Plan or process?

The medieval fortifications of Utrecht from the 12th to 15th century.

Author: Marc Baggerman

Cover page, the Weerdpoort depicted by D. Verrijk in 1755 (Utrechts Archief, tekeningen en prenten, 36783)

H.J.E. Wenckebachweg 1624
1096 DE Amsterdam
marc.baggerman@gmail.com
Tel. 0615044286

Plan or process?

The medieval fortifications of Utrecht from the 12th to 15th century.

Author: Marc Baggerman

Student number: s1606751

Master Thesis

Supervisor: Dr. R. van Oosten

Specialisation: Archaeology of the Roman provinces, Middle Ages and Modern period

University of Leiden, Faculty of Archaeology

Amsterdam, 19-04-2017, version 1

Table of Contents

Preface 6

1. Introduction 7

2. General town defences 13

2.1 Initial town defences 13

2.2 The stone defences 15

2.2.1 The gates 16

2.2.2 The town walls 18

2.2.3 The towers 19

2.3 Topics to analyse 20

3. The development of Utrecht 23

3.1 Political power play 23

3.2 Town development 25

4. Methodology 31

4.1 Catalogue 31

4.2 Masonry 32

5. The Town defences of Utrecht: Phase 1 37

5.1 The course of the circuit 39

5.2 Construction and development 44

5.2.1 The earthen wall 45

5.2.2 The tufa towers 47

5.3 The creation of the first town defences 51

5.4 Summary 56

6. The Town defences of Utrecht: Phase 2 59

6.1 The circuit of the town defences 66

6.3 The construction of the wall 71

6.4 The improved town moat 79
6.5 The towers 79
6.6 The brick town gates 85
6.6.1 The Tolsteegpoort-complex 87
6.6.2 The Weerdpoort 89
6.6.3 The Wittevrouwenpoort and the Catharijnepoort 92
6.7 Summary 94
7. The town walls: single or multiple phased structure? 95
7.1 Foundations 95
7.2 Construction 97
7.3 Brickwork 100
7.4 Summary 103
8. Comparison between Utrecht and other towns 107
8.1 Den Bosch 107
8.2 Deventer 111
8.3 Cologne 115
8.4 Norwich 117
9. Conclusion 121
Abstract 125
Bibliography 127
Manuscripts 131
List of figures 133
List of tables 139
List of Appendices 141
Appendices 143
Appendix 1. Waarnemingen 145

Vermeldingen..... 157
Appendix 2. Map locations..... 163
Appendix 3. Maps, phase 1 and phase 2..... 167

Preface

Recreating the town defences of Utrecht was not one of the ideas I had in mind when I started looking for a thesis subject. Luckily Dr. R.M.R. van Oosten kept a watchful eye for interesting topics and after a meeting with A.M. Bakker, the municipal archaeologist of Utrecht, I was hooked. Therefore I would like to thank them both for the opportunity to research this topic during my last year at the university. Working at the town hall of Utrecht brought me some interesting experiences and insights into the working life of a municipal archaeologist. It has been a joy (and sometimes pain) to work through all the archaeological data collected in Utrecht over the last century and the end-result is definitely worthwhile.

1. Introduction

Medieval town walls do not only encompass the walls surrounding the town but also all other aspects of this defensive perimeter such as: towers, gates, waterways and earth works. Yet the study of medieval town walls has long been a subject lacking in attention in the archaeological and historical world. Creightown and Higham's *Medieval Town Walls*, a study of town walls in the United Kingdom (2005), delineates this problem well. Traditionally the focus lay with the more illustrious works such as castles. The focus on castles can be understandable as these were 'private' constructions and with them carry an immense amount of prestige and links to well-known historical figures, whereas the town walls were mostly a product of and for the community (Creightown and Higham 2005, 15). Another complicating factor is the necessity to combine the data from an enormous amount of excavations into one comprehensive study, making their reconstruction not a trivial matter (Creightown and Higham 2005, 15-16). Once again we see the focus of our research drawn to the more glamorous and accessible aspects of the past. Yet there is much to say for the grandeur of the town walls.

The town wall was a prominent element in the day to day life of the medieval townsfolk and to truly understand the society living in a medieval town, the border of their daily world, the town defences, needs to be understood as well. Influencing all layers of society, town walls were as much a functional ward against outside threats as a status symbol for the town they encompassed and its ruling elite (Creightown and Higham 2005, 15-16). These fortifications provided a measure of protection from invasions and threats to the independence of the town in times of war, while in times of peace these walls marked the boundary between town and countryside (Van der Vlerk 1983, 80). In order to provide this protection or boundary, the walls first needed to be constructed. In what manner this was done is one of the central questions regarding town walls today. This is where the research of Creightown and Higham in England (Creightown and Higham 2005) and that of Janse and Van

Straalen in the Netherlands (*Middeleeuwse Stadwallen en Stadspoorten in de Lage Landen,* Janse and Van Straalen 1974) comes up short. Both studies have a definitive lack of primary archaeological sources. The question whether town walls were built according to a plan or if it was a long lasting process, can only be answered by scrutinizing every source of data available: historical maps and documents, but even more importantly: archaeological excavations.

What exactly do we mean by a town wall created as a plan or process? A good example of a planned town wall can be found in earlier research such as that of Janssen in Den Bosch (Janssen 1983, 64-74). He shows us that this question can be answered through archaeological excavations. In the case of Den Bosch it was clear that the oldest defences were constructed according to a plan, as the entire town wall was uniform in construction (more on Den Bosch in chapter 8) (Janssen 1983, 67). Uniformity is one of the key points to distinguish different phases in town walls. A town wall with a uniform construction points to a single phase, a structure that was built in one go. A town wall built in many different styles, using different kinds of bricks and construction methods suggests multiple phases, constructed over a longer period of time with possible pauses in its construction. An example of one such town wall is that of York, where the Roman walls were improved and repaired until the late medieval period. This is a case of a vertical phasing, where the town wall, located on the same spot, was altered during a long period of time. The Robin Hood tower's foundation where Roman but the walls itself were post-medieval (Hall 2010, 73-77).

In the case of Utrecht it is possible to discern that very process of improvement, but also a different type of phasing; a horizontal phasing. This type of phasing, showing us spatially which parts of the walls are younger, could tell us the direction of the construction of the medieval town walls. Because a good number of excavations of the town walls have taken place in Utrecht it is possible to determine whether the town wall had a uniform construction or not. Therefore it is possible to ask

ourselves: were the town walls of Utrecht a single or multiple phased structure? Were they built according to a plan or not? The ground on which the wall is built, the depth and construction of its foundations, its brickwork and its general construction all need to be taken into account when trying to answer these questions.

Before studying the construction of the town wall of Utrecht, it is necessary for one to comprehend the general construction and development of town walls in the area. In their comprehensive work about the Dutch town walls, Janse and Van Straalen give a detailed description about many different town walls throughout the Netherlands. They provide us with the development from earthen rampart to stone walls. For instance, they state that in Bruges the first constructed aspect of the town walls were the gates (Janse and Van Straalen 1974, 38-39). Was this the case in Utrecht as well? Several of their other statements about the development of town defences (see chapter 2) will be compared to the case of Utrecht.

Many assumptions have been made about the town defences in the past based solely on historical sources. Van der Vlerks comprehensive study about the town wall in *Utrecht Ommuurd* for example is almost entirely based on the historical sources. In this thesis many of her statements about the date of origin of the very first town walls, the circuit of the town walls and the construction of the town walls of Utrecht will be confirmed or disproved using the archaeological excavations of the past decades (Van der Vlerk 1980, 13; 43-45; 49-56).

The defences of Utrecht have been divided into two phases based on their construction in this thesis: Phase 1 and Phase 2. Phase 1 (12th to 13th century) encompasses the initial defences including a town moat, earthen rampart, several stone towers and possibly some stretches of stone walls. Phase 2 (13th to 15th century) includes a brick town wall, brick towers, brick gates and a town moat with two brick retaining walls. Both these phases will be reconstructed using historical and archaeological sources reconstructing the medieval town walls of Utrecht. The main goal of this

thesis is to answer the question whether the town walls of Utrecht were created according to a plan or built over a large period of time as a process. Were they single or multiple phased? To answer this, these sub questions need to be answered about the following topics:

1. Development of town defences
    a. How did town walls in general develop in the Netherlands, what phases can be seen and how does Utrecht compare to these phases?
2. Phase 1 (12th to 13th century)
    a. In what year were the earliest defences constructed?
    b. What was the circuit of the earliest defences?
    c. How were the earliest defences constructed?
3. Phase 2 (13th to 15th century)
    a. What developments took place to improve the town walls between phase 1 and 2?
    b. What was the circuit of the defences of Phase 2?
    c. How were the defences of Phase 2 constructed?
4. Single or multiple phased town walls in Utrecht and the direction of their construction
    a. What similarities or differences can be found in the foundations of the town walls of Utrecht?
    b. What similarities or differences can be found in the construction of the town walls of Utrecht?
    c. What similarities or differences can be found in the brickwork of the town walls and is it possible to date the excavated wall according to its brickwork?
    d. Were the town walls of Utrecht constructed at once or in several phases over multiple centuries?
5. Comparison to other towns
    a. How do the defences of Den Bosch and Utrecht compare in the 12th and 13th century? What are the similarities, what are the differences and why?

b. What can we say about the development of the earthen walls in Deventer and how does it compare to those of Utrecht?
c. Why are the more advanced rounded towers in Deventer (expected to be built out of brick) constructed out of the generally earlier used tufa?
d. What are the chronological differences in the development of the town walls of Utrecht and Cologne and why are they present?

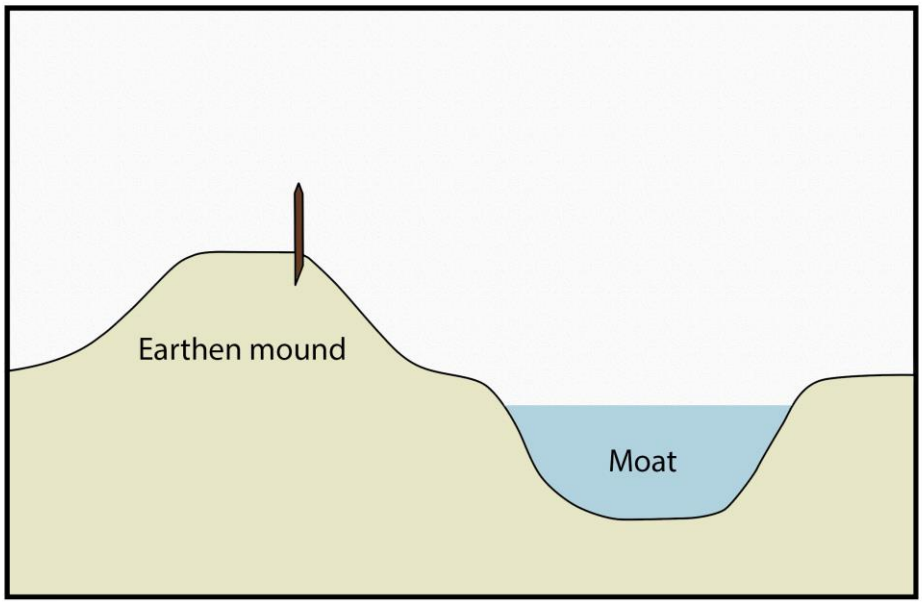
Beginning in chapter 2 the general development and construction of town walls will be described. In chapter 3 the development of Utrecht shall be examined and in chapter 4 the methodology will be stated. After that a reconstruction will be made of the town walls from the 12th to the 15th century in chapter 5 and 6. The many historical assumptions that have been made regarding the town walls of Utrecht will be scrutinized as well. After the reconstruction of the town walls of Utrecht in chapter 5 and 6 the main question of this thesis will be answered in chapter 7. In this chapter the town walls will be divided into different phases according to their construction, brickwork and foundation. This will provide us with an overview of the town walls of Utrecht and give us the answer to the question whether the town walls of Utrecht were a single or multiple phased structure. In the last chapter of this thesis a comparison will be made with the town walls of several other towns in order to explain the differences the available natural resources make, what chronological discrepancies can be seen and what the notable differences in construction is between the towns.

2. General town defences

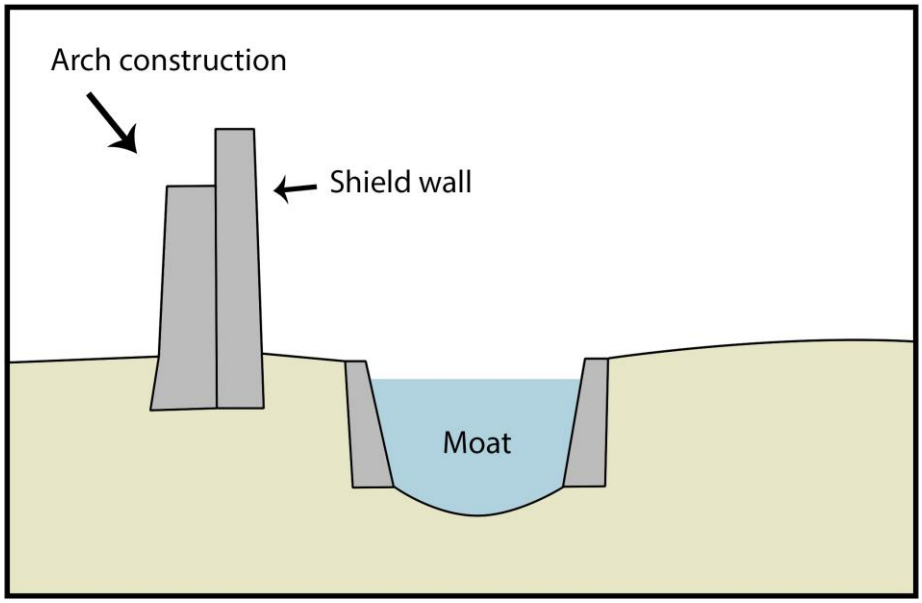
Town walls conjure up images of great sieges and warfare in ways few other structures can. But what exactly are town walls and were there any common guidelines to build them? One expects town walls to be built to provide a defensive perimeter for the town, but there are also secondary functions such as delineating the border between town and countryside. In the Netherlands it was general practice to erect a town wall after a town was granted town privileges (Van der Vlerk 1983, 80). Because without town privileges it was not allowed to construct a town wall. In the following pages the study of town defences by H. Janse and Th. Van Straalen in their book *Middeleeuwse Stadswallen en Stadspoorten in de Lage Landen* is used to describe a general description of the developments of town defences in the Netherlands. The development of the town defences has been divided in two different phases according to their study: the initial defences and the developed defences. It starts with the initial simplistic defences which develop through time resulting in large, intricate stone defences.

2.1 Initial town defences

According to Janse and Van Straalen most town defences started out as a 'simple' earthen wall surrounding the town. (Figure 2). Often a palisade stood on the earthen rampart. This is a defensive structure made of wooden stakes. Surrounding this wall a moat was excavated to provide another measure of defence. Sometimes natural river courses were used as part of the moat, as was the case in Utrecht. In many cases such as in Amersfoort in 1434 thorny bushes were grown on the side of the water to increase the defensive properties of the moat (Janse and van Straalen 1974, 14). We need to keep in mind that while it is usual for a town to have a water filled moat surrounding a town in the Netherlands (Janse and van Straalen 1974, 16), this was not the case in other areas. Many towns in the United Kingdom and other more mountainous areas (which is the larger part of the earth) moats were often dry (Creightown and Higham 2005, 28).



A: Early defences (phase 1) consisting of an earthen mound with palissade and moat.



B: Late defences (phase 2) consisting of a brick wall containing arches and a shield wall and a moat flanked by brick walls.

Figure 2, layout of the early and late defences, by author.

Not all town walls surrounded their town completely. In these cases natural features such as rivers or mountain ranges were often used to complete the encirclement of the town (e.g. Chepstow, Newport and Perth). Yet some were just not closed of entirely (e.g. Hay on Wye and Brecon). Some may say that these missing parts have just not been recovered as of yet, but Creightown and Higham argue that this is not the case (Creightown and Higham 2005, 26).

The towers and gates were the only aspect made of stone in the early concept of town walls in the Netherlands. The towers provided a clear view of the surrounding area to keep an eye out for enemies and a location to place archers. The towers of this early phase were square and tall (Janse and van Straalen 1974, 11-16). They were not necessarily placed at regular intervals, but at the most strategic positions such as a corner in the town wall. The town gates themselves might have been stone structures as well, but it could also possible that simple wooden structures stood once were later proud stone gates were erected. However, Janse and Van Straalen argue that the oldest gates were the rectangular stone building described below (Janse and Van Straalen 1974, 27).

2.2 The stone defences

In many cases (Amsterdam, Utrecht, Groningen, etc.) the initial defences are found lacking after a period of time as they are not able to withstand the improved artillery such as cannons (Janse and Van Straalen 1974, 15). A time of improvement and restructuring of the town wall and towers then took place. This phase is marked by stone walls, towers and gates surrounding the town (Figure 1). In the Netherlands this was made possible by the rediscovery of brick at the end of the 12th century (Van der Vlerk 1983, 44). This second phase of stone defences did not occur in all towns. In some cases such as Heenvliet op Voorne a stone wall was never realized (Janse and van Straalen 1974, 17). However, if and when these changes were introduced the town walls took on a completely different appearance. On the inner side of the newly walled moat now stood a proud stone wall several meters high containing many integrated

towers and in most cases several town gates. The material used for town walls in this developed phase range to a variety of stone. From the *kolenzandsteen* (coal sandstone) in the oldest gate (*de Helpoort*) of the Netherlands located in Maastricht (dating back to 1230) to tufa in the oldest stone town wall of Utrecht and limestone in the 12th century walls of Leuven. But the most common material used is brick. This is because this cheap and locally produced material provided a way for more towns to construct their town defences out of stone from the 12th century onward (Amsterdam, Utrecht, Den Bosch, etc.). It was produced in Utrecht (Janse and van Straalen 1974, 17).

2.2.1 The gates

The first aspect to be improved seems (in the Netherlands at least) to have been the gates. The first references in the historical records to a town defence often refer to the gates. This most complex aspect of the town walls is hard to generalize as there are so many shapes and sizes the gates took on. Not only did the layouts change over time, but also between towns. In their book H. Janse and Th. Van Straalen distinguish four different types of gates, mentioning all the while that many gates will not fit into any as there are just too much discrepancies between different gates. Many other gates can be encountered while travelling through the Netherlands, but these are the ones most often seen.

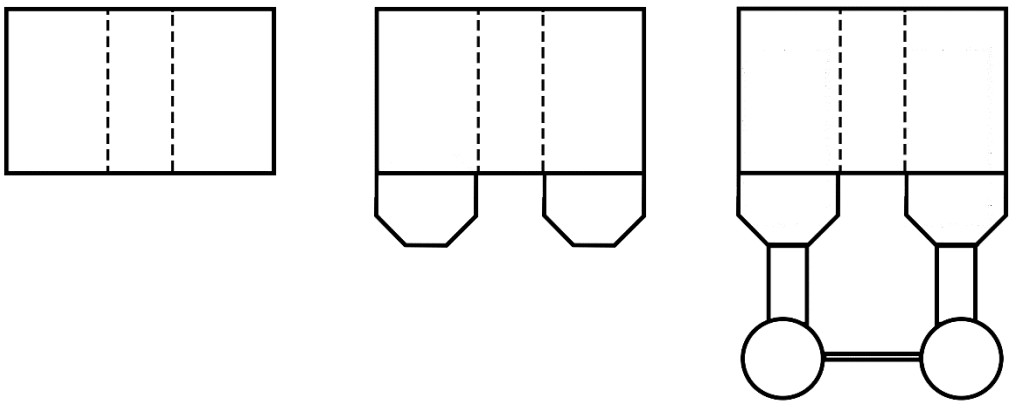


Figure 3, development of town gates. From left to right: (a) oldest to (b) middle to (c) youngest (c) plans. The dotted lines represent the path into the town, by author after the description of gates in Janse and Van Straalen 1974, 27-34).

Type A was the oldest type and had a rectangular gatebuilding (Figure 3, A). Its plan was as its name implies: simply rectangular, joined on both sides by the town wall. A thoroughfare was situated in the middle, measuring at least three to four metres broad and eight to eleven deep. These measurements allowed a horse (or other animal) drawn cart to pass through. This oldest type of gate was soon improved by strategically important towns. Towns of lesser importance such as Vianen, and Culemborg retained their rectangular gates. The next type is the gate with two towers attached to the outer corners of the gate, type B (Figure 3, B). The type B gate was militaristically more sophisticated. The towers provided the necessary angle to cover all ground in front and around the gate, the blind spots were eliminated. Early versions of this type have high towers extending above the gate itself, but in examples built later the towers do not extend above the gate (Janse and van Straalen 1974, 27-30). This was due to the development of better artillery in the late medieval period which could destroy high towers with ease and cause them to collapse on the gate itself. An excellent example for this is the *Koornmarktspoort* situated in Kampen was built in 1335 and the corner towers extended two floors above the gate while the *Cellebroederspoort,* which was built in 1485, had two corner towers extending only one floor above the gate (Jan and van Straalen 1974, 29). The last addition to medieval gates was that of the front gate or *voorpoort* (Figure 3, C). This concerned two more towers on a distance from the actual gate. Between these two locations two walls connected the four towers forming the gate of type C (the corner towers of the gate with the towers of the front gate). Once again this made the defending of the gate easier, this time by keeping the enemy at arm's length from the actual gate. It was not uncommon for the town moat to flow beneath the area between the front and actual gate (Jan and van Straalen 1974, 33-34). At the end of the medieval period the medieval gates were often replaced with gates mounted in the large earthen walls that replaced the medieval walls. These gates were modest in appearance to their medieval predecessors but could withstand much heavier sieges. These developments were the

direct effect of the improvement of artillery and cannon fire. The high medieval walls are easy targets to shoot down with cannons. These lower, wider earthen walls and gates were harder targets and could withstand much more.

2.2.2 The town walls

The town wall itself was most often a structure containing two aspects: a shield wall (schildmuur) on the outside and an arch construction (boogconstructie) on the inside on which the wall walk (weergang) stood (Figure 2). The wall had to be high enough to prevent attackers from easily scaling it. Although many town walls have been excavated, the height is rarely recorded. Most of the time the top of the wall is missing. One instance where they did happen to be able to record its height was in Bruges, where the town wall was 7.5 metres high (De Witte 2010, 105). The width of the shield wall can typically be set at about one metre and was typically higher than the inner wall. The heavy shield wall was often founded on arches beneath floor level to provide support. The inner wall contained an arch construction which was made of heavy buttresses, on top of which the actual arches were constructed. Within the arches on the inside of the wall loopholes were placed, providing sight to the surrounding land. A stretch of wall just like this dating back to the 12th century still stands in the town Leuven in Brabant. According to 17th century images a battlement was supposed to crown the wall, sadly none of this remains this day (Janse and van Straalen 1974, 18). This description of a medieval wall can be taken as a general consensus within its field, most town walls adhered to this layout. Of course there were exceptions, as was the case in Zwolle where the wall walk was constructed over the complete breadth of the wall and several cantilevers which caused the parapet to be constructed outward (Janse and van Straalen 1974, 19). Around the 16th century the high medieval town walls were replaced by a lower wall backed by an earthen rampart in order to withstand the increasingly powerful cannon fire.

