

Agrarianism in a boomtown

The proto-urban origins of 13th century 's-Hertogenbosch



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The proto-urban origins of 13th century 's-
Hertogenbosch

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Preface

The road to the completion of this thesis has not been easy. During two years I struggled with finding a proper subject and getting a proper structure. Thankfully the bureau for archaeology in 's-Hertogenbosch provided me with all the support and inspiration that lead to the producing of this research. Especially Ronald van Genabeek and Eddie Nijhof have provided me with support wherever possible. Despite the two years it took for me to complete this work my tutor, Roos van Oosten, remained faithful in the outcome and gave me any advice I needed. Beside these people I would like to show my gratitude to my parents for supporting my choices and their trust over the past years.

James van der Weiden

Chapter 1: Introduction to the research

1.1 Introduction to the subject

The development of a historical city usually followed a certain pattern. From its pre-urban core, whether it is a village, castle or pioneer settlement, it would spread out as it grew and would urbanise in appearance. In an absolute definition urbanisation is an increase in the percentage of the population that lives in cities. This definition only takes demographic factors into consideration, so although it is correct; it is also a narrow explanation of a complex process. A broader and more complete definition is given by Lesger in his chapter for *Stedebouw*. “[..] “Urbanisation can be seen as the increase of the mentioned characteristics in the society” (Lesger 1993, 31). These ‘mentioned characteristics’ are those characteristics argued to define a city. These characteristics are used and adapted by many scholars but originate with Van Uytven and his chapter on urban life in the *Algemene geschiedenis der Nederlanden*. In this chapter he defines a city as followed: “a settlement with a central role which gives it a diverse economic and social structure, a dense population and building pattern and a resulting distinct appearance.”¹ All these give a new mentality to the inhabitants of the settlement (Van Uytven 1982, 188). In other words, a city has a central role, diverse social and economic structures, a high population and building density and its own mentality. Dumolyn and Stabel argue that an increase in population density is in the end the one basic factor that defines urbanisation; all other above mentioned characteristics are merely a result of this factor (Dumolyn and Stabel 2012, 57). While this description applies to urbanisation on a larger scale; that of a region or society, it is equally true for individual cities.

Now if we agree that urbanisation is equal to increasing population density, how does this materialise into archaeologically detectable remains? The single most immediate effect of an increased population is a greater need for space. More people require more buildings to live and work. To satisfy this need for buildings, expansion is required. There are two ways for this expansion to happen; external expansion; in

¹ “De stad is een nederzetting met centrale functies, waaraan zij haar gediversifieerde sociaal-economische structuur, haar relatief dichte bevolking en geconcentreerde bebouwing en een tegen de omgeving afstekende mentaliteit dankt” (Van Uytven 1982, 188) Translation by author.

the shape of added suburbs and internal expansion within the confines of the old city (Sarfatij 1990, 186-88). One would say that spreading outwards is the easier way of growing. But pre-modern cities always had to consider their defences. The building of a city wall or other fortifications (earthen banks, moats, bastions) was a very expensive project. Once in place they were not easily replaced. And since construction outside the walls was, at least in theory, prohibited; cities were restrained in their expansion. So if the settlement could not expand outward due to its walls it would have to make better use of its available space and expand internally. The result is the dividing of plots into multiple smaller plots on which narrower but often higher houses were built. Smaller plots and the dividing of larger plots is an essential characteristic of pre-modern cities (Boerefijn 2005, 134, Sarfatij 1990, 187 and Cleijne 2008, 83). Another strong restricting factor in 's-Hertogenbosch was the natural environment. The area consisted of a sand bulge raised above the surrounding wetland. Habitation was restricted to this sand ridge and this dictated the city's growth and its eventual shape. Besides the plots getting narrower they were also getting built on more heavily. On the yards behind the main houses, accessible by alleys, other dwellings were built. These developments are often visible through archaeology. The division of parcels is visible through the placement of walls and/or plot boundaries. A shift to narrower plots and denser occupation can be detected through study of the evolution of these boundaries over a longer period of time.

Expansion outward is also visible in the archaeological stratigraphy. The new terrain is first reclaimed through clearing, raising and draining. When habitation started, it was usually with wooden structures. Later brick built houses became more common and the wooden variants were often replaced. Timber did remain a popular building material however. Low cost structures were often built from timber and houses frequently had wooden gables (Voskuil 1990, 66-69). The evolution of dwellings in the city is studied further on in this thesis. The normal pattern in which this happened starts with the adapting of the natural terrain. Making the terrain available for habitation (reclaiming) is the first and vital step, certainly in the waterlogged conditions of The Netherlands. If the terrain then is not immediately

needed for structures it can temporarily be used for growing crops or keeping animals. Habitation is then started with wooden structures. Firstly because wood was cheaper. Secondly, brick was not yet common in this period (late 13th, early 14th century). As time passed and the terrain got implemented into the main city structure habitation continued with brick buildings.

During my study of the site Sint Andriesstraatje/Hinthamereinde in the city of 's-Hertogenbosch; I found a stratigraphy that is in contrast to this order of developments (Van der Weiden 2015). The site was just beside a gate in the 2nd city wall. After its reclamation and raising, several postholes are indicative of a wooden building that occupied the site immediately. Covering these postholes is a layer of rich soil with spade marks that appeared to be of agrarian origin. This period of use is followed shortly afterwards by the construction of the city wall and the brick foundation of a building. The foundation probably carried a wooden house. All of these events happen in a period of 50 years, 1275-1325. The remarkable thing is the disappearance of habitation in favour of agrarian use.

We should be careful to attribute this return to agrarian use of the terrain to the decline of the population or economy. The decline of a city, due to economic or demographic reasons can archaeologically be difficult to see and is not as straightforward as one might think. Studies in England have shown that population decline does not necessarily lead to a shrinking of the buildup area of the city. Rather, the changes occur internally, on the scale of individual- or groups of plots (Lilly 2000, 245-248). Dwellings build on backyards, behind the main houses lining the streets, would have been abandoned first leaving the street front intact. Another example is the creation of larger plots and houses by using deserted plots. In this way the population density changed but the overall surface of the city remained similar (Lilly 2000, 252-253, Astill 2000, 217). While decline is thus mostly visible on the scale of plots there is one difficulty added. The decay of a plot or block does not necessarily mean the decay of the entire city. The cities were adapting constantly and some areas might have been abandoned in favor of others. As a result the focus of activity merely shifted, it did not disappear (Lilly 2000, 256).

Besides the danger of connecting urban decline to changes on individual plots, there is also no indication of significant decline in 's-Hertogenbosch. In the first century of its existence the city experienced an impressive and perhaps unexpected growth. That is was perhaps unexpected can be seen in the fact that the first city wall, erected circa 1200, was already confining the cities growth before it was even finished. As stated by 15th century chroniclers the population had doubled by 1250 and a large part was living outside the walls (Glaudemans 1999, 12, Kuijer 2000, 53 and Janssen 2011, 35). Clearly the attraction of the city to surrounding people was significant and underestimated. In the beginning of the 14th century the construction of a new city wall was finally started. The continuing pressure of population growth was surely a primary reason for its commissioning. This time the wall was build for growth, it enclosed a space 10 times bigger than the first and it took more than half a century to finish (Personal correspondence Van Genabeek). The exact reason for this massive increase in territory is unknown yet fascinating. Despite a dip during the harsh periods of the 14th century, the city continued growing in the 14th and 16th century (Kuijer 2000, 133). The area within the second wall proved big enough to accommodate the population growth until well into the 19th century.

While the complete space might not have been used for expansion during our period of interest (13th/14th century); there is no indication of a general decline of the inhabited space. Returning plots to arable fields thus seems unnecessary for two reasons. Firstly there were large areas of open land within the city wall. Secondly there is no indication that the population or the need for buildings shrank. The conclusion is that re-agriculture (returning a terrain from habitation to agrarian use) seems an illogical process in the light of this city's development.

1.2. The research

While the existence of this phenomenon is well known among the archaeologist in 's-Hertogenbosch, it was never studied. This thesis hopefully can provide an overview of the circumstances and characteristics of the reoccurring agrarian layer. In order to achieve a conclusion we need to look at several aspects of this phenomenon. The composition and appearance of the agrarian layer needs to be established first. This

in order to define the subject clearly. Studying the structures present before and after the agrarian layer might allow us to establish a pattern in which re-agrarisation occurs. Equally important for this pattern is the time period in which it takes place and how this connects to the development of the city. It is this connection that might give the opportunity to predict where a reoccurring agrarian layer might be found. Finally we try to come to understanding why re-agrarisation occurred.

What is the reason for re-agrarisation and how is it connected to the development of the city in general?

- What buildings were present before the agrarian layer?
- What is the composition of the agrarian layer?
- Where in the city does re-agrarisation appear?
- In what period does re-agrarisation take place and how does it relate to the development of the city?
- How did the site develop after the agrarian layer?
- Does this phenomenon appear in other cities?
- Why did re-agrarisation take place?

1.3. Data and literature

The 10 excavations in which a reoccurring agrarian layer was found were in different stages of publication. Most were not published and only internal reports were available for data. Brandweerkazerne, Windmolenberg, Sint Jansstraat were summarised in an internal report by Van Genabeek. Marienburg and Sint Andriesstraatje were in the process of publication; the later by the author of this thesis. Sint Jacobsstraat-35, Mgr. Prinsenstraat and Kerkstraat were fully published in an official report. Achter het Vergulde Harnas was partially described in a book published about the coin hoard found on the location. Of Keizershof there was no report and the data from this site was communicated by personal correspondence with Van Genabeek. The excavations of chapter 4 were all described by Ingrid Cleijne in her thesis on Parcel development in 's-Hertogenbosch. Most data was taken from this source. In some cases additional information was taken from the original publications where needed. Chapter 2 is mainly comprised of literature studies. The works of Janssen, Van Drunen and Kuijer were of particular importance for this chapter. Information about the city of Deventer and the town of Bunschoten were taken from report from Vermeulen and Vervloet.

1.4. Structure

The thesis is composed of five chapters followed by a list of used literature, illustrations and an appendix of original illustrations. Chapter one was an introduction to the subject and identification of the research. Chapter 2 consists of a short history of 's-Hertogenbosch, especially focussing on the development of its cityscape. Further there is a description of the various types of dwellings within the city. The focus lies on their foundation as this forms the data used in this research. This information is provided with the aim to make it easier for the reader to understand the data presented in chapter 3. This chapter is significantly larger than the others as it contains the short descriptions of the selected excavations and their analysis. Through the process of answering the research questions we try to reach an understanding of the phenomenon. In chapter 4 we compare the results from chapter 3 with excavations not containing re-agrarisation. Also we compare the situation in

's-Hertogenbosch with two other settlements, Deventer and Bunschoten. In both of these some form of agrarian activity was present within the fortifications. The aim is to illustrate the unique situation of 's-Hertogenbosch. Chapter 5 contains the conclusion of the research and a proposal to further advance our knowledge of this subject.

Chapter 2: The wonder of 's-Hertogenbosch

To understand the context of the excavations discussed in chapter 3 better; one needs to know the development of 's-Hertogenbosch. For that reason this chapter will present the evolution and development of the city, from its founding to its peak. The central question is how the cityscape changed and the buildings evolved. In this context it is domestic buildings that are described. Public buildings hold no interest for the subject of this thesis. The role of the agrarian component in medieval cities is vital. Sadly the subject does not have a wide range of literature. One paragraph tries to give an idea on the techniques and crops of urban agriculture.

2.1 The city of 's-Hertogenbosch

The questions that I am aiming to answer in this thesis are very much entwined with the historic development of 's-Hertogenbosch into a city. The connection of the various sites with the urban structure depends greatly on the phase of development the city was in. The name 's-Hertogenbosch holds in its meaning the origin and founding father of the city. From Old Dutch it translates to: the duke's forest or the forest of the duke. The duke in this case is Henry I of Brabant and the forest mentioned was part of his demesne. More precisely it was part of his domain at Orthen, a small hamlet near the river Maas that still exists today as a suburb of the city of 's-Hertogenbosch (Kuijer 2000, 33-36). Henry spent his reign enlarging and strengthening the duchy of Brabant, especially against his rivals in Holland and Gelre. The border with these rulers lay in the northern half of Brabant, an undeveloped and sparsely populated area (see figure 1). The forest at Orthen was an ideal location for a settlement, both geographically as well as politically. Much of the plateau of northern Brabant is cut off from the main rivers by a ridge running east to west. At Orthen the rivers Aa and Dommel cut through this ridge and join with the Maas. Goods from the Kempen (the eastern part of the Brabant plateau) could thus be shipped onto the Maas and into the markets of Western Europe (Steehouwer 1991, 19). The new city would have complete control over this trade. The actual motive for the founding of the city is debated. Some scholars maintain that the city was a

strongpoint to protect the open border against aggression from Holland or Gelre and subdue local noblemen. Others see the city as an economic entity, used by the duke to profit from the expanding agriculture in the region and, in my opinion a more likely argument; states that the city was a means of including the backward region into the greater network of the duchy, both economically as strategically (Janssen 2007, 101).

The new settlement was placed in the wilderness south of Orthen. Archaeological traces of the clearing of trees have been found underneath the market square. These traces are the pits that form when roots are pulled out of the ground. Such clear evidence of an activity connected with the founding of a city is very rare. It allows us to date the clearance of the forest and subsequent starting of habitation in the 2nd half of the 12th century (Janssen 1983, 57).

Despite its charter the very early settlement was

of humble construction, one should imagine little more than a village. On a small bit of high ground, the current Markt, the pioneers lived in wooden hovels. The layout of the buildings and their construction represented more of a village than anything else. On the edge of the high ground stood the tufa build residence of the Duke,

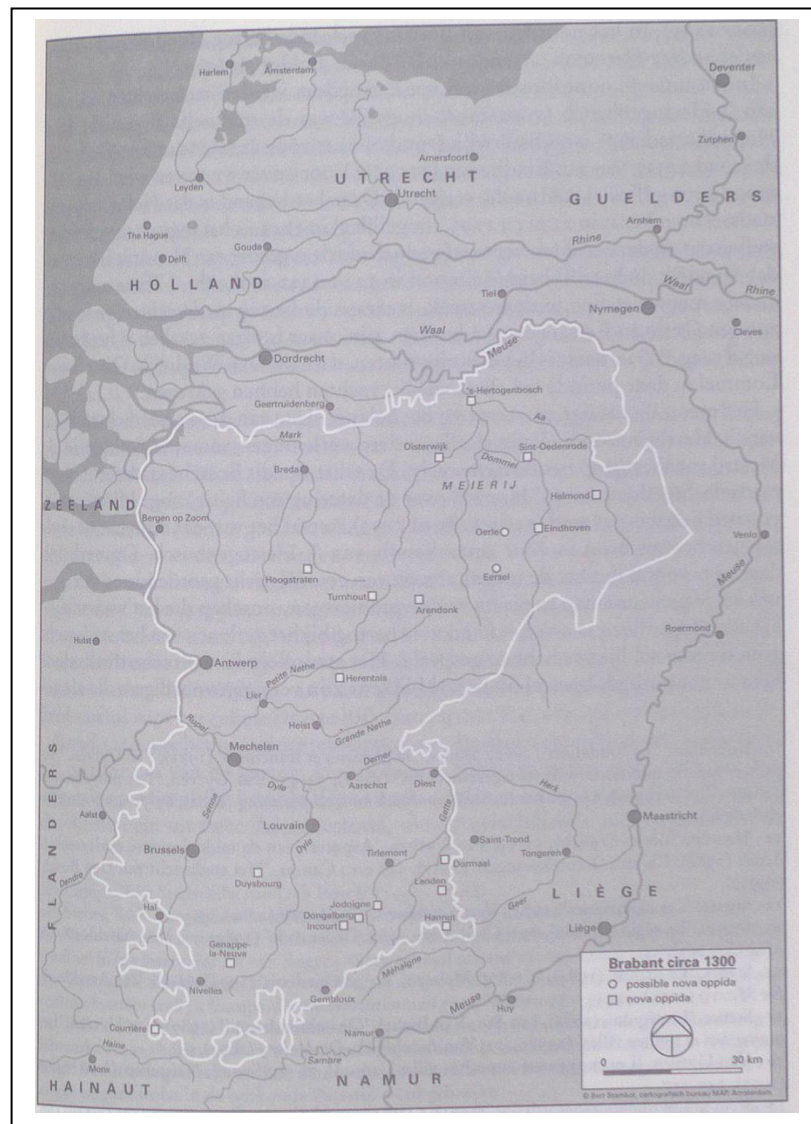


Fig.1 Map of the Duchy of Brabant (white outline) circa 1300. 's-Hertogenbosch is part of the newly founded cities (white marks). (Janssen 2007, 97)

dating from the end of the 12th century (Janssen 2007, 104). This stage of the settlement is distinctively agrarian and can be considered pre urban. It is however a small scale agrarian system as no large hovels were found within the settlements boundaries. It is possible that it was mere subsistence agriculture or market gardens (Sarfatij 1990, 195).

