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

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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]

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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).

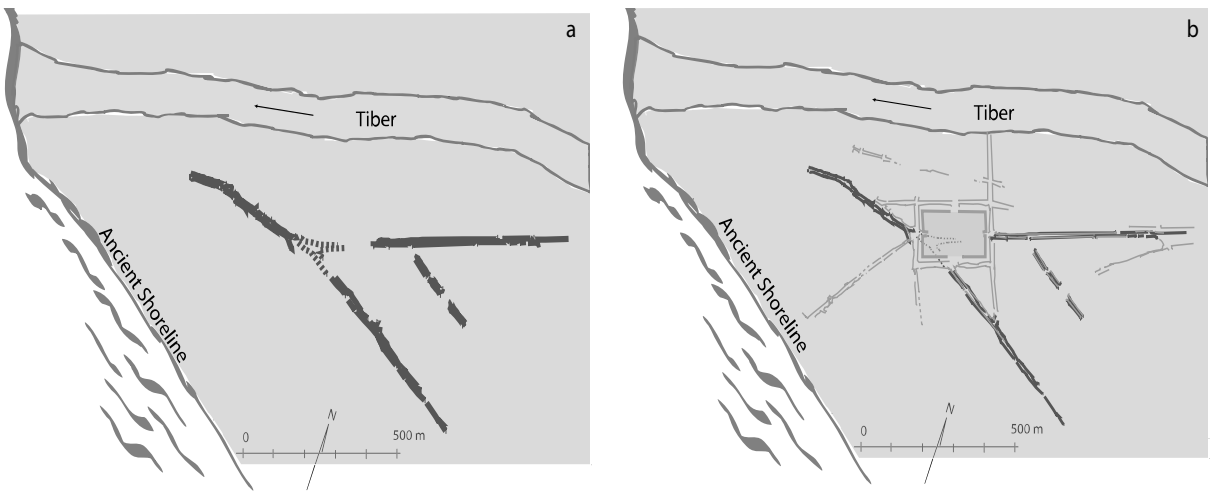

Fig. 7.1– The evolution of Ostia's street system; left: proto-communication lines, pre-existing the foundation of the castrum; right: the adjustment of the street system to the castrum; (after Mar 1991)

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

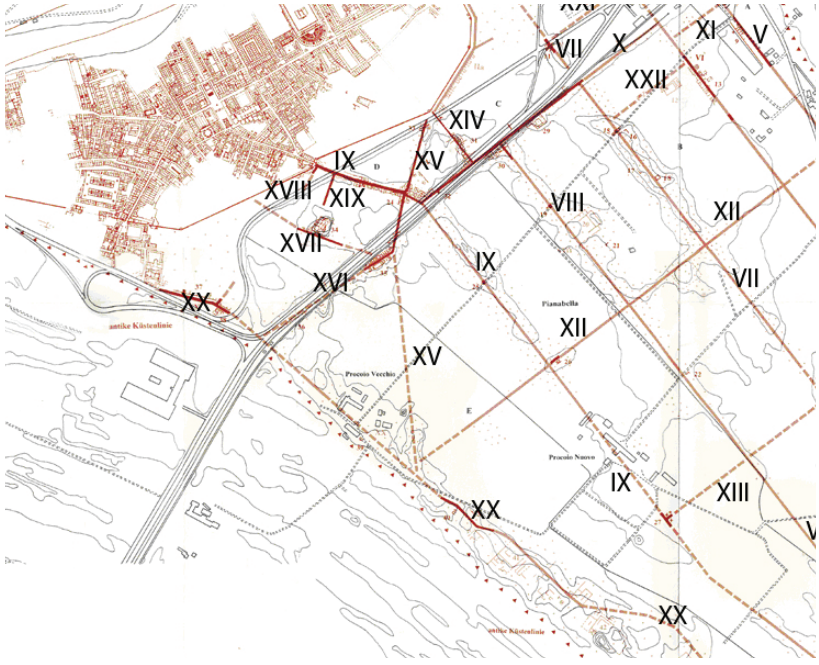

Fig. 7.2 – Ostia and its periphery with the street network numbered according to the DAI survey, section of the DAI map (source Heinzelmann 1998a)

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).

