation between movement and visibility.

Before homing in on the Insula's space structure, a look at Hillier's findings about the City of London's space structure may be helpful for developing a deeper understanding of the Insula spatial organisation.[52] Hillier identified two constant spatial properties within the small-scale complexes of the City of London which seem to explain how the supposedly labyrinthine back areas of the City prove to be highly intelligible for those who navigated its spaces. The first property relates to the prevailing movement patterns in which he identified a persistent 'two-line-logic.'[53] In a similar but less intricate way, there is also a 'two-line logic' to movement within the Insula: if one enters the Insula through one of the passage corridors which can be seen from the *cardo maximus*, the next line will take a visitor either out of the back area by leaving the courtyard through the exit on the Via della Caupona, or further into the Insula to some significant spatial event like the next large courtyard, i.e. the southern courtyard. From there, another line would take visitors again out of the Insula by passing through building IV ii 7, reaching the Via della Caupona. This means that wherever one goes within the Insula, there is usually a point from which one can see the point of departure, i.e. the entry into the Insula, and where the next point of aim might be. Hillier contends that this spatial technique has the effect that the back areas become normally and naturally used for movement as part of the urban space pattern, and there is no inhibition or sense of territorial intrusion in these areas.[54] Whether this holds true for the Insula is difficult to prove, but the ideas are compelling and should be examined in the light of the archaeological evidence, and above all they should be put to the test by correlating the Insula's axial line structure and the spatial integration values (RRA) for the courtyards under discussion.

The second spatial property identified by Hillier's 'City of London' study concerns how the buildings relate to the open spaces. Hillier observed for London that almost all buildings open directly onto convex spaces (courtyards and squares), and through this practice a close relationship between the residents within the buildings and those outside is created. According to Hillier this kind of direct interfacing engenders a sense of unforced co-presence between people carrying out different activities.[55] Hillier's observation locates the spatial properties which are instrumental in generating the potential for social interaction. Above all it becomes clear that interaction potential is dependent upon a two-way relationship between the linear space structure (movement spaces) and the buildings relating to it.

Regarding the Insula we can notice that only the southern courtyard was surrounded by individual buildings, while the other courtyards were integral parts of buildings (Caseggiato dell'Ercole and Caseggiato IV ii 7). The irregular shape of the southern courtyard suggests that it was rather a product of individual negotiations than planned design. In line with Hillier's observations it is worth noting that Buildings IV ii 12, 13 and 14 fully open onto the courtyard,[56] and hence provide for the interface described by Hillier as being necessary to engender interaction potential. These observations are confirmed by the high levels of local and global interaction potential which have been attributed to the southern courtyard (see Table 6.18 above), as well as by the high integration levels which the buildings themselves created for the courtyard.[57] The next step is to examine whether the courtyard's high integration values can be matched by the line structure which represents the Insula's movement potential.

52. See Hillier's article on 'cities as movement economies' for different ways of looking into urban space (2007:111-137).
53. On the 'two-line logic' see Hillier (2007: 116-119).
54. Hillier (2007: 116-118).

55. Hiller (2007: 118).
56. Building IV ii 10 presumably opened onto the courtyard, however, the archaeological assessment was not able to produce a reliable site plan, see section 5.2.10 above.
57. Buildings IV ii 12, 13 and 14 cause high integration values for the southern courtyard; see Fig. 6.1 above.

Fig. 6.20 – Insula IV ii: internal courtyards, including the movement spaces of the Terme del Faro; Axial Analysis (all lines) identifies the central passage leading from the portico to the southern courtyard as the visually most integrated space (graph produced with Depthmap UCL)

Fig. 6.21 – The Insula's potential route matrix based on the longest and fewest lines, including the movement spaces of the Terme del Faro

Movement including Terme del Faro	Integration HH	Ranking	Colour Coding	Line Selection	Integration HH
Average	2.06651	1	red	Southern courtyard to baths	3.52814
Minimum	1.23485	2	orange	Portico to southern courtyard	3.08713
Maximum	3.52814	69	blue	Passage Building 8	1.23485
Std Dev.	0.531128				
Line Count 69					

Table 6.19 – Integration values for the most integrated and least integrated visual lines; the area analysed includes the spaces of the Terme del Faro

6.6 THE INSULA'S AXIAL AND VISUAL STRUCTURE

Depthmap's axial analysis applied to the Insula's internal space structure identified the most integrated visual lines, calculated for axial integration on the basis of the longest visual lines. This is a two step process: first, all lines to all lines are calculated (Fig. 6.24); in a second round the fewest longest lines are extracted from the total set and reduced to a representative minimum of lines. The fewest lines embody the Insula's potential route matrix (Figs. 6.25 and Tables 6.19 and 6.20), colour-coded according to their level of integration. From the Insula's route matrix, the red line extending diagonally from the southern courtyard to the baths emerges as the most integrated line within the system. The second most integrated line connects the portico to the southern courtyard. Moderate integration levels are represented by the lines in yellows and greens. The blue lines signify the most segregated lines, of which the most isolated one is found in the passage corridor of Building IV ii 8. Clearly, the southern courtyard comes out as the converging zone for visual lines from all directions, making the courtyard the prime space for movement and social encounter. This however raises the question about the importance of the baths for the Insula's overall movement dynamics, or more precisely whether the baths were an important force in pulling movement into the southern part of the Insula, in particular the southern courtyard.[58]

Movement without Terme del Faro	Integration HH	Ranking	Colour Coding	Selection	Integration HH
Average	1.92754	1	red	Via della Caupona to border with Campo della Magna Mater	4.2116
Minimum	0.827921	2	yellow	Portico to southern courtyard	2.93536
Maximum	4.2116	36	blue	Corridor to baths from Caseggiato	0.827921
Std. Dev.	0.644301			dell'Ercole	
Line Count 36					

Table 6.20 – Integration values for the most integrated and least integrated visual lines; area analysed excludes the spaces of the Terme del Faro

58. Including the baths' movement spaces compromises to some extent the definition of the sample set – which was defined as the open spaces dedicated to movement. The bath's movement spaces have been included since they represent semi-public spaces and form a spatial hybrid between open and closed structure.

By adding the baths to the Insula's movement system, their influence can be demonstrated (Fig. 6.20). However, when excluding the baths from the movement spaces, the southern courtyard still emerges as the most visually integrated area within the Insula as the graph demonstrates (see Fig. 6.21). Interestingly, a new dynamic becomes visible when the baths are disconnected from the movement flow: the new longest, most integrated visual line connects the Via della Caupona through Building IV ii 7 and through the southern courtyard, leading towards the eastern boundary where the Insula meets the Campo della Magna Mater.

Both analyses, including and excluding the baths, confirmed the long line connecting the portico to the southern courtyard as the second most integrated line. This line represents the axial connection between outside public space (*cardo maximus*) and the very centre of the Insula. The line proves to be consistent and seems to point to the 'two-line-logic' which seems to emerge as a constant element in the Insula's space structure. The 'second' line's counterpart is found in the longest axial line which connects from the Via della Caupona through Building IV ii 7 all across the southern courtyard. Together these two lines form the Insula's visual base structure and seem to constitute the starting point for the 'two-line-logic'. Both lines remained preserved and respected throughout the Insula's development. This is evident from the alignment of the buildings which safeguard the visual line, even at all costs as the passage through Buildings IV ii 7, 9 and 13 demonstrates. Interestingly, the lines are also respected by more mundane structures such as the fountains located within the courtyards. Above all, the visual lines seem to contradict Liedke's suggestion of a continuous structure involving Buildings IV ii 14 and IV ii 5,[59] which would break the visual line from the porticus to the southern courtyard.

Fig. 6.22 - The Insula's potential route matrix based on the longest and fewest lines, excluding the movement spaces of the Terme del Faro

59. See Chapter Five.

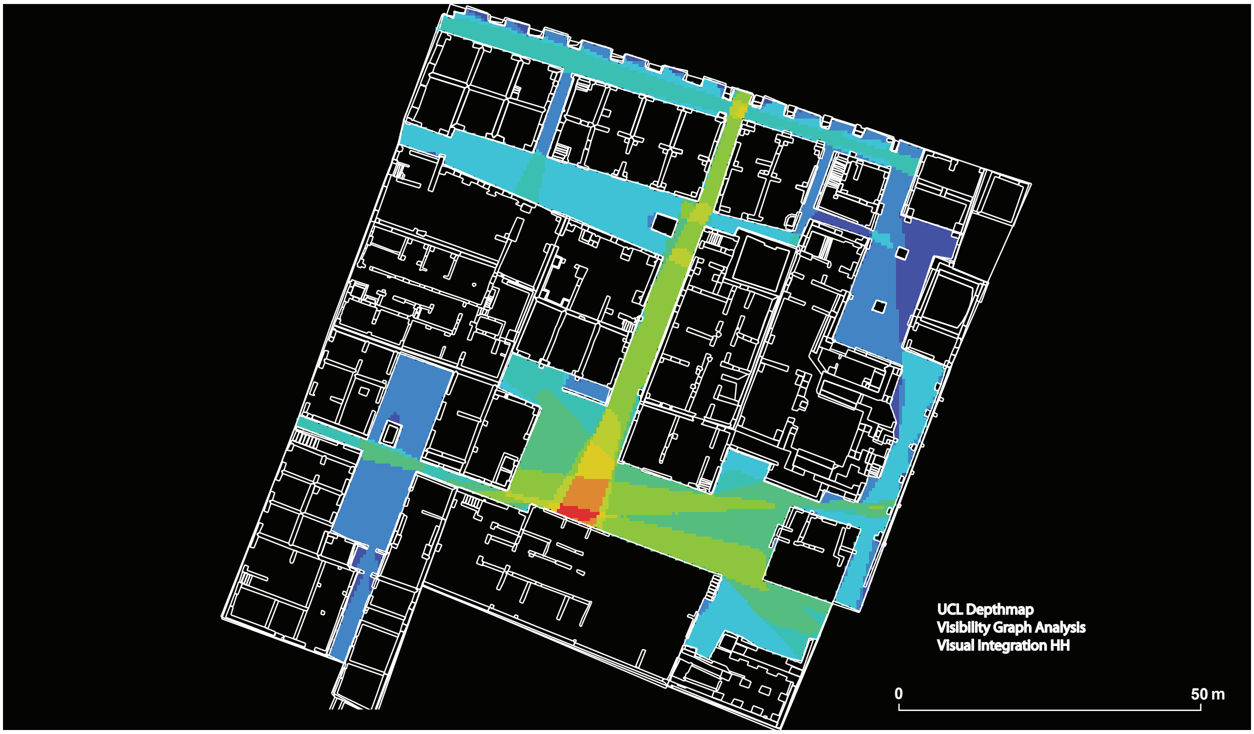


Fig. 6.23 - VGA identifies the southern courtyard as the visually most integrated space

The fountains of the Caseggiato dell'Ercole and Caseggiato IV ii 7 were placed in a way so as not to obstruct the longest visual lines. Their placing not only respects the Insula's 'two-line-logic', but also appears to respond to another spatial law which seems to be known to human intuition. This law has to do with the 'interference effect' of objects within space.[60] Both fountains are not located in the geometric centre of the courtyards, but were moved to the sides.[61] Their somewhat off-side position decreases their interference effect and makes them better accessible from all places within the courtyard, calculated for the mean distance from all surrounding spaces.[62]

A further level of analysis pertaining to the Insula's visual fields has been applied, the so-called Visibility Graph Analysis (VGA). It is based on visual integration and on a positive correlation between visibility and movement potential. The visibility graph produced reveals the Insula's visually most integrated spaces (Fig. 6.27), displayed in a ranked order from the most to the least visually integrated spaces, colour coded along a scale from red for the most integrated to dark blue for the most segregated spaces. The southern courtyard emerges as the visually most integrated space, marking the area where the longest visual lines converge as the most integrated zone. Hence VGA confirms what has been identified by the axial line analysis. Both analyses earmark the southern courtyard as the area where movement, coming from various directions within the Insula converged; greater density of movement raises co-presence within the southern courtyard which is an indication for increased potential for social interaction. Finally, agent based analysis provided by Depthmap (Fig. 6.28) produced a graph showing the movement traces of 50 virtual agents walking randomly through the Insula driven by visual parameters only and allowed to turn

60. Hillier (2008a: 225).

61. Apart from the spatial laws mentioned, the location of the fountains is also influenced by other parameters such as water pipes and property divisions.

62. The 'interference effect' can also be put to intended use when an object is expected to interfere with movement, e.g. placing a statue or monument in the centre of a square.

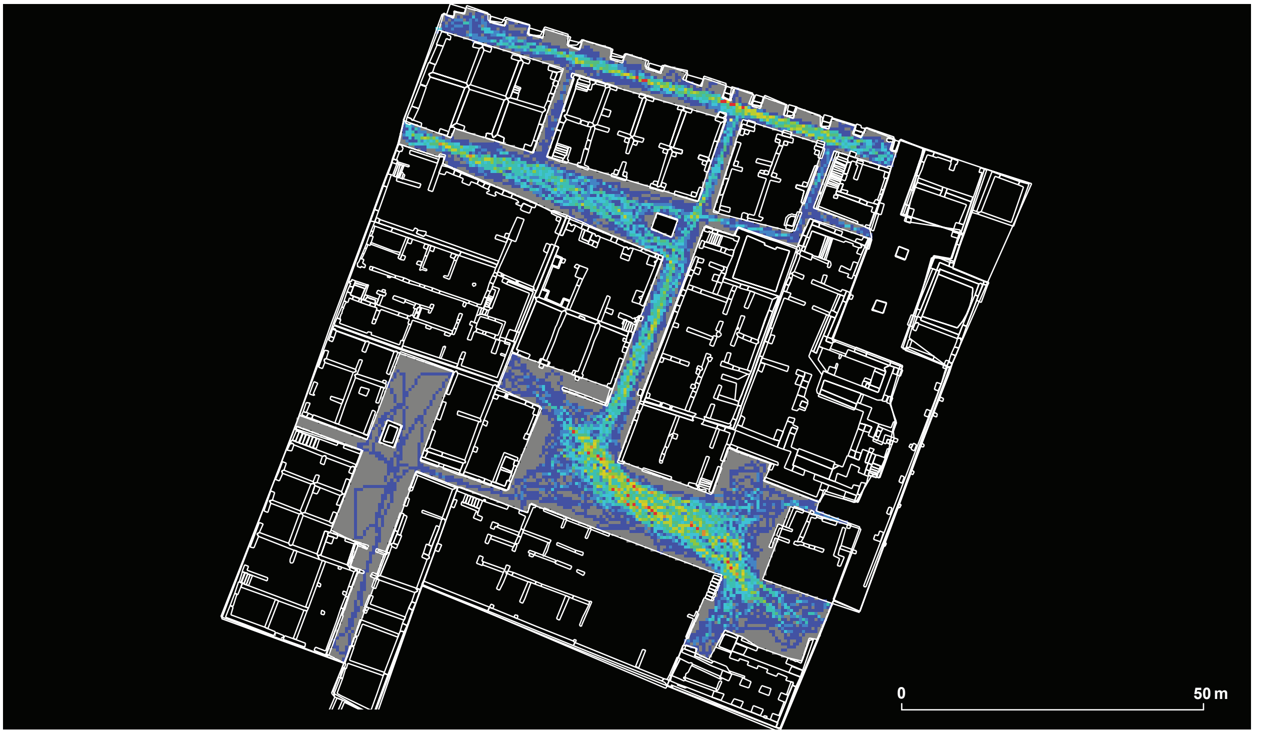


Fig. 6.24 – Agent analysis (preliminary state) movement traces of 50 autonomous agents

directions,[63] their random walks take the larger part of them to the southern courtyard. Hence, once again the southern courtyard emerges as the Insula's best place for social interaction.

6.7 Conclusion

Through systematic analysis and interpretation of the various spatial aspects of the Insula this study was able to extract different layers of spatial structuring which co-exist within the same Insula plan, each with its own contribution to the Insula's spatial functioning, and to the way the spaces were perceived by those who used and navigated them. Access Analysis provided insights into the individual buildings as well as the Insula's collective configuration, demonstrating how the individual layouts structured the relationship between residents, and between residents and visitors. Axial line analysis and VGA helped in identifying the southern courtyard as the Insula's most integrated area.

In terms of the Human Use of Space this clearly points to the fact that the Insula was able to draw people in from the street space. Most importantly however, by promoting accessibility to the back part, i.e. the southern courtyard, the Insula's space structure helped in sustaining activities in the back areas. This is even more interesting since the Insula had clearly defined its commercial front towards the outside through the Caseggiato dell'Ercole, with its portico taking up almost the entire length of the Insula along the *cardo maximus*. As we have seen earlier on, a lively environment of unforced co-presence is not only dependent on the line structure and the open spaces which constitute the movement spaces, but also requires that the buildings relate to the open spaces by providing openness themselves. The analysis has shown that the buildings surrounding the southern courtyard interfaced in a manner to encourage co-presence.

The Insula seemed also successful in the way it provided various route choices. This enabled the same configuration to form different kinds of spatial experience for both residents and visitors; the route

63. See Chapter Four, section 4.5.2.

choices could also articulate formal and informal relations within the Insula. This seems demonstrated by the structured entrances to the baths which allowed a distinction between visitors and those who operated the baths. Various circulation paths through the Insula could be followed, allowing function-specific routes, or even a simple pub-crawl moving from one inn to the next. One circulation path is of particular interest since it completely encircled the baths and its associated buildings without passing through outside space, and could therefore run independently of visitor relations. The loop interconnects the baths with the southern courtyard, leading back again into the baths through the central passage and the eastern part of the Caseggiato dell'Ercole, thereby creating a 'spatial Insula' within the Insula (see Fig. 6.27, VGA makes the circulation path visible which encircles the baths).

The case study of Ostia's Insula IV ii has demonstrated that syntactical and visual tools of spatial analysis can add a valuable dimension to the archaeological assessment of a past built environment. Spatial aspects have been detected which would otherwise not be noted by observation only. The real advantage of Space Syntax lies in the fact that the method forces the researcher to understand a building or a group of buildings as a configuration of space; Space Syntax becomes a tool to think with. It inspires the researcher to explore further and to experiment at both levels: the technical side of the analyses and the possible interpretations of the results provided by the analyses. The syntactical enquiry into the Insula could and should be expanded including various other spatial parameters, such as examining the Insula's total configuration from the perspective of each individual building, or exploring the Insula's visual fields from location to location. Another promising addition to the current analysis would be to include the streets of the Insula's immediate surroundings into the area defined for analysis. Firstly this would give the Insula a buffer zone to counteract possible edge effects which the immediate boundary of the Insula might exert on the analysis. Secondly, by including a certain amount of street space the effect of the streets on the Insula could be calculated and evaluated. Surely this would lead to yet another set of questions related to the position of the Insula within the spatial configuration of the entire city, of which the Insula is a member, as much as it is a unique and distinguishable entity.

With regard to the Insula and its quality as lived space, spatial tools provided a valuable contribution to show that within the Insula space was designed to promote encounter, and to privilege integration over segregation, which ultimately makes for a better and safer neighbourhood, not only in early 3rd century Ostia. The Insula's integrating capacity seems the key to its long period of occupation. Although composed of individual buildings, still the Insula's space structure, its courtyards and passages, were essentially collective and shared by the buildings which composed the group. Its collective space structure seems to have prevented fragmentation into highly individualised luxury architecture, which was the fate of the neighbouring *insulae*, as can be seen in the development of the late Roman *domus* which affected other Ostian *insulae* at a later point.

7 – Street Networks and Public Places: Movement and Interaction in the Roman City

As stated in the introduction, our analysis proceeds through a sequence of increasing spatial scales: individual houses, a city block (Insula IV ii), and finally the city's street network and selected buildings distributed across the city. The assessment of the confined neighbourhood of Insula IV ii made already clear that the Insula not only responded to internal dynamics but also to the streets surrounding the Insula, and in an accumulative way to the wider street network of the entire city. In this chapter the focus is on the complex phenomenon of movement and traffic in Roman cities. In the following sections selected studies, centered on the streets and streetscapes of Pompeii and Rome will be introduced. This will help to outline the range of topics addressed by current research.[1] However, the emphasis of the chapter is on Ostia's street patterns and its 'movement economy', thus bringing in new aspects from Space Syntax to the discussion of movement and traffic in the ancient city.

Topics like movement and traffic in antiquity started to receive attention from today's awareness of streets and spaces and the related effects they have on people,[2] even more so since our responsiveness to movement and traffic developed relatively recently, provoked by the fundamental changes in human experience brought about by motorized traffic, mass transport and above all by the effects of speed on movement.[3] Likewise, today's appreciation of the complex function of streets resulted only from a deeper understanding of the adverse effects of modernist urban planning, with its policies to separate traffic routes from the traditional interaction that took place in the street. Therefore, any comprehensive approach to ancient streets needs to respond to their dual nature and look into both movement and interaction. Lefebvre's definition of the function of streets proves helpful.[4] According to him the meaning of streets is dominated by two needs: a free flow of traffic (pedestrian and vehicular) and the interaction that takes place in the street by those who live or have travelled there to interact.[5]

While the 'street' has been a popular subject matter in social and culture studies since the early 1940s,[6] archaeological research has, until recently, not given much attention to ancient traffic and movement, nor to the associated built and non-built spatial forms (e.g. streets and public spaces).[7] There are many reasons for the limited study of streets and street space in archaeology.[8] One may lie in the preference for designed and planned architectural space found in classical archaeology. Such attention leaves the streets as an architectural void between

1. This overview is restricted to studies of streets within the urban context. For approaches to streets leading from Rome to towns within the periphery, see for example the Via Tiburtina project, conducted by the Swedish Institute at Rome (Bjur and Frizell 2009). Furthermore, the overview does not include 'itineraria', although they have been very much in the focus of Late Antique studies.
2. See Mertens (2008: 1) on the difficulties of formulising a theoretical framework for a conference on 'streets and traffic in the ancient world'; for a today's approach see Marshall (2005) on the relationship between streets and urban development in today's urban planning.
3. See Harvey's concept of 'Space-Time-Compression', for example discussed in Günzel (2010: 95).
4. Jacobs' (1993) and Lefebvre's (2003) seminal work are fundamental for an understanding of the real function of streets; see Laurence (2008: 87) and Newsome (2009: 25-26) on the importance of Lefebvre's work in archaeological and historical urban studies.
5. Lefebvre (2003: 18-21).
6. Foote Whyte's *Street Corner Society* (1943 1st editing) has been the model for urban ethnography for more than fifty years; Duneier's (1999) Sidewalks explores how sidewalks became a sustaining habitat in New York.
7. Recent publications on movement and traffic in antiquity include Mertens (2008), Van Tilburg (2007) and Laurence and Newsome (forthcoming); see also Wallace-Hadrill on streets as a representation of imperial power, however with a focus on the backstreet (2003:189-206).
8. See Hartnett on the neglect of streets in archaeological research (2008: 91-92).

the buildings.[9] Furthermore, traditionally urban space has been approached by type (civic, religious, domestic) which compartmentalizes the ancient city along artificial lines, and thus removes the 'multiple contexts and juxtapositions present along streets'.[10] The apparent lack of archaeological interest in these topics even prompted some archaeologists to question the viability of studying these phenomena at all: concerns were raised as to whether investigations into past movement and streets merely foster 'artificial problems', since our enquiries tend to reflect modern concerns rather than the past experience of movement and traffic.[11] Notwithstanding these apprehensions, the number of recently developed studies into ancient streets and movement keeps growing and has significantly enriched our understanding, and has helped to bridge the gap between our modern awareness and the ancient experience.

7.1 THE ARCHAEOLOGY OF STREETS AND MOVEMENT

The streets and public spaces of historical cities and archaeological sites provide the physical context for archaeological research into past movement and traffic.[12] In general, streets and public areas can range from the smallest spaces left empty between buildings to splendidly arranged large-scale public squares; they can emerge from incremental or spontaneous processes, but can also be the results of authoritative, planned interventions.[13] Streets derive their characteristics from ongoing urban processes, which can be both proactive and reactive.[14] At archaeological sites such as Pompeii and Ostia, although their urban function has been reduced to being outdoor museums open to visitors, all the same, some aspects of the urban process remain continuous up to this day. The street network and the resulting patterns of pedestrian movement within these sites are a case in point. Visiting tourists are still walking the very same streets and use the same sidewalks as the cities' ancient residents and visitors. In this way the modern visitors take part in an urban experience shared through the common use of space. On behalf of countless silent visitors, the American writer Mark Twain, informs us about his very personal encounter with Pompeii's streets in his vivid description of 1875:[15] "*…for in the great, chief thoroughfares (Merchant Street and the Street of Fortune) have I not seen with my own eyes how for two hundred years at least the pavements were not repaired! —how ruts five and even ten inches deep were worn into the thick flagstones by the chariot wheels of generations of swindled tax-payers?... I speak with feeling on this subject, because I caught my foot in one of those ruts…"*

7.1.1 Streets as archaeological artefacts

Surely, Mark Twain was not the only visitor intrigued by Pompeii's streets and their signs of heavy use. Quite specifically, Pompeii's ruts caught the interest of Japanese researchers in the early 1990s.[16] Unlike Mark Twain, their sympathy was not so much with the ancient Pompeian taxpayers and whether tax-money destined for street maintenance was misappropriated. Instead, the first Japanese project reconstructed traffic flows within Pompeii by closely examining ruts visible at cross roads. A city-wide restricted traffic system, involving one-way roads, could be inferred from the regular positions of the curved traces of ruts near intersections.[17] A second Japanese project, carried out between 2006 and 2008, took this research further, involving 3D laser scanning of Pompeii's street surfaces. Next to

9. Hartnett (2008: 91).
10. Hartnett (2008: 91).
11. These concerns were raised in the context of a conference on ancient urban traffic organised in Rome, in 2004; see Mertens (2008: 1).
12. For a wider discussion of movement beyond the physical space of streets and public spaces (including e.g. the legal aspects of movement and transport, the political dimension of crowd control in cities as well as mobility of people within the Empire) see especially Mertens (2008); see Çelik *et al*. (1994) on the symbolic role of streets and street space; see also Larmour and Spencer (2007) and Laurence and Newsome (forthcoming).
13. Çelik *et al*. (1994:1-7)
14. Çelik *et al*. (1994:1)
15. From Mark Twain's travelogue 'The Innocents Abroad' (1875) internet version.
16. Tsujimura (1991) and Hanghai *et al*. (2009)
17. See also Poehler (2006) on traffic circulation in Pompeii's Region V.

the ancient ruts, the project also focussed on signs of recent deterioration, which have considerably progressed since the excavations in the 18th century. The millions of visitors wearing down Pompeii's ancient streets every year exacerbate the problem. Hence, from a largely neglected area of research, Pompeii's streets have turned into an artefact recognised for its serious conservation problems; which, unless addressed adequately, will lead to the loss of valuable historical information.[18]

7.1.2 Streets and street life through the eyes of Roman authors

Along with the study of the material aspects of ancient streets, a different perspective on streets and public spaces has developed from a focused attention on the sensual and social experiences of past urban space. The major part of these studies is rooted in the literary tradition of classical discourse, calling upon the impressions offered by ancient authors and their references to selected topographical features of the city. Playing on themes like 'getting around on the streets of Rome with Horace, Martial, Ovid and Juvenal', ancient sources describing activities placed along streets and public places of Rome are interpreted as city-texts, similar to Joyce's Dublin or Döblin's Berlin.[19] Some of the vivid literary references to the lived reality of ancient Rome appear surprisingly local, being centred on a specific neighbourhood or region, like the *subura* district of the *Epigrams* of Martial.[20] Tied to a local neighbourhood by social status and occupation, the characters would spend their lives with limited contact with the 'ancient mega-city' at their doorstep.[21] Then again, in contrast to the localised urban experience, and more relevant to the issues of traffic and movement discussed in this chapter, Roman urban poetry also focuses on a perception of the city shaped by movement. Horace and Martial emerge as two ancient Roman 'urban wanderers', who convey enjoyment in the variety and complexity of the urban experience. Not being restricted by the temporal and spatial confines of a workshop or an office, both authors benefitted from the freedom and the flexibility that came from being writers.[22] However, to survive as authors they had to engage in patronage cultivation. In pursuit of his profession Martial is led almost all over the city. While his daily rounds were varied, certain regions received particular attention.[23]

Horace's satires and Martial's epigrams seem inspired by incidents that occurred along the rounds performed as a routine part of everyday life. These circles took the individual Roman frequently along routes through specific, sometimes limited sections of the city, depending on the needs of occupation, the demands of sociability, or the pursuit of enjoyment.[24] However, the exaggerated and frenetic tone of the narrative transforms these casual incidents into specific events, while the underlying patterns of almost ritualized everyday movement remain concealed.[25] Martial seems to know of the quotidian routines and loitering habits of those who frequently visit a range of gathering places in the Campus Martius. In addition, his texts demonstrate a keen awareness of the spatial qualities of different porticoes and squares, and seem to be well informed as to whether they offer suitable gathering

18. A sustainable solution needs to be found, ensuring protection for the streets without denying visitors the physical and cognitive sensation of walking along the ancient streets and experiencing the city through movement.
19. See Miller (2007:138-167) on 'getting around on the streets of Rome with Horace, Ovid and Juvenal'; see Larmour (2007:168-210) on Juvenal Satire's as city-text related to modern analogies of Joyce and Döblin; see also Dyson and Prior on Horace's and Martial's reading of the ancient city (1995: 245-263).
20. References to the *Subura* in Martial's *Epigrams*: 2.17, 6.66, 731, 9.37, 10.20, 10.95, 11.61, 11.78, 12.2, 12.18, 12.21, from Dyson and Prior (1995: 246).
21. See Dyson and Prior (1995: 246-247).
22. Dyson and Prior (1995: 249, 251).
23. The Campus Martius was dominant in Martial's social agenda, and about a quarter of all topographical references in his work are situated there. Interestingly enough, the traditional political and public spaces of Rome were less central to the urban narrative of Martial (Dyson and Prior 1995: 253).
24. See Prior's (1996: 1-16) literary and topographical assessment of Martial (*Epig*. 2.14) termed 'going around hungry'. The epigram details the circuit of a certain Selius, desperately searching for a dinner invitation. Prior's article explores the social issues and topographical questions involved in the epigram.
25. Dyson and Prior (1995: 247) and Prior (1996); see also Laurence on temporal and spatial sequences of daily activities in Roman urban life (2007: 154-166).

spots for his characters. Being equally aware of human behaviour and spatial properties, Martial strategically positioned characters who desperately sought social encounters at specific locations, often porticoes and entrances to baths, which promised a high potential for social interaction.[26] In this way Martial acknowledged and responded to the active role of space, [27] recognising that Rome's porticoes and streets were not only passive backdrop scenery for action, but were socially constructed spaces generative of social relations.[28]

7.1.3 Experiential approaches to ancient streets

Other studies, equally concerned with the sensual and social experiences of urban space, have been initially developed by anthropologists and cultural geographers, using 'participant observation', and employing the 'authority of being there'.[29] Archaeologists and architectural historians, unable to conduct actual interviews with the original users of ancient environments, have instead concentrated on the visual context of past built space. Drawing on the perception of three-dimensional urban recreations, these studies favour visual experience over other sensory receptors.[30] Although it seems a modern preoccupation to rank vision before other senses, a similar acute awareness of the impact of vision on human perception has been suggested for antiquity.[31] Cicero, writing for contemporary readers informs us: '*…that the most complete pictures are formed in our minds of the things that have been conveyed to them and imprinted on them by the senses, but that the keenest of all our senses is the sense of sight…*".[32] Hence, approaches based on a reconstruction of the ancient visual experience seem to respond not only to our modern visual acuity, but also reflect perceptual concerns of the ancient past. In their attempts to reconstruct the past, some studies focus on experiential walks within recreated environments, invoking the past sensation of streetscapes and the effects of public spaces on human cognition.[33]

The genre of narrative description was first introduced into the urban discourse by Purcell, presenting an imaginary walk through Nero's Rome to the adjacent countryside.[34] However, it was Rome's physical transformation under Augustus which has remained one of the most popular subjects for such approaches.[35] The powerful images of Augustan Rome provided inspiration for two fictional walks, playing on a before-and-after situation: the first 'experiential reading' of the city recreates a walk through Rome of the Late Republic, starting from the centre following the Via Flaminia, crossing the Milvian Bridge and leaving the city towards the rural areas. The second imaginary route takes the reverse order, leading from the Milvian Bridge to the heart of Rome shortly after Augustus' funeral.[36] Along their walks, the fictional characters experience how Rome's urban image had taken shape and was consolidated between Julius Caesar's death and that of Augustus. The perceived differences between the Republican and the Augustan streetscapes could not have been greater.[37]

---

26. Martial's *epigram* 2.14 combines topography and poetics to narrate a desperate search for a dinner invitation.
27. This point has not been emphasised enough; even recent work on Pompeian streets still refers to the role of urban thoroughfares as social theatres, see Hartnett (2008: 91), thus confining them to their more 'passive' role as a backdrop to human activity.
28. See Parker-Pearson and Richards (1994) on communities and (urban) landscapes as active *loci* of social life, see also Yaeger and Canuto (2000).
29. See Favro (1999: 367).
30. See Trachtenberg's (1997) visual approach to 13th century Florence; see also Maïm and Haegler (2007) on populating ancient Pompeii with virtual crowds.
31. Cf. Jütte (2005) on the hierarchy of senses in Antiquity.
32. Cicero (*De Or*. 2.87.357) '...*acerrimum autem ex omnibus nostris sensibus esse sensum videndi*..."; see also Favro (1996: 182-183) applying Cicero's statement to the perception of colours in Roman urban life.
33. See Haselberger for an overview on the long tradition of reviving ancient life through fictional narrative and written images (2000: 520, note 20).
34. Purcell's descriptive narrative (1987; 187-189) sought to re-create the changing mental pictures that an ancient beholder received when walking from Nero's Rome to the adjacent countryside (following the ancient Via Tiburtina).
35. See Zanker (1988), and also Favro (1996) on Augustan Rome; cf. Coarelli (2009) on Flavian Rome.
36. These two 'experiental readings' of the city frame the central argument of Favro's 1996 publication; while the book's main argument maintains that 'Augustus found Rome in semiotic chaos, and left it a clear pointer to his own greatness'; see Jaeger (1997) http://bmcr.brynmawr.edu/1997/97.04.23.html (date of access 24.02.2010)
37. See also Favro (1996: 238-257).

Other examples of imaginary walks, this time traversing Pompeii, have been recreated to illustrate interaction taking place between inhabitants and visitors.[38] The fictional protagonists of the Pompeian walks are a female vineyard owner, coming into the city from the countryside, and an elderly male farmer with a mule, on his first visit to Pompeii.[39] Potential encounters between these visitors and locals have been reconstructed through the arrangement of space along the major thoroughfares.[40] Hence the characters make use of opportunities offered by spaces that invite interaction, like smaller open piazzas and shops whose activities spill out into the public space. These narrated Pompeian walks were created with the intention to make a syntactical analysis of Pompeii's streets more accessible by adding 'human elements' to an essentially theoretical approach.[41] Still, despite these efforts, these fictional Pompeian walks appear very mechanical and remain too sterile to reflect a lively representation of the city's streetscapes.[42] These approaches started to gain popularity in the 1990s, and were mainly pursued by historical architects, while heavily criticised by classicists and archaeologists for being fictional and even Disney-like.[43] Admittedly, it is very tempting to immerse fictitious characters into the ancient city and allow them, or rather the author of the narrative, free reign to experience the past urban environment. Still caution is needed and a clear line needs to be drawn between fact and fiction.

With a focus on public squares instead of streets, but also drawing on the concept of experiencing space through movement, La Rocca's '*Passeggiando intorno ai Fori Imperiali*' offers an outstanding account of the spatial organisation of Rome's imperial *fora*.[44] By examining the individual *fora* through their entrances and their system of interconnecting passages, the spatial logic of the *fora* has been revealed as a closed system, retaining the individual *fora* as independent functional compartments. Although La Rocca employs the analytical concept of movement to an excellent effect, anticipating in some ways formal methods of spatial analysis, he presents his approach not without reservation. He stresses that the formal unity of the system of the imperial *fora* remains at best fictitious, since it can only be understood from studying the site plan, and not from the physical evidence of the single structures.[45] Without doubt this problem is not unusual and not at all restricted to the imperial *fora*. Most architectural spaces with a high degree of complexity, while being fairly well understood at plan-level, require considerable stored spatial knowledge as well as way-finding skills from those who navigate through the spaces.[46] Notwithstanding this, the conceptual and social significance of buildings and open spaces, as well as their impact on the ancient observers, might not be revealed at all through way-finding exercises and the study of site-plans.[47] If at all, we might gain a glimpse of what the imperial *fora* could have meant to their ancient visitors when considering them against the outside space of bustling Rome. La Rocca refers to the *Tempio della Pace*,[48] suggesting that it must have appeared to its visitors like a divine oasis, cut-off from the busy streets and the commotion of Rome's crowds, which must have reached high levels in Flavian times.[49]

By means of this brief overview of selected studies from Rome and Pompeii, different approaches to Roman streets and public spaces, centered on the material, conceptual and social aspects, have been

38. Fridell Anter and Weilguni (2003: 37-39).
39. See also Ling (1990) on way-finding in the ancient city for a different approach.
40. The imaginary walks conclude a preliminary Space Syntax analysis of Pompeii's street network. The walks are intended to illustrate how linear and convex spaces work together to create an interaction field for encounter
41. See Fridell Anter and Weilguni for a preliminary Space Syntax analysis of Pompeii (2003: 31-39).
42. See Hartnett (2008) for an insightful assessment of interaction-space along Pompeii's streets.
43. For reviews of Favro (1996) see Bender (1998); Jaeger (1997); and above all Haselberger (2000: 515-528).
44. La Rocca (2006: 121-143) (I owe this reference to N. Sojc).
45. La Rocca (2006: 142-143).
46. See Hölscher *et al*. (2006) on way-finding strategies in complex buildings.
47. See Webmoor (2005) on the use of maps as conceptual frameworks to guide archaeological methods and interpretations.
48. On the Flavian Temple of Peace see Tucci (2009: 158-167).
49. La Rocca (2006: 143).

addressed.[50] Earlier research into Ostia's streets has largely neglected the conceptual and social aspects of street space,[51] while the city's streets and traffic has remained a somewhat overlooked field of research on the whole. Before taking a closer look at Ostia's streets and traffic along them, we should begin by considering the city's street space within the tradition of narrative description. So far no ancient observers, guided along fictional walks, have been sent out to experience the streets and public places of Ostia.[52] Perhaps there was no need to do so. Instead, we can turn to the account of the ancient writer Marcus Minucius Felix to gain an impression of how ancient visitors experienced the city.[53] In his dialogue *Octavius,* M. Minucius Felix describes a short holiday trip to the pleasant city of Ostia ('*amoenissimam civitatem*') with two friends from Rome. They spent some time in Ostia, when the Roman law courts were closed at the wine vintage season. They enjoyed 'a pleasant walk, a pleasant talk and a stroll along the briny beach', before seating themselves on the stones of one of the small breakwaters that protected a bathing place.[54]

While it is difficult to draw precise topographical inferences from this passage, Meiggs' interpretation seems very plausible.[55] He assumes that the holiday party lodged in town and at daybreak they walked, most likely along the western *decumanus*, to the coast.[56] They continued their walk along the curving shoreline towards what would be today's Castel Fusano. They then retraced their steps until they reached the point on the coast from where they started. There they sat down on a breakwater for a rest and launched into a more serious discussion.[57] As far as the walk is concerned, the text invokes the image of a delightful city almost entirely dedicated to leisure; nothing reminds us of the busy commercial port city of Ostia's boomtown phase. At the time of Minucius Felix' visit to Ostia the city appears to have turned into a holiday resort, attracting busy Romans to spend short vacations at the sea shore, not unlike today's Ostia Lido which still attracts thousands of Romans during the summer months.

7.2 OSTIA'S STREETS IN EARLIER STUDIES

The following section will take stock of previous research into Ostia's streets. These earlier studies were primarily concerned with identifying and charting the past streets and defining their physical nature, thus producing invaluable information on the extent of Ostia's urban and sub-urban street network.[58] This research, while not at all dismissing such studies, will apply a more dynamic approach and focus on questions concerning the use of Ostia's streets. The emphasis will be on traffic flows and movement carried along them. However, before turning to movement and interaction within Ostia's street system, a synthesis of what has been established through earlier work will be presented. To begin with, some conceptual issues need to be addressed; these should help to raise awareness of the multifunctional aspects of Ostia's streets, one of which is the streets' function as intra-urban boundaries.

50. For references to Campanian studies on streets see Hartnett (2008: 91, note 1).
51. Gering's study of Ostia's main thoroughfares in Late Antiquity (2004: 299-301) presents an exception to this rule since it incorporates aspects of how the streets have been perceived by those who walked along them. He considers the main promenades as deliberately embellished not only to impress but also to provide a high level of urban quality by means of fountains and monumental arrangements decorated with marble.
52. C. Lawrence's highly acclaimed children's books place their stories in Roman Ostia, leading the young protagonists along Ostia's streets. Despite being well-researched and well-written, these publications are not considered within this context.
53. The Early Christian writer Marcus Minucius Felix is difficult to date (approximate dates have been suggested between 150-270 AD); the passages concerning Ostia are found in *Octavius* II (3) to IV (5); see Meiggs for a detailed discussion (1973: 490-492); see also Becatti (1969: 51); see Bradford's reference to the passages about Ostia (1957: 241).
54. *Octavius* II (3) to IV (5); this interpretation follows Bradford (1957: 241).
55. See Meiggs (1973: 491).
56. The text includes a brief reference to a statue of Serapis, apparently visible from the street, since it was spotted by one of the friends during their walk towards the sea shore; see *Octavius* III (4).
57. The discussion between the friends was concerned with the 'new religion' (Christianity) and was conducted through an argument, weighing the pros and cons.
58. Cf. Newsome (2009: 122-123) with a critique on 'static' approaches to street systems and a claim for enquires into urban space that allow for fluid and evolving patterns over time and space.

Since the publication of Ostia's site plans in Calza's *Scavi di Ostia* I,[59] the city's main streets have been associated with the arbitrary boundaries along which Ostia's five archaeological *regiones* were established by the excavators in the first half of the 20th century. Ostia's streets have been utilised as a structuring device to subdivide the city into five sections. These five polygons, shaped by the dividing streets, have become an accepted convention serving as a reference system, and are firmly imprinted on the 'mental map' of most researchers working in Ostia.[60] Although there is epigraphic evidence for the existence of five *regiones* within Ostia in Antiquity,[61] there is no physical evidence which could help to reconstruct the ancient *regiones*.[62] This leaves the role of Ostia's street system as boundary markers between the city's ancient *regiones* as undefined; by the same token Ostia's streets do not offer conclusive evidence for neighbourhood divisions along which the city could have been subdivided into local districts.[63]

7.2.1 Ostia's proto-street system

As stated before, Ostia's street network was relatively neglected by researchers in the 20th century.[64] Yet, a small number of studies have made significant contributions to the better understanding of the city's streets and their underlying formation processes.[65] Valuable insights regarding the earliest roads, existing long before the foundation of Ostia's *castrum*, come from Van Essen's work of the 1950s.[66] His research was based on a careful study of Ostia's site plans, applying approaches similar to Conzen's method of town plan analysis.[67] Van Essen identified several stretches of oblique streets, cutting diagonally through the urban fabric (identified in region I iii 6; iv 5, xix and xx).[68] By focussing on features which run against the grain of the general street network, he recognised in the skewed courses the imprint of an old road system, leading from Rome to the mouth of the Tiber. In all, two pre-existing roads which converged near the mouth of the Tiber have been identified, one coming from Rome and another coming from Laurentum.[69] Their presumed courses and their relative influence on the location chosen for Ostia's *castrum,* have led to controversies between various authors.[70] These arguments concern the course of Ostia's later major axial thoroughfares, the *decumanus maximus* and *cardo maximus,* and the extent to which these new streets perpetuated portions of the ancient roads.[71] By now it seems generally accepted that the old roads were rerouted to serve the *castrum*.[72] Moreover, through the superimposition of the *castrum* on a pre-existing road system, Rome seemed to physically mark her presence and intention of controlling the coastal area.[73]

59. Ostia's *pianta delle regione e degli isolate* in Calza (1953).
60. All buildings recorded within the area of the 'Scavi di Ostia' have been referenced according to the divisions established in the 1953 site plans, indicating 'regioni' (I-V), isolati (separate divisions) and individual buildings.
61. *CIL* XIV 353 '*sodalis corp(oris) V region(vm) col(oniae) Ost(iensis)*', see Bakker (1994: 197) and Meiggs (1973: 335).
62. See Van der Meer's survey on the use of travertine in Ostia (2002). The study established that quite a number of travertine blocks are found in positions to function as intra-urban boundary markers, or insula buffer stones, delimiting city street blocks against public space.
63. See Bakker (1994) on Ostia's *compitalia* (cross road shrines); see also Stek's discussion of cross-road shrines in ancient cities (2008: 119-122).
64. For a general description of the major access roads (Via Ostiense and Via Portuense) and their territories see Senna (2007), published within the series of *Antiche Strade*. See also Lorenzatti (2007) for an ecological long-term approach to the coastal region of Ostia, including general references to the streets in the area; see especially the section on 'itinerari' (2007: 95-100).
65. Boersma (1985) discusses the street network in the neighbourhood of Insula V ii, the focus of his enquiry; Rose (2005) systematically investigates several sections of Ostia's visible remains, including changes in the street network; Kaiser's 2011 publication on *Roman Urban Street Networks: Streets and the Organization of Space in Four Cities*, includes a section on Ostia, however the book was not available to the author.
66. Van Essen's research in Ostia was primarily concerned with wall-paintings and mosaics, however, he also took an interest in Roman urban development; and hence offered some observations on the street system; see Van Essen (1957: 511-513).
67. Conzen (1960), see also Lilley (2000) for a methodological approach to map analysis.
68. Van Essen (1957: 509-513, plates 1-3).
69. Calza (1954: 93-96).
70. See Calza (1954: 93-94), Bradford (1957: 239) and later Hermansen (1982: 2-4) and more recently Zevi (1996: 71-75).
71. Bradford (1957, 239-240).
72. Hermansen (1982: 3), Mar (1991: 85-86) and Pavolini (2006: 27).
73. Pavolini (2006: 27), see Martin (1996) suggesting c. 300

7.2.2 The formation of the urban street system

A number of interesting insights into the formation processes of Ostia's street network have resulted from Mar's and Giannini's studies.[74] Mar reconstructs the major lines of urban development, applying a diachronic approach. While his recent article is concerned with the effects of urban projects on public space and streets, his earlier study concentrates on urban formation processes, demonstrating how the city progressively reconstituted itself. Hence the earlier study is more relevant for this research. Mar's paper traces the formation of the street system along the major lines of urban development: to begin with, he postulates the existence of a proto-communication system that long preceded the foundation of Ostia's so-called *castrum* (Fig. 7.1).