The people from Heusden repeatedly burned the young settlement, no doubt instigated by their overlord, the earl of Holland (Kuijer 2000, 79 and Steehouwer 1991, 25). The need for defences became ever more apparent, eventually resulting in the construction of the first stone city wall. The construction is only dated archaeologically, namely somewhere at the beginning of the 13th century. The last invasion from Heusden happened in 1202 so it seems that this might have been the event that triggered construction of the wall. The fact that the wall was constructed in one campaign suggests it was commissioned by the duke (Janssen 2007, 111). The small settlement would have been incapable to afford such an expensive project. Whatever the precise reasons for its construction were, it is certain that it is the oldest stone city wall in the Netherlands (Janssen 1983, 70-72 and Treling 2007, 51). The wall was build of a mixture of tufa blocks and bricks. The wall had five gates; three land passages and two water gates. The three main gates were supposedly named after the cities that financed them: Brussel, Leuven and Antwerpen (Glaudemans and Tussenbroek 1999, 7-10). Through the water gates ran the stream "Marktstroom". This provided a sheltered harbour close to the Markt where the city's commerce activities took place. The exact layout of buildings within the wall is difficult to determine. None of these buildings remain and the archaeological record has been severely disturbed by the later building activities. The Markt was probably significantly smaller with wooden buildings on its edges. These houses had the classic "street up front, stream at the back" position that would remain typical throughout the history of 's-Hertogenbosch. This meant that their front gable faced the street while the back yard ended on one of the many channels (Van Drunen 1983, 128).

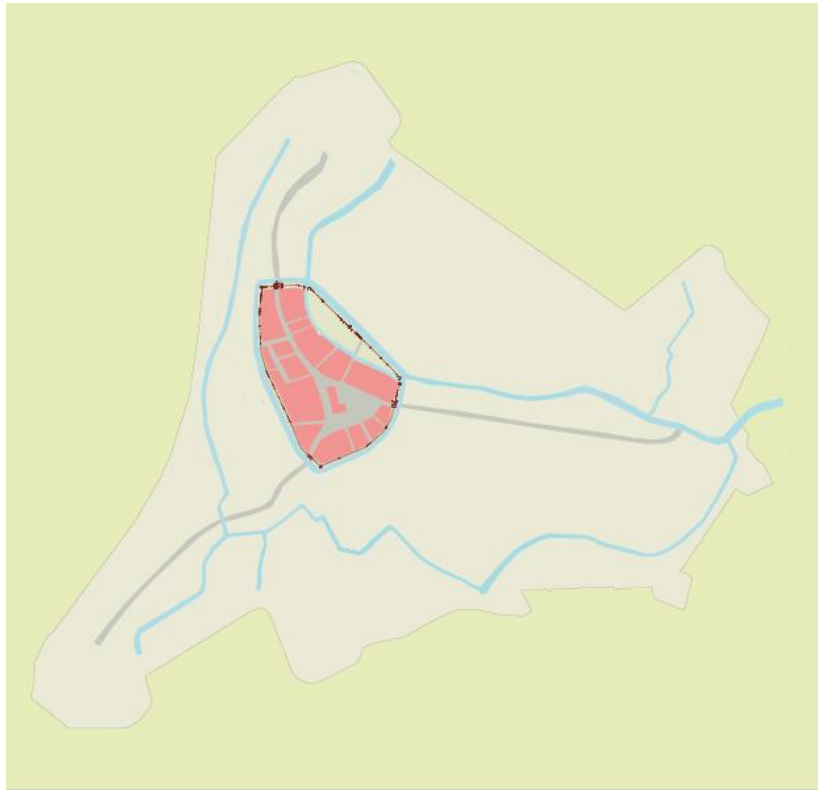


Fig.2 Abstract map showing the young settlement within the first city wall. The white outline is the 16th century extent of the city. (BAM archive)

After the construction of the first city wall the city's economy gathered steam. The trade with the hinterland and its local industries, mainly leather, knife and cloth production, had fully integrated with the new settlement and its wealth started to grow. As a result, the space within the first wall quickly became too small. Soon buildings were erected outside the defences, a prime example being the new church dedicated to Sint Jan; the later cathedral. The first record of the church dates from 1222. Around the church habitation initially was as on the early Markt; prefab wooden houses without dug in posts (see fig. 4. and an agrarian function (Janssen 2007, 125-27, Janssen 1997, 245). The marshes around the settlement were not suited for habitation and thus houses were focused on the sandy ridges running east and south. By 1250 the total build-up area of the city had doubled. Most of these new houses lay outside the first wall. As a result a large part of the population lived outside the walls. The construction of a new wall would have been extremely expensive; a price the city could probably not bear. Also the first wall had only just been finished and it would seem a waste of resources to make it obsolete already. For

these reasons no expansion was undertaken until the beginning of the 14th century (Glaudemans and Van Tussenbroek 1999, 13).

In 1318 Duke Jan III gave approval for the construction of a new wall and the levying of new taxes to finance it. A forest was also donated by the duke, the exploitation of which would contribute to financing the construction. Fines imposed upon citizens of the city had to be paid in bricks. In this way the city was able to pay for the massive project that was the second city wall. Build entirely in brick; it was 6km long, included eight gates and several water gates. It is estimated that completion of the works took fifty years. To complement the new wall; a new moat was dug around the city and new canals connected the major waterways (Kuijer 2000, 162). In total the area of the city grew in tenfold to 104ha, a huge terrain of wetland that had to be raised in order to be useable. Developments in the hinterland (deforestation, canalization); altered the water management of the city. It suffered more frequent flooding, even on the high Markt. To counter these problems massive projects of raising the ground level were undertaken all over the city. Especially the low areas within the second town wall were targeted, yet also the Markt and the old settlement were raised by meters (Janssen and Treling 1990, 92 and Janssen 2011, 24). Cleijne did a specific research considering this level raising. Most of the raising took place between 1200 and 1500. Prior to the 14th century the layers of sand were usually clean yellow sand, exported into the city. Afterwards it is a far more polluted mix of dark soil, waste and rubble (Cleijne 2008, 81-82).

After the construction of the second wall the layout of the city started to take its final shape. The Markt consolidated its space in the period around 1350, having doubled in size (Janssen 1983, 58). The Hinthamer-, Orthense- and Vughterstreets ran along the sandy ridges, they were the first area's to be inhabited and were already well developed by 1300. Along its street lay narrow plots, with houses side by side; with already in many cases a closed street front. The narrowing of the plots was a direct consequence of urbanization and the pressure on the limited amount of land (see paragraph on urbanization). In 's-Hertogenbosch the width of parcels varied greatly. Many were, however, around 6 m wide or 20 *Bossche voeten* (Van Drunen 2006, 84-85). With the main streets full, occupation spread into the marshy areas, first

around the new church; then in other areas. Many monastic orders set up new convents and churches on the reclaimed grounds (Steehouwer 1991, 31, Janssen and Thelen 2007, 9). These institutions would occupy large parts of the city, up to her fall to protestant forces in 1629.

The population of the city continued to grow reaching its peak in the 16th century. The 15th and early 16th century were a golden age in which the industries and trade flourished in Brabant and Flanders. 's-Hertogenbosch became one of the most important cities in Brabant and certainly the most important in the northern reaches of the duchy. During these two centuries; two more extensions of the city were made, even though there was plenty of free land inside the walls. These extensions at the Hinthammer- and Vughterstraat, were meant to incorporate the buildings there into the defensive ring of the walls (see figure 3). The already mentioned environmental circumstances made that incorporating these annexes was easier than reclaiming low lying area's within the second city wall (Personal correspondence, Van Genabeek). In the second half of the 16th century the religious turmoil that raged through Europe started to affect the city. The mainly Catholic population sided with the Spanish King during the rebellion of the protestant Northern provinces. This put the city in the frontline of the revolt that lasted 80 years. The damage to the surrounding countryside, the city herself and above all

trade; was severe (Prak 1997, 23). The city's walls were reinforced with earthen banks to protect them against the power of modern canons. Several bastions were built as bases for defensive



Fig.3 16th century overview of the city.(By Jacob van Deventer c. 1560. Cropped by BAM)

artillery. It was of no avail; in 1629 prince Frederik-Hendrik besieged the city with protestant troops. He diverted the streams feeding the marshes surrounding the city, allowing his artillery to move closer to its walls. Eventually bastion “Vught” was breached and the city surrendered. Catholicism was banned from public services and church property was confiscated then sold or demolished. A large fortress was built on the city’s northern edge to keep an eye on the still Catholic population. The peace treaty of 1648 drew a new boundary between north and south Brabant. The city was forever cut off from its former hinterland. The trade of the city stagnated until the industrial revolution in the 19th century. Stagnation is however something different than decline, the city maintained a certain level of prosperity, certainly in contrast to its neighbours, and many buildings were rebuild or renovated during the 17th and 18th century (Steehouwer 1991, 32 and Van de Sande 1997, 76).

2.2 Wooden houses and barns in the region of ‘s-Hertogenbosch

As the settlement evolved during its life, many aspects of its structure changed. One very important part of this structure is the buildings that constitute it. Often the biggest, most impressive and complex buildings in a medieval city were either public; like town halls and guild houses, or religious convents or churches. Impressive as they might have been, they only occupied a minor part of the inhabited space. Dwellings, from very common to exquisitely grand, lined the many streets and alleys of the city and occupied the majority of the space. Since my research is concerned with the processes on domestic plots, this paragraph will focus on the evolution of those dwellings.

The pre-urban settlement mentioned above, located on the current Markt, was in all its appearance agrarian (Sarfatij 1990, 185 and 195, Janssen and Treling 1990, 91). Not much is known of the houses during this period, the few traces they left are severely disturbed by the building activity in later centuries. Janssen describes “cabin like houses” scattered loosely on the Markt, corresponding with the first pioneers inhabiting this area (Janssen 1983, 58). He is not very clear in describing what these “cabin like” houses look like or what he means by loosely scattered. However, in later publications he expands his description of these buildings. These pioneer

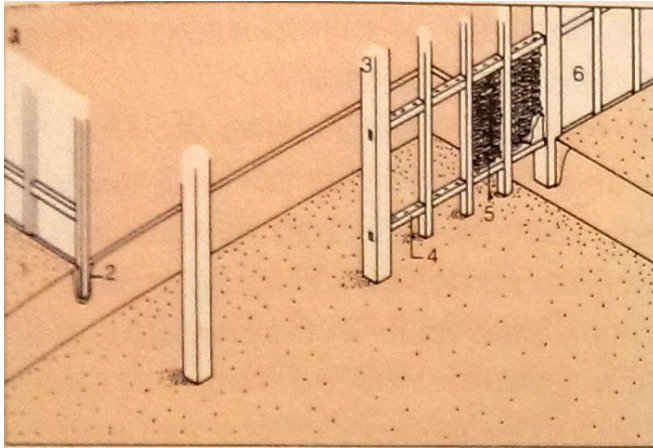


Fig. 4 Construction methode of dug in posts and wattle and daub walls. (Janssen and Treling 1990. Cropped by author)

houses consist of a possibly pre-fabricated wooden framework standing on horizontal girders. These structures were barely dug in, thus hard to see in the archaeological record. The theory is that these structures were transported in and assembled on site to house the first settlers (Janssen 2007, 125). The exact function of

these structures is hard to determine, they also appear near the St Jan in a later period, yet here they seem to have a role as barn or stable. The buildings on the Markt could equally have been early hovels or outbuildings belonging to nearby houses of a different type. The absence of a (visible) division of the area into plots leads to difficulties in determining the relations between the separate buildings (Janssen 1990, 162). Another type of structure coincides, or follows shortly after these buildings. These are more visible in the archaeological record since their timber frame is supported by posts dug into the soil (see fig 4). The distance between the posts is an average of 2m and the houses can have varying widths and lengths. The dug in posts support girders that carry the wattle and daub walls as well as the roofing beams. Often there is a row of posts in the middle of the building to carry the central purling. In larger buildings, as for instance the Postel refuge, there could be two rows of posts carrying the purling (Janssen and Zoetbrood 1983, 77-81). The house consisted mainly of a big hall with a central hearth. The floors were made of compacted daub, the roofing was either thatched or covered with clay tiles. Further details on the appearance or interior of these early houses are scarce. The archaeology of 's-Hertogenbosch in this period is very disturbed and often fragmented. It is clear though that as the city grew during its first century of existence these houses spread out across the area surrounding the Markt and the main streets. Afterwards their appearance continued on the edges of the built up

area, shifting as the brick houses spread. They disappeared from use in the late 13th century.