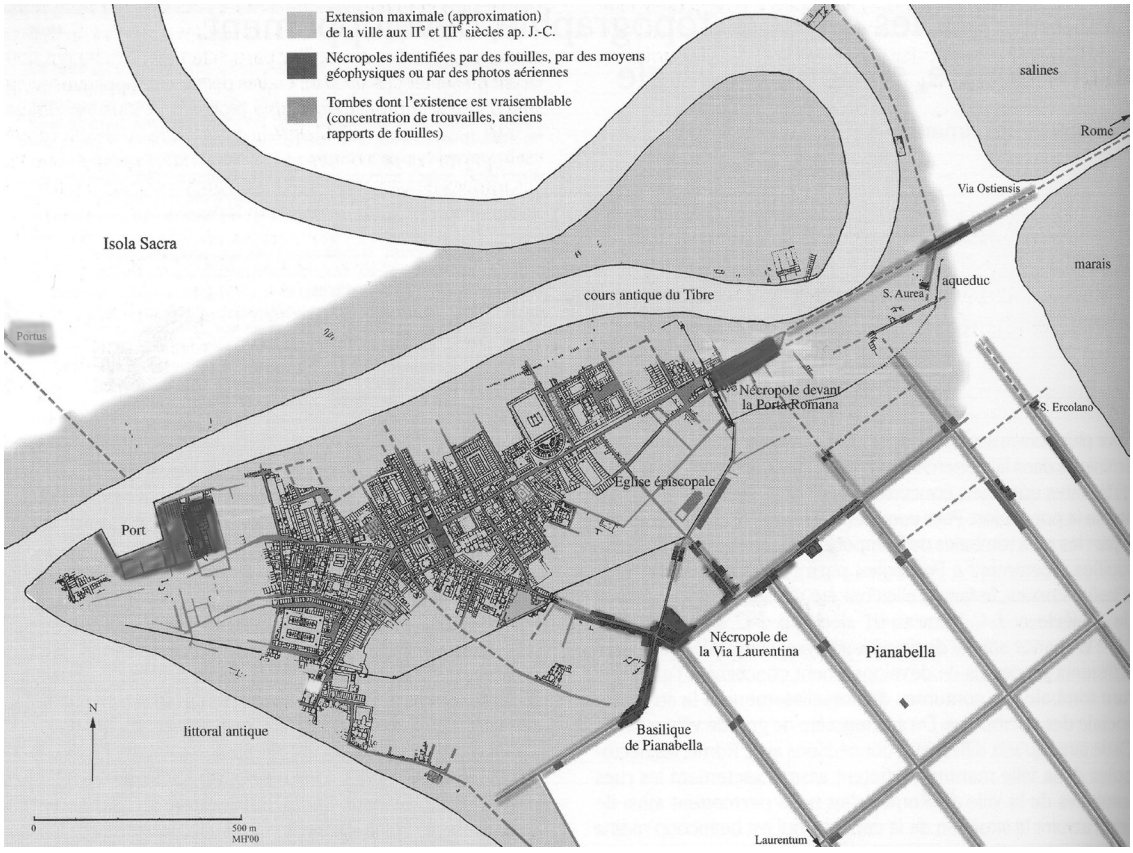

Fig. 7.3 – Ostia and the area of Pianabella, with necropoleis located along the street grid (source Heinzelmann 2001: 374, fig. 1)

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]

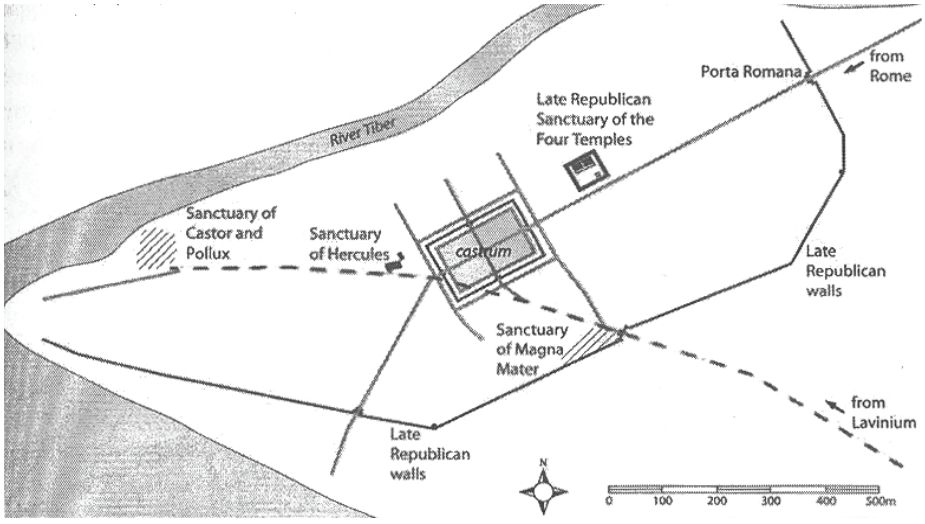

Fig. 7.4 – The 'archaic sacred route' leading from Lavinium to the sanctuary of Castor and Pollux at Ostia (drawing after DeLaine 2008: 101)

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).