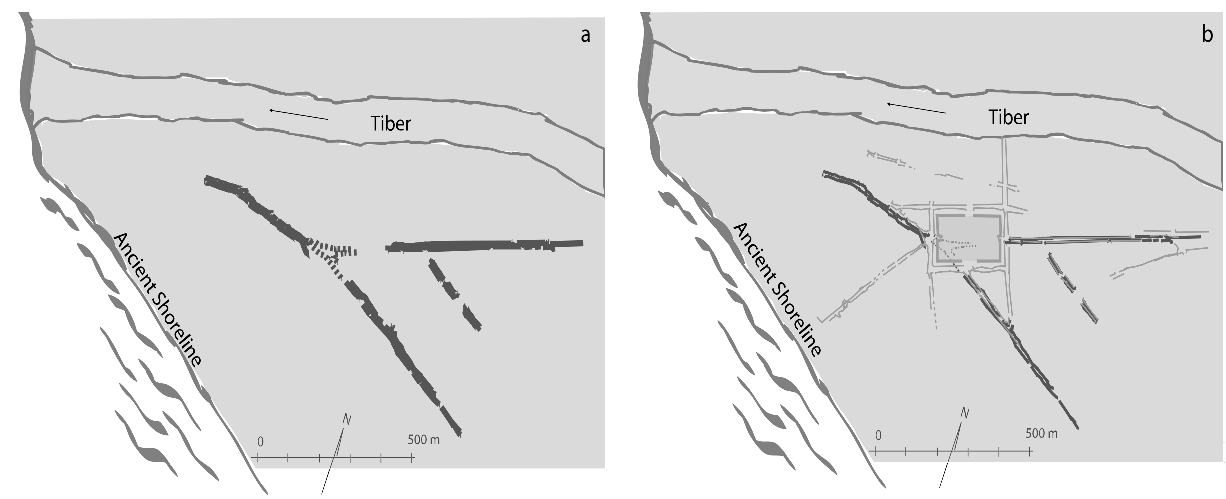


Fig. 7.1– The evolution of Ostia's street system; left: proto-communication lines, pre-existing the foundation of the castrum; right: the adjustment of the street system to the castrum; (after Mar 1991)

Next, he sees the adjustment of the streets according to new factors brought in by the foundation of the *castrum*, and finally, the development of a coherent street system, emerging in connection to exits and entrances to the *castrum*. These streets formed a network which responded to the most frequented directions around the settlement, as well as to the major access roads linking up with gates and city walls (the Via Ostiensis to Rome, and the Via Laurentina leading towards Laurentum). From the new balance achieved, the town's street and road systems developed as we know it today (Fig. 7.2). From Mar's study it becomes clear that Ostia's street network is a result of long-term processes, aiming for equilibrium between territorial determinants and urban development.

7.2.3 The road system of Ostia's periphery

Important work on the wider road system, linking Ostia with its rural hinterland, originated from surveys carried out in the Pianabella area.[75] The area is located to the south of Ostia, where an orthogonal road grid, dating to the Augustan period, has been identified. These streets divided large plots of land

BC as a foundation date for Ostia's so-called castrum.

74. Mar (1991: 81-109) and Mar (2008: 125-144), see section on Mar in Chapter One above; Giannini's (1970) somewhat unorthodox study from an urban planner's view lacks a solid archaeological base; still Giannini's ideas about the evolution of Ostia's *tabernae* and their relationship with the street system makes an interesting contribution to the study of Ostia's urban development, but will not be closer examined here.

75. The area is referred to as Pianabella by its modern name, see Heinzelmann (1998a: 175).

with mixed but mainly agricultural land-use. The area of Pianabella was linked to Ostia's urban core through the Via Laurentina, a continuation of the southern *cardo maximus*. Already in the 1950s an exploratory field survey of the area had started, pioneering a combined study of aerial photographs and surface indications.[76]

Located south of Ostia, the fertile plain of Pianabella offered the only arable land directly linked to the city's territory, and therefore accessible to the inhabitants of Ostia without crossing water.[79] In contrast, the city's northern, eastern and western boundaries were bordered by water.[80] Considering the specific topographic parameters, the area of Pianabella must have played an important role in

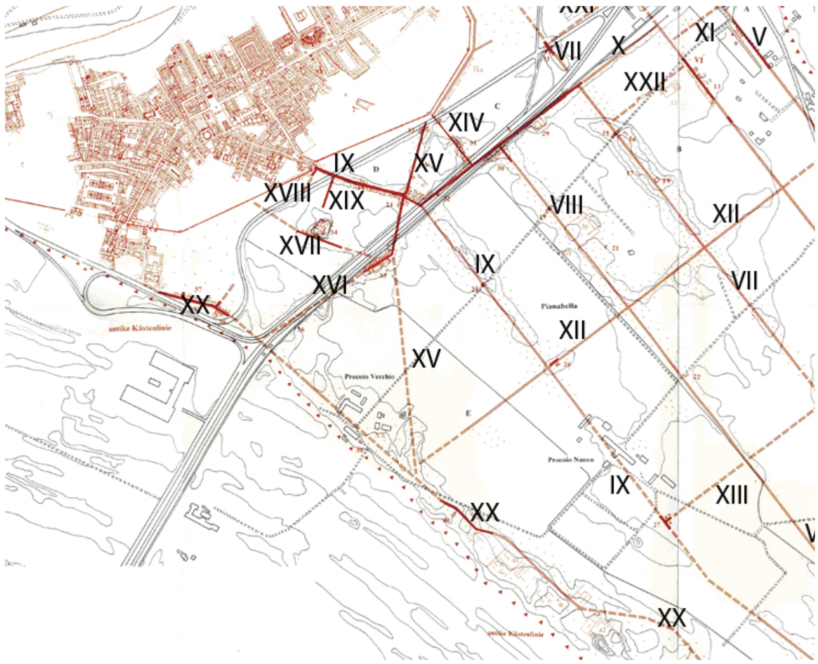


Fig. 7.2 – Ostia and its periphery with the street network numbered according to the DAI survey, section of the DAI map (source Heinzelmann 1998a)

An intensive survey followed almost five decades later, conducted by the DAI in the 1990s.[77] The project's aim was to provide information on land-use and the organisation of space in the suburban areas of Ostia. For the first time a detailed archaeological map of Ostia's suburban territories was produced, synthesizing information from aerial photographs, land surveys, as well as published and unpublished excavation reports (Fig. 7.2).[78]

supplying the inhabitants of Ostia with agricultural products, offering a degree of self-sufficiency to the city.[81] For this reason, a well-functioning suburban street system, structuring the agricultural area and connecting it to the city, was essential for keeping the city supplied with local products.

76. Bradford (1957: 242) informs us that he conducted field studies with the help of Russell Meiggs; the aerial photographs used were RAF photographs.
77. Heinzelmann (1998a).
78. Heinzelmann (1998a, 175-176).

79. Heinzelmann (1998a: 182).
80. The course of the Tiber marked the northern extent of the settlement, the ancient shore line the southern, while the east was bounded by a the marshy areas and probably a water channel connecting the marshy areas of the *Stagnum Ostiense* with the sea; see Heinzelmann (1998a: 182).
81. See Meiggs (1973: 265, notes 3-6) on classical sources providing references to agricultural produce from Ostia.

The intensive DAI survey was able to establish a preliminary chronology for Ostia's suburban street network:[82] The oldest streets were the major access roads, the Via Ostiensis (I) and the Via Laurentina (IX).[83] These proved essential in connecting Ostia to Rome and to the areas south along the coast.[84] Both roads most likely predated the foundation of the *castrum*.[85] Next, during the Late Republican period, a by-pass road along the outside of the eastern city walls was laid down. Avoiding the centre of Ostia, the by-pass provided a connection between the Via Ostiensis and the Via Laurentina and, most importantly, continued towards the sea shore to serve the area there, which was at that time developing into a district with large sea side villas.[86] The by-pass consisted of two sections (streets IIa and XV), which in turn intersected other streets and thus absorbed along its course traffic coming from intra-urban and extra-mural streets.[87]

During the Augustan period a considerable expansion of this road system took place, when the orthogonal grid in the Pianabella area was laid out and tied to the existing streets.[88] The key feature in the Pianabella area is a series of roads subdividing the terrain.[89] Five parallel roads have been located (V, VI, VII, VIII and IX) lying on a north-south axis, and others, at least three streets crossing them at right angles (X, XII, XIII). One was tied to a feature in the town plan, the Via Laurentina (IX), a continuation of the street that formed the *cardo maximus*. Intervals between the streets are not uniform but vary from 177 to 265 m, presumably responding to the *stagnum* in the east and pre-existing development within the area.[90] A large part of the orthogonal street system remained in use for a long period of time, as can be inferred from consecutive layers of repaving and repair work of the streets, accumulating up to 3.5 m difference in height.[91]

South of the Pianabella grid, the so-called Via Severiana (XX), a continuous road along the coast, was laid out during the second half of the first century AD. This road provided a connection from the extra-mural areas outside Ostia's Porta Marina to the coastal regions, where the suburban sea-side villas were located along the Laurentine shore south of Ostia.[92] The most recent phase of the so-called Via Severiana has indeed been dated to the Severan era. Hence the road has been confirmed for this particular period, when it formed part of a coastal road that was created along the Latium seaboard from Ostia to Terracina in the Severan period.[93] After the second century AD most road works within Ostia and its periphery were restricted to maintenance and repair of existing roads; only a few new streets were built, and these were confined to a densely gridded areas indicative of dynamic building development, in closer vicinity to the city (streets XVII, XVIII, XIX).[94]

In addition, a different, yet very important, functional aspect of the suburban street system should be addressed: the location of Ostia's *necropoleis* along peripheral streets (Fig. 7.3).[95] The city's specific topography played a decisive role in the development

82. This description follows Heinzelmanns's assessment of the suburban street system (1998a); the chronological sequences are largely based on stratigraphic soundings carried out in the suburban areas.
83. See Fig. 7.2: Via Ostiensis (I) and Via Laurentina (IX), following Heinzelmann's numbering of streets (I-XXIII).
84. See Staccioli (2003: 50) on the course of the Via Ostiensis, which had its beginnings at the Porta Trigemina at Rome, followed the Tiber for a total of 16 miles (23.6 km), cutting many bends, until it became the *decumanus maximus* of the city of Ostia.
85. See section 7.2.1 on Ostia's proto-street system.
86. See Heinzelmann (1998a: 183).
87. See Heinzelmann (1998a: 216-218) for a description of the sections of the by-pass: IIa and XV.
88. Dating is based on stratigraphic sondages examined along street V (Heinzelmann 1998a: 184). The Augustan dating of the grid-system would therefore not support a chronological connection to the distribution of land within the *ager ostiensis* to veterans during the periods of Vespasian, Trajan and Hadrian, according to the entry in the *liber coloniarum* (I, 236, 7-10).
89. See Heinzelmann's observations on a possible *scamnatio* (land division), laid out in reference to the centre of Ostia's *forum* (1998a: 183-185).
90. See Bradford (1957: 242) and Heinzelmann (1998a: 183).
91. Heinzelmann (1998a: 184-185).
92. See Claridge (1998) on the Laurentine shore project.
93. Heinzelmann (1998a: 221); see also Staccioli on Roman roads with a section on the Via Severiana (2003: 76).
94. Heinzelmann (1998a: 185); hopefully Heinzelmann's forthcoming publication will supply detailed information on the development in this area.
95. See Heinzelmann (2000) and (1998a: 186-188).

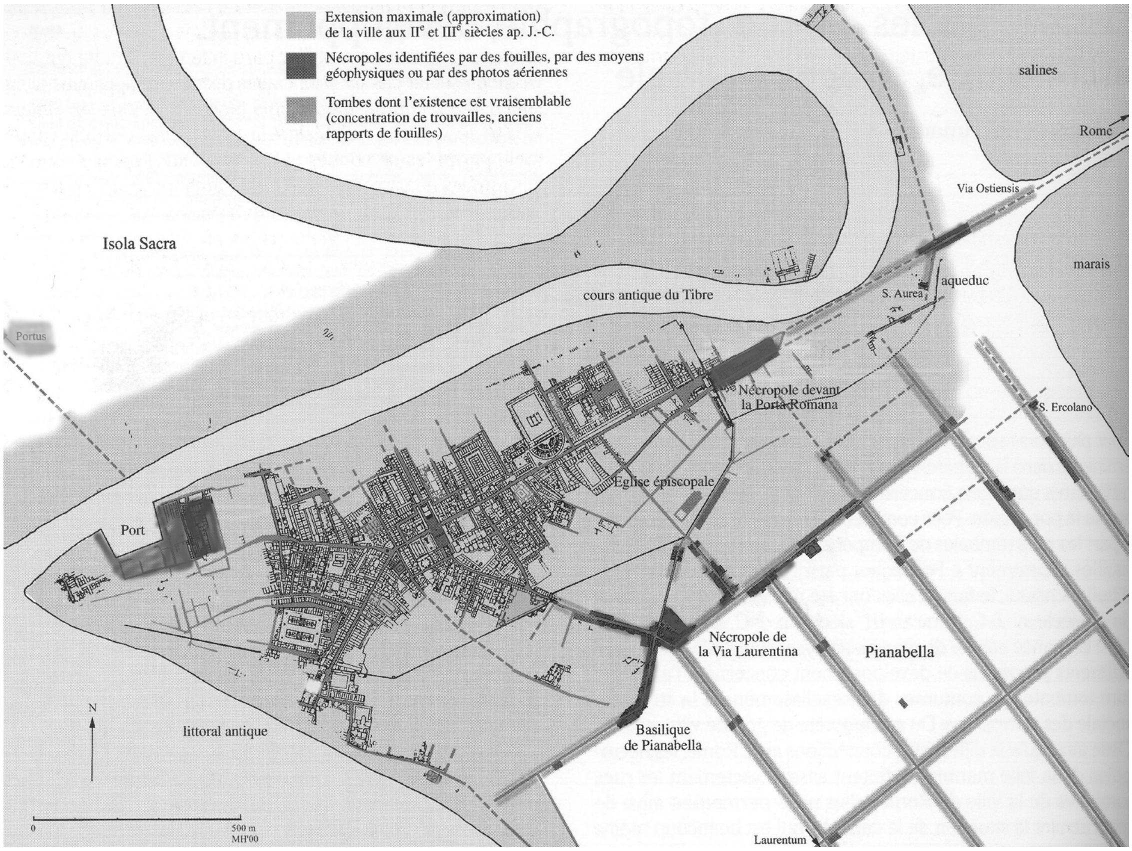


Fig. 7.3 – Ostia and the area of Pianabella, with necropoleis located along the street grid (source Heinzelmann 2001: 374, fig. 1)

of its cemeteries. In an open city like Rome, located in the landscape without geomorphic boundaries, *necropoleis* could develop along various access roads.[96] In contrast, Ostia, being confined by water, had only two access roads available: the Via Ostiensis and the Via Laurentina. Consequently, once these major access roads had been densely lined by tombs and sepulchral monuments, the city's *necropoleis* expanded into the minor roads of the Pianabella area.[97] These primarily 'agricultural' roads might not have been the ideal location for tombs, since they were not frequented by travellers as much as the tomb builders had wished for. At the same time, the minor roads attracted prestigious projects since they very likely offered larger and affordable plots. As a result, some of the largest monumental tomb complexes, built during the 2nd century AD, did not develop along the prestigious Via Ostiensis leading to Rome, but along the Via Laurentina and the minor street grid of the Pianabella plain.[98]

Finally, the streets' role in creating and confirming a religious topography needs to be addressed. By considering the non-orthogonal elements that survived in the later urban layout,[99] DeLaine identified a continuous diagonal 'archaic sacred route' that can be followed through the city.[100] An early coastal road leading from Lavinium to the mouth of the Tiber was perpetuated in the course of Ostia's Via Laurentina,

96. Heinzelmann (1998a: 187).
97. Heinzelmann (1998a: 188).

98. Heinzelmann (1998a: 187).
99. Similar to Van Essen's approach, see subsection 7.2.1 above.
100. See DeLaine (2008b: 100).

which continued in the southern *cardo maximus* and the Via della Foce. The route had its beginning in Lavinium, and seemed to have ended at the shrine of the *dioscouri* Castor and Pollux near the river port of Ostia (Fig. 7.4).[101] Alongside its course a number of sanctuaries developed at different periods of time.[102] Some had their origins in the early periods of settlement in the region and can be related to the proto-road/street system discussed above. Along its path we find the Campo della Magna Mater, the sanctuary dedicated to the great mother goddess Cybele, the sanctuary of Hercules, and the final station along the path, the sanctuary of Castor and Pollux. The sanctuaries' location ties them closely to the streets, almost suggesting the notion of way stations along a route, giving the trajectory a processional character. The sanctuaries located along this 'processional route' show signs of activities into the second half of the fourth century AD, thus we can assume that the street system supporting these sanctuaries enjoyed an equally long period of activity.

7.2.4 The physical structure of Ostia's streets

Large charcoal-grey basalt blocks of irregular size characterise the pavements of Ostia's streets,[103] giving them a quality of permanence and aesthetic beauty. After every rainfall, once the sun is out again, the basalt appears 'brand-new', all shiny and lustrous. Nevertheless, the long term occupation of Ostia and the transformations that took place over time left a mark on the physical structure of Ostia's streets. The consecutive street levels, layered on top of each other in the course of Ostia's urban development provide a preliminary dating sequence, as well as information on the materials employed for street pavements. The heightening of street and terrain levels did not only occur within the city, but also in the suburban and peripheral areas, in particular on those streets which were lined with tombs and sepulchral monuments. Along the Via Ostiensis and the Via Laurentina, a heightening of street levels of up to 3.50 m has been confirmed through stratigraphic excavation.[104]

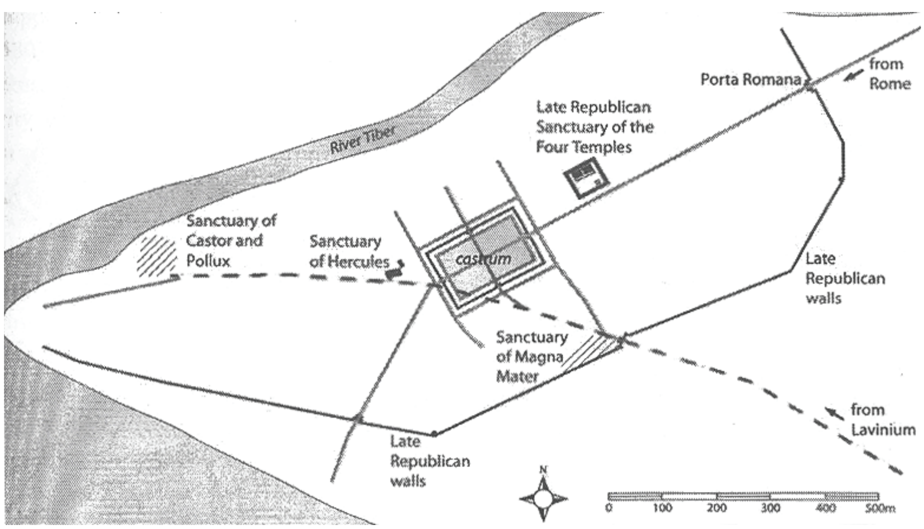


Fig. 7.4 – The 'archaic sacred route' leading from Lavinium to the sanctuary of Castor and Pollux at Ostia (drawing after DeLaine 2008: 101)

101. Heinzelmann and Martin (2002).
102. On the sanctuaries along the route see DeLaine (2008b: 100-102).
103. On the supply of basalt to Ostia see Black, Browning and Laurence (2009).
104. See Heinzelmann (1999: 84-89), see also Heinzelmann (2000: 322-342).

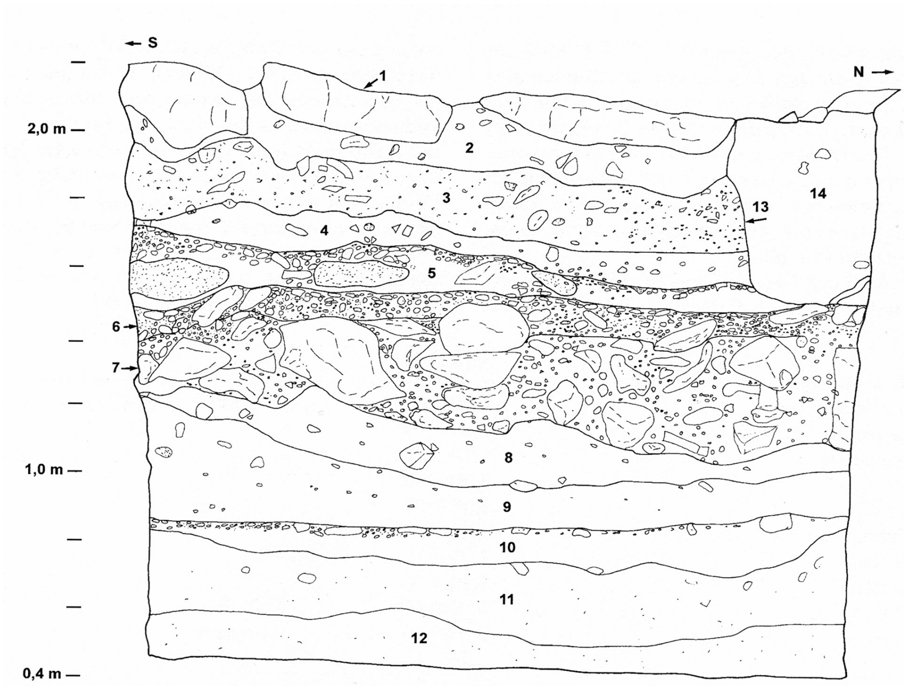


Fig. 7.5 – Via Ostiensis, trial trench east of the Porta Romana; western section; preliminary dates: street 1 (10) about 3rd to 2nd century BC; street II (6) Claudian period; street III (5) 1st half of 1st century AD; street IV (3) 2nd half of the 1st century AD; existing street level V (1) Severan period (source Heinzelmann 2000: 333, fig. 202)

Several trial trenches along the access roads (Via Ostiensis and Via Laurentina) have led to interesting observations regarding the frequency and the *modus operandi* of the heightening of street levels (Fig.7.5). A comparative stratigraphic analysis showed that the built-up terrain was continuously heightened by applying numerous layers,[105] whereas the actual street levels were only heightened at large intervals, however applying substantially thicker layers. This seems to explain how some sections of the street network have lower street-levels than the occupation levels and at others the streets appear like 'dams' with respect to the levels of built-up space along them. Considering the enormous resources and manpower that were involved in heightening and repaving a street, it is not surprising that Ostia's streets were in use for several decades, if not a century, before a renewal was undertaken.[106]

The physical material, i.e. the large basalt blocks which pave Ostia's streets, as they are visible today within the excavated areas, are, most of all, a statement of a conscious choice made by a city that owned the necessary financial resources to invest in such durable materials, and had learnt how to keep its roads dry.[107] Surely not much of a concern in Antiquity, anyone of today's visitors however who has ever experienced a day of walking along Ostia's streets can confirm how unsympathetic the basalt paving is to pedestrian movement. This brings us to the point of wheeled traffic on Ostia's roads.[108]

105. The stratigraphic sequence revealed a larger number of relatively shallow layers; cf. Heinzelmann (1999: 85, fig. 2).
106. See Heinzelmann (1999: 87) for a preliminary chronology, established for a section of the Via Ostiensis, east of the Porta Romana.
107. Basalt does not have capillary properties; hence it does not absorb water which keeps the stones relatively dry (verbal communication from E. Rinaldi, conservation expert at Ostia).
108. Traffic rules prohibited wheeled transport for the movement of persons within the city; see Eck (2008: 59-70).

7.3 TEMPORAL OR SPATIAL LIMITS IMPOSED ON TRAFFIC ALONG OSTIA'S STREETS

Wheeled traffic seems to be confirmed by cart-ruts, visible on the basalt paving of the eastern *decumanus*, where they are most pronounced, although also present in some other locations (e.g. Semita dei Cippi). However, it is not clear whether Ostia followed Rome in imposing temporal control on wheeled traffic.[109] Ostia appears to have responded differently to movement and traffic than Pompeii, which had developed a structured approach including one way systems and restrictions for wheeled traffic.[110] For Ostia it is difficult to establish whether the accommodation of vehicular traffic was ever taken so far as to completely or partially restrict certain roads to wheeled traffic. However, there are some almost defining events, most notably when the course of the *cardo maximus* was intercepted by the placing of the temple of Augustus and Roma (beginning of the 1st century AD) and later the Capitolium (about 120 AD).[111] The series of authoritatively imposed interventions had the effect of successively closing the north-south axis for wheeled traffic, and thus isolating the northern and southern parts of the *forum* area from through traffic (Fig. 7.6). The alteration of the street system occurred in several steps. First traffic on the north-south axis was blocked by placing the temple, while pedestrian movement seems still possible passing along the eastern and western side of the temple; wheeled traffic was presumably re-routed along the course of the outer castrum boundary.[112] The final transformation took place when the Forum baths (Terme del Foro) were constructed in the second half of the second century AD.[113] With the insertion of the Forum baths into the southeastern quadrant of the city core, the streets which had formed ring-roads along the inner and outer castrum boundary had been interrupted.[114] The vehicular network around the *forum* became discontinuous and hence traffic had to find alternative routes, while pedestrian movement seemed to continue along footpaths which traversed the baths, still providing a link between the southern *cardo maximus* and the Semita dei Cippi.

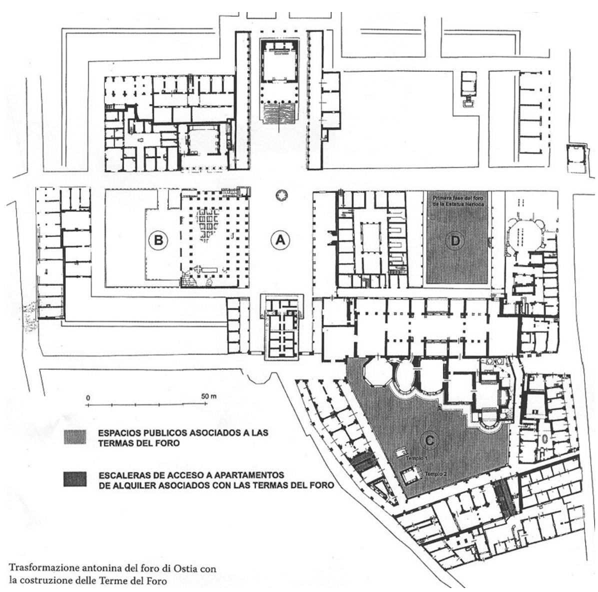


Fig. 7.6 – Ostia's *forum* in the Antonine period: an emphasis on bounded spaces as well as a loss of linear movement space can be observed (source Mar 2008: 138)

109. See Laurence (2008: 87-88).
110. Laurence (2007, 2008), Poehler (2006) and Tsujimura (1991).
111. See Pavolini (2006: 106) for a general outline of the development of Ostia's *forum*. The construction dates for the Capitolium are around 120 AD, based on brickstamps (Calza 1953: 215); the dating of the temple dedicated to Roma and Augustus has not been firmly established. Construction dates have been suggested during the reign of Tiberius, linked to the spread of the cult of Augustus. The cult had not been introduced to Rome during the Emperor Augustus' lifetime, whereas it was allowed in other cities. More recent work suggests mid-to-late Augustan dates for Ostia's temple of Roma and Augustus (Calandra 2000: 417-50).
112. See also Perring (1991: 276-280) for a comparative perspective on changes in the area of the *forum* in Roman towns in the Western Empire.
113. See Mar (2008: 139) on the Antonine transformation of the *forum* completed with the construction of the Terme del Foro; on the Terme del Foro see above all Cicerchia and Marinucci (1992).
114. See Mar (2008: 141, fig. 10) on the urban restructuction around the Terme del Foro; see also Van Tilburg (2007: 163-165) on the use of the pomerium as a ring-road with examples from Xanten and Trier.

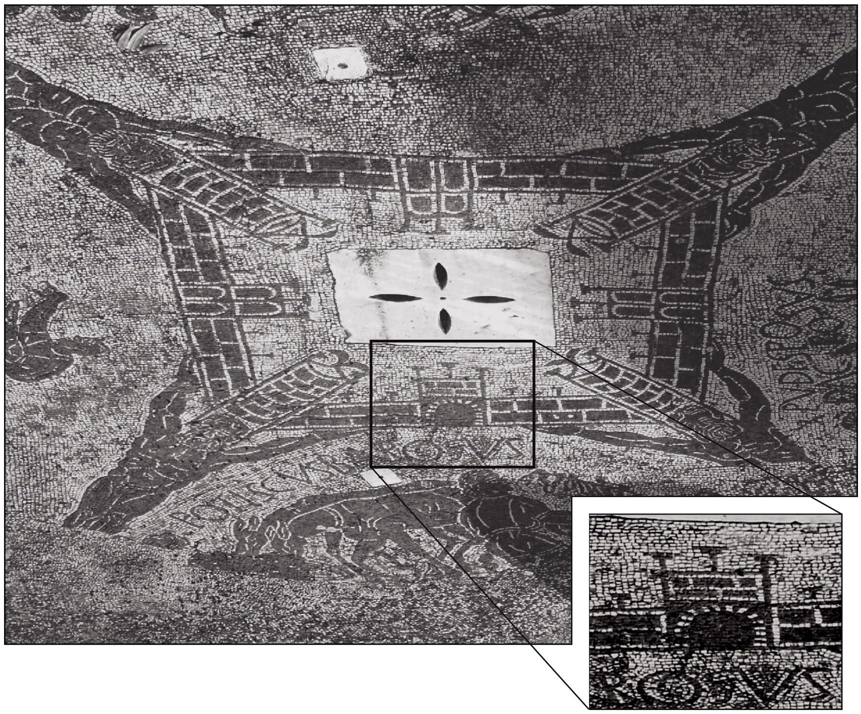


Fig. 7.7 – Mosaic pavements in the Terme dei Cisiarii, stylised city walls featuring four gates: one provides a large gate opening to allow wheeled traffic to pass

However, no interventions seem to have affected the east-west/west-east movement through Ostia along the eastern *decumanus*, and its continuation the Via della Foce*,* leading to the mouth of the river. The *decumanus* stands out as the life-line that runs through Ostia; its course seems responsive to the course of the Tiber. Undoubtedly the river played an equally important role within the city's system of movement: all communication with the areas north of the Tiber required some form of river crossing.[115] In addition, river transport could have potentially accounted for the movement of bulky goods even within the confines of Ostia, thus partially relieving the urban streets from the transport of heavy cargo.[116] Within the context of transport along Ostia's streets, the significance of the road link with Portus needs to be considered.[117] Research at Portus has established that the road leading to Ostia, the so-called Via Flavia, has been an integral part of the infrastructure of both port cities and proved essential to the success of the harbours at Portus, as well as the river harbour in Ostia.[118]

Turning our focus back to Ostia's street network, an interesting clue to the streets is detailed by one of the mosaics from the baths of the *cisiarii*,[119] the

115. References to guilds active in the ferry business suggest plenty of interaction via the river: e.g. *corpus scaphariorum et lenunculariorum traiectus Luculli* (the guild of the operators of skiffs and ferryboats at Lucullus' crossing); *corpus traiectus togatensium* (the guild of the civilians' crossing); *corpus traiectus marmorariorum* (the guild of the marblemen's crossing); see Hermansen for a detailed survey of Ostia's guilds and their activities (1982: 56-59, 239-241).

116. Current research at Portus might shed further light on the existence of a canal providing a waterway between Ostia and Portus; see Keay *et al*. (2005).

117. See Keay *et al*. on the road system of Portus (2005: 279).

118. The so-called Via Flavia led northwards from a point near the river mouth of Ostia, across the Isola Sacra, and then crossed the Fossa Trainana into Portus.

119. Referred to as II, ii, 3 Terme dei Cisiarii in Calza (1953).

coachmen, located close to the Porta Romana. The mosaic found in the *frigidarium* displays scenes related to wheeled traffic rendered in black and white *tesserae*. These scenes are framed by a line of city walls as outer border ornament;[120] within the centre of the mosaic the image of a second city wall has been placed. There are four gates within the stylised inner walls. The gates are rendered in quite some detail, visibly distinguishing between three gates with two narrow doors placed next to each other, and one gate with a single wide door opening (Fig. 7.7). It is striking that a clear distinction had been made between gates which seem to be narrow enough to restrict passage to pedestrians alone, while only one gate seemed wide enough to allow for wheeled traffic to pass. It is difficult to be sure, but could this point to the way Ostia's city gates regulated wheeled traffic, possibly leaving the *decumanus* as the only street with a road clearance wide enough to accommodate even two-way wheeled traffic?

7.4 THE 'MOVEMENT ECONOMY' OF OSTIA'S STREETS

So far, the expansion of Ostia's street system and the physical nature of the streets have been discussed. Next, we should turn to traffic and movement and attempt to reconstruct how movement was carried through Ostia's streets. If we want to understand city traffic, it has been suggested that we need to see its reflection in the architecture of the street and the flow of traffic through it.[121] While this might be possible for any modern street system which allows for pedestrian counts and traffic surveys, ancient street networks need to be studied differently. Therefore this study utilizes the methodological framework of Space Syntax, as discussed above. Space Syntax offers suitable theoretical concepts and techniques for the analysis and interpretation of continuous urban space. By taking account of the entire street system, or large parts of it, Space Syntax examines how each street interrelates spatially to all other streets within a city. In addition, it provides a set of methods for observing how the networks of space relate to functional patterns such as land use and movement flows. To take the analysis further, this study explores Ostia's street network through the relationship between visibility and accessibility and therefore 'observed use' in terms of movement and land-use. Eventually the study seeks to elicit exactly how Ostia's public space layout generates interactions.

On the theoretical level, Space Syntax adds the principles of 'Movement Economies' to the discussion of traffic and movement in past urban space.[122] The concepts of the movement economy postulate that the configuration of the urban street network (the urban grid itself) is the key determinant of movement flows and co-presence in space.[123] Hence, the urban grid prioritises certain locations. This can be best understood by looking at the streets of any town or city. There we find people carrying out their activities, involving numerous journeys which have their origin and destination more or less everywhere. Consequently, every journey in an urban system has three elements: an origin, a destination, and the series of intervening spaces that are passed through on the way from one to the other. The passage between origin and destination is considered to be the by-product of movement. Streets that are easily accessible and better connected to other streets are more likely to be selected as passage routes between other pairs of streets; thus well integrated streets attract more passing movement.[124] For this reason, most journeys from side street origins to side street destinations are likely to pass through one or more segments of the main street, thus making the main street a better location for land use which is depending on movement. Conversely, other types of land use, like residential use, might have sought a location away from the main streets to minimise the possible interference through movement.[125]

120. An article by Iorio (2008: 289-298) on the occurrence of walls in mosaics from Pompeii and Ostia was not accessible to the author and hence could not be included in the discussion.
121. Laurence (2008: 88).

122. See Hillier (1996a: 41-60; 2007: 111-137) on the theoretical underpinnings of the 'movement economy'; a brief summary of the main ideass is reproduced here.
123. Hillier and Vaughan (2007).
124. See Hillier (1996a: 53).
125. Hillier (1996a).

These issues are further elucidated via detailed analyses of the street system presented in the following sections, with the intention of testing whether a Space Syntax analysis will allow new insights into the spatial properties of Ostia's streets. An additional aspect of the Space Syntax approach is to establish whether the concept of the movement economy could offer a suitable model for the explanation of the citywide distribution of various land-uses (e.g. guild buildings, see Chapter Eight). Hence, the next matter to be dealt with is Ostia's street network and its syntactical analysis.

7.5 SAMPLING OSTIA'S STREET NETWORK

Any analysis requires a coherent data set. Ostia's street network is difficult to sample. Owing to the long-term occupation of the city, the largely unrecorded excavations as well as undocumented restorations, it is not easy to identify a consistent simultaneous street network for which there is secure archaeological evidence. We therefore need to clarify many central issues before carrying out the analysis: under what criteria can streets be considered to be part of the public space shared by the community of Ostia during a certain period of time? Which streets are public, semi-public or private? How can we deal with large open spaces like the *forum* area with four interactive borders? How can we divide continuous urban space into individual street units? And above all, we need to be aware of the fact that there is a qualitative judgment to be made when decisions are taken to identify units of space.[126] Ostia's *pianta delle regioni e degli isolati* (1953) serves as a good indicator for the street network present within the excavated areas,[127] even more so since the map provides additional information, marking all those streets and squares which have paved surfaces, hence public use can then be assumed. Therefore it was decided to use the '*pianta*' as the base map, and once having defined the data set we can move on to the analysis.

.

126. Grahame (2000: 29).
127. See map attachment in Calza (1953).

7.6 SYNTACTICAL ASSESSMENT OF OSTIA'S STREETS

Ostia's street network within the excavated areas comprises a total of 150 street-units.[128] The syntactical assessment, using UCL's Depthmap software for spatial analysis, produced axial graphs, calculated for integration (radius n and radius 3). Integration (radius n) is a global measure showing the degree of accessibility a street has to all other streets in the city, taking into account the relation between all streets to all other streets within the system.[129] Integration (r3) is a local measure calculating all streets accessible within a certain topological radius, here a radius of two other streets. The graphs are visually rendered along a colour range from red to blue, with the most integrated streets marked red to orange and the least integrated ones marked dark blue. However, we have to keep in mind that the results remain preliminary since the analysis is restricted to streets within the excavated areas, and therefore represent only a part of the entire system. At best we can consider the street network within the excavated area as a delimited sub-set, confined by the river as a natural boundary and the city-gates as additional boundary markers.

From the analysis of the street configuration of the excavated area, the main access roads, the eastern and western *decumanus*, as well as the *Via della Foce,* leading from the *forum* to the mouth of the river and the river harbour, clearly emerge as the most integrated streets, serving the east-west/west-east movement within the city (Fig. 7.8). These results have been confirmed by the preliminary analysis of the complete street network, using 476 street-units (Fig. 7.9).[130] The larger Ostian street system still

128. The programme used for axial analysis, Depthmap, identifies and analyses visually connected lines, hence some streets will be composed of two or more units, depending on whether lines of sight have been disrupted along the course of the street.
129. Hillier and Hanson (1984: 108-109).
130. The analysis of the extended street system is based on the DAI survey; the preliminary results were communicated by M. Heinzelmann at the 105th Annual Meeting of the Archaeological Institute of America, San Francisco, California, January 3, 2004; the final publication of the DAI survey, conducted between 1996 and 2001, is expected shortly.

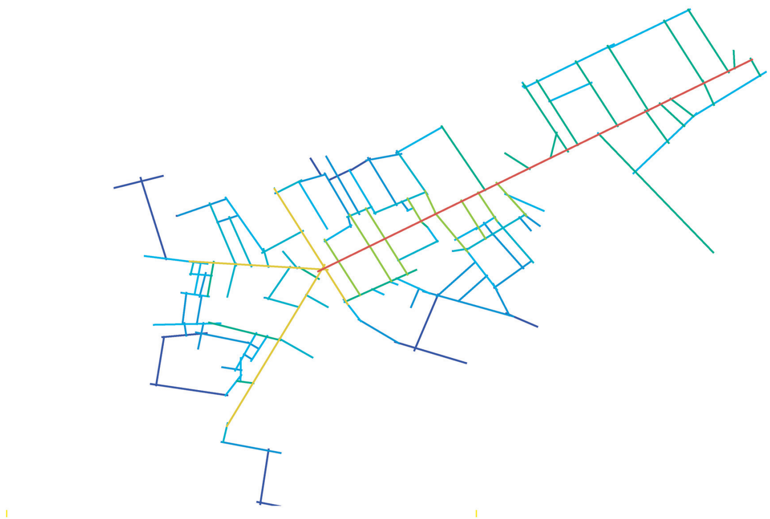


Fig. 7.8 – Street network, excavated areas only; axial analysis, integration (HH, n-streets, 150)

earmarks the eastern and western *decumanus* as the most integrated streets. However an interesting shift of gravity can be observed, giving more weight to movement towards the areas south-east of the Porta Laurentina, where fairly dense urban development appears to have been present. This issue needs to be further explored, once the final results of the geophysical survey of Ostia have been published.[131]

Within the scope of this chapter it is sufficient to establish that the eastern and western *decumanus* and the *Via della Foce* remain unchallenged as the most accessible streets, even within the larger city expansion. These most integrated streets are directly linked to each other within the system. They form a close network and can be interpreted as streets that would have facilitated the intelligible movement through a system that follows 'globalising rules'.[132] These are the streets which were most likely the ones to be used by everybody, local population as well as visitors and transient population, since they direct movement to the centre from possible places of arrival and departure. In addition, as stated earlier on, movement from side-street origins to side-street destinations most likely passes through sections of the main streets, thus creating more movement along the main streets and leading to a higher potential for chance interaction along these streets. Hence the grid itself contributes to making the main streets the busiest streets, as has been explained by the principles of the movement economy. The relevance of this will be become more significant when streets will be examined in terms of the land-use located along them. This will be the subject of the next chapter, which is concerned with Ostia's guild seats and their spatial organisation.

131. See Heinzelmann (1998a, 1999) for preliminary results of the geophysical surveys in the unexcavated areas of Ostia.

132.'Globalising rules' ensure a proportional relationship between the streets and the blocks of a city. With regard to movement, globalising rules have the effect of maintaining the coherence of the growing city from the point of view of the individual (a stranger), moving around in the system; see Hillier and Penn *et al*. (1993: 63). A good example comes from the pre-modern City of London: whichever city gate was entered, the 'centre' could be reached in three axial steps, provided only that at every point of choice the longest available line of sight was followed. In this way the street system preserves a limited depth of access ('shallowness' cf. Hillier and Penn *et al*. 1993: 63-64), which is much needed for intelligible movement within the city.