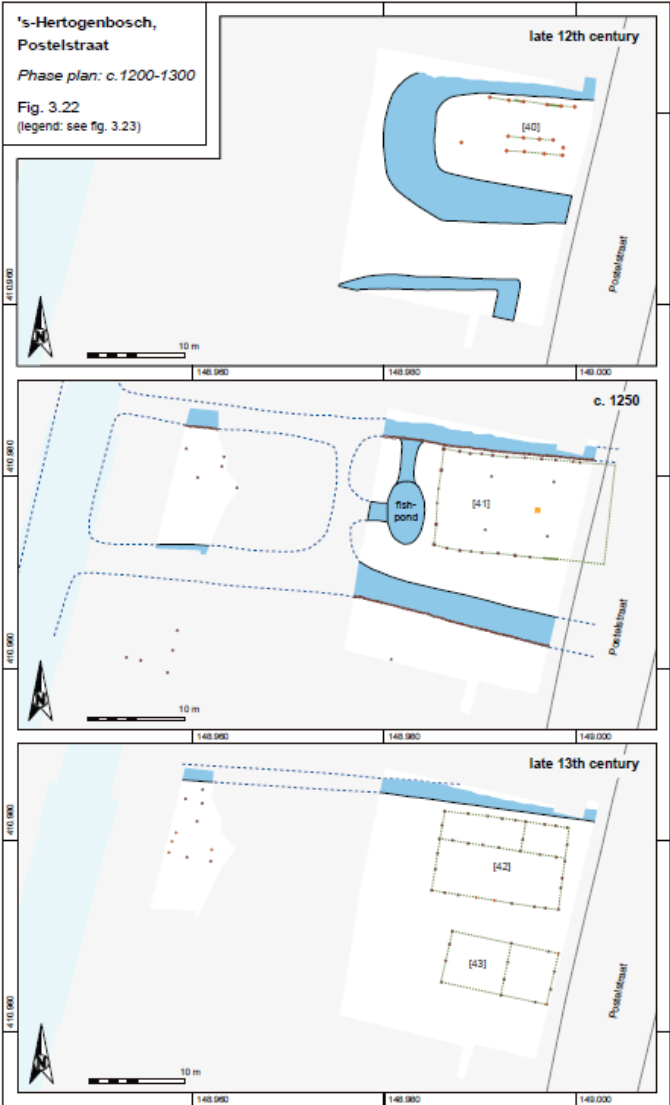


Fig. 5 An example of a wooden dug in post –type of structure. The Refuge of Postel, a semi agrarian complex for storing supplies. 1200-1300 (after Janssen and Zoetbrood 1983, figs. 3, 8 and 13. Adapted by I. Cleijne 2008)

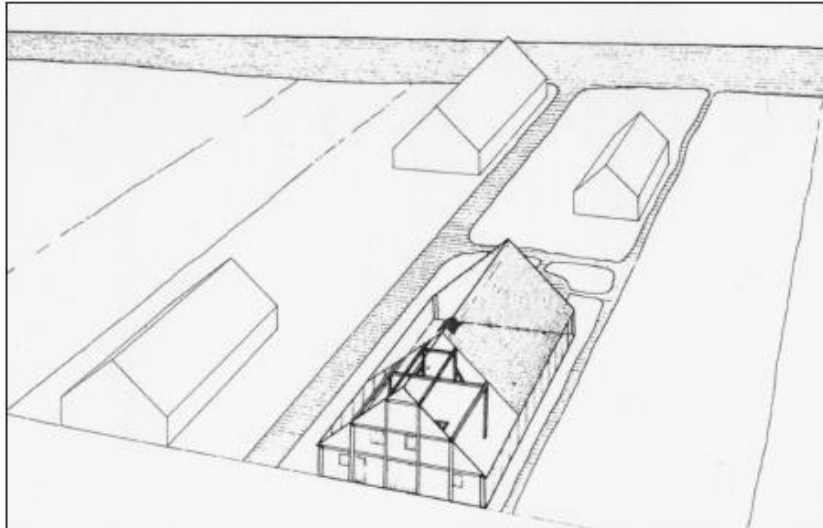


Fig. 6 Reconstruction of the Refuge of Postel in the 13th century. (Janssen and Zoetbrood 1983)

Around the 12th century there was a great shift in how rural settlements were placed in the environment, especially in Brabant. Where in the early medieval period farms were concentrated on the higher ridges they now shifted to the wetter valleys of the many streams like Dommel, Aa and Essche Stroom. With their shift there also came a differentiation of buildings within the settlements. Instead of a single large building we now see a main building accompanied by smaller barns (Van Ginkel and Theunissen 2009, 244-245, Huijbers 2007, 39). The reason for this shift has quite possibly to do with the new focus on the rearing of cattle on the grasslands of these valleys. The sandy ridges now transformed into fields that were fertilized with the manure of said cattle.

Not only the settlements change in composition but so do the buildings that are in them. Early medieval farm buildings were of a more rectangular construction. From the 10th century hovels became boat shaped with curved walls. The large thatched roof is carried by two rows of dug in posts, sometimes themselves placed in slightly curved rows. The wattle walls were supported by smaller posts, rarely found archaeologically. These buildings could be up to 22m long and 14 m wide and housed probably both cattle and human occupants. Barns were of similar construction only smaller and more often rectangular instead of boat shaped (Van

Dierendonck 1989, 69)². From the 13th century the farmhouses became again rectangular in shape. The study of this type of buildings in an urban context is almost non-existent, largely due to the lack of data. It is assumed that urban barns for instance were of a smaller scale than their agrarian counterparts (Cleijne 2011, 41). Research on this subject requires a significant impulse if we wish to understand the role of agrarian activity in the city.

During the second half of the 13th century villages once again shift in the landscape and disappear from the archaeological radar. The reason is that they moved to their final location and are today covered by modern villages or suburbia. The little research done within today's villages' results in a very meagre understanding of medieval rural settlements after the 13th century (Van Ginkel and Theunissen 2009, 249).

2.3 Brick-built houses

Stone was an expensive building material and as a result not frequently used in the early medieval period. Exemptions are buildings of great status such as churches, public buildings or city walls. These were often built out of tufa blocks imported

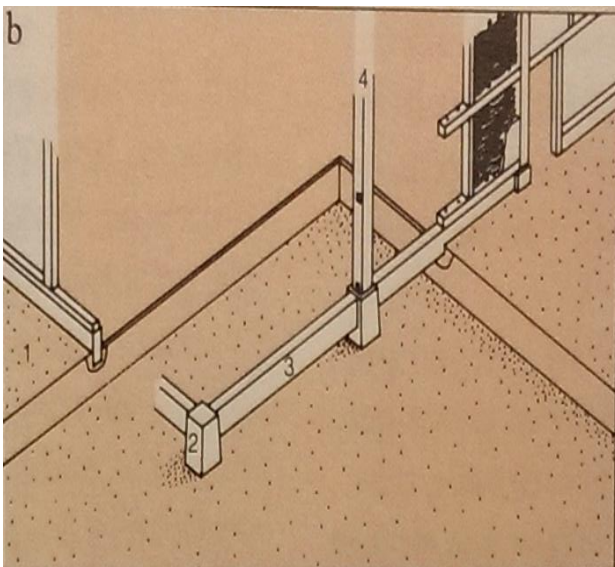


Fig. 7 Construction method of brick piers supporting a wooden superstructure. The walls are still of wattle and daub. (Janssen and Treling 1990. Cropped by author)

from the Eifel region, or blocks looted from Roman ruins. It was only with the reinvention of clay bricks that brick built domestic buildings became more viable. In many ways the adaptation of stone in the buildings structure is the true beginning of urbanism (Sarfati 1990, 189). Bricks are initially used in the foundations of the new houses, starting from around 1250. Through the technique

of brick piers and wall foundations, the perishable wooden frame of the building is

² For an extensive study on buildings types in rural settlements see : Huijbers 2007: Metaforiseringen in beweging.

no longer in contact with the soil, extending its durability (see figure 7). The superstructure carried by the brick foundation is very comparable to the earlier hall like dwellings. The walls are still of wattle and daub, the roof is now solely covered in tiles. Especially around the Markt the houses would be several stories high to reflect the owner's prosperity and prestige.

Two peculiar regularities are noted by Janssen (Janssen 1990b, 419-21, Janssen 2007, 130) concerning the adaptation of this new technique. Firstly the conversion of the earlier wooden buildings into these new brick founded buildings is very abrupt, around 1250. And secondly, the resulting buildings are uniform in design. He explains these regularities by two theories. The early wooden houses were all constructed around the same period; as a result they all had to be replaced roughly in the same decade. And the availability of affordable bricks made it possible to use a brick foundation in these necessary replacements. The affordable bricks also make them available to the social middle class resulting in a uniform building structure. Cleijne's study on these construction types has led to somewhat different conclusions. The dug in post foundation remained in use longer, as was the practice of brick piers supporting wooden posts. The overall replacement of these types by

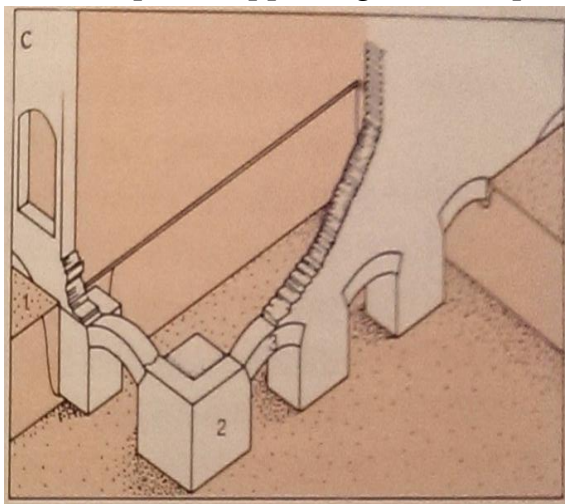


Fig. 8 Construction method of heavy brick piers, connected by arches carrying complete brick walls. (Janssen and Treling 1990. Cropped by author)

ground arch type foundations was proven incorrect as very few were identified by Cleijne. These differences might very well be the result of a focus on respectively central and peripheral sites (Cleijne 2008, 97). By this time the city has its wall built, is expanding rapidly and as a result has begun to organize its space. Whereas the

pre-urban settlement on the Markt was unorganized, by 1250 a clear defined system of parcelisation has developed. These parcels were often one Bosscheroede wide (5.75m) and stretched from the street to one of the tributaries of the Dieze. Hence comes the term "from street to stream" often used in contemporary sources. The narrow and long nature of the plots was the result of the

natural situation and the fact that taxes were calculated according to the width of the plot (Cleijne 2008, 82). During the growth of the city plots were often divided in to multiple narrower ones. The planning and narrowing of plots is a sure sign of urbanization (Van Drunen 1983, 127 and Sarfatij 1990, 188). The length of the plots varied greatly, depending on the situation behind it. Those stretching from a street to a stream could reach lengths of 50 m. Multiple extra buildings could be built on the backyards of these plots. This made internal expansion very practical in this city. Soon brick was used more widely and a new trend developed and houses were

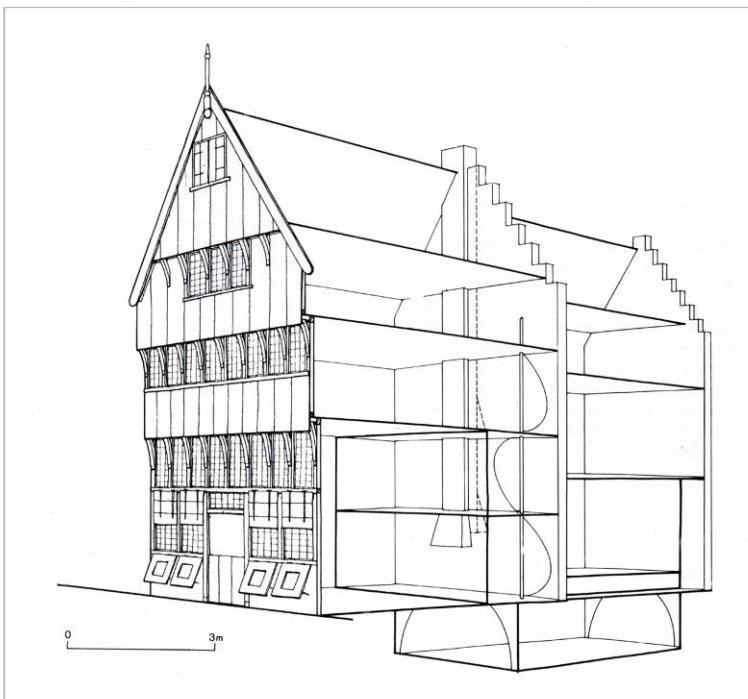


Fig. 9 The structure of a typical "Bossche Huis"; a merchant dwelling from brick with a wooden gable. (BAM)

constructed completely in brick. There were two techniques in which complete brick houses were constructed. These two techniques are easily distinguishable in their foundations (the main source of archaeological data). The first is not so different from the earlier pier and foundation arrangement. In this case however the foundations are a

continuous wall, without separate piers. Depending on

the masse of the foundation it could have either carried a wooden structure, or a brick structure (Cleijne 2011, 93). The second type of foundation can be typically connected to the large merchant dwellings around the Markt and main streets; it can be seen in figure 6. These consist of heavy piers connected by ground arches that could carry multilevel brick houses (see figure 8 and 9). From 1300 onward brick houses became ever more dominant and quickly replaced the wooden merchant houses. However the use of brick foundations and wooden frame was continued in the lower class buildings for centuries to come (Janssen 1990, 164 and 1988, 415). The practice of a brick foundation and wooden structure poses a terminological problem.

From an archaeological point of view the structure is made of brick, since that is what is found, however the visible building was actually made of wood. Because of the archaeological point of view in this thesis; wooden buildings with brick foundations are categorised under brick houses.

Of the layout and construction of the brick houses far more is known than of the earlier types. This is due to the simple fact that many of these dwellings have survived to the present day. Many have been extensively altered over the last centuries but they still hide their old structural origins. Through architectural-historical research these origins are studied. The back gable was usually built in brick; the front gable was surprisingly often still constructed out of wood. This material allowed more windows and thus lighter rooms. Also this allowed the classic medieval practice of overhanging floors, a way to increase floor space outside the boundaries of the plot. The building was usually divided in a front and back half by a brick fire wall on which the chimney and hearths were located (see figure 7). The height of these houses, in respect to levels, varied. The amount of levels has been studied for the buildings around the Markt, a map has been produced depicting the distribution of mainly 2 and 3 story dwellings with some exceptions having 4 levels (Van Drunen 2006, 69 and 84-85). Those houses near the main streets had a higher front while those along the lesser streets were higher at the back end. This might be connected to the desire to show of wealth by the richest owners. It was also the result of the placement of the cellar. In the older and higher parts of the city the cellar was usually under the front part of the house and accessible from the street. In the lower parts of the city the cellar was under the back half of the house and raised slightly above the ground level, thus that whole side of the house was raised (Janssen 1990, 193, Van Drunen 1983, 128-129 and 2006, 54-55). This semi-subterranean aspect suggests that they were used for habitation. Further, pointing out the dense habitation of the city. This type of house came to dominate the city in the 16th century by which time they had reached the end of their evolution.

2.5 Urban agriculture

Agrarian activity within urban limits is a difficult and little understood subject. Yet since this thesis is very much about this activity we must try and understand what it encompasses. The difficulty of the subject lies in the scarcity of primary sources considering agrarian production prior to the 14th century. A lack of sources makes comparative studies unreliable and thus provides no hard evidence (Hoppenbrouwers 1997, 89). It is however clear that between the 11th and 14th century there was a period of expansion and great change in the agricultural landscape. Villages settled in the lower, wetter stream valleys allowing the dry sand ridges to be used as fields. The manure of cattle kept on the grassland of the wet valleys was used to fertilize these fields. Through this new technique these otherwise infertile ridges could be worked continuously (Van Haaster 2003, 98 and Hoppenbrouwers 1997, 95). The produce was often rye, a fairly robust grain that provided a large yield on poor ground. Van Haaster estimates that the city needed 6000 tons of rye a year to feed its 15th century population. The majority would have been grown in the Meijerij, the hinterland of the city (Van Haaster, 2003, 69-71).

The agricultural production inside the city is another matter. Due to the limitations of space the production would naturally be on a small scale. Urban agriculture is no exception when it comes to the lack of primary sources. As a result the information is often provided by archaeology. Especially archeobotany provides extensive information through the use of seed and pollen analysis. It is unfortunate that vegetables leave basically no remains that can be identified (Van Haaster 2003, 82-85). This makes it very difficult to estimate the proportion of urban agriculture that produced them. Despite it not being properly researched I suspect that the proportion would be relatively high. A small garden plot between buildings is a lot more useful for producing some extra vegetables for the household that produce a small amount of rye. With rye being the staple I think the amount produced by a small plot would not weigh up against the effort. It would be a lot more sensible to complement the diet with vegetables and herbs.