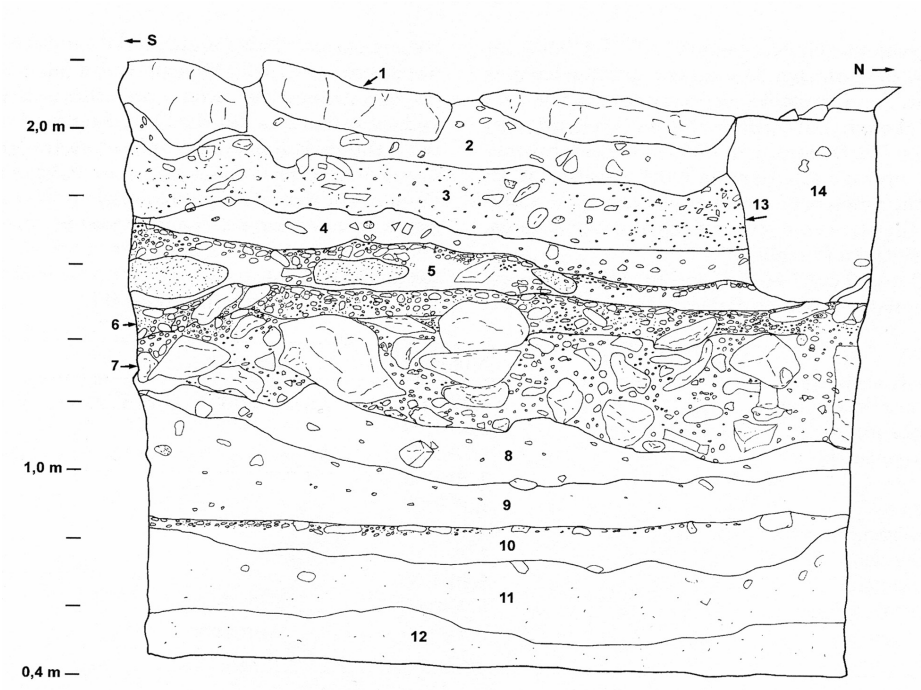

Fig. 7.5 – Via Ostiensis, trial trench east of the Porta Romana; western section; preliminary dates: street 1 (10) about 3rd to 2nd century BC; street II (6) Claudian period; street III (5) 1st half of 1st century AD; street IV (3) 2nd half of the 1st century AD; existing street level V (1) Severan period (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.

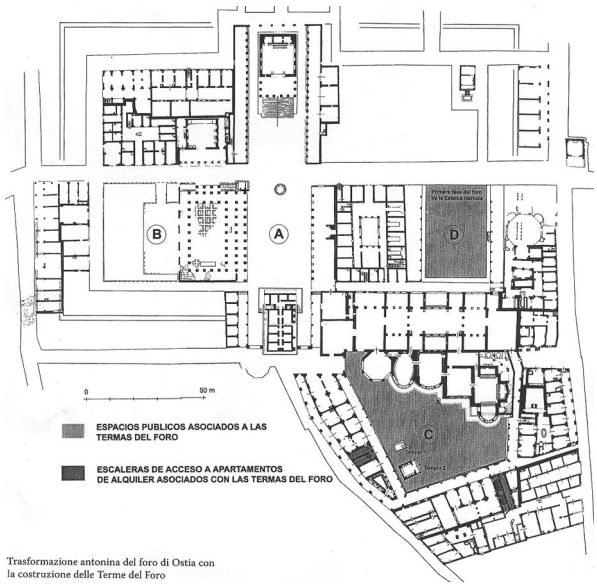

Fig. 7.6 – Ostia's *forum* in the Antonine period: an emphasis on bounded spaces as well as a loss of linear movement space can be observed (source Mar 2008: 138)

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.