Fig. 7.9 – Street network, extended area; axial analysis, integration (radius-n, n-streets=476)

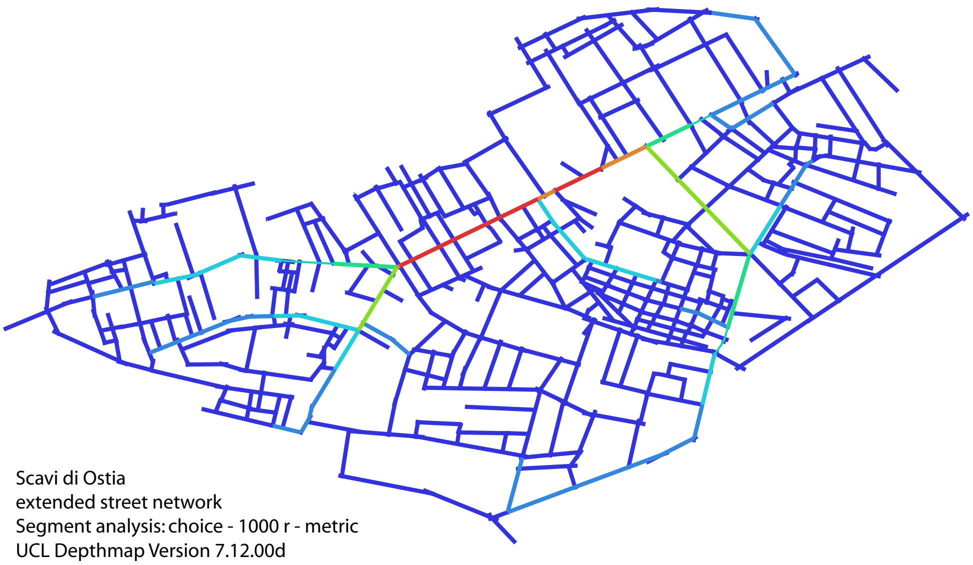
7.7 SEGMENT ANALYSIS ALONG VARIOUS METRIC RADII

A further analytical perspective has been explored to strengthen the Space Syntax analysis. Therefore, Ostia's street network has been analysed a second time, using Depthmap's segment analysis.[133] Segment analysis identifies the line structure of the streets and finds the paths with the least angles; the latter correspond closely to how people navigate through urban space, as has been established through both street network analysis and empirical research.[134] Ostia's extended street network has been examined for the following metrical radii (250, 400, and 1000) calculated for all streets to all streets within the range of the radius given. Two spatial values have been calculated: integration and choice. These measures deal with the two main components of human movement: selecting a destination (integration) and selecting a route (choice).[135] Hence these measures give a reasonably good account of observed human movement. In practical terms, 'integration values' can help to identify whether a shop is placed in an easily accessible location with respect to all other street segments. 'Choice values', in contrast, measure the potential for passing movement, which can be understood as an indication for 'passing trade', referring to occasional encounters on the route to another destination. The graphs are again rendered in a colour scale from red to blue, with the red colour as the most integrated street segments, while the blue colour indicates the least accessible segments (see Fig. 7.10 to 7.13 for 1000, 400, 250, and 50 m metric radii). Local movement is best accounted for by a local radius choice measure of about 400 metres, whilst vehicular movement should be best reflected in a higher radius. The graphs allow insights into the movement potential of Ostia's streets and again identify the streets which were most used as destinations (based on the integration values) and as routes passed through on the way to reach a destination (reflected by choice values).

133. This brief introduction to segment analysis follows the 'simple guide' compiled by B. Hillier. These instructions have been communicated and distributed through the Space Syntax network (reference: Using Depthmap for urban analysis_1401081) Hillier (2008b)

134. Hillier and Iida (2005).

135. The analysis takes into consideration the so-called 'distance decay', which means that more often a close destination is selected and less often a distant one.



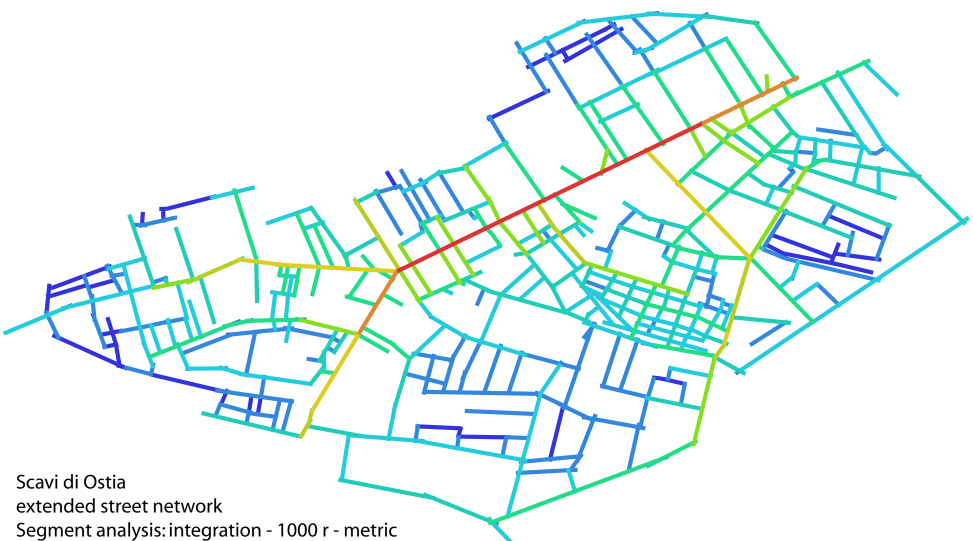


Fig. 7.10 – The metrical radius of 1000 m measured for choice indicates the routes selected by most journeys to reach any destination within the range of the radius of 1000 m; measured for integration, the graph indicates in red the streets which were most accessible to all others and hence most likely selected as destination streets; a high consistency between choice and integration is observable along the eastern *decumanus*

Both graphs measured for choice and integration (radius 1000 m) identify the eastern *decumanus* (marked in red) as the most integrated and most accessible segment of Ostia's extended street network, hence the best location for any movement seeking business. Choice measures for the same radius also identify the eastern *decumanus* (marked in red) as the segment of the street network which was most likely to be selected when travelling from any point of departure to any destination within the radius given. The graphs measured for integration also reveal high values for the first section of the western *decumanus*, and interestingly enough also for the first part of the Via del Sabazeo; the latter intersects the *decumanus* east of the theatre, leading from the *decumanus* to the areas in the south east of

Fig. 7.11 – The graph (250 m radius) confirms the western *decumanus* (choice and integration measures)

the city. Quite significantly, the southern *cardo* has not been detected by any of the analyses as playing an important role within the street system. The Semita dei Cippi as well as the southern *cardo* are often referred to as Ostia's all important north-south axis providing the lines of communication to the south-eastern areas of the Piana Bella and beyond. In Late Antiquity the connection between the *decumanus* and the Semita dei Cippi was blocked by a monumental exedra,[136] which seems very probably to have been an urban response to a street which had not much interaction to offer, and hence could easily be blocked off. Judging from the Space Syntax analysis, it seems very likely that the role of the Semita dei Cippi for

136. See for example Gering (2004: 326) who refers to the Semita dei Cippi as the most important north-south axis of Ostia.

Fig. 7.12 – Segment analysis graphs produced for 400 m radius: choice and integration

the transport of agricultural products entering the city from south-eastern direction through the Porta Laurentina might have been overrated in Ostian research, while the importance of the Via Sabazeo, leading to Ostia's south-eastern areas, might have been underestimated within traditional views.

The graphs produced for the range of 400 m are more interesting since they would allow us to gain some insights into local movement. Within today's urban planning a radius of 400 m is considered to be the range within which nearly all pedestrian movement is likely to be confined, while radii of 800 m and larger would imply vehicular movement in today's terms. Within our past urban environment the 400 m radius identifies the eastern and western *decumanus* as the most integrated streets, while the first part of the Via della Foce and the Via del Sabazeo are also part of the most accessible streets within the range of the 400 m radius. Concerning the choice measurements, once again the western *decumanus* is identified as the segment of the street network which has the most potential to be the through route for all journeys within the given radius.

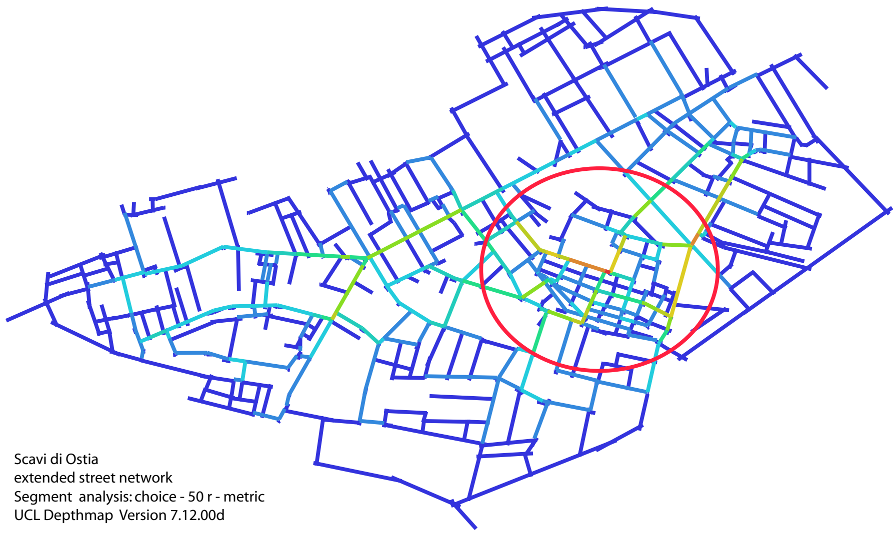


Fig. 7.13 – Segment analysis graphs for 50 m radius: choice and integration

Segment analysis calculated for a radius of 50 m might not be very revealing, although it might enable us to detect a smaller scale of movement within a very local environment. The choice measures for the 50 m radius brings us into the densely gridded streets of the area south-east of the *decumanus*, the smaller scale and denser network of paths suggests that the area was compactly developed. When looking at the graph for integration measures for the same radius, the graph takes us out into the more peripheral areas, where it seems likely that short trips would stay within the local neighbourhood: one could think of short trips to the local grocer shop at the corner, all serving their own small neighbourhood.

In conclusion, when considering all metric radii calculated, segment analysis re-confirms the eastern *decumanus* as the most integrated part of the entire street system. However, at a more local level (r 400 m) the south-eastern area of Ostia emerges as a densely developed area which certainly carried an important weight within the movement system of the city.

7.8 THE VISUAL STRUCTURE OF OSTIA'S URBAN LANDSCAPE

A further method of analysis provided by Depthmap's visibility graph analysis (VGA) has been applied to Ostia's streets and public spaces. VGA allows insights into the visual structure of the streetscape, drawing on the relationship between visibility and movement.[137] The positive correlation between visual integration and observed movement is one of the important findings from syntactic studies of building layouts and urban spaces, and has been confirmed by empirical studies.[138] As discussed before, axial analysis and segment analysis of the street networks have demonstrated that the eastern *decumanus* and its extensions (Via della Foce and the western *decumanus*) emerged as the most integrated streets within the entire system.

VGA confirms this picture and in addition provides clear indications where the most visually connected spaces have been located (see Fig.7.14), again displayed along a colour range from red for the most integrated spaces to blue for the least integrated spaces.

A number of interesting observations can be made through a reverse mode of archaeological investigation, starting from the results of the VGA. The analysis identified several locations within Ostia's streets and public space with a very high degree of visual integration. These are the areas along the eastern *decumanus*, concentrated in front of the theatre, and in the centre of the *forum*, as well as the so-called 'bivio del castrum', referring to the intersection between the *decumanus* and the Via del Pomerio, which is also the starting point for the Via della Foce and the western *decumanus*, hence a place where five streets meet.[139]

Fig. 7.14 – Visibility Graph Analysis: public space of Ostia (2nd half of the 2nd century AD) – the visually most connected spaces along the eastern *decumanus*, notably in front of the theatre, in the centre of the *forum* and at the intersection of the *decumanus* and the Via del Pomerio

137. The method has been explained in Chapter Four, see above.
138. See section on Space Syntax above, especially the studies conducted in the Tate Gallery.

139. Visual lines from five directions converge here; as a matter of fact this point has been selected as the 0-benchmark (reference point 36), when the local reference system for Ostia was set up by the University of Viterbo and the École Française de Rome (see Chapter Four on methodology above).

When comparing the VGA results against the site map of Ostia and the architectural remains which are still extant, it can be observed that most areas of high visual integration were marked by architectural structures in the form of fountains, arches or *compita* (cross road shrines). Being constructed at different periods of time, these 'markers' do not conform to a coherent programme of urban embellishment, but seem to suggest a deeply rooted concern for ordering space along visual principles. This brings to mind Lynch's concepts of place legibility, and MacDonald's ideas about 'urban armatures', as well as the concept of the 'urban information field', a more recent approach by Salingaros that developed out of Christopher Alexander's ideas about cities.[140] Surely these concepts could be helpful in adding theoretical strength to the results of the VGA, moreover they would contribute a 'vertical aspect' to the essentially two-dimensional VGA analysis. However they are not further explored within the remit of this chapter, but might be interesting for future research.

As indicated by VGA (Fig 7.14), visibility converges in front of the theatre; this fact seems to have been 'exploited' architecturally through the construction of *nymphaea* on both sides of the theatre (Fig. 7.15), marking the location of greatest visual integration, and giving the area social cohesion.[141] At a later point in time, an arch in honour of Caracalla was added,[142] underlining the area of heightened visibility in front of the theatre. Placed there, the arch stretched over the entire width of the *decumanus* and was supported by ornately decorated pillars on either side of it. Two pillars were placed against a pre-existing portico on the southern side (IV, xi),[143] while their counterparts were built against the arcades of the theatre (Fig. 7.16). The arch of Caracalla must have provided the first focal point for visitors (or residents) after entering the city through the Porta Romana, when proceeding along the eastern *decumanus*.[144] When standing at the Porta Romana, the arch would have marked the limits of 'comfortable' inter-visibility and would have offered visitors a directional focus, pulling movement towards the centre of the city.

Fig. 7.15 – Architectural markers: nymphaeum located on the eastern side of the theatre, along the eastern *decumanus maximus*

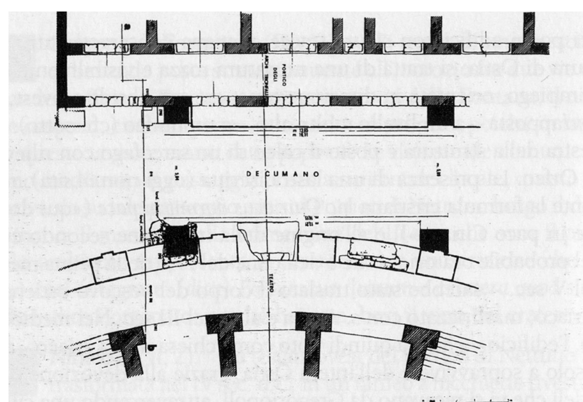


Fig. 7.16 – Arco di Caracalla, plan (source Zevi and Pensabene in Pavolini 2006: 68-69).

140. See Lynch (1960), MacDonald (1986); and Salingaros (2005: 44-63).
141. See Schmölder on public fountains in Ostia (2000, 2001) and Schmölder-Veit (2009); see also Ricciardi and Scrinari on the culture of water in Ostia (1996).
142. J. DeLaine drew my attention to the arch in honour of Caracalla; see Meiggs (1973: 583).
143. On the Portico degli archi trionfali see Zevi and Pensabene (1971: 482); see also Pavolini (2006: 67-69).

144. These observations have been ground-checked by the author, confirming inter-visibility between the visually most integrated areas; inter-visibility has been documented through photographs, taking fore-sight and back-sight shots.

After the theatre, if one continues to proceed along the *decumanus,* the next spot where visibility converges is the intersection between the *decumanus* and the Via dei Molini/Semita dei Cippi (Fig. 7.17). Here it is no longer possible to confirm the presence of an architectural marker. However, the often quoted inscription *CIL* XIV 375,[145] could offer an indirect clue. The inscription commemorates a long list of deeds performed by P. Lucilius Gamala, including public works, donations and sponsorships. Among those many accomplishments claimed by Gamala there is a reference to road maintenance carried out at a section of a street which leads to the *forum*, from the 'arch to the arch' (…*idem sua pecunia viam silice stravit || quae est iuncta foro ab arcu ad arcum*|…). At face value it is plausible to assume that the street paved by P. Lucilius Gamala was the section of the *decumanus*, which passes through the centre of the town, intersecting the *forum*, and the arches were the original east and west gates of the Republican castrum.[146] This view was however refuted by a more recent study, suggesting that the section of the street in question was the *cardo maximus*, leading to the *forum* in a south-north direction, and hence the arches would be the northern and southern gates.[147] In any case, there is no archaeological evidence which could confirm the presence of an arch at the intersection of the Via Molini and the *decumanus*. However, this does not exclude that arches once marked the entrances to the city centre, replacing the original gates to the *castrum*. Moreover, the use of the term 'arch' instead of 'gate' in the inscription could imply that a shift in meaning from a civic gate to an architectural monument had taken place, and hence we would already be a step closer to the use of arches as architectural markers.[148] Another inscription, probably from a statue base dated the 2nd century AD, was also found in the vicinity of the intersection, and could also point to the presence of an arch or gate placed there to mark the entrance to the centre of the city. The inscription seems to relate to the creation of urban memory. It commemorates the foundation of Ostia as the first Roman colony by Ancus Marcius, the fourth king of Rome.[149] It seems likely that there may have been an arch marking the entrance to the centre of the city and it would have been a suitable location to place such an inscription.

Fig. 7.17 – The eastern *decumanus* towards the *forum*, approaching the intersection between *decumanus* and Semita dei Cippi/Via Molini

Further along the *decumanus*, the next area with a high integration of visibility is the central area of the *forum*. VGA shows that visibility is intensified only along the portion of the *decumanus,* where it crosses the *forum* in an east-west direction. In contrast, the areas south and north of the *decumanus* remain less visually integrated (Figs. 7.14 and 7.18). This would indicate that the *decumanus* axis clearly dominates the *forum* and movement would privilege this axis.

145. Meiggs (1973: 558); more recently Zevi (2004b: 47-67).
146. Tentatively suggested by Meiggs (1973: 501).
147. Meiggs' suggestion was convincingly refuted by Zevi (2004b: 55-57).
148. Zevi draws our attention to the use of the term arcus instead of porta, linking it to a functional change which would have turned the gates of the original castrum into architectural monuments, while the civic function of the gates had been taken over by the city walls (2004b: 57).

149. *CIL* XIV S4338 (A[NCO] MAR[CIO] REG[I] QUART[O A R] OM VL[O] QUI A[B VRBE C]ONDITA[A PRI] MVM COLONI[AM –] DEDVX[IT]; see Meiggs 1973: 18; see DeLaine 2008b: 99 on monuments and memory; see also Stöger (2007: 358) on the inscription discussed in the context of urban memory.

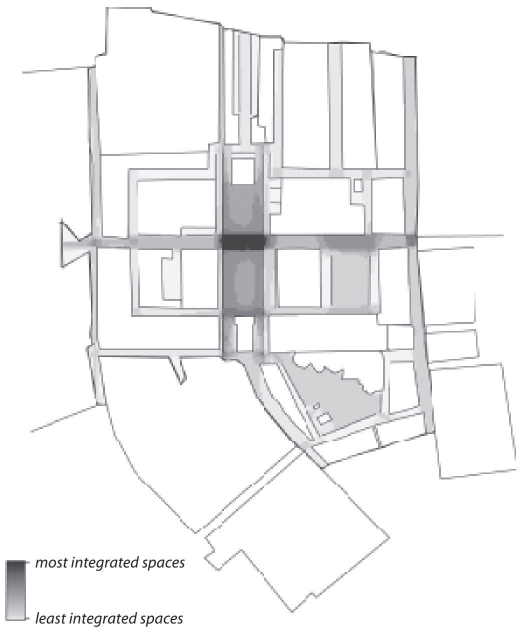


Fig. 7.18 – The *forum* space in the Antonine period (redrawn after Mar 2008: 138, fig. 9): the visually most integrated spaces are concentrated along the *decumanus*, while the north-south axis remains less integrated (Visibility Graph Analysis, Depthmap UCL)

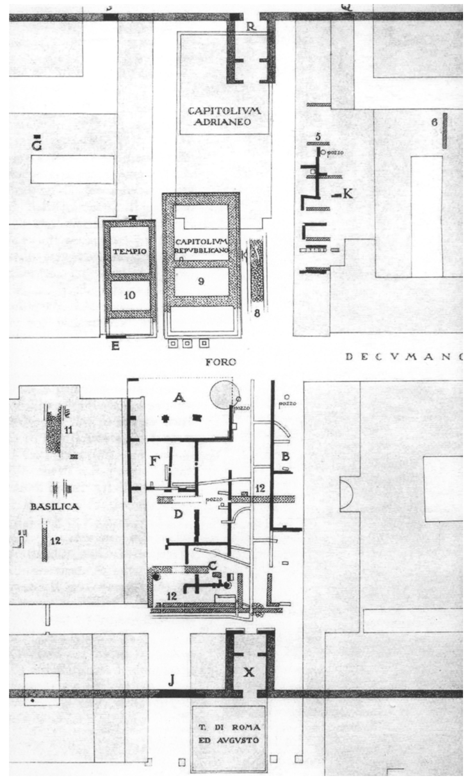


Fig. 7.19 – Ostia's central area in the Republican period: the fountain located south of the *decumanus* might have its origins in the Republican period (Calza 1953, fig. 19)

This could also provide us with some ideas about the spatial dynamics within the total area of the *forum*. A standard way of examining the character of public space is to establish its proportions in terms of width-to-length ratios.[150] These proportions help to distinguish between spaces with more street or square character. Ostia's *forum* seems to have a ratio of about 1:3, and hence falls into the transition between street and square, as one axis, here the north-south axis, would begin to dominate. However, while a north-south dynamic seems implied by the proportions of the square, it is not at all supported by the movement patterns suggested by VGA. The latter seems to indicate a division between the northern and the southern part of the *forum*, with the *decumanus* acting as a dividing line. Interestingly enough, again we find an architectural marker close to the area of intense visibility: a circular structure (most probably a fountain),[151] located in the centre of the *forum* (Fig. 7.19), placed to the south of the area with highest visibility, so as not to impact the flow of traffic along the *decumanus*. The circular structure provided a nodal point within the otherwise open space of the *forum*. It should be mentioned that the *capitolium*, although built to a considerable height,[152] due to its deep setback does not at all have an impact on the visual experience when moving along the *decumanus*. In fact, the *capitolium* is only visible when approached frontally, upon entering the *forum* from the southern *cardo maximus*.

150. See Carmona *et al*. on the spatial dimension of public places (2003: 141).

151. Bakker (1994: 120, 246-247) argues that the circular structure served as a fountain, built over a pre-existing well; see also Calza's plan of Ostia's Republican *forum* which indicates a well at the *forum* (1953: fig. 19).

152. The capitolium is preserved to a height of 17 metres (Pavolini 2006: 103).

The somewhat 'withdrawn' location of the *capitolium* from the *decumanus* could possibly be explained by the relatively late development of the *forum*, which received its northern extension only during the Hadrianic period (or possibly planned in the late Trajanic period). The Trajan/Hadrianic reconstructions of the area seemed to have created an almost separate area including the *capitolium* and the porticoes (see Fig. 1.1 above). Visibility graph analysis confirms the relatively segregated position of the *capitolium* within the larger area of the *forum*.

Fig. 7.20 - Compitum at the *bivio del castrum*

The next focus of concentrated visibility is the '*bivio del castrum*', an important cross-road, located west of the city centre.[153] Throughout Ostia's urban development this junction must have been one of the busiest, making it also one of the most sensitive urban areas. It remained a crucial spot throughout all the imperial period, assuming more and more a monumental image.[154] Notwithstanding this, an open area of considerable size remained preserved, marking the point of 'confluence' of the western *decumanus* and the Via della Foce.

Once again, we find architectural 'markers', first and foremost a *compitum* (Fig. 7.20),[155] later accompanied by a monumental *nymphaeum* dated to the later 2nd century AD.[156] We can observe that the location of the *compitum* coincides with the area where visibility converges (see Fig. 7.14 and 7.21). The *compitum* held its position from Republican times, providing religious protection as a cross-road shrine, and at the same time assuming the role of a nodal point around which streets, coming from several directions, converged.[157] The centre of the cross roads marks the city's cardinal point from which a vast visual field can be commanded, radiating in all directions and expanding over large parts of the city's public space.

153. These cross-roads have their origin in the road system that predates the foundation of the castrum; see above section 7.2.1 and 7.2.2.
154. Calza (1953: 107, tav. XXXVI).
155. See Bakker (1994: 247-250) for a description of the compitum; see Gering for a discussion of the fountain
156. See Gering (2004:351) for detailed information on the nymphaeum and its changes over time. The nymphaeum is located at the intersection between Via Epagathiana and Via della Foce.
157. By analogy one could think of Rome's *Meta Sudans*, a monumental fountain, north of the Colosseum, The *Meta Sudans* marks one of the city's cardinal points, an area where several ancient roads met, creating a hub for four or five of the Augustan regions (II, III, IV, X, I?); see FastiOnline for information and references to Rome's Meta Sudans: http://www.fastionline.org/record_view.php?fst_cd=AIAC_362 (accessed 02.07.2010).

Fig. 7.21 – Isovist analysis reveals the vast extent of the visual field commanded by the location of the crossroads

The visual field can best be captured by means of Isovist analysis (viewshed) as illustrated in Fig. 7.21. The Isovist reveals the visual field as one of the city's underlying spatial structures; it pertains to the city as a global system linking local places through inter-visibility into a larger unit.[158]

When we draw our attention to the western *decumanus* and the Via della Foce, we notice that VGA does not identify any location with heightened visibility (Fig. 7.14 above). Several spatial factors account for the lack of visually integrated spaces along those streets. Firstly, it should be noted that very few intersecting streets are found, while none of them cross the *decumanus*. Secondly, we can observe that the section of the western *decumanus* between the Porta Marina and the Cardo degli Aurighi has been widened, as can be identified from the earlier Republican buildings which had reached further into the streets (Fig. 7.22), while second century AD buildings, e.g. the Caseggiato della Fontana con Lucerna (IV, vii 1-2), have been set-back from the edge of the street, with a portico added to provide protected movement space.

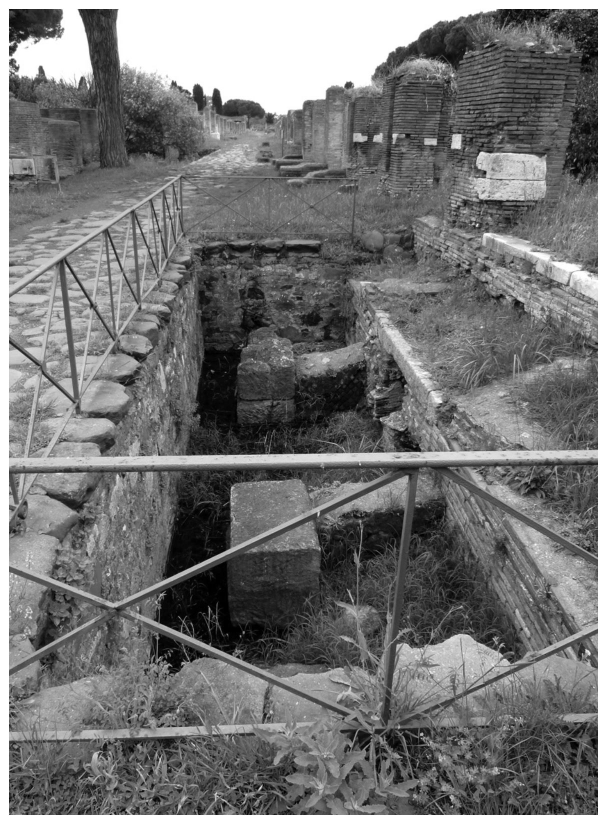


Fig. 7.22 – Republican buildings reaching further into the western *decumanus*, while the 2nd century development pulled back from the street space allowing for wider road clearance

158. See Hillier (2007: 116) on spatial structures.

Fig. 7.23 – The white marble fountain (Fontana con Lucerna) projects into the streets space, providing a visual marker

The apparent lack of visual focus along the straight stretch of the western *decumanus* seems to have been a concern and was adequately addressed during the Late Roman period by placing an eye-catcher: the white marble fountain (Fig. 7.23), located midway between the cross-roads and the Porta Marina might serve as a directional focus, taking advantage of the long vista along the route leading from the *bivio del castrum* to the Porta Marina.

We can further observe that the large-scale commercial-residential building, the Caseggiato della Fontana con Lucerna, located on the western *decumanus*, brought about a marked increase in urban block-size and must have had a significant impact on the street grid. The enormous block size surely affected the coherence of the street network, since direct connections between side streets and back streets no longer existed. Pedestrian movement might still have been permitted, as it is very likely that large city blocks provided passage space for pedestrians to cross from the main street to the back streets. For all we know such arrangements might have depended on individual agreements of free passage, and therefore were not available to the general public. In any case these passages should not distract from the fact that public street space was taken away whenever large city blocks closed off entire areas.

The discontinuity of the urban grid, observed in several locations (Fig. 7.24) is disconcerting. The impact of these large city blocks which formed clusters of semi-private or segregated areas seem to have borne heavily on the street system and one doubts whether the loss of connecting streets could ever be balanced and sufficiently regulated by the remaining part of the still intact street network. The discontinuity seems to be the result of several processes active over long periods of time, whereby city blocks were joined and streets which divided the land-parcels were cancelled and built over. The question arises whether there is a critical amount or a limit to how much discontinuity a street system can handle without losing its ability to generate movement and interaction.

Ostia's street system enjoyed a long period of use during which it was expanded and adapted to serve new directional foci. However, during the late phase of Ostia's occupation, these gradual processes might have escalated into the phenomenon which has been identified as 'road-blocks', completely closing off access between the main street (*decumanus*) and various side streets.[159] It might be an interesting avenue to explore whether there is a relationship between second or third century clusters of discontinued street systems and the Late Roman complete closing off the main street from the intersecting side streets. Again, we have to recognise, and acknowledge that existing space may outlive its original purpose and may become vacant and susceptible to being diverted and re-appropriated.[160]

159. See Gering '(2004) on road blocks ("Strassensperren') in Late Antiquity.
160. Lefebvre (1991: 167).

Fig. 7.24 – Discontinuity (solid pink areas) affecting the cohesion of the street system

7.9 CONCLUSION

This chapter dealt with Roman urban streets in general, and with Ostia's street system in particular. Starting from a theoretical perspective the chapter discussed current approaches concerned with the reconstruction of sensual and social experiences related to movement and interaction in the city. Moving away from the static position of charting streets and defining their physical nature, this study applied a more dynamic approach focused on movement and traffic carried by Ostia's street network. Space Syntax analysis tools helped to explore new ways of looking into Ostia's streets, and revealed the city's movement economy. A variety of Space Syntax analysis tools was employed to investigate different aspects of the street system. Visibility graph analysis helped to identify those locations within the urban grid where visibility converges. By means of an 'inverted archaeological assessment' architectural markers (fountains and compitalia) could be identified, which were placed at locations with heightened inter-visibility. These seem to have been placed to order space along visual principles generated to anchor the city's visual structure to topographical locations. This method helped to establish that the city's most integrated places and cross roads where kept together through inter-visibility. Inter-visibility seems to infuse a global element into all local places and thus creates urban cohesion.

A number of smaller observations can be offered, one of which is the overrated importance attributed to the role of the Semita dei Cippi within Ostia's street network; this was detected by Space Syntax. This idea needs more follow up, but it is certainly a good starting point for investigating the area south-east of Ostia which emerged so strongly from the analysis, and therefore seems promising for new insights to be gained from the local position of this densely developed area of Ostia. Another interesting idea which developed out of the Space Syntax analysis is the discontinuity of the urban grid which can be identified in several locations, and presumably jeopardized viability. The relationship between the areas of discontinuity and the areas which were first abandoned in the Late Roman period should be an interesting field of study. A closer archaeological investigation into those areas seems promising and needs to be taken up in the near future.

8 – Scaled Approaches to Urban Space: Ostia's Guild Seats and the Movement Economy in Roman Cities

This chapter examines the relationship between individual buildings and street space, applying Space Syntax concepts and techniques to Ostia's guild buildings and the street network. Constructed in the second century AD, the guild buildings served as club-houses, accommodating the activities performed by the guilds, the so-called *collegia*. The guild buildings played an important role within Ostia's second century AD society, marking those hot-spots within the city, which offered platforms for social and economic activities and potentially sustained a greater social dialogue than most other places. To appreciate the guilds' spatial behaviour in a more comprehensive way, questions about the interaction between the guild buildings and the city's streets and public spaces will be addressed.

This chapter begins with an overview of Roman guilds and the history of their study before taking a closer look at the guild seats and their topographic setting. Next, the data-sets for spatial analysis are introduced. This is followed by the analysis of the individual buildings, matching them to the results obtained from the assessment of the street network. Finally, by way of conclusion the value of the method will be considered in the light of the results obtained and how these contribute to our understanding of the movement economy in Roman cities.

8.1 THE GUILDS AND THEIR BUILDINGS: COLLEGIA AND SCHOLAE

The *collegia* or *corpora,* the so-called guilds, were probably the most important private associations in Roman society. Organised on the basis of voluntary membership, the guilds pursued goals with stated religious, social or professional objectives, which in practice often overlapped. Their members belonged to the *tenuiores,* the lower classes, below the three orders *(ordines)* of senators, knights and municipal decurions.[1] This class distinction seems foremost a legal one, since at the same time the members must have been of good financial standing since their memberships involved considerable financial commitment.[2] The guilds could hold property and inherit legacies.[3] Their investment in urban assets becomes primarily visible through their guild buildings, the so-called *scholae*.[4] These often form part of a larger building complex, sometimes comprising entire *insulae* with diverse land uses.[5]

8.1.1 History of research

About 60 different guilds and their activities have been identified for Ostia through inscriptions.[6] These guilds are mainly connected to port activities (e.g. the guilds of the ship owners, the weight controllers, the grain measurers and the bargemen), but also to services required by parts of the city's inhabitants.[7] Concurrently these guilds also dealt with the social and religious needs of the local community. In one way or another, the guilds covered almost every aspect of the town's life, involving a considerable part of the population.[8] The complexity of guilds and their extent of involvement compares well to networks in various senses: functional, social and spatial. As social networks the guilds provided interaction between individuals, groups and institutions;[9] while

1.Bollmann (1998: 22).
2. Ausbüttel (1982: 46-48).
3. See Meiggs (1973: 312 note 4).
4. See Ausbüttel on donations and investments by guild members to construct or embellish guild buildings (1982: 43).
5. See Hermansen (1982: 95-121) on urban property owned by Ostia's guilds; and specifically Hermansen's assessment of possible guild property based on Roman building laws; contra Bollmann (1998: 213-221).
6. Chevallier (1986: 153-157).
7. Hermansen (1982: 56).
8. Meiggs (1973: 312).
9. Cf. Remus (1996).

on a functional level they offered a flow of commercial services, communication and man-power. As spatial networks the guilds manifested themselves through the city-wide distribution of their buildings.

Information about the social activities of *collegia* comes almost entirely from dedicatory inscriptions, *alba*, decrees conferring offices, and legal codes.[10] In this way little is known about daily routines or less 'celebrated' activities, while the commemorated activities are mostly religious observance, acts of patronage, reciprocation and conviviality.[11] These activities were often attached to particular and identifiable locations, the so-called *scholae* (guild buildings). Thus the guild buildings played an important role in second century AD Ostian society. Out of a larger number of Ostia's possible guild buildings, only 18 have been archaeologically identified as *scholae.*[12] Their identification is based on the combined evidence of architectural remains and inscriptions found *in situ*, often corroborated by iconography and décor of wall paintings, floor mosaics, as well as statuary.[13]

Roman *collegia* and *corpora* have a long research tradition, attracting scholarly interest as early as the 16th and 17th centuries.[14] In the 19th century, when ancient historians were inspired by their personal experience of newly founded 'bourgeois' voluntary associations, their research interest was principally focussed on the legal and political status of Greek and Roman *corpora.* With the compilation of the *Corpus Inscriptionum Latinarum* at the end of the 19th century, *collegia* research experienced a major advance. Waltzing's four volumes (1895-1900), resting firmly on the basis of the *CIL*, included a collection of all then available relevant epigraphic and literary material. The work remains an unmatched landmark in *collegia* studies.[15] The interest in Roman associations peaked a second time in Italy in the 1930s/40s, when the corporative state ideology of Italian fascism prompted a renewed fascination with Roman associations. The resulting studies however did not reflect the bias of the political system which created the renewed interest.[16] De Robertis, the foremost authority on the legal status of the Roman *collegia*, produced academic analyses that bore no trace of the environment in which they were created.[17] Recent scholarship has been mapping out the modern evolution of the ancient concept of Roman *collegia*, taking a keen interest in how the political and social movements of the 19th and 20th centuries in Western Europe have shaped scholarly work on the ancient Roman *collegia.*[18]

Until the 1980s research on *collegia* seemed to be firmly in the hands of historians, relying exclusively on epigraphic and literary sources. Hence the material culture of *collegia* and *corpora* was only explored through epigraphic material and its references to certain buildings and related objects. Even when large-scale excavations in Ostia (between 1938-40) substantially broadened the material record, it took almost two decades before the first essays concerned with *scholae,* the actual *collegia* buildings, appeared.[19] Such excavations gave the first indications of what *scholae* could look like, when confirmed by epigraphy, which alone gives certainty and allows for limited comparative inference.[20] Subsequently, various *scholae* and their architectural characteristics were published independently. The first compilation of all Ostia's presumed *scholae* appeared in 1982.[21] Yet other publications, although presenting combined archaeological and epigraphic

10. See Bollmann (1998: 37-39) on social activities performed by collegia with references to relevant epigraphic sources, see Bollmann's for Ostia's collegia: catalogue entries A27-A45 (1998: 275-345). These entries describe identified *scholae* with inscriptions attributed to them. In addition, Bollmann's catalogue C provides inscriptions referring to *scholae* which have not been identified archaeologically; catalogue entries C 29-37 are relevant to Ostia (Bollmann 1998: 470-471).
11. Patterson (1994: 233).
12. Bollmann (1998).
13. Bollmann (1998: 275-345), cf. Hermansen (1982: 85-6), cf. Laird (2000) for a controversial view.
14. Ausbüttel (1982: 11).
15. Waltzing (1895; 1896; 1899 and 1900).
16. Ausbüttel (1982: 13).
17. In 1971, after decades of research De Robertis (1971) published a two-volume history of Roman corporations, including his earlier works produced during the crucial period of Italian fascism; see Ausbüttel (1982: 13) and Perry (2001: 205).
18. Perry (2006).
19. See Bollmann (1998: 17).
20. Slater (2000: 495).
21. Hermansen (1982: 55-89).

evidence, concentrated on comparative studies of single groups of *collegia* and their respective type of *schola* in various Roman cities, e.g. the *scholae* of the *augustales*.[22] Flambard's essay provided a model for the integration of architecture and epigraphy, detailing a selection of several important collegial inscriptions.[23] To date the most complete survey of the combined archaeological evidence and epigraphic sources is Bollmann's *Römische Vereinshäuser*.[24] Her study relates to a wider field of interpretations and seeks to understand the *scholae* as a means of self-representation within a civic and urban context. With specific reference to Ostia, various earlier studies have already identified the *collegia* as one of the major urban driving forces.[25] Accordingly, the social and spatial significance of *scholae* has been realised and demonstrated, offering various interpretations of their architectural structures.[26] These are informed by Roman building laws,[27] literary analogies,[28] and to a large extent by a careful reading of topological characteristics.[29] Most of these studies share a notional understanding of the

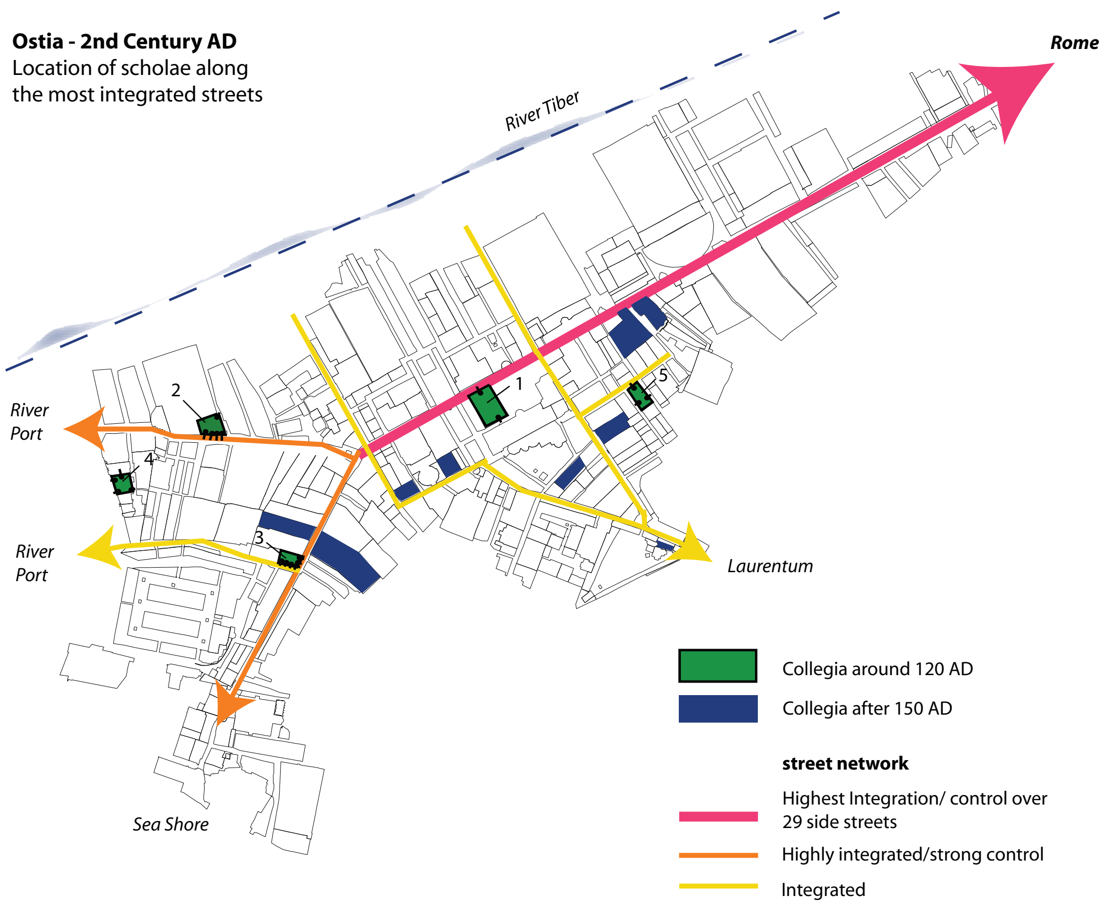


Fig. 8.1 – Ostia in the second century AD (excavated areas only), location of guild buildings (scholae) along the most integrated streets

22. Cf. Bollmann (1998: 18).
23. Cf. Slater (2000: 493); Flambard (1987).
24. Bollmann (1998).
25. Meiggs (1973); Kockel (1993).
26. Bollmann (1996: 195-200); Steuernagel (2004: 176-209).
27. Hermansen (1982).
28. Egelhaaf-Gaiser (2000; 2002).
29. Steuernagel (2005: 73-80).

spatial patterns present in the location of the guild seats and the spatial organisation of the buildings; but do not advance much beyond a descriptive level of this aspect.

8.1.2 A fresh look at guild seats

To reach past these descriptive interpretations and to understand better the dynamics at play, different ways of spatial assessment should be explored. The architectural structures of Ostia's *scholae* and their overall integration within the urban network are the point of departure for the spatial investigations presented here. A number of independent spatial aspects of the city's *scholae* have been considered: the size and shape of buildings and rooms, and the internal organisation of space and their accessibility. Size and form of the buildings often correspond to physical expressions of economic and social standing and might betray a link to the status of the guild and their members. The organisation of space and the degree of control or ease of access reflect the level to which the *scholae* have been structured to promote and encourage social encounter. The accessibility of the buildings and their location in relation to the street network are indicative of the spatial behaviour of *collegia* and their interaction with the city. Therefore, by examining the buildings' spatial properties this study investigates whether the spatial organisation of Ostia's *scholae* matches their presumed integrative role in society, a role suggested by previous investigations based on ancient literary sources and intuitive approaches to space.

Moreover, to appreciate better how Ostia's guilds organised and negotiated space, the locations and distribution of their *scholae* need to be studied within the wider context of the city's street network (Fig. 8.1).

8.1.3 An integrated approach with two data sets: buildings and streets

The integrated approach proposed in this study, combining aspects of Space Syntax at the micro-scale level of individual buildings and at town plan level, appears to be a promising way to capture thespatial properties of Ostia's guild buildings.[30] From a larger group of guild buildings, dating to the second century AD, five guild buildings have been selected for closer spatial assessment (Table 8.1). These form a small but coherent sample for spatial analysis, since all were built during the 1st half of the second century AD, within a period of *c.* 20 years. The second data set concerns Ostia's street network, for which two sets of streets have been taken into consideration. Firstly, the streets and public spaces which make up the street network of the excavated area, which amounts to about one third of the original expansion of Ostia.[31] Secondly, the extended street network based on the preliminary results of the geophysical surveys, tentatively assessed for control purposes only.[32] The Space Syntax analysis of Ostia's streets has been presented in detail in chapter seven of this study.