When it comes to identifying the remains of this urban agrarianism; the city of 's-Hertogenbosch has an advantage over many other Dutch cities. The natural sand, both present and that used in the first reclamation, is of a light colour. The dark,

organic soil is in contrast to this. Any spademarks are well defined in the light sand underneath the soil. The organic definition of the soil illustrates the large amount of nutrients in it. Caused by the manure and waste used to fertilize the crops it gives the layer a “greasy” feel. The constant working of the soil makes it very homogenous in contrast to sometimes coarse landfill. Apart from identifying its presence, it is almost impossible to determine the activity that took place. Vegetables, grain, cash crops, grass or a pigsty; none of them show in the soil.

The history of 's-Hertogenbosch is an interesting one; from the barren grounds of a wet wilderness; to an urban centre of great importance. After a difficult start the settlement experienced a turbulent growth, quickly outracing the expectations. From the 13th century onward the settlement became ever more urban in character. Construction methods of dwellings started to incorporate more brick. Initially starting with the foundations; then spreading to the walls. Wooden facades remained a popular practice as it allowed protruding jetties which increases the amount of floor space. The height of the houses was another way to increase the space available on the narrow plots. Houses in 's-Hertogenbosch were indeed very tall, compared to contemporary cities in the region. The large completely brick build “merchant” houses were another indication of the dense urban character of the city (Janssen 2007, 132). Their cellars, partially above the ground, were another way to increase living space. Behind the street front a whole other range of buildings were built on the long parcels. These were tenements accessible by alleys which were another indication of a dense population. Despite the dense population in many parts of the city, there still remained a large amount of open spaces. These were often not immediately inhabitable without major improvements. Yet within the highly urbanised area's we still find traces of agriculture. The next chapter will study the details of these finds and place them into the context of this city's evolution.

Chapter 3: Re-agrarisation in practice

With the knowledge of the context in which the phenomenon of reoccurring agrarian layers occurs; we can now study the available cases. This chapter will present the ten excavations in which an agrarian layer covers earlier structures. The excavation results for each site are ordered according to three phases; before the agrarian layer, the occurrence of the agrarian layer and after the agrarian layer. In order to keep the descriptions short the unrelated phases of habitation have been left out. These mostly consider the 16th century buildings. Because the reason for re-agrarisation will become evident by comparing the circumstances in which it appears, there are five excavations included that do not contain the phenomenon. By studying these excavations within the same questions as the others we might see a pattern emerge. Hopefully this pattern can explain a part of the phenomenon. These excavations were selected from the thesis of Ingrid Cleijne, yet many were sourced from various publications.

Before the agrarian layers are discussed it is important to define these objects. It has already been touched upon in chapter 1 but here a more detailed definition will follow. An agrarian layer is the level of soil that was cultivated in order to produce a certain crop. The longer this process took place the thicker the layer would get. Through the cultivation of the soil it gets an appearance that distinguishes it from the other layers surrounding it although not always very clearly. The first characteristic is the colour, black or dark brown. While this does set it apart from the yellow sand that is naturally present in Brabant and often used for the early reclamation of sites; it is similar to other, non agrarian layers. An example is the layers which are formed after a great fire or intense occupation. The ash and charcoal give a black colour to the layer even more intense than that of agrarian fertilizing. It is this fertilizer that has the greatest influence on the layers physiology. It creates not only the colour but also the “organic” composition of the soil. This is evident by a greasy feel to the sand and, sometimes observable, plant remains. Continuous ploughing causes the soil to be very homogenous and fine. It is this greasy, homogenous composition that distinguishes the layer from others. However, as most

things in archaeology it is not that straightforward. The agrarian layer can contain charcoal from hearths or furnaces. It can be less homogenous due to building rubble. In this way it can be very similar to other occupation layers. In the end there are two aspects that positively identify it as agrarian; the organic composition and the presence of spade marks. Spade marks are the intrusion of the spade into an underlying layer, causing the dark agrarian soil to be pushed into that layer. This is visible as a tooth like edge underneath the agrarian layer. This is only possible if the underlying layer is of a significantly different colour than the agrarian layer. In reality this usually means it has to be yellow or white sand.

Due to the fact that throughout eastern Brabant the soil consists of fairly infertile sand; agrarian activity leaves similar traces. As a result we see the same layers of dark organic soil outside the city. These are however often far thicker than those in the city as a result of centuries of fertilizing. An example close to the city was found during an excavation in the village of Sint Michielsgestel (Tump 2014, 12-13). The difficulty is the relative small contribution of pre- 16th century farmers to this layer. The vast majority of the thickness was added during the 17th and 18th century.

3.1 Presentation of the excavation data

Windmolenbergstraat HTWB

During the months of September and October 1996, a large scale archaeological excavation took place on the grounds of the psychiatric hospital Reinier van Arkel; between the Windmolenberg- and St Jacobsstraat. Due to a modernization program, several old buildings had been demolished in preparation for the construction of new hospital wings. This allowed/ an archaeological examination of this historically interesting terrain. The site is located on the eastern end of the ridge on which the Hinthamerstraat lies. The research goals were divided among two parts of the site, the Windmolenberg area was primarily excavated to get a better understanding of the present parcelisation and the dating of the habitation. The research in the St Jacobs area was primarily focused on the old barracks and the

cemetery pre dating those barracks. The 4 trenches in the first area are those that contain the information needed for this thesis (Put I-IV). The other results will not be addressed here. (Profile drawings of this excavation can be seen below, figure 8).

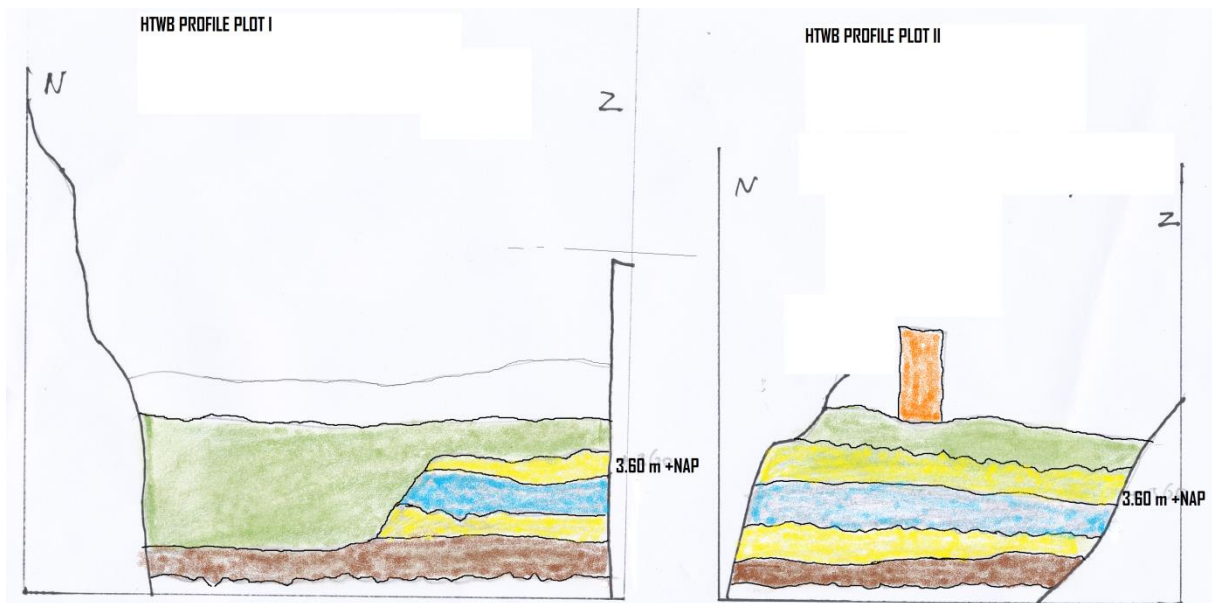


Fig. 10 Profiles of plots 1 and 2 of HTWB. Visible are the first two agrarian layers (brown and blue) separated by landfill (yellow) and covered by the re-agrarisation layer (green). Postholes were not present in the profile, a brick foundation is visible on plot 2 (orange). (Author)

Pre agrarian layer.

The start of occupation in this area is marked with two successive agrarian layers separated by a layer of landfill. The two agrarian layers are in contrast to the natural soil and landfill through their dark colour, organic composition and spade marks. The second layer is at a height of 4.15 m+ NAP, the first roughly 30 cm lower. Already during this period there is a difference in stratigraphy between the parcels, suggesting that a division was in place from very early on. On Plot I a set of possible postholes was found cutting through the second agrarian layer. This is the only evidence for a wooden building on this plot. Parcel II has a different history than its neighbour, starting directly after the mentioned agrarian layers. What is called a depression and a wooden house occupies the site in the 13th century or early 14th. Multiple postholes without a clear pattern are discovered, it seems there was more than one building present over a period of time. Some lines of postholes are angular on the Windmolenbergstraat, supporting the presence of actual building rather than random posts. Parcel III is again very different from its neighbour. On the initial agrarian layers lies a layer of probable landfill. In these layers, a large amount of pits

is dug through and over each other. The filling of these pits dates mostly between 1250 and 1350. The whole terrain is then raised to 4.35 m +NAP, with traces of a wooden structure. The contemporary surface seems to slope down towards plot II, suggesting a difference in height between the two plots during this period. Parcel IV is severely disturbed by later phases and as a result little can be said with certainty about the history of this plot. The overall image suggests a terrain occupied with wooden structures and pits followed by a wooden frame house that burned down somewhere in the 14th century (Van Genabeek 2005, 8-10).

Agrarian layer.

After the two buildings go out of use plot I and II are raised with clean sand on which a third agrarian layer is present. Again it is identified by its dark, organic composition. A large pit dug around the same period contained datable material. Its date places this period of re-agrarisation in the 13th century. During this period there is indication that there were frequent puddles with stagnant water on the plot.

Post agrarian layer.

From the late 14th century onward plot I is largely covered by a brick pavement. On the south half parts of a building were uncovered, due to later destruction no connection could be established between the pavement and this building (Van Genabeek 2005, 5). The entire area is raised to 4.80 m +NAP, a remarkable change from the previous practice of individual raising. Plot II then contains a pair of semi-detached houses, about 9m deep and two times 5.20m wide. The two dwellings share a chimney on the dividing wall where two fire places are placed. The thickness of the outer walls (1 ½ brick) suggests a complete brick build dwelling. Underneath the back part of the houses, two semi subterranean cellars are dug. The cellars and houses undergo several changes during the following centuries (Van Genabeek 2005, 6). Plot III contains a 14th century brick cellar that destroyed any other traces. Plot IV contained severely disturbed traces.

SintJanssingel/Sint Jansstraat HTSJ

This excavation on the corner of Sint Janssingel and Sint Jansstraat took place at the plot of a 16th century house that was destroyed by fire in 1996. Before the remains were demolished, architectural historical research was done to study the history of

the house and its connection with the adjoining city fortifications. After the houses remains were removed, 3 trenches were dug for archaeological research. The confined space resulted in small trenches and restrictions in researching the plots history. The plot was located next to the St Jans gate in the 2nd city wall; this places it on a main road close to the river Dommel. (Of this excavation no profiles were available).

Pre agrarian layer.

Occupation of the site starts early in the 13th century; the first evidence of is a layer of landfill. In this layer several postholes were present without a clear structure. It seems that the terrain was inhabited immediately after its reclamation. The postholes give no indication of the size of shape of the building(s).

Agrarian layer.

Once the building(s) are demolished the site is being used for agrarian purposes, as is shown by a thin layer of dark soil at a height of around 3.30m +NAP. Its organic composition supports the interpretation of agrarian use.

Post agrarian layer.

During the rest of the 13th century the site is raised, by a succession of landfill and occupation layers. The occupation layers consist of clay floors and some scattered postholes. The last layer suggests the presence of a brick pier foundation, no piers were found but the traces of burned plaster, charcoal and bricks suggest the presence of such a structure (Van Genabeek 2005, 18-19). After the fire the terrain is raised to 4.10m +NAP and a brick dwelling is constructed somewhere in the early 14th century. Only little of its foundation was found but what was found suggests a ground arch construction. This could mean a fairly substantial brick house, with possibly a second house behind it. The connection between these two houses is unclear but the second was of a lighter construction. Around 1500 the 2nd house was demolished and the yard remained open from this point onward. The front house was eventually replaced when the city wall was reinforced with an earthen bank, somewhere in the 16th century (Van Genabeek 2005, 19-21).

Brandweerkazerne HTBW

In 1998 the old fire station in the city centre was disused and demolished. The demolition of the foundations had disturbed a part of the site to significant depth. Heavy pollution of the soil prevented excavations on other parts of the plot. With these restrictions and the building plans in mind, 3 trenches were set out. Trench I and II had results that are interesting for this research. Trench III provided insight on the development of the adjoining branch of the Dieze and will not be discussed in this thesis. The site is located behind the houses on the Orthenstraat, at the northern end of this street. The north and east border are determined by the Dieze and to the south by the houses on the Sint Geertruikerkhof. It is on the edge of the ridge along which the Orthenstraat runs, one of the oldest roads and the axis along which habitation focused. Important to note is that the houses along the streets remained in place and that the excavation only uncovered the backyards of the historic parcels. (Of this excavation no profile drawing were available, a map depicting the postholes is placed in the Appendix, figure 2)

Pre agrarian layer.

In trenches I and II the natural sand layer is covered with an agrarian layer that contains material from pre-historic and early medieval times. The layer consisted of 10-30cm of dark homogeneous sand. The presence of a clear level suggests that the terrain might have been out of use for a long period of time following the agrarian activity. The first high medieval activity is a general raising of the ground by roughly 50cm, without respecting later parcel divisions, to an average height of 3.20m+ NAP. This landfill extends to a ditch running parallel to the Orthenstraat. The layer is dated to the 13th century. The period that follows is characterized by a succession of layers with pits and levels. These layers seem to develop independently on each plot; a division in parcels was thus established after the first general landfill. In the excavation 5 plots were uncovered, originally stretching from the Orthenstraat to the Dieze. The alley Achter de Roskam seems to have been established around this period as well, somewhere late 13th or early 14th century (Van Genabeek 2005, 42).

Plot I was only excavated partially and contained the back end of a house on the Orthenstraat. Behind this structure a stratigraphy of various pits was uncovered

with the youngest datable to the early 15th century. Notable is that the refuse in this pit was identifiable as belonging to the craft of pin making. At the end of the 15th or early 16th century an extension was built onto the house on the Orthenstraat. Underneath this extension was a cellar originally for storage, later converted for containing water. The long strip of terrain running to the Dieze remained open until the construction of a small building in the 19th century (Van Genabeek 2005, 43-44). Plot II is as plot I divided in the small backyard directly behind the main house and a long strip of land that remained mostly open. During the aforementioned period of successive layers of landfill (late 13th century) a wooden structure existed on the rear of the plot, parallel to the alley. Six postholes were found in a straight line, roughly 1.80m apart. The other side of the building was not found.

Agrarian layer.

On plot II the entire strip of land behind the backyard was covered by a dark, homogenous, organic layer of soil. It starts at a depth of 3.80m +NAP and is a meter thick with various surfaces visible within it. This layer seems to be connected with a garden or agrarian function, however the presence of a dug in barrel with the remains of the process of tanning suggest artisan activity as well. This barrel and a slightly later tub are datable to the 15th or 16th century.