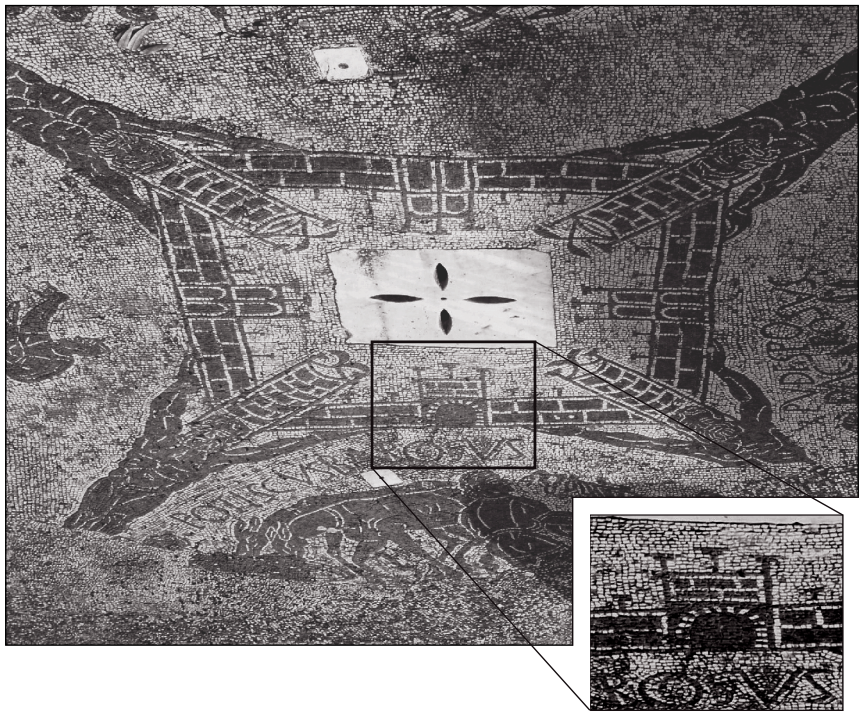

Fig. 7.7 – Mosaic pavements in the Terme dei Cisiarii, stylised city walls featuring four gates: one provides a large gate opening to allow wheeled traffic to pass

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 scapharioruma et lenuncularioruma 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.

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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.

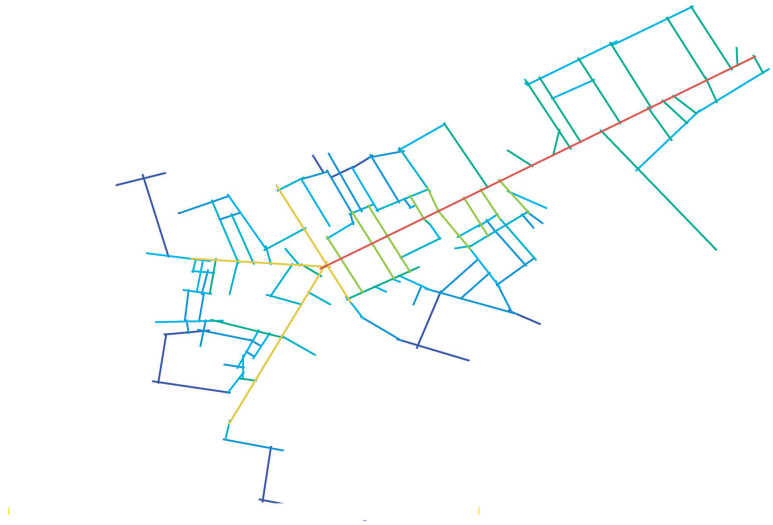

Fig. 7.8 – Street network, excavated areas only; axial analysis, integration (HH, n-streets, 150)

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*

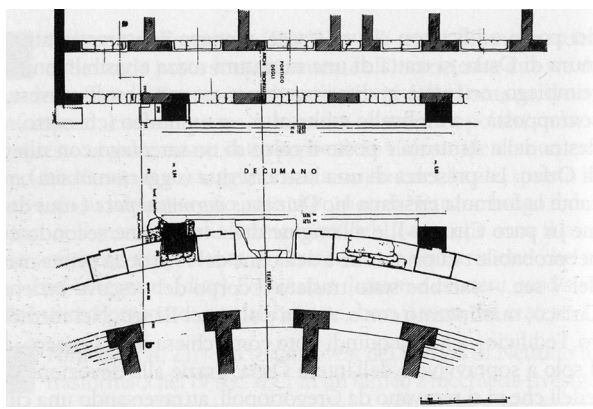

Fig. 7.16 – Arco di Caracalla, plan (source Zevi and Pensabene in Pavolini 2006: 68-69).

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.