Names of the Guild Buildings[a]	Site-Reference	Date	Location
Casa dei Triclini	I, xii, 1	c. AD 120	Decumanus/Forum
Aula e Tempio dei Mensores	I, xix, 1-3	c. AD 112	Via della Foce
Domus di Marte	III, ii, 5	c. AD 127	Decumanus (west)
Domus accanto al Serapeo	III, xvii, 3	AD 123-126	Via del Serapide
Caseggiato dei Lottatori	V, iii, 1	c. AD 120	Via della Fortuna Annonaria

Table 8.1 – Sample for spatial analysis: five selected guild buildings of Ostia

[a] The names have been attributed to the buildings by the excavators. Some reflect proximity to other buildings or have been inspired by archaeological features present in the buildings, e.g. the walled *triclinia* or the statue base dedicated to Mars

30. See Stöger (2009; 2011), for earlier published work on a syntactical assessment of Ostia's guild buildings.
31. Heinzelmann (2002).
32. See Chapter Seven, section 7.5, p. 213, note 130.

8.1.4 Guild seats - buildings with low architectural definition

Ostia's guild buildings and Roman guild buildings in general, are characterised by varied layouts and a lack of formal architectural language, making it hard to identify them as *scholae* in the first place. The ultimate confirmation comes from epigraphy, which alone gives certainty.[33] While they display architectural diversity, their functional role seems to be shared by all guild buildings. Above all, these buildings had to offer suitable premises to accommodate a range of activities performed by the guilds (banquets, religious and cult practice, as well as formal and informal encounters and gatherings).

Although the small sample size of five guild buildings does not offer sufficient statistical material to allow for a strictly quantitative assessment, still some general characteristics can be evaluated, and a comparative examination between the individual *scholae* can be achieved. Space Syntax is well equipped to compare different ground plans, since it permits the assessment of architectural structures of very different spatial configurations.[34] Space Syntax does not attach functional labels to space; instead it understands buildings as structured configurations of space, which form patterns of movement and encounter.[35] Given the fragmentary nature of archaeological data, such a value-free characterisation seems most welcome in archaeological research, even more so since 'labelled spaces' with evident land-use properties and clearly defined functions are often only found in exceptional sites such as Pompeii, where spaces can be identified through well-preserved finds and detailed architectural records, which is rarely the case for Ostia.

8.2 THE SCHOLAE: ARCHITECTURE AND SETTING

The *scholae* selected for analysis will be briefly introduced and for better clarity their specific urban setting will be explained. The *scholae* are located in various parts of the city; the significance of their trans-spatial distribution will be discussed later. The following descriptions of their spatial layout, which also formed the basis for the access diagrams, are largely based on Bollmann's descriptive reconstructions, complemented by the Calza's 1953 site-plans,[36] and an on-site assessment of the architectural structures by the author.

8.2.1. The Casa dei Triclini, I xii 1 (Fig. 8.12)

The building is located on the southern side of the eastern *decumanus* (Fig. 8.1 building nr 1), bounded by the Via della Forica in the south and separated by a colonnaded passage from the *forum* proper in the west. The area east of the *schola* was at a later stage (fourth century AD) occupied by the so-called Foro della statua eroica creating an extension to the open areas of the Terme del Foro. The Foro della statua eroica had been built over the structures of earlier baths, dated to the Hadrianic period,[37] contemporaneous with the Casa dei Triclini.

The *Casa dei Triclini* has been identified as the meeting place of the *fabri tignuari* (the guild of the builders) by an inscription found on the base of a statue which presumably once carried an image of Septimius Severus.[38] There is no secure evidence for earlier use as a *schola*. Nevertheless, constructed in *opus reticulatum/brick* of remarkable regularity and finish, the building appears to be well-suited to represent the trade of the builders. The layout resembles a large *domus* with a central inner courtyard, a *tablinum*-style cult-room and ranges of rooms on both sides of the courtyard. The following architectural description neglects later alterations and attempts to reconstruct the building at its earlier phases as represented on the schematic plan (Fig. 8.12). The building's main entrance (E1) leads from the *decumanus* into the courtyard (Fig. 8.2). This wide entrance is flanked by two *tabernae* on both sides and a flight of stairs leading to upper

33. Bollman (1998); Slater (2000).
34. Lawrence (1990: 75), cf. DeLaine (2004: 161-3).
35. Grahame (2000: 40).
36. Bollman (1998); Calza (1953).
37. Pavolini (1983: 108); Cicerchia and Marinucci (1992: 20-22); Calza (1953: 128, fig. 32).
38. Calza (1927: 380); Pavolini (1986: 137); and Hermansen (1982: 62).

floors, no longer extant. *Tabernae* and stairs have no access to the inner part of the building. A secondary entrance (E2) opens to the Via della forica, while a third entrance links room (4) to the area to the east which was later to be occupied by the Foro della statua eroica. This southern entrance is also flanked by rows of *tabernae* and stairs, none of which are linked to the house's interior. The narrow entrance corridor provides access to room (K), which might have served as a kitchen/utility room. The corridor connects to space (8); a room that is best defined as one of the two *alae* flanking the *tablinum*-style central cult room (A).

Fig. 8.2 – Casa dei Triclini, I xii 1, seen from the entrance corridor when accessed from the *decumanus*; the tablinum-type room is in frontal view located opposite the entrance; patches of *opus spicatum* pavement are visible in the left corner below (photo courtesy of Ostia website)

Inside the building are two staircases (st1, st2) leading to upper floors no longer extant. Without having to cross much of the interior porticoes (3, 8), the stairs can be reached by a single right-hand turn from the corresponding entrance closest by, making accessibility of the upper floors relatively independent of the ground floor. On both sides of the central courtyard, ranges of rooms open behind the porticoes. Four larger rooms are located on the eastern side (4, 5, 6, 7) and five smaller ones (10, 11, 12, 13, 14) on the western side. The location and the size of the doors connecting the rooms to the portico are significant. The eastern rooms, characterized by walled *triclinia* placed there at a later point, have wide, centrally positioned doors (1.50 m w, 2.40 m h), offering full visibility from the courtyard into the rooms and vice-versa. The rooms on the western side show a different pattern. Smaller door openings (1.15 m w) are placed right next to the southern walls, while centrally placed windows offer an additional light source. By locating the door next to the corner where the wall along the portico meets the southern walls at an angle, only a small part of the room is visible from the outside. The major part of the room is kept "out of sight" and potentially offers more privacy. All rooms have travertine thresholds with grooves to insert doors that could be closed from the inside.

From the main entrance (E1) the ample courtyard presents itself in full axial alignment. The first part of the portico (3), linking the entrance to the courtyard, creates a spacious foyer measuring twice the size of the lateral porticoes (8, 9). An atrium-like rectangular space forms the central space of the courtyard, its floor is covered by a slightly concave surface paved with white mosaic *tesserae*. A bronze ring was placed at the lowest point in the centre presumably collecting and conducting rain water.[39] 12 columns enclose the apparent *atrium* and support the surrounding porticoes (3, 8, 9, 15). The *tablinum*-style cult room (A) opposite the main entrance represents the focal point of the building. A separate space (15) in front of it provides access to the cult-room and a passage between the flanking *alae* (8, 9).

8.2.2 Aula e Tempio dei Mensores, I xix 1-3 (Fig. 8.3)

These buildings are located within a trapezoid enclosure, situated at the northern side of the Via della Foce (Fig. 8.1, building nr 2). The enclosure also includes a courtyard and a range of rooms east of the temple (Fig. 8.4).[40] The *schola* complex seems structurally and functionally linked to the *Horrea dei*

39. Calza (1929: 170).
40. Bollmann (1998:291-295), Hermansen (1982:65-66), Calza (1953:125).

Mensores (I xix 4), and occupies the south-eastern corner of the street block otherwise fully taken up by the *horrea*. Along the eastern boundary of the *insula*, a street leads from the Via della Foce to the Tiber, separating the *horrea cum schola* from the *Terme del Mithra.*

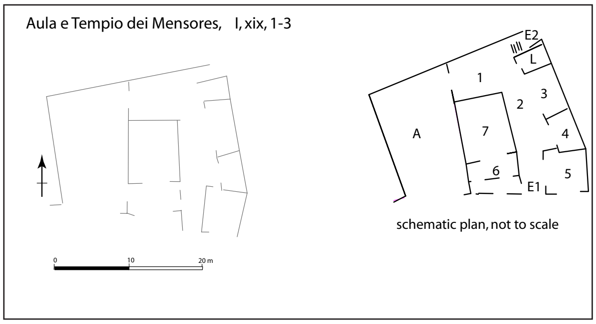


Fig. 8.3 – Aula e Tempio dei Mensores, I xix 1-3

Confirmed by epigraphy and iconography the so-called *aula* has been identified as the seat of the *collegia* of the *mensores*, the grain measurers.[41] The aula (A) consists of a single room fully open towards the Via della Foce, yet separated from the street level by a 50 cm high travertine threshold. Adjacent to the aula, elevated on a podium lies the presumably tetrastyle prostyle temple (7). The remaining *cella* is oriented towards the Via della Foce and accessed by stairs (6) which reach out into the street space. East of the temple the surrounding irregular L-shaped space starts as a passage (E1, 2) and opens up into a courtyard (1) north of the temple. Starting from the Via della Foce the floor levels of the L-shaped space gradually descend, creating a difference in height of about two meters between courtyard and adjacent aula (Fig. 8.4).

Fig. 8.4 – Aula e Tempio dei Mensores (I xix 1-3): aula and temple have access points to the Via della Foce

41. Bollmann (1998:290).

Fig. 8.5 – Aula e Tempio dei Mensores (I xix 1-3): inside courtyard (1) facing the wall between aula and courtyard; the original wide opening was constricted during later periods of use; the 3rd century well (left)

East of the courtyard are a range of rooms (3, 4, 5), with a latrine (L) placed in the northernmost room next to the stairs. These provide a secondary entrance (E2) connecting the courtyard to the street leading toward the Tiber. The difference in height of 2.0 m between the floor levels of the aula (A) and the courtyard (1) is critical when considering a possible connection between these spaces. The published plans in Calza (1953) suggest that the two spaces were interconnected. When checked against the architectural remains on site this seems to be confirmed.

Clearly, the wall bounding the spaces has a wide door opening, although slightly narrowed down by later interventions. In addition, the black and white floor mosaics in the aula, although dating to a later phase, still suggest a continuation of space rather than a boundary. In front of the door opening, the mosaic's framing pattern which runs along the walls of the aula was interrupted to feature a symbolic object (possibly a *rutellum* and a *modius*), pointing outward in direction of the courtyard. According to the excavation reports no remains of stairs to overcome the difference in height have been found.[42] This does not exclude that stairs of perishable materials like wood once connected these spaces, although no traces can be identified in the remaining walls of the court.

The relationship between aula and courtyard plays a key-role for investigating the spatial organisation of the *schola* complex. Space Syntax states that a building unit is defined by a continuous outer boundary (such that all parts of the external world are subject to some form of control) and continuous internal permeability, such that every part of the building is accessible to every other part without going outside the boundary.[43] Continuous internal permeability within the *schola* complex would only be retained as long as the aula and the courtyard are interconnected. Therefore it needs to be examined why this link would have been significant for the overall organization of the *schola* complex. As indicated by the *SO I* site-plan the courtyard adjacent to the aula comprises a fountain and two rectangular water basins, today no longer visible.[44] Water facilities and latrines seem almost standard

42. Bollmann (1998: 292, notes 383, 342).

43. Hillier and Hanson (1984: 147).

44. Ricciardi and Scrinari (1996) date the fountain to the 3rd century AD, replacing an earlier well.

features of guild seats.[45] Convenience and ease of access to these water facilities could certainly have been an important consideration when decisions were taken to link the aula to the courtyard. While such considerations might have played a role, it is difficult to estimate their influence. However, based on the archaeological evidence which suggests a wide door opening later to be constricted (see Fig. 8.5), this study treats the aula and the courtyard as interconnected spaces (see schematic plan Fig. 8.3).

8.2.3 Domus di Marte (III ii 5) (Fig. 8.6)

Located right at the corner where the western *decumanus* and the Cardo degli Aurighi intersect, the so-called *Domus di Marte* enjoys an exposed location (Fig. 8.1, building nr 3). Bounded by a commercial building (part of the *Domus sul decumano* (III ii 3, 4) on the *decumanus* to the north, and the Trajanic *horrea* (III ii 6) on the Cardo degli Aurighi to the west, the *schola* occupies space within a street block of largely commercial use. The original structures of the *Domus di Marte* have been dated to about 127 AD,[46] with considerable alterations taking place over time.

The building has been identified as *schola* for a number of considerations,[47] none of them compelling on their own. Only the combined evidence of epigraphy and architecture make a convincing enough case. Above all, it is not really clear whether the building was originally built to serve as a *schola*, or it was used as such at a later point in time. Central to the argument whether it is a *schola* at all, is the marble altar with the inscription "Marti/ Avg/Sacrvm",[48] placed in the northern corner of the courtyard (Fig. 8.7). No parallels for such altars have been found within a domestic context elsewhere in Ostia. Likewise the *Domus di Marte* does not seem fitting as a private house, with the majority of rooms interconnected and open to the street. Whether upper floors ever existed is difficult to establish, as no traces of stairs can be identified; however, the amount of reworking and subsequent abandonment might have removed evidence for stairs.[49] Through its openness the *Domus di Marte* suggests a close similarity to the spatial model of a traditional corner-shop that exploits the basic potential of its structure and its location.[50] Hillier and Hanson claim that this elementary spatial structure is generated whenever the logic of circumstances dictates the maximizing of random encounters without losing minimal spatial control.

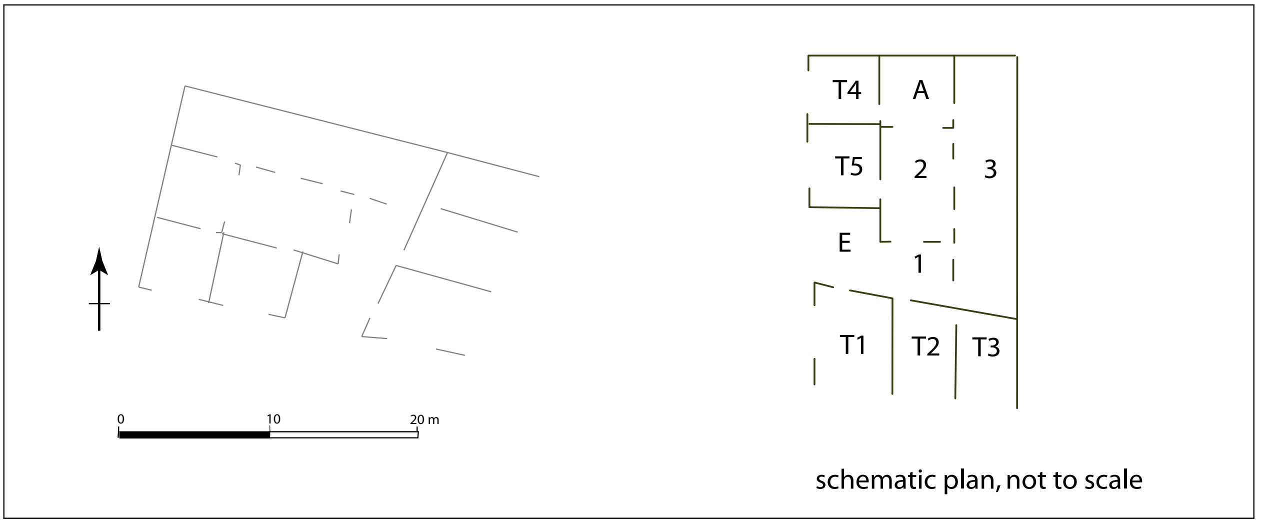


Fig. 8.6 – Domus di Marte, III ii 5

45. Hermansen (1982: 66).
46. Calza (1953: 222).
47. Bollmann (1998: 308-309); Hermansen (1982: 75-76).
48. Hermansen (1982: 76).
49. Bollmann (1998: 308, note 436) claims that the walls of *c.* 0.50 cm thickness could not support upper floors.
50. Hillier and Hanson (1984: 176-177).

Fig. 8.7 – The marble altar (room 2) with a dedication to Mars is visible through the door opening from room T5

The *Domus di Marte* represents a spatial structure that compares well to Hillier's shop model (see schematic plan). It takes full advantage of its corner position by locating three *tabernae* (T1, T2, T3) on the *decumanus* and two on the Cardo degli Aurighi (T4, T5). At the same time two of the *tabernae* on the *decumanus* (T1, T2) and both on the *cardo* are directly connected to the interior of the building, thus making the interior as continuous as possible with the outside space. The actual entrance (E) on the *cardo* is reached from a ramp. It directs into an L-shaped foyer (1) that leads deep into the building. The courtyard (2) runs perpendicular to the *decumanus* and links to the *tablinum*-style room (A) at the western extension. To the north of the courtyard is a hall (3) stretching along the whole length of the inner building, providing ample space for potential meetings of the *collegium*. The hall is connected to the *tablinum*-style room as well as to the courtyard and the foyer.

The requirements of the owners of the *Domus di Marte*, presumably the guild in question, must have influenced the planning decisions. The 'logic of circumstances' that generated this pronounced commercial space might be related to the mercantile interests pursued by the guild. Within the context of commercial value the absence of upper floors would seem surprising; serving as rental property the upper floors could have potentially generated additional income. Considering the *schola*'s construction date of around 127 AD, a time when Ostia experienced a major building boom and multi-storey buildings dominated the streetscapes, one would expect any building to take advantage of this prime location and strive to achieve its full development potential. In view of Ostia's urban expansion the moderate scale of the *Domus di Marte* appears to be a statement of conservatism and financial and 'spatial' independence from the city's booming housing market.[51]

8.2.4 Domus accanto al Serapeo (III xvii 3) (Fig. 8.8)

This so-called *domus* forms part of a larger set of buildings dedicated to the cult of Serapis. The complex comprises three inter-linked courtyard buildings (III xvii 3-5) located within a triangular area on the southern side of the Via della Foce (see 8.1 building nr 4), extending from the Caseggiato di Bacco e Arianna (III xvii 5) towards the *horrea* (III xvii 1) on the Cardo degli Aurighi. The central building hosted the temple dedicated to Serapis (III xvii 4), while the two others, located on either side, acted as service corridors and spaces for banquets and meetings. Together these buildings created a unitary function linked through a system of doorways and passages, running along the rear of the buildings. The complex was built in between 123-126 AD and inaugurated in 127 AD.[52] Later interventions blocked the original interconnections between the buildings, and new entrances accessible from the so-called Via del Serapide were created.

The identification of the *Domus accanto al Serapeo* as a guild seat is based on its structural and functional

51. Cf. Heinzelmann (2005).
52. Bloch (1959: 226).

link to the Serapeum. The sanctuary has been securely identified as a Serapeum by epigraphy and iconography.[53] It might have been the private temple of a religious *collegium*, which used the adjacent buildings for cultic activities. Since the whole complex is of considerable size it is also likely that it served a double function, a public sanctuary open to all worshippers of Serapis and a guild seat of a religious *collegium* in charge of the Serapis cult.[54]

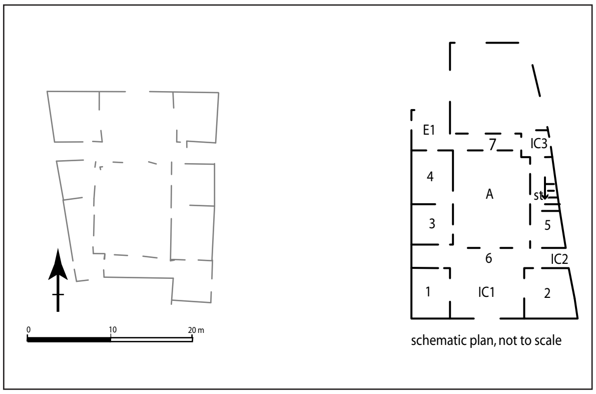


Fig. 8.8 – Domus accanto al Serapeo (III xvii 3)

The so-called *Domus accanto al Serapeo* is situated south of the temple. The original layout, which is reconstructed in the following description (Fig. 8.8 schematic plan), shows a wide door opening placed in the centre of the temple's southern wall and providing a link between the temple's courtyard and the spacious foyer (IC1) of the adjacent *schola*. The foyer is flanked by two rooms (1, 2), both of them connected to the passageway (6) which traverses the building. At its western extension there is an opening (IC2) leading to the service corridor linking the buildings. Behind the passageway (6), separated by pillars is a large *triclinium* (A) representing the focal point of the *schola* (Fig. 8.9). East and west of the *triclinium* are two interconnected rooms each (3, 4, 5 and st). From the south-western room (st), a flight of stairs leads to upper floors no longer extant. The southern wall of the *triclinium* opens to a portico-like passageway (7) that runs across the entire length of the building and connects to the service corridor (IC3). Entrance (E1) links the building to the Via del Serapide. It is partly directed toward the courtyard area south of the *schola* and to the passageway (7).

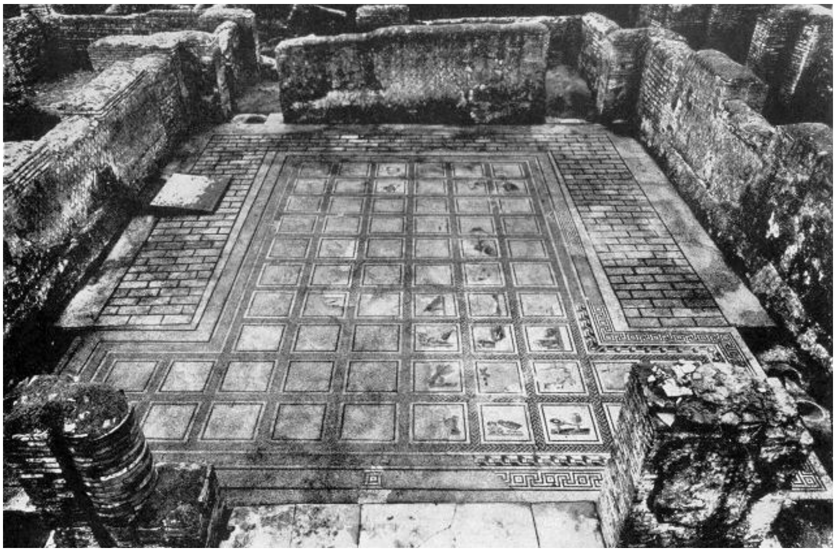


Fig. 8.9 – Domus accanto al Serapeo (III xvii 3), the schola's triclinium; the spaces destined for the reclining couches are visible in the changing mosaic decoration of the pavement (photo courtesy of Ostia website)

53. Calza (1953: 138); Hermansen (1982: 66); Bollmann (1998: 315).
54. Hermansen (1982: 67); Bollmann (1998: 317).

The entrances connecting the *schola* to the public or semi-public space of the Via del Serapide as well as the interconnecting doors (IC1, IC2, IC3) between the *schola* and the adjacent Serapeum relate to different degrees of accessibility from *schola* to the outside space. Since previous attempts to reconstruct the original layout were not overly concerned with space and its structuring properties, the presence or absence of entrances during a certain period of occupation were not given sufficient attention. Bollmann's description of the original layout does not include any entrances linking the *schola* directly to the Via del Serapide,[55] instead the *schola* was only reached through the courtyard of the temple or the service corridors. Mar's plan of the initial phase suggests two entrances from the Via del Serapide,[56] both located at the eastern side of the passageways. This study, based on the author's own on-site assessment, considers entrance (E1) to be part of the original plan, and agrees with Bollmann that the entrance to the passageway (6) was a later adjustment probably linked to the separation of the *domus* from the sanctuary. A telling detail is the long stretch of *reticulate* wall, in which the entrance seems simply inserted, whilst any planned entrance required brick faced doorposts or similar reinforcing techniques to strengthen the end of the reticulate wall.

8.2.5 Caseggiato dei Lottatori (V iii1) (Fig. 8.10)

This *schola* was originally classified as a *domus* according to Calza.[57] It is located at the north end of a street block bordered by the Via della Fortuna Annonaria, Via delle Ermette and Via della Casa del Pozzo (Fig. 8.1 building nr 5). On the south the *schola* is built against the northern wall of the neighbouring building, predating the *schola*. This is evident from the two walled-up doors, originally leading to the plot later to be occupied by the *schola*. The *schola*'s original structures date to the Hadrianic period, with subsequent interventions taking place in several phases. The most pronounced entrance (1) is on the Via della Fortuna Annonaria (Fig. 8.11); it is flanked by a *taberna* on either side, with the entrance hall measuring about the same size as each of the *tabernae*. The latter are not linked to the interior of the building. Left of the entrance hall was a drinking fountain; its presence was marked on the site plan (*SO* I plan section 8); according to Hermansen its remains were removed in the 1970s.[58] The *schola* consists of one large rectangular space with a *tablinum*-type room (A) located opposite the main entrance. On either side of the *tablinum* is a side hall (4, 5). In the centre of the rectangular hall (2) is an *impluvium*, once surrounded by columns.

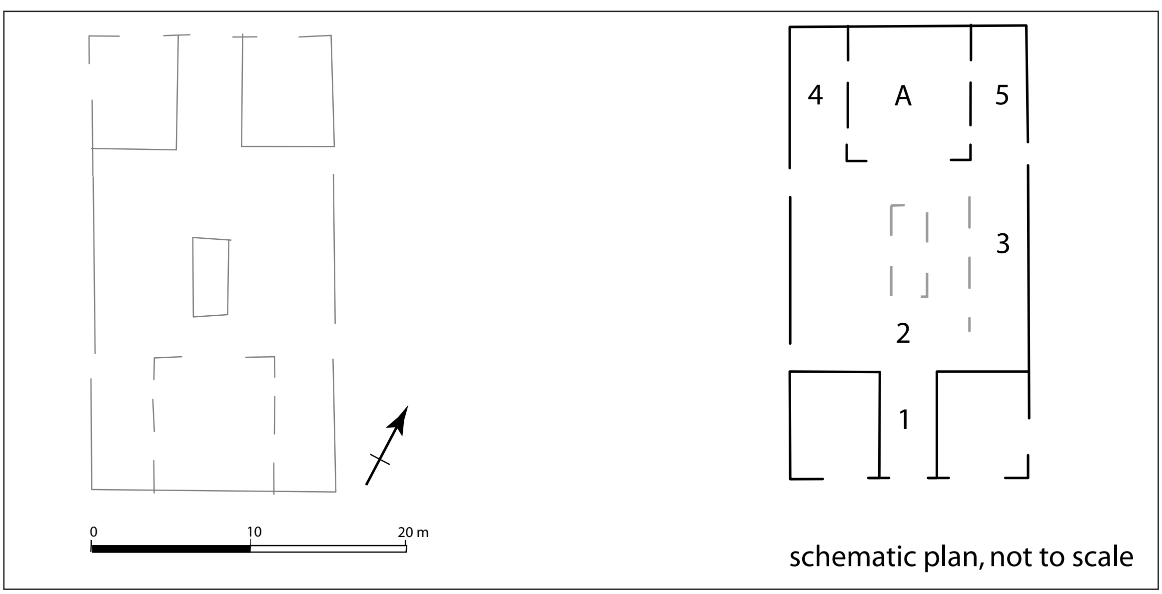


Fig. 8.10 – Caseggiato dei Lottatori (V ii 1)

55. Bollmann (1998: 312).
56. Mar (2001: 51, fig. 14).

57. Calza (1953: 236).
58. Hermansen (1982: 77).

The western part of the hall was separated from the remaining space by a number of pillars, creating a nave-like space all along the western wall (3). A secondary point of access is found on the Via della Casa del Pozzo, leading into the side hall west of the *tablinum*. On the eastern wall along the Via delle Ermette, are two further door openings. Being surrounded on three sides by streets, the building has access points to all of them, maximizing the potential of its location.

Fig. 8.11 – Caseggiato dei Lottatori (V iii 1) view from the main entrance into the atrium-style inner courtyard

8.3 SCHOLAE ARCHITECTURE – A READING FROM ACCESS MAPS AND SPATIAL VALUES

In order to reach beyond on what can be observed on site plans and through careful study of the structural remains, this study, once again, resorts to Space Syntax concepts and techniques. To gain a better understanding of the guild seats' underlying spatial organisation, access analysis will be applied. The basic principles of Space Syntax have been outlined in chapter three, while the analysis tools have been explained in chapter four, hence they do not require further comment. We should however emphasis once more why these techniques allow us to correlate between spatial and social form and provide us with powerful tools to think with. Grahame explains that the actual process of translating the spatial layout of buildings into access maps has two parts, on the one hand it transforms our understanding of built space by reducing the building's architectural layout to its basic relations; on the other hand it creates a system of spaces linked together into a continuous unit, where action in one part affects the rest of the system.[59] The resulting access graphs are both visual representation and a quantitative account of a spatial system.

Two analysis tools have been used for a configuration assessment of the guild buildings, access diagrams (j-graphs) and spatial values. The spatial values applied comprise two independent Space Syntax measures: control values and real relative asymmetry (RRA). These measures respond to the buildings' local and global spatial properties and help in assessing the potential of different building layouts for interaction between the different groups who used the building: the inhabitants (the guild's members) and those visiting the buildings. Hence, access data offer indications about those spaces potentially destined for interaction, and those which were more likely to have provided privacy. Ideally, the spatial values of various specific spaces typical of all *scholae* should be compared to investigate whether similar patterns emerge, or whether pattern variation can be detected. However, the small sample size does not support a strictly formal quantitative evaluation; still, valuable deductions have been made from a comparison between the different spaces present within each individual *schola*, as well as a comparison across the sample between selected spaces common to most *scholae*.

8.3.1 *Scholae* and spatial organisation: a spotlight on the Casa dei Triclini

The *Casa dei Triclini, I xii 1* (Fig. 8.12), appears like the textbook version of guild buildings, drawing on traditional *domus* architecture. Significantly it features four spaces of consistently high local and global interaction potential (3, 9, 8, 15). These are the spaces forming the porticoes designed to facilitate a flow of movement and casual encounter, providing

59. Grahame (2000: 33).

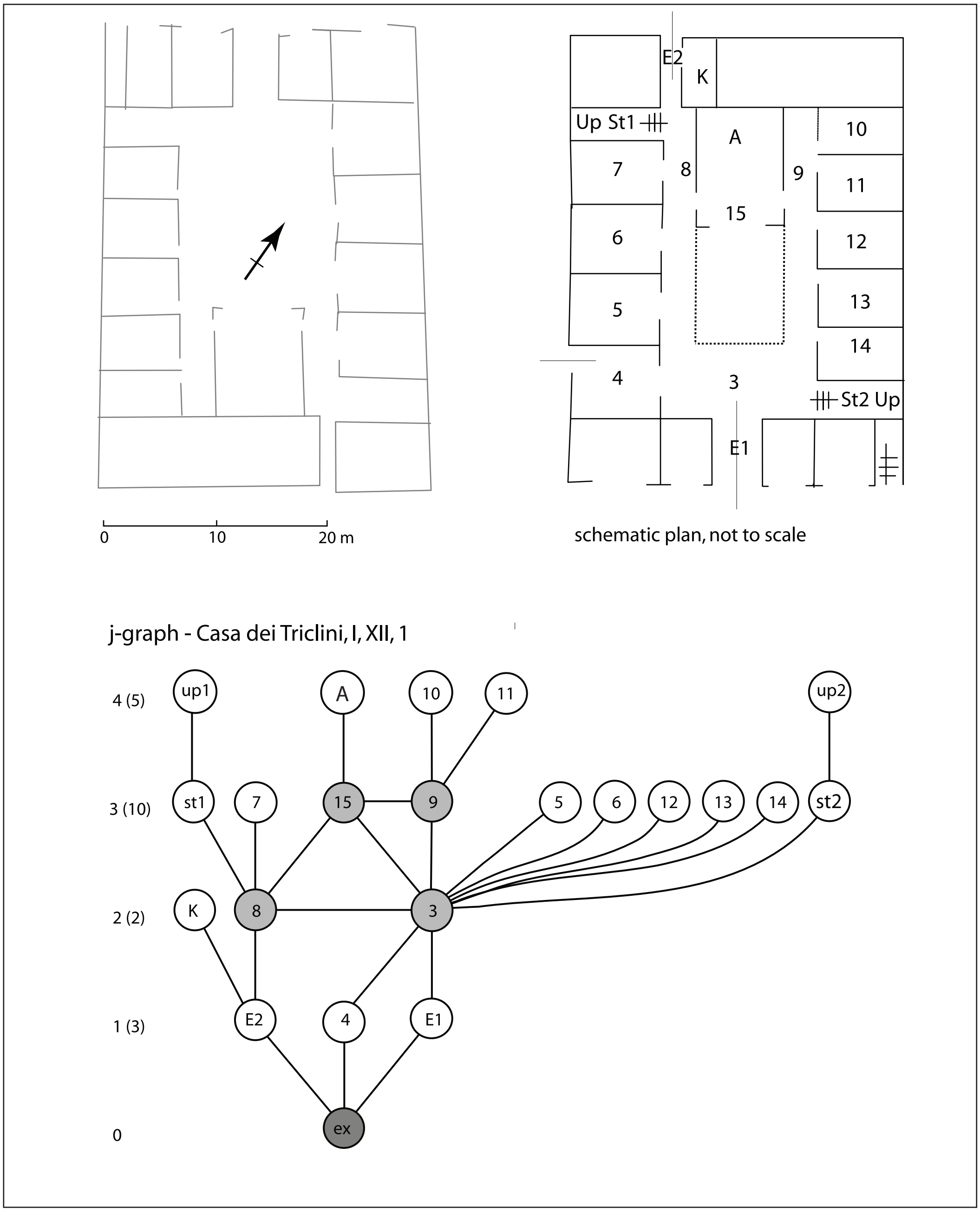


Fig. 8.12 – Casa dei Triclini (I xii 1) Access Analysis (corridor space 3 not strictly convex, extends to meet spaces 8 and 9)

the highest potential for presence availability. No space other than the porticoes had to be crossed to reach any room within the system. Furthermore none of the other rooms lined up along the porticoes were connected to any other room. Hence these rooms remained relatively segregated with moderate local and low global interaction potentials. The access diagram reflects a typical tree-like spatial structure (Fig. 8.8) branching out from centralizing spaces. In terms of their functionality such spatial configurations allow for a synchronous yet independent organisation of activities. Each room, possibly selected according to the degree of privacy required, could be used to hold smaller meetings, with none of the activities interfering with each other. This particular spatial formation seems well suited for any hierarchically structured organization where members have been divided into sub-groups, as it is evidenced by the collegium's album dated 198 AD (*CIL* XIV 4569), listing 331 members grouped into 16 *decuriae*.[60] One could think of many independent activities taking place within the *schola*, where the guild of the builders could wine and dine potential clients, negotiate contracts and carry out their devotional duties to the emperor and to their protective deities as well as enjoy the club-like atmosphere amongst members.

Complementary to its spatial origanisation, distinct material characteristics expressed in room size and choice of building materials augment the *schola*. Firstly, the foyer (3) offers the most generous spatial dimensions, providing ample room for encounter upon entering the building. Secondly, the choices of floor materials suggest a cautious structuring of space, creating a distinction between the rooms highly frequented as opposed to those less open to general use. The porticoed corridors, including the foyer (3), feature *opus spicatum* floors (terracotta tiles laid in herring bone pattern), a well-suited pavement for areas of high wear and tear. Here the choice of material underlines the intended dedication to intense use. *Opus spicatum* was also placed in all eastern rooms, later furnished with walled *triclinia*. In contrast, the rooms comprising the western range were paved with mosaic floors (Fig. 8.13) to further enhance the degree of privacy already maintained by their specific door arrangements (Fig. 8.14).

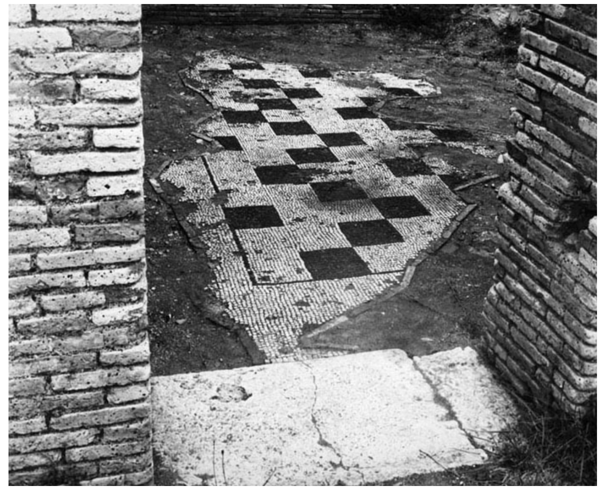


Fig. 8.13 – Casa dei Triclini: mosaic pavements in the western range of rooms (Fototeca Nazionale, scheda foto N15391)

Contrary to the coarse *opus spicatum*, the passage space (15) marking the transition zone between the inner courtyard and the cult room (A), was clearly set apart by the use of precious marble flooring. The white marble mosaic *tesserae* used within the inner courtyard space are more difficult to relate to a potential function of the space. It has been suggests that the inner courtyard served as meeting place for the entire congregation of guild members.[61] This seems to conflict with the choice of white mosaic flooring and the central water pipes. These materials imply an area dedicated to water catchment, ventilation and lighting. In fact, without any windows on the outer walls the central courtyard remains the only source of air and light. The reflecting quality of the white mosaic *tesserae* seems to enhance the latter function. The various floor materials used in the *Casa dei Triclini* have not been studied in depth; stratigraphic excavation data are lacking thus secure dates have not been established. Clearly some of the floor materials date to successive later phases, however, there is no reason to assume that these interventions reflect a change of use. They rather seem to provide evidence for continued use, during which consecutive

60. Bollmann (1998: 286, note 297); Egelhaaf-Gaiser (2002: 136).

61. Egelhaaf-Gaiser (2002: 136).

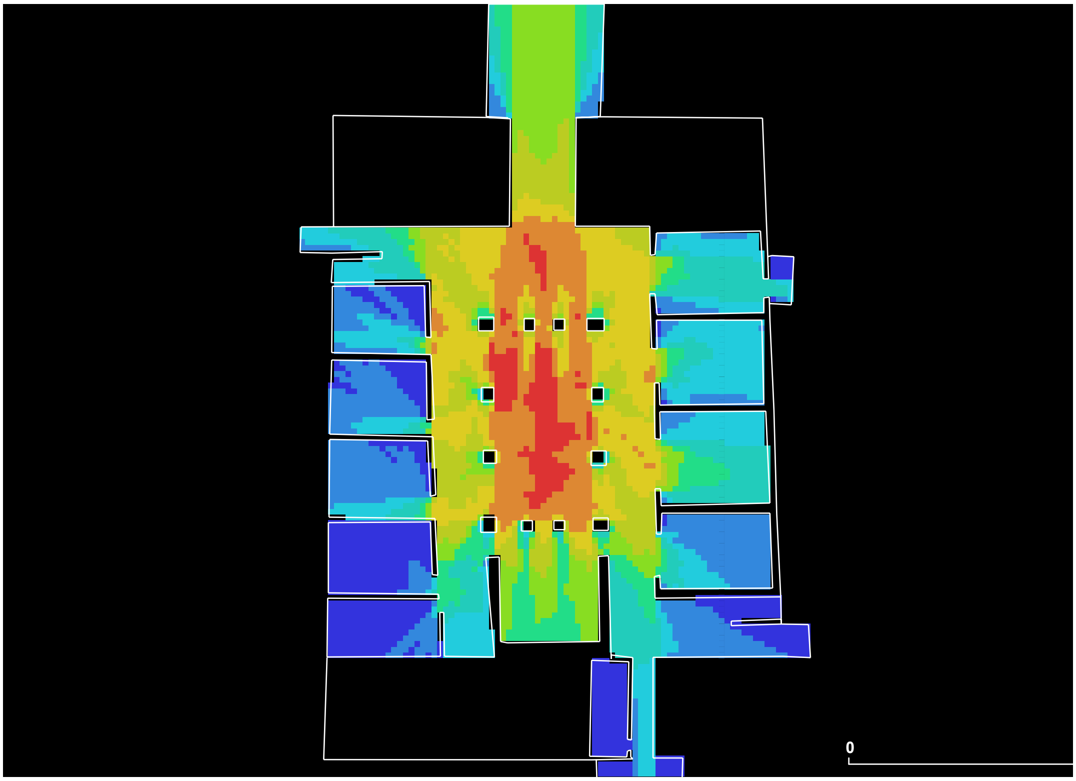


Fig. 8.14 – Casa dei Triclini (I xii 1) visibility graph analysis reveals structured visual access to the range of rooms arranged on the western and eastern side of the inner courtyard. Wide central doors on the eastern side allow for higher visual access, while the door arrangement at the western side prevent visibility and thus promotes more privacy (VGA, Depthmap, UCL).

changes emphasize the longevity of the *schola* and its activities as observable social practice.

Perhaps the fact that the guild of the builders selected *domus* architecture to establish their physical presence needs to be addressed briefly. As stated earlier, there is no evidence to ascertain that the building served as a guild seat before the Severan period. This does neither exclude that it could have been used as a guild seat earlier, nor does it exclude that it was purposely built as a guilt seat. It is equally possible that it was built as a private *domus* and was taken over by the guild at a later point. Notwithstanding these uncertainties, when the building was in use as a *schola*, it fully preserved and made use of its *domus* architecture. This brings to mind Wallace-Hadrill's definition of the *domus* as the 'power house' of the urban elite. In a similar way to the traditional *domus* owner, the guild of the *fabri tignuari* might have used the building to establish their claim to a position in society. By appropriating traditional *domus* architecture the guild could associate itself at least symbolically with the social system of patronage and clientele. This could be an interesting thought when considered within the context of Vitruvius' statements about the relationship between architect and patron.[62] Vitruvius is anxious to communicate that when it comes to private commissions the architect feels the need to avoid being put in the position of a social inferior, hence the patron will have to approach the architect, not the other way round.[63] The Casa dei Triclini

62. Vitruvius deliberates on the relationship between architect and patron in the preface to book 6 on private buildings; see Roland and Howe (1999: 75); see also Wallace-Hadrill (1994: 10).

63. Vitruvius writes (translation Roland and Howe (1999: 75-76) "...Other architects make the rounds and ask openly to work as architects, but my teachers passed on the tradition that one was asked to take on a responsibility, rather than

would certainly provide the ambience for socially adequate meetings between builders, architects and their prospective clients.

The *Aula e Tempio dei Mensores* (see schematic plan Fig. 8.15) also shows high presence availability for passage (2) and courtyard (1), as well as the outside space (ex). These high levels of local and global control imposed by the outside space are indicative of a shallow spatial structure linking almost half its spaces directly to the outside carrier. Unexpectedly, the so-called aula (A) only accounts for moderate global and local interaction potentials. Judging from appearance only, the aula's direct link to the street promotes it as the prime space destined for social encounter; still with only one further link to the courtyard (1) the aula remains relatively segregated within the overall arrangement. Equally surprising is the high degree of segregation that the temple (7) shows in comparison to the rest of the configuration. In order to access the temple from any space within the building, the outside space has to be crossed. In fact, it remains the only space that is not connected to the spatial system via a second entrance.

The stairs (6) leading up to the temple (7) physically emphasize this spatial phenomenon. These were literally pushed out into the road space, linking the temple clearly to the public domain. Calza considers temple and *schola* as built contemporaneously with the *Horrea dei Mensores*.[64] The spatial analysis seems to suggest a different pattern, where the temple appears independent of all other *schola* spaces. Surprisingly, this particular spatial arrangement has not received much attention. Egelhaaf-Gaiser sees in the unique way of placing temple and aula alongside each other an expression of competition between two "prestige" buildings.[65] She argues that the *aula* alludes to sacred architecture by means of its wide entrance and the use of columns and pillars. According to Egelhaaf-Gaiser, this signals to passers-by not only a connection between temple and aula but also invokes a comparison of quality between these buildings, whereby the temple emerges as the most important building, marked by its central position and stern rectangular layout. Although being the earliest *schola* of Ostia dating to 112 AD, this particular layout remains singular; no later Ostian *scholae* hitherto identified show similar configurations. Egelhaaf-Gaiser's interpretation, even though overtly concerned with making sense of this configuration, does not fully convince; most of all she does not account for the difference in height between courtyard and aula. It seems more plausible that we are dealing with a configuration that seemed to have developed piecemeal. In fact, Calza provides brick-stamp dates only for the party walls shared between *horrea* and *schola*.[66] An alternative explanation could be that the spatial phenomenon is rooted in earlier construction dates for the temple, around which the *schola* might have been arranged later, when the *horrea* were constructed. The temple's strict north-south alignment, its structural predominance and apparent inability to correspond to any other space might point to the temple's pre-existence.