Post agrarian layer.

On the strip of land a building with a brick floor was built during the 16th century. No walls were discovered suggesting a wooden frame or open workshop. The building measured about 7 by 4 meters and remained in place well into the 18th century. The area between this building and the backyard remained of a mixed artisan and garden use. The backyard itself contained a 16th century extension with cellar just as on plot I. Yet here the cellar was constructed as cesspit (Van Genabeek 2005, 44-46).

On Plot III the house was situated further east than was the case on the other plots. A large cesspit (15th century) covered most of the remaining excavated surface on this plot. As a result there was very little data uncovered about the earlier history of this plot. Apart from the succession of layers found on the other plots, no structures were found dating from this period. This has more to do with a lack of

data and does not say much about the possibility of wooden structures on the backyard of plot III (Van Genabeek 2005, 47).

Postkantoor/Kerkstraat SHKS

In 2009 an archaeological excavation was ordered on a terrain lining the Kerkstraat. The former post office on this location, dating 1970, was being converted for commercial use. A storage area for bikes was planned in the cellar, with the addition of an extra cellar at the rear and a subterranean entrance on the street. These additions would disturb the archaeological record to a great depth and thus these two areas were excavated. The area of the research is along the street between the cathedral and the Markt, a very old route. It can be considered one of the first occupied areas outside the first city wall. In the trench for the subterranean entrance no building remains were found. This part of the terrain seems to have been used mostly as front yard and/or part of the street. The part of the terrain that is interesting in the light of this research is the part behind the old post office. This part is in the middle of a block of houses and has been so since its very beginning. It has always been cut off from main streets, by parcels of about 40m deep. The first sign of activity here is a layer of landfill dating from around 1175-1225. This is a very early period for a plot of land outside the first city wall. This early dating is however not certain as it could contain pollution. There are no further signs of activity for the next 50 years, so it seems the terrain was sparsely used. (Due to the size the published drawing of this excavation are placed in the appendix, figure 3-6)

Pre agrarian layer.

The first definitive activity on this part of the site is at the end of the 13th century. At first there is a set of ditches dug which correspond with the later parcel divisions. They seem to be the first evidence of a division of the land. The ditches are orientated on the Peperstraat (Parade) suggesting that these backyards belonged to the houses on that street. In the ditches traces of human manure and a plant used for dying cloth was found (Wouw). In the south part of the excavation many postholes were found without any clear organization. Nevertheless they prove the existence of some sort of building, certainly because some seem to have been removed at the same time, as is

evident from the filling of those postholes (Cleijne 2013, 45-47). This phase is followed by a slight raising of the terrain to ca 4.00m +NAP and the digging of a new ditch, still on a parcel division. Another division is made by a line of small posts, most likely part of a wattle fence. The most notable feature during this phase is a well, constructed from a dug in barrel. The end of this overall phase (of which the above two are part) is marked by the construction of a wooden building at the northern end of the trench. 3 posts were found dating to around 1300. It could not be determined whether the posts are part of the short or long side of the building. In the beginning of the 14th century the entire area is raised and the ditches and well are filled in (Cleijne 2013, 50).

Phase 2 is marked by the construction of a new building in the east of the trench. From the building 6 postholes were found that were hammered into the soil. The posts would have been roughly 15 cm thick. The building was orientated east-west and had a width of 5.90m; of the length 3.90m was recovered. Some girders that carried the walls were found on the eastern wall and inside the house a brick fireplace was present. The height of the contemporary surface was around 4.10m +NAP. The dating of the bricks points towards the first quarter of the 14th century.

Agrarian layer.

During the remainder of the 14th century any evidence of parcels disappeared. The entire terrain was covered with thick organic soil, suggesting the presence of agricultural/horticultural activity. By the end of the century the layer has reached a thickness of 80cm. No traces of any other activity are found until the beginning of the 15th century (Cleijne 2013, 52-53).

Post agrarian layer.

During the first half of the 15th century the terrain was occupied by a brick cesspit, a large pit possibly used for disposing sewage, and several buildings. In the west of the trench a building was uncovered completely. It consisted of a pier and wall type foundation and measured 7.60 m by 4.70 m. Two floors were discovered inside the building, both at the level of 5.60 m +NAP. One was of clay, the other of brick. This building has been demolished somewhere before 1500. The traces that coincided with the period after 1450 were found on a single level and severely disturbed by the construction of the post office. As a result it is difficult to accurately date all

subsequent structures. This terrain at the back of the houses lining the main streets seemed to have been used mainly for cesspits and several buildings (Cleijne 2013, 53-64). As these phases are not important for this research I will leave them out of this description.

Achter het Verguld Harnas HTVH

In 1997 a set of old houses was demolished on the small street Achter het Verguld Harnas, a street running of from the Vughterstraat. Dating from 1938 these houses had in their turn replaced a 19th century community building. After the demolition of the houses; archaeological research was done on the site. The excavation received wide media attention at the time as, by chance, a jar containing several hundreds of silvers coins was discovered in one of the corners of the excavation. As spectacular as this find may be, it is of little importance to the research in this thesis. Some of the earlier occupation layers are however, and therefore I will discuss the results of the excavation focusing on these layers. The site itself lies just outside the first city wall, close to the gate through which the Vughterstraat began its course south. Relatively high (3.00 m +NAP), the location was well suited for habitation from prehistoric times on. Mixed in the top of the natural sand prehistoric pottery was found. There is however a good chance that this was washed down from the area of the Markt. (No profile drawing of this excavation were available, two published maps are presented in the appendix, figure 7-8)

Pre agrarian layer.

The first use of the terrain begins around 1200, fairly early but quite reasonable considering the vicinity to the pioneer settlement on the Markt. The first activity is the digging of ditches. Likely for drainage; there seems no connection between these ditches and later parcel divisions. The ditches were not long in use and were filled in with sods after which a wooden building was erected. A row of postholes with no clear structure is the only evidence for it; notable is the odd angle of the row. This building did not have a long life as it was demolished early in the 13th century.

Agrarian layer.

The western half of the terrain was then used for agrarian purpose as indicated by a 25 cm thick layer of slightly organic dark soil. The soil seems to follow parcel divisions, as in a later phase a channel dug on the edge of the agrarian layer separated the eastern and western half of the excavation trench into individual plots. It is likely that the channel marked the back end of the plot. The orientation was on the Vughterstraat as the small street Achter het Verguld Harnas did probably not exist yet in this early period (Treling 2011, 53). The channel is probably part of the Binnen-Dieze network that provided access to the plot by boat.

Post agrarian layer.

The channel proved unsuccessful as natural currents caused it to fill with sand, it was filled back in during the 2nd half of the 13th century. With the channel turned into a street the plot was now accessible from the side (the later Achter het Vergulde Harnas). On the plot a quite exceptional building was constructed. Heavy square foundations with ground arches are all that remain of a domestic tower. A tall brick tower used by affluent families for habitation, they are uncommon in this city. However with the knowledge from this excavation another similar foundation was identified slightly south from this plot (Treling 2011, 57-60). With the construction of the 2nd city wall this plot came within the city's boundaries and the plots were divided to allow a denser level of buildings. In the first quarter of the 14th century a new house was built on this plot but the remains are fragmented.

Jacobsstraat 35 HTJS-35

This excavation is a very small scale excavation in a domestic cellar. The owner of the cellar planned to deepen the cellar to make it more accessible. The result would be the destruction of the archaeological layers remaining underneath the cellar floor.

As a result it was decided that archaeologists would monitor the works and document any archaeological traces. The site is located just off the Hinthamerstraat, on the edge of the ridge this street ran along. It is also very close to the excavation on the Windmolenbergstraat.

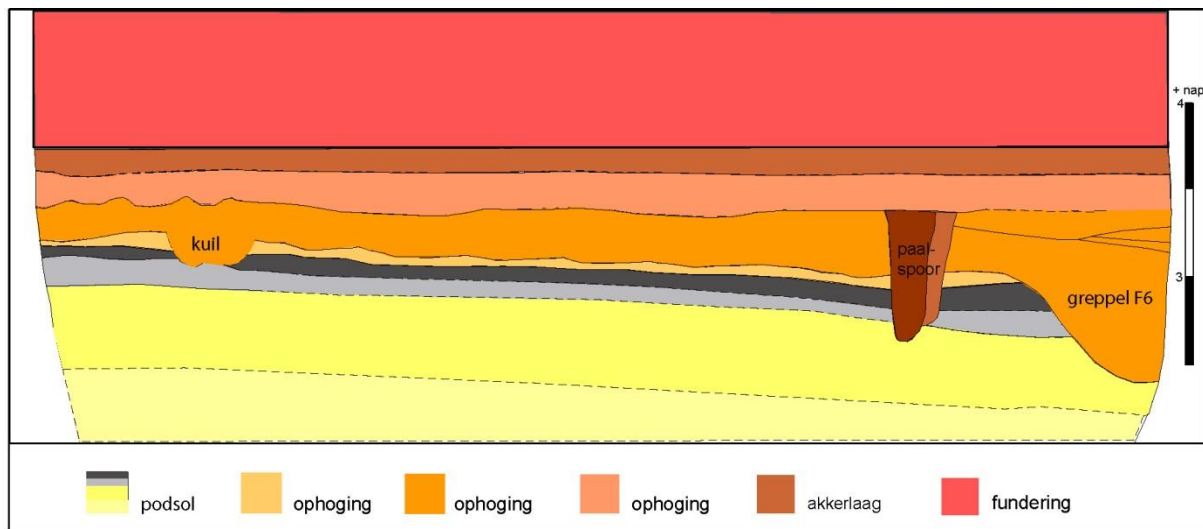


Fig. 11 Section of HTJS-35. Showing posthole (paalspoor) and agrarian layer(akkerlaag). (Treling, 2009, 16)

The initial occupation of the terrain (as far as could be determined in this small trench) is around 1200 with a slight raising of the terrain followed by a ditch dug into the natural soil. This phase is followed by a wooden building, as is evident by a posthole. The ditch was no longer in use by this time, roughly in the middle of the 13th century. After this building the terrain was raised again and used for agricultural purposes. A layer of organic, brown soil is the evidence of this. At the end of the 13th century a new wooden building was erected of which 3 postholes are remaining. Any younger traces were destroyed during the construction of the cellar in the 19th century. This excavation proves that there was occupation in the area during the early stages of the city's development (Treling 2009, 15-17).

Mariënborg HTMB

During the years 1999 up to 2003 the BAM undertook a series of excavations on the terrain of a future apartment complex. The site had previously been used as a parking lot and measured 1700m² of which about 700m² was excavated. The site is

located just between the Vughterstraat and Westwal, next to the Dommel River. The excavation Sint Janstraat is slightly to the north. (The published profile drawing are placed in the appendix, figure 9)

Pre agrarian layer.

Occupation on the site starts with the digging of some ditches dividing the terrain into plots orientated on the Vughterstraat. The ditches are found on a depth of roughly 2.30 m +NAP. This initial phase (1a) can be dated by pottery to the early 13th century. The ditches are filled in and the terrain raised during the second half of the 13th century. Eleven postholes indicate the presence of a wooden building during this period. A claylike surface at a height of 3.30 m +NAP might be the remains of the buildings floor but this is uncertain. In the same period a channel of 4 m wide was dug, possibly marking the back end of the plot. At the end of the 13th century, phase 1c is marked with the filling in of the channel and the digging of a new one. This new channel is on a slightly higher elevation, a result of the continued raising of the terrain. The old channel remains a wet area and the growth of peat shows a semi submerged environment.

Agrarian layer.

On the spot of the former wooden building an agrarian layer is present at roughly 3.40 m +NAP. Remains of this layer were found throughout other trenches on the site as well. The layer consists of dark organic sand.

Post agrarian layer.

Phase 2 is again characterized by the raising of the terrain and the (partial) in filling of the channel. The presence of a clay floor suggests a new wooden structure was present on the site. Artisanal refuse found in the surrounding layers could point to a workshop. Some new ditches and a line of small posts suggest the reorientation of the parcel divisions on the (newly created) Berewoutstraat. One of the ditches is quickly filled back in, but in it rests the foundation of the first brick structure on the site. It consists of the pier and ground arch construction type, possibly a complete brick house was carried by this foundation. The building measured 9.5 m wide and roughly 7.5 m deep and ran parallel to the Berewoutstraat. This house seems to have been built in the beginning of the 14th century, around the construction of the 2nd city wall. Slightly later a second similar building is placed next to this building, slightly to

the north. During the 14th century more buildings are placed on the site, notably a large brick patrician “Mansio”. However these structures no longer hold a direct correlation to this research so will not be discussed in this chapter (Van der Venne 2015, in preparation).

Keizershof HTKZ

In 2000 and 2001 a new municipality hall was being built in the Keizerstraat. Underneath this building a parking garage was planned. The construction of this massive underground cellar would destroy any traces of the grand Keizershof complex which was demolished in 1871. This complex of buildings was an architectural masterpiece of 16th century style. During the planned excavation it was discovered that the remains of the building were in incredibly good condition, despite the site being redeveloped several times. Sadly this did not persuade the council to alter the plans for the garage. The remains have thus been demolished and only the archaeological report remains. The excavation is still in the early stages of publication, a couple of subject specific articles have been published about the cesspits present (Genabeek 2012). About the early phases nothing has been published so far. All that can be said is that after an initial raising of the terrain and digging of channels there is evidence of wooden structures. But the number of postholes does not allow reconstructions. Afterwards the entire terrain is raised and the channels filled in. A layer with traces of vegetation could point towards an agrarian use of the site, probably around 1300. The site is then again raised and a wooden building occupies the terrain again. This wooden building is followed by the construction of brick buildings and a wall surrounding the plot. This all takes place in the first half of the 14th century (Personal correspondence, Ronald van Genabeek). (No drawings of this excavation were available).

Sint Andriesstraatje HTAS

In 1998 a house and industrial building were demolished on the corner of the Hinthamereinde and Sint Andriesstraatje. The BAM took specific interest in the site as it was known that at this location a section of the 2nd city wall was located, as well

as some small houses build against that wall. As a result an excavation was planned before the construction; a new building would destroy the remains. The site is located at the end of the Hinthamerstraat³, there where it went through the city wall using the Pijnappels gate. This gate was located just in front of this excavation. Beyond this gate was the Hinthamereinde, a section of the city that was added during the 15th century (see chapter 2). When the section was added to the city, the part of the city wall featured in the excavation lost its primary role but was maintained. Behind the plot was a branch of the Aa that formed part of the city moat. Trench II of the excavation cut a section trough the moat there where it ran north of the city wall.

Pre agrarian layer.

First activity on the terrain is layers of clean sand that raised the terrain from an average of 2 m to an average of 3 m +NAP. The presence of a layer of peat suggests a period in which the terrain was partially inundated. Through these layers a ditch was dug; parallel to the Hinthamereinde. The ditch has also been found in an excavation further north, it probably collected the water flowing of the street. On the banks of this ditch a wooden building was constructed. As is evident by the row of postholes the building was about 10 m long, the width could not be established. No floor levels or hearth were found that could be connected to the building. The contemporary surface was probably destroyed during the next phase. All the before mentioned activities take place at the end of the 13th century, but they cannot be dated more precise. (A profile drawing of this excavation can be seen below; figure 10).

Agrarian layer.