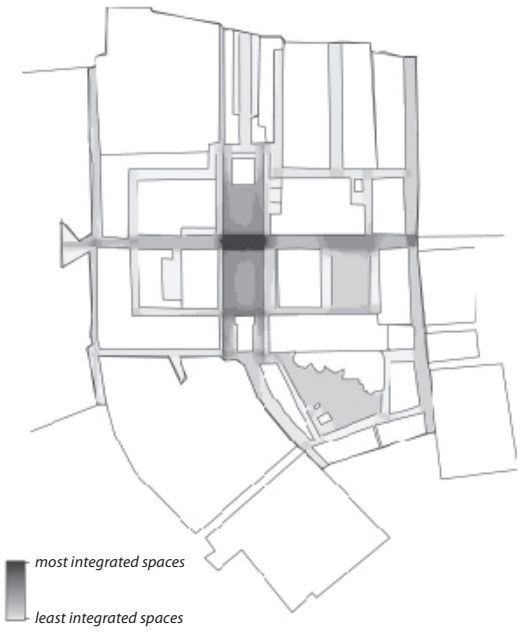

Fig. 7.18 – The *forum* space in the Antonine period (redrawn after Mar 2008: 138, fig. 9): the visually most integrated spaces are concentrated along the *decumanus*, while the north-south axis remains less integrated (Visibility Graph Analysis, Depthmap UCL)

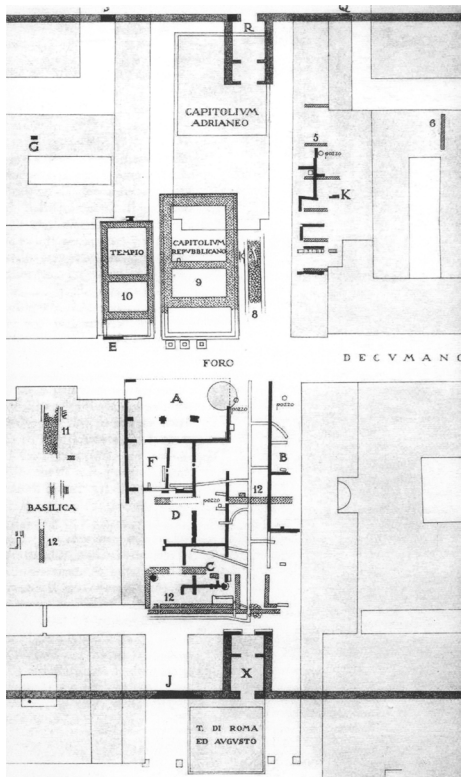

Fig. 7.19 – Ostia's central area in the Republican period: the fountain located south of the *decumanus* might have its origins in the Republican period (Calza 1953, fig. 19)

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.

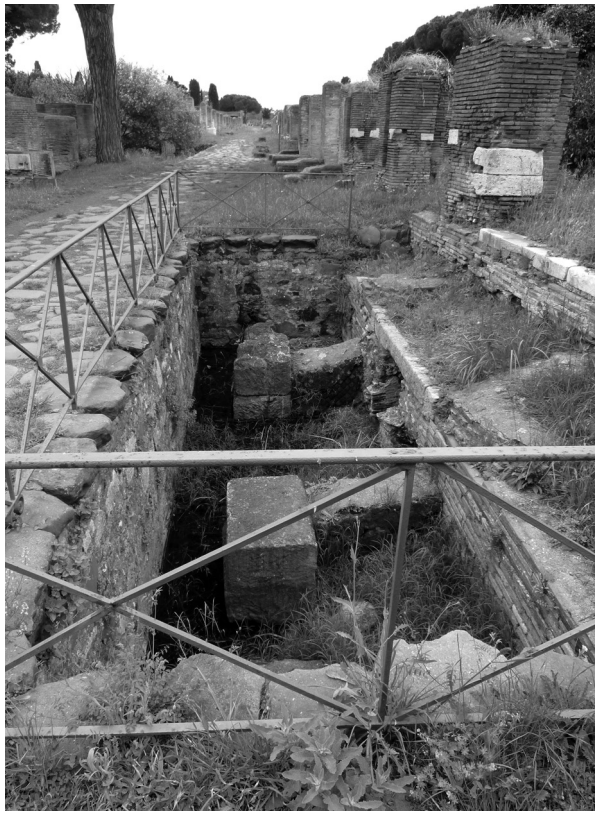

Fig. 7.22 – Republican buildings reaching further into the western *decumanus*, while the 2nd century development pulled back from the street space allowing for wider road clearance

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.