Concerning the *Domus di Marte* (Fig. 8.15), the access diagram and spatial data identify the passage (1) and the central courtyard (2) as those spaces with consistency between local and global integration. Furthermore the exterior carrier (ex) engenders high presence availability. Space (3) remains relatively segregated with moderate local and low global control and would therefore provide for most privacy in relation to the other rooms. Similar to the *Aula e Tempio dei Mensores,* as many entrances as possible are present, with every room located along the street front having its own door to the outside space. Again this accounts for a shallow configuration, where the exterior space has high local and global integration potential: hence Hillier's shop model introduced earlier on, fits well as a spatial model for this *schola*.

Conversely, in the case of the *Domus accanto al Serapeo* (Fig. 8.11) the exterior carrier diverges

asking for it oneself. An honest person will blush from the shame of seeking something questionable, and it is those who grant a favor, not those who receive it, who are courted. For what are we to think about someone who is asked to make an expenditure from his patrimony for the gratification of a petitioner, other than that it is all to be done for the sake of the other man's profit and gain?"

64. Calza (1953: 125, 219, 235).

65. Egelhaaf-Gaiser (2002: 138-139).

66. Calza (1953: 219).

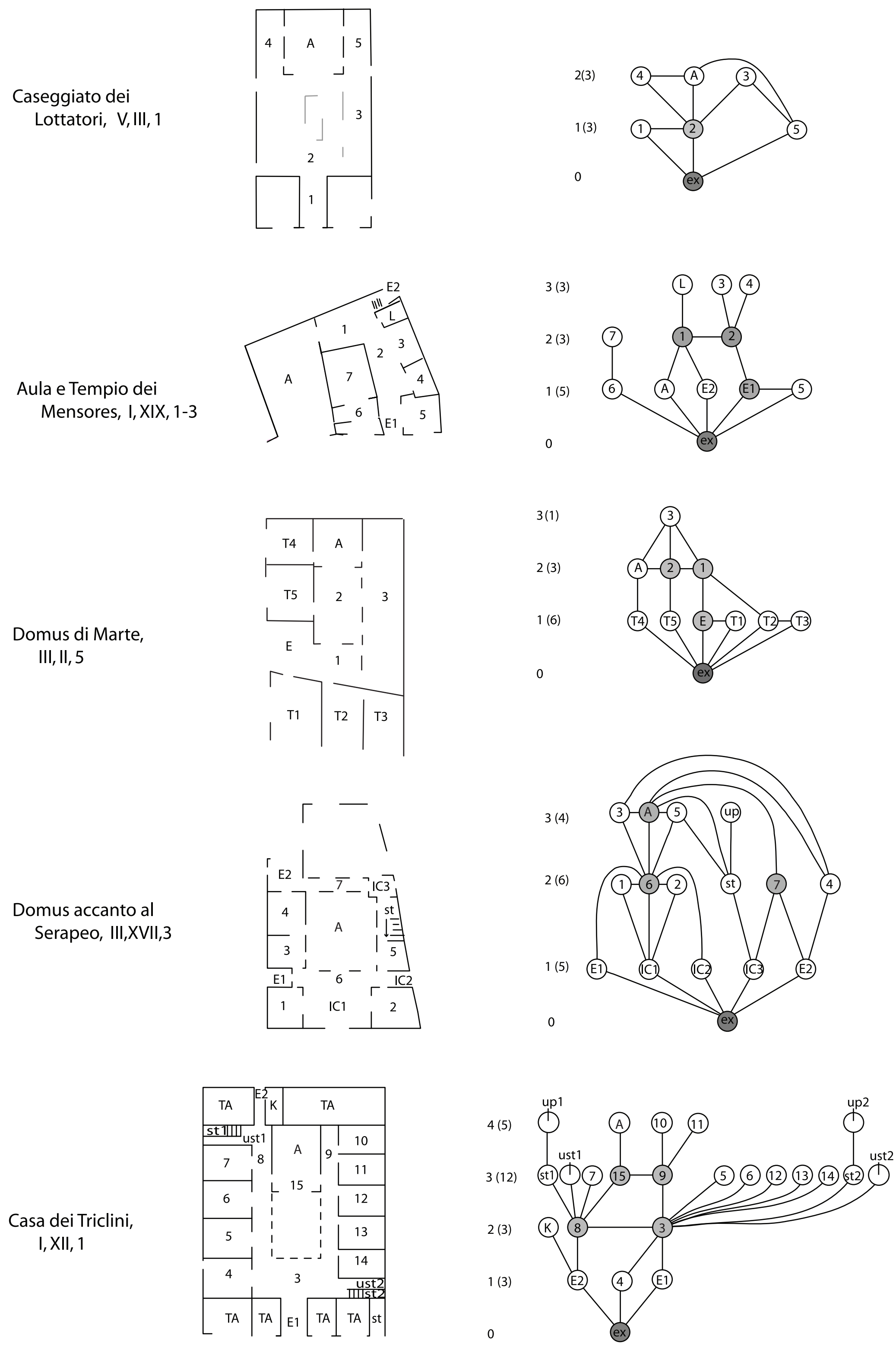


Fig. 8.15 – Schematic plans and access graphs for five Ostian *scholae*

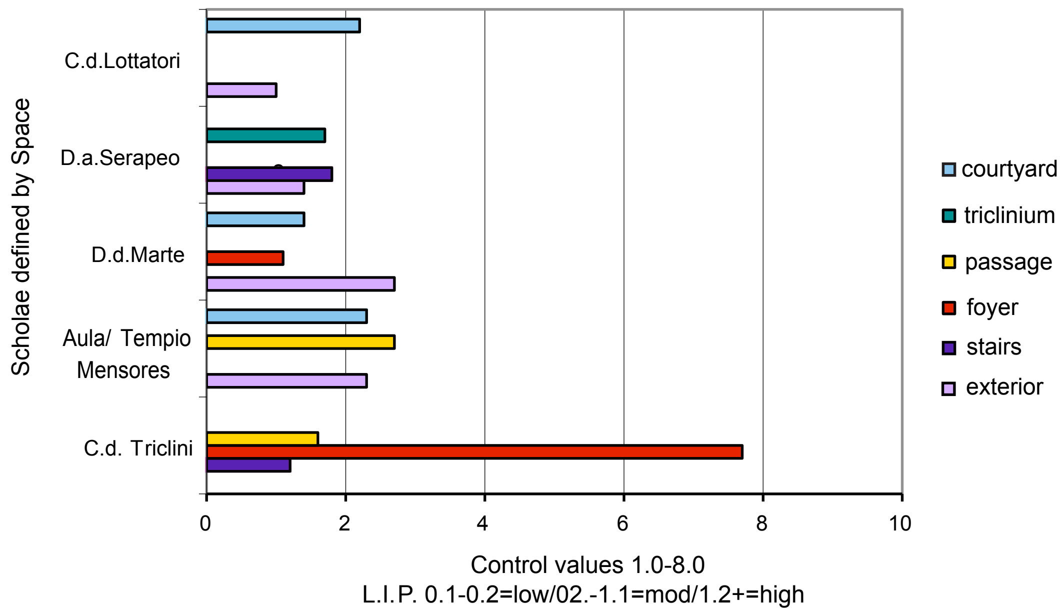
from other *scholae* and is far more differentiated than the schematic plan and the resulting access map are capable to represent. Since the *domus* is part of a larger complex, the entrances IC1, IC2 and IC3 are interconnecting spaces linking *domus* and sanctuary. Only entrance E1 connects to the carrier space outside the complex. Access analysis does not distinguish between different qualities of exterior space; it recognizes only one boundary thus linking all entrances to one carrier space. The consistent spaces with high local and global interaction potentials within the configuration of the *Domus accanto al Serapeo* are the spaces (6) and (A), as well as the stairs (st). Furthermore the exterior space (ex) accounts for high presence availability. Space (A) the most central room of the plan controls six neighbouring spaces and has the second highest global interaction potential. According to its floor mosaics, room (A) was used as a *triclinium*, with the areas marking the reclining benches rendered in simpler mosaics than the visible area in the centre of the room (Fig. 8.6).[67] This room does not offer any privacy; instead it is directly accessible from almost every room within the *domus*. Seclusion was certainly no planning consideration when this room was designed. Surprisingly, the most segregated rooms within the entire arrangement are rooms (1) and (2). As part of the *schola* configuration they appear tucked away behind entrance IC1, while they are only two topological steps away from the sanctuary. Potentially they could have fulfilled a pivotal role mediating between the sanctuary and the *domus*.

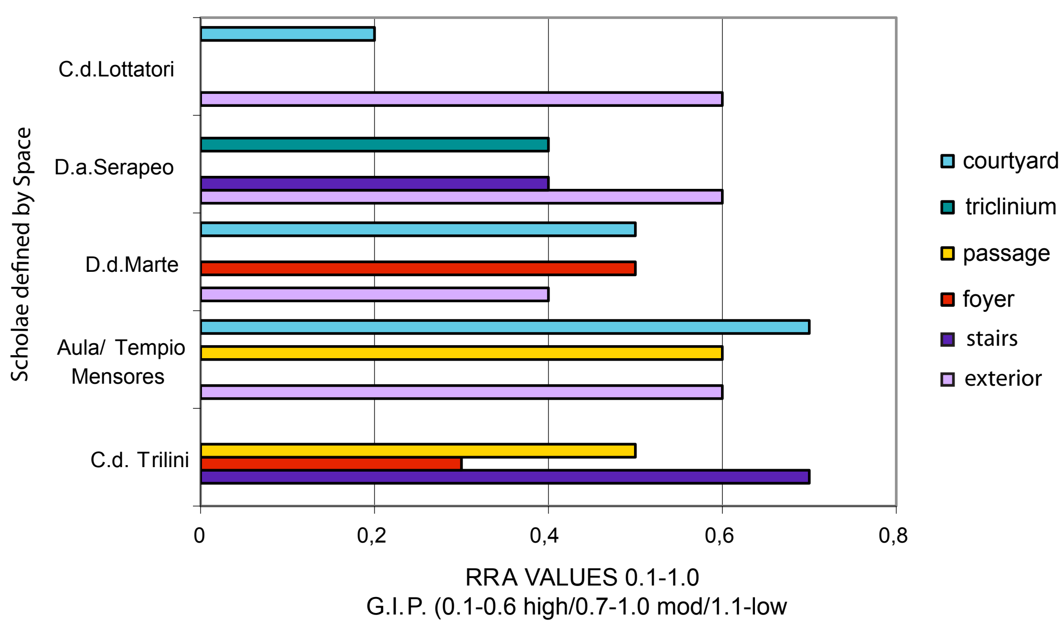
The *Caseggiato dei Lottatori* (Fig. 8.15) features only one space (2) with consistency between local and global control. All other spaces show moderate to low presence availability, including room (3), which could have served for banqueting. Similar to the *Domus di Marte*, also this *schola* has high levels of control attached to the outside space (ex). It is connected to the outside carrier by three entrances, relating to a high level of permeability while allowing for differentiated access to the building.

Name	Potential Function	Nr.	RRA*1	C.V. *2	Nb.*3	L.I.P. *4	G.I.P. *5	Pr. Av. *6
Casa dei Triclini I xii 1	Foyer	3	0.27	7.7	11	high	high	high
	Passage	15	0.46	1.55	4	high	high	high
	Portico	8	0.49	2.25	5	high	high	high
Aula e Tempio dei Mensores I xix 1-3	Outside	ex	0.571	2.33	5	high	high	high
	Courtyard	1	0.701	2.25	4	high	high	high
	Passage	2	0.631	2.66	4	high	high	high
Domus di Marte III ii 5	Outside	ex	0.377	2.666	6	high	high	high
	Courtyard	2	0.527	1.416	4	high	high	high
	Foyer	1	0.527	1.083	3	high	high	high
Domus accanto al Serapeo III xvii 3	Stairs	st	0.382	1.83	4	high	high	high
	Outside	ex	0.594	1.41	4	high	high	high
	Triclinium	A	0.382	1.712	6	high	high	high
Caseggiato dei Lottatori V iii 1	Courtyard	2	0.196	2.166	5	high	high	high
	Outside	ex	0.588	1.033	3	mod	high	M/h
	Undefined	5	0.588	1.166	3	high	mod	M/h
*1 real relative asymmetry; *2 control value; *3 number of neighbours; *4 local integration potential; *5 global integration potential; *6 presence availability								

Table 8.2 – Access data for spaces with high local and global integration potential – high presence availability potential

67. Becatti (1961: 144).





Figs. 8.16 (top) and 8.17 (below): Correlation between spaces with high control values (C.V.) and low RRA values; the spaces selected show consistency between high local and global control potential

8.3.2 Correlation between Control Values and Real Relative Asymmetry (RRA)

By correlating the *scholae*'s controlling spaces, identified by control values in excess of 1, with those spaces with very low RRA values, interesting insights have been gained on those locales where most interaction took place. As DeLaine's study of Ostia's *medianum* houses has already shown, the area in which we would expect the highest consistency between local and global interaction potential might point to those spaces by which buildings are functionally defined.[68] Within the guild buildings these spaces are most notably movement related spaces, such as passages, foyers, courtyards and corridors, and above all the exterior carrier space, the city's street network (Table 8.2 and Figs. 8.16 - 8.17).

Access data reveal that four of the studied *scholae* attribute high local and high global integration potential to the outside carrier – hence their spatial structure is to a large extent defined by the exterior, the public street space.[69] These buildings take full advantage of their location by maximizing their street fronts and making their buildings as permeable as possible, thus promoting social encounter at the interface between *scholae* and public domain. Next to the exterior space, other spaces indicative of high presence availability might offer further insights into the buildings' attitude towards visitors and outsiders. In this regard it is interesting to note that despite their obvious outward direction, the *scholae* rarely link their internal spaces of high presence availability (courtyards, porticoes, passages etc.) directly to the outside. Instead, entrance corridors intercept between the outside and the internal spaces, keeping the building's internal movement at a flow and at the same time at least one topological step away from the public space. This seems to signify a slight tension between the internal system and the exterior, which required constant renegotiation with the public space.[70] This slight spatial incongruence present within *schola* architecture has been ascribed to their semi-public and ambivalent nature,[71] allowing visual access on the one hand and restricting physical access on the other.

Concrete examples of this somewhat conflicting spatial relationship can be observed in most guild buildings. The *Casa di Lottatori* provides an interesting deviation from this rule. From the main street, the so-called *Via della Fortuna Annonaria*, so as to keep up appearances, a well-pronounced central entrance corridor leads into the courtyard offering full visual access to the axially located *tablinum*-space at the other end of the building. At the same time the formal exclusivity of the main entrance appears to be negated by several secondary entrances directly connecting the *schola*'s courtyard to the back streets along the eastern and western side of the *schola.* Within the spatial configuration of the *schola*, the different entrances agree to structured access and might point to specific use relating to different groups of people accessing different parts of the *schola*. One possible explanation for these direct links between streets and central *schola* space (courtyard) could be the *collegium*'s property relations resulting in different responses between *schola* and street space. This would be in line with Hermansen's suggestion that the whole complex of buildings (V iii 1-5) between the Via della Casa del Pozzo and the Via delle Ermette belonged to one *collegium.*[72] Surely such a hold on a considerable part of urban space by a single group would influence the relative accessibility of certain urban areas, adding to segregation by bringing the back streets closer into the private sphere of the *collegium,* while the main street still makes for a public front.

68. Cf. DeLaine (2004: 158).
69. A further level of analysis, gauging the interior-exterior relationship has been included into the spatial assessment of the guild buildings: Hanson's difference factor to quantify the degree of configurational differentiation among a building's integration values (Hanson 1998: 32). Since the sample is not large enough, the difference factor did not seem to add a significant new dimension to the already calculated spatial values; see Stöger (2009: 108.6).

70. Hillier and Hanson (1984: 20).
71. Steuernagel (2005: 80).
72. Hermansen (1982: 114).

8.4 THE ROLE OF SPECIFIC ROOMS

Additional to the analysis of individual *scholae* configurations, a comparison between particular spaces common to all *scholae* should be informative in terms of their specific role related to *scholae* activities. One particular room, although present in slight variations, can be found in all *scholae* under discussion: a tablinum. This room is reminiscent of domestic architecture, where it held a prominent position opposite the building's main entrance, serving as the main reception room. The access data listed in Table 8.3 provide indication about the room's degree of accessibility from the exterior, as well as its integration within the *schola*. The *Casa dei Triclini* and the *Caseggiato di Lottatori* follow most closely traditional *domus* architecture, with both tablinum-style rooms characterised by moderate local and low global integration potential thus low to moderate presence availability. This allows for the possibility of segregation, which predestines these rooms for specific use, potentially of a cultic or ritual nature, reserving access to specific people. Then again, the *Domus accanto al Serapeo* and the *Domus di Marte* imply a centralising function for their variation of the tablinum-style room. These rooms privilege interaction between *collegia* members and visitors, while allowing the possibility of segregation in the surrounding rooms. The *aula* of the *schola* of the *mensores* remains singular; with moderate levels of global and local integration this space neither privileges interaction nor segregation, but might lend itself to multi-purpose use. Already this limited comparison of only five different *scholae* produces a more varied pattern of use than realised in previous descriptions of *scholae* spaces.[73]

As discussed above, access data (see Table 8.2 above) reveal that four of the studied *scholae* attribute high local and high global integration potential to the outside carrier space – this leads us to suggest that these buildings were to a large extent defined by their relationship with the exterior. By making their buildings as open as possible they strove to maximize their street fronts in order to take full advantage of their location. This brings us to questions on how well the guild buildings are integrated within the street network. But before matching the guild seats to Ostia's street network, perhaps the most straightforward aspect of the *scholae* under study, their overall size, needs to be briefly discussed.

Table 8.4 provides an overview of the total ground floor space and the extent of the street fronts of the *scholae* under discussion. As stated before, the small sample size does not allow for a strictly comparative approach or quantitative assessment, yet some observations can be made. As the numbers indicate, the extent of street fronts does not simply increase in proportion to the overall plot size; instead it reflects the inherent land divisions, and above all situational responses to the specific setting of the guild buildings, as the corner position of the *Domus di Marte* demonstrates.

Name	Reference	Nr.	RRA*[1]	C.V. *[2]	Nb.*[3]	L.I.P. *[4]	G.I.P. *[5]	Pr. Av. *[6]
C. dei Triclini	I, xii, 1	A	0.91	0.25	1	mod	low	mod/low
Aula e Tempio dei Mensores	I, xix, 1-3	A	0.96	0.53	2	mod	mod	mod
Domus di Marte	III, ii, 5	A	0.75	1.08	3	high	mod	High/mod/
Domus accanto al Serapeo	III, xvii, 3	A	0.38	1.71	6	high	high	high
Caseggiato d. Lottatori	V, iii, 1	A	0.78	0.53	3	mod	low	mod/low
*[1] real relative asymmetry; *[2] control value; *[3] number of neighbouring spaces; *[4] local integration potential; *[5] global integration potential; *[6] presence availability								

Table 8.3 – Access data for the *tablinum*-type space

73. Steuernagel (2005).

Guild Buildings	Street front on major roads in metres	Ground floor area in sq m	*Tabernae* in total, and on major roads in sq m
Casa dei Triclini, I xii 1	28.3	1,239.00	275.00 / 159.00[b]
A/Temp. Mens, I xix 1-3	24.8	540.70	30.10
Domus di Marte, III ii 5	37.7[a]	356.00	145.00
D.ac.al Serapeo, III xvii 3	-	407.60	-
Cas. dei Lottatori, V iii 1	15.9	455.80	67.40

Unit size calculations are based on a digital map of Ostia, scaled and rectified; all calculations made in MapInfo

[a] Total 37.7 m divided into 14.2 m on the western *decumanus* and 23.5 m on the *Cardo degli Aurighi*

[b] Total of *tabernae* space 275.00 sq m; 159.00 sq m of *tabernae* are located along the eastern *decumanus*/ *forum*

Table 8.4 – Overall size of ground plan space, including *tabernae*

Scholae dedicate their street fronts largely to *tabernae* (commercial outlets like shops and bars). The table lists the unit sizes inclusive of *tabernae* as far as they are part of the bounded space of the *scholae*, even if these are not accessed directly from within the *schola*. Wherever *tabernae* remain strictly independent of the internal *scholae* spaces, these were not included in the Space Syntax analysis when access values were calculated. Nevertheless, in terms of the total overall size of the unit, these independent *tabernae* constitute a considerable part, therefore they should help to throw light on how *scholae* relate to the street space in general. Again, the numbers in Table 8.4 show that there is no proportional relationship between the total unit size and the area covered by *tabernae*. Instead, the presence or absence of *tabernae* reflects a direct response to how well the street is integrated on which the *scholae* are located. In other words, guild buildings do not seem inclined to dedicate space to *tabernae*, unless these can be located along busy streets. Similar to any movement seeking business, the *collegia* studied tend to locate those spaces destined for transactions along the most accessible roads, while back roads are less likely to be attractive locations for *tabernae*.

8.5 THE GUILDS AND THE MOVEMENT ECONOMY OF OSTIA

Ostia's guilds and the location of their buildings are well-documented in Ostian studies.[74] The citywide distribution pattern of the guild buildings makes it apparent that there was no clustering (see Fig. 8.1). This might have been expected from the comparable functions these buildings fulfill. One only needs to think of today's banking districts, where functionally similar buildings are clustered to reinforce each other in an additive way, while single landmarks are likely to be weak references by themselves.[75] Their preferred location along Ostia's major thoroughfares and access roads has been interpreted as alluding to status and striving for association with the public buildings of the *forum* area.[76] Following Lynch's concept of place legibility, the image strength of a building rises when it coincides with a concentration of associations. Hence creating public associations could have been a powerful motif for several *collegia*, successfully put into effect by those *scholae* seeking the vicinity of the *forum.* Still, the location of choice might have been moderated by the realities of available urban space, as well as the guild's financial standing. In other cases the locality of certain guild seats appears dictated by proximity

74. Meiggs (1973: 324-7); Hermansen (1983); Zanker (1992: 273); Bollmann (1998); Steuernagel (2005: 79).
75. Lynch (1960).
76. Bollmann (1998: 195-199).

to their professional field, e.g. *Aula e Tempio dei Mensores,* located next to storage facilities possibly used to store grain. Others again opted for closeness to their particular temple of worship, e.g. *Domus accanto al Serapeo*.

Despite their broad distribution within the city, certain areas were almost devoid of *scholae,* in particular those located north of the *decumanus,*[77] where disintegration into smaller plot-size was apparently prevented by the prevailing large-scale development consisting of public buildings and warehouses. In fact, those few *scholae* found north of the *decumanus* and its continuation the Via della Foce, never reached the depth of the urban plot that conventionally characterizes the *domus.*[78] Instead their layout is shallow, often not extending further into the *insulae* than the front row of *tabernae* would permit (e.g. *Aula e Tempio dei Mensores and Mitreo Sacello*, close to the Porta Romana). A different picture is presented by those *scholae* located south of the *decumanus*. Here they appear to conform to the ideal of the plot size laid down by the original property divisions, when the land outside Ostia's *castrum* was divided into fairly regular land parcels.[79] In exceptional cases, property parcels could be joined back to back and alongside each other, allowing the creation of large *scholae* like the *schola del Traiano*, along the western *decumanus.* This in itself is an unconcealed statement of good financial standing. Similar assumptions can be made for other *scholae* which managed to secure a prime location along Ostia's major access routes. Since accessibility within the city's street network seemed to have been a decisive factor for the location of *scholae*, Space Syntax might add some insights beyond the generally held attractor functions attributed to the *forum* and the major access roads, even more so when these spatial characteristics give the impression of being self-evident and obvious.

To take these observations a little further, the result of the full analysis of the street network presented in chapter seven, has to be taken in consideration. From the street configuration analysed, the main access roads, the eastern and western *decumanus*, as well as the *Via della Foce,* leading from the *forum* to the river harbour, clearly emerged as the most integrated streets, serving the east-west/west-east movement within the city (see Fig. 7.8 above). These results are confirmed by the preliminary analysis of the complete street network; using 476 street-units (see Fig. 7.9 above). The extended Ostia street system confirms the eastern and western *decumanus* as the most integrated streets.

Value	Integration	Selection				
	all streets (n=150)	Decumanus/ Forum	Via della Foce	Decumanus (west)	Via del Serapide	Via Fortuna Annonaria
		Casa dei Triclini	*Aula e Tempio dei Mensores*	*Domus di Marte*	*Domus accanto al Serapeo*	*Caseggiato dei Lottatori*
Average	1.42907	2.98062	2.44057	2.46635	1.6894	1.4324
Minimum	0.8107	2.98062	2.44057	2.46635	1.6894	1.4324
Maximum	2.98062	2.98062	2.44057	2.46635	1.6894	1.4324
Stand. D.	0.374281	0	0	0	0	0
Count	150	1	1	1	1	1

Table 8.5 – Global integration values for all streets [n-150] (2nd column) within the excavated areas only; selections of streets where guild buildings were located. These streets show integration values higher than average

77. Bollmann (1998: 196).
78. See Mar (1991) on land division in Ostia during the Republican period.
79. Mar (1991).

Value	Integration	Selection				
	all streets (n=467)	Decumanus/ Forum	Via della Foce	Decumanus (west)	Via del Serapide	Via Fortuna Annonaria
		Casa dei Triclini	*Aula e Tempio dei Mensores*	*Domus di Marte*	*Domus accanto al Serapeo*	*Caseggiato dei Lottatori*
Average	1.01881	1.84646	1.63297	1.67106	1.12384	1.24956
Minimum	0.532099	1.84646	1.63297	1.67106	1.12384	1.24956
Maximum	1.84646	1.84646	1.63297	1.67106	1.12384	1.24956
Stand. D.	0.227051	0	0	0	0	0
Count	467	1	1	1	1	1

Table 8.6 – Global integration values for all streets [n-467] (2nd column) including the unexcavated areas; selections of streets where guild buildings have been located. These streets show integration values higher than average

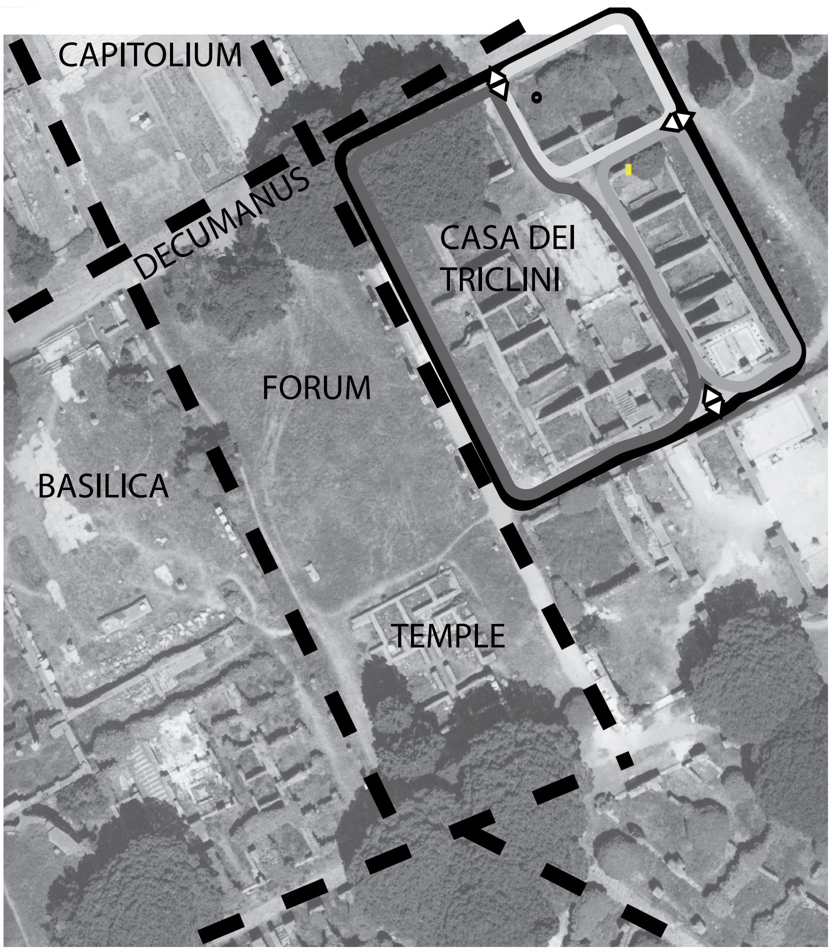


Fig. 8.18 - The Casa dei Triclini and its external circulations space

The most integrated streets emerge as the ones on which the guilds chose to locate their buildings (Tables 8.5 and 8.6). While some guild buildings are situated along less integrated streets, still they are never more than two streets away from the main road. In this sense the guilds prove to be movement seeking, some more than others. Foremost is the *Casa dei Triclini*, the guild seat of the builders, the *fabri tignuari*. This *schola* is located along the eastern *decumanus* in close proximity to the *forum*. It is fully embedded into the public space of the wider *forum* area; and, through the way the building's entrances have been structured, actively incorporates large portions of public space within its own external circulation space (Fig. 8.18). Again, other guild buildings enjoy corner locations at the intersections between main and side streets (e.g. *Domus di Marte*). This brings to mind Hillier and Hanson's traditional corner shop model,[80] which exploits the basic potential of its location and adapts its structure to maximize chance encounter at the interface with public space. Apart from the traditional corner-shop model, to which some of Ostia's *scholae* seem to conform, there are also cognitive reasons for such choice locations: pedestrians are known to heighten attention at corners; there, decisions are prompted about which direction to take, thus associations are likely made with buildings at corners.[81]

8.6 CONCLUSIONS

The spatial assessment of Ostia's guild buildings, using Space Syntax methods, has allowed us to examine the guild buildings at the micro-scale of the individual buildings and their specific location, as well as at the scale of the entire town plan, through their distribution along Ostia's streets. The two scales of assessment and their results have to be considered together since they represent interdependent spatial factors which inevitably influence each other. Firstly, the study of the spatial logic of the individual ground plans (access analysis) of the *scholae* was able to capture the spatial organisation of the buildings and recognise them as largely defined by the outside space, the public domain of Ostia's streets. Their outward focus seems to suggest that the guild buildings had a high potential for promoting contact and communication at the interface with public space. Secondly, from the assessment of the overall size of the buildings and the way they related to their local settings, several key observations were made. It emerged that the buildings strove to exploit their street fronts to the best effect and utilized them in response to their specific location. This affected the way the buildings structured their entrances and defined those street fronts best suited for the location of the *tabernae,* which were integrated into the guild buildings. Such *tabernae* were preferably placed along busy main streets and well-integrated side-streets, responding to peak pedestrian flows ('movement-seeking' behaviour). Thirdly, the guild buildings' pronounced outward orientation is complemented by their location of choice: the guilds preferred to locate their buildings along the most easily accessible ('integrated') streets within Ostia's street network. Their exposed location not only gave the guild buildings a high public profile, but also enhanced their capacity to benefit from the concentration of movement that occurred along the main streets. While some *scholae* are found on side-street locations, these are still well integrated streets when considered within the whole system and at the same time always in close proximity to the main streets. Street corners seemed desired locations for guild buildings; movement seeking as well as cognitive factors seem to account for these patterns.

One of the stated intentions of the analyses presented here was to test whether the concept of the movement economy could offer a suitable model for the explanation of the citywide distribution of guild seats in Ostia. This proved to be even more challenging since some of the *scholae*'s spatial characteristics give the impression of being readily apparent, and this implies that they can be understood intuitively, as would be suggested by the guild buildings' preferred location along the main streets (the eastern and western *decumanus* and the *Via della Foce*). Furthermore these patterns of distribution seem to confirm already established principles of Roman spatial organisation. Other Roman cities like

80. Hillier and Hanson (1984: 176-177).
81. Lynch (1960).

Pompeii and Empúries[82] show similar concentrations of movement-seeking land-use (commercial, public and religious) located along streets that are easily accessible from outside and inside the city. For Pompeii factors such as ambulatory traffic and the forces of economic rationality have long been identified as accounting for distribution patterns of retail outlets in areas of greatest social activity.[83] When taking a critical stance one might rightly ask what makes Ostia and its guild buildings different; or more to the point what can a Space Syntax analysis of these selected buildings and their settings add to our understanding of the spatial organisation of the Roman city that we do not already know?

The approach offered here adds a different theoretical perspective to the current discussion on the spatial organisation of Roman towns, and above all it produces the statistical values to place these spatial nexuses on solid impartial grounds. The movement from intuition to testable theory is justified through the importance of recognising the fundamental relationship between the urban grid structure (Ostia's street system) and human movement, as defined by the principles of the movement economy.[84] This allows a broader understanding of movement, away from attractor-driven and purposive directed movement with their emphasis on direction and location. In fact, when we look at cities as movement economies, our attention shifts to the so-called movement by-product that occurs along the passage between origin and destination, from more or less everywhere to everywhere within the city. By definition, such approaches take account of the city's whole street system or large portions of it. This not only has implications for alternative, existing theories of the city, but will essentially determine the method of analysis. Hence, the decisive strategy emerges from the Space Syntax analysis of Ostia's total street system, creating integration values for each street to all other streets; based on this, the most integrated streets have been identified as the ones which would have encouraged the greatest amount of circulation. However, to attain unbiased explanatory strength, it is crucial that the analysis of the street network is carried out completely independent of any specific land-use attached to a street. In the study of Ostia's streets and their buildings we must prioritise purely spatial measures, in this case through calculating the significance of each street within the hierarchical access network of the entire city street system. Once the relative integration of each street has been established, the next step is the evaluation of its associated land-use. At this point we can objectively match the guild buildings to the movement value of their associated streets.[85] In other words, the presence of the guild buildings can in itself attract people, but it cannot counteract the influence of the street's relative position in defining high and low flows of people. In this way we avoid the circularity of explaining the position of a building by describing its specific location in the city without further underlying explanation.

Within the framework of Ostia as a movement economy the following scenario can be presented concerning guild buildings. Placed along the most integrated streets the *scholae* were easily accessible to people directly aiming for them; hence these buildings attracted direct purposive movement. However by virtue of their highly advantageous location within the urban grid, the guilds benefited from intense general circulation, which included accidental interactions between people heading for different destinations. In this way the guild buildings contributed to the 'urban buzz' that occurs where a larger number of different activities coincide, involving people going about their business in different ways, but still prioritizing the same space.[86] Ostia's *decumanus* and the immediately adjacent streets would have been such an area of 'urban buzz', where movement was channelled and activities converged.

Clearly, Space Syntax tools have helped us to identify spatial configurations which would not have been visible to merely qualitative or intuitive scanning of street plans. However, having answered one set

82. Cf. Raper (1977); see Laurence (2007), Kaiser (2000), and Ellis (2004).
83. Ellis (2004).
84. Hillier (1996a; 1996b; 2007).

85. Cf. Kaiser (2000: 48-56) for selected Space Syntax approaches applied to Roman Empúries, Spain.
86. Hillier (1996a: 53).

of questions cannot distract from the fact that this spatial enquiry left many questions unanswered and raised a number of new ones. These unanswered and new questions encourage future research and allow us to develop new research directions. A new round of analysis should certainly take into account a larger sample size, possibly including all identified types of guild seats, to test whether the pattern identified by this analysis would be strengthened or require some different interpretation. The analysis of the guild buildings would also benefit from a comparative analysis of buildings with pure domestic use. This would allow us to examine how the scholae's access diagram's and spatial values relate to graphs of domestic buildings, and would help to explore further why the guild buildings show such different patterns of access.

9 – Conclusion and Directions for Future Research

This study provides a spatial and archaeological examination of selected aspects of Ostia's past urban space, following a scalar approach from individual houses to the city's street network. Throughout this thesis a 'Space First' policy was applied and Ostia's past built environment was examined to identify the underlying spatial structure, from which insights into the social organisation could be gained. This study was able to demonstrate that the 'Insula neighbourhood' (IV ii) was essentially collective, mediated through common spaces which were accessible to inhabitants and visitors alike. The analysis of the guild houses has shown that their spatial structure was primarily focused on generating potential for social interaction where the buildings meet the public domain, comprising Ostia's streets and public squares. For the street network itself the study could identify an underlying visual structure which gives cohesion to the city. With regard to the Human Use of Space, in many instances it could be established that spatial integration and interaction were privileged over segregation and exclusion, which should make for a safe and friendly urban environment, and thus providing urban qualities which were not only appreciated in second and early third century AD Ostia but are also highly relevant in today's cities. This brings us to other issues which were encountered in the course of the spatial enquiry into Roman Ostia: the questions of urban sustainability and abandonment. Our city block IV ii proved to be a good survivor and was able to sustain a long period of occupation. Several factors seem decisive for ensuring a long period of use; its spatial structure which encouraged interaction, but also its integration into a lively city quarter which was able to sustain a degree of urban density and a good variety of land-uses.[1]

The data-driven approach, applying Space Syntax's concepts and techniques, has proved to be a suitable and valuable research strategy to gain a deeper understanding of Ostia's urban landscape. Although Space Syntax methods have been developed to confront the challenges posed by today's urban planning, using common methods in the study of ancient and modern cities might allow us to find a common language in the study of cities, recognizing the potential of archaeology for illuminating long-term developments in cities, trends or other temporal patterns.[2] The case study of Ostia's Insula IV has demonstrated that Space Syntax has helped to detect spatial aspects which would otherwise not be noted by careful observation only. Space Syntax becomes a tool to think with, it inspires the researcher to explore further and to experiment at both levels: the technical side of the analyses and the possible interpretations of the results provided by the analyses. Finally, it also needs to be stressed that this study pursued a non-invasive approach to the city, applying non-destructive methods of data capture and interpretation, and it is thus fully compatible with current heritage principles. The method is not site specific and can be applied to the built environment at all time scales and geographic regions.

The following conclusion provides a chapter-by-chapter review of this thesis summing up what has been argued for and achieved, and presenting ideas for future research.

In the first chapter our appraisal of previous research into Ostia made clear that although recent studies made important contributions to the understanding of urban formation processes and development, insufficient attention has been paid to the city's spatial structure as a research interest in itself, let alone the relationship between the spatial organisation und urban society. Moreover, our evaluation has

1. See Pavolini (2002).

2. Smith (2010: 229-230).

shown that there is a need for more data-driven studies related to the built environment. Pioneer work in Space Syntax by DeLaine at Ostia revealed considerable scope for further development in which Space Syntax could be applied to the entire city at different spatial levels.

The following chapter introducing relevant comparative studies in Roman urbanism included three that were specifically guided in their spatial investigations by Space Syntax's theory and methods. The merits of the methods as well as the difficulties of applying the techniques to past urban space were presented in detail. The advantages offered by such a rigorous, analysis-driven approach to past built space seem to outweigh the difficulties which arise when a methodology is being followed which has its origin and motive in empirical studies of today's urban environment. When applied with caution, Space Syntax methods and techniques can lead to new insights into the past urban space which would not have been available to archaeological investigation alone. To gain a better insight into Space Syntax methods and theories Chapter Three introduced the main theoretical principles, and briefly reviewed a number of additional archaeological case studies deploying the technique.

In Chapter Four the methods and techniques discussed range from re-mapping an archaeological site to a fully embedded spatial analysis. The complexity of Ostia's archaeological record requires a combination of methods. Despite their diversity these can be summarised as non-destructive or non-invasive techniques of archaeological research. Such approaches have been successful in gaining new insights into sites which have been excavated some time ago. Moreover these methods are receiving increasing importance since excavations have become too demanding on both human and financial resources. Thus there is a large potential for integrating old excavation data with standing architecture at sites with a long history of excavations. The added analytical component, employing Space Syntax methods for spatial analysis, however took the approach followed in this study beyond the conventional recording and data processing and moved it towards a holistic study of past urban space.

In the following Chapter Five, focussing on one of Ostia's *insulae,* the little studied IV ii, a close examination of the buildings allowed us to reconstruct the Insula's development over the first three centuries AD. The structural remains bear witness to a dynamic environment which afforded continuous change involving all buildings to various degrees. The development reflected not only the larger building booms which shaped Ostia's built environment, but also periods of less pronounced activity. Through our detailed assessment structural changes could be identified and a chronological sequence, although relative, could be established for the development of the internal elements. For the majority of the discrete structures it could be demonstrated how closely they were linked to neighbouring buildings within the Insula and how changes in one unit affected the others. Not a single building existed within the Insula which did not in one way or other interfere with its next-door neighbour.

On the whole the Insula's structural remains confirm the general picture which has been established for Ostia's built environment. However, one important phase typical of Ostia is absent within the Insula: none of the buildings was ever converted into a Late Antique private luxury *domus,* as can be observed in other *insulae* of the surrounding area. Several reasons could account for this. The most plausible one seems to be that since the buildings remained operational into the 4th and some even into the 5th century they were not vacant and therefore not susceptible to functional change, i.e. being converted into luxury dwellings. Another reason could be that the single building units which comprise the Insula were too interdependent and interwoven and therefore not attractive for new owners, who would have to single out individual plots for luxury development while the remainder of the Insula would stay unchanged.

Chapter Six dealt with the application of Space Syntax to the functioning of life within the Insula. Through systematic analyses and interpretation of the various spatial aspects of the built environment this study was able to extract different layers of spatial structuring, co-existing within the same Insula plan, each with its own contribution to the city block's spatial functioning, and to the way the spaces were perceived by those who used and navigated them. Access analysis provided insights into the individual buildings as well as the Insula's collective configuration, demonstrating how the individual layouts structured the relationship between residents, and between residents and visitors. Axial line analysis and Visibility Graph Analysis (VGA) helped in identifying the southern courtyard as the Insula's most integrated area, or its social hub. It could be established that the Insula's spatial structure was instrumental to its sustained development which assured occupation over about five centuries. Its collective space structure seems to have prevented fragmentation into highly individualised luxury architecture, which was the fate of some of the neighbouring *insulae*.

Although the Insula is a unique and distinguishable entity, at the same time it is only such by virtue of its membership of a much larger system of spatial relations. Moving then to the city as a whole in chapter seven we review our knowledge of Roman urban streets in general and of Ostia's street network in particular. Starting from a theoretical perspective the chapter discussed current approaches applied by various scholars to develop a better understanding of ancient streets as communication systems and spaces where social interaction took place.

The tools provided by Space Syntax allowed us to explore new ways of looking into Ostia's streets, moving away from the static position of charting street courses and recording the material evidence of street surfaces and paving materials. Chapter Seven focused on the movements of Ostia's population around their community and on those spaces which were destined to generate interaction, because of their overriding influence on aggregating pedestrian flows. We were able to confirm the predictions of Space Syntax theory whereby the location of particular streets or public spaces within the total network of such units within a city defines its effectiveness in concentrating human movement and social encounter.

A complementary aspect of Space Syntax analysis, the creation of visibility graphs helped us to identify the city's visual structure by detecting places which were most integrated by sight. This method revealed that the city's visually most integrated places and cross roads not only formed local visual *foci* for their neighbourhoods, but as a group they were linked up to each other through inter-visibility. Thus all local places were infused with a global element which binds the city together. Working backwards from this wider spatial analysis we investigated the identified focal points of the city to see if there were archaeological markers (an 'inverted archaeological assessment'). Our approach succeeded in finding public features (fountains, arches etc.) which the city generated to anchor its visual structure to topographical locations.

In Chapter Eight the analysis moved up one level higher to a class of important buildings distributed over many points of the urban plan: the guild seats (*scholae*) or headquarters, serving as centres for various commercial and religious organisations. As always these buildings reflect local spatial factors and at the same time their position responds to conditions created by the overall street grid of the city. The two scales of assessment and their results have to be considered jointly, since they represent interdependent spatial factors which inevitably influenced each other. The study of the spatial logic of the individual ground plans (Access Analysis) of the *scholae* was able to capture the spatial organisation of the buildings and recognise them as largely defined by the outside space, Ostia's streets. Their outward focus seems to suggest that the guild buildings had a high potential for promoting contact and communication at the interface with public space. Moreover the guilds preferred to locate their buildings along the most easily accessible streets within Ostia's street network. Their exposed location not only gave the guild buildings a high public profile, but also enhanced their capacity to benefit from the concentration of movement that occurred along the main streets.

Some of the *scholae*'s spatial characteristics give the impression of being readily apparent, and seem to confirm already established principles of Roman spatial organisation. Other Roman cities like Pompeii and Empúries show similar concentrations of movement-seeking land-use (commercial, public and religious), located along streets that are easily accessible from outside and inside the city. What can a space syntax analysis add to our understanding of the spatial organisation of the Roman city that we do not already know? The added value of the approach offered here is that it produces the statistical values to place these spatial nexuses on solid impartial grounds. The turn from intuition to testable theory is justified through the importance of recognising the fundamental relationship between the urban grid structure (Ostia's street system) and human movement, as defined by the principles of the movement economy. This allows a broader understanding of movement beyond attractor-driven and purposive directed movement with their emphasis on direction and location.