The building was demolished shortly afterwards and thus remained in use not very long. The terrain (if the ditch was still open is uncertain) was then covered in an agrarian layer. It could be clearly identified at a depth of 3.50 m +NAP. The 20 cm thick layer of organic sand was distinctly different from the underlying yellow sand of the landfill. The presence of spade marks underneath this organic layer support its

³Since the digging of the Zuid-Willemsvaart the last stretch of the Hinthamerstraat was added to the Hinthamereinde so that the division between the two streets is at the Zuid-Willemsvaart. Originally the division would be at the Pijnappelse gate.

identification as an agrarian layer. The black soil can be traced from the edge of the ditch to halfway down the plot. It gradually slopes down following the terrain. The activity should be around 1300 looking at the layers underneath and above.

Post agrarian layer.

At the beginning of the 14th century the city wall is built on the edge of the plot. Standing right up to the wall was a house with a foundation of the pier and wall type. It was difficult to determine whether the house or whether the city wall was built first. There is some evidence that the house might have been on the site prior to the building of the wall. In either way, they were both built in the second quarter of the 14th century. The gable end of the house was situated on the, now filled in, ditch. It did not respect the later street line; the gable was moved for this purpose in the next phase. Inside the house a clay floor was discovered but no traces of a hearth or fire. The length of the building measured 11 m but again the southern side wall was not found. The use of the building in this phase could not be determined.



Fig. 12 Profile of HTAS. Showing layers of landfill (yellow), a posthole (blue) and the agrarian layer (grey). The typical “teeth” structure is visible underneath the agrarian layer. (Author)

During the next phase the building underwent an expansion in the shape of an added building at the rear. This section of the building appeared to be of brick, as is evident by the heavy foundation. The back gable might have been of wood though. A cesspit was added to the house at this phase as was a fireplace. The house now loosely resembled the classic merchant home as mentioned in chapter 2. At the

backyard of the house evidence for the production of iron products was discovered (Van der Weiden 2015, in preparation).

Mgr. Prinsenstraat 1a-c HTMP

The buildings on the plots of Hinthamerstraat 163 and Mgr. Prinsenstraat 1c were demolished in 2004. The following rebuilding would endanger the archaeological record thus an excavation was undertaken to examine the archaeological remains. The excavation uncovered one plot on the corner of the two mentioned streets. Before the construction of the Mgr. Prinsenstraat and Jeroen Boschplein this plot was in the middle of a housing block. At the back it is bordered by a small branch of the Dieze, the main channel of which runs several plots to the west. Being situated on the Hinthamerstraat the terrain lies on the ridge that dictated the route of this street and was the focus of early habitation. (The drawings of this excavation are placed in the appendix, figure 10-13).

Pre agrarian layer.

After clearance the site was immediately used as an agrarian field. This agrarian use is evident from a dark, slightly organic layer on top of the natural soil. Spade marks underneath this layer support this function (Cleijne 2007, 13). The layer is dated around 1225, shortly after the building of the first city wall. After this period a wooden building was built at the end of the plot bordering the Hinthamerstraat. Three rows of postholes, dug into the soil, were recovered from this building. Inside this building a shallow ditch was dug, 7.6 m long and 1 m wide. The exact function of the building is uncertain, it does not seem domestic.

Agrarian layer.

Still in the first half of the 13th century the structure is removed, the ditch filled in and the northern part of the plot (along the street) is raised; reaching 4.10 m +NAP. Several pits suggest that the terrain was not occupied by a building for a short period. The excavators suspect that the entire terrain might have been converted to agricultural use again or it may be just the back yard that was agrarian. Despite the uncertainty it is important to consider the possibility; if only to illustrate the difficulty of determining agrarian activity in urban archaeology.

Post agrarian layer.

During the next phase of the site clay floors indicates the presence of a wooden house, the walls were not found but a hearth was. This house is eventually replaced by a foundation of brick piers and walls supporting a wooden building. Datable material indicates that the clay floors originate in the first half of the 14th century.

3.2 Sites not containing re-agrarisation

For a complete view on a subject one needs to look at both sides of a problem. Therefore this paragraph will contain four excavations not containing a return to agrarian use. They have been selected from the thesis of Ingrid Cleijne, just as Mgr. Prinsenstraat. A connection between the study of Ingrid and this thesis is the main reason for choosing these excavations. Their clear description also made acquiring data easier. While they were selected from Cleijne's thesis primary publications were used for most of them.

Jeroen Boschplein SHJB

The site is located along the Hinthamerstraat, just before it starts its turn north. Situated on the same ridge as Mgr. Prinsenstraat and Windmolenberg, it is one of the early focal points of habitation. 3 parcels aligned on the main street were uncovered, together with a small part of the alley: Achter den Doove. The whole terrain was raised during the early 13th century to a height of roughly 4.50 m +NAP. After this activity the division in parcels became apparent and would continue into the 20th century. On parcel 1 several layers of clay flooring suggest the presence of wooden buildings. The structure of these buildings has not been found, it appears that the brick house in the 3rd phase was placed on the exact same alignment of this house and thus destroyed the traces of it. This 3rd phase did not initiate until the 15th century, the 2nd phase consisting mostly of landfills and more clay flooring lasting the entire 14th century. The walls of the brick house are of the continues type without sign of piers or arches (Arts 2008, 20-23). (Drawing of this excavation are placed in the appendix, figure 14)

Phase 1 of parcel 2 consists of a single posthole, the size of which indicates the presence of a heavy structure. No other traces have been found and thus no dimensions can be assigned to this building. The 2nd phase is, as on parcel 1, used for raising and continuous habitation in the shape of wooden structures as is evident from several clay flooring. The height of the terrain by the end of this period is roughly 5.20 m+ NAP. Again the 3rd phase sees the replacement of the wooden structure by brick walls in exactly the same alignment (Arts 2008, 24-28). Parcel 3 was severely disturbed by a cellar dug in the 17th century and little was found of the first 3 phases. The traces that were found suggest the same development as on the other 2 plots in these early periods

In the alley traces of wooden structures and clay flooring were uncovered dating from the late 13th century. This coincides with the first phases of the other plots yet phase two could not be established in this trench. During the 3rd phase (15th century) the alley was established as such and contains no further building remains (Arts 2008, 29-38).

St Janskerkhof

This site is just north of the cathedral and is the location of its early graveyard. Around 1200 the site was occupied as is evident by a few postholes and pits. The terrain had a height of 4.20 m +NAP. In the early 13th century the site housed a wooden structure. Botanical research suggests agrarian activity in the area of the plot. In the 2nd half of that century another wooden building occupied the plot along the street. Behind it was a plot with two litter stables (potstal), indicating there was still an agrarian use of this part of the site. Around 1275 the buildings on the site were destroyed by a fire after which the terrain was raised to 4.70 m +NAP. Several structures founded on a pier and wall foundation were built. At the beginning of the 14th century the house along the street burned down again and the terrain was raised to 5.20 m +NAP. Two new dwellings founded on a pier and ground arch foundation replaced the earlier building. Agrarian use disappeared in this period (Van de Vrie en Janssen 1997). (As the published drawings of this excavation show no profile they are not included)

Oostwal HTOW

In 2003 a building, stretching from the Hinthamereinde to the Oostwal was to be replaced. The construction of the new building would destroy the archaeological remains still present. The site was covered by 10 trenches; some however were only partially or not at all excavated due to soil pollution. The site is located in the extension of the city called Hinthamereinde, between the main street and the city wall. The street was one of the main routes into the city. The excavation is in close proximity to HTAS, which is slightly south, just inside the 2nd city wall.

The initial activity on the site is the raising of the terrain by a meter to approximately 3.70 m +NAP. In this layer a ditch is dug, the same ditch found and mentioned in the HTAS project. There is no clear trace of agrarian activity, a natural surface was found but it shows no human activity. Around 1300 a wooden building also occupied this site, as is evident from clay flooring. No posts connected to this building were found, the burned remains of a hearth were discovered in the rear of the building (Treling and Jayasena 2009, 21).

After a slight raising of the terrain with clean yellow sand; a wooden building with a foundation of the pier and wall type was constructed. The width is estimated at 10 m and the depth at least 12.5 m. Its construction was dated post 1325. The ditch is in this case maintained, probably because the habitation was still (and would be for some time) outside the city (Treling and Jayasena 2009, 23-27. This is the opposite of HTAS where the ditch was filled in at this stage. In the 15th century the building is demolished and the plot divided into two separate plots. The area became more densely occupied and this is reflected in the structures.

Stoofstraat HTSN

Between 2002 and 2006 a large scale excavation project was undertaken in the building block between the Stoofstraat, Begijnstraatje and the Snellestraat. The construction of a new parking garage would destroy the present archaeological remains so an excavation was necessary. The report discussed here focuses on the results of the 2005 excavation on the plots along the Stoofstraat. The site is located just west of the Markt, on the same ridge that housed the earliest part of the city. The

location was just outside the first city wall, the course of which is roughly the current Snellestraat. The Vughterstraat is just to the south, connecting this site directly to the early city. (Published drawings of this excavation are included in the appendix, figure 15-21).

During the early period of this site, 1175-1325, the Stoofstraat did not yet exist. The site was probably part of the backyards of the plots located on the Postelstraat or Vughterstraat. Around 1200 the first human activity is found in the shape of shovel marks directly in the natural sand. This is at a height of 2.10 m +NAP, there is no trace of problems with water on this site. Several large pits cut through this agrarian layer, their botanical content indicating several types of grain, manure and flax. A posthole was discovered dating from the beginning of the 13th century, no building or other postholes were connected to this find. It seems the terrain was still lightly occupied (Cleijne 2011, 24-28).

In the 2nd half of the 13th century the 3rd phase was characterized by the raising of the terrain to 2.70 m +NAP. During this period a light wooden structure was present on the site. Several posts and planks were recovered from the building; one should consider it more of a shack than a house. The structure was probably connected to a house on the Vughter or Postelstraat. At the beginning of the 14th century the terrain was raised to 3.10 m +NAP.

A ditch was dug across the site and later filled back in. The ditch could be connected to a passage that ran at the back of the plots on the Vughterstraat. This passage would be the origin of the later Stoofstraat (Cleijne 2011, 27-30). After this period the site is divided into the two plots that existed until the excavation. Around 1325 two buildings are constructed on the plots, the use of clay flooring and wooden frames appeared to remain standard here until the end of the 14th century when brick houses were built (Cleijne 2009, 31-37).

Table 1 characteristics of the sites. (author)

Site	Start date occupation	Agrarian use	Parcel division	On street	Height NAP +/-	Domestic buildings
Windmolenberg	1250-1300	Yes	Yes	Yes	4.00 +	NB
Sint Jansstraat	1200-1250	No	NB	Yes	3.00+	NB
Brandweer	1250-1300	Yes	Yes	No	3.20+	NB
Kerkstraat	1250-1300	Yes	Yes	No	3.60+	Yes
Verguld Harnas	1200-1250	No	Yes	No	NB	NB
Jacobsstraat 35	1200-1250	No	NB	Yes	3.00+	NB
Mariënburg	1200-1250	No	Yes	No	2.50+	Possibly
Keizershof	1250-1300	NB	Nb	Yes	NB	NB
Andriesstraatje	1250-1300	No	Possibly	Yes	3.00+	NB
Mgr. Prinsen	1200-1250	Yes	Possibly	Yes	3.30+	No
Jeroen Boschpl.	1200-1250	No	Yes	Yes	4.00+	Possibly
Sint Janskerkhof	1200-1225	Yes	Yes	Yes	4.20+	NB
Oostwal	1250-1300	No	NB	Yes	3.70+	Yes
Stoofstraat	1200-1250	Yes	Yes	No	2.10+	NB
Site	Date re-agrarisation	Thickness layer +/-	Parcel division	On street	Height NAP +/-	End-date
Windmolenberg	1275-1325	30 cm	Yes	Yes	4.50+	1325-1375
Sint Jansstraat	1275-1325	30 cm	NB	Yes	3.30+	1300-1350
Brandweer	1300-1400	1.00 m	Yes	No	3.80+	1500
Kerkstraat	1325-1400	80 cm	No	No	4.20+	1400
Verguld Harnas	1200-1250	25 cm	Yes	No	NB	1250-1300
Jacobsstraat 35	~1300	20 cm	NB	Yes	3.50+	1275-1325
Mariënburg	1275-1325	35 cm	NB	Yes	3.40+	1275-1325
Keizershof	~1300	NB	NB	Yes	NB	1275-1350
Andriesstraatje	1275-1325	20 cm	NB	Yes	3.50+	1300-1325
Mgr. Prinsen	1225-1275	NB	Yes	Yes	4.10+	1275-1325

3.3 Comparing the sites, a lack of patterns?

Now if we compare these sites to those from paragraph 3.1 we see no clear indication of why those contain re-agrarisation and these do not. The site Jeroen Boschplein is right next to the excavation of Mgr. Prinsenstraat yet shows no traces of agrarian layers. The terrain develops in the early 13th century, as would be expected. After this an evolution of wooden and brick buildings follows; with the first bricks appearing in the early 14th century. There is no clear difference between the sites that would explain the absence of re-agrisation. The site of Oostwal is very near to Sint Andriesstraatje, just a couple of houses further north. Again this site shows no re-occurring agrarian layer. However, it is situated in a very different part of the city, namely the 15th century annex. The development of the site is around 1300, which is somewhat early but similar to HTAS. The site features a wooden building with a hearth followed by a brick building of the pier and wall type. Stoofstraat is about a century earlier in its development, near to the founding of the city. It is however part of a backyard until the early 14th century. It starts as an agrarian plot with possible small structures. It is not until the Stoofstraat emerges that the site is divided into plots and occupied by dwellings. These dwellings remain of a wooden nature until the end of the 14th century, which is late compared to other sites. On the Sint Janskerkhof there is also indication of agrarian activity in the backyards, including some stables. By the end of the 13th century the plots were reorganized and dwellings occupied the site from then on.

Some of these sites, Jeroen Boschplein and Oostwal, are almost identical in their development to nearby sites and have no clear distinction that explains the absence of re-agrarisation. The site of the St Janskerkhof has a clear agrarian purpose in its early life, but due to its central location it quickly became densely occupied. After the fire of 1275 the site was completely built up by dwellings. This might be the reason for the lack of re-agrarisation. Stoofstraat is another interesting example. This site remained largely agrarian, with some small shed like structures until the 14th century. It then became part of the street front on the new Stoofstraat. Due to its lack of substantial early buildings and its continuing agrarian use it could not return to agrarian use. For these sites their specific function or location is an arguable reason why re-agrarisation did not occur. When we look at the role of parcel division on the

sites we see an interesting development. On almost all sites we have a clear indication of very early parcel divisions, prior to re-agrarisation but also on sites without. On those without it is difficult to establish but not necessarily absent. During the period of re-agrarisation parcelisation seems to have continued on most sites but it is difficult to be certain as many sites are too small to show these divisions. Only in Kerkstraat can we be certain that a formerly present division was removed when re-agrarisation was established.

Chapter 4: Understanding re-agrarisation

With the data provided by the excavations in chapter 3 we can now try to construct a blueprint of the re-agrarisation process. In the summary of the last chapter we have seen that there are no clear differences that set apart the sites with no re-agrarisation from those that do. In this chapter the process of re-agrarisation is deconstructed through means of the research questions. This will eventually give us a general description of the phenomenon allowing us to compare it to development in other historical settlements in the Netherlands.

4.1 Answering the research questions

What buildings were present before the re-agrarisation?