2.2.3 The towers

One of the most fundamental aspects of a town wall is the tower. In most cases towers were built along the trace of the town wall. Built at more or less regular intervals it was possible to launch projectiles, such as bow and arrow, from the top of these towers to the enemy. Battlements were regularly found at the top of the tower to defend the towns' archers. In many cases the tower possessed a roof, in which case the battlements could be closed off by latches (Janse and van Straalen 1974, 69). There are three developments that can be seen in towers in the late medieval period. First of all is the change from a square to round layout, then there is the decrease in height and finally the tower becomes integrated in the wall itself. The towers of the town wall changed from square to angular to rounded over time to account for the heavier artillery that was used against them. There are many examples for the occurrence of square towers in Dutch town walls such as the *Plompetoren* in Utrecht, the *Dieventoren* in Amersfoort, the *Kruittoren* in Nieuwstad Zutphen and the *Vispoort* in Elburg (Janse and van Straalen 1974, 69). But over time these towers became obsolete. A square tower used in the early phase (until the late 12th century in Utrecht) would have its corners blown of easily by the heavier artillery that was developed at the end of the medieval period. Over time the towers also became shorter until they were barely taller than the wall walk to become smaller targets for the ever increasing cannon fire, similar to the development of the gates (Janse and van Straalen 1974, 69). In the 16th century large earthen bulwarks replaced the towers as the most effective defensive structure, such as *Sterrenburg* in Utrecht. Another important improvement was the incorporation of the towers into the town wall. While the early towers stood without walls connecting them (only the earthen wall stood between), the newer, rounded, towers where built with the idea to incorporate them into the town wall. The horse-shoe shaped plan of these towers allowed them to be incorporated yet stand out from the wall (Figure 4).

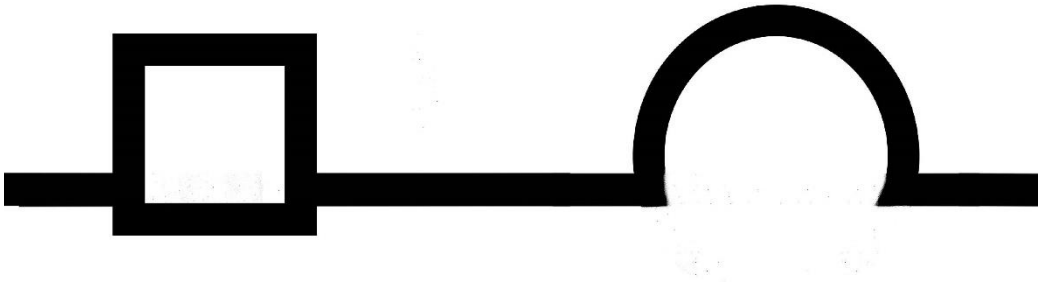


Figure 4, the plan of a square and round tower (N.B. the general plan, not to scale, by author.

Furthermore a new type of tower appeared in this phase: the so-called *Ronddeel*. Its layout is identical to the rounded tower shown in Figure 4, yet these towers were lower and had wider walls. Incorporated in the town wall, this tower had a circular plan and stood for three-quarters of that outside the wall, providing a much broader view. This allowed for a better flank protection using the cannons inside. The first example of this type of tower in the Netherlands can be found in Zuthpen in 1457. The *Bourgonjetoren* was mentioned in accounts which mentioned alder beams needed for a new type of tower called a *Ronddeel*. The lower levels of these *Ronddelen* was a lot wider than the older towers, standing proud at four meters wide to withstand the cannon fire that was the blight of this era (Janse and van Straalen 1974, 75-76).

2.3 Topics to analyse

Considering these general developments can we determine if these general guidelines of development were followed in Utrecht? As can be read above, one would assume the town defences of Utrecht to start out as an earthen rampart with a palisade, town moat, stone towers and stone gates. Is it possible to confirm stone gates, most likely made out of tufa or other stone in these initial defences in Utrecht? Were there stone towers present? Can we confirm the general development from earthen rampart and town moat to a brick wall? How high was this brick wall? The gates developed from simple rectangular stone buildings to sophisticated military structures with towers and front gates added in

later stages. Did the gates of Utrecht resemble any of the above mentioned types and if so, which? Were the gates in Utrecht the first aspect of the town defences constructed out of brick? The arch construction and shield wall described above is one possible construction of a stone town wall. Is the dual construction of shield wall and arch construction present in the walls of Utrecht or can we see evidence for another type of construction? The towers developed from square towers to rounded ones according to Janse and Van Straalen, is this true in the case of Utrecht? Do the towers resemble the ones described above? To answer these questions a large amount of data had to be studied. Before we answer these questions a short overview will be given of the history of medieval Utrecht.

3. The development of Utrecht

In this chapter a brief overview of the history of the town Utrecht shall be given. First the political background surrounding the town and its rulers will be discussed, after which the development of the town itself shall be described to create a clear view unto which the town defences can be projected.

3.1 Political power play

At the very beginning of what we now call Utrecht lay a Roman *castellum*. The history of this *castellum* and the following centuries of development into the early Middle Ages has been described in great detail in *Een Paradijs Vol Weelde* by De Bruin *et. al* (De Bruin 2000). In the medieval period Utrecht was ruled by the bishop (in the emperor's name) until 1122. Utrecht was granted definitive town privileges that year by Karel V, written down on the oldest surviving decree concerning the town. 1122 is generally accepted as the year that Utrecht got its walls. Historical sources suggest that no town walls existed before that year. But while it is true that during the Norman invasion of 1006 the people took shelter in the bishop's stronghold (Struick 1983, 19), it seems unreasonable that no actions took place to defend the surrounding town in the intervening years. The issue about the date of origin of the town defences will be discussed in chapter 4. Issued by the emperor Hendrik V it was from 1122 that the sheriff (schout) and aldermen (schepenen) took on the leading role in the town. However, the sheriff was still appointed by the bishop and the aldermen usually came from the patrician population.

In the course of the 13th century the patrician government starts to lose its power over Utrecht (van Vliet 2000b, 105-111). 1304 can be seen as another turning point in Utrecht's history. On the 8th of May, that year the so called Gildenbrief was written, stating that the guilds would have a vote in the town council. This resulted in the fact that the guilds now chose who joined the town council and who became alderman instead of the patricians (van den Hoven van Genderen 2000, 113-115). The guilds of Utrecht steadily expanded their influence until 1528, when Karel V

took direct control of Utrecht. It was in this period that the bishop relinquished his worldly power into the hands of the emperor Karel V of Habsburg (Van Schaik 2000, 191-201). In the following years many changes were made in Utrecht, with no exception to the town's defences.

When Karel V took over the power of Utrecht in 1528 from the bishop of Utrecht, he appointed a steward called Antonius van Lalaing, whom already was the steward of Holland and Zeeland. Castle *Vredenburg* was built in 1529-1534. The purpose of this castle was to defend against Gelre, the neighbouring kingdom, but mainly to keep the people of Utrecht in check. The Medieval town wall (including the *Snijderstoren*) were destroyed and became part of the earthen filling of the west wall of the castle. The town wall and its towers were renovated and improved as well. In order to account for the improved artillery (cannons) the medieval town wall was lowered. Many new towers were incorporated in the town wall (such as toren the Leeuw and the Vos) while other disappeared, as was the case between the Tolsteegpoorten and the Catharijnepoort. All these plans were recorded in the Memorie van 1537. The Memorie van 1537 is a document in which the plan for the improvement of the town defences were recorded. While these improvements were still under construction Italian master builder Balthasar came to Utrecht and drew up his own plans for the town in cooperation with Van Lalaing. In 1539 Balthasar proposed the building of four bastions. These four stone bastions were built on strategical positions, called: Manenburg, Morgenster, Sterrenburg and Zonnenburg (van der Vlerk 1983, 87-94). In the end the improvements recorded in the Memorie van 1537 were completed with the addition of the bastions by Balthasar.

At the end of the time frame of this thesis it seems an appropriate point to cut off the tale of Utrecht's political developments and look at the development of the town itself.

3.2 Town development

Utrecht is situated between three different landscapes: the crest (*Heuvelrug*) to the east, the river landscape of the *Kromme Rijn* to the south and south-east and the peat through which the *Oude Rijn* and the *Vecht* flow in the north (Figure 5) (De Groot 2000b, 11).

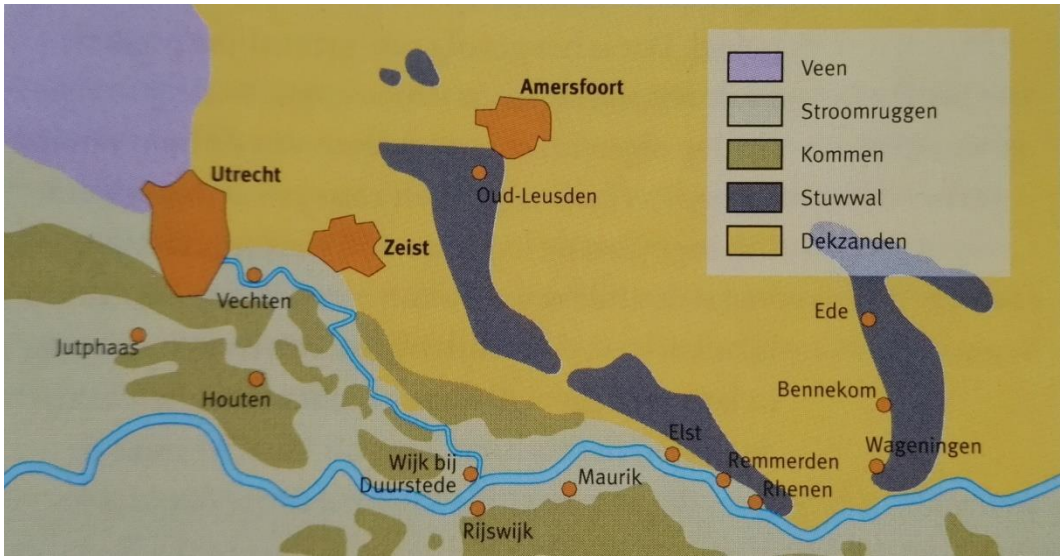


Figure 5, the area surrounding Utrecht (De Groot 2000b, 11).

When we take a look at the inhabited space at what is now the centre of Utrecht we see that there hasn't always been a dense town. Around the year 1000 we can see only the stronghold of *Trecht* and some surrounding settlements located next to the rivers Rhine (Stathe) and Vecht (Figure 6). Several wrecks and quay constructions have been found next to the Vecht point that these settlements were trade oriented. When the northern part of the *Oude gracht* in the late 10th century was excavated, the settlement on the bank of the Vecht prospered as a result (van Vliet 2000a, 55).

Figure 6, habitation zones of Utrecht around the year 1000 (Van Vliet 2000, 55).

With the development of the immunities of Utrecht in the following century, the town grew to a more expansive settlement, but still there were several distinguishable areas with no habitation between the now established town walls around 1150 (Figure 7). Another development was the excavating of the *Borchtgracht*, which connected the Rhine to the Vecht. Later this canal combined with the northern part of the *Oude gracht* excavated in the late 10th century would become the *Oude gracht*, which flowed from the *Weerdpoort* to the *Tolsteegpoorten* (van Vliet 2000b, 80-81).

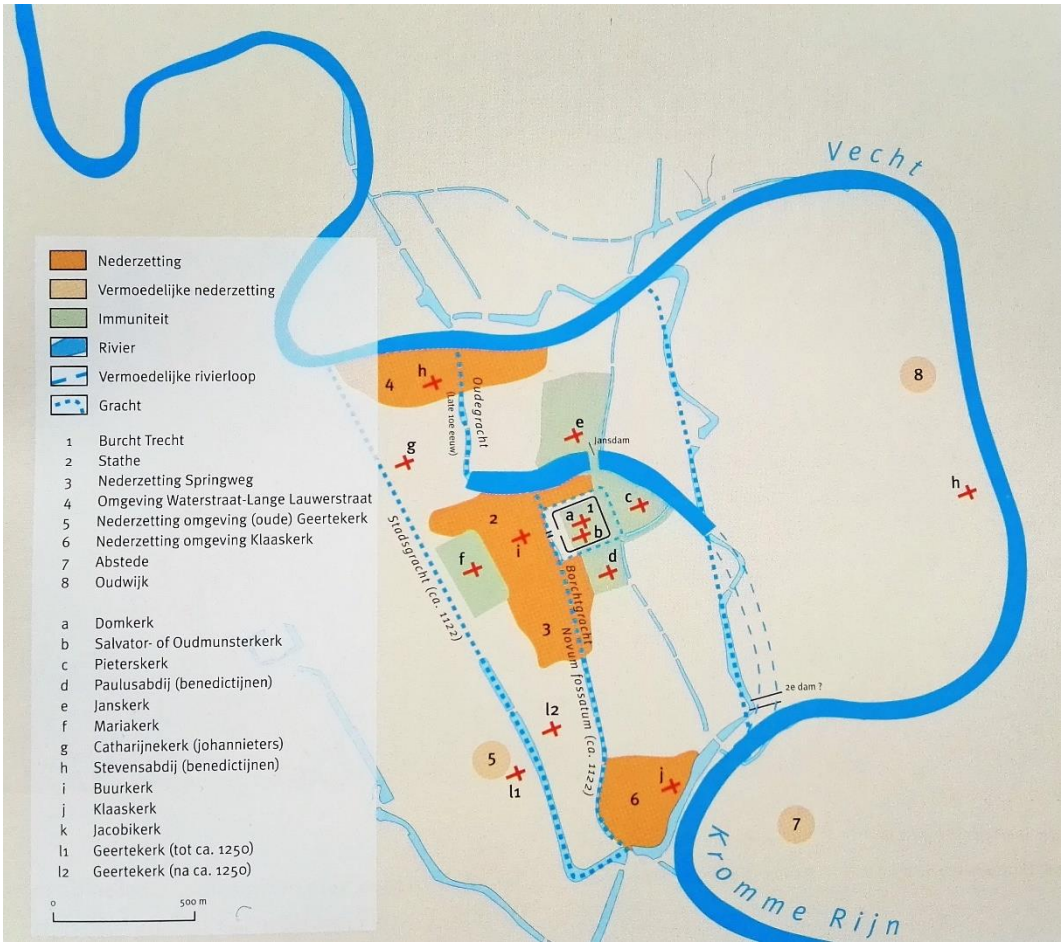


Figure 7, habitation zones of Utrecht around the year 1150 (Van Vliet 2000, 81).

Only in the 14th century did the population expand enough to fill the vast area between the walls. Evidence for this can be seen on the map containing the known street layout of Utrecht in 1300 (Figure 8).

This expansion of Utrecht was made possible by three different economic markets: trade, industry and centralized management of agricultural lands (De Groot 2000b, 13). Utrecht was positioned in a favourable location for trade. It was connected to the Zuiderzee through the IJssel (from which Scandinavia and Germany could be reached) and located in a central position within the Netherlands.

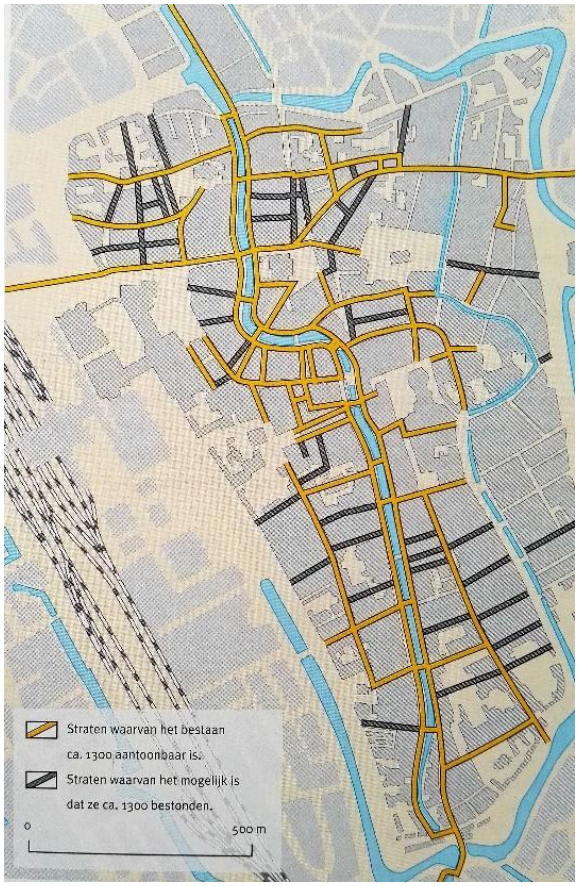


Figure 8, street layout of Utrecht around 1300 on a background of the modern day street pattern. In yellow the streets formed around 1300 and in dark grey streets that were likely to exist around 1300 (Van den Hoven van Genderen 2000, 140).

Therefore it comes as no surprise that trade between Utrecht, the North Sea, the East Sea and areas along the Rhine flourished. The industry of Utrecht profited from the yearly and weekly markets on which merchants traded their commodities and the markets likewise profited from the growing industry of Utrecht. Centralized management of agricultural lands appeared in the Late Medieval period. Because of this Utrecht gained an agricultural hinterland which made it possible for the citizens of the town to focus on the industry even more (Struick 1983, 17). Through these developments Utrecht developed a name for itself and by creating this name they not only formed an identity for themselves but also became known to the surrounding lands.

Up to this day the topographical layout of Utrecht that was formed through the developments throughout the Middle Ages remains very

similar to that of its medieval predecessor (Figure 8). The layout of the streets remains mostly the same when compared the medieval one. Although regretfully, most remains from the Middle Ages are not directly visible anymore, they were built over or are completely removed. Such is the case with the town wall, its towers and the gates. Almost all traces have been removed from sight. The only examples of the old defences still standing are the 16th century bastions and a strip of wall behind the Nobeldwarsstraat (Figure 9). This 14th century strip of wall was left standing during the demolishment of the defences in the 19th century because the mayor decided he wanted a picturesque park with ruins in it. The shield wall was stripped off and a supporting was created on the town's side to prevent earth sliding into peoples homes.

Figure 9, still standing stretch of medieval town wall on the Nobeldwarsstraat. Here we see the arch construction on the town side. The shield wall has been stripped off in the 19th century and a supportive wall has been constructed on the town side closing off the arches.

What is left for us are mostly the underground foundations of the wall. These were left intact when the above-ground walls were torn down in the 19th century. These fundaments have been uncovered in many different places during the excavations over the last century. Relatively small strips of the trace of the town wall were found with every excavation, excluding some of the larger projects such as the Nieuwekade (Appendix 1; Nieuwekade 1982), van Asch van Wijckskade (Appendix 1;

1973-74) and parts of castle Vredenburg (Hoekstra 1983, 12). These excavations will be discussed during the reconstruction of the town walls in chapters 5, 6 and 7.

4. Methodology

The data used in this thesis stems from a century of excavations and architectural research. Through the architectural study of still standing parts and excavated remains of gates and towers, a detailed account can be provided of said aspects of the town wall. Studying the architecture of the town wall could also reveal to us a detailed description of its history, including repairs, damage and improvements of the wall, towers and gates. Meticulous study of masonry fabric provides an insight into the building materials used in the structures and therefore may provide information on when and how it was built (Creightown and Higham 2005, 123-124). Through intersecting the line of defence containing the town wall, earth works and all things related to the defence, archaeology once more provides a clear overview of all aspects of the town's defence. Studying the stratigraphy makes it possible to discern the layers belonging to the earthen works used to fortify the town and to separate different phases of construction. Without excavating these earth works are difficult to find as they are not visible in the landscape anymore because of the rising ground level. Besides adding more information to known strips of town walls, lost traces can be found as well at places where nothing remains above ground (Creightown and Higham 2005, 125). In the following paragraphs the methods used to date and analyse the town walls of Utrecht will be described.

4.1 Catalogue

In order to create an overview of the medieval defences of Utrecht a large number of excavation's documentation had to be assembled. The documentation was found in several places: the archive of the department of heritage of the county of Utrecht, the archaeological company BAAC and old annals made by the town archaeologist of Utrecht. From the oldest documentation of the excavation of the eastern Tolsteegpoort in 1926 to the youngest of the tower found at the Zeedijk in 2016 this gives us data from almost a century of excavations (Appendix 1; Twijnstraat 1985; Zeedijk 2016). All this data has been compiled into the catalogue found in Appendix 1. This data will be used to recreate the

construction, circuit, composition of the town defences of Utrecht and will also be used to date the different parts of the town walls. This will be done using the technique of masonry dating.

4.2 Masonry

Using masonry dimensions and connection the town walls of Utrecht can be dated. Brick was reintroduced in the Netherlands around 1200 A.D. and the notion that the size of the first bricks coincided with the blocks of their predecessor tufa has been disclaimed by Orsel. As tufa is processed in different shapes and sizes to fit the need of the building project, bricks are baked in a uniform shape. This uniform shape was regulated by officials and therefore provides us with a dating method for masonry (Orsel 2007, 9). It is of the important to keep in mind that there are limitations to this method as the measurements of brick varies from place to place and can be salvaged from older buildings and used again. There are three aspects to dating masonry: dimensions or measurements, mortar and masonry connection.

1. Dimensions: all bricks were made using moulds resulting in a uniform shape that gradually changed over the centuries.
2. Mortar: different types of mortar were used throughout the ages.
3. Masonry connection (or *metselverband* in Dutch): the way the bricks were used to construct the wall (e.g. in which format they were placed in relation to each other).
4. Colour: different types of clay or baking results in different colours.

The length, width and height of a brick are the measurements used when determining the dimensions and dating of masonry. The dimensions of the bricks changed as masonry developed as a craft and pros and cons were discovered. Overall, the bricks shrank as the centuries passed. A good example for this are the measurements of bricks made in Leiden during the medieval period. Whereas a 13th century brick could have dimensions from 28x14x7 to 34x17x12 centimetres (respectively: length x width x height), a 19th century bricks dimensions range from 18x8,5x3,5

to 22.5x10.5x4.5 centimetres (Orsel 2007, 9-10). In Utrecht two manuscripts have been written on brick measurements in the medieval period. For this research the catalogues of C.L. Temminck Grol and D. Berends shall be used[1]. The general development of the dimensions is depicted in Table ***1*** (all in centimetres):

Table 1, development of brick in Utrecht after Temminck Grol 1963 and Berends 1980. Dimensions in centimetres.

	Dimensions	10 layer
13th century	32-36x16-18x8-9	c.a. 100
14th century	29-30.5x14-15x6-7	80-87
15th century	28-30x14-14.5x6.5-7	c.a. 80
16th century	26x12.5x6	c.a. 67
17th century	21-24x10.5-12x4.5-5.5	52-59

Keep in mind that this is a general overview of several pages containing numerous recordings of many different dates. Both have recorded many different brick dimensions in a numerous amount of structures such as: the Domkerk, Vredenburg, Schipkapellen, etc. (Temminck Grol 1963, 173; Berends 1980, 2) In order to date the wall the more precise measurements in the respective manuscripts shall be used (Berends 1980; Temminck Grol 1963, 173-174)

To form a stable wall, mortar is needed to connect the individual bricks. From 1200 onward the most used mortar was a lime mortar, which was made using chalk. Procured from either shells or chalk, this mortar provided flexibility to masonry which prevented tearing. Besides lime mortar, a type of cement was used as well: tras. Made from grounded down tufa, this so called trass had a hydraulic function. This caused the cement to harden when it came into contact with water, providing a decent protection from the currents chafing. Trass was in use until 1789 when an alternative was created in Amsterdam called *Amsterdams*

[1] These manuscripts are filled with research of many years comparing brick dimensions from structures with known origin dates all over Utrecht. This was done twice, separately by C.L. Temminck Grol and D. Berends. Both are unpublished works.

cement. Only then could the expensive import of tufa for cement be avoided (Orsel 2007, 24). Using mortar and trass we can only establish a large dating range which points to the period from 1200 to 1789.