Future directions

Clearly, Space Syntax tools have helped us to identify spatial configurations which would not have been visible to merely qualitative or intuitive scanning of street plans. However, having answered one set of questions cannot distract from the fact that this spatial enquiry left many questions unanswered and raised a number of new ones. These encourage future research and the development of new research directions.

The syntactical enquiry into the Insula could and should be expanded to include various other spatial parameters, such as by examining the Insula's total configuration from the perspective of each individual building, or by exploring the Insula's visual fields from location to location. Another promising addition to the current analysis would be to include the streets of the Insula's immediate surroundings into the area defined for analysis. Firstly this would give the Insula a buffer zone to counteract possible edge effects which the immediate boundary of the Insula might exert on the analysis. Secondly, by including a certain amount of street space the effect of the streets on the Insula can be more clearly appreciated. Above all, a similar spatial assessment to that conducted for Insula IV ii should be applied to other *insulae* of Ostia.

As for the street system itself, several pointers for future work can be offered, one of which is the overrated importance of the street termed the 'Semita dei Cippi' for Ostia's street network, as emerged from the Space Syntax analysis. An alternative favoured route now deserves investigation as a good starting point for examining the south-eastern suburbs of Ostia, promising new insights into the most densely developed area of the city. Another interesting idea which developed out of the Space Syntax analysis are several discontinuities in the urban grid which we identified in various locations, and presumably 'jeopardized' the viability of human mobility. A closer archaeological investigation into those areas would be rewarding.

Regarding future work on the guild seats it would be advantageous to increase their sample size, including all identified or hypothesised examples of Ostian guild seats to test whether the pattern identified by this analysis would be strengthened or require more elaborate and varied interpretative scenarios. In addition to guild seats other groups of buildings which have a city-wide distribution like Ostia's baths, or the *mithraea* could be an interesting field of study where Space Syntax could add new insights.

Although we have been obliged to construct this thesis from a series of different analyses at increasing spatial levels, we hope we have demonstrated the necessity of treating an ancient city as an integrated whole. This was indeed not only how the ancient inhabitants would have experienced it, but more fundamentally, their lives were highly conditioned by the constraints and possibilities engendered by the patterning of buildings and spaces that constituted the physical matrix of their daily existence. Hopefully this holistic form of urban analysis will be extended to the study of many other urban communities of the ancient world.

References

Allison, P. M., 1999. Introduction, in *The Archaeology of Household Activities*, P. M. Allison (ed.), London and New York: Routledge, 1-18.

Allison, P.M., 2001. Using the Material and the Written Sources: Turn of the Millennium Approaches to Roman Domestic Space, *American Journal of Archaeology,* 105, 181-208.

Allison, P.M., 2004. *Pompeian Households: An Analysis of Material Culture*, Los Angeles, CA: The Cotsen Institute of Archaeology, University of California.

Anderson, M., 2004. Houses, GIS and the Micro-Topology of Pompeian Domestic Space, in *TRAC 2004, Proceedings of the 14th Annual Theoretical Roman Archaeology Conference, Durham 2004*, B. Croxford, D. Grigoropoulos and J. Bruhn (eds.), Oxford: Oxbow Books, 144-156.

Ausbüttel, F. M., 1982. *Untersuchungen zu den Vereinen im Westen des Römischen Reiches,* Kallmütz: Verlag Michael Lassleben.

Bafna, S., 2003. Space Syntax: A Brief Introduction to its Logic and Analytical Techniques, *Environment and Behaviour*, 35 (1), 17-65.

Bakker, J. T., 1994. *Living and Working with the Gods: Studies of Evidence for Private Religion and its Material Environment in Ostia (100 BC - 500 AD),* Amsterdam: J. C. Gieben.

Barbieri, G., 1953. Ostia - Fistole Aquarie Inedite o Completate, *Notizie degli Scavi di Antichità,* 78 (VII), 172-174.

Barret, J.C., 1994. Defining Domestic Space in the Bronze Age of Southern Britain, in *Architecture and Order: Approaches to Social Space*, M. Parker Pearson and C. Richards (eds.), London and New York: Routledge, 87-97.

Bates, W., 1983. A Spatial Analysis of Roman Silchester, *Scottish Archaeological Review,* 2, 134-143.

Bauer, F. A. and Heinzelmann, M., 1999a. The Constantinian Bishop's Church at Ostia: Preliminary Report on the 1998 Season, *Journal of Roman Archaeology,* 12, 342-353.

Bauer, F. A. and Heinzelmann, M., 1999b. Die frühchristliche Basilika in der Regio V: erste Grabungsergebnisse, in *Mededelingen van het Nederlands Instituut te Rome*, S. Mols and C. E. v. d. Laan (eds.), Assen: Van Gorcum, 25.

Bauer, F. A., Heinzelmann, M. and Martin, A., 2000. Ostia: Ein urbanistisches Forschungsprojekt in den unausgegrabenen Bereichen des Stadtgebiets, *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung,* 107, 375-415.

Bauers, N., 2001. Die Insulae 'Dell'Ercole Bambino' und 'Del Soffitto Dipinto' in Ostia, in *Bericht über die 41. Tagung für Ausgrabungswissenschaft und Bauforschung*, 67-73.

Becatti, G. (ed.), 1954. *Scavi di Ostia II, I Mitrei,* Roma: La Libreria dello Stato.

Becatti, G. (ed.), 1961. *Scavi di Ostia IV, Mosaici e Pavimenti Marmorei,* Roma: Istituto Poligrafico dello Stato.

Becatti, G. (ed.), 1969. *Scavi di Ostia VI, Edificio con Opus Sectile Fuori Porta Marina,* Roma Istituto Poligrafico dello Stato.

Bender, T., 1998. Review of Favro (1996), The Urban Image of Augustan Rome, Cambridge and New York: Cambridge University Press. *Harvard Design Magazine*, 4, 1-3.

Benech, C., 2007. New Approaches to the Study of City Planning and Domestic Dwellings in the Ancient Near East, *Archaeological Prospection,* 14, 87-103.

Bert Lott, J., 2004. *The Neighbourhoods of Augustan Rome,* Cambridge: Cambridge University Press.

Bintliff, J., 2007. Emergent Complexity in Settlement Systems and Urban Transformations, in *Grundlagen, Erträge, Perspektiven*, Festgabe für Eckart Olshausen, U. Fellmeth, P. Guyot and H. Sonnabend (eds.), Zürich and New York: Georg Olms Verlag Hildesheim, 43-82.

Bintliff, J., 2010. Classical Greek Urbanism: A Social Darwinian View, in *Valuing Others in Classical Antiquity,* R. M. Rosen and I. Sluiter (eds.), London-Boston: Brill, 15-41.

Bjur, H., and Frizell, B. S., 2009. *Via Tiburtina: Space, Movement and Artefacts in the Urban Landscape*, Rome: Svenska Institutet.

Black, S., Browning, J.L., and Laurence, R., 2009. From Quarry to Road: The Supply of Basalt for Road Paving in the Tiber Valley, in *Mercator Placidissimus – The Tiber Valley in Antiquity*, F. Coarelli and H. Patterson (eds.), Rome: Edizioni Quasar, 705-730.

Blake, E., 2002. Spatiality Past and Present: An interview with Edward Soja, Los Angeles, 12th April 2001, *Journal of Social Archaeology,* 2, 139-158.

Blake, E., 2004. Space, Spatiality, and Archaeology, in *A Companion to Social Archaeology,* L. Meskell and R. W. Preucel (eds.), Oxford: Blackwell Publishing, 230-254.

Blake, M. E., 1973. *Roman Construction in Italy from Nerva through the Antonines*, Philadelphia: American Philosophical Society.

Bloch, H., 1959. The Serapeum of Ostia and the Brick-Stamps of 123 AD: A New Landmark in the History of Roman Architecture, *American Journal of Archaeology,* 63, 225-240.

Bloch, H., 1967. *The Roman Brick Stamps not published in Vol, XV, 1 of the Corpus Inscriptionum Latinarum, including indices to the Roman Brick-Stamps,* Rome: L'Erma di Bretschneider.

Boersma, J. S., 1985. *Amoenissima Civitas, Block V.ii at Ostia: Description and Analysis of its Visible Remains,* Assen: Van Gorcum.

Bollmann, B., 1998. *Römische Vereinshäuser: Untersuchungen zu den Scholae der römischen Berufs-, Kult- und Augustalen-Kollegien in Italien,* Mainz: Philipp von Zabern.

Bonanno, A., Gouder, T., Malone, C., and Stoddart, S., 1990. Monuments in an Island Society: The Maltese Context, in *Monuments and the Monumental, World Archaeology*, 22 (2), 190-205.

Bradford, J., 1957. *Ancient Landscapes: Studies in Field Archaeology,* London: G. Bell and Sons.

Brusasco, P., 2004. Theory and Practice in the Study of Mesopotamian Domestic Space, *Antiquity,* 78 (229), 142-157.

Brusasco, P., 2007. *The Archaeology of Verbal and Nonverbal Meaning: Mesopotamian Domestic Architecture and its Textual Dimension,* BAR International Series 1631, Oxford: Archaeopress.

Bruun, C., and A. Gallina Zevi (eds.), 2002. *Ostia e Portus: Nelle loro relazioni con Roma,* Rome: Institutum Romanum Finlandiae.

Calandra, E., 2000. Documenti Inediti sul Tempio di Roma e di Augusto a Ostia. *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung,* 107, 417-450.

Calza, G., 1927. Ostia - Rinvenimenti Epigrafici, *Notizie degli Scavi di Antichità*, 379-431.

Calza, G. (ed.), 1953. *Scavi di Ostia I, Topografia Generale,* Rome: Istituto Poligrafico e Zecca dello Stato/Libreria dello Stato.

Calza, G., and Becatti, G, 1971. *Ostia,* Istituto Poligrafico dello Stato, La Liberia dello Stato.

Canter, D., 1991. Social Past and Social Present: The Archaeological Dimensions to Environmental Psychology, in *Social Space: Human Spatial Behaviour in Dwellings and Settlements*, O. Gron, E. Engelstad and I. Lindblom (eds.), Odense: Odense University Press, 10-6.

Capogrossi Colognesi, L., 2004. *Max Weber und die Wirtschaft der Antike. Abhandlungen der Akademie der Wissenschaften in Göttingen,* 259. Göttingen: Vandenhoeck und Ruprecht.

Carl, P. *et al.*, 2000. Were Cities Built as Images?, *Cambridge Archaeological Journal,* 10 (2), 327-365.

Carmona, M., Heath, T., Oc, T., and Tiesdell, S., 2003. *Public Places and Urban Spaces*, Amsterdam and Boston: Architectural Press.

Çelik, Z., Favro, D., and Ingersoll, R., (eds.), 1994. *Streets: Critical Perspectives on Public Space,* Berkeley, Los Angeles and London: University of California Press.

Cicerchia, P., and Marinucci, A., 1992. *Scavi di Ostia XI, Le Terme del Foro o di Gavio Massimo*, Roma: Istituto Poligrafico e Zecca dello Stato/Libreria dello Stato.

Chapman, J., 1990. Social Inequality on Bulgarian Tells and the Varna Problem, in *The Social Archaeology of Houses*, R. Samson (ed.), Edinburgh: Edinburgh University Press, 49-92.

Chevallier, R., 1986. *Ostie Antique: Ville e Port,* Paris.

Chatford Clark, D. L., 2007. Viewing the Liturgy: A Space Syntax Study of Changing Visibility and Accessibility in the Development of the Byzantine Church in Jordan, *World Archaeology,* 39 (1), 84-104.

Claridge, A., 1998. The Villas of the Laurentina Shore, *Atti della Pontificia Accademia Romana di Archeologia,* 70, 307-317.

Clarke, D.L., (ed.), 1977. *Spatial Archaeology*, London, New York and San Francisco: Academic Press.

Coarelli, F., 2009. I Flavi e Roma, in *Divus Vespasianus,* F. Coarelli (ed.), Rome: Ministero per i Beni e le Attivita Culturali.

Cohen, H., 1880. *Description Historique des Monnaies Frappes sous l'Empire Romain*, Paris and London: Rollin and Feuardent.

Conroy-Dalton, R., 2003. The Secret is to Follow Your Nose: Route Path Selection and Angularity, *Environment and Behaviour,* 35 (1), 107-131.

Conroy-Dalton, R., and Bafna, S., 2003. The Syntactical Image of the City: A Reciprocal Definition of Spatial Elements and Spatial Syntaxes, in *4th International Space Syntax Symposium* London, 59.1-59.22.

Conzen, M.R.G., 1960. *Alnwick, Northumberland: A Study in Town-Plan Analysis*. London: Institute of British Geographers.

Cooley, A., 1999. A New Date for Agrippa's Theatre at Ostia, *Papers of the British School at Rome,* LXVII, 173-182.

Cooper, K., 2007. Closely Watched Households: Visibility, Exposure and Private Power in the Roman Domus, *Past and Present,* 197 (1), 3-33.

Cornell, T. J., and Lomas, K. (eds.), 1995. *Urban Life in Roman Italy,* London: University College London Press.

Craane, M.L., 2009. The Medieval Urban 'Movement Economy': Using Space Syntax in the Study of Medieval Towns as Exemplified by the Town of 's-Hertogenbosch, The Netherlands, in *Proceedings of the 7th International Space Syntax Symposium,* D. Koch, L. Marcus and J. Steen (eds.), Stockholm: KTH, 19.01-19.14.

Cumont, F., 1902. *Les Mystères de Mithras*, Paris: A. Fontemoing.

Cutting, M., 2003. The Use of Spatial Analysis to Study Prehistoric Settlement Architecture, *Oxford Journal of Archaeology,* 22 (1), 1-21.

D'Arms, J. H., 2000. P. Lucilius Gamala's Feasts for the Ostians and their Roman Models, *Journal of Roman Archaeology,* 13, 192-200.

Dawson, P.C., 2002. Space Syntax Analysis of Central Inuit Snow Houses, *Journal of Anthropological Archaeology*, 21, 464-480.

Davis, B., 1997. Reconsidering Habermas, Gender, and the Public Sphere: The Case of Wilhelmine Germany, in *Society, Culture, and the State in Germany, 1870-1930*, G. Eley (ed.), Ann Arbor: The University of Michigan Press, 397-426.

Davis, H., 2009. The Commercial-Residential Building and Local Urban Form, *Urban Morphology,* 13 (2), 89-104.

Deininger, J., 2005. Review of Luigi Capogrosssi Colognesi (2004), Max Weber und die Wirtschaft der Antike. Aus dem Italienischen von Brigitte Szabó-Bechstein, Göttingen: Vandenhoeck & Ruprecht. *sehepunkte* 5, Nr. 2; URL: http://www.sehepunkte.historicum.net/2005/02/4555.html (accessed 03/07/2007)

DeLaine, J., 1993. Review of Nielsen (1991) and Yegül (1994). *Journal of Roman Archaeology* 6, 348-358.

DeLaine, J., 1995. The Insula of the Paintings at Ostia 1.4. 2-4. Paradigm for a City in Flux, in *Urban Life in Roman Italy,* T. J. Cornell and K. Lomas (eds.), London: University College London Press, 79-106.

DeLaine, J., 1997. *The Baths of Caracalla: A Study in the Design, Construction, and Economics of Large-scale Building Projects in Imperial Rome,* Journal of Roman Archaeology, Supplementary Series 25.

DeLaine, J., 1999. High Status Insula Apartments in Early Imperial Ostia - a Reading, in *Mededelingen van het Nederlands Instituut te Rome: Antiquity,* S. Mols and C. van der Laan (eds.), Nederlands Instituut te Rome, 58, 175-189.

DeLaine, J., 2002. Building Activity in Ostia in the Second Century AD, in *Ostia e Portus: Nelle Loro Relazioni con Roma*, C. Bruun and A. Gallina Zevi (eds.), Roma: Institutum Romanum Finlandiae, 41-101.

DeLaine, J., 2004. Designing for a Market: 'Medianum' Apartments at Ostia, *Journal of Roman Archaeology,* 17, 147-176.

DeLaine, J., 2008a. Conclusions, in *Arqueología de la Construcción I: Los Procesos Constructivos en el Mundo Romano: Italia y Provincias Occidentales,* S. Camporeale, H. Dessales, and A. Pizzo (eds.), Merida: Consejo Superior de Investigaciones Cientificas, Università di Siena, École Normale Supérieure, 321-328.

DeLaine, J., 2008b. Between Concept and Reality: Case Studies in the Development of Roman Cities in the Mediterranean, in *The Ancient City: New Perspectives on Urbanism in the Old and New World*, J. Marcus and J.A. Sabloff (eds.), Santa Fe, N.M.: School for Advanced Research Press, 95-116.

DeLaine, J., and Wilkinson, D., 1999. The Reading Ostia Project: Excavation and Survey in Insula I, IV, Ostia, in *Mededelingen van het Nederlands Instituut te Rome: Antiquity*. S. Mols and C. van der Laan (eds.), Nederlands Instituut te Rome, 58, 19.

De Robertis, F.M., 1971. *Storia delle corporazioni e del regime associativa nel mondo romano,* Bari: Adriatica Editrice.

Dickmann, J.A., 1999. *Domus Frequentata: Anspruchsvolles Wohnen im pompejanischen Stadthaus,* München: Verlag Dr. Friedrich Pfeil.

Dobbins, J.J., and Foss, P.W. (eds.), 2007. *The World of Pompeii*, London and New York: Routledge.

Descœudres, J.-P. (ed.), 2001. *Ostia: Port et Porte de la Rome Antique,* Genève: Ville de Genève, Département des Affaires Culturelles.

Donley-Reid, L., 1990. A Structuring Structure: The Swahili House, in *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-cultural Study*, S. Kent (ed.), London and New York: Cambridge University Press, 114-126.

Duneier, M., 1999. *Sidewalks*, New York: Farrar, Straus and Giroux.

Dyson, S. L., 1992. *Community and Society in Roman Italy,* Baltimore and London: The Johns Hopkins University Press.

Dyson, S. L., and Prior, R.E., 1995. Horace, Martial, and Rome: Two Poetic Outsiders Read the Ancient City. *Arethusa,* 28 (2/3), 245-263.

Eck, W., 2008. Verkehr und Verkehrsregeln in einer antiken Grossstadt, in *Stadtverkehr in der antiken Welt*, D. Mertens (ed.), Palilia 18, Wiesbaden: Dr. Ludwig Reichert Verlag, 59-69.

Eder, K., Becker, H., and Heinzelmann, M., 1997. Vorbericht zu einer Geophysikalischen Prospektionskampagne in Ostia Antica, in *Mitteilungen des Deutschen Archäologischen Institutes, Römische Abteilung,* 104, 537-548.

Egelhaaf-Gaiser, U., 2000. *Kulträume im römischen Alltag: Das Isisbuch des Apuleius und der Ort von Religion im kaiserzeitlichen Rom,* Stuttgart: Franz Steiner Verlag.

Egelhaaf-Gaiser, U., 2002. Religionsästhetic und Raumordnung am Beispiel der Vereinsgebäude von Ostia, in *Religiöse Vereine in der römischen Antike: Untersuchungen zu Organisation, Ritual und Raumordnung*, U. Egelhaaf-Gaiser und A. Schaefer (eds.), Tübingen: Mohr Siebeck, 123-172.

Ellis, J.R., 2004. The Distribution of Bars at Pompeii: Archaeological, Spatial and Viewshed Analysis, *Journal of Roman Archaeology*, 17, 371-384.

Engels, D., 1990. *Roman Corinth: An Alternative Model for the Classical City,* Chicago and London: The University of Chicago.

Eschebach, H., 1970. *Die städtebauliche Entwicklung des antiken Pompeji, mit einem Plan 1:1000*, Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung, Supplement 17.

Fairclough, G., 1992. Meaningful Constructions – Spatial and Functional Analysis of Medieval Buildings, *Antiquity,* 66, 348-366.

Falzone, S., 2004. *Scavi di Ostia XIV, Le Pitture delle Insulae (180-250 circa d. C.),* Roma: Libreria dello Stato, Istituto Poligrafico e Zecca dello Stato.

Falzone, S., 2007. *Ornata Aedificia, Pitture Parietali delle Case Ostiensi*, Roma: Libreria dello Stato.

Favro, D., 1994. The Street Triumphant: The Urban Impact of Roman Triumphal Parades, in *Streets: Critical Perspectives on Public Space,* Z. Celik, D. Favro and R. Ingersoll (eds.), Berkeley, Los Angeles and London: University of California Press, 151-164.

Favro, D., 1996. *The Urban Image of Augustan Rome,* Cambridge: Cambridge University Press.

Ferretti, L., 1995. La Realizzazione del Fotopiano, in *Atlante di Ostia Antica,* V. Mannucci (ed.), Venezia: Marsilio Editori, 55-60.

Ferri, G., and Berreca, V., 1995. Il Rilievo Cartografico, in *Atlante di Ostia Antica,* V. Mannucci (ed.), Venezia: Marsilio Editori, 53-55.

Ferguson, T.J., 1996. *Historic Zuni Architecture and Society: An Archaeological Application of Space Syntax*, Anthropological Papers of the University of Arizona, 60. Tucson: University of Arizona Press.

Finley, M.I., 1973. *The Ancient Economy*, Berkeley, CA: University of California Press.

Fisher, K.D., 2006. Messages in Stone: Constructing Socio-Political Inequality in Late Bronze Age Cyprus, in *Space and Spatial Analysis in Archaeology*, E.C. Robertson, J.D. Seibert, D.C. Fernandez, and M.U. Zender (eds.), Calgary: University of Calgary Press, 123-131.

Flambart, J.M., 1987. Élements pour une Approche Financière de la Mort dans les Classes Populaires du Haut-Empire, in *La Mort, les Morts e l'au-delà dans le Monde Romain*, Caen: Pu De Caen, 209-243.

Foote Wyte, W., 1993 (3rd edition, first published 1943). *Street Corner Society*, Chicago and London: The University of Chicago Press.

Foss, P.W., 1996. Pompeii: The Social City, *Journal of Roman Archaeology,* 9, 351-352.

Foster, S.M., 1989. Analysis of Spatial Patterns in Building (access analysis) as an Insight into Social Structure: Examples from the Scottish Atlantic Iron Age, *Antiquity,* 63, 40-50.

Fridell Anter, K., and Weilguni, M., 2003. Public Space in Roman Pompeii, in *Toward an Archaeology of Buildings: Contexts and Concepts*, G. Malm (ed.), BAR International Series 1186, Oxford: Archaeopress, 31-39.

Fulford, M., 1987. Economic Interdependence Among Urban Communities of the Roman Mediterranean, *World Archaeology,* 19 (1), 58-75.

Fulford, M., 1991. Territorial Expansion and the Roman Empire, *World Archaeology,* 23(1), 294-305.

Fustel de Coulange, N.D., 1956. *The Ancient City: A Study of Religion, Laws and Institutions of Greece and Rome*, Mineola, N.Y.: Dover Publications.

Gallina Zevi, A., and Claridge, A., (eds.), 1996. *'Roman Ostia' Revisited: Archaeological and Historical Papers in Memory of Russell Meiggs,* Rome and London: The British School at Rome and the Soprintendenza Archeologica di Ostia.

Gasparri, C., 1970. *Ostia: Le Pitture della Caupona del Pavone, Fasc. IV.* Sezione Terza.

Geremia-Nucci, R., 2000. Le Terme del Faro di Ostia. Nuovi dati provenienti dallo studio delle fistulae, *Archeologia Classica,* 51, 383-409.

Gering, A., 2002. Die Case a Giardino als unerfüllter Architektentraum: Planung und gewandelte Nutzung einer Luxuswohnanlage im Antiken Ostia, in *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung,* 109, 109-140.

Gering, A., 2004. Plätze und Strassensperren an Promenaden: Zum Funktionswandel Ostias in der Spätantike, in *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung,* 111, 299-382.

Giannini, S., 1970. *Ostia,* Genova: Quaderno dell'Istituto di Elementi dell'Architectura e Rilievo dei Monumenti 4.

Giddens, A., 1984. *The Constitution of Society: Outline of the Theory of Structuration,* Berkeley and Los Angeles: University of California Press.

Gilchrist, R., 1988. The Spatial Archaeology of Gender Domains: A Case Study of Medieval English Nunneries, *Archaeological Review from Cambridge,* 7 (1), 21-29.

Girri, G., 1956. *La Taberna nel Quadro Urbanistico e Sociale di Ostia*, Roma: L'Erma di Bretschneider.

George, M., 1995. Review of R. Laurence (1994) Roman Pompeii: Space and Society. London and New York: Routledge. *Bryn Mawr Classical Review* 95.10.19.

George, M., 2002. Review of M. Grahame (2000), Reading Space: Social Interaction and Identity in the Houses of Roman Pompeii, BAR International Series 886. *The Journal of Roman Studies*, 92, 238-239.

Gibson, J. J., 1979. *The Ecological Approach to Visual Perception*, Boston: Houghton Mifflin.

Gofmann, E., 1959. *The Presentation of Self in Every Day Life,* New York: Anchor Books Doubleday.

Gofmann, E., 1963. *Behavior in Public Places: Notes on the Social Organization of Gatherings,* New York: The Free Press.

Goodman, P., 2001. Review of A. Kaiser (2000), The Urban Dialogue: An Analysis of the Use of Space in the Roman City of Empuries, Spain, BAR International Series 901. *Digressus* 1, 4-7.

Grahame, M., 1997. Towards a Theory of Roman Urbanism, in *TRAC 96, Proceedings of the Sixth Annual Theoretical Roman Archaeology Conference*, Sheffield 1996, K. Meadows, C. Lemke and J. Heron (eds.), Oxford: Oxbow Books, 151-162.

Grahame, M., 2000. *Reading Space: Social Interaction and Identity in the Houses of Roman Pompeii: A Syntactical Approach to the Analysis and Interpretation of Built Space,* BAR International Series 886, Oxford: Archaeopress.

Gron, O., Engelstad, E., and Lindblom, I. (eds.), 1991. *Social Space: Human Spatial Behaviour in Dwellings and Settlements*, Odense: Odense University Press.

Günzel, S. (ed.), 2010. *Raum. Ein interdisziplinäres Handbuch*. Stuttgart and Weimar: Verlag J.B. Metzler.

Habermas, J., 1989 (transl. 1st published in German 1962). *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society,* Cambridge: Polity.

Hanghai, A., Hori, Y., and Ajioka, O., 2009. Revising General Maps in the Light of Evidence Based on New Survey in Pompeii and Ostia Using a Long-range Laser Scanner, in *22nd CIPA Symposium* Kyoto. URL: http://cipa.icomos.org/text%20files/KYOTO/142.pdf (accessed 19/07/2011).

Hanghai, A. and Hori, Y., 2009. Laser Scanning in Ostia: A Comparative Study of Accuracy of the Drawings in the 1950s and a Field Survey on Tall Structures, in *'3D-Arch' 2009 3D Virtual Reconstruction and Visualization of Complex Architectures*, URL: http://www.isprs.org/proceedings/XXXVIII/5-W1/pdf/hanghai_hori.pdf (accessed 19/07/2011).

Hanson, J., 1998. *Decoding Homes and Houses,* Cambridge: Cambridge University Press.

Hanson, J., and Conroy-Dalton, R., 2007. Feeling Good and Feeling Safe in the Landscape: A 'Syntactic' Approach, in (Proceedings) *Open Space - People Space: Innovative Approaches to Research Excellence in Landscape and Health*, Edinburgh. URL:
http://www.openspace.eca.ac.uk/conference2007/PDF/Summary_Paper._Final._J_Hanson._AB_edit.W-out_trackg..pdf

Hartnett, J., 2008. *Si quis hic sederit*: Streetside Benches and Urban Society in Pompeii, *American Journal of Archaeology,* 112 (2), 91-119.

Haselberger, L., 2000. Imaging Augustan Rome, *Journal of Roman Archaeology,* 13, 515-528.

Heinrich, E., 2000. Review of A. Wallace-Hadrill (1994), Houses and Society in Pompeii and Herculaneum, Princeton: Princeton Univ. Press. *KLIO* 82 (1), 302-303.

Heinzelmann, M., 1998a. Beobachtungen zur suburbanen Topographie Ostias. Ein orthogonales Strassensystem im Bereich der Pianabella, in *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung*, 105, 175-225.

Heinzelmann, M., 1998b. Arbeitsbericht zu einer zweiten geophysikalischen Prospektionskampagne in Ostia antica, in *Mitteilungen des Deutschen Archäologischen Instituts Römische Abteilung*, 105, 425-429.

Heinzelmann, M., 1999. Neue Untersuchungen in den unausgegrabenen Gebieten von Ostia: Luftbildauswertung und geophysikalische Prospektionen, in *Mededelingen van het Nederlands Instituut te Rome*, S. Mols and C. E. van der Laan (eds.), Assen: Van Gorcum, 24-25, 84-89.

Heinzelmann, M., 2000. *Die Nekropolen von Ostia: Untersuchungen zu den Gräberstrassen vor der Porta Romana und an der Via Laurentina*, München: Verlag Dr. Friedrich Pfeil.

Heinzelmann, M. 2001. Les nécropoles d'Ostie: topographie, développement, architecture, structure sociale, in *Ostia: Port et Porte de la Rome Antique,* J.-P. Descœudres (ed.), Genève: Ville de Genève, Département des Affaires Culturelles, 373-384.

Heinzelmann, M., 2002. Bauboom und urbanistitische Defizite - zur städtebaulichen Entwicklung Ostias im 2. Jh., in *Ostia e Portus: Nelle loro Relazioni con Roma*, C. Bruun and A. Galina Zevi (eds.), Rome: Institutum Romanum Finlandiae, 103-121.

Heinzelmann, M., 2005. Die vermietete Stadt, in *Lebenswelten: Bilder und Räume in der Römischen Stadt der Kaiserzeit*, P. Zanker and R. Neudecker (eds.), Palilia 16, Wiesbaden: Dr. Ludwig Reichert Verlag, 113-128.

Heinzelmann, M., 2008. Review of K. Rieger (2004), Heiligtümer in Ostia, Munich: Friedrich Pfeil. *American Journal of Archaeology Online Book Review*. URL: http://www.ajaonline.org/sites/default/files/10_Heinzelmann.pdf (accessed 19/07/2011)

Heinzelmann, M., and Martin, A., 2002. River Port, Navalia and Harbour Temple at Ostia: New Results of a DAI-AAR Project. *Journal of Roman Archaeology,* 15, 9-15.

Heres, T. L., 1982. *Paries: A Proposal for a Dating System of Late-Antique Masonry Structures in Rome and Ostia,* Amsterdam: Rodopi.

Hermansen, G., 1982. *Ostia: Aspects of Roman City Life,* Edmonton Alberta, Canada: The University of Alberta Press.

Hesberg, H. von., 1985. Zur Plangestaltung der Coloniae Maritimae. *Mitteilungen des Deutschen Archälogischen Instituts, Römische Abteilung,* 92, 127-150.

Hillier, B., 1996a. Cities as Movement Economies, *Urban Design International,* 1 (1), 41-60.

Hillier, B., 1996b. *Space is the Machine,* Cambridge: Cambridge University Press.

Hillier, B., 1999. Centrality as a Process: Accounting for Attraction Inequalities in Deformed Grids, in *Space Syntax' Second International Symposium, Brasilia 1999*, 06.1-06.20.

Hillier, B., 2001. A Theory of the City as Object: Or, How Spatial Laws Mediate the Social Construction of Urban Space, in *Proceedings of the 3rd International Space Syntax Symposium Atlanta*, 02.1-02.28.

Hillier, B., 2007. Cities as Movement Economies, in *Space is the Machine, Part II: Non-Discursive Regularities*, Cambridge University e-Publication, 111-137. URL:http://discovery.ucl.ac.uk/3850/1/SpaceIsTheMachine_Part2.pdf (accessed17/7/2011)

Hillier, B., 2008a. Space and Spatiality: What the Built Environment Needs from Social Theory, *Building Research and Information,* 36 (3), 216-230.

Hillier, B., 2008b. *Using DepthMap for Urban Analysis (unpublished manual) 1401081.doc*

Hillier, B., 2009. Spatial Sustainability in Cities: Organic Patterns and Sustainable Forms, in *Proceedings of the 7th International Space Syntax Symposium,* D. Koch, L. Marcus and J. Steen (eds.), KHT: Stockholm, 16-35.

Hillier, B., and Hanson, J., 1984. *The Social Logic of Space,* Cambridge and New York: Cambridge University Press.

Hillier, B., Iida, S., 2005. Network and Psychological Effects in Urban Movement, in: *Spatial Information Theory: COSIT 2005*, A.G. Cohn and D.M. Mark (eds.), Lecture Notes in Computer Science number 3693, Berlin: Springer Verlag, 475-490.

Hillier, B., Penn, A., *et al*., 1993. Natural Movement: Or Configuration and Attraction in Urban Pedestrian Movement, *Environment and Planning, B: Planning and Design,* 20, 29-66.

Hillier, B., and Vaughan, L., 2007. The City as One Thing, *Progress in Planning,* 67 (3), 205-230.

Hölscher, C., Meilinger, T., *et al*., 2006. Up the Down Staircase: Wayfinding Strategies in Multi-level Buildings, *Journal of Environmental Psychology,* 26, 284-299.

Hopkins, K., 1983. Introduction, in *Trade in the Ancient Economy,* P. Garnsey, K. Hopkins, and C. R. Whittaker (eds.), Berkeley-Los Angeles, CA: University of California Press, ix-xxv.

Horkheimer, M. and Adorno, T.W. 2002 (1st published in German in 1947). *Dialectic of Enlightenment: Philosophical Fragments* (1947), G. S. Noerr (ed.), trans. E. Jephcott, Stanford: Stanford Univ. Press.

Jakobs, J., 1993 (1st edition 1961). *The Death and Life of Great American Cities*, New York: The Modern Library.

Jaeger, M., 1997. Review of Diane Favro (1996), The Urban Image of Augustan Rome, Cambridge: Cambridge University Press. *Bryn Mawr Classical Review,* 97.4.23.

Jongman, W., 1988. *The Economy and Society of Pompeii*, Amsterdam: J.C. Gieben.

Jones, R., and Robinson, D.J., (2007). Intensification, Heterogeneity and Power in the Development of Insula VI, 1, in *The World of Pompeii*, J. J. Dobbins and J. E. Foss (eds.), London and New York: Routledge, 119-128.

Jouffroy, H., 1986. *La construction publique en Italie et dans L'Afrique romaine,* Strasbourg: AECR.

Jütte, R., 2005. *A History of the Senses: From Antiquity to Cyberspace,* Cambridge, UK and Malden, MA: Polity.

Kaiser, A., 2000. *The Urban Dialogue: An Analysis of the Use of Space in the Roman City of Empúries, Spain,* BAR International Series 901*,* Oxford: Archaeopress.

Karimi, K., (1997). The Spatial Logic of Organic Cities in Iran and the United Kingdom, in *Space Syntax Symposium,* London, 05.1-05.17.

Keay, S., Millet, M., Paroli, L., and Strutt, K., 2005. *Portus: An Archaeological Survey of the Port of Imperial Rome,* London and Rome: The British School at Rome and the Soprintendenza per i Beni Archaeologici di Ostia.

Kent, S. (ed.), 1990. *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study,* Cambridge: Cambridge University Press.

Kloppenborg, J. S., and Wilson, S.G. (eds.), 1996. *Voluntary Associations in the Graeco-Roman World,* London and New York: Routledge.

Kockel, V., 1992. Ostia im 2. Jahrhundert n. Chr.: Beobachtungen zum Wandel eines Stadtbilds, in *Die Römische Stadt im 2. Jahrhundert n. Chr.: Der Funktionswandel des öffentlichen Raumes*, H.-J. Schalles, H. v. Hesberg and P. Zanker (eds.), Xanten: Rheinland-Verlag Köln, 99-117.

Kockel, V., 1999. Ausgrabungen der Universität Augsburg im sog. Macellum von Ostia, in *Mededelingen van het Nederlands Instituut te Rome,* S. Mols and C. E. van der Laan (eds.), Rome: Nederlands Institute te Rome, 22-24.

Kockel, V., 2002. 'Il palazzo per tutti' La découverte des immeubles locatifs de l'antiquité et son influence sur l'architecture de la Rome fasciste, in *Ostia. Port et Porte de la Rome Antique*, J.-P. Descœudres (ed.), Genève: Ville de Genève, 66-73.

Kockel, V., 2003. Review of Beate Bollmann (1998), Römische Vereinshäuser. *Gnomon,* 75, 572-575.

Kockel, V., and Ortisi, S., 2000. Ostia. Sogenanntes Macellum (VI 5,2). Vorbericht über die Ausgrabungen der Universität Augsburg 1997/98, *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung,* 107, 351-363.

Laeuchli, S. (ed.), 1967. *Mithraism in Ostia,* Evanston, Ill: Northwestern University Press.

Laird, M.L., 2000. Reconsidering the so-called 'Sede degli Augustali' at Ostia, *Memoirs of the American Academy in Rome,* 45, 41-84.

Lancaster, L.C., 2009. *Concrete Vaulted Construction in Imperial Rome, Innovations in Context*, Cambridge and New York: Cambridge University Press.

Lang, F., 2005. Structural Change in Archaic Greek Housing, in *Ancient Greek Houses and Households: Chronological, Regional, and Social Diversity*, B.A. Ault and L.C. Nevett (eds), Philadelphia: University of Pennsylvania Press, 12-35.

La Rocca, E., 2006. Passeggiando intorno ai Fori Imperiali, in *Imaging Ancient Rome: Documentation – Visualization – Imagination,* L. Haselberger and J. Humphrey (eds.), Journal of Roman Archaeology, Supplementary Series Nr. 61, 121-143.

Laurence, R., 2008. City Traffic and the Archaeology of Roman Streets from Pompeii to Rome, in *Stadtverkehr in der antiken Welt*, D. Mertens (ed.), Palilia 18, Wiesbaden: Dr. Ludwig Reichert Verlag, 67-106.

Laurence, R., 1994. *Roman Pompeii: Space and Society,* London and New York: Routledge.

Laurence, R., 2007 (2nd edition). *Roman Pompeii: Space and Society,* London and New York: Routledge.

Lauro, M. G., 1995, Lineamenti di storia degli scavi, in *Atlante di Ostia Antica,* V. Mannucci (ed.), Venezia: Marsilio Editori, 41-52.

Lawrence, R.J., 1990. Public Collective and Private Space: A Study of Urban Housing in Switzerland, in *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study*, S. Kent (ed.), Cambridge: Cambridge University Press, 73-91.

Lawrence, D.L., and Low, S. M., 1990. The Built Environment and Spatial Form, *Annual Reviews of Anthropology*, 19, 453-505.

Leach, E., 1978. Does Space Syntax Really 'Constitute the Social'?, in *Social Organisation and Settlement: Contributions from Anthropology, Archaeology and Geography*, D. Green, C. Haselgrove, and M. Spriggs (eds.), BAR International Series (Supplementary) 47(ii), 385-401.

Lefebvre, H., 1991. *The Production of Space,* Oxford: Blackwell.

Lefebvre, H., 2003. *The Urban Revolution,* Minneapolis, MN: University of Minnesota Press.

Letesson, Q., 2009. *Du Phénotype au Génotype: Analyse de la Syntaxe Spatiale en Architecture Minoenne (MM IIIB-LM IB)* (Aegis 2), Louvain: Presses Universitaires de Louvain, Louvain-la-Neuve.

Lévi-Strauss, C., 1963. *Structural Anthropology*, London: Basic Books.

Liedke, C., 1995. *Weiße Greifenwände. Zwei Leihgaben von Wandmalereien des 2. Jahrhunderts n. Chr. aus Ostia in Berlin*, Berlin: Antikensammlung Staatliche Museen zu Berlin.

Liedke, C., 2003. *Nebenraumdekorationen des 2. und 3. Jahrhunderts in Italien*, Berlin and New York: Walter de Gruyter.

Lilley, K. D., 2000. Mapping the Medieval City: Plan Analysis and Urban History, *Urban History,* 27, 1, 7-30.

Ling, R., 1990. A Stranger in Town: Finding the Way in the Ancient City, *Greece and Rome,* 37 (2), 204-214.

Low, S. M., 2001. The Edge and the Centre: Gated Communities and the Discourse of Urban Fear, *American Anthropologist,* 103 (1), 45-58.

Lynch, K., 1960. *The Image of a City*, Cambridge, MA and London: The MIT Press.

Mackay, E.A., 2000. Review of Paul Zanker (1999), Pompeii: Public and Private Life, Cambridge, MA: Harvard University Press. *Scholia Reviews* ns 9, 17. URL: http:///www.und.ac.za/und/classics/00-17zan.html (accessed 08/06/2006).

Mackenzie, D., 2007. Boomtown, *New Scientist*, 26th May 2007, 48-51.

MacDonald, W.L., 1986. *Architecture of the Roman Empire, Vol. 2*, New Haven: Yale University Press.

Maïm, J., Haegler, S., *et al*., 2007. Populating Ancient Pompeii with Crowds of Virtual Romans, *Eurographics*, 1-8. URL: http://vrlab.epfl.ch/~maim/vast07.pdf (accessed 17/07/2011)

Manderscheid, H., 1981. *Die Skulpturenausstattung der kaiserlichen Thermenanlagen*, Berlin: Gebr. Mann.

Mannucci, V., 1995. *Atlante di Ostia antica,* Venezia: Marsilio.

Mar, R., 1991. La Formazione dello Spazio Urbano nella Città di Ostia, in *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung,* 98, 81-109.

Mar, R., 1992. El Serapeum Ostiense y la Urbanistica de la Ciudad. Una Aproximacion a Su Studio, *Bollettino di Archeologia,* 13-15, 31-52.

Mar, R., 1996. Santuarios e inversión inmobiliaria en la urbanistica ostiense del siglo II, in *'Roman Ostia' Revisited: Archaeological and Historical Papers in Memory of Russell Meiggs*, A. Gallina Zevi and A. Claridge (eds.), London and Ostia: British School at Rome and the Soprintendenza Archeologica di Ostia, 115-164.

Mar, R. (ed.), 2001. *El Santuario de Serapis en Ostia*: Documento d'Arqueologia Classica, Tarragona.

Mar, R., 2002. Ostia, Una Ciudad Modelada por el Comercio: La Construccion del Foro, *Mélanges de l'École française de Rome,* 114 (1), 111-180.

Mar, R., 2008. Il traffico viario a Ostia: Spazio pubblico e progetto urbano, in *Stadtverkehr in der antiken Welt,* D. Mertens (ed.), Palilia 18, Wiesbaden: Dr. Ludwig Reichert Verlag, 125-144.

Marshall, S., 2005. *Streets and Patterns,* London and New York: Spon Press.

Martin, A., 1996. Un saggio sulle mura del Castrum di Ostia (Reg. I, Ins. x, 3), in '*Roman Ostia' Revisited: Archaeological and Historical Papers in Memory of Russell Meiggs*, A. Gallina-Zevi and A. Claridge (eds.), London and Ostia: British School at Rome and the Sorpintendenza Archeologica di Ostia, 19-38.

Mattingly, D., 1997. Beyond belief? Drawing a Line Beneath the Consumer City, in *Roman Urbanism: Beyond the Consumer City*, H. M. Parkins (ed.), London and New York: Routledge, 205-214.

Meiggs, R., 1973. *Roman Ostia,* Oxford: Clarendon Press.

Meiggs, R., 1974. Review of James E. Packer (1971), The Insulae of Imperial Ostia, Memoirs of the American Academy in Rome, xxxi; *The Classical Review. New Series.,* 24 (2), 268-271.

Mertens, D., 2008. Introduction, in *Stadtverkehr in der antiken Welt,* D. Mertens (ed.), Palilia 18, Wiesbaden: Dr. Ludwig Reichert Verlag, 1.

Miller, P.A., 2007. 'I Get Around': Sadism, Desire, and Metonymy on the Streets of Rome with Horace, Ovid, and Juvenal, in *The Sites of Rome: Time, Space, Memory*, D.H.J. Larmour and D. Spencer (eds.), Oxford: Oxford University Press, 138-167.

Mischerlich, A. 2008 (1st published 1965). Die *Unwirtlichkeit unserer Städte. Anstiftung zum Unfrieden*. Frankfurt am Main: Suhrkamp.

Morley, N., 1997. City in Context: Urban Systems in Roman Italy, in *Roman Urbanism: Beyond the Consumer City*, H.M. Parkins (ed.), London and New York: Routledge, 42-58.

Moughtin, C., 1991. The European City Street. Part 1: Paths and Places, *Town Planning Review,* 62 (1), 51-77.

Moughtin, C., 1991. The European City Street. Part 2: Relating Form and Function, *Town Planning Review,* 62 (2), 153-199.