Ideally this question is answered with a list of buildings, ordered by typology; and with a detailed description. Through comparing the distribution of these buildings, hopefully, a pattern would become apparent. As it turns out there is only one pattern that can be determined and that is the sheer lack of information. The high expectations are tempered by archaeological reality. The remains of the wooden buildings mentioned here are of a fragile nature. This combined with their age, and the amount of later activity on a typical urban site; has led to the destruction of much of the traces or made them difficult to interpret. Another problem is the fragmented nature of (urban) archaeology. The excavations are often restricted to a part of the plots and especially the edges of the plot, and thus buildings, are under structures still standing. In other words, the walls of the wooden structures are often under the later brick walls or just outside the excavated area. All these reasons have led to a very fragmented knowledge of the wooden buildings present in the first phases of the various sites.

Several of the studied sites had a small amount of postholes that were too few in number to reconstruct a structure from them. Their size however does prove that they were more than a simple fence and were most likely part of buildings. These sites are Sint Janstraat, HTSJ-35 and Keizershof. Slightly more conclusive, but hardly any more informative are the sites Windmolenberg, Brandweerkazerne and Achter het Verguld Harnas. Here a clear row of postholes was present but the end of the

row, nor the opposite row, (wall) could be determined. In some cases the line of postholes is at an angle to the road. This makes a better case for actual buildings being present but the size of them cannot be determined. The lack of flooring or fireplaces means that a function also cannot be assigned to these structures. Marienburg is a special combination as the presence of clay flooring suggests certain uses for the structures. Yet the large numbers of postholes are so disorganized that no structures can be reconstructed.

The other sites provide us with enough information to be addressed individually. Kerkstraat is a somewhat different subject due to the unusually late appearance of re-agrarisation. 2 phases of activity and building precede the reconverting of the terrain to agrarian use. The last wooden building, built at the end of the 2nd phase, was 5.90 m long and 3.90 m wide. Of its main framework; 6 hammered in posts were found and girders supporting its walls were also recovered. Inside; a brick fireplace suggests that the building was used for more than mere storage and quite possibly was a house. This makes this early 14th century example the best preserved pre re-agrarisation building in this research. Similarly complete is the building in the Mgr. Prinsenstraat excavation where two rows of postholes were recovered, 6 m long and 2 m wide. The ditch inside the building suggests the opposite of the fire place in the above mentioned building. Namely that the function of this building must have been something connected to artisanal activity. Finally; Sint Andriesstraatje has a single row of postholes which suggests a building with a length of 10 m. The building was directly bordering the drainage ditch along the Hinthamerstraat. No indications of its functions have been found. Considering the presence of hearths in the same period building on Oostwal we might conclude that this building was probably a dwellings as well.

So as to the question what type of building was present before re-agrarisation, we simply don't know. Apart from two clear cases function cannot be established. In most cases we cannot even determine the size of the building. We won't get a decisive answer by studying the structure of the buildings; since houses and barns were constructed in similar techniques. Most of the time we don't have enough of the structure to study it anyway. A fairly safe assumption is that the buildings not

directly on the street were probably sheds or barns. Those on the streets have a higher chance of being dwellings. Yet as Kerkstraat shows this is not necessarily the case so it remains a theory.

What is the composition of the agrarian layer?

The agrarian layer was in most cases identified as such due to its dark, homogenous and organic composition. Mostly it consists of sand mixed with organic compounds. In the case of Sint Andriesstraatje the layer had spade marks cutting into the underlying layer. On the sites of Brandweerkazerne and Kerkstraat the layer was circa 1 m thick and was the result of a century of agrarian activity. On the other sites the layer was much thinner, mostly between 20 and 40 cm. The apparent difference can be explained by the fact that the first two sites are located behind the main buildings and functioned as a yard/garden for most of their existence.

Kerkstraat is the only site from which analysed botanical samples are available. The samples were taken from several pits in the excavation. Beside the already mentioned presence of Wouw there were indications of grains and vegetable crops. The conclusion of the analyst is that the backyard was used as a garden plot growing food during the late 13th and 14th century (Cleijne 2013, 240-252). In hardly any of the sites is there an indication of a layered appearance within the agrarian layer. This could confirm the homogenous composition of the layers, yet it could also be the result of the condensed nature of many of the reports. The sites that do show stratigraphy within the layer are Kerkstraat and Brandweer. These are also the thickest and longest in use. The duration of their function is possibly the best explanation for the absence of stratigraphy in most of the re-agrarisation layers.

Where in the city does re-agrarisation appear?



Fig. 13 The 16th century map of 's-Hertogenbosch. Plotted are the excavations featured in this thesis. Brandweerkazerne (HTBW), SintJanstraat (HTSJ), Mariënburg (HTMB), Achter het Verguld Harnas (HTVH), Keizershof (HTKZ), Kerkstraat (SHKS), Jacobstraat 35 (HTJS-35), Windmolenberg (HTWB), Sint Andriesstraatje (HTAS), Oostwal (HTOW), Mgr. Prinsenstraat-Jeroen Bosch plein (HTMP-SHJB), Papenhulst (HTPH), Stofstraat (HTSH), Hofstad (HTSHS), Refugiehuis van Postel (DBPS), Sint Janskerkhof, Markt (DBGM) and Tolburgkwartier (DBLO, HTLO, DBTB). (Van Deventer, c1560. Reproduced by BAM and produced by author)

The map above shows the 16th century city as drawn by Jacob van Deventer. Plotted on it are the excavations containing re-agrarisation, those excavations included in this thesis that do not contain re-agrarisation and several major excavation area's not included in this thesis. Although circa 200 years later than the period in which re-agrarisation is present (as will be shown below), the situation on this map does give a

good topographic view of the old city. Since details like buildings are not important in this case, the map is fit for its purpose here. On the next map (figure 14) we see the excavations plotted on the natural geological map of the city.

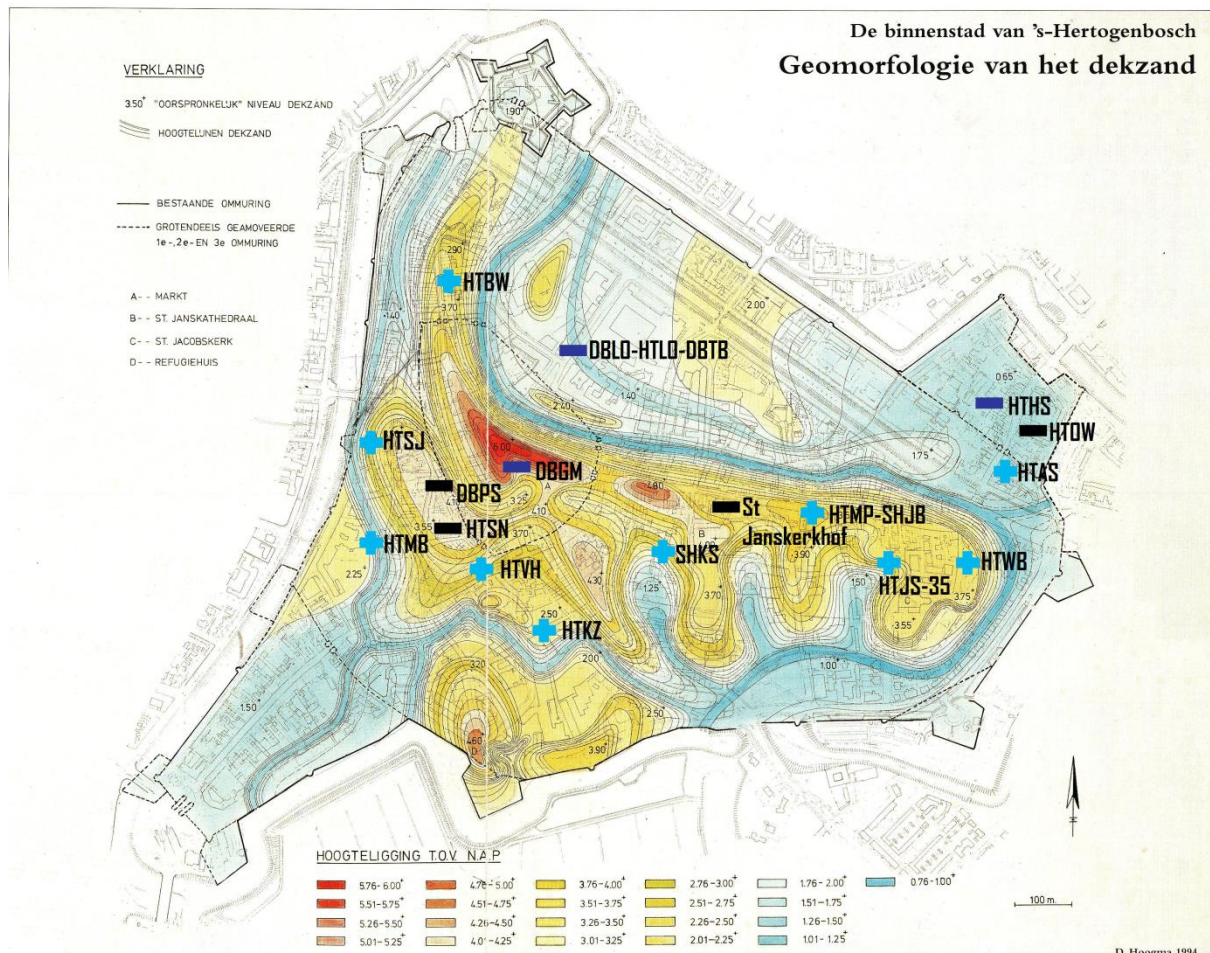


Fig. 14 Geomorphological map of the old city. Clearly visible are the sand ridges (yellow) that made this area so favorable for habitation in the wetlands (blue). (Hoogma 1994, bijlage 1. edited by author)

What is clear is that, despite the fairly small amount of excavations available for this research, we see an even spread throughout the build-up area of sites containing reagrification. There are three apparent areas not represented. The first is the area within the first city wall, the original pioneering settlement. I think that the unique nature of this part of the city, combined with a limited amount⁴ of (published) excavations from this area, can explain this absence of the phenomenon here. The relatively quick transformation from proto urban; which has a natural large agrarian component, to a highly urbanized state with significant brick structures did not leave time for re-agricultivation to happen.

⁴One major excavation is that of the square itself published in *Van bos tot stad*.

The second area is the large section in the north of the city, between the Aa and the city wall. Again the reason for its underrepresentation is twofold and in fact causal. As can be seen on the Van Deventer map this area was almost uninhabited even during the 16th century. Only churchly institutions settled here from the 15th century onward (Treling 2007, 58). The result is few traces of early habitation and a resulting low priority on the archaeological agenda. The last area not represented is the later additions to the city, the Vughter- and Hinthamereinde. Their later development might explain the absence of re-agrarisation, otherwise excavations might have just missed the evidence for it up to this date. The latter is to be considered in all parts of the city, due to the nature of the archaeology it is very likely that many examples of re-agrarisation have either not been found yet or are no longer visible archaeologically.

In what period does re-agrarisation take place and how does it relate to the development of the city?

To understand the phenomenon we need to understand its relation to the development of the city. As we (roughly) know the city's evolution through time we need to first place the phenomenon in a time frame. When we look at the table 1, it is apparent that most dates are centred around 1300. This is the period in which the city is expanding itself towards her new city wall. Due to the fact that the dating is accurate only to a degree of decades it is quite possible that most of these dates are connected to the incorporation of the site into the new city. Apart from the cases of Brandweerkazerne and Kerkstraat; most cases of re-agrarisation seem to last at most several decades. The agrarian layer is sandwiched between two layers dated not more than 50 years apart. In the case of Brandweerkazerne and Kerkstraat the site is the terrain behind the houses, not the actual plots the buildings stand on. These sites seem to have been used as gardens for a longer period than the others.

As mentioned in chapter 2, the build up area of the city spread along the sandy ridges, originating on the Markt. The rough estimate of the period in which each area was first occupied is shown on figure 15, the excavations are plotted on it. Most of the sites with re-agrarisation are in the nr IV areas, corresponding to the first half of the 14th century development. These excavations are Windmolenberg,

Brandweerkazerne,
 Mariënborg, Sint
 Andriesstraatje,
 Keizershof and HTSJ-
 35. The dates of re-
 agrarisation on these
 sites all match the early
 14th century date,
 mostly concentrated
 around 1300. The
 processes that led to
 re-agrarisation thus
 seem to be connected
 to the early period of
 habitation. This is also
 the period of the

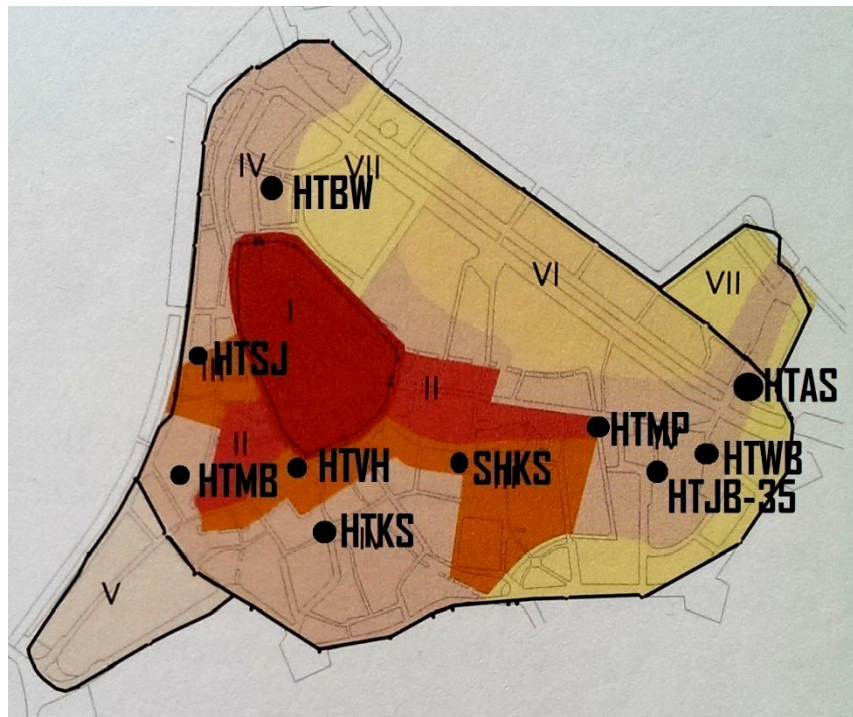


Fig. 15 Map depicting the spread of habitation during the centuries with the sites containing re-agrarisation plotted on it. Phase I (red) 1150-1200, phase II (red-orange) 1200-1250, phase III (orange) 1250-1300, phase IV (purple) 1300-1350, phase V (light purple) 1350-1400, phase VI (amber) 1400-1450, phase VII (yellow) 1450-1500. (BAM, adapted by author)

construction of the 2nd city wall and the incorporation of the newly enclosed land. If we look at the other excavations the connection seems to be confirmed. Kerkstraat and Sint Jansstraat are both situated in the nr III area, developed during the 2nd half of the 13th century. The later has a, not very accurate, dating of the 13th century, yet before 1300. A dating clearly earlier than those excavations located in the nr IV area. It is however only one example, Kerkstraat has a date of 1325-1400, out of line for this area. It must be noted that the re-agrarisation of this site came after 2 phases of relative expansive occupation. This is in contrast to the other excavation; which had only minor activity beforehand. Achter het Verguld Harnas is technically located in area III as well, as is visible on the map. The map however does not accurately show the proximity of this site to the first city wall and moat. This proximity might explain why re-agrarisation happens in the first part of the 13th century, one of the earliest dates encountered in this research. This date is comparative to nr II zones. Although not indicated on the map in this area, it might be reasonable to expect early habitation considering the vicinity to area I. Mgr. Prinsenstraat does lie in an nr II

zone, just at its edge on the Hinthamerstraat. The date of 1200-1250 ties in nicely to the presumed development of this area.