The next way to date masonry is by looking at the masonry connection (*metselwerk).* Several types of connections were used during the medieval period, starting at 1200 when bricks were re-introduced in the Netherlands (Figure 10). The oldest is *Noords verband*, which can be dated to roughly 1200 and is configured: long side, long side, head side, etc. This method was mostly used on *kistwerkmuren* which had outer walls filled with debris. Then came the *Vlaams verband* which was used until 1325 and is configured: long side, head side, long side, head side, etc. Thereafter came *Staand verband* which used two different layers above each other and can be dated from roughly 1350 to the mid-16th century. The first layer would be only long sides and the second only head sides, repeating this from top to bottom. The last method was *Kruisverband*, dating back to mid-16th century up to the 19th century when industrial developments, allowing for artistic masonry, marking the end of the traditional masonry methods (Orsel 2007, 13-16).

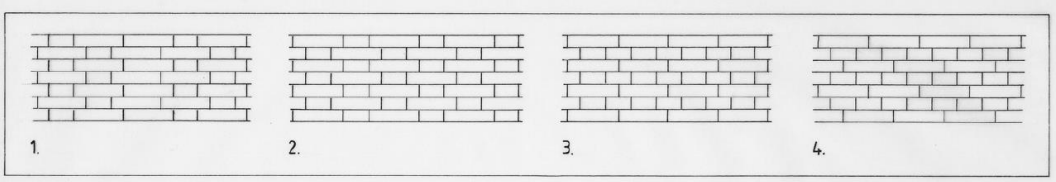


Figure 10, masonry connections; 1: Noords Verband, 2: Vlaams verband, 3: Staand verband, 4: Kruisverband (Orsel 2007, 15).

While it is possible to date masonry according to its colour, this does not present a valid topic when researching the town walls. Most of the bricks have the same red colour and therefore belong to the same range of centuries.

Using the three above mentioned aspects of brickwork we can determine the uniformity or disparity in the construction of the town walls and date them. When identical bricks, mortar and masonry connections are used it is most likely that the walls were constructed in the same period. Then

when comparing all these individual pieces one can determine a relative dating. In the following three chapters a reconstruction will be made of the town defences ranging from the 12th to the 15th century, after which the defences will be divided into separate phases if possible using these methods of dating.

5. The Town defences of Utrecht: Phase 1

In this chapter several issues will be discussed concerning the earliest defences of Utrecht. In this phase the defences were most likely made up of an earthen wall within a town moat, stone towers and stone gates. A reconstruction has been made by L.M.C. van der Vlerk in her comprehensive book *Utrecht Ommuurd*. This reconstruction provides us with a detailed description of the medieval town defences. However, this is a reconstruction based for the largest part on historical data. Moreover, this reconstruction was made in 1983, which means that the last 34 years of archaeological and historical research are not included. Many questions are still unanswered about the earliest fortifications. The unclear aspects surrounding the first fortifications come down to these three questions: what was the date of their inception? What was its circuit? And how was it constructed? To this day it has not been confirmed whether the construction of the first town defences began before the granting of town privileges in 1122 or after that. Neither could the course of the exact circuit be determined, nor how it was constructed and what developments took place. Several of the questions posed at the end of chapter 2 will be answered as well: were there stone gates in these initial defences? Can we confirm the existence of stone towers and was their plan indeed square? Do the initial defences include an earthen rampart and town moat? What follows is an examination of the archaeological data of the first town defences of Utrecht with the aim of clarifying these issues and answering these questions. Below you find a table containing the core information of all the excavations dealing with the initial defences. This concerns four excavations (Jan Meijenstraat 1979, Lange Smeestraat 1973, Nieuwe Kade 1988 and Servaasbolwerk 2003), which can be found in the table below (Table 2) or in Appendix 1. Their exact location can be found on Figure 12 or Appendix 3. Whenever an X fills a spot no data was recorded during the excavation or it was lost over the years. In cases such as the brick info of the earthen rampart, it is not applicable. We shall begin with the examination of the course of

the circuit, after which the construction of the defences will be scrutinized and to conclude the date of inception will be looked at.

Table 2, core data of the excavations listed in Appendix 1, concerning the first phase of the defences of Utrecht. Their location can be found on Figure 12 or Appendix 3 in greater detail. Brick sizes are in centimetres.

Excavation	Element	Brick	Dimensions	Foundation	Dating
i. Jan Meijenstraat 1979	Earthen rampart	X	Height: at least 2.5m Width: more than 5m	X	X
	Dyke	X	X	Cut tree trunks	11th century
	Shoring equipment	X	X	X	1050-1125
vii. Servaasbolwerk 2003	Tufa tower foundation	X	Length: 9m Width: 1.25m Rectangular shape, no corners found.	Sabulous clay 1.48-1.55 m+ NAP	Before 13th century
xv. Lange Smeestraat 1973	Tufa tower foundation	X	Length: ? Width: 2.6m Roughly rectangular, no corners found.	0.9 m+ NAP	1145
xxvi. Nieuwe Kade 1988	Earthen rampart	X	X	X	X

	Retaining wall	30x14x7	X	X	13th-14th century

5.1 The course of the circuit

To recreate the course of the circuit a geographical background is needed. The cadastre of Utrecht made in 1832 provides us with a map on which the town defences are depicted and has also been georeferenced (Figure 11). This map will be used as the background for the reconstruction as it has the best of both world: it contains the defences of the medieval period but also has the accuracy of modern maps.

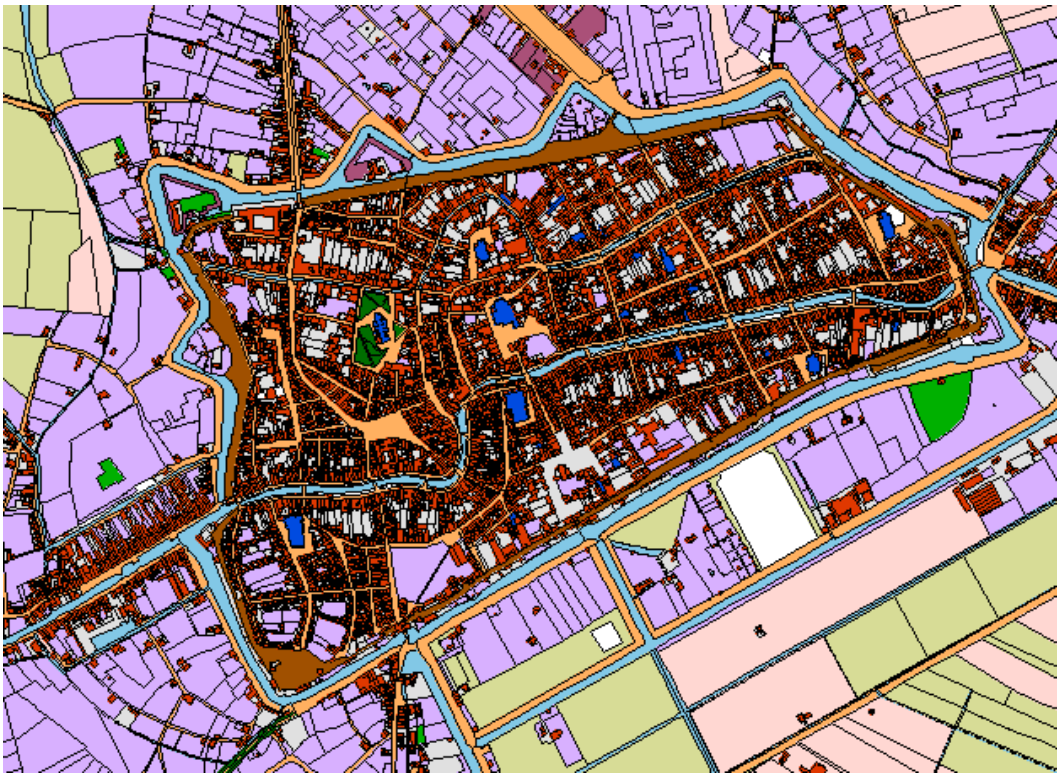


Figure 11, cadastre of Utrecht originating from 1832 (hisgis.nl)

There are two theories about the circuit of the first town defences. The oldest, by Acket and Wagenaar, argues that the earthen wall ran around the stronghold Trecht in a somewhat rectangular shape. The wall would have followed the river Vecht in the north, the town moat as seen in later centuries in the east and west and a line following the Smeestraat, Zuilenstraat and Schalkwijkstraat in the south, see Figure 12 (Acket

1946, 70-71; Wagenaar 1971, 15). Van der Vlerk and Van Vliet describe the more widely accepted theory. This theory describes a circuit that encompassed the land between the modern canals surrounding the old city centre of Utrecht (Figure 12). This circuit coincides largely with the later stone town walls surrounding Utrecht after the 13th century (Appendix 3).

No maps remain of the oldest phase of the town defences, nor are there sketches or paintings found from this early period. Recreating the trace therefore poses somewhat of a challenge in this phase. Consensus has been the above mentioned theory supported by Van der Vlerk and Van Vliet. To create this circuit the river Vecht on the north side and the river Rhine on the south were used as natural barriers and earthen walls were built to connect the two rivers in order to create a defensible area between them (Van Vliet 2000, 82). Traces of the first defences have been excavated over the last century in multiple locations. Their locations can be found on Figure 12, Table 2 and in greater detail in Appendix 3. There are four excavations and two archaeological watching briefs, which will be discussed separately in a clockwise manner. It is important to understand that these watching briefs contain less precise documentation as an archaeologists observes the excavation done by construction workers instead of excavating himself with a team of fellow archaeologists. We start with the excavations and finish with the observations.

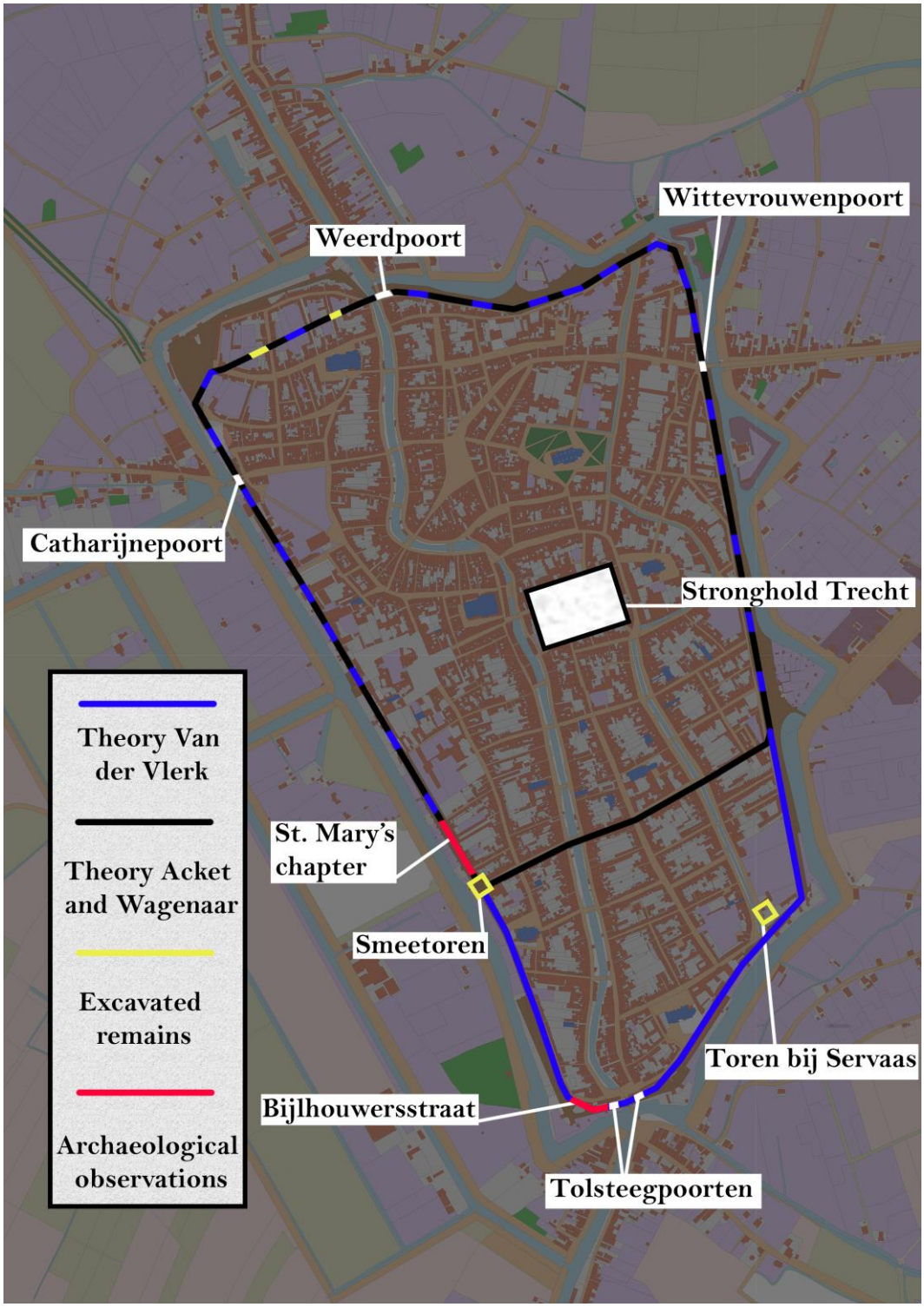


Figure 12, the different theories about the course of the circuit of the first defences. Included are the excavated remains and archaeological observations. Note that the theory of Van der Vlerk includes the circuit of Acket and Wagenaar with the exception of the southern wall. By author.

Starting at the north-west of Utrecht on the Jan Meijenstraat and Nieuwe Kade, two parts of the earthen rampart were found (Appendix 3, i and xxvi). Then in the south-east, near the Servaasbolwerk, the tufa foundation of the Toren bij Servaas was excavated and at the Lange Smeestraat (in the south-western part of Utrecht) the tufa foundation of the Smeetoren came to light (Appendix 3, vii. Servaasbolwerk 20030; xiv. Lange Smeestraat 1973). Other than these excavations we have two archaeological watching briefs of tufa structures. The first tufa structure surfaced on the Bijlhouwersstraat (in the southwest) and was spotted by F. Kipp. Large, loose tufa stones were found which most likely belonged to a tufa wall. During construction work large stretches of the Bijlhouwersstraat were dug out to repair several sewer pipes. This was done without observing archaeologist. The earth dug out was thrown next to the trench and it was F. Kipp who happened to pay a visit and spot many pieces of tufa with fresh cleavage. As a construction historian he identified these pieces to resemble the tufa found at the Smeetoren and other excavations uncovering tufa from the first town defences (Hoekstra 1973, 7). Although we have no documentation of this instance we can say with some certainty that a tufa wall stood somewhere on the location of the Bijlhouwersstraat in the period of the first town defences. The second tufa structure was a wall was seen between the Smeetoren and the St. Marie's chapter (Van Vliet 2000, 79). Although regretfully no primary documentation remains we do know that it was located just north of the Smeetoren (Appendix 3, xiv). This location coincides with the historically reported tufa wall. Using the *Annales Sanctae Mariae 477* from 1138, Van der Vlerk states that a tufa wall was erected shortly after 1122 at the St. Marie chapter (Van der Vlerk 1983, 43-44).

When we consider the location of the tufa structures excavated and observed at the Jan Meijenstraat, Nieuwe Kade, Servaasbolwerk and Lange Smeestraat we can see if the theory of Van der Vlerk and Van Vliet or that of Acket and Wagenaar holds true. The excavation of the Toren bij Servaas lay 330 metres south of the proposed southern border of the defences by Acket and Wagenaar and the observation of the tufa

structure on the Bijlhouwersstraat was located 475 metres south of their southern border. This proves that the defences extended much further south, as one would not build isolated stretches of wall or even towers hundreds of metres south of their actual defence. The location of these structures correspond to the theory of Van der Vlerk and Van Vliet, proving their proposed circuit and disproving the theory of Acket and Wagenaar.

Combining all the historical and archaeological data mentioned in Table 2, a reconstruction has been drafted of the circuit of the first defences (appendix 3). This could be done by carefully digitalizing the old excavation drawings and assembling them all into one large AutoCAD file, drafted on top of the cadastre of Utrecht. This cadastre comes from HISGIS where the cadastre of 1832 (where the circuit of the 16th century defences can still be seen) could be found. Using the precise location of the archaeological remains as reference points and the proposed circuit of Van der Vlerk and Van Vliet as general idea it was possible to reconstruct the circuit of the first defences. This area measured roughly 900 by 1590 metres or 143.1 ha (1,43km^2). The connection between the rivers Vecht and Rhine measured roughly 1400 metres on the east and 1700 metres on the west. Along these lines the town moat had to be dug out to complete the encirclement of Utrecht by water. Adding to a total of 3100 metres of ditch to be dug. Using the earth excavated from these stretches the wall could be built next to the moat. But a wall was also necessary in the north and south, even though the moat was formed by the rivers themselves on these sides. In the north side of Utrecht the wall would measure almost 1100 metres and on the south side around 700 metres. In the northwest the circuit deviated from the later medieval circuit. Until the 13th century the river Vecht flowed further south (see 'The creation of the first defences' below and Figure 19). So to complete a full encirclement of Utrecht with an earthen wall 4800 metres of wall had to be built. This area only had to be expanded radically in the 19th century and can be considered quite large when compared to other towns. For example: Den Bosch' first defences of the 12th century only

enclosed an area of 0.85 ha. We will go into more depth on this subject in chapter 8. With only around 3000 inhabitants in the 12th century (Van Schaik 2000, 249), it seems odd to put this much effort in creating such a large enclosure when its population was not large enough to fill it, but one of the reasons for this was the fact that they could have used nearby rivers as the north and south side of their construct, alleviating the workload (Van der Vlerk 1983, 41; Van Vliet 2000, 81).

5.2 Construction and development

According to the general development of town defences discussed in chapter 2 it is to be expected that the first phase would include a moat, an earthen wall, stone towers and perhaps stone gates. However, the earliest phase of the town defences have left significantly less archaeological remains for us to discover than those of the second phase, making it difficult to accurately reconstruct the first phase. There are two main reasons for this. Firstly, the first phase contains less structures. There were for example fewer stone structures, these structures are made of material that deteriorates at such a slow rate that even today most could be recovered. Secondly, later phases of the town defence were largely built over this first and earliest phase. Although there have been changes in the trace of the town defences, it followed the same route for most parts. This resulted in the consequential destruction and rebuilding of many parts of the oldest defence using new material. By combining both historical and archaeological sources we can reconstruct the construction of the first phase of the town defences of Utrecht.

In Utrecht the town defences of phase 1 largely coincide with the initial defences described by Janse and Van Straalen (chapter 2; Figure 2): it included an earthen rampart, a town moat and stone towers. However, no evidence has been found to confirm the existence of stone gates in this phase. What follows is a reconstruction of the different recovered aspects of the town defences of phase 1.

5.2.1 The earthen wall

The existence of the earthen wall has been confirmed on the Jan Meijenstraat and the Nieuwe Kade (Appendix 1, Jan Meijenstraat 1979; Nieuwe Kade 1988). At these two locations the earthen wall itself was found. Although the earthen wall was recovered on the Nieuwe Kade, not much documentation about the wall itself remains. The only thing noted was that the wall was made of wet clay, most likely from the Vecht. However, a brick retaining wall was found as well, supporting the earthen wall at the town's side and dating back to the 13th or 14th century (Figure 13).

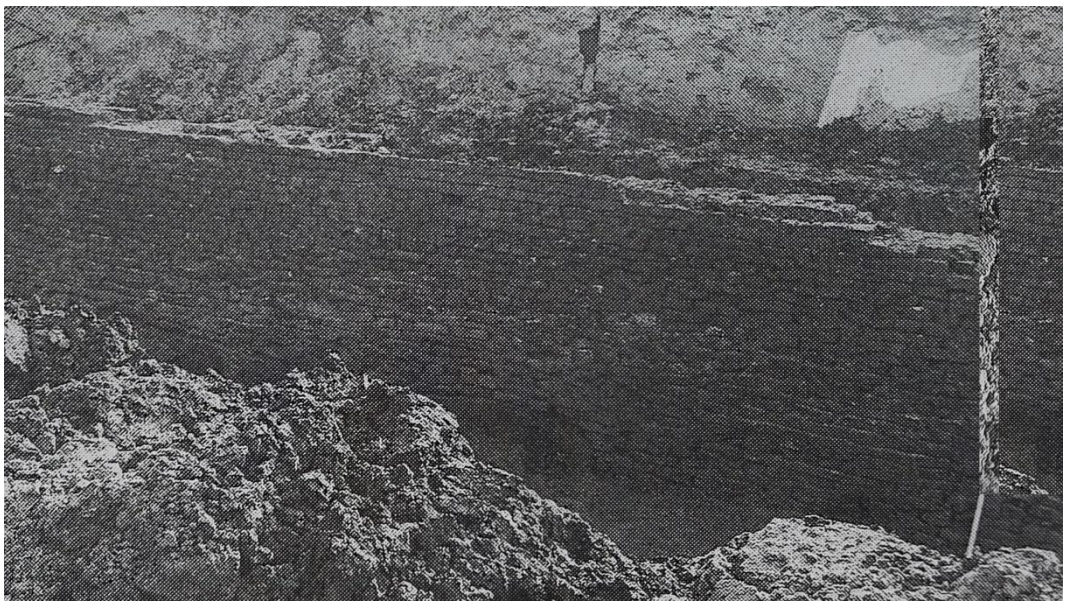


Figure 13, the brick retaining wall standing over 2 metres high at the excavation on the Nieuwe Kade, after De Groot 1989, 132.

This brick wall was possibly built to strengthen and support the earthen wall as was evident by the brick wall leaning away from the earthen wall itself as a result of the pressure over time (Figure 14). However, the wall cut through a 13th century layer of ground (dating by de Groot and Pot, based on the presence of proto-stoneware) making it younger than that layer, which points more in the direction of the 14th century (De Groot and Pot 1989, 133). It is therefore likely that this wall was built

simultaneously with the brick town wall of phase 2 and had less to do with the earthen wall of phase 1.

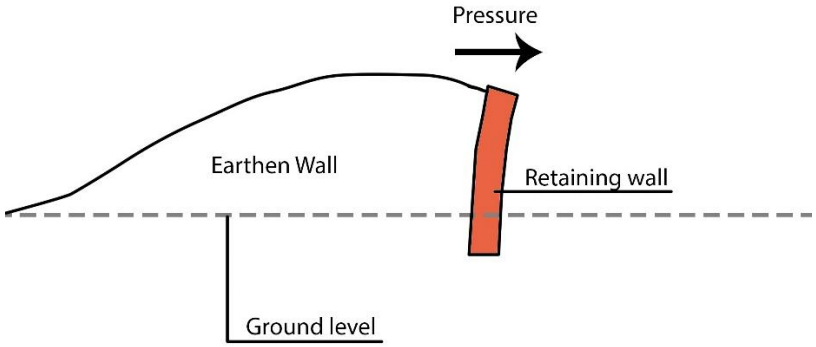


Figure 14, schematic representation of the earthen wall's mass causing the brick retaining wall to lean away from the earthen wall. By author.

The second recovered stretch of earthen wall on the Jan Meijenstraat was better documented. Because the top was not recovered it could not be confirmed whether a palisade may have stood on top. The earthen wall itself was estimated to be 2.5 metres high and at least 5 metres wide (De Groot 1981, 48) (Figure 15).

Figure 15, profile in which the earthen wall at the Jan Meijenstraat can be seen (left). After De Groot 1981, 49.