Mugnier, C. J., 2005. Grids & Datums: Italian Republic, *Photogrammetric Engineering and Remote Sensing* (August, 2005), 889-890.

Newsome, D.J., 2009a. Traffic, Space and Legal Change around the Casa del Marinaio at Pompeii (VII 15.1-2), *BABesch,* (84), 121-142.

Newsome, D., 2009b. Centrality in its Place: Defining Urban Space in the City of Rome, in *TRAC 2008, Proceedings of the 18th Theoretical Roman Archaeology Conference,* Amsterdam, M. Driessen et al. (eds.), Oxford: Oxbow Books, 25-38.

Nielsen, I., 1991. *Thermae et Balnea: The Architecture and Cultural History of Roman Public Baths,* Aarhus: Aarhus University Press.

Nubani, L., and Winemann, J., 2005. The Role of Space Syntax in Identifying the Relationship Between Space and Crime, in *Proceedings of the 5th International Space Syntax Symposium*, V. Nes (ed.), Delft: TU Delft, 413-422.

Packer, J. E., 1971. *The Insulae of Imperial Ostia,* Rome: Memoirs of the American Academy in Rome.

Paliou, E., 2008. An Autonomous Agent Approach to the Investigation of Intra-Site Movement and Visibiliy: The Visual Consumption of Theran Murals from the Public Spaces of LBA Akrotiri (Thera, Greece), in *Layers of Perception: Proceedings of the 35th International Conference on Computer Applications and Quantitative Methods in Archaeology (CAA) Berlin.Germany, April 2-6, 2007*, A. Poluschny, K. Lambers, I. Herzog (eds.), Bonn: Dr. Rudolf Habelt, 328-335.

Park, R. E., Burgess, E. W., and McKenzie, R.D., 1967. *The City,* Chicago and London: The University of Chicago Press.

Parker-Pearson, M., and Richards, C., 1994. *Architecture and Order: Approaches to Social Space*, London and New York: Routledge.

Parkins, H. M. (ed.), 1997. *Roman Urbanism: Beyond the Consumer City*, London and New York: Routledge.

Parslow, C., 1999. Review of Paul Zanker (1998), Pompeii: Public and Private Life. Cambridge, MA: Harvard University Press; *Bryn Mawr Classical Review* 10.25.

Paschetto, L., 1912. *Ostia Colonia Romana, Storia e Monumenti*, Roma: Tipografia poliglotta Vaticana.

Patterson, J. R., 1992. The C*ollegia* and the Transformation of the Towns of Italy in the Second Century AD, in *L'Italie d'Auguste à Diocletien*, Rome: École française de Rome, 227-238.

Pasini, F., 1978. *Ostia Antica: Insule e Classi Sociali*, Roma: Multigrafica.

Pavolini, C., 1986. *La Vita Quotidiana a Ostia.* Bari: Gius. Laterza.

Pavolini, C., 2002. La Trasformazione del Ruolo di Ostia, in *Villes et Avant-ports: l'Exemple de Rome et Ostie. Nouvelles Recherches à Ostie,* Mélanges de l'École française de Rome, Rome: École française de Rome, 325-352.

Pavolini, C., 2006 (1st edition 1983). *Ostia: Guide Archeologiche Laterza,* Rome and Bari: Laterza.

Perring, D., 1991. Spatial Organisation and Social Change in Roman Towns, in *City and Country in the Ancient World*, J. Rich and A. Wallace-Hadrill (eds.), London and New York: Routledge, 273-293.

Perry, J. S., 2001. Ancient *Collegia*, Modern Blackshirts?: The Study of Roman Corporations in Fascist Italy, *International Journal of Classical Tradition*, 8 (2), 205-216.

Perry, J. S., 2006. *The Roman Collegia: The Modern Evolution of an Ancient Concept,* Leiden and Boston: Brill.

Pirson, F., 1999. *Mietwohnungen in Pompeji und Herkulaneum: Untersuchungen zur Architektur, zum Wohnen und zur Sozial- und Wirtschaftsgeschichte der Vesuvstädte,* München: Verlag Dr. Friedrich Pfeil.

Poehler, E. E., 2006. The Circulation of Traffic in Pompeii's RegioVI, *Journal of Roman Archaeology,* 19, 53-74.

Prior, R. E., 1996. Going Around Hungry: Topography and Poetics in Martial 2.14, *American Journal of Philology,* 117 (1), 121-141.

Purcell, N., 1987. Town in Country and Country in Town, in *Ancient Roman Villa Gardens*, E. Blair and MacDougall (ed.), Washington, D.C.: Dumbarton Oaks Research Library and Collection, 187-203.

Raper, R., 1977. The Analysis of the Urban Structure of Pompeii: A Sociological Examination of Land Use (Semi-micro), in *Spatial Archaeology*, D. L. Clarke (ed.), London, New York and San Francisco: Academic Press, 189-221.

Raper, R., 1979. Pompeii - Planning and Social Implications, in *Space, Hierarchy and Society: Interdisciplinary Studies in Social Area Analysis*, B. C. Burnham and J. Kingsbury (eds.), BAR International Series 59, Oxford: Archaeopress, 137-148.

Rapoport, A., 2002 (1st published 1994). Spatial Organization and the Built Environment, in *Companion Encyclopaedia of Anthropology*, T. Ingold (ed.), London and New York: Routledge, 460-502.

Remus, H., 1996. Voluntary Association and Networks, in *Voluntary Associations in the Graeco-Roman World*, J. S. Kloppenborg and S.G. Wilson (ed.), London and New York: Routledge, 146-175.

Ricciardi, M. A. and Scrinari, V.S.M., 1996. *La Civiltà dell' Acqua in Ostia Antica,* Vol. I-II, Rome: Fratelli Palombi.

Rickman, G., 1971. *Roman Granaries and Store Buildings,* Cambridge: Cambridge University Press.

Rieger, A.K., 2004. *Heiligtümer in Ostia,* München: Verlag Dr. Friedrich Pfeil.

Robinson, D. J., 1997. The Social Texture of Pompeii, in *Sequence and Space in Pompeii*, S. E. Bon and R. Jones (eds.), Oxford: Oxbow Press, 135-144.

Roland, I. D., and Howe, T. N., 1999. *Vitruvius: Ten Books on Architecture,* Cambridge: Cambridge Univ. Press.

Rose, P., 2005. *Remapping Ostia: A Systematic Study of the Urban Landscape of Ostia from the 2nd to the 4th Century AD* (unpublished PhD dissertation), University of Reading.

Rykwert, J., 1964. *The Idea of a Town: Anthropology of Urban Form in Rome, Italy and the Ancient World,* Hilversum: G. van Saane.

Salingaros, N., 2005. *Principles of Urban Structure,* Amsterdam: Techne Press.

Scagliarini Corlaita, D., 1995. Le grandi insulae di Ostia come integrazione tra edilizia residenziale e infrastrutture urbane, in *Splendida Civitas Nostra: Studi Archeologici in Onore di Antonio Frova*, G. C. Manasse and E. Roffia (eds.), Rome: Quasar, 171-181.

Schmölder-Veit, A., 2009. *Brunnen in den Städten des westlichen Römischen Reiches*, Palilia 19, Wiesbaden: Dr. Ludwig Reichert Verlag.

Schmölder, A., 2000. Őffentliche Brunnen und Nymphaen in Ostia, in *Cura Aquarum in Sicilia. Tenth International Congress on the History of Water Management and Hydraulic Engineering in the Mediterranean Region*, G. Jansen (ed.), Stichting Babesch, 255-263.

Serra, S., 2007. *Via Ostiense - Via Portuense,* Roma: Istituto Poligrafico e Zecca dello Stato - Libreria dello Stato.

Shapiro, J., 1997. Fingerprints in the Landscape: Cultural Evolution in the North Rio Grande, in *Proceedings of the First International Space Syntax Symposium,* Volume II, 21.1-21.21.

Shennan, S., 1997 (2nd edition). *Quantifying Archaeology*, Edinburgh: Edinburgh University Press.

Shepherd, E.J., 2006. Il 'Rilievo Topofotografico di Ostia dal Pallone'(1911), *Aaera II,* 15-38.

Slater, W. J., 2000. The Scholae of Roman Collegia, *Journal of Roman Archaeology,* 13, 493-497.

Smith, M. E., 2010a. The Archaeological Study of Neighbourhoods and Districts in Ancient Cities, *Journal of Anthropological Archaeology*, doi:10.1016/j.jaa.2010.01.001.

Smith, M. E., 2010b. Sprawl, Squatters and Sustainable Cities: Can Archaeological Data Shed Light on Modern Urban Issues?, *Cambridge Archaeological Journal,* (20:2), 229-253.

Small, D.B., 1996. Review of Ray Laurence (1994), Roman Pompeii Space and Society, London and New York: Routledge. *American Journal of Archaeology*, Vol. 100, 430.

Soja, E., 2001. In Different Spaces: Interpreting the Spatial Organization of Societies, in *Proceedings 3rd International Space Syntax Symposium, Atlanta*, 1.1-1.7.

Staccioli, R.A., 2003. *The Roads of the Romans*, Los Angeles: Getty Publications.

Steinby, M., 1977. La cronologia dalle 'figlinae' doliari urbane dalla fine dell'età repubblicana fino all'inizio del III secolo, *Bullettino della Commissione Archeologica Comunale di Roma,* Roma: L'Erma di Bretschneider, 7-132.

Stek, T. D., 2008. A Roman Cult in the Italian Countryside?: The 'Compitalia' and the Shrines of the 'Lares Compitales*', BABesch,* 83, 111-132.

Steuernagel, D., 2001. Kult and Community: Sacella in den Insulae von Ostia, *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung,* 108, 41-56.

Steuernagel, D., 2004. *Kult und Alltag in römischen Hafenstädten,* Wiesbaden: Franz Steiner Verlag.

Steuernagel, D., 2005. Öffentliche und Private Aspekte von Vereinskulten am Beispiel von Ostia, in *Lebenswelten: Bilder und Räume in der römischen Stadt der Kaiserzeit,* P. Zanker and R. Neudecker (eds.), Palilia 16, Wiesbaden: Dr. Ludwig Reichert Verlag, 73-80.

Steuernagel, D., 2006. Ancient Harbour Towns- Religious Market Places?: Formation and Social Functions of Voluntary Associations in Roman Ostia, in *Zwischen Kult und Gesellschaft: Kosmopolitische Zentren des antiken Mittelmeerraumes als Aktionsraum von Kultvereinen und Religionsgemeinschaften*, I. Nielsen (ed.), Archäologisches Institut, Hamburg: Camelion-Verlag Augsburg, 141-151.

Stöger, H., 2007. Monumental Entrances of Roman Ostia: Architecture with Public Associations and Spatial Meaning, *BABesch* 82, 347-363.

Stöger, H., 2008. Roman Ostia: Space Syntax and the Domestication of Space, in *Layers of Perception, Proceedings of the 35th International Conference on Computer Applications and Quantitative Methods in Archaeology (CAA),* A. Posluschny, K. Lambers and I. Herzog (eds.), Berlin: Dr. Rudolf Habelt Verlag, 322-327.

Stöger, H., 2009. Clubs and Lounges at Roman Ostia: The Spatial Organisation of a Boomtown Phenomenon (Space Syntax applied to the Study of 2nd century AD 'Guild Buildings' at a Roman Port Town) in *7th International Space Syntax Symposium Stockholm,,* D. Koch, L. Markus and J. Steen (eds.), Stockholm: KTH, 108:1-108:11.

Stöger, H., 2010. Space Syntax and Archaeology, *The European Archaeologist,* 55-58.

Stöger, H., 2011 (in press). The Spatial Organisation of the Movement Economy: The Analysis of Ostia's Scholae, in *Rome, Ostia, Pompeii: Movement and Space*, R. Laurence and D.J. Newsome (eds.), Oxford: Oxford University Press.

Stone, T., 2000. Prehistoric Community Integration in the Point of Pines Region of Arizona, *Journal of Field Archaeology,* 27(2), 197-208.

Storey, G.R., 2004. The Meaning of Insula in Roman Residential Terminology, *Memoirs of the American Academy in Rome*, 49, 47-84.

Storey, G. R., 2001. Regionaries-Type Insulae 1: Architectural / Residential Units at Ostia, *American Journal of Archaeology,* 105, 389-401.

Storey, G. R., 1997. The Population of Ancient Rome, *Antiquity,* 71, 966-978.

Thaler, U., 2005. Narrative and Syntax: New Perspectives on the Late Bronze Age Palace of Pylos, Greece, in *Proceedings of the 5th International Space Syntax Symposium,* A. v. Nes (ed.), Delft: TU Delft, 323-239.

Tanner, J., 1995. Review of A. Wallace-Hadrill (1994), Houses and Society in Pompeii and Herculaneum and R. Laurence (1994), Roman Pompeii: Space and Society. *Antiquity*, 69 (262), 217-118.

Trachtenberg, M. 1997. *Dominion of the Eye: Urbanism, Art, and Power in Early Modern Florence.* New York: New York University.

Trümper, M., 2005. Modest Housing in Late Hellenistic Delos, in *Ancient Greek Houses and Households: Chronological, Regional, and Social Diversity*, B.A. Ault and L.C. Nevett (eds.), Philadelphia: University of Pennsylvania Press, 119-139.

Tucci, P.L., 2009. Nuove Osservazioni sull'Architettura del Templum Pacis, in *Divus Vespasianus*, F. Coarelli (ed.), Rome: Electa, 158-167.

Turner, A., Doxa, M., O'Sullivan, D., and Penn, A., 2001. From Isovists to Visibility Graphs: Methodology for the Analysis of Architectural Space, *Environment and Planning B: Planning and Design 2001,* 28, 103-121.

Turner, A., and Penn, A., 1999. Making Isovists Syntactic: Isovist Integration Analysis, in *Proceedings 2nd International Symposium on Space Syntax, Brasilia,* 1-9.

Tsujimura, S., 1991. Ruts in Pompeii: The Traffic System in the Roman City, *Opuscula Pompeiana,* 1:58-86.

Twain, M., 1875. *The Innocents Abroad*, URL: http://etext.lib.virginia.edu/etcbin/toccer-new2?id=TwaInno.sgm&images=images/modeng&data=/texts/english/modeng/parsed&tag=public&part=all (accessed 17/07/2011).

Ulrich, R.B., 1997. Review of Ray Laurence (1994), Roman Pompeii: Space and Society. *Journal of Field Archaeology*, 24 (1), 382-385.

Van Dalen, J. H., 1991. The Late Use of Opus Reticulatum in Ostia, in *Mededelingen van het Nederlands Institute te Rome,* Assen and Maastricht: Van Gorcum, 236-380.

Van der Meer, L.B., 2002. Travertine Cornerstones in Ostia Antica: Odd Blocks, *American Journal of Archaeology,* 106, 575-580.

Van der Meer, L.B., 2009. The Temple on the Piazza delle Corporazioni in Ostia antica. *BaBesch*, 84, 163-170.

Van Dyke, R. M., 1999. Space Syntax Analysis at the Chacoan Outlier of Guadalupe, *American Antiquity,* 64.

Van Essen, C. C., 1957. «A Propos du Plan de la Ville d'Ostie», Hommages à Waldemar Deonna, *Collection Latomus Bruxelles,* 18, 509-513.

Van Krimpen-Winckel, L. M., 2009. *Ordinatio et Dispositio: Design and Meaning in Pompeian Private Architecture*, (unpublished PhD dissertation), Faculty of Archaeology, Leiden.

Van Nes, A., 2009. Measuring Spatial Visibility, Adjacency, Permeability and Degrees of Street Life in Excavated Towns, in *7th International Space Syntax Symposium,* D. Koch, L. Markus and J. Steen (eds.), Stockholm: KTH, 120:1-120:11.

Van Nijf, O., 2002. Collegia and Civic Guards: Two Chapters in the History of Sociability, in *After the Past: Essays in Ancient History in Honour of H.W. Pleket*, W. Jongman and M. Kleijwegt (eds.), Leiden, Boston and Köln: Brill, 305-339.

Van Tilburg, C., 2007. *Traffic and Congestion in the Roman Empire,* London and New York: Routledge.

Valeri, C., 2002. Arredi scultorei dagli edifici termali di Ostia, in *Ostia e Portus nelle Loro Relazioni con Roma,* C. Bruun and A.Gallina Zevi (eds.), Acta Instituti Romani Finlandiae, 27, 213-228.

Vaughan, L., 2007. The Spatial Form of Poverty in Charles Booth's London, *Progress in Planning*, 67 (4), 231-250.

Verduchi, P., 1995. Lo sviluppo della citta, in *Atlante di Ostia Antica*, V. Mannucci (ed.), Venezia: Marsilio, 9-24.

Visconti, C. L., 1868. *I monumenti del Metroon Ostiense e degli annessi collegi dei Dendrofori e dei Cannofori,* Roma: Tipografia Tiberina.

Vitelli, G., 1980. Grain Storage and Urban Growth in Imperial Ostia: A Quantitative Study, in *World Archaeology* 12, 54-68.

Wallace-Hadrill, A., 1988. The Social Structure of the Roman House, in *Papers of the British School at Rome*, Vol. LVI, 43-97.

Wallace-Hadrill, A., 1994. *Houses and Society in Pompeii and Herculaneum,* Princeton: Princeton Univ. Press.

Wallace-Hadrill, A., 2002. The Streets of Rome as Representation of Imperial Power, in *The Presentation and Perception of Roman Imperial Power - Proceedings of the 3rd International Workshop 'Impact of Empire',* Nederlands Institute in Rome (20-23 March 2002), L. De Blois *et al* (ed.), Amsterdam: J.C. Gieben, 189-206.

Waltzing, J.P., 1895-1900. *Étude Historique sur les Corporations Professionnelles Chez les Romains Depuis les Origines Jusqu'à la Chute de l'Empire d'Occident*, 4 volumes, Louvain: C. Peeters.

Waarsenburg D.J. 1998, «De oudste sporen van Ostia. Van de Bronstijd tot de stichting van het castrum», *Hermeneus* 70,2, 60-69.

Weber, M., 1958. *The City*, D. Martindale and G. Neuwirth (trans.), New York: Free Press.

Webmoor, T., 2005. Mediational Techniques and Conceptual Frameworks in Archaeology: A Model in 'Mapwork' at Teotihuacan, Mexico, *Journal of Social Archaeology,* 5, 52-84.

Westgate, R., 2007. House and Society in Classical and Hellenistic Crete: A Case Study in Regional Variation, *American Journal of Archaeology,* Vol. 111, 3, 423-457.

White, L.M., 2001. *The Ostia Synagogue-Area Masonry Analysis Project*, unpublished preliminary report of the 2001 Field Season at Ostia Antica, Austin Texas.

Whittaker, C. R., 1995. Do Theories of the Ancient City Matter?, in *Urban Society in Roman Italy*, K. Lomas and T. Cornell (eds.), London: University College London Press, 9-26.

Widlock, T., 1999. Mapping Spatial and Social Permeability, *Current Anthropology*, 40 (3), 392-400.

Yaeger, J., and Canuto, M. A., 2000. *The Archaeology of Communities: A New World Perspective*, London: Routledge.

Yegül, F. K., 1992. *Baths and Bathing in Classical Antiquity,* Cambridge MA and London, England Architectural History Foundation and the MIT Press, 95-110.

Yegül, F. K., 1994. The Street Experience of Ancient Ephesus, in *Streets: Critical Perspectives on Public Space,* D. Favro, Z. Celik, and R. Ingersoll (eds.), Berkeley, Los Angeles and London: University of California Press, 95-110.

Ynnilä, H., (2011). Meaningful Insula: Bridging the Gap Between Large and Small Case Studies of Urban Living Conditions, in *TRAC 2010: Proceedings of the Twentieth Annual Theoretical Roman Archaeology Conference*, D. Mladenovic and B. Russel (eds.), Oxford: Oxbow Books, 47-58.

Zanker, P., 1988a. *Pompeji: Stadtbilder als Spiegel von Gesellschaft und Herrschaftsform,* Mainz am Rhein: Verlag Philipp von Zabern.

Zanker, P., 1988b. *The Power of Images in the Age of Augustus,* Ann Arbor: The Univ. of Michigan Press.

Zanker, P., 1994. Veränderungen im öffentlichen Raum der Italischen Städte der Kaiserzeit, in *L'Italie d'Auguste à Dioclétien,* Rome: École française de Rome, 259-283.

Zanker, P., 1998. *Pompeii: Public and Private Life,* Cambridge MA and London: Harvard Univ. Press.

Zanker, P., 2000. The City as Symbol: Rome and the Creation of an Urban Image, in *Romanisation and the City: Creation, Transformation, and Failures*, E. Fentress (ed.), Porthmouth, Rhode Island: Journal of Roman Archaeology, 25-41.

Zevi, F., 1996. Sulle fasi più antiche di Ostia, in *'Roman Ostia' Revisited: Archaeological and Historical Papers in Memory of Russell Meiggs,* A. Galina Zevi and A. Claridge (eds.), London and Ostia: British School at Rome and the Sorpintendenza Archeologica di Ostia, 69-80.

Zevi, F., 2004a. Cicero and Ostia, *Journal of Roman Archaeology,* in *Ostia, Cicero, Gamala, Papers in Memory of John H. D'Arms, , Journal of Roman Archaeology*, *Suppl. 57,* A. Gallina Zevi and J.H. Humphrey (eds.), 15-31.

Zevi, F., 2004b. P. Lucilio Gamala Senior: Un riepilogo trent'anni dopo, in *Ostia, Cicero, Gamala, Papers in Memory of John H. D'Arms, Journal of Roman Archaeology*, *Suppl. 57,* A. Gallina Zevi and J.H. Humphrey (eds.), 47-68.

Zevi, F., and Pensabene, P., 1971. Un arco in onore di Caracalla ad Ostia, *Rendiconti della R. Accademia dei Lincei,* 26, 481-523.

Appendix 1

Terme del Faro, IV ii 1							
J-graph						TRRA 37.052	
	Nodes 31	8.0				MRRA 1.195	
	Node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
caldarium	1	7.0	147.000	4.900	0.269	1.515	0.500
service corr.	2	6.0	148.000	4.933	0.271	1.528	0.500
caldarium	3	7.0	145.000	4.833	0.264	1.489	0.250
service corr.	4	7.0	150.000	5.000	0.275	1.553	2.250
tepidarium	5	6.0	121.000	4.033	0.209	1.178	2.250
heat trap	6	5.0	102.000	3.400	0.165	0.932	0.583
passage	7	4.0	85.000	2.833	0.126	0.712	1.333
frigidarium m.	8	5.0	112.000	3.733	0.188	1.062	3.083
frigidarium	9	3.0	74.000	2.467	0.101	0.569	3.083
latrine	10	5.0	130.000	4.333	0.230	1.294	0.500
changing r.	11	4.0	97.000	3.233	0.154	0.867	0.310
pool cold	12	4.0	103.000	3.433	0.168	0.945	0.143
changing r.	13	4.0	101.000	3.367	0.163	0.919	1.143
entrance	14	1.0	111.000	3.700	0.186	1.049	1.167
service corr.	15	5.0	121.000	4.033	0.209	1.178	0.167
service corr.	16	5.0	119.000	3.067	0.143	0.803	1.893
passage	17	3.0	92.000	3.067	0.143	0.803	4.133
changing r.	18	3.0	92.000	3.067	0.143	0.803	1.893
taberna	19	1.0	159.000	5.300	0.297	1.670	0.750
taberna	20	1.0	159.000	3.600	0.297	1.670	0.750
taberna	21	2.0	108.000	3.600	0.179	1.010	1.417
pool warm	22	8.0	174.000	5.800	0.331	1.864	0.250
pool warm	23	8.0	174.000	5.800	0.331	1.864	0.250
neighbour	24	4.0	121.000	4.033	0.209	1.178	0.250
courtyard	25	5.0	121.000	4.033	0.291	1.178	0.167
outside space	26	0.0	131.000	4.367	0.232	1.308	1.667
portico neigh.	27	1.0	129.000	4.300	0.228	1.282	0.833
passage	28	2.0	90.000	3.000	0.138	0.777	0.726
pool cold	29	6.0	141.000	4.700	0.255	1.437	0.500
stairs	30	5.0	121.000	4.033	0.209	1.178	0.167
understairs	31	3.0	114.000	3.800	0.193	1.087	0.500

Table A1.1 – Terme del Faro, (IV ii 1)

Portico and Caseggiato dell'Ercole (IV ii 2-3)

j-graph			depth				21.370 TRRA	Control/V
	Node	Node	4.0	Total/	Mean/		0.562 MRRA	
		corrected	depth	Depth	Depth	**RA**	**RRA**	Control/V
passage	1		2.0	79.0	2.135	0.063	0.400	0.462
stairs	2		2.0	101.0	2.730	0.096	0.609	0.063
taberna (baths)	3		2.0	98.0	2.648	0.091	0.581	0.563
room (baths)	4		3.0	125.0	3.378	0.132	0.838	1.000
tab. commerc.	5		2.0	91.0	2.459	0.081	0.514	0.813
tab. commerc.	6		3.0	95.0	2.054	0.059	0.552	0.399
passage	7		2.0	76.0	2.054	0.059	0.371	0.962
tab. commerc.	8		2.0	92.0	2.486	0.083	0.524	0.896
tab. back-room	9		3.0	95.0	2.567	0.087	0.552	0.399
tab. commerc.	10		2.0	93.0	2.514	0.084	0.533	0.567
tab. back-room.	11		3.0	95.0	2.568	0.087	0.552	0.567
tab. commerc.	12		2.0	92.0	2.513	0.083	0.524	0.395
tab. back-room	13		3.0	93.0	2.514	0.084	0.533	0.817
tab. commerc.	14		2.0	91.0	2.459	0.081	0.514	0.313
tab. back-room	15		3.0	91.0	2.459	0.081	0.514	1.150
passage	16		2.0	92.0	2.486	0.083	0.524	0.313
passage	17		3.0	91.0	2.459	0.081	0.514	1.017
stairs	18		3.0	103.0	2.784	0.099	0.629	0.067
stairs	19		2.0	101.0	2.730	0.096	0.609	0.063
passage	20		2.0	77.0	2.081	0.060	0.381	1.379
tab. commerc.	21		2.0	92.0	2.486	0.083	0.524	0.263
tab. commerc.	22		2.0	101.0	2.730	0.096	0.609	0.063
tab. commerc.	23		1.0	94.0	2.541	0.086	0.543	0.205
tab. commerc.	24		3.0	95.0	2.568	0.087	0.552	0.267
tab. commerc.	25		3.0	103.0	2.784	0.099	0.629	0.067
tab. commerc.	26		1.0	104.0	2.811	0.101	0.638	0.393
entrance	27		1.0	86.0	2.324	0.074	0.467	1.043
passage/south	28	36	3.0	103.0	2.784	0.099	0.629	0.067
passage baths	29	37	3.0	109.0	2.946	0.108	0.686	0.75
porter house	30	28	1.0	102.0	2.757	0.098	0.619	0.726
stairs	31	29	1.0	118.0	3.189	0.122	0.771	0.143
comm/indust.	32	30	1.0	111.0	3.000	0.111	0.705	0.976
entrance 04	33		3.0					
courtyard	34		2.0	67.0	1.811	0.045	0.286	7.199
portico	35	39	1.0	65.0	1.757	0.042	0.267	8.093
outside space	36	38	0.0	82.0	2.216	0.068	0.429	2.979
void	37/38							
comm/indust.	39	35	2.0	117.0	3.162	0.120	0.762	0.667
entr. Indus. bld.	40	33	2.0	90.0	2.647	0.099	0.603	0.577
neighbour IV ii 4	41	35	4.0	133.0	3.594	0.144	0.914	0.333

Table A1.2 – Portico and Cseggiato dell'Ercole (IV ii 2-3)

Building IV ii 04 (industrial space)							
j-graph						TRRA 12.181	
total	Nodes 10					MRRA 1.218	
	Node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
entrance	1	1.0	21.0	2.333	0.333	1.091	0.833
space	2	2.0	21.0	2.333	0.333	1.091	2.0
space	3	3.0	29.0	3.222	0.555	1.818	0.333
space	4	3.0	21.0	2.333	0.555	1.091	0.833
space	5	3.9	20.0	2.222	0.305	1.000	0.833
space	6	2.0	19.0	2.111	0.278	0.909	1.833
understairs	7	3.0	27.0	3.000	0.500	1.636	0.333
stairs	8	2.0	27.0	3.000	0.500	1.636	0.333
passage	9	1.0	19.0	2.222	0.278	0.909	1.833
courtyard	10	0.0	20.0	2.222	0.306	1.000	0.833

Table A1.3 – Building IV ii 4 (industrial space)

Caseggiato IV ii 5							
j-graph						TRRA 18.268	
total	Nodes 15	6.0				MRRA 1.218	
	node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
room	1	5.0	39.0	2.786	0.275	1.062	0.533
room	2	4.0	34.0	2.429	0.242	0.849	0.999
room	3	3.0	31.0	2.214	0.187	0.722	1.0
courtyard	4	5.0	33.0	2.357	0.209	0.807	3.667
corridor	5	4.0	28.0	2.000	0.154	0.595	3.867
cubicula	6	5.0	41.0	2.929	0.297	1.147	0.167
cubicula	7	5.0	41.0	2.929	0.279	1.147	0.167
room	8	5.0	41.0	2.929	0.297	1.147	0.167
storage room	9	2.0	38.0	3.357	0.363	1.402	0.833
entrance	10	6.0	46.0	3.286	0.352	1.359	0.2
mixed	11	6.0	46.0	3.286	0.352	1.359	0.2
mixed	12	6.0	46.0	3.286	0.352	1.359	0.2
neighbour	13	1.0	46.0	3.286	0.352	1.359	0.2
stairs	14	1.0	71.0	5.071	0.626	2.422	0.5
outside space	15	0.0	58.0	4.143	0.484	1.869	1.5

Table A1.4 – Caseggiato IV ii 5

Caupona del Pavone (IV ii 6)							
j-graph						TRRA 23.303	
total	Nodes 21	4.0				MRRA 1.110	
	node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
corridor	1	1.0	40.0	2.0	0.105	0.479	2.833
understairs	2	2.0	57.0	2.85	0.195	0.887	1.167
storage room	3	2.0	59.0	2.95	0.205	0.935	0.167
corridor	4	2.0	57.0	2.85	0.195	0.887	0.167
latrine	5	3.0	76.0	3.8	0.195	0.887	0.500
corridor	6	2.0	49.0	2.45	0.153	0.695	1.167
courtyard	7	3.0	66.0	3.3	0.242	1.103	1.250
main room	8	3.0	66.0	3.3	0.242	1.103	1.250
small room	9	4.0	85.0	4.25	0.342	1.558	0.500
room	10	3.0	68.0	3.4	0.252	1.151	0.250
taberna	11	1.0	67.0	3.35	0.247	1.127	0.250
corridor	12	1.0	47.0	2.35	0.142	0.647	0.667
corridor	13	2.0	60.0	3.0	0.211	0.959	3.333
room	14	3.0	79.0	3.95	0.311	1.414	0.250
room	15	3.0	79.0	3.95	0.311	1.414	0.250
room	16	1.0	65.0	3.25	0.237	1.079	1.250
taberna	17	1.0	65.0	3.25	0.237	1.079	1.250
back-room	18	2.0	84.0	4.20	0.337	1.534	0.500
stairs	19	3.0	76.0	3.80	0.295	1.343	0.500
stairs	20	4.0	85.0	4.25	0.342	1.343	0.500
outside space	21	0.0	48.0	2.4	0.147	0.672	2.0

Table A1.5 – Caupona del Pavone (IV ii 6)

Caseggiato IV ii 07							
j-graph						TRRA 18.849	
total	Nodes 26	4.0				MRRA 0.725	
	node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
courtyard	1	2.0	41.0	1.64	0.053	0.272	9.667
room	2	3.0	64.0	2.56	0.130	0.663	0.567
room	3	3.0	64.0	2.56	0.130	0.663	0.567
latrine	4	3.0	63.0	2.48	0.127	0.646	0.340
corridor	5	3.0	62.0	2.48	0.123	0.624	1.567
room	6	3.0	64.0	2.56	0.130	0.663	0.567
room	7	3.0	64.0	2.56	0.130	0.663	0.567
room	8	3.0	65.0	2.60	0.133	0.680	0.067
taberna	9	1.0	82.0	3.28	0.190	0.969	0.125
taberna	10	1.0	82.0	3.28	0.190	0.969	0.125
room	11	3.0	65.0	2.60	0.133	0.680	0.067
taberna	12	1.0	82.0	3.28	0.190	0.969	1.000
room	13	3.0	65.0	2.60	0.133	0.680	0.067
stairs	14	1.0	82.0	3.28	0.190	0.970	0.125
corridor	15	1.0	49.0	1.96	0.080	0.408	0.692
taberna	16	1.0	81.0	3.24	0.187	0.953	0.067
room water?	17	3.0	65.0	2.60	0.133	0.680	0.067
taberna	18	1.0	81.0	3.24	0.187	0.953	0.625
taberna	19	1.0	65.0	2.60	0.133	0.680	0.625
back-room	20	2.0	56.0	2.24	0.103	0.527	0.567
understairs	21	2.0	57.0	2.28	0.107	0.544	0.340
room	22	3.0	65.0	2.60	0.133	0.680	0.067
link to bld. 08	23	3.0	63.0	2.52	0.126	0.646	1.067
outside space	24	0.0	58.0	2.32	0.110	0.561	5.833
neighbour	25	4.0	87.0	3.48	0.206	1.055	0.333
neighbour	26	4.0	86.0	3.44	0.203	1.038	0.333

Table A1.6 – Building IV ii 7

Building IV ii 08							
j-graph						TRRA 11.725	
total	Nodes 14	2.0				MRRA 0.8374	
	node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
passage	1	2.0	29.0	2.307	0.205	0.769	1.143
stairs	2	1.0	31.0	2.385	0.231	0.865	0.143
back-room	3	2.0	41.0	3.154	0.359	1.345	0.500
commerc	4	1.0	31.0	2.385	0.231	0.865	0.143
room	5	1.0	31.0	2.385	0.231	0.865	0.143
hall	6	1.0	29.0	2.231	0.205	0.779	0.643
hall	7	2.0	31.0	2.345	0.230	0.865	0.667
room	8	2.0	33.0	2.538	0.256	0.961	0.167
room	9	2.0	33.0	2.538	0.256	0.961	0.167
room	10	2.0	33.0	2.538	0.256	0.961	0.167
room	11	1.0	31.0	2.385	0.231	0.865	0.143
passage	12	1.0	21.0	1.615	0.102	0.384	4.643
neighbour	13	2.0	33.0	2.538	0.256	0.961	0.167
outside	14	0.0	19.0	1.462	0.077	0.288	5.167

Table A1.7 – Building IV ii 8

Caseggiato IV ii 9 and IV ii 13 (loggia)							
j-graph						TRRA 25.326	
total	Nodes 19	7.0				MRRA 1.333	
	Node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
Loggia IVii13	1	1.0	82.0	4.555	0.418	1.811	1.000
passage	2	1.0	82.0	4.555	0.418	1.811	1.917
entrance IVii9	3	6.0	49.0	2.722	0.203	0.877	1.250
room	4	5.0	46.0	2.555	0.183	0.792	2.333
room	5	6.0	55.0	3.055	0.242	1.047	0.583
Room (special)	6	6.0	63.0	3.500	0.294	1.273	0.250
corridor	7	4.0	51.0	2.833	0.216	0.934	0.583
room	8	5.0	58.0	3.222	0.261	1.132	1.167
room	9	5.0	65.0	3.611	0.307	1.329	1.667
room	10	6.0	82.0	4.555	0.413	1.811	0.333
corridor	11	4.0	58.0	3.222	0.261	1.132	1.000
passage	12	3.0	49.0	2.722	0.203	0.877	1.167
entrance	13	1.0	59.0	3.278	0.268	1.160	0.583
room	14	2.0	52.0	2.889	0.222	0.962	1.833
room	15	3.0	69.0	3.833	0.333	1.443	0.333
stairs	16	7.0	66.0	3.667	0.314	1.358	0.333

courtyard	17	0.0	68.0	3.778	0.327	1.415	1.583
neighbour	18	2.0	99.0	5.500	0.524	2.292	0.500
courtyard	19	1.0	84.0	4.666	0.431	1.867	0.583

Table A1.8 – Caseggiato IV ii 9 and IV ii 13 (loggia)

Building IV ii 10							
Graph						TRRA 12.181	
total	Nodes 8					MRRA 1.523	
	Node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
room	1	3.0	24.0	3.428	0.899	2.465	0.500
room	2	1.0	14.0	2.000	0.333	1.015	0.833
room	3	1.0	14.0	2.000	0.333	1.015	2.333
room	4	2.0	18.0	2.571	0.524	1.595	1.500
room	5	2.0	20.0	2.857	0.619	1.885	0.333
room	6	2.0	20.0	2.857	0.619	1.885	0.333
outside court	7	0.0	12.0	1.714	0.238	0.725	1.833
stairs	8	1.0	18.0	2.571	0.524	1.595	0.333

Table A1.9 – Building IV ii 10

Mitreo degli Animali (IV ii 11)							
j-graph						TRRA 9.469	
total	Nodes 5	4.0				MRRA 1.893	
	Node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
entrance	1	1.0	7.0	1.750	0.5	1.420	1.500
corridor	2	2.0	6.0	1.500	0.333	0.947	1.000
approach	3	3.0	7.0	17.500	0.500	1.420	1.500
cult room	4	4.0	10.0	2.500	1.0	2.841	0.500
outside space	5	0.0	10.0	2.500	1.0	2.841	0.500

Table A1.10 – Mitreo degli Animali (IV ii 11)

Building IV ii 12							
j-graph						TRRA 8.121	
total	Nodes 8	3.0				MRRA 1.015	
	Node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
room	1	1.0	12.0	1.710	0.238	0.725	0.950
room	2	1.0	10.0	1.428	0.143	0.435	2.033
understairs	3	2.0	14.0	2.000	0.333	1.015	0.750
stairs	4	1.0	18.0	2.571	0.524	1.595	0.600
coutyard baths	5	3.0	14.0	2.000	0.333	1.015	0.500
neighbour	6	2.0	16.0	2.286	0.429	1.305	0.250
courtyard ins.	7	0.0	12.0	1.714	0.238	0.725	2.583
passage	8	2.0	16.0	2.286	0.429	1.305	0.333

Table A1.11 – Building IV ii 12

Building (*tabernae*) IV ii 14							
j-graph						TRRA 5.444	
total	Nodes 6	2.0				MRRA 0.907	
	node	depth	totalDepth	meanDepth	**RA**	**RRA**	Control/V
Taberna	1	1.0	10.0	2.0	0.5	1.433	0.25
Taberna	2	1.0	10.0	2.0	0.5	1.433	0.25
Taberna	3	2.0	10.0	1.4	0.199	0.573	1.0
entrance	4	1.0	8.0	1.6	0.300	0.859	0.733
courtyard	5	1.0	6.0	1.2	0.099	0.287	3.333
passage	6	1.0	8.0	1.6	0.300	0.859	0.533

Table A1.12 – Building (tabernae) IV ii 14

Appendix 2

Insula IV ii Spatial Values: Control Value (C.-Value) and Real Relative Asymmetry (RRA)

			Total Node count			
Graph	10.0	Depth	183			
Graph	170.068	10				segregated
Graph	163.976	TRRA				integrated
Building	Room function	Node	**Depth**	**C./Value**		**RRA**
IV ii 1	entrance	1	1.0	0.432		0.682
IV ii 1	taberna	2	1.0	0.536		0.763
IV ii 1	taberna	3	1.0	0.536		0.763
IV ii 1	corridor	4	2.0	0.793		0.745
IV ii 1	chang. Room	5	4.0	1.125		0.935
IV ii 1	latrine	6	5.0	0.500		1.137
IV ii 1	frigidarium	7	3.0	0.500		0.735
IV ii 1	chang. Room	8	3.0	0.458		0.822
IV ii 1	passage	9	4.0	0.458		0.838
IV ii 1	cold room	10	5.0	1.333		1.116
IV ii 1	cold pool	11	6.0	0.500		1.319
IV ii 1	passage	12	4.0	1.125		0.916
IV ii 1	heat trap	13	5.0	0.583		1.105
IV ii 1	tepidarium	14	6.0	2.250		1.295
IV ii 1	caldarium	15	7.0	0.500		1.494
IV ii 1	caldarium	16	7.0	2.750		1.492
IV ii 1	serv. Corrid.	17	7.0	0.250		1.498
IV ii 1	warm pool	18	8.0	0.250		1.693
IV ii 1	warm pool	19	8.0	0.250		1.693
IV ii 1	chang. Room	20	4.0	0.292		0.869
IV ii 1	cold pool lg	21	4.0	0.125		0.938
IV ii 1	passage	22	4.0	3.458		0.784
IV ii 1	serv. Corrid.	23	5.0	0.167		0.987
IV ii 1	stairs	24	5.0	0.167		0.987
IV ii 1	serv. Corrid.	25	6.0	0.500		1.186
IV ii 1	serv. Corrid.	26	5.0	1.167		0.984
IV ii 1	opan space	27	5.0	0.744		0.759
IV ii 2	portico	28	1.0	7.652		0.622
IV ii 3	tab. Comm.	29	1.0	0.098		0.736
IV ii 3	tab. Comm.	30	2.0	0.063		0.824
IV ii 3	tab. Inn	31	2.0	0.263		0.746
IV ii 3	corridor	32	2.0	1.371		0.658
IV ii 3	stairs	33	2.0	0.063		0.824

IV ii 3	passage	34	2.0	0.313		0.746
IV ii 3	tab. Comm.	35	2.0	0.313		0.745
IV ii 3	tab. Comm.	36	2.0	0.396		0.746
IV ii 3	tab. Comm.	37	2.0	0.396		0.747
IV ii 3	passage	38	2.0	0.705		0.659
IV ii 3	tab. Inn	39	2.0	1.063		0.740
IV ii 3	tab. Comm.	40	2.0	1.146		0.717
IV ii 3	passage	41	3.0	0.809		0.694
IV ii 3	courtyard	42	2.0	7.699		0.558
IV ii 3	tab. Comm.	43	1.0	0.286		0.691
IV ii 3	tab. Comm.	44	3.0	0.059		0.760
IV ii 3	tab. Comm.	45	3.0	0.259		0.747
IV ii 3	stairs	46	3.0	0.059		0.759
IV ii 3	passage	47	3.0	1.009		0.742
IV ii 3	tab. Comm.	48	3.0	1.142		0.742
IV ii 3	tab. Comm.	49	3.0	0.809		0.745
IV ii 3	tab. Comm.	50	3.0	0.809		0.745
IV ii 3	tab. Comm.	51	3.0	0.309		0.746
IV ii 3	tab. Comm.	52	3.0	0.309		0.746
IV ii 3	entrance	53	1.0	0.928		0.602
IV ii 3	porch room	54	1.0	0.619		0.689
IV ii 3	stairs	55	1.0	0.036		0.764
IV ii 3	tab. Comm.	56	1.0	0.869		0.750
IV ii 3	Indus. Space	57	2.0	0.667		0.793
IV ii 3	entrance	58	3.0	0.892		0.747
IV ii 3	Indus. Space	59	5.0	0.333		1.142
IV ii 4	Indus. Space	60	4.0	1.833		0.940
IV ii 4	Indus. Space	61	5.0	0.833		1.075
IV ii 4	Indus. Space	62	5.0	0.833		1.002
IV ii 4	Indus. Space	63	4.0	1.667		0.810
IV ii 4	Understairs	64	5.0	0.333		0.810
IV ii 4	stairs	65	4.0	0.167		0.819
open	passage	66	3.0	2.302		0.617
IV ii 5	stairs	67	3.0	0.059		0.759
IV ii 5	entrance	68	3.0	0.392		0.738
IV ii 5	room mixed	69	4.0	1.333		0.914
IV ii 5	room mixed	70	5.0	0.500		1.046
IV ii 5	room	71	5.0	0.833		1.044
IV ii 5	room	72	6.0	1.500		1.169
IV ii 5	room	73	7.0	0.333		1.371
IV ii 5	corridor	74	6.0	2.467		1.064
IV ii 5	cubicula ?	75	7.0	0.667		1.265
IV ii 5	cubicula ?	76	7.0	0.667		1.265
IV ii 5	intern. Courty.	77	6.0	2.416		0.969
IV ii 5	room mixed	78	7.0	0.250		1.171
IV ii 5	room mixed	79	7.0	0.250		1.171
IV ii 6	tab. Comm.	80	1.0	0.036		0.764