The period of re-agrarisation seems to tie in nicely with the development of the area and its incorporation into the cityscape. If we look at the end date of the process we see that firstly it was a fairly short period, mostly several decades and that the end of re-agrarisation is in all cases before the second half of the 14th century. The exception of Achter het Verguld Harnas is most likely to do with its very close proximity to the Markt. Kerkstraat and Brandweerkazerne have already been proven non typical, a cause of their location on backyards. If we relate this date of roughly 1350 to the development of the city; we come to the second city wall. Current estimates are that this wall was finished around this period (personal correspondence Van Genabeek). Agrarian activity thus seems to have seized after the completion of the new wall.

How did the site develop after the agrarian layer?

Initially the concept of re-agrarisation was defined as stratigraphy of wooden buildings, agrarian use, brick buildings. For the purpose of studying these brick buildings a paragraph is present in chapter 2. This research question was meant to be answered by referring back to that paragraph to establish the different types of brick dwellings. While we will still be able to do this there is an alteration of the concept. As it turns out re-agrarisation is not necessarily followed by a phase of brick structures. In the excavations Sint Jansstraat, Mariënborg, Mgr. Prinsenstraat and Keizershof the phase following re-agrarisation consisted of wooden buildings. In the early 14th century these were eventually replaced by brick houses. Only a hearth found in Mgr. Prinsenstraat gives evidence that the wooden building in this instance was most likely a dwelling.

If we look at the other sites we see a variety of brick structures. In Windmolenberg plot I is occupied by a paved surface and an unknown building. Plot II has a very peculiar building on it. Basically a semi detached house, it is two dwellings sharing a single chimney. The complete building measures 9 m by 10 m and is completely build of brick. The type of wall is the continuing type. At the back

of the dwellings; two cellars lie partially below the surface. At Brandweerkazerne the brick floor of a workshop was found, the lack of walls suggests that the building was open or covered by a simple roof. This building is fairly late, 16th century, and remained in place until well into the 18th. Kerkstraat features a brick cesspit and a brick building in the phase following re-agrarisation. The brick building was constructed following the pier and wall principle. It measured 7.6 m long and 4.70 m wide and initially featured a clay floor later succeeded by a brick version. Its function is unknown but considering the previous wooden buildings it might well have been a dwelling. A building of a similar type was constructed at Sint Andriesstraatje, albeit a century earlier. This building probably has complete brick gables as opposed to the building in Kerkstraat. The length of the building is 11 m, the width is unknown. On the site of Achter het Verguld Harnas an even more unusual building was built; a solid brick domestic tower, a highly unusual building for this city.

Whether the sites continue with brick built buildings or wooden built buildings seems to have partially depended on the period in which the agrarian activity seized. More important is that almost all sites reinstated habitation after a couple of decades. The only exceptions are Brandweerkazerne and Kerkstraat where the site was, as mentioned, behind the main buildings. This continuation of habitation proves that the area was not abandoned but merely used otherwise for a short period of time.

Why did re-agrarisation take place?

Now we have established the characteristics of re-agrarisation and the circumstances of its appearance we come to the big questions. Why did certain plots return to agrarian use after habitation had been established? General abandonment can be discarded. After all, the area was relatively quick reoccupied by buildings. The production of food was probably central to the development. I have three theories concerning this question.

The first is deduced from a process that takes place in the countryside of Brabant. Usually named “zwervende erven” (wandering homesteads), it is the apparent habit of Bronze Age and Iron Age homesteads to move throughout the

landscape (Van Ginkel and Theunissen 2009, 155). These homesteads consisted of one or two houses and outbuildings. Archaeologically they seem to be in place for a couple of decades. Then they are torn down and moved a couple of hundred meters in the landscape. The fields shift with them throughout the area. There are several reasons suspected for these shifts. The death of a farmer might have placed a taboo on a specific site, forcing the family to move. A more practical explanation is that the poor sands of the region can only support farming, without intense fertilizing, for a short while. When the soil was exhausted the fields had to be moved elsewhere. Farm buildings would deteriorate after several decades and would have to be reconstructed anyway. As a result the entire settlement shifted. Treling suggested in his publication on *Achter het Vergulde Harnas* that what happened in 's-Hertogenbosch could be something similar (Treling 2011, 53). Before the plots were incorporated into the main cityscape they were used by citizens to grow food. In order to make the soil richer they started inhabiting the plot. The build-up of refuse of humans and animals, ash and other organic traces; fertilized the ground. Then the site was cleared and used for growing crops. By the time the soil was exhausted again, the plot was incorporated into the cityscape and permanently inhabited.

A theory related to this considers re-agrarisation the result of the fragmented information urban archaeology provides. Often only one or a few parcels are uncovered during excavations. As a result we have no knowledge of the situation in the surrounding area; unless other excavations took place there. It is therefore possible that there were other buildings present during the re-agrarisation period that we cannot see. If the wooden buildings found underneath the agrarian layer were agrarian buildings, like barns or stables, that existed during the agrarian use but were replaced or moved; we have no way of seeing this. For instance if building A was standing on a plot where vegetables were grown and had been replaced once it was in disrepair. Then it could have been moved into the old vegetable patch and the crops now grew on the old spot of building A. The subsequent ploughing would have destroyed the upper portion of the postholes, giving the impression that the building was earlier than the agrarian layer. Lacking exact dating for these buildings, it is impossible to prove this. We do have to consider that the wooden building of the

pre-agrarian period might have been in place during the re-agrarisation. It would then not be re-agrarisation but merely the first exploitation of land not yet needed for housing.

4.2 The developments of 's-Hertogenbosch in a national view: an unique situation.

Agrarian activity within the walls of a settlement is not uncommon. To understand the situation in 's-Hertogenbosch within the larger history of cities in the Netherlands; a comparison is needed. For this purpose two settlements were selected on the advice of Michiel Bartels. Deventer and Bunschoten are two very different settlements and not necessarily comparable to 's-Hertogenbosch. But due to the scarce research done on the subject of agrarianism inside settlements they were the only available for now.

Deventer is a trading emporium on the river IJssel; dating from the 9th century. It was probably inhabited by the original inhabitants of Dorestad that had fled for Viking incursions (Vermeulen 2006, 28-31). An earthen wall was thrown up to protect the settlement from these Viking plunderers. Excavations on the south eastern edge of the settlement showed an interesting development of the area within the wall. For two hundred years the area was inhabited. The buildings consisted of wooden hovels with dug in posts and several barns and other agrarian buildings. There is little indication of any urban aspect other than the development of plots, aligned along several axes (Vermeulen 2006, 53-56). In the 11th century this habitation disappears and the entire area is slowly raised with sand and soil. The dark organic soil indicates that the site was used for agrarian production. Until the 15th century there are no traces of any habitation. After this period the terrain is raised by another meter, despite the presence of brick rubble, the amount of refuse suggest very little habitation on the site (Vermeulen 2006, 59). It appears than that the settlement within the wall was not very urban in its appearance (according to the characteristics) and shrank during the 11th century. While the centre of Deventer remained inhabited this area was abandoned and returned to agrarian use.

Bunschoten is a small town close to the city of Amersfoort. During the beginning of the 14th century it was a classical peat village. Along a central road a band of farms with long plots of farmland behind them. During the second half of the century the settlement was reinforced with an earthen wall. This was most likely done for political reasons by the local lord. The structure of the original village was disturbed by the construction of the wall as it cut of the elongated row of farms (Vervloet 1973, 427). Despite the town defences the settlement remained little more than a fortified village, inhabited by farmers. The fortifications were short-lived. After taking the wrong side in a conflict the city of Utrecht had the walls of Bunschoten dismantled as punishment for its treachery. So by 1429 the settlement was again a village, with the remains of the fortifications forming a low bank and moat around it. Within the area of the wall the land was never fully occupied and after the dismantlement; much of the buildings were abandoned. As a result some of the plots were returned to agrarian fields. Many however were never even inhabited and formed inter mural fields (Vervloet 1973, 429-34).

Re-agrarisation in 's-Hertogenbosch was a very specific process. As we have seen, it occurred for a fairly short period during the development of an area. It seems to have been specifically connected to the building of the second city wall and disappeared once this was completed. As a result of the short duration of the period the agrarian layers are fairly thin. Little structure can not be detected in them nor can we establish the type of agrarian activity that took place. The exceptions are the plots that were located on backyards and most likely functioned as gardens for centuries. Their agrarian layer was considerably thicker. Re-agrarisation seems to have focussed on the higher lying locations. But as habitation in general was focussed on these higher locations little conclusions can be drawn from this. It is doubtful whether re-agrarisation is really a return to agrarian use. And whether the fragmented nature of the evidence causes us to think as such while in reality it is just a continues development of shifting buildings in an agrarian landscape. After 1350 all agrarian sites that were along a road; had returned to habitation. The structures of this habitation were founded on brick from this period onward. This may be a result from

the availability of bricks but maybe also due to the increased urban appearance of the now inter mural area.

The situations in Deventer en Bunschoten compare very poorly to that in 's-Hertogenbosch. Bunschoten is a prime example of a failed town, a village forcefully pushed up the ladder to cityhood but incapable to rise above its simple beginnings. The composition of the habitation and the large amount of agrarian fields within the town walls are indicative of this. Deventer is slightly different and closer to the situation of 's-Hertogenbosch. This city did grow out to become a very important economic centre and did gain an urban appearance. The abandonment of the area described and its return to agrarian use was far longer than the Bossche examples however. This was not a temporary change in use but long term abandonment, maybe in favour of another area of the city. As mentioned in chapter one; abandonment of one site is often because the priorities of the inhabitants change. It can be concluded that 's-Hertogenbosch is a truly unique situation. The development of re-agrarisation in this form has not been studied for any other city in the country. Therefore our knowledge about this phenomenon can indeed enrich our understanding of emerging medieval cities in the Netherlands.

Chapter 5: Conclusions

's-Hertogenbosch is a fascinating city with a complex history and development. It had a troubled start as the pioneer settlement on the sand ridges near Orthen was shunned by more powerful neighbours. But with the addition of a stone town wall, funded by the duke, the settlement managed to establish itself as an economic centre. It was such an economic success that its population grew rapidly, leading to a great expansion of the inhabited space. Since the first wall was too constraining, this habitation spread into the surrounding area. It focussed on the high ridges between the streams of the Dieze and Aa. This new habitation, including the city's future cathedral, remained outside the walls until the completion of a new wall during the second half of the 14th century. It was during this period that the process of re-agrarisation occurred within the city. On many locations wooden buildings were dismantled and the terrain was used for an agrarian purpose. Layers of rich, agrarian soil are evident of this. Relatively shortly afterwards buildings were once again built on these plots. Yet on other plots there is no agrarian layer, or there are no buildings present before any agrarian layers. Why this process developed as such and why it appears to have taken place at random was the subject of this research.

In chapter 4 we have seen some theories considering the why of re-agrarisation. These include a comparison with the concept of wandering homesteads found in the rural areas of Brabant. The second theory, connected to the first, is the idea that due to the nature of archaeological data; we see a distorted image. We might not see the entire process that was occurring because we only see one or two plots. These plots were part of a wider area in which buildings might have shifted, due to our lack of overview we cannot see establish this.

To conclude this research I will formulate a definitive hypothesis concerning the phenomenon. Paradoxically the basis of this hypothesis is that re-agrarisation is actually non-existent, at least not in the scale that was assumed at the beginning of this thesis. The key lies in the sites without re-agrarisation. The initial agrarian layers present in these sites are of the same age as many of the initial agrarian layers found on sites with re-agrarisation. So during the beginning of occupation, usually after some raising of the terrain, agrarian activity was fairly common. I argue that these

layers and those of re-agrarisation are actually part of the same process. The fragmented excavations give us a wrong image of the situation. It might very well be that the excavated plot had no sign of a wooden building prior to its agrarian layer because that building was located on the plot beside it. What this means is that re-agrarisation should not be seen as a process on its own but as something part of the initial development of a site. It is not the purposeful demolition of buildings in favour of agrarian fields but the shifting of buildings due to natural decay. Another argument can be seen in the dating of these processes. The time between the occupation of a site and the beginning of re-agrarisation is generally in the region of 50 years. This combined with the also fairly short duration of re-agrarisation itself means a century of development. On average we could say from 1250-1350. This coincides roughly with the expansion of habitation outside the first city wall up to the completion of the second. It is the development of wilderness before its incorporation into the city. So what we are seeing is in essence a proto-urban landscape. A wide spread area of low density occupation of perishable wooden hovels, shacks and barns. Many of the inhabitants most likely had a role in the urban economy but still sustained themselves partially with agrarian activities. Closer to the first city wall this environment would have become increasingly urbanised as the economy grew. Industry would have spread with the growth of the economy, pushing out the more rural part of the population. The landscape had a mixture of agrarian and artisanal use and frequent land raisings. The result is a complex stratigraphy that most likely is in no place intact. The wide spread of this landscape was certainly influential in the planning for the second city wall. In an effort to incorporate as much of these buildings as possible the area it encompassed was vast. Large areas of wetland were included within the walls by the simple fact that this was the shortest route between two habitation clusters. As a result many open spaces were included in the new city, spaces that would not be occupied for centuries. The reasons why the second wall lies where it does are far more complex; but this factor certainly most have a significant influence. After the completion of the wall the entire area saw an increase in urban appearance. One visible result of this is the increased use of brick in the construction of houses.

So what I conclude on re-agrarisation is that it was indeed the return of a very specific place to agrarian use. But this was not a large scale change of an urban area. Rather, it was merely part of a larger process that took place in a proto-urban landscape. In essence we are looking at one small step in the evolution of 's-Hertogenbosch.

Further research proposal

Even though re-agrarisation might not exist; we can still do a lot of research to understand this period of the history of 's-Hertogenbosch. Unfortunately Malta archaeology restricts our excavation potential for this period. Excavations might be mandatory but they are also governed by necessity. As a result archaeologist dig where they must, not where they would like to. More importantly is the restrictions in excavation depth. Unless a planned building will contain a cellar or deep foundation; the excavation will not go much deeper than a couple of meters. The large amount of landfill deposited during the long history of 's-Hertogenbosch means the traces of the 13th/14th century are buried 3 to 4 meters deep in most places. If we want to improve our understanding of the proto-urban period of the city we need to focus on these deep layers. Especially important is the relation between the various layers of this period. This might clarify whether there are general shifts in habitation or use, whether the area became more urban and whether the period was continues. A useful tool could be petro graphic sections. These thin slices of soil can provide data about the way the layers were deposited, whether they were worked and what they contain.

A better understanding of the agrarian produce and activities that went on in this period would be useful. It remains a difficult task however. The traces left by the activities are minimal. Yet a greater focus on archeobotanical research of the agrarian layers might yield some workable results. For truly good research we would need a complete overview of this period throughout the city. And therefore we need all older excavations published. The BAM is doing its best to achieve this with the resources that it has. In the future this data will come available. Then someone will

be able to systematically compare all excavations of the city and might establish the development of the proto-urban period.

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