However, one needs to take into account that the earth of the wall may have settled and that therefore the wall may have stood taller when it was built. When comparing the earthen rampart of Utrecht to that of Deventer (chapter 8) we see that there is a difference in height (2.5 metres in Utrecht versus 3 to 6 metres high in Deventer). While the earthen walls of Deventer were initially little higher than those of Utrecht, improvements were made to increase its height. No such improvements were made in Utrecht, where the brick town wall replaced the earthen wall. On the Jan Meijenstraat the earthen wall may have had the second function as a dike to keep the Vecht at bay as it is located right next to the river.

5.2.2 The tufa towers

One of the most impressive stone aspects of the town defences in the first phase are the tufa towers. According to Van der Vlerks research several of these towers were located in the town defences: behind the St. Servaasabdij, at the end of the Nieuwe Gracht, behind Lepelenburg and the Plompetoren (Van der Vlerk 1983, 43). Two of these tufa towers have been excavated.

The first tufa fundament was found at the end of the Lange Smeestraat and belonged to the Smeetoren (Appendix 1, Lange Smeestraat 1973) (Figure 12). Although it confirms its existence, it does not offer much insight into the construction of the structure that once stood there. The foundation was found at 0.9 metre +NAP, was 2.6 metres wide and a layer of bricks of a later era lay on top of them. The structure was rectangular in shape, but no corner was found. However the structure was straight, which coincides with the layout of a square tower (as opposed to a rounded one). It is therefore likely that these towers were constructed with square fundaments whereas the newer ones of phase 2 were rounded. This was because in later centuries improvement of siege weapons rendered the square towers impractical and vulnerable to artillery (Van der Vlerk 1983, 43-44).

D. Claessen working at the department of Erfgoed at the county of Utrecht has made 3D images of several towers (including the Smeetoren, Figure 17) and gates of medieval Utrecht based on historical drawings such as Van Wijngaarden's panorama ca 1550; omgeving Bloemaert in the early 17th century; the recording of the cadastre in 1872 (when parts of the defences were still standing), construction drawings of the Physisch Lab with old and new situations and the recording of the Smeetoren before demolishment in 1864 (Figure 16). In cooperation with historicus F. Kipp they created a beautiful view using historical drawings to show how the defences might have looked like. They too argue for a square layout for the towers, with evidence provided by the construction drawings of the Smeetoren. These 3D images can be seen as an accurate depiction of different part of the medieval defences as they have been based off of both archaeological and historical sources[2].

[2] For more information on these 3D images, see: https://www.utrecht.nl/wonen-en-leven/vrije-tijd/erfgoed/utrecht-in-3d/

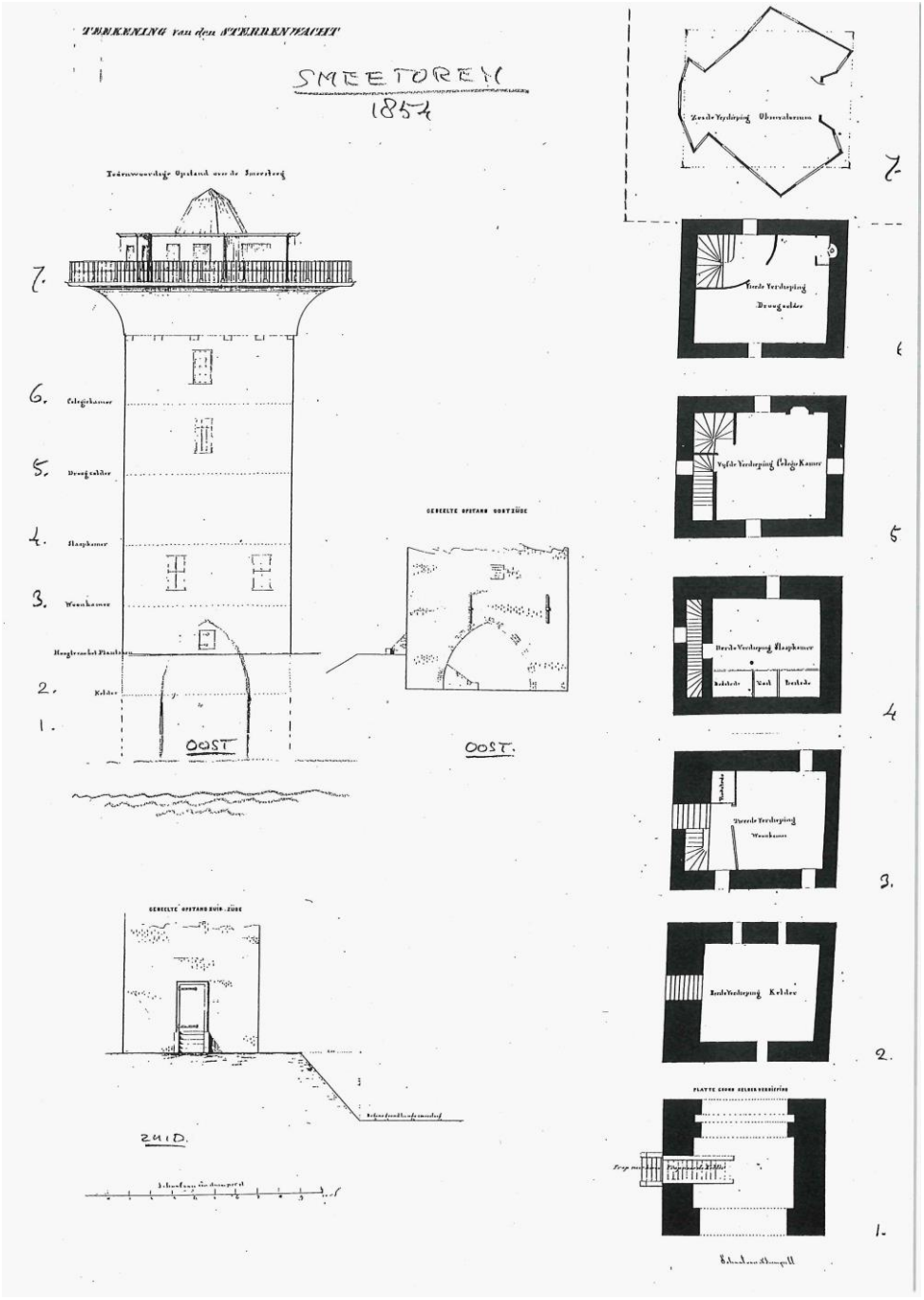


Figure 16, measurements of the Smeetoren from 1864, before the demolishment. Here we see that the Smeetoren was 22 metres high, had a square layout and walls ranging from 0.8 to 2 metres wide at the time (Opmeting Smeetoren 1864, UD-SM01).

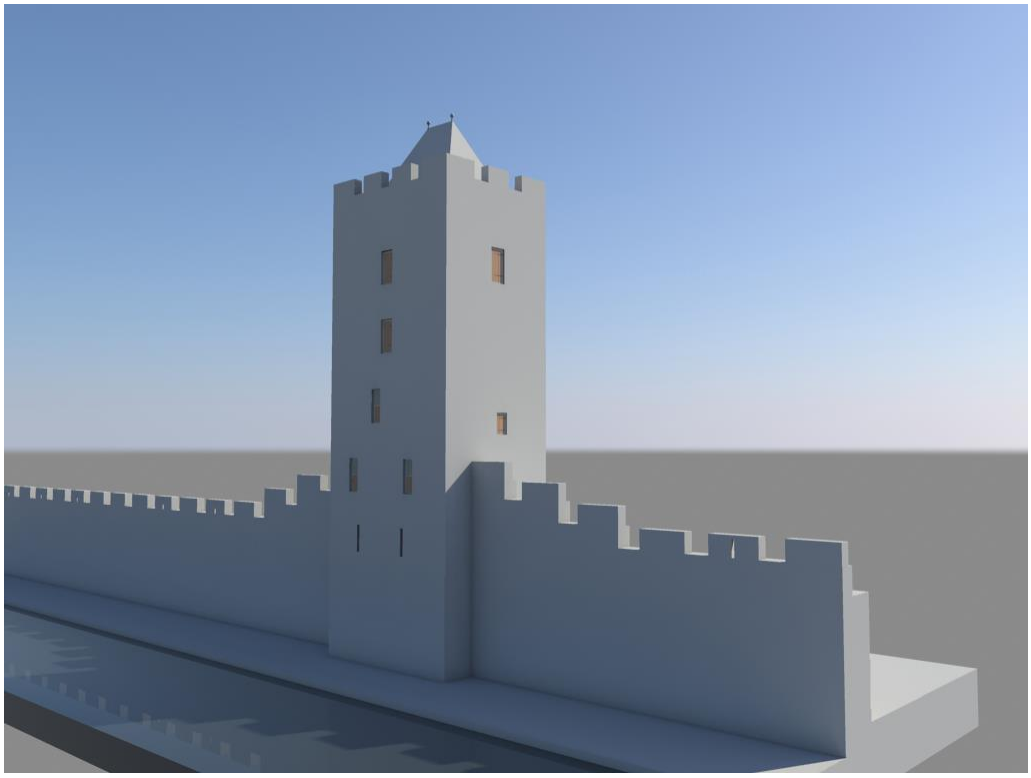


Figure 17, 3d reconstruction of the Smeetoren around 1200 by D. Claessen.

The second tufa foundation, of the Toren bij Servaas (Appendix 1, Servaasbolwerk 2003), provides us a bit more information about the construction of the earliest towers of Utrecht. The recovered foundation was found at 1.48-1.55 metre +NAP, was 9 metres long, 1.25 metres wide and rectangular in shape (Figure 18). Again no corner was found, yet the wall itself was straight. This excludes a rounded layout and supports the theory of towers with a square layout. It was founded on sabulous clay (zavel in Dutch). No wooden foundation construction was found. The walls were made purely out of tufa. It can be said that the walls of the oldest towers most likely measured between 1.25 and 2.6 metres, perhaps less above ground, around 1 to 1.5 metres. Combining both historical and archaeological sources we can confirm the existence of at least two tall square tufa towers: the Smeetoren and Toren bij Servaas, dating back to the first phase of Utrecht's town defences.

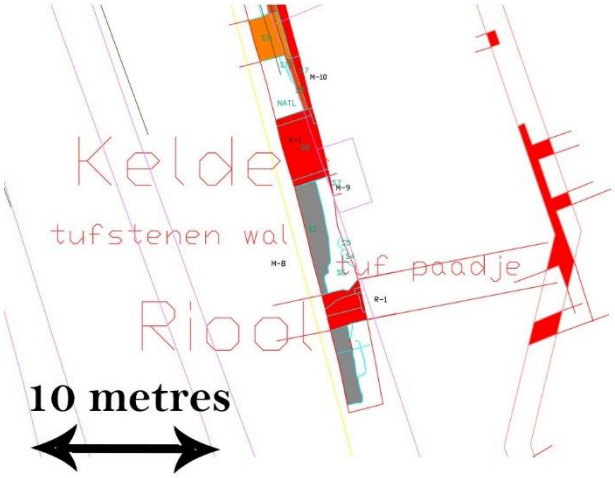


Figure 18, field drawing of the excavation of the tufa wall of the Servaastoren. The top grey feature is the tufa wall. After original field drawing (UD-SER002)

5.3 The creation of the first town defences

To date the initial defences of Utrecht one has to look at the dating of the earthen rampart and the towers. However before we do that we need to take a look at the existing theories surrounding the origin of the town walls.

There are two theories about the date of creation of the first defences by Van der Vlerk and Calkoen. Van der Vlerk takes the year 1122, in which the town privileges of Utrecht were approved by Henrik V as the date of inception of the first defences. In 1122 a document was written by Emperor Hendrik V which stated that he accepted and confirmed the town privileges granted to the citizens of Utrecht by bishop Godebald several years beforehand. Whether to accept 1122 as the year in which the first town walls were built has been a point of debate between scholars over the years. The right to build a wall was indeed given to a town when it was granted town privileges (Van der Vlerk 1983, 80). However, Utrecht's town privileges can be dated back to before 1122. Godebald was anointed by Hendrik V in 1114 and was the one that actually granted the town privileges to Utrecht, which were accepted by Henrik V in 1122 (Van der Vlerk 1983, 41; Van Vliet 2000, 74). This would suggest that the first town privileges (granted by Godebald) originate from the period between 1114 and 1122. Because the right to

build a wall coincides with the granting of town privileges it is possible that the initial defences were built somewhere between 1114 and 1122.

While van der Vlerk uses the year 1122, C.G. Calkoen offers a second theory and argues for a considerably earlier date (Calkoen 1903, 1-3). He states that it is likely that the first parts of the wall were erected under bishop Koenraad, who ruled from 1076 to 1099. The stronghold of the bishop of Utrecht was still in working condition and the population (not more than 3000 at this point) was still small enough to fit into it (Van Schaik 2000, 249). During an attack the population would take shelter within the walls of the stronghold. Only after 1076 with the fall of the stronghold IJsselmonde can reasons be found for the fortification of Utrecht. This stronghold northwest of Utrecht defended the town against invasion from Holland. Because of the fall of IJsselmonde no more outposts lay between the soldiers of Holland and the town of Utrecht. Therefore Utrecht was driven back to a defensive position and the town of Utrecht itself. Calkoen argues that bishop Koenraad van Zwaben would have built an earthen wall stretching from the *Catharijnepoort* to the *Plompetoren* to defend Utrecht from attacks from the northwest (for their locations see Appendix 3, map phase 1) (Calkoen 1903, 1-3). This wall would have been roughly 1.2 km long. Considering the historical developments this interpretation could be a theoretical possibility, yet the only real evidence he presents is the discovery of a coin faced with bishop Koenraad. This coin was found during the taking down of the town walls in 1839 and cannot be placed in a specific layer or location (Calkoen 1903, 2-3). Another thing to keep in mind is the fact that this coin could be lost anywhere after the reign of bishop Koenraad. This theory can be considered as a possibility, yet a lot more hard evidence needs to be found to prove it. One cannot assume that a structure is a certain date when all that was found was a coin.

Four excavations offer us archaeological insight into the dating of the first defences of Utrecht: Jan Meijenstraat 1979, Nieuwe Kade 1988, Lange Smeestraat 1973 and Servaasbolwerk 2003. At the Jan

Meijenstraat several structures were found: a dyke, shoring equipment and the earthen wall. During this excavation it came to light that no town defences stood in the north-western part of town until the 13th century. The earliest structure found was the dyke, according to ceramics sherds (kogelpot and pingsdorf) found beneath its foundation it dates back to the 11th century (De Groot 1981, 44-47). This structure kept the Vecht at bay just north of the Waterstraat (Figure 19). Sometime after the construction of this a row of oak poles was constructed at its foot on the river side. The space between the dyke and oak poles was then filled and equalized. More indications for a northward expansion of the shoreline can be found in the shoring equipment that was recovered. These structures were dated between 1050 and 1125 based on ceramic finds (pingsdorf) and were located further north (Figure 19). This indicates that the shore expanded to the north until it reached the levee found at the Oranjestraat, dating back to the end of the 12th century. No sign of a town defence can be found on this location until the 13th century, effectively disproving the theory proposed by C.G. Calkoen. The shoring equipment found supports the idea that there was a harbour located on this very location until the 13th century as mentioned by Van Vliet (Van Vliet 2000, 55).

The second excavation that offers insight into the dating of the town defences of the first phase is the Nieuwe Kade. Here a brick retaining wall was recovered, supporting the earthen wall (Appendix 1, Nieuwe Kade 1988). This brick wall could be dated to the 13th or 14th century through the brick dimensions (30x14x7 centimetres) and was most likely a later addition to the earthen wall. As mentioned above, the Vecht flowed at this location until the late 12th century. This means that although the brick wall can be a later addendum, it does provide us with a *terminus ante quem* of the 12th century for the earthen rampart.

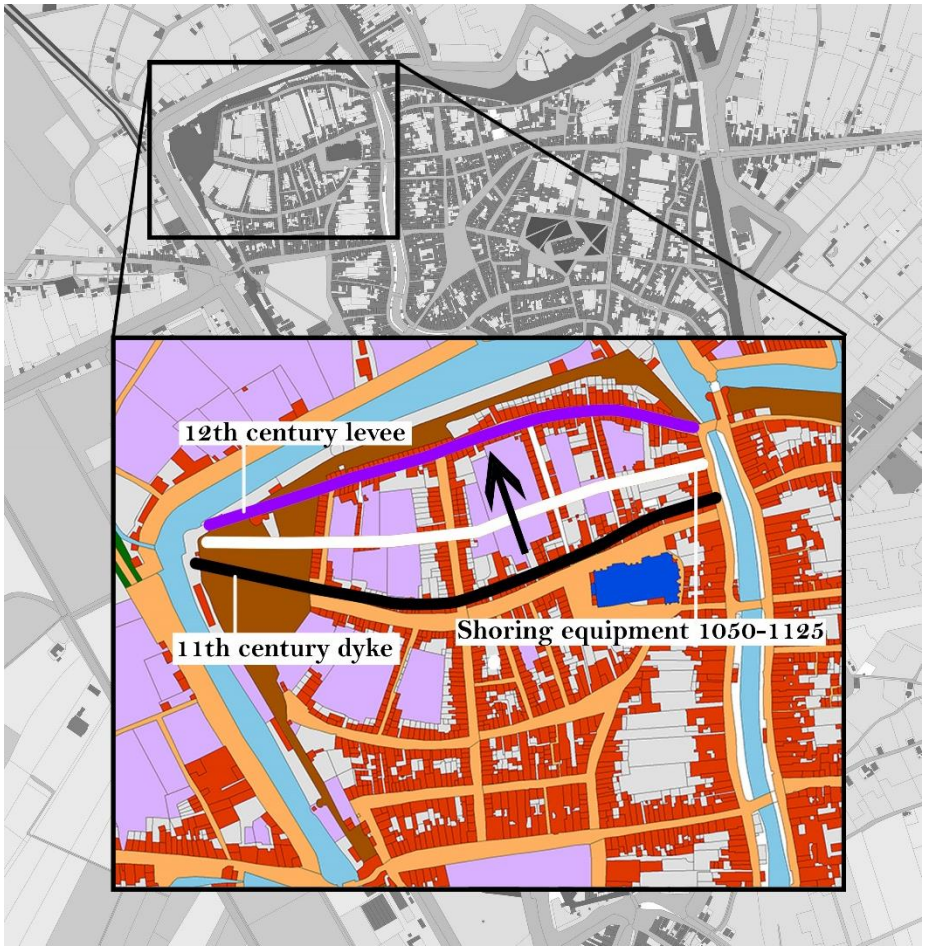


Figure 19, the development of the north-western area of Utrecht. From the 11th to the 12th century the river slowly retreated north. In black the 11th century dyke, white the shoring equipment dated to 1050-1125 and in purple the 12th century levee, by author.

The third excavation provides us with the oldest datable find was recovered. During the excavation of the tufa foundation of the Smeetoren in 1973 (Appendix 1, Lange Smeestraat 1973). During this excavation the foundation stone of the Smeetoren was found (Figure 20), on which the year of its construction was inscribed: 1145. This places the oldest datable find of the fortifications firmly in the middle of the 12th century.

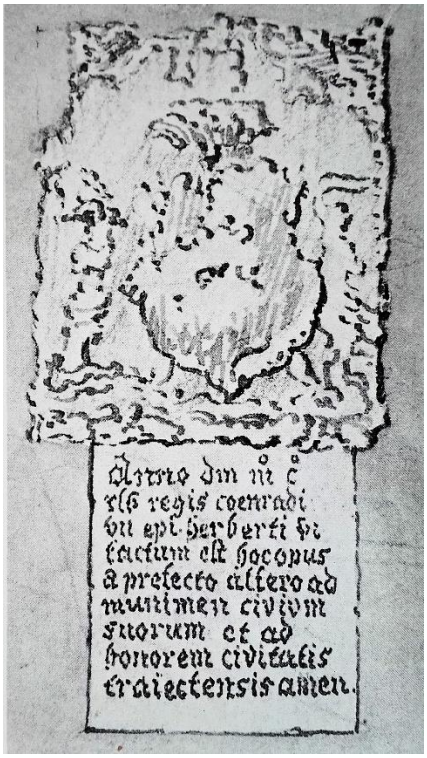


Figure 20, the foundation stone of the Smeetoren. This stone found at the excavation in 1973 is a 15th century replacement for the original foundation stone. It states the date of construction: 1145. The translation of the original Latin is: 'In the year of our Lord 1145, the seventh year of King Koenraad and the sixth of bishop Hartbert, this structure has been erected by sheriff Alfer' (After Van Vliet 2000, 78).

At the fourth and final excavation, a second tufa foundation was found, this time on the southeast side of town at the Servaasbolwerk (Appendix 1, Servaasbolwerk 2003). This foundation was discovered at the location of which Van der Vlerk states that the Toren bij Servaas would have stood. It was rectangular in shape, measuring 9 metres long and 1.25 metres wide, see Table 2 (Appendix 1, Servaasbolwerk 2003; Van der Vlerk 1983, 3). Although no other datable finds were made at this location, the use of tufa does place this tower before the brick defences starting in the late 12th century.

Two conclusions can be drawn considering the archaeological evidence. First, Calkoen's theory is disproved: on the very location he argued that the defences were constructed in the 11th century, clear evidence has been found for the contrary. At the Jan Meijenstraat the earthen

rampart, as first element to be constructed of the town defences, was constructed no earlier than the late 12th century. Second is the actual dating of the initial town defences. Taking into account all of the above mentioned excavations the earliest date to be attached to the town defences is 1145, the year in which the Smeetoren was constructed. Since it is logical to first construct the earthen rampart and then add the towers it is likely that the initial town defences were constructed somewhere before 1145. Therefore a *terminus ante quem* of 1145 can be established for the initial town defences. After which the construction continued into the 13th century as seen at the Jan Meijenstraat's earthen rampart and retaining wall.

5.4 Summary

Taking into account all of the data, a reconstruction can be made (Appendix 3) and several conclusions can be drawn. The oldest defences can be dated back to somewhere shortly before 1122 through historical sources and to the middle 12th century (1145) through archaeological methods, based on the excavation of the foundation stone of the Smeetoren at the Lange Smeestraat in 1973. While the archaeological evidence states a later date, it is likely that somewhere shortly before 1122 the construction of the defences started. The Smeetoren, which gave us the year 1145, was not likely to be the first aspect constructed. Once the town privileges were granted by Godebald, the construction of the canals began and was most likely completed in several years (as one cannot dig out half a canal and then stop). Then when the canals were dug and the earthen wall was erected one could think about fortifying the walls more, depending on necessity and threats from the outside. Second, the earthen wall's circuit largely follows the medieval stone wall's trace inside the town moat with an exception for the north-western part of town where no wall stood until the 13th century, confirming the theory proposed by Van der Vlerk and Van Vliet. Additionally several conclusions can be drawn about the construction of the town defences in the first phase:

1. The town defences of the first phase in Utrecht encompassed a town moat, an earthen rampart and stone towers.
2. The earthen wall was circa 2.5 metres high and at least 5 metres wide.
3. At least two towers were made of stone (tufa) and were square, as can be learned from the archaeological evidence found at the Lange Smeestraat and the Servaasbolwerk and the historical sources such as the measurement of the Smeetoren in 1864.

About the development of the first phase not much can be said archaeologically, whether it was a single or multiple phased structure remains unknown. To find out if the first defences were a plan or process, a single phased or multiple phased structure, more excavations are needed. These excavations would have to focus on the stratigraphy of the earthen wall and its surrounding structures.

6. The Town defences of Utrecht: Phase 2

For the second phase a more extensive reconstruction can be made, both historically and archaeologically. For one because old maps show us (if somewhat distorted) the layout of the defences through the eyes of contemporary citizens and many more structures were erected, leaving behind more for us to find. The first thing the enemy encountered while laying siege on Utrecht in the second phase was still the town moat. Stretching all around the town this in itself already provided a considerable challenge and it was further enhanced with well-placed thorn bushes on the outside of the moat and on the inside below the wall (Van der Vlerk 1983 1983, 49).[3] In opposition to the first phase, the wall of the second phase is erected out of brick and surrounds the entire town. Two stone retaining walls were also built surrounding the town

Figure 21, map of Utrecht, showing the situation at the end of the 16th century (Braun and Hogenberg, 1572).

[3] Although this was a perfectly good defence during the summer, it was not the case in the winter. When the water froze over, it posed a serious breach in the defence of Utrecht, so when that happened each guild was responsible for the removal of the ice in front of their slag. The town itself took care of the water around the town gates (Van der Vlerk 1983 1983, 50).

moat on town and country side and the gates were constructed out of brick as well. Numerous excavations result in a large dataset to consult. Yet we need to keep in mind that most of this dataset can only reveal to us information about the foundation of the town defences, as almost everything aboveground was destroyed in the 19th century when the town walls were torn down to make place for the ever expanding town. This was done because the fortifications were not in use anymore and were extremely deteriorated. The first gate was torn down in 1842 and the rest of the town wall followed suit in the rest of the century (Van der Vlerk 1983, 94).

In this chapter the goal will be to recreate the circuit and construction of the town walls of Utrecht as they stood from the 13th to the 15th century. In order to do that it is necessary to create a reconstruction using the historical sources as well as the archaeological excavations that took place over the last century. While reconstructing the town walls the validity of several historical statements about the town walls will be tested. The questions of chapter 2 that have remained unanswered in the last chapter shall be taken into consideration as well: to which type of gate mentioned by Janse and Van Straalen (Figure 3) do the gates of phase 2 in Utrecht correspond? Was the wall constructed as a shield wall backed by an arch construction or something different? Were the towers indeed built with rounded walls? The core data of the excavations can be found in the tables below. The gates (Table 3), the towers (Table 4), the town walls and its adjoining elements such as buttresses (

Table ***5***) and the retaining walls of the moat (Table 6) have all been listed in separate tables. First we look at the circuit of the town defences and after that the construction and dating.

Table 3, the gates of phase 2. The core data of the excavations listed in Appendix 1, concerning the gates of the second phase of the defences of Utrecht. Their location can be found in Appendix 3 in greater detail. Brick sizes are in centimetres.

Excavation	Element	Brick	Dimensions	Foundation	Dating
ii. Noord-Oostelijk deel van de Stad 1974	Weerdpoort	32x16x8	Outer diameter of the towers: 6m Tower walls: 1m wide	X	13th century
xi. Wijde Doelen 1948	Tolsteegpoort (East) east wall	30x15x7	X	X	13th century
	Tolsteegpoort (East) wall	32x15x7.5	X	X	13th century
	Tolsteegpoort (East) wall	30x14x6	X	X	15th century
xii. Twijnstraat 1985	Tolsteegpoort (East) Two towers, the connecting wall and a side wall	30x15x7	Outer diameter of the towers: 4.8m Tower walls: 0.6m wide Walls of the gate building: 1 to 1.5m wide	X	14th century
xiii. Tolsteegpoort 1998	Tolsteegpoort (West	X	X	X	13th century

Table 4, the towers of phase 2. The core data of the excavations listed in Appendix 1, concerning the towers of the second phase of the defences of Utrecht. Their location can be found in Appendix 3 in greater detail. Brick sizes are in centimetres.

Excavation	Element	Brick	Dimensions	Foundation	Dating
ii. Noord-Oostelijk deel van de Stad 1974	Lauwerstoren	X	X	X	X
	Unnamed tower	X	X	X	X
iii. Van Asch van Wijcks-kade 1973-74	Wollewevers-toren	28x14x7	Rounded with outer diameter: 12m	2.1 m wide	Late 14th century
xiii. Tolsteegpoort 1998	Rode Toren (West) The corner of the square tower	31-32.5x15-15.5x8.8 10-layer: 106	X	X	13th century
xvi. Vredenburg-knoop 2011-13	Pulvertoren	31x12x5.5 10-layer: 70	0.75m high	Foundation at 0.75m – NAP	15th century
	Wantsnijders-toren	X	X	X	X
xx. Weerdsingel-Nieuwe Kade 2001	Brouwers-toren (Toren het Paard)	27x16.5x6.5 10-layer: 92	X	X	13th century
xxii. Zeedijk 2016	Tower (Bemuurde Weerd)	X	Horse-shoe shaped	Foundation 1.2m wide at 0.49m – NAP, on vertical wooden poles in	Most likely 14th century

				sabulous clay	
xxv. Gruttersdijk 1980	Tower (Bemuurde Weerd)	29-30x14.5x6-6.5	Horse-shoe shaped The walls of the tower are 0.9m wide	X	Likely 14th century

Table 5, the town walls of phase 2, the core data of the excavations listed in Appendix 1, concerning the town walls of the second phase of the defences of Utrecht. Their location can be found in Appendix 3 in greater detail. Brick sizes are in centimetres and all bricks found were whole.

Excavation	Element	Brick	Dimensions	Foundation	Dating
i. Jan Mijenstraat 1973	Town wall (shield wall and arch construction)	30x15x7	Shield wall: 0.85m wide Arches: 4.5m apart	1.9m wide	14th century
ii. Noord-Oostelijk deel van de Stad 1974	Town wall	X	X	X	13th/15th century
iii. Van Asch van Wijcks-kade 1973-74	Town wall	30x14-15x6.5-7	X	X	14th century
iv. Van Asch van Wijcks-kade 1976	Town wall	28x15x6 10-layer: 76	X	X	Late 14th century
	3 buttresses	X	1.5m wide 7m apart	X	14th/15th century
v. Lepelenburg 1998	Town wall	X	X	X	X
vi. Lepelenburg 1972	Town wall	X	X	3-4.2m wide	X

vii. Servaas-bolwerk 2003	Town wall	32x17x9	1.9m wide and 0.95m deep	On sand at 0.42m –NAP	13th century
	Town wall	X	0.6m wide 2m long and 0.45 deep	On sand at 0.44m –NAP	14th century
vii. Zochertsplantsoen 2009	Town wall	28x15x9 10-layer: 91	X	X	14th century
ix. Manenburg 1948	5 buttresses	32x15x8	1m wide 7 metres apart	X	13th century
x. Wijde Doelen 1984	Town wall	32x15x7-8 10 layer: 87.5	Shield wall: 0.9m	Built on brick arches below ground	Late 13th, early 14th century
xiii. Tolsteegpoort 1998	Town wall	32x15.5-16x8.5 10-layer: 92	X	X	13th century
	Town wall	31-32x15-16x8 10-layer: 88	X	X	13th century
xix. Vredenburg proefsleuven 2006	Town wall	29.5x16x7	1.2-1.9m wide	2.2m wide at 0.4m –NAP	14th century
xxi. Nieuwe Kade 1982	Town wall	33-33.5x15-16x7-7.5	Shield wall: 0.8-0.9m wide	X	Late 13th/ early 14th century

	Buttresses	X	1-1.2 long and 1 m wide (3.2m apart)	X	13th/14th century
	Town wall	29.5-30x13x6.5-7	X	Foundation 2.1m wide	Late 15th/ early 16th century
xxii. Zeedijk 2016	Wall (Bemuurde Weerd)	X	0.9m wide	On sabulous clay, no poles	Most likely 14th century
xxiii. Keizers-gracht 1984	Wall (Bemuurde Weerd)	30x15x6	1m wide	Foundation contained trass	14th century
xxiv. Lauwerecht 1987	Wall (Bemuurde Weerd)	X	X	X	X
xxv. Gruttersdijk 1980	Wall (Bemuurde Weerd)	29-30x14.5x6-6.5	0.9m wide	X	Likely 14th century

Table 6, the retaining walls of the moat of phase 2, the core data of the excavations listed in Appendix 1, concerning the retaining walls of the moat of the second phase of the defences of Utrecht. Their location can be found in Appendix 3 in greater detail. Brick sizes are in centimetres.

Excavation	Element	Brick	Dimensions	Foundation	Dating
xiv. Tolsteeg-singel 1975	Town moat retaining wall (country side)	32-34x16-17x8	X	Masonry contained trass	13th century
xvii. Catharijne-singel 2013-14	Town moat retaining wall (country side)	28-30x13-14x6.5-8	1m wide at the top	No foundation poles found	First half of the 14th century

xviii. Catharijne-singel 1972	Town moat retaining wall (country side)	29-30x14-15x6.5-7 10-layer: 80	X	X	14th/15th century

6.1 The circuit of the town defences

Using maps, historical sources and archaeological research an excellent reconstruction can be made of the circuit of the fortifications of Utrecht in the period between the 13th and 15th century. A general idea can be gleaned from the maps of Braun Hogenberg (Figure 21) or Specht (Figure 22). The authors of these maps made in the 16th and 17th century would have had the chance to see the town defences in their full glory. Moreover it has been said that the maps of this era were very accurate, making them useful when reconstructing the circuit of the town defences (van der Vlerk 1983, 45).

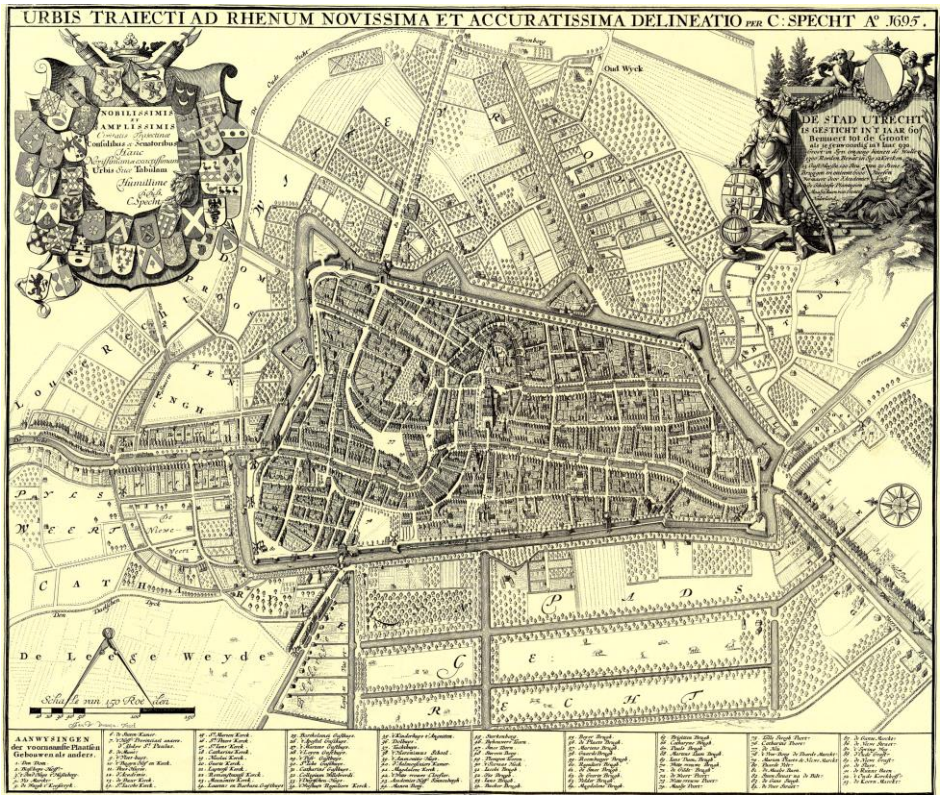


Figure 22, map of Utrecht, showing the situation around the end of the 17th century (Specht 1695).

However, one has to keep in mind that these maps show not just the medieval defences but the defences as they would have existed in the time of the creation of the maps (16th or 17th century). This means that the post medieval bulwarks and earthen strongholds, constructed to strengthen the defences in the 16th century, are depicted as well. Using the archaeological evidence it is possible to test the validity of these historical maps and therefore test the accuracy of their tracing of the town wall. Moreover it is important to take into consideration the geographical inaccuracy of these historical maps. While the overall picture of maps such as Braun's (Figure 21) seems to be correct, the historical maps still portray a warped reality. When trying to align the map of Braun to the current topographical maps, they did not align. Therefore the cadastre of 1832 has once again been used as a background on which the town defences are projected.

The georeferencing of the excavations of the last decades provides us with the possibility to pinpoint the exact locations of specific parts of the town defences and validate, or disprove, the historical maps. In the following paragraphs the elements of the town defences that have been recovered will be listed in order to recreate the circuit. We start with the gates, then the towers and to conclude the wall itself.

Two of the gates have been located. First of all the Tolsteegpoortcomplex, which was found during the excavations at Wijde Doelen in 1984, Twijnstraat 1985 and Tolsteegpoort 1998 (Table 3; Appendix 1). These excavations have provided us with the exact location of the Tolsteegpoort-complex and its layout (more on that later), see Figure 23. Second, on the north side of town, the Weerdpoort was excavated, during the project at the Noord-Oostelijk deel van de stad in 1974 (Table 3 and Appendix 1), see Figure 39. The location of these two gates coincides with what we know from the maps of Braun and Specht. However, the east gate, the Wittevrouwenpoort, has not been recovered and of the west gate, the Catharijnepoort, only post-medieval remains were found. So not much can be said for those two.

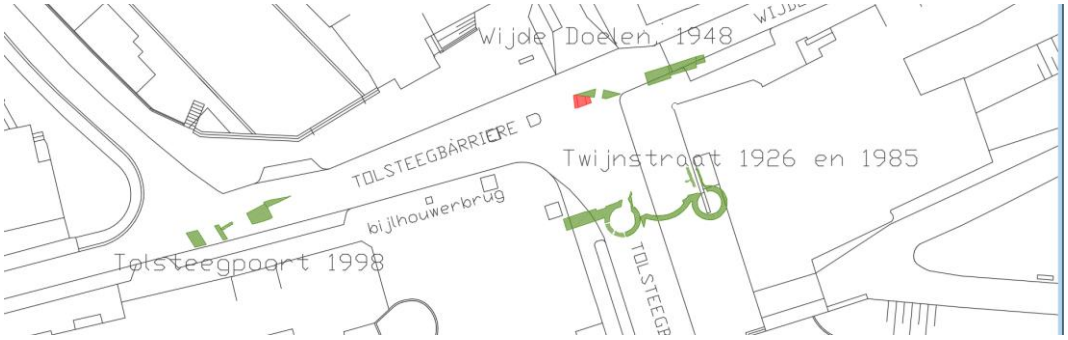


Figure 23, the excavations of the Tolsteegpoort-complex. On the background the cadastre of Utrecht, making it possible to pinpoint the exact location of the medieval gate, by author.

Furthermore five towers have been excavated. The first two at the location of the Bemuurde Weerd (more on that later): the Tower at Zeedijk and the Tower at Gruttersdijk. The third on the north side of town, namely the Wolleweverstoren. In the south the fourth tower was excavated: the Rode Toren and in the west the fifth and last: the Pulvertoren (tower for powder storage) was found (Appendix 1; Figure 24; Table 4). No towers were found on the east side of town dating back to the 13th to 15th century. All of these towers once again confirm the circuit we see on the historical maps mentioned above.

Finally, on 17 locations spread out over the north, east, south and west sides of the town, remains of the town walls have been found. These excavations are too great in number to mention separately by name in the text, but can all be found in Appendix 1 (and their location in Appendix 3). Once again we find no surprises in the locations of these walls. It seems that the historical maps, especially the one by Specht (Figure 22), show us a pretty accurate image of the layout of the town defences.

Combining the excavations and projecting them on the same cadastre of Utrecht that was used in the previous chapter for phase 1, a recreation of the circuit has been made. Included are the remains of the earliest defence such as the Smeetoren. Shown in Figure 24 is the circuit of the town walls during the period from the 13th to the 15th century. The precise location and what was excavated can be found in Appendix 1 and C respectively.

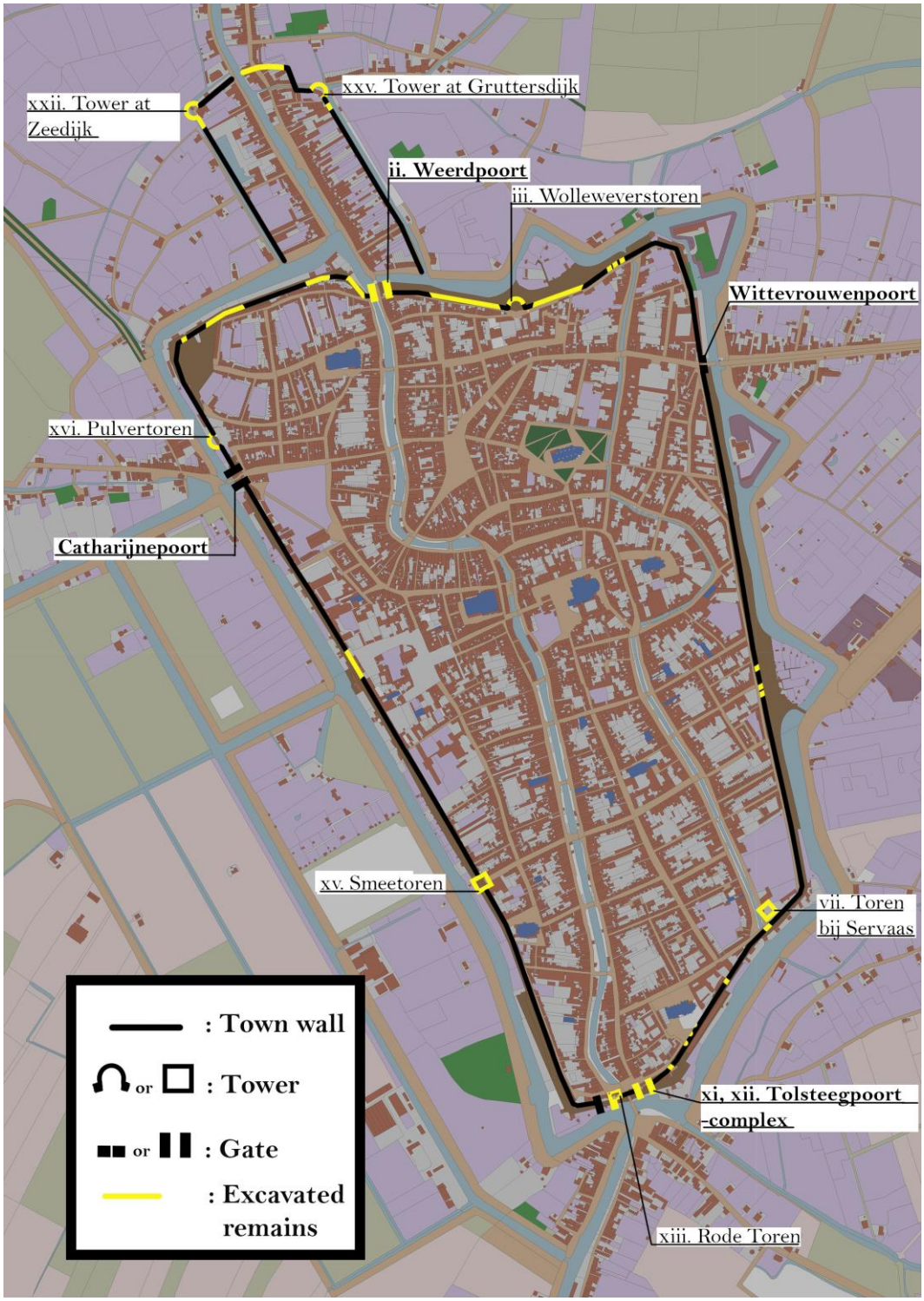


Figure 24, circuit of the town wall between the 13th and 15th century. Based on excavated remains of the town wall on a background of the cadastre of Utrecht in 1832 from HISGIS. In yellow the excavated remains. Keep in mind that this is a rough indication of the elements excavated: e.g. from the Smeetoren, not everything was recovered. For greater detail see Appendix 3. By author.

The stone wall's trace is very similar to the supposed trace of the earthen wall of phase 1, with two notable differences. The first difference is the Bemuurde Weerd. This new suburb was most likely already inhabited by the end of the 13th century. A reason for its creation can be found in the deportation of the craftsmen responsible for the most pollution or danger to their surroundings. Moving those craftsmen (for example potters with their relatively dangerous ovens) out of the town left the town a safer place. Located to the north of the Weerdpoort this suburban neighbourhood was surrounded with a stone wall and a moat measuring 4 metres wide around the year 1330 (Van Hoven Van Genderen 2000, 136-137). The wall itself has been mentioned in conflicts such as the siege of 1483 when Archduke Maximillian attacked Utrecht and the Bemuurde Weerd was breached by his army (Struick 1983, 28-30).

The two georeferenced excavations of the towers at Grutterdijk and Zeedijk (Appendix 1, Gruttersdijk 1980; Zeedijk 2016), confirm the location of the wall surrounding this suburb as depicted on the historical maps (Figure 21; Figure 22). The tower and its connecting wall at Zeedijk confirms the north-western corner of the wall surrounding the suburb. The Tower at Gruttersdijk and its nearby wall confirm the existence of a tower at that location, where on the map of Braun an inlet in the north-eastern part of the wall is depicted. These excavation furthermore prove that the stone wall was indeed built in the 14th century, as can be deduced from its brick dimensions (Table 5). The brick wall surrounding the Bemuurde Weerd was 1km long in total. The area of the Bemuurde Weerd measured roughly 450 by 90 metres or 4.05 ha (0.4 km^2).

The second notable difference from the first phase is the town wall in the northwest of Utrecht. The stone wall here lies further north than the earthen predecessor. This was caused by the deposition of sand by the Vecht in the bend of the river. From the 11th to the 12th century the embankment moved slowly north until it reached its current state at the end of the 12th century, as described in detail in chapter 5.1 (De Groot 1981, 44-47). This addendum to the town wall accounts for an expansion

of the circuit by 500 metres, bringing the total length of the town wall to 5400 metres, encircling a surface of roughly 146.1 ha. Adding the Bemuurde Weerd to that amount Utrecht's town walls now encompassed an area of 150.15 ha or 1.5km^2.

6.3 The construction of the wall

It is possible to reconstruct the appearance of the town wall using written sources, but while the archaeological evidence confirms most of the assumptions made (such as the width of the wall and it being constructed out of a shield wall and arch construction), some aspects are contradicted. Van der Vlerk mentions for instance that the constructing method of arches to save bricks was not used in the town walls foundations, yet evidence for this has been found at Wijde Doelen in 1984. Here the foundations of the wall may have rested on such a construction of arches underground to save bricks (Appendix 1, Wijde Doelen 1984).

Van der Vlerks states that the medieval town walls were circa 4 to 5 metres high, yet this seems unlikely. Although no archaeological excavations revealed the full height of the town wall, but only the foundations and sometimes the lower part of the actual wall, several historical drawings give us an indication for its greater height. On Saftleven's drawing of the town walls and several towers along the Catharijnesingel (Figure 25) we can clearly see that the walls surpass the 5 metres by far. Although no exact measurements can be drawn from a centuries old drawing, considering the inaccuracies, we can say that on this location the wall surpassed the 5 metres and was most likely 8 to 10 metres tall. A second drawing that gives us insight into the height of the wall is a drawing of the Bijlhouwerstoren from the early 17th century. On this we see the Bijlhouwerstoren, connected to the 15th century town wall. Combining this drawing with the measurement of the Bijlhouwerstoren from 1872 we can see that the lowest windows depicted in the tower would have been located 6.5 to 7 metres above the ground. The connecting wall on the far side is a bit higher than that still, supporting the aforementioned height of 8 to 10 metres. Taking into

account the height of the wall depicted on the historical drawings and the fact that in other towns, such as Den Bosch (see chapter 8), the town walls were measured at 7-8 metres as well, we can say that a height of 8 to 10 metres for the walls of Utrecht is not unlikely.

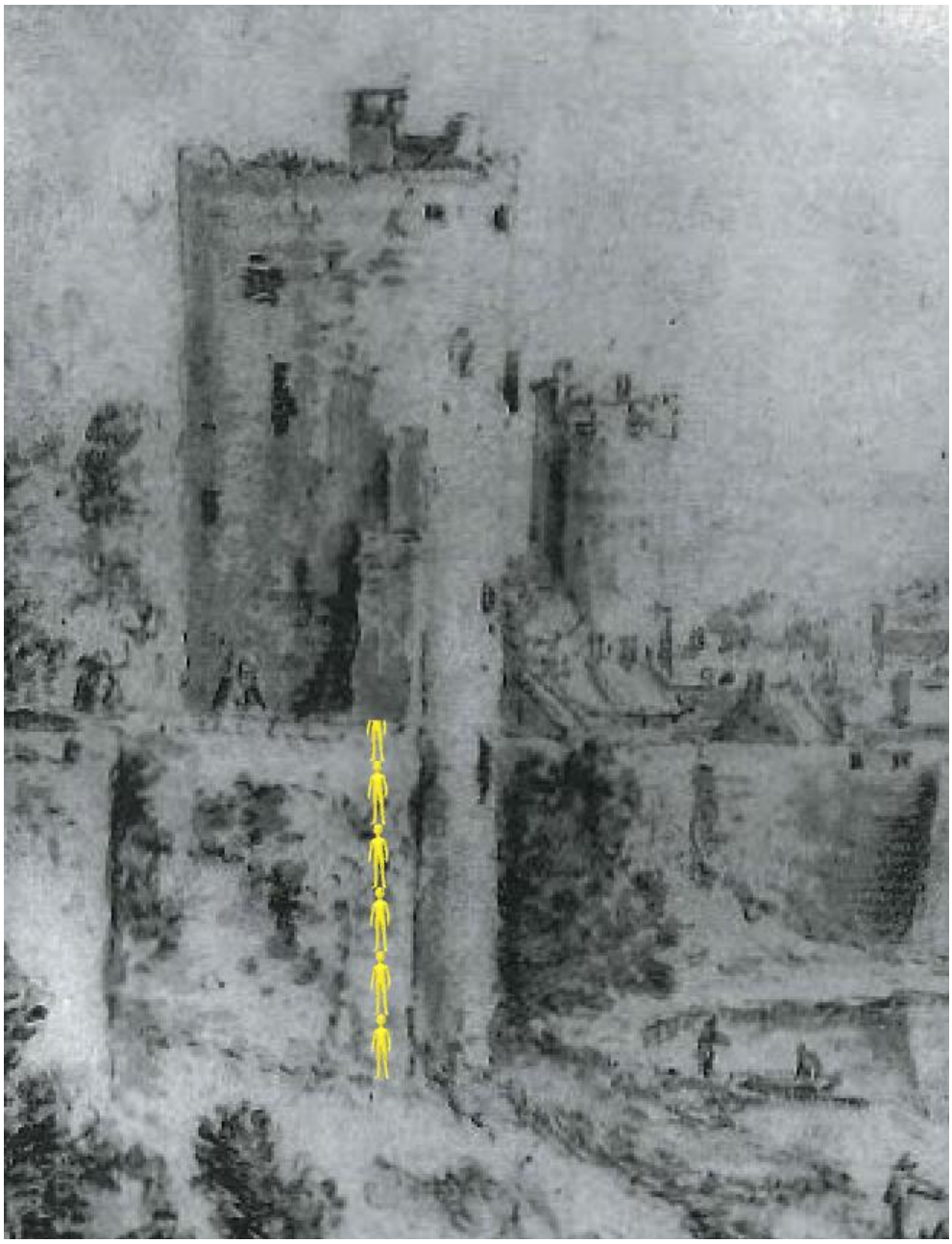


Figure 25, a 17th century drawing of the town wall and towers. Here we can see that the walls were higher than 4-5 metres. Taking the average length of 1.70m, we can stack the man depicted next to the river in order to find the height of the town walls. The height of the wall equals 5.5 men. 5.5x1.7m= 9.35m. Taking into account the inaccuracy of the drawing the length of the town walls still stands roughly between 8 to 10 metres. After H. Saftleven 1642.

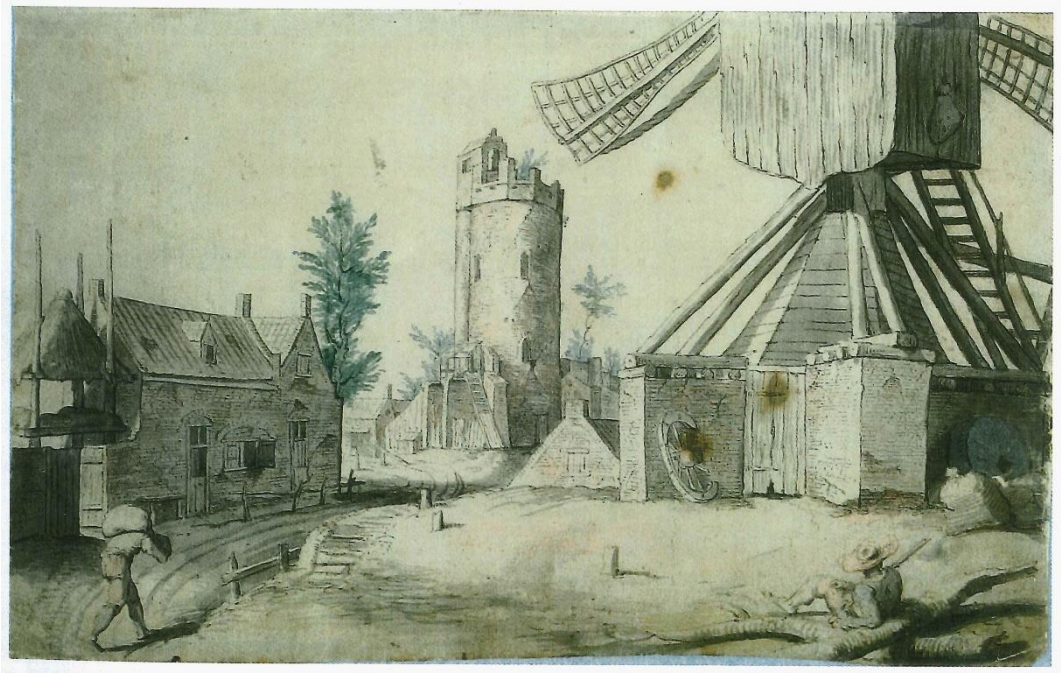


Figure 26, region Abraham Bloemaert, early 17th century. In the background we see the Bijlhouwerstoren, on the right of the tower the connecting town wall, (Unknown, first quarter of the 17th century).

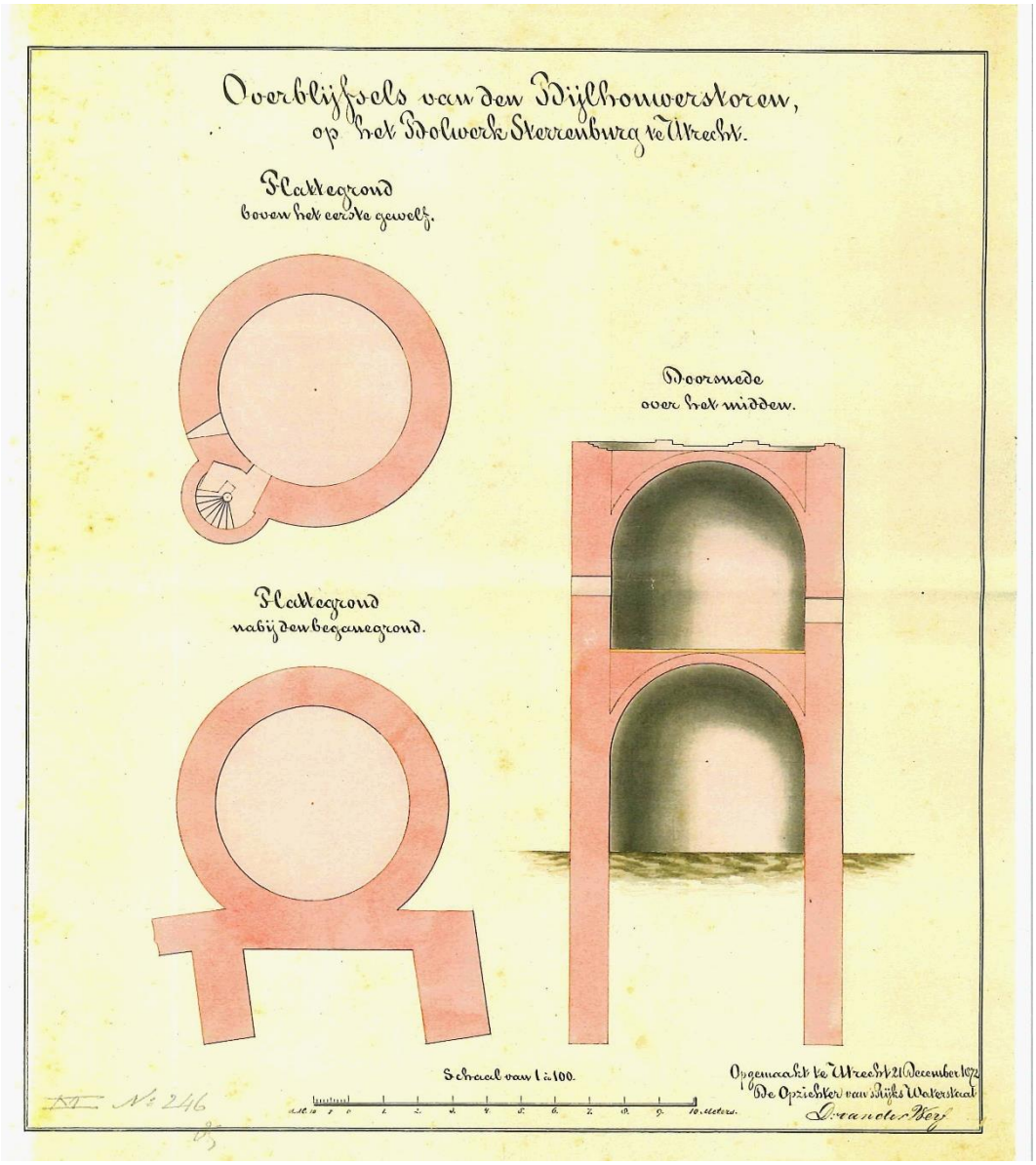


Figure 27, measurement of the Bijlhouwerstoren in 1872, note that the windows are located at 6.5 and 7 metres high (UD-BIJ001).

The wall itself consisted of two parts: an arch-construction on the inside and a solid wall on the outside (Figure 28). According to van der Vlerk the outer wall's width varied between 0.80 metres and 1.50 metres above ground and could be as high as four to five metres. The inner wall contained a wall walk on top of the arches (Van der Vlerk 1983, 53). The excavations confirm this idea. The width of the stone walls recovered was circa 90 centimetres above ground (Appendix 1, Wijde Doelen 1948). It was built using brick, varying in size over the centuries. Where parts of the wall built in the 13th century were built using bricks measuring 32x15.5x8.5 centimetres with a 10-layer measurement of 92 centimetres (Appendix 1, Tolsteegpoort 1998), the bricks in the parts made in the 15th century measured only 28x15x6 centimetres with a 10-layer measurement of 76 (Appendix 1, Van Asch van Wijckskade 1976). All of these walls were built using complete bricks (Table 5), disproving Van der Vlerks statement that the inner wall was often constructed out of broken brick (Van der Vlerk 1983, 53). However the wall itself was indeed constructed out of a shield wall and an arch construction behind it. The shield wall ranges from 80 to 120 centimetres wide.

On the town side of the shield wall remains of pillars have been discovered, which were part of the arch construction on which the wall walk stood mentioned by Van der Vlerk.

This arch construction can be seen at the Nobeldwarsstraat, where the last remaining stretch of wall still stands (Figure 9). These two layers stood on top of each other, saving a lot of brickwork for the inner wall, as only the wall walk would rest on top. The arch construction consisted of two rows of arches above one another, with the first row submerged largely below ground (Figure 28; Figure 29). The recovered pillars measured 1-1.2 by 1 metres and stood circa 3.2 to 4.5 metres apart (Appendix 1, Jan Meijenstraat 1979; Nieuwe Kade 1982).

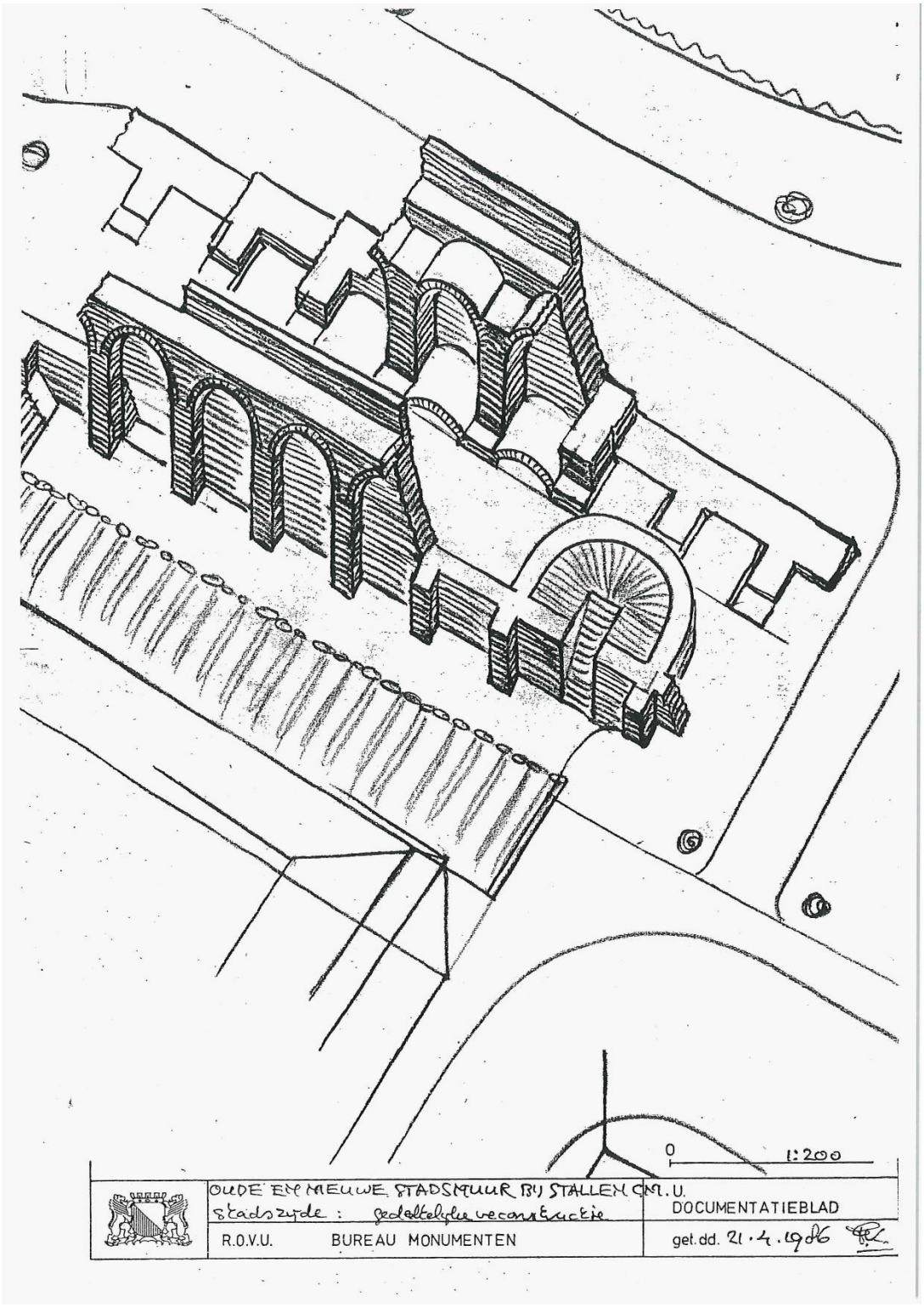


Figure 28, a reconstruction of the old 14th century town wall (below) containing a tower and the new 16th century (above) town wall. Both are constructed out of a shield wall (solid) and an arch construction on the town's side, by F. Kipp (UD-CM003)

On several locations (both in the north and south of Utrecht) only one of these pillars was recovered and dubbed an abutment, see Figure 30 (Van Asch van Wijckskade 1985; Wijde Doelen 1984). It could be that on some locations the wall was not backed by an arch construction, but merely by abutments or buttresses. Figure 29 presents a reconstruction of the

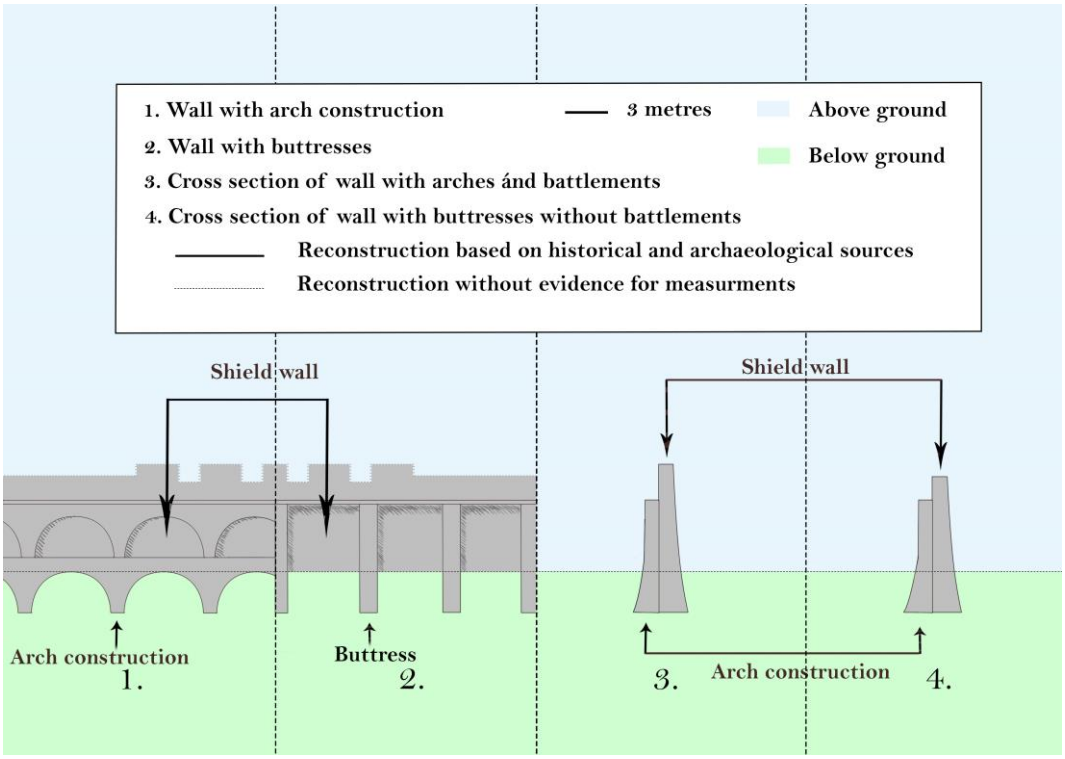


Figure 29, possible reconstructions of the town wall based on excavation results and historical drawings, by author.

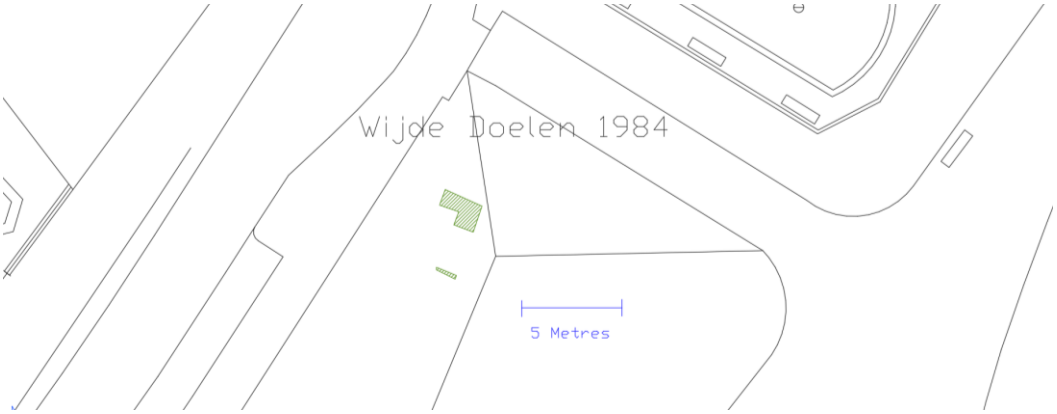


Figure 30, the excavated town wall at Wijde Doelen 1984. Two pieces of the wall have separately been recovered. The L-shaped element is the town wall with its adjoining abutment. After original excavation drawing Wijde Doelen 1984, UD-WD001.

construction of the town wall. One reconstruction contains the arch construction and one contains only buttresses. If the wall was backed only by buttresses it would be unlikely that the wall walk was made of stone. In this particular construction the buttresses would not be able to provide enough support for a stone walk, perhaps a wooden wall walk was in place on these locations. However it is likely that an arch construction was in place on the locations where only one buttress was found as well. Because the only part remaining of the arch construction was exactly that; the buttresses. The arch construction itself was never recovered in an excavations, only on locations where the wall itself was still standing.

On top of the wall there is mention of battlements (kantelen in Dutch) lining the wall, both from historical drawings and writings (Van der Vlerk 1983, 53). Inside the wall there were peep- and shooting holes (kijk en shietgaten in Dutch), from which man could spy or fire on the enemy. Interesting to note is that these holes did not appear to have been constructed in the old wall, only to be drilled in it in a later period (van der Vlerk 1983 53-54). Even though Van der Vlerk mentions battlements on top of the walls (Van der Vlerk 1983, 53), no evidence for this has been found during the excavations. The lack of evidence stems from the fact that in no excavation the top of the wall was recovered. All in all two possible appearances of the top of the town wall can be created (Figure 29): 1. it could contain battlements with the highest point at 2 metres and recesses low enough to look through or shoot at the enemy or 2. the top of the shield wall was flat standing at approximately 1.40 higher than the wall walk providing the possibility of cover and view at the same time. These are all speculations of course, as no evidence has been found to support these claims. These speculations are based on historical drawings from the 16th and 17th century of the walls of Utrecht which show no battlements (Figure 25; Figure 26).

A special case is the wall surrounding the Bemuurde Weerd. Where the town wall itself can be as wide as 4.2 metres at its foundation the widest

foundation found at the Bemuurde Weerd is only 1.2 metres wide. The two towers found at the Bemuurde Weerd (Table 4) were founded on vertical standing wooden poles in sabulous clay to improve the stability of the foundation, more on that later.

This is another point on which the reality clashes with Van der Vlerks theory. She stated that the town wall was founded on the layer of sand to provide stability (Van der Vlerk 1983, 51). The bricks used in this wall are red and mostly uniform in shape with only small deviations, all around 30x15x6 centimetres, pointing to a fast construction of the wall. But more on that later (Appendix 1, Gruttersdijk 1980; Keizersgracht 1984; Zeedijk 2016). No evidence has been found for an arch construction at the Bemuurde Weerd.

6.4 The improved town moat

The town moat was also improved in the second phase. Historical sources mention that in 1348 two retaining walls were built on either side of the river (Figure 2) (Hoekstra 1977, 138). These walls have been recovered in the south, near the east Tolsteegpoort at: xiv. Tolsteegsingel 1975; xvii. Catharijnesingel 2013-14 and xviii. Catharijnesingel 1972 (see Appendix 3 for their location). The walls surrounding the moat were made of red bricks placed in wild verband measuring between 34x17x8 and 28x13x6.5 centimetres and can therefore indeed be dated back to the 14th century. These walls were around 1 metres wide and no extra constructions have been found supporting the foundations (Appendix 1, Catharijnesingel 2013-14). The schutmeestersrekeningen state that the insides of these walls were filled using 'teghelstuken' or broken tiles according to Van der Vlerk (Van der Vlerk 1983, 50), yet no evidence has been found for this. All of the walls recovered were built solely out of brick and mortar (Appendix 1, Catharijnesingel 1972, Catharijnesingel 2013-14; Tolsteegsingel 1975).

6.5 The towers

A lot is known about the towers donning the town walls after the renewal of 1528 by Karel V (Van Schaik 2000, 191-201). On Figure 31 we can see

in detail which tower stood where and what its name was. However, of the towers standing before 1500 less is known. Van der Van der Vlerks historical research states not much else than that the medieval towers would be 'rounded on the outside'. This is because only short entries concerning the towers of this period (13th to 15th century) were found in the historical sources used in her research (Van der Vlerk 1983, 73). So the following excavations provide us with new and valuable information.

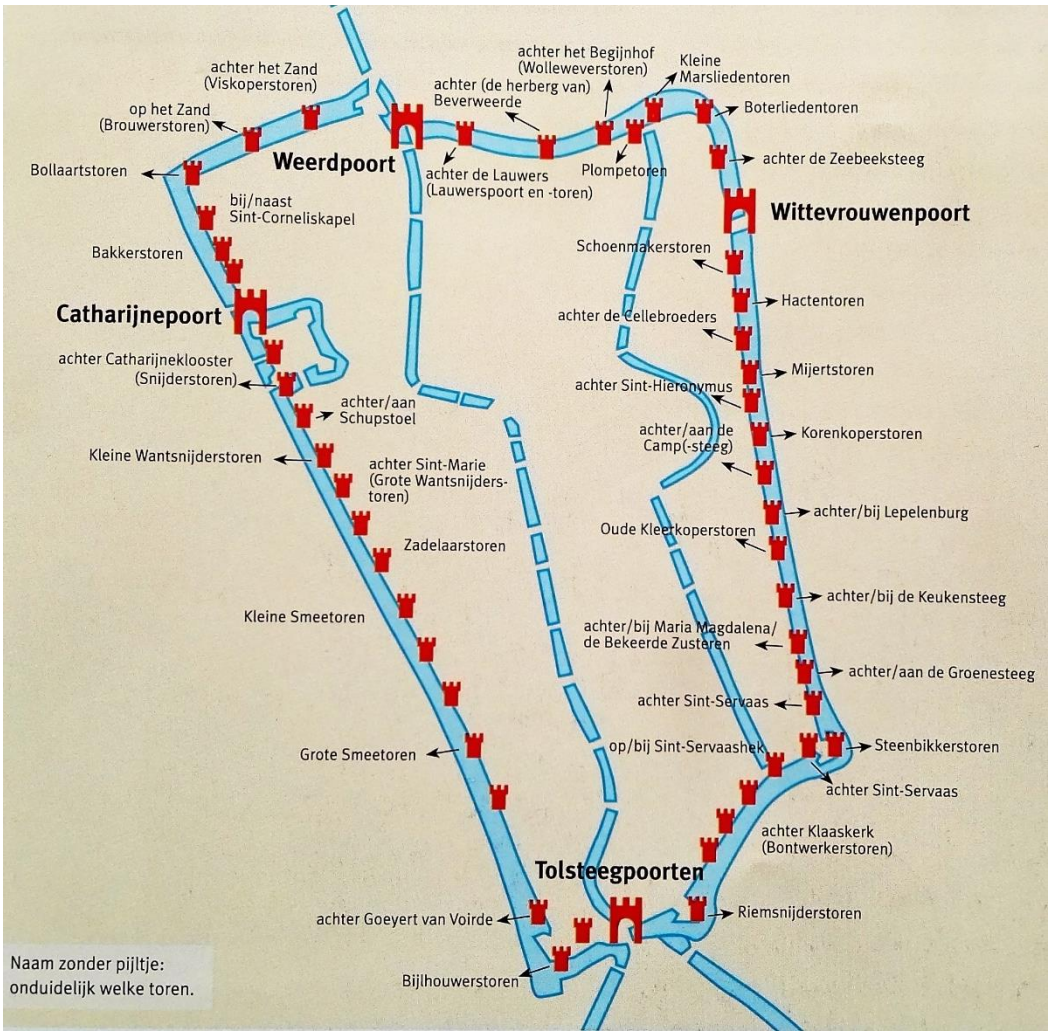


Figure 31, the town wall including its towers and gates shortly after 1500 based on the map of Jacob van Deventer (1560) (Van den Hoven van Genderen 2000, 129).

Seven towers have been recovered from the second phase and are included in Table 4: the two towers at the Bemuurde Weerd, the Wolleweverstoren, the Rode Toren, the Wantsnijderstoren, the

Pulvertoren and the Brouwerstoren (which would be called Toren het Paard in the 16th century (Appendix 1, xxii. Zeedijk 2016; xxv. Gruttersdijk; iii. Van Asch en Wijckskade 1973-74; xiii. Tolsteegpoort 1998; xvi. Vredenburgknoop, 2011-13; xx. Weerdsingel-Nieuwe Kade, 2001). For their locations, see Figure 32 or Appendix 3 for greater detail.

The towers built in the second phase, where horseshoe shaped, with the rounded side towards the countryside and constructed out of brick (Figure 28). Incorporated within the town wall the towers allowed for better protection against enemy attacks than the freestanding towers of the first phase. One exception to this is the Rode Toren found at the western Tolsteegpoort, which had a square layout (Appendix 1, Tolsteegpoort 1998; Table 4). Two more towers were excavated during the project in the Noord-Oostelijk deel van de Stad 1974. Sadly all of their documentation was lost. In the following paragraphs the construction and dating of the seven towers mentioned above will be discussed.

The earliest tower is the Rode Toren, which comes as no surprise because of its square layout. The bricks used to build this tower measured 31-32.5x15-15.5x8.8cm and had a 10-layer measurement of 106. This places the tower in the early 13th century. Not much else can be learned from the excavations as only one corner of the tower was excavated.

The Brouwerstoren is a special case. In the core of the walls of Toren het Paard (Figure 33), 13th century bricks were found that most likely belonged to the Brouwerstoren (Table 4). Van der Vlerk places the Brouwerstoren on the exact location where Toren het Paard was excavated at the Weerdsingel-Nieuwe Kade in 2001 (Appendix 1; Van der Vlerk 1983, 1). Combining this with the fact that during the renewal of the town defences in 1528 by Karel V (van Schaik 2000, 191-201) many of the old towers were torn down and built up again from scratch, causing the remains to be incorporated in the younger towers, we can conclude that this is the location of the Brouwerstoren. This is what

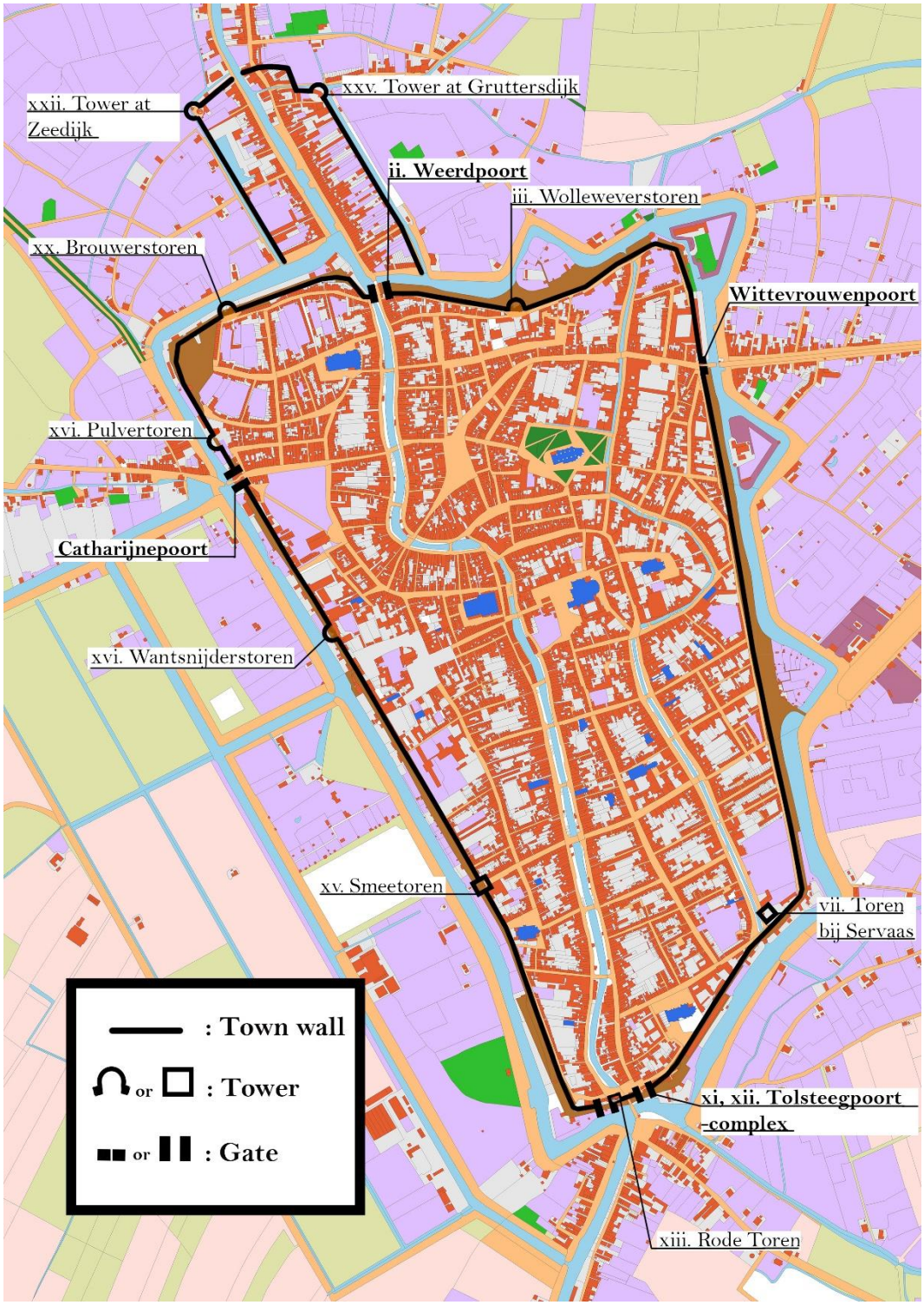


Figure 32, locations of the towers and gates of Phase 2.

happened at the location of Toren het Paard: the older Brouwerstoren was demolished and its bricks re-used in the construction of the more advanced Toren het Paard. Although nothing can be said about the construction of the Brouwerstoren, its location has been found, see (Figure 32).

Figure 33, reconstruction of 16th century Toren het Paard, the successor of the Brouwerstoren.

The next towers to be constructed are part of the suburb the Bemuurde Weerd; the Tower at Grutterdijk and the Tower at Zeedijk. Because we know that the wall of the Bemuurde Weerd was constructed in around the year 1330 (Van Hoven Van Genderen 2000, 136-137). The brick dimensions found at the Gruttersdijk confirm this (Table 4). Measuring 29-30x14.5x6-6.5 places the Tower at Gruttersdijk in the 14th century. Both towers were Horse-shoe shaped and had walls 0.9m wide walls. At the Zeedijk it was discovered that the foundation of the tower was 1.2 metres wide and was supported by vertical wooden poles in sabulous clay at 0.49m –NAP (Table 4). The outer diameter measured at the Zeedijk is 5 metres.

Then in the late 14th century the Wolleweverstoren was constructed (Table 4). The walls of this tower were 210 centimetres wide with an outer diameter of 12 metres. However, this does contain a 17th century shell

wall placed around the medieval tower to fortify it that was roughly 23 centimetres wide. This brings the diameter down to 11.54 metres and the width of the walls to 1.87 metres (Van Asch van Wijckskade 1973-1974). The Wolleweverstoren is an excellent example of the type of tower mentioned by Van der Vlerk. These towers were incorporated in the wall, rounded in shape and most likely horse-shoe shaped at that. Sadly the connection to the town wall could not be found at the Wolleweverstoren which could have confirmed whether the towers were constructed directly into the wall. So while the Rode Toren as the earliest towers of the second phase still had a square plan, the later towers (such as the Wolleweverstoren) were all most likely built with a rounded plan to account for the improved artillery of that day and age.

Only the outermost part of the Pulvertoren was recovered. Inside the recovered walls a latrine was found and it is likely that this tower was used as storage for powder. The foundations were located at 0.75 –NAP. The wall itself was 0.7 metres high and was constructed out of bricks measuring 31x12x5.5 with a 10-layer measurement of 70 centimetres. This places the tower in the late 15th century.

Figure 34, the excavated part of the Pulvertoren (in green) and a reconstruction of how it would have fit in the full tower (blue lines), by author (based on original field drawings).

Not much is known of the last tower, the Wantsnijderstoren. At the time of writing the publication of this excavation has not yet been published. However, using the information provided by BAAC, it was possible to

discern the likely location of this tower tower on the field drawings. The wall of the tower can be seen protruding from the town wall. This tower is located at the same location where Van der Vlerk mentions the Wantsnijderstoren, making it very possible that this is in fact that the Wantsnijdertoren (Van der Vlerk 1983, 1).

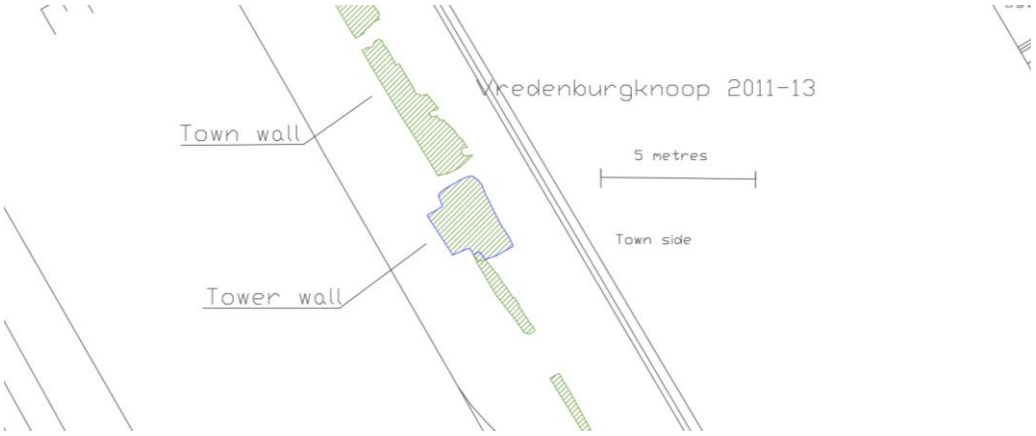


Figure 35, the Wantsnijderstoren (blue outline) and town walls (green) excavated at Vredenburgknoop 2011-13, by author (based on original field drawings).

6.6 The brick town gates

Four gates granted entrance to the medieval town of Utrecht. These can be found on the map of Figure 31 and their appearance on the 3D reconstruction of Figure 43. The four gates of Utrecht were at the same time strong and weak spots in the defence, for they had to allow people access into the town while keeping enemies away from it. Waterways and roads crossed into Utrecht at four locations during the medieval period. The first being the Tolsteegpoorten, where an influent of the Rhine flowed into the Oude Gracht. This waterway crossed the town in a South-North line towards the second gate, the Weerdpoort where the water body was known as the Vecht. This was the only waterway until 1393. The Tolsteegpoort-complex consisted out of two gates on either side of the Oudegracht, with a fortified bridge in between (Figure 36). Next to this particular waterway a smaller one was built in 1393 as a drainage canal, consisting of the southern part of the Nieuwegracht and the Plompetorengracht. No gates were located at the intersections with the town wall, only water fences. The third and fourth gates were the

Wittevrouwenpoort and the Catharijnepoort, where the road from Gelre to Holland crossed the town (van der Vlerk 1983, 55). The entrance to the town within all these gates was presumably closed off by double wooden doors. The canals flowing in and out of the town next to the Weerdpoort and Tolsteegpoort-complex could be closed off by iron fences. In the following paragraphs each gate will be discussed. Historical sources as used by Van der Vlerk, archaeological excavations and 3D reconstructions will be used in order to recreate the gates of Phase 2. Of the four gates, the Weerdpoort and Tolsteegpoort-complex have been excavated. Only post medieval phases of the Catharijnepoort have been recovered and nothing of the Wittevrouwenpoort. The 3d reconstructions have been made by D. Claessen, based on historical sources, drawings and several excavations.

According to Van der Vlerk the Weerdpoort and the two Tolsteegpoorten had a similar layout (Figure 36). The gates contained a rectangular main building through which one entered the town. The main building on the town side was connected to the front gate with two walls, enclosing an inner courtyard. This layout corresponds with Janse and Van Straalen's gate type C (Figure 3). The Tolsteegpoortcomplex consisted out of two gates in the medieval period, east and west. As we can see on Figure 37 these gates were located near to each other and has a similar layout. It is unusual for a town gate to have both the main and front gate on the same side of the town moat. Normally the main building is on the town side bank and the front gate on the outer side. One reason that this what not the case could be the fact that the moat was part of a natural river and therefore too wide to span with a bridge. It is assumed that the Weerdpoort was constructed somewhere in the 14th century and the Tolsteegpoort-complex at the end of the 13th century (Van der Vlerk 1983, 57-65).

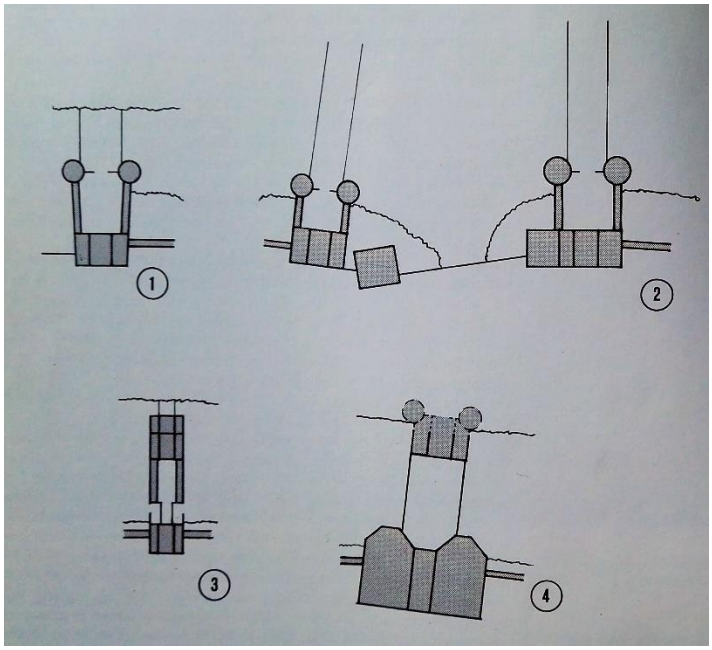


Figure 36, layout of the four gates. 1. Weerdpoort, 2. Tolsteegpoorten, 3. Wittevrouwenpoort and 4. Catharijnepoort, based on historical construction plans (Van der Vlerk 1983, 56).

6.6.1 The Tolsteegpoort-complex

The excavations at the Tolsteegpoort-complex confirm most of the statements above. The East and West Tolsteegpoort were indeed recovered, only 30 metres apart. The layout of the West Tolsteegpoort could not be confirmed as only one piece of wall was recovered of the actual gate building (Table 3). However according to the original report it was possible to place this structure in the 13th century (De Groot 1998, 56). Other than the wall of the main gate building, the corner of the Rode Toren, mentioned above, was found here. This 13th century tower was incorporated into main gate's building. One could see that the tower was built firs, after which the main Tolsteegpoort (West) was built against it. This means that the gate building of the west Tolsteegpoort was built after the Rode Toren.

Two short pieces of the town wall were recovered as well, attached to the Rode Toren and the gate building. These pieces of the town wall were built with bricks measuring 32x15.5-16x8.5 centimetres with a 10 layer measurement of 88 centimetres. Interesting to note is the cobbled street

found just behind the west lying Rode toren, which dates back to the same era as the fortifications, that is to say the 13th or 14th century. This could indicate the street level in at the time (Appendix 1, Tolsteegpoort 1998).

At the east gate much more has been found. Two towers, their connecting wall, a side wall and three more wall fragments have been found (Table 3). These two towers make up the front gate of the East Tolsteegpoort and resemble the front towers of Janse and Van Straalen's type C gate building. A few stone cannonballs were found lying in one of the towers. The brick sizes ranged from 32x15x7.5 to 30x15x7 and 30x14x6 centimetres (Table 3). These brick sizes are similar to those of the western gate, albeit a bit thinner. This points to a 13th century construction with a later, 15th century addition. The walls of the towers were circa 60 centimetres wide, while the wall fragments found on the town side were much wider, around 1 to 1.5 metres. The outer diameter of both the two towers was 4.5 metres and the passage area between the towers was 4.8 metres wide (Twijnstraat 1985; Tolsteegpoort 1998; Wijde Doelen 1948). The two recovered towers of the East Tolsteegpoort coincide with the two outer towers on the drawing of Rombout Keldermans in 1529-1531 (Figure 37; van der Vlerk 1983, 63). This means that the plan we see on his drawing is most likely the actual plan of the Tolsteeg-poort complex. Then, combining historical drawings of the Tolsteegpoort-complex, the layout by Rombout Keldermans and the excavations confirming this layout we can say that the 3D reconstruction is most likely correct and we have recovered the appearance of the Tolsteegpoort-complex (Figure 38).

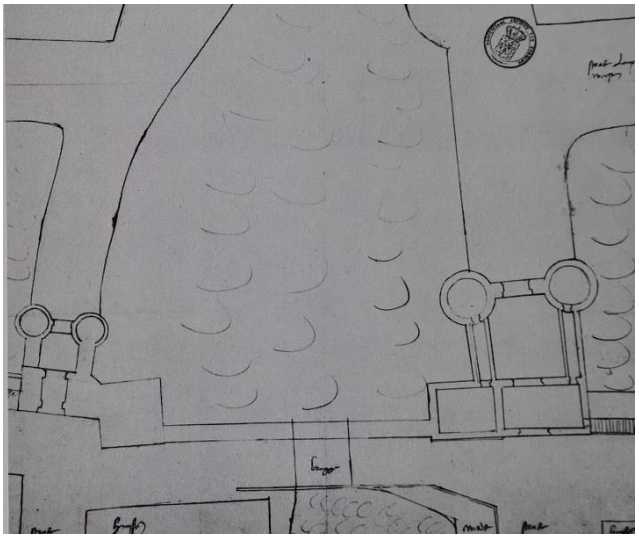


Figure 37, ground plan of the Tolsteegpoort-complex drawn by Rombout Keldermans in 1529-1531 (Van der Vlerk 1983, 63)

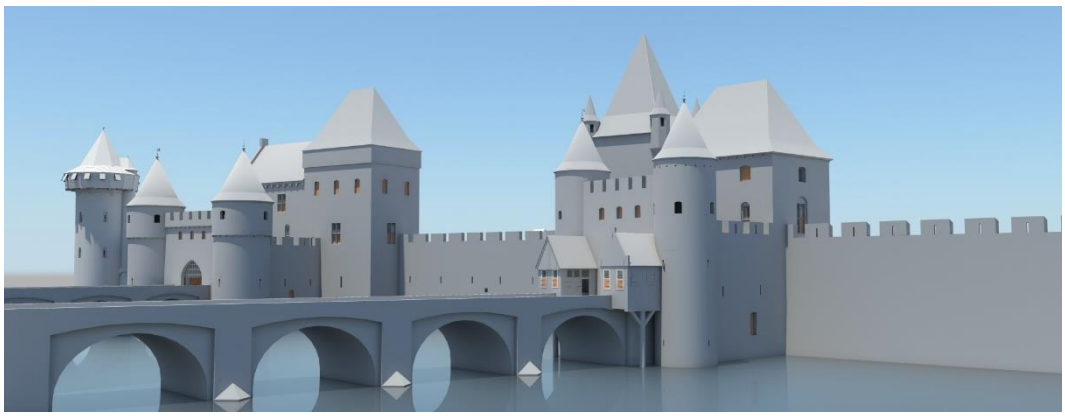


Figure 38, 3D reconstruction of the Tolsteegpoort west (left) and east (right), based on historical drawings and excavations, by D. Claessen.

6.6.2 The Weerdpoort

On the north side of town the Weerdpoort has been excavated as well (Figure 39). The walls of the Weerdpoort's towers were circa 1 metre wide, wider than those of the East Tolsteegpoort. The layout once more resembles gate type C from Janse and Van Straalen's research. The largest bricks measured 32x16x8 centimetres and the outer diameter of the towers was around 6 metres. Of the main building no real measurements could be taken as this part of the gate was only reconstructed in the pavement (Figure 40) and while its dimensions should be accurate, intervening factors prevented a proper measurement.

The original documentation of this excavation has been lost in the move of the county archives (Appendix 1, Noord Oostelijk deel van de Stad, 1974). However, a reconstruction of the two towers of the front gate was made and still stands today (Figure 41). This reconstruction was made using the original excavation documentation as a guideline, therefore we can assume that this reconstruction is quite accurate. The remains found of the Weerdpoort during the excavation in 1974 included the two towers of the front gate and large parts of the main gate building (Figure 39). This gate is similar to the Tolsteegpoort in layout, containing the two towers standing in front of the gate.

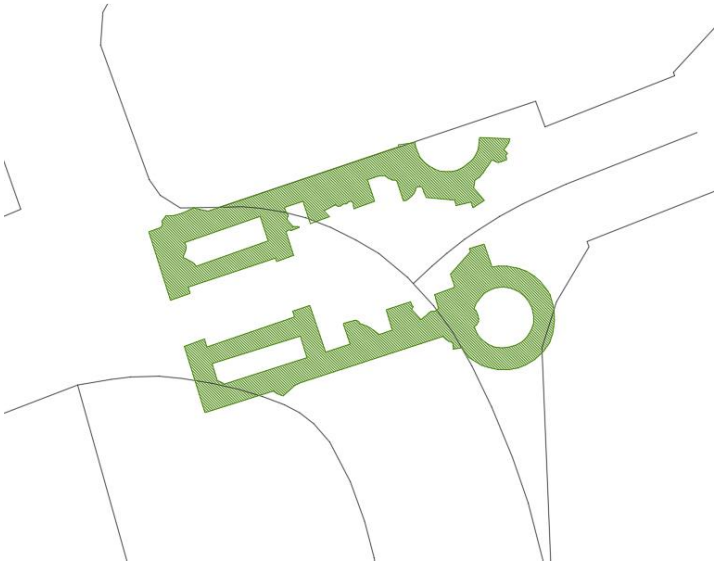


Figure 39, ground plan of the recovered Weerdpoort.

Once again by combining the historical drawings, archaeological excavations the appearance of the Weerdpoort could be recreated. In Figure 42 the 3D reconstruction of the Weerdpoort is presented.

Figure 40, reconstruction of the east part of the main gate building of the Weerdpoort in the pavement. The small square stones represent the plan of the gate.

Figure 41, the reconstructed front towers of the Weerdpoort with an added window to look inside.

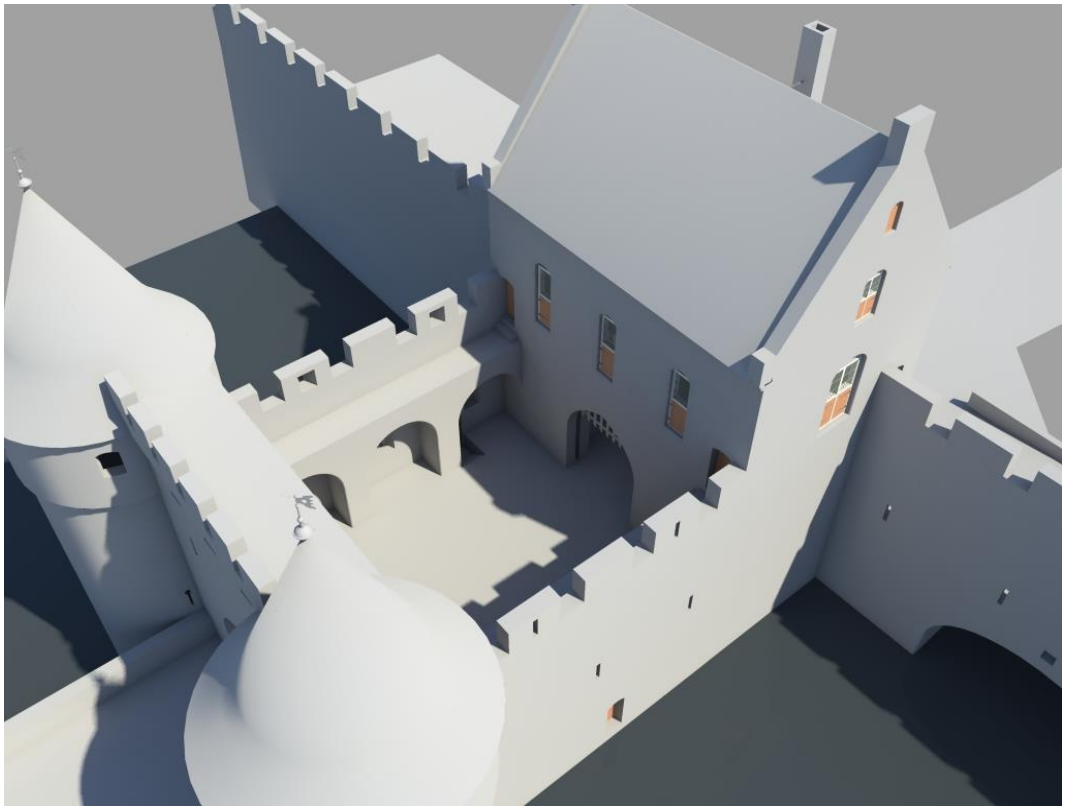


Figure 42, 3D reconstruction of the Weerdpoort, based on historical drawings and excavations, by D. Claessen.

6.6.3 The Wittevrouwenpoort and the Catharijnepoort

Of these two gates we only have data from historical sources, as no excavations recovered traces of the 13th to 15th century Wittevrouwen- and Catharijnepoort. Van der Vlerk states that the Wittevrouwenpoort had a high main building with a gable and gable roof, standing perpendicular on the town wall. The front gate was a rectangular building. Connecting the two was a stone bridge with walls and a drawbridge. The fourth gate was different as well and only the layout has been recovered: two heavy towers with three sides facing the countryside, between them the main gate and on the opposite bank two smaller towers containing the front gate (Van der Vlerk 1983, 55-56).

In this instance the 3D reconstruction has not been confirmed by the actual remains found in excavations. It is therefore necessary to state that the reconstructions found below are likely, but not certain.

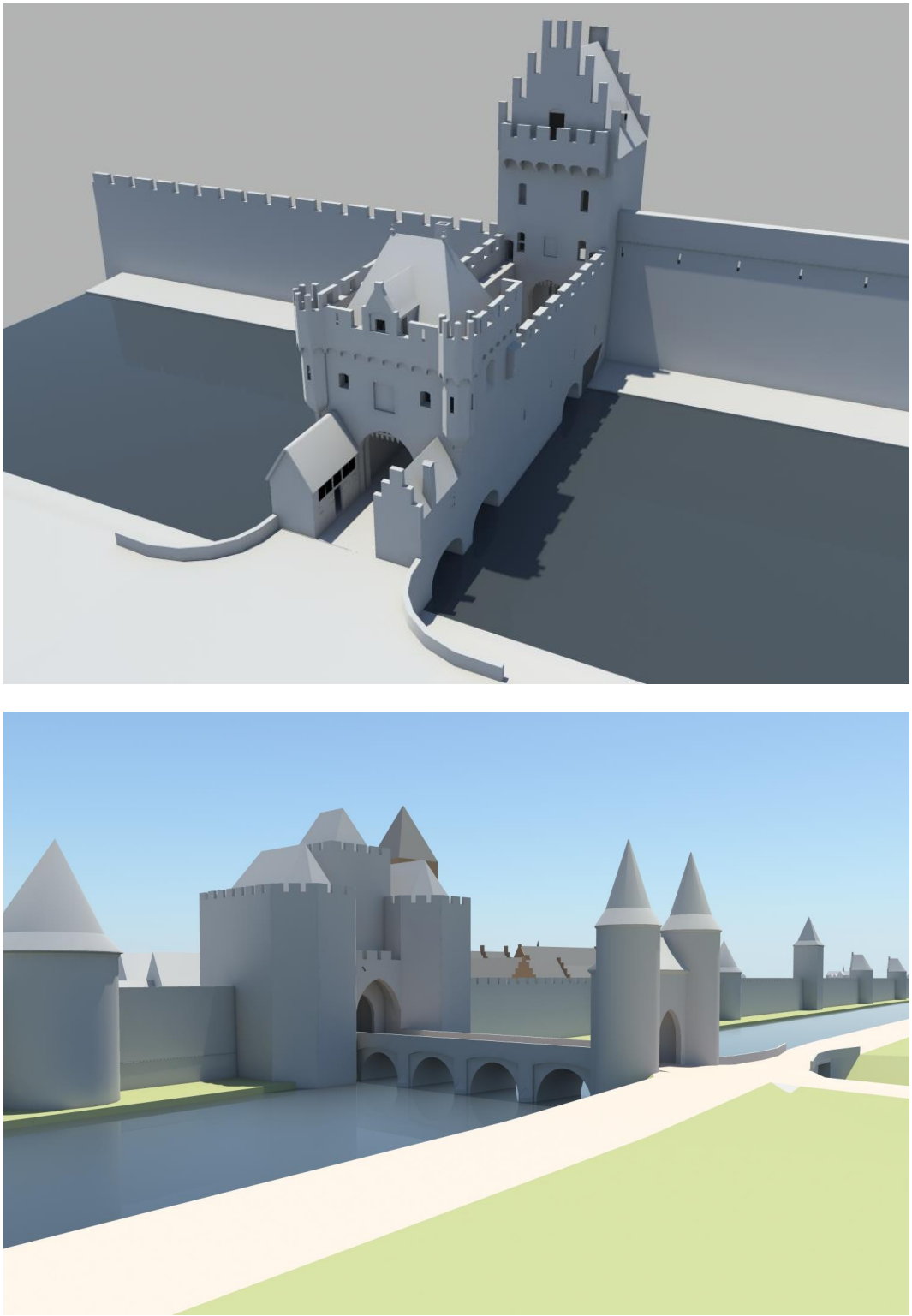


Figure 43, 3d reconstructions of the Wittevrouwenpoort (top) and Catharijnepoort (bottom) by D. Claessen, based on historical drawings.

6.7 Summary

Examining the data above the circuit has become apparent. We can also tell more about the construction of the wall and confirm certain previous reconstructions that were made using the historical sources: it was constructed out of a wide outer shield wall with an arch construction behind it to support the wall walk. Furthermore, the layout of the Tolsteegpoort-complex and the Weerdpoort have been reconstructed using historical and archaeological sources. These gates resemble the gate type C, a rectangular gate building with a front gate containing two towers, mentioned in Janse and Van Straalen's research. Other assumptions have been disproved: the foundation of wall was most likely constructed in several places on a brick saving arch construction, while the retaining walls of the moat and the town wall itself were made only out of brick. Not a single filling of tiles nor broken brick has been recovered. To conclude, it was possible to discern the location of seven towers dating between the 13th and 15th century (Figure 32). They were constructed out of brick and had generally a rounded or horse-shoe shaped layout (with an exception of the square Rode Toren). The width of the tower walls of the original town wall was only recovered at the Wolleweverstoren with a width of 1.87 metres and an outer diameter of 11.54. The width of the tower walls of the Bemuurde weerd seems to be 0.9 metres with an outer diameter of 5 metres, as was seen at the Zeedijk. The towers of the Bemuurde Weerd are therefore significantly smaller than those of the towers located in the original town wall. Having recreated the medieval town defences from the 13th to the 15th century it is now time to look at the central issue of this thesis: was the medieval town wall of Utrecht a plan or a process? To speak of just one phase seems insufficient.

7. The town walls: single or multiple phased structure?

To answer the question whether the medieval town walls of Utrecht were a single or multiple phased structure we need to look on different levels. In the broadest sense it is already possible to say that the town walls were a multiple phased structure: there is a clear distinction between phase 1 and phase 2, as is described in the previous two chapters. These two phases contain two very different structures: in phase 1 an earthen wall with tufa reinforcements (towers, stretches of wall and gates) and a brick wall with brick towers, gates and a moat containing retaining walls on either side. However, this distinction based on the basic elements contained in both walls is not the only one to be made. While the data of the first phase is insufficient to further distinguish any subphases, the dataset of the second phase most certainly is not.

In this chapter the town walls of the second phase, ranging from the 13th to the 15th century shall be scrutinized in order to see if these brick town walls in itself were a single or multiple phased structure, if this enormous structure was laid out according to a strict plan or its construction was a process over multiple centuries and if the gate buildings were indeed the first to be constructed. To do this we need to look at three different aspects of the town wall and all it encompasses: its foundations, its general construction and the brickwork used. By comparing these three aspects between the stretches of wall excavated it is possible to see if all these isolated pieces of the town walls were made at once or by different people during different centuries. Uniformity represents a plan, while disparity suggests a process.

7.1 Foundations

The foundations of the different pieces of town walls can tell us something about their relative dating: the oldest walls are likely to be founded deeper than their younger counterparts. When comparing the foundations one needs to look at the ground beneath the foundations themselves as well. There are many different ways of creating stable ground on which to build. One could for example reinforce the soil with

piles. It was possible on three location to confirm the foundation level of the brick town wall: in the east at the Servaasbolwerk, in the west at the Catharijnekade and in the north at the Zeedijk (Appendix 1, Servaasbolwerk 2003; Vredenburgknoop 2011-13; Zeedijk 2016). In most of the other excavations this level could not be reached due to groundwater (Appendix 1, Vredenburg Proefsleuven 2006). At some of the older excavations the documentation simply does not exist anymore.

At the Servaasbolwerk two pieces of the town wall were found. Both were founded on sand, the first stretch of wall lying perpendicular against the second. The first piece of wall's foundation lies at 42 centimetres –NAP and the second wall's foundation lies at 45 centimetres –NAP (Appendix 1, Servaasbolwerk 2003). At the Zeedijk the northwest tower of the Bemuurde Weerd was recovered. This tower was founded on sabulous clay on a foundation of vertical standing wooden poles at 49 centimetres –NAP (Appendix 1, 2016). The last confirmed foundation level can be found at the Catharijnesingel. Here another tower was excavated, dating back to the end of the 15th/beginning of the 16th century. This tower's foundation was located at 75 centimetres –NAP (Appendix 1, Vredenburgknoop 2011-13).

When comparing these few foundation levels one could suggest that all three locations were built at a different time. But considering the fact that at least 700 metres lies between any of these locations it is important to keep in mind that the ground conditions may vary, resulting in different foundations necessary. In order to make any credible statements based on the foundations of the town walls, more data is needed. However evidence has been found that suggests uniformity at the Keizersgracht (Appendix 1, Keizersgracht 1984). Here another foundation of the wall of the Bemuurde Weerd was uncovered, which was founded on wooden poles, just like the foundation found at the Zeedijk. Their difference from the foundations of the town wall itself and the similarities between them suggests that the Bemuurde Weerd was

constructed in a short period of time, separately from the town walls itself.

7.2 Construction

Comparing the general construction between different excavations within Utrecht poses another challenge. Due to the small areas of excavation, hindered by all kinds of infrastructure many excavations only partly uncovered the town wall. This interferes with the measurement of the width of the town wall on most locations. It is however possible to compare the general construction of the wall on different locations. For example: evidence for the arch construction described in chapter 6 has been uncovered on several locations in the north and the southeast (Appendix 1, iv. Van Asch van Wijckskade 1976; ix. Manenburg 1948; xxi. Nieuwe Kade 1982). Their locations can be found on Figure 45.

At Manenburg 1948 five buttresses were found (Table 5). These buttresses were 1 metre wide and the length is unknown. This is because the buttresses continued outside of the edge of the trench (Figure 44). The buttresses were spaced 7 metres apart and were dated to the 13th century by their brickwork (32x15x8 centimetres) (Appendix 1, ix. Manenburg 1948).

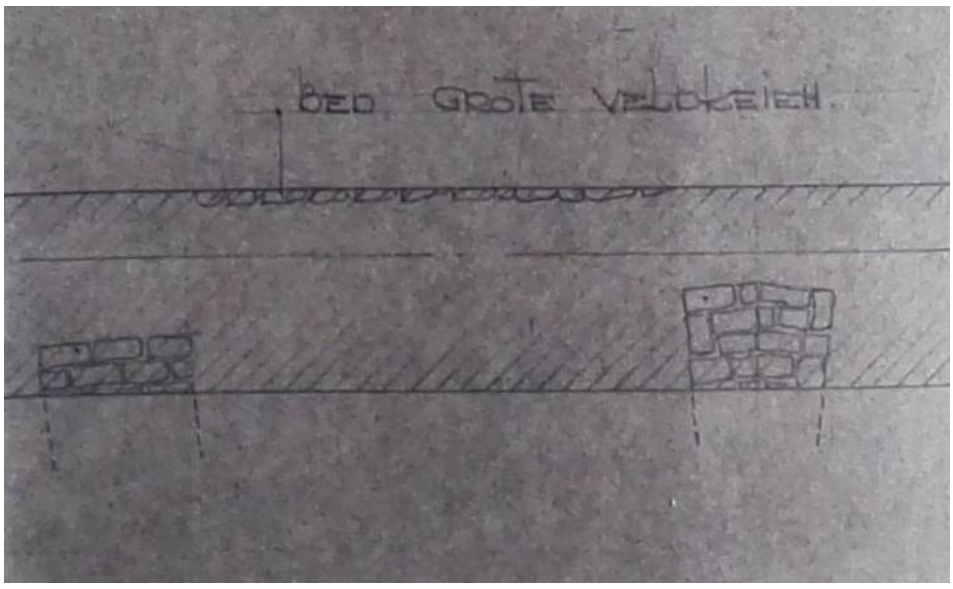


Figure 44, exerpt from the excavation drawings of Manenburg 1948, showing two of the five buttresses, UD-MAN01.

Figure 45, the location of the excavated buttresses of phase 2. For greater detail, see Appendix 3, by author.

A similar construction can be seen at the Van Asch van Wijckskade 1976 (Table 5). Here the buttresses were 1.5 metres wide and once again cut off lengthwise by the edge of the trench. They also stood 7 metres apart from eachother. However, these buttresses were dated to the 14th or 15th century, as their brickwork measured 28x15x6 centimetres with a 10-layer measurement of 76 centimeters (Appendix 1, iv. Van Asch van Wijckskade 1976).

The last location where multiple buttresses were found is the Nieuwe Kade (Table 5). 9 buttresses were recovered at this location (Figure 46). All of them were standing circa 3.2 metres apart and were 1-1.2 metres long and 1 metre wide. These buttresses were found in context alongside the town wall, which could be dated to the late 13th or 14th century (Appendix 1, xxi. Nieuwe Kade 1982).

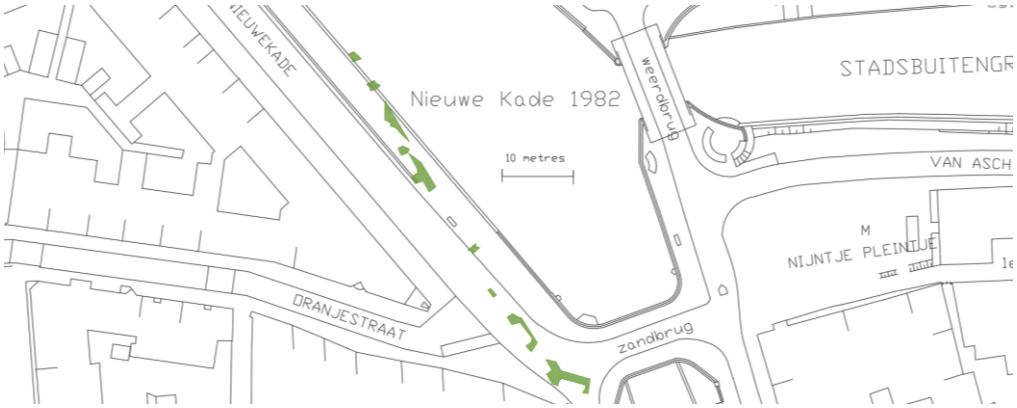


Figure 46, the excavation at the Nieuwe Kade 1982. Shown are the 13th/14th century town wall and buttresses, by author based on original field drawing Nieuwe Kade 1982.

On all of the above mentioned locations a number of buttresses were found standing apart at a regular interval. While this points to uniformity, the distance between them suggests otherwise. The buttresses on the Van Asch van Wijckskade stand only 3 metres apart, while those near Manenburg and on Wijde Doelen stand more than 7 metres apart. If the whole wall was planned out and constructed in one instance, one would expect a uniformity in its construction, these buttresses suggest differently.

7.3 Brickwork

Now that we have evidence for both uniformity and disparity it is time to take a look at the best documented aspect of the town wall's excavations of the last century: the brickwork. Using this data a map has been made on which the town defences have been separated into phases according to their brick dimensions (Figure 47), the general brick dimensions used can be found in Table 1 and the brick dimensions of each excavation can be found in Table 3, Table 4 and Table 5. It is through the separation of the town walls into these different phases that we find conclusive evidence whether it was a single or multiple phased structure. While the earliest finds date back to the 12th century (the Toren bij Servaas and the Smeetoren), the latest can be placed in the 15th century (Pulvertoren). Of course one could argue that these aspects are exceptions. That, while they are incorporated into the brick defences of the second phase, the 12th century towers are remnants of the earlier defence of phase 1 and that the 15th century Pulvertoren is just a small addendum. But setting aside these aspect we are still presented with a multi-coloured (phased) map. The town walls of Utrecht were definitively a multi-phased structure, the building a process spanning multiple centuries. The first aspects constructed were most likely the town gates: the Tolsteegpoort (east and west) and the Weerdpoort both date back to the 13th century. This included the Rode Toren, which was part of the west Tolsteegpoort and is older (very early 13th century) than the gate building itself. This coincides with an historical source stating the construction of the town defences of Bruges (Janse and