IV ii 6	room mixed	81	2.0	0.250		0.943	
IV ii 6	room mixed	82	3.0	0.333			1.141
IV ii 6	entrance	83	1.0		1.512	0.741	
IV ii 6	passage	84	2.0		2.250	0.939	
IV ii 6	room	85	3.0	0.333			1.141
IV ii 6	corridor	86	1.0		4.035	0.733	
IV ii 6	corridor	87	2.0		2.142	0.923	
IV ii 6	room tablinum	88	3.0		1.250		1.123
IV ii 6	room spec.	89	4.0	0.500			1.326
IV ii 6	intern. Courty.	90	3.0		1.250		1.123
IV ii 6	stairs to well	91	4.0	0.500			1.326
IV ii 6	tab. Comm.	92	1.0		1.036	0.762	
IV ii 6	backroom	93	2.0	0.500		0.964	
IV ii 6	room	94	3.0	0.250			1.126
IV ii 6	stairs	95	2.0	0.143		0.935	
IV ii 6	latrine	96	2.0	0.143		0.935	
IV ii 6	store room	97	2.0	0.143		0.935	
IV ii 6	latrine	98	3.0	0.500			1.135
IV ii 6	courtyard	99	2.0		1.143	0.933	
IV ii 7	tab. Comm.	100	1.0	0.536		0.731	
IV ii 7	tab. Comm.	101	1.0	0.536		0.763	
IV ii 7	tab. Comm.	102	1.0	0.536		0.763	
IV ii 7	backroom	103	2.0	0.567		0.791	
IV ii 7	room (water)	104	3.0	0.067		0.905	
IV ii 7	courtyard	105	2.0		9.416	0.703	
IV ii 7	room	106	3.0	0.567		0.904	
IV ii 7	room	107	3.0	0.567		0.904	
IV ii 7	latrine	108	3.0	0.317		0.832	
IV ii 7	passage	109	3.0		1.233	0.724	
IV ii 7	room	110	3.0	0.567		0.904	
IV ii 7	room	111	3.0	0.567		0.904	
IV ii 7	room connect	112	3.0	0.267		0.892	
IV ii 7	room	113	3.0	0.067		0.905	
IV ii 7	room	114	3.0	0.067		0.905	
IV ii 7	tab. Comm.	115	1.0	0.036		0.764	
IV ii 7	room	116	3.0	0.067		0.905	
IV ii 7	tab. Comm.	117	1.0	0.036		0.764	
IV ii 7	room	118	3.0	0.067		0.905	
IV ii 7	tab. Comm.	119	1.0	0.036		0.764	
IV ii 7	stairs	120	1.0	0.369		0.731	
IV ii 7	Understairs	121	2.0	0.899		0.790	
IV ii 7	passage	122	1.0	0.602		0.663	
IV ii 8	tab. Comm.	123	1.0		1.036	0.762	
IV ii 8	room	124	2.0	0.500		0.964	
IV ii 8	stairs	125	1.0	0.036		0.764	

IV ii 8	tab. Comm.	126	1.0	0.036			0.764	
IV ii 8	room	127	1.0	0.036			0.764	
IV ii 8	room	128	2.0	0.700			0.912	
IV ii 8	room	129	1.0	0.536			0.752	
IV ii 8	passage	130	3.0		4.000		0.973	
IV ii 8	room	131	4.0	0.200				1.175
IV ii 8	room mixed	132	4.0	0.200				1.175
IV ii 8	room	133	4.0	0.200				1.175
IV ii 8	room	134	1.0	0.036			0.764	
IV ii 9	room mixed	135	6.0		2.333			1.057
IV ii 9	stairs	136	6.0	0.333				1.080
IV ii 9	entrance	137	5.0		1.583		0.878	
IV ii 9	corridor	138	7.0	0.583				1.247
IV ii 9	room spec.	139	7.0	0.250				1.259
IV ii 9	room undef.	140	7.0	0.750				1.252
IV ii 9	room	141	1.0		1.000			1.450
IV ii 9	room	142	9.0		1.500			1.649
IV ii 9	room	143	10.0	0.500				1.851
IV ii 9	corridor	144	8.0	0.333				1.368
IV ii 9	corridor	145	7.0		1.833			1.166
IV ii 9	entrance	146	5.0	0.410			0.808	
IV ii 9	room	147	6.0		1.833		0.987	
IV ii 9	room	148	7.0	0.333				1.189
IV ii 13	loggia	149	4.0	0.527			0.715	
IV ii 10	room	151	7.0	0.333				1.210
IV ii 10	room	152	6.0		1.833			1.008
IV ii 10	room/entrance	153	5.0	0.410			0.814	
IV ii 10	room/entrance	154	5.0	0.910			0.812	
IV ii 10	room	155	6.0		1.167			1.008
IV ii 10	room	156	6.0	0.667				1.011
IV ii 10	stairs	157	5.0	0.077			0.819	
open	open space	158	5.0	0.577			0.810	
IV ii 11	entrance	159	6.0		1.000			1.005
IV ii 11	passage	160	7.0		1.000			1.203
IV ii 11	passage	161	1.5		1.500			1.403
IV ii 11	cult room	162	9.0	0.500				1.605
IV ii 12	tab. Comm.	163	4.0	0.494			0.706	
IV ii 12	tab. Comm.	164	5.0		1.160		0.791	
IV ii 12	Understairs	165	6.0	0.583			0.933	
IV ii 12	stairs	166	5.0	0.077			0.819	
IV ii 14	tab. Comm.	169	6.0	0.200			0.985	
IV ii 14	tab. Comm.	170	6.0	0.200			0.985	
IV ii 14	tab. Comm.	171	4.0	0.667			0.814	
IV ii 14	entr. Enclos.	172	5.0	0.700			0.888	
IV ii 1	tab. Inn	178	2.0	0.896			0.767	
IV ii 1	stairs	179	2.0	0.063			0.824	
open	open space	180	4.0		5.783		0.617	

open	outside IV ii 14	181	5.0	2.910		0.783
IV ii 13	passage	182	4.0	0.660		0.699
open	outside public	183	0.0	165.386		0.562

Table A2.1 – Spatial Values - Control and RRA (Real Relative Asymmetry)

Table A2.2: Most integrated spaces

Building	Room_funct.	Node	Depth	C.-Value	L.I.P.	RRA	G.I.P
IV ii 2	portico	28	1.0	7.652	high	0.622	high
IV ii 3	courtyard	42	2.0	7.699	high	0.558	high
IV ii 6	corridor	86	1.0	4.035	med.high	0.733	Mod/high
IV ii 7	courtyard	105	2.0	9.416	high	0.703	Mod/high
open	S.-Courty.	180	4.0	5.783	med.high	0.617	high
open	outside pub.	183	0.0	165.386	high high	0.562	high

Table A2.2 – The Insula’s most integrated spaces

Insula IV ii: most segregated spaces

Building	Room/function	Node	Depth	C.-Value	L.I.P.	RRA	G.I.P
IV ii 1	warm pool	18	8.0	0.250	low	1.693	low
IV ii 1	warm pool	19	8.0	0.250	low	1.693	low
IV ii 9	room	143	10.0	0.500	low	1.851	low
IV ii 11	cult room	162	9.0	0.500	low	1.605	low

Table A2.3 – The Insula’s most segregated spaces

List of Figures

List of Tables

Glossary

The following glossary is intended to provide brief definitions for architectural or culture specific terms used in the text. The keywords are denoted in capital letters, the use of *italics* within an entry indicates a cross-reference.

***ALA(-AE)* –** room (wing) opening from the atrium of a Roman *domus*; *alae* usually occur in pairs flanking the *tablinum*.

***ALBUM (-A)* –** membership list.

***ALBUM COLLEGII* -** membership list of a Roman *collegium.*

***ANNONA* –** grain supply to the city of Rome.

***APODYTERIUM* –** the changing room of a Roman bath**.**

***BIPEDALIS* –** two-foot-square brick (*c*. 58 cm).

***CALDARIUM* –** the main heated room or rooms of Roman baths.

CAPITOLIUM – the main temple of a Roman city dedicated to the three supreme deities (Jupiter, Juno and Minerva).

***CARDO MAXIMUS* –** the central north-south axis in a Roman urban street system.

CASEGGIATO (-I) – Italian term for a Roman building, divided into separate units, often including commercial space (*tabernae*).

***CASTRUM (-A)* –** denotes a military camp or fortifications.

CAUPONA – a Latin term to describe a Roman hotel, hostel or restaurant.

***CISIARII* –** *cisium* refers to a type of ancient Roman chariot, the conductors of these hired gigs were called *cisiarii*.

COCCIOPESTO – Italian term for a hydraulic mortar made with crushed terracotta, also used as floor pavement and roofing.

***COLLEGIUM (-A)* –** Roman voluntary association of professionals and/or religious followers.

***COLLEGIUM FABRUM TIGNARIORUM (FABRI TIGNUARII)* –** builders' association (literally 'woodworker's guild'). The association required an entry fee and consisted of freeborn and freedmen builders (not limited to wood workers in spite of the name).

***COMPLUVIUM* –** an opening in the roof of the atrium that allowed light and rain water to enter; the latter being gathered (*impluvium*) and stored in a cistern below.

CUBICULUM (-A) – a room in a Roman house, serving various functions; when used as bedrooms the night-time bedrooms were called *cubicula nocturna* or *dormitoria*, while those rooms used for rest in the daytime were *cubicula diurna*.

DOMUS – refers to a Roman town house, the term is used for domestic buildings.

DECUMANUS – the term denotes the main east-west axis in the street system of a Roman town.

EUERGETISM – the practice of the élite in Greek and Roman cities of distributing a part of their wealth to the community. It might take the form of the construction of public buildings, the provision of public pleasures, the entertainment of the populace in circus or arena, or the provision of food in times of famine.

EXEDRA – in architecture, a semicircular niche forming part of a building, but also an outside seating area.

FAUCES – a term used for the hallway leading from the street into the building.

FISTULA – a water-pipe; Vitruvius (VIII, 7) distinguishes three modes of conveying water: by channels of masonry (*per canales structiles*), by leaden pipes (*fistulis plumbeis*), and by earthern pipes (*tubulis fictilibus*); lead pipes were the more commonly used.

FIGLINA – on brickstamps, signifies the name of the place of the production of the brick, or a production unit.

FORUM – a public space in the centre of the Roman town that serves as political, economic, and social centre of the city.

FRIGIDARIUM – the main cold-water bathing hall, often containing one or several large unheated pools**.**

HORREA – warehouses and storage buildings.

HYPOCAUST – the major heating system of Roman baths. In the fully developed *hypocaust* the floor of the room is suspended, resting on short pillars (often a stack of tiles); the hollow space is heated by the circulation of hot air produced by the furnace (*praefurnium*) stoked from outside.

IMPLUVIUM – the sunken part of the atrium in a Roman house (*domus*), designed to collect the rainwater which comes into the house through the *compluvium.*

INSULA (-AE) – a city block; or a large multi-apartment building.

LATRINA – usually a communal space with multiple toilets, but also single units with one seat.

LIMES (-ITES) – the boundary marking the land parcels allocated to individuals or towns.

MEDIANUM – *medianum* apartments are a type of dwelling unit typically found in Ostia, characteristic of a *medianum* apartment is the arrangement of rooms on three sides of a centrally positioned rectangular space, the *medianum*.

MODIUS – a Roman dry measuring unit used primarily to measure out grain.

***NATATIO (-IONES)* –** a large unheated swimming pool, open or roofed, the term is also used to refer to the hall of the swimming pool itself.

***NAVALIA* –** dock-yard.

***NYMPHAEUM (-A)* –** In general use, an elaborate or monumental fountain structure, often adorning public space; originally the term denoted a cave or grotto with a running water source sacred to the nymphs.

OPUS LATERICIUM – Roman form of construction using brickwork to face the cement core of the wall.

OPUS RETICULATUM (brick) **–** construction method consisting of a combination of techniques: *opus reticulatum* for the walls and *opus latericium* to strengthen the corners and apertures (in the literature often referred to as *opus mixtum*). This technique was used in particular during the Trajanic and Hadrianic periods.

***OPUS RETICULATUM* –** term referring to a type of facing on concrete walls in which small cone shaped stones (*tufa*) are set in such a way that the joints between them form a diagonal grid on the face of the wall.

OPUS SPICATUM – type of floor paving employing small bricks set in herringbone fashion.

OPUS VITTATUM – Roman construction technique consisting of bands of *tufa* blocks intersected by one or more brick bands at regular or irregular distances.

***PALAESTRA* –** the exercise court of the baths, often a colonnaded enclosure.

***POMERIUM* –** the ritual boundary defining the city, usually corresponding to the course of the city walls.

PORTA MARINA – Ostia's south-western gate leading to the ancient shoreline.

P**ORTA ROMANA** – Ostia's eastern gate; it is part of the city walls of the 1st century BC. The Via Ostiensis leading from Rome to Ostia ends at the Porta Romana and continues as Ostia's eastern *decumanus maximus*.

PORTA LAURENTINA – Ostia's southeastern gate belongs to the city walls of the first century BC. It received its name from the village Laurentum located to the south of Ostia. The gate marks the beginning of the Via Laurentina leading to Ostia's suburban areas and the rural areas of Laurentum.

***PORTICUS* –** a colonnade or covered walkway.

***PRAEFURNIUM (-A)* –** furnace of a Roman bath. The term may denote only the stoke hole (*fornix)* of the furnace, or the larger area of the furnace or furnaces.

PUTLOG HOLE – the holes in a wall in which the ends of scaffolding beams were lodged during construction. In Roman buildings they were usually covered by the final wall facing.

RELIEVING ARCH – an arch built into a wall usually to relieve the pressure from an opening below.

RUTELLUM – a stick used to straighten out the surface of the grain to obtain the correct quantity when the *modius* was filled.

SCHOLA (-AE) – Guild building, headquarters or clubhouse of a professional or religious guild.

***STAGNUM* –** any enclosed stretch of water, also a pool or pond.

***SUSPENSURA (-AE)* –** In the Vitruvian description of the *hypocaust*, the term means 'hanging floor' or 'suspended floor' (5.10.2-3); more correctly it denotes a floor supported by the small pillars of the *hypocaust*.

***TABERNA (-AE)* –** a one or two room space primarily used as a shop; but also used as a workshop and residence by the shopkeeper, as well as for storage.

TABLINUM – refers to a reception room generally situated on one side of the atrium and opposite to the entrance.

***TEPIDARIUM (-A)* –** the 'lukewarm' warm room or rooms in Roman baths; in the context of the imperial baths it has been interpreted to be the relatively small heated room (or the 'heat lock') between the *caldarium* and the *frigidarium*.

***TESSERAE* –** small cut stones arranged in patterns to decorate mosaic pavements.

***TRICLINIUM* –** a dining room in the Roman house.

***TUBULI* –** inter-capillary wall-heating elements in Roman baths made up of continous hollow terra-cotta tiles, normally box-shaped ('box tiles'), and connected at one end to the *hypocaust*.

***TUFO* (TUFF) –** volcanic rock formed of consolidated pyroclastic materials ejected during a volcanic eruption.

Chronology of the Imperial Periods

Octavian/Augustus		31 BC to AD 14
Julio-Claudian dynasy	Tiberius	AD 14 – 37
	Caligula	AD 37 – 41
	Claudius	AD 41 – 54
	Nero	AD 54 – 68
Year of the four emperors:		
Galba		AD 68 – 69
Otho		AD 69
Vitellius		AD 69
Flavian dynasty	Vespasian	AD 69 – 79
	Titus	AD 79 – 81
	Domitian	AD 81 – 96
Nerva		AD 96 – 98
Trajan		AD 98 – 117
Hadrian		AD 117 – 138
Antonine dynasty	Antoninus Pius	AD 138 – 161
	Marcus Aurelius	AD 161 – 180
	Commodus	AD 180 – 193
Pertinax		AD 193
Severan dynasty	Septimius Severus	AD 193 – 211
	Caracalla	AD 211 – 217
	Elagabalus	AD 218 – 222
	Severus Alexander	AD 222 – 235
Maximinus Thrax		AD 235 – 238
Gordian III		AD 238 – 244
Philip the Arab		AD 244 – 249
Decius		AD 249 – 251
Trebonianus Gallus		AD 251 – 253
Valerian		AD 253 – 260
Gallienus		AD 260 – 268
Claudius II Gothicus		AD 268 – 270
Aurelian		AD 270 – 275
Probus		AD 276 – 282
Carus, Carinus and Numerian		AD 282 – 284
Diocletian		AD 284 – 305
Tetrarchy		AD 293 – 305
Maxentius		AD 306 – 312
Constantine I		AD 312 – 337

Dutch Summary

Het onderzoek 'Rethinking Ostia' bestaat uit een ruimtelijke en archeologische studie naar een selectie van facetten van de urbane ruimtes in het antieke Ostia. De studie is trapsgewijs opgebouwd, werkend vanuit individuele huizen (en een selectie van gildehuizen) naar een stadswijk (Insula IV ii) en uiteindelijk naar het stratenplan van de volledige stad. Het onderzoek onderschrijft het belang van een analyse van stedelijke centra vanuit hun eigen ruimtelijke en sociale textuur. Door het gehele onderzoek is een 'Space First policy' gehanteerd, waarbij Ostia's gebouwde omgeving is onderzocht om hiermee de onderliggende ruimtelijke structuur te identificeren en om nieuwe inzichten te verkrijgen in de sociale organisatie van de stad.

Het onderzoek heeft aangetoond dat de wijk IV ii in essentie 'gemeenschaplijk' was, wat tot uiting kwam in openbare ruimtes die toegankelijk waren voor zowel bewoners als bezoekers van het Insula. De analyse van de gildehuizen heeft aangetoond dat hun ruimtelijke structuur primair gericht was op het genereren van potentieel voor sociale interactie op de overgang tussen de bebouwde en de publieke ruimte (straten en pleinen). Voor het stratenplan zelf is het onderzoek erin geslaagd een onderliggende visuele structuur te onderscheiden die cohesie gaf aan de stad. Ten aanzien van de 'Human Use of Space' kon in veel gevallen worden aangetoond dat ruimtelijke integratie en interactie de voorkeur kregen boven segregatie en buitensluiting, wat zorgde voor een veilige en vriendelijke stedelijke leefomgeving. Hierdoor ontstonden urbanistieke eigenschappen, die niet alleen in de tweede en vroege derde eeuw na Chr. gewaardeerd werden, maar ook van groot belang zijn in hedendaagse steden.

Dit brengt ons op enkele andere kwesties die aan het licht gekomen zijn gedurende het ruimtelijk onderzoek naar Romeins Ostia, namelijk: vragen over stedelijke *sustainability* en ontvolking. Ons huizenblok IV ii bleek de tand des tijds goed te doorstaan en kent een lange bewoningsfase. Verscheidene factoren zijn beslissend geweest voor een lange bestaans- en gebruiksgeschiedenis. Ten eerste is het van belang dat er een ruimtelijke structuur is die interactie stimuleert. Daarnaast is het ook noodzakelijk dat het blok geïntegreerd is in een levendige stadswijk, die een hoog niveau van stedelijke dichtheid en een grote verscheidenheid aan landgebruik weet te houden.

De vanuit de data beredeneerde benadering, waarbij concepten en technieken zijn toegepast vanuit de Space Syntax methode, is een goede en waardevolle onderzoeksstrategie gebleken om een beter begrip van Ostia's urbane landschap te verkrijgen. De analyse methoden, die Space Syntax gebruikt zijn oorspronkelijk ontworpen om moderne stedelijke planning en ontwikkelingen beter te begrijpen. Echter, het toepassen van deze methoden voor zowel de moderne als de antieke wereld zou een mogelijkheid bieden om een gemeenschappelijke taal te vinden binnen urbanisatiestudies, welke het vermogen erkent van de archeologie om lange termijn-veranderingen in steden, trends of andere temporele patronen te verhelderen. De case-study van Ostia's Insula IV heeft aangetoond dat Space Syntax erg belangrijk is voor het aantonen van ruimtelijke aspecten, aspecten die op een andere wijze niet aan het daglicht waren gekomen. Dit maakt Space Syntax een gereedschap om mee te denken, iets dat de onderzoeker inspireert om verder te exploreren en om te experimenteren op zowel de technische kant van de analyse als de mogelijke interpretaties van de door de analyse behaalde resultaten. Iets dat zeker niet van gering belang is is dat deze methode een benadering inhoudt, die niet-desctructieve methodes toepast op zowel de data-verzameling als de interpretatie en daarom geheel in overeenstemming is met huidige erfgoedbeheer adviezen. De methode is niet site-specifiek en kan in de meeste gevallen toegepast worden op alle soorten bebouwde omgeving en geografische regio's.

De complexiteit van het archeologische bestand zoals dat van Ostia heeft een combinatie van methoden nodig. In hoofdstuk vier worden deze methodes en technieken besproken. De methodes variëren van het opnieuw in kaart brengen van een archeologische site tot een volledig geïntegreerde ruimtelijke analyse. Ondanks de diversiteit aan benaderingen kunnen al deze technieken samengevat worden als non-destructieve manieren van archeologisch onderzoek. Echter, de toegevoegde analytische component van Space Syntax heeft het onderzoek naar een hoger niveau getild dan het conventionele vastleggen en verwerken van data, namelijk naar een holistische studie van antieke urbane ruimte.

In Hoofdstuk vijf wordt er gekeken naar één van Ostia's *insulae*, namelijk de nog weinig bestudeerde *insula* IV ii. Door een gedetailleerd onderzoek van de gebouwen in het huizenblok was het mogelijk om de ontwikkeling van de Insula van de eerste drie eeuwen na Chr. te reconstrueren. De structuren laten een dynamische omgeving zien die een constante transformatie van alle betrokken gebouwen in de insula heeft toegestaan. De ontwikkeling weerspiegelde niet alleen de toename van bouwactiviteit die de bebouwde omgeving van Ostia vorm gaf, maar liet ook momenten zien van verminderde activiteit in de stad. Door de grondige studie konden structurele veranderingen worden aangetoond en kon er tevens een relatieve chronologische sequentie worden vastgesteld voor de ontwikkeling van de interne elementen van de Insula. Voor het merendeel van de afzonderlijke structuren kon worden aangetoond hoezeer zij verbonden waren aan aangrenzende gebouwen binnen de Insula en hoe veranderingen in een bepaalde unit de andere units kon beïnvloeden. Geen enkel gebouw stond los van een ander. Samenvattend bevestigen de overblijfselen uit de Insula het algemene beeld dat voor Ostia's bebouwde omgeving geschetst is. Desalniettemin ontbreekt er in dit Insula een belangrijke en typische fase binnen de bouwgeschiedenis van Ostia: geen enkel gebouw is namelijk ooit getransformeerd in de zo typische Laat Antieke private luxe-domus. In andere *insulae* in Ostia is dit fenomeen wel zichtbaar en voor Insula IV ii niet. Verscheidene redenen kunnen worden aangebracht om dit fenomeen te verklaren. De meest plausibele reden is dat de gebouwen hun functie behielden tot de vierde, soms zelfs tot de vijfde eeuw na Chr. en daarom gewoonweg niet beschikbaar waren voor een functionele transformatie naar een luxe-domus.

Hoofdstuk zes kijkt naar de toepassing van Space Syntax in relatie tot het functioneren van het leven binnen de Insula. Door systematische analyses en interpretatie van de verschillende ruimtelijke aspecten is dit deelonderzoek geslaagd in het aantonen van verschillende niveaus van ruimtelijke structuur die met elkaar in verbinding staan binnen het Insula, elke met zijn eigen bijdrage aan het ruimtelijke functioneren van het huizenblok en aan de manier waarop de ruimte ervaren werd door de gebruikers. De zogenaamde 'Access Analysis' bood inzichten in zowel de configuratie van de individuele gebouwen als van het totale huizenblok. Het onderzoek demonstreerde hiermee hoe de individuele layouts de relatie structureerde tussen bewoners, en tussen bewoners en bezoekers. Er kon ook worden vastgesteld dat de ruimtelijke structuur van de Insula van grote invloed is geweest voor haar behoud en ontwikkeling die vijf eeuwen van bewoning mogelijk heeft gemaakt.

Hoewel de Insula een uniek en onderscheidend fenomeen is, is het tegelijkertijd ook deel van een veel groter systeem van ruimtelijke relaties. Hoofdstuk zeven richt zich op de bewegingen van Ostia's bevolking rond hun gemeenschap en die ruimtes die bedoeld waren om interactie te genereren. Het was mogelijk om de voorspellingen die Space Syntax gemaakt heeft over het ruimtegebruik te bevestigen. Hierbij is naar voren gekomen dat de posities van specifieke straten of publieke ruimtes binnen het totale netwerk van deze ruimtes de effectiviteit van menselijke beweging en sociale samenkomst definieert. Een andere techniek van de Space Syntax analyse is de z.g. Visibility Graph Analysis. Deze heeft geholpen om de visuele structuur van de stad te identificeren door middel van het detecteren van plaatsten met de grootste visuele integratie. Dit toonde aan dat de visueel meest geïntegreerde plaatsten in de stad locale visuele *foci* vormden voor de buurten en daarnaast als groep met elkaar verbonden waren door hun onderlinge zichtrelaties. Dit betekent dat alle locale punten een globaal element had die de stad samenbond als geheel. Terugwerkend vanuit deze bredere ruimtelijke analyse zijn de meest belangrijke ruimtelijke punten onderzocht om te kijken of deze archeologische *markers* betroffen (een zgn. 'inverted archaeological assessment'). Deze benadering bleek succesvol in het lokaliseren van publieke objecten (fonteinen, erebogen, etc.) die de stad Ostia creëerde om zijn visuele structuur vast te hechten aan topografische locaties.

In Hoofdstuk Acht zet de analyse zich een niveau hoger voort, naar een categorie van belangrijke gebouwen in de stad, die verspreid zijn over verscheidene locaties in de stad: de gildehuizen (*scholae*) of –hoofdkwartieren. Zij fungeerden als centra voor verschillende commerciële en religieuze organisaties. Zoals verwacht weerspiegelen deze gebouwen de lokale ruimtelijke factoren, terwijl hun positie zich tegelijkertijd schikt naar de voorwaarden die geschapen zijn door het stratenplan van de stad. Deze twee aspecten en de resultaten van hun beider analyses moeten gezamenlijk in ogenschouw genomen worden, omdat ze gemeenschappelijke ruimtelijke factoren belichamen die elkaar ontegenzeggelijk beïnvloed hebben. De studie naar de ruimtelijke logica van de individuele plattegronden (Access Analysis) van de *scholae* heeft de ruimtelijke organisatie kunnen identificeren en kon ze vervolgens herkennen als iets dat voornamelijk door de buitenruimtes werd bepaald: de straten van Ostia.

Hun focus naar buiten doet vermoeden dat de gildes een potentieel genereerden voor het promoten van contact en communicatie met publieke ruimtes. Daarbovenop zien we dat de gildes een voorkeur hadden voor een locatie langs de makkelijkst bereikbare straten binnen het stratennetwerk. Hun goed zichtbare locatie gaf de gebouwen niet alleen een publiek aangezicht, maar verbeterde ook hun capaciteit om te profiteren van de concentratie van beweging langs de wegen. De toegevoegde waarde van de benadering is in dit geval voornamelijk te zien in de productie van statische waardes die deze ruimtelijke knooppunten een objectieve basis gaven.

De omslag van intuïtie naar testbare theorie wordt gerechtvaardigd door het belang van het herkennen van de fundamentele relatie tussen het stratenpatron en menselijke beweging, zoals die gedefinieerd is door de principes van de zgn. 'Movement Economy'. Deze theorie biedt de mogelijkheid om een breder begrip te krijgen van beweging dat verder gaat dan de 'attractor-driven' theorieën met hun specifiek doelgerichte bewegingen die zich vooral richten op zaken als locatie en einddoelen.

Ondanks de noodzaak om voor de analyses van deze dissertatie gebruik te maken van verschillende methodes, hopen we dat het belang naar voren gekomen is om een antieke stad te benaderen als geïntegreerd geheel. Dit is namelijk niet alleen de manier waarop de bewoners ooit hun stad beleefd hebben, hun levens werden in hoge mate beïnvloed door de mogelijkheden en beperkingen die ruimtelijke organisatie hen bood. Het zou een interessante toevoeging zijn om deze holistische manier van stedelijke analyse toe te passen op andere urbane samenlevingen in de antieke wereld.

Italian Summary

'Rethinking Ostia' si incentra sull'analisi spaziale e archeologica di aspetti selezionati dello spazio urbano di Ostia antica. Lo studio è stato condotto con un approccio multi scala cominciando con l'esame di singole case (sedi di corporazioni), passando all'analisi di un'isola urbana (Insula IV ii) e concludendo con l'intera rete stradale. Questo studio mette in luce l'importanza di analizzare centri urbani dall'interno del loro tessuto spaziale e sociale. La linea di ricerca seguita si può definire una "Space First Policy" e l'ambiente edificato è stato esaminato per identificarne la sottostante struttura spaziale e per approfondire la conoscenza dell'organizzazione sociale della città.

Questo studio ha dimostrato che l'Insula IV ii era essenzialmente collettiva, mediata da spazi comuni accessibili sia a residenti che a visitatori. L'analisi delle case delle corporazioni ha mostrato che la loro organizzazione spaziale era indirizzata a creare occasioni per interazioni sociali dove gli edifici si affacciano su luoghi pubblici come strade e piazze. Questo studio ha poi identificato una "struttura visiva" sottostante la rete stradale che contribuiva a dare coesione alla città. Per quanto riguarda l'uso che l'uomo fa dello spazio, è stato possibile stabilire in molti casi che integrazione spaziale e interazione erano privilegiate rispetto a segregazione ed esclusione. Questi elementi dovrebbero contribuire a creare un ambiente urbano sicuro e a misura d'uomo, caratteristiche non solo apprezzate nella Ostia del II e III secolo d.C., ma molto rilevanti anche nelle città odierne. Queste considerazioni ci portano ad esaminare altre problematiche riscontrate durante l'indagine spaziale sulla Ostia romana, come il tema della sostenibilità urbana e dell'abbandono. L'Insula IV ii ha mostrato di essere sopravvissuta a lungo e di essere riuscita a sostenere un lungo periodo di occupazione. Molti fattori sembrano aver giocato un ruolo decisivo a questo fine: non solo la sua struttura spaziale che incoraggiava l'interazione, ma anche l'integrazione in un quartiere urbano vivace. Questi elementi hanno permesso di mantenere un certo livello di densità urbana e una buona varietà di destinazioni d'uso del terreno.

Questo approccio guidato dai dati, applicando concetti e tecniche della Space Syntax, si è dimostrato una strategia di ricerca adeguata e utile per acquisire una maggiore comprensione del panorama urbano di Ostia. I metodi della Space Syntax sono stati sviluppati per affrontare le sfide poste dalla pianificazione dello spazio cittadino odierno. L'uso degli stessi metodi nello studio delle città antiche e moderne può essere d'aiuto per trovare un linguaggio comune nello studio dell'urbanizzazione, riconoscendo in questo modo le potenzialità dell'archeologia nel far luce sull'evoluzione a lungo termine delle città, su tendenze e altri *pattern* temporali. Il caso di studio dell'Insula IV ii di Ostia ha dimostrato che la Space Syntax permette di riconoscere caratteristiche spaziali che non sarebbero state notate nemmeno dopo attenta osservazione. La Space Syntax diventa quindi uno strumento per pensare, che motiva i ricercatori ad indagare oltre e a sperimentare su due livelli: l'aspetto tecnico delle analisi e la possibile interpretazione dei risultati prodotti dall'analisi. E' necessario sottolineare inoltre che l'approccio non invasivo portato avanti in questo studio, applicando metodi non distruttivi di raccolta dati e interpretazione, lo rende compatibile con gli attuali principi di tutela del patrimonio culturale. Inoltre, il metodo non è confinato a un sito specifico, ma può essere applicato ad ambienti edificati di ogni epoca e luogo.

La complessità del *record* archeologico di Ostia ha richiesto di combinare più metodi tra loro. Nel quarto capitolo i metodi e le tecniche discusse vanno dalla rimappatura di un sito archeologico fino alla completa integrazione di analisi spaziali. Nonostante la loro diversità, tutti questi metodi si possono sintetizzare come tecniche di ricerca archeologica non distruttive o non invasive. L'aggiunta della componente analitica, che si avvale dei metodi della Space Syntax per le analisi spaziali, ha permesso di andare oltre ad una convenzionale raccolta e studio di dati, facendo diventare questo approccio un studio olistico dello spazio urbano antico.

Nel quinto capitolo, incentrato sulla poco studiata Insula IV ii, un'attenta analisi delle strutture murarie ha permesso di ricostruire lo sviluppo dell'Insula nel corso dei primi tre secoli d.C. I resti murari testimoniano un ambiente dinamico in cui continui cambiamenti hanno interessato in vari modi tutti gli edifici. Questo sviluppo non riflette solo il boom degli edifici più grandi che hanno dato forma al tessuto urbano di Ostia, ma anche periodi di minor attività. La nostra dettagliata valutazione ha permesso di identificare cambiamenti strutturali e di determinare una seppur relativa sequenza cronologica per lo sviluppo degli elementi interni. E`stato possibile stabilire per la maggior parte degli edifici quanto essi fossero connessi alle strutture vicine all'interno dell'insula e quanto i cambiamenti avvenuti in un'unità abitativa abbiano influito sulle altre. Tutti gli edifici nell'insula investigata hanno in un modo o nell'altro interferito tra di loro. In generale, i resti strutturali dell'Insula confermano quello che è stato osservato per lo spazio edificato di Ostia antica. E' però assente nell'Insula un'importante fase tipica per Ostia: nessuno degli edifici è stato convertito in una lussuosa *domus* tardoantica come si osserva in altre *insulae* dell'area circostante. Si possono suggerire molte spiegazioni: la più plausibile sembra essere che gli edifici siano rimasti in uso nel IV (alcuni anche nel V) secolo e che, essendo ancora abitati, non fossero modificabili e per questo non siano stati convertiti in abitazioni lussuose.

Il sesto capitolo riguarda l'applicazione della Space Syntax al funzionamento della vita dell'Insula. Attraverso analisi e interpretazioni sistematiche dei vari aspetti spaziali questo studio ha permesso di estrarre strati diversi di organizzazione spaziale. Questi coesistevano all'interno della stessa Insula e contribuivano alla funzionalità spaziale del quartiere e al modo in cui gli spazi erano percepiti da quelli che li usavano e attraversavano. L'Access Analysis ha fatto luce sui singoli edifici e sulla configurazione collettiva dell'Insula, dimostrando come le conformazioni individuali strutturavano le relazioni tra residenti e tra questi e i visitatori. Si è potuto stabilire che la struttura spaziale dell'Insula ha avuto un ruolo fondamentale per il suo sviluppo prolungato cosa che ha assicurato circa cinque secoli di occupazione.

Sebbene l'Insula sia un'entità unica e distinta, essa fa contemporaneamente parte di un sistema di relazioni spaziali molto più esteso. Il settimo capitolo tratta dei movimenti degli abitanti di Ostia nella loro comunità e negli spazi destinati a generare interazione. Abbiamo potuto confermare le previsioni della "Space Syntax theory" – secondo cui la posizione di strade o spazi pubblici nel sistema generale della città ne determina l'efficacia nel concentrare movimenti e incontri. La creazione di grafici di visibilità, aspetto complementare dell'analisi della Space Syntax, ci ha aiutato a identificare la "struttura visiva" della città individuando i luoghi più integrati a livello visivo. Questo metodo ha mostrato che i luoghi e gli incroci più integrati nella città non solo formavano i *foci* visivi dei quartieri, ma erano anche connessi l'uno all'altro da relazioni di inter-visibilità. Tutti i singoli luoghi erano quindi permeati da un elemento di globalità che unificava l'intera città. Lavorando a ritroso a partire da questa analisi spaziale più ampia, abbiamo investigato i punti focali identificati nella città per verificare se lì vi fossero marker archeologici (un approccio che si può definire "inverted archaeological assessment"). Con questo approccio sono stati effettivamente trovati in questi punti elementi pubblici (fontane, archi ecc.) generati dalla città per ancorare la sua struttura visiva a luoghi topografici.

Nel capitolo ottavo l'analisi si sposta a un livello superiore prendendo in esame una classe di importanti edifici distribuiti in tanti punti sulla mappa della città: le sedi delle corporazioni (*scholae*) che servivano da centri per molte organizzazioni commerciali e religiose. Come già osservato, questi edifici riflettono fattori spaziali locali e allo stesso tempo la loro posizione si adegua alle condizioni create dal reticolo stradale della città. I due livelli di indagine e i loro risultati devono essere considerati congiuntamente, dato che rappresentano fattori spaziali interdipendenti che inevitabilmente si influenzano a vicenda. Lo studio della logica spaziale delle singole piante delle *scholae* (Access Analysis) ha permesso di cogliere l'organizzazione spaziale degli edifici e di riconoscerli come in gran parte definiti dallo spazio esterno, le strade di Ostia. Il loro rivolgersi verso l'esterno sembra suggerire che le sedi delle corporazioni avevano un grande potenziale nel promuovere contatti e comunicazioni nel punto di interfaccia con lo spazio pubblico. Inoltre, si è notato che le corporazioni preferivano costruire le loro sedi lungo le vie più accessibili del reticolo stradale di Ostia antica. La loro posizione prominente non solo aumentava il loro prestigio pubblico, ma potenziava anche la loro capacità di beneficiare della concentrazione di movimenti che avveniva nelle strade principali. Il valore aggiunto dell'approccio qui presentato è che esso rende possibile produrre valori statistici per definire questi nessi spaziali in modo imparziale. Il passaggio da intuizione a teoria verificabile è basato sull'importanza di riconoscere la relazione fondamentale tra la struttura del reticolo urbano (il sistema stradale di Ostia) e i movimenti dell'uomo, definiti dai principi della "Movement Economy". Questo permette una comprensione più vasta che va al di là dei movimenti guidati da punti di attrazione o finalizzati al raggiungimento di uno scopo, mettendo l'enfasi su direzione e luogo.

Anche se è stato necessario articolare questa tesi partendo da una serie di analisi che hanno preso in considerazione diversi livelli spaziali, speriamo di aver dimostrato l'importanza di trattare una città antica come un tutt'uno integrato. Non solo infatti gli abitanti la vivevano in questo modo, ma soprattutto, le loro vite erano molto condizionate da limiti e possibilità offerte dalla conformazione di edifici e spazi che costituivano la matrice fisica della loro esistenza quotidiana. Ci si augura che questa forma olistica di analisi urbana sarà estesa allo studio di molte altre comunità urbane del mondo antico.

Acknowledgements

This thesis would have been impossible without the academic, practical and moral support from colleagues, friends and family. My first depth of gratitude is to John Bintliff, my supervisor at the University of Leiden, who remained a great inspiration throughout the development of this doctoral thesis, and first drew my attention to Space Syntax. I am also indebted to Bouke van der Meer, my co-promoter, who pointed me firmly to Ostia when I was looking for a field of research, and kept his watchful 'eagle-eyes' over the progress of my thesis. I also owe my deepest gratitude to Hans Kamermans, my co-promoter, who made available his support in many ways, not only in his field of computer archaeology but also in a number of fieldwork campaigns in Ostia. I am also most grateful to Janet DeLaine, since this work would not have been possible had she not shared her expert knowledge on Ostia and lent her support and critical thoughts. A special dept of gratitude is owed to Bill Hillier, whose work has been a source of immense inspiration to me, while he has also offered great personal support to my ongoing research. An additional word of thanks is due to Miguel John Versluys and Natascha Sojc for their constant support and lively interest in my research.

The basic fieldwork was carried out over several visits to Rome and Ostia between 2004 and 2010, first with the support of the Koninklijk Nederlands Instituut te Rome (KNIR) and later with the generous help of Barbara Steindl and Francesco Francisci whom I cannot thank enough for allowing me to stay at their place in Rome. My sincere thanks go to the KNIR and to the then director Marjan Schwegman, and to the successive archaeologists in residence Natalie de Haan and Gert-Jan Burgers, and to all the staff. My thanks are due for their help and encouragement and their continuous interest in my work.

My study would not have been possible without the co-operation of the Soprintendenza at Ostia. My greatest dept is to the former Soprintendente Anna Gallina-Zevi and I also owe gratitude to later successive directors, foremost Angelo Pellegrini, and to all the colleagues at the archives and the library in Ostia: Paolo Olivanti, Paola Germoni, Stefano Stani, Marco Sangiorgio, Simona Pannuzi, Elvira Angeloni, Manuela Seno, and Grazia Pettinelli, and above all to Enrico Rinaldi who has helped me with many invaluable discussions, and to Jane Shepherd, who remained interested in my work and read some of the original chapters and made many useful suggestions.

I am indebted to many colleagues at the Faculty of Archaeology in Leiden, special thanks are due to Annelou van Gijn and Roswitha Manning for their critical thoughts and moral support. I also wish to thank Erik Dullaart who set up the Access database used by this study, and Tjaco Mast who helped with countless computer problems. I am also most grateful to Joanne Porck who helped prepare the images and photographs for this publication, and to Tom Breukel for his help with InDesign. I thank too all colleagues in the faculty's administration, especially Claudia Regoor, Olga Yates, Ilone de Vries, Jaap Hoff and Erik Stavleu for their kindness and help in many practical ways. A special word of thanks is due to all my fellow PhD researchers at the Leiden Graduate School, especially to Diane van de Zande, Tatiana Ivleva, Noriyuki Shirai, Kyryakos Savvopolous, Chiara Piccoli and Eva Mol. Some have received their doctorate before me, others will follow later, but all in their ways helped to make research enjoyable. Special thanks are due to Chiara Piccoli for translating the summary into Italian.

This work on the whole profited from many discussions and from a stimulating exchange of ideas. I would particularly like to mention Erik van Rossenberg who not only alerted me about new publications but also shared critical thoughts and helped with useful advice. My warmest thanks go to Jolanda Lee for her patience and limitless help with producing the maps in ArcGIS and organising the field work data. I also received support from Stijn Arnoldussen who helped with MapInfo, and from Akkelies van Nes on questions related to Space Syntax and wish to thank her for sharing her expertise and enthusiasm. There are many colleagues and friends to whom I owe gratitude, I wish to single out Gertrudis Offenberg, Andrew Ricca, Hue Wang and Carien Creutzberg and wish to thank them for their kindness and help.

My research was partially supported in its early stage by a travel grant from the Stichting Philologisch Studiefonds Utrecht, several travel grants from the Koninklijk Nederlandse Instituut te Rome, the Faculty of Archaeology in Leiden, and the Leids Universiteits Fonds.

Finally, I wish to thank my husband Mario Damato and my daughter Samira Damato for their patience and support during these years between Ostia and Leiden. I hope they still bear with me since 'Rethinking Ostia', is not a closed book. The title invites a discussion and implies an ongoing process which encourages a continuous re-evaluation in the light of new evidence, new methods of investigation, as well as different interpretations. New answers will lead to new questions and will constantly require serious 're-thinking', however, ultimately all these processes are part of our ongoing search for knowledge of the past.

Curriculum vitae

Johanna (Hanna) Stöger graduated from the department of Archaeology and Classics at the University of Malta, with a major in Archaeology (B.A. hons., November 1999). Her thesis was entitled "*Albert Mayr: A Legacy of Pioneer Work in Maltese Archaeology*', and was supervised by Prof. Anthony Bonanno. In 2001-2002 she successfully completed a taught Master of Arts programme in Classical and Mediterranean Archaeology at the University of Leiden, The Netherlands. She graduated in October 2002 (M.A. *cum laude*) specializing in Roman Urbanism, with a thesis on *Monumental Entrances of Roman Ostia*, supervised by Prof. John Bintliff and Dr Bouke van der Meer.

She continued her studies at Leiden University as a PhD researcher (2004 to 2010), and developed a keen interest in the spatial dynamics of urban sites and the application of methods of spatial analysis (Space Syntax) to Roman towns. She submitted her PhD thesis in March 2011. Her dissertation was supervised by Prof. John Bintliff, Dr Hans Kamermans and Dr Bouke van der Meer. This book, *Rethinking Ostia: A Spatial Enquiry into the Urban Society of Rome's Imperial Port-Town*, is the result of her PhD research.

Since September 2010 she is a post-doctoral researcher within the EU-funded project 'Archaeo-Landscapes', and a part-time lecturer at the University of Leiden.

Hanna Stöger has worked as a field archaeologist in several excavations and survey projects in Malta, Germany, Italy, Greece and The Netherlands. She was a founding member of the Archaeology Service Co-Operative, (ASC) Malta, where she carried out rescue excavations and survey projects (rural and urban) for the documentation of heritage in Malta. She has also been a constant member of the excavation team of the University of Malta working at the multi-period site of Tas-Silġ (Malta). She has published on spatial aspects of Roman Ostia and organized several sessions at International conferences (EAA and TRAC), and workshops organized by the Leiden Graduate School. Apart from her main research interest in Roman urbanism and spatial analysis, her areas of interest include urban history, city development and today's methods of urban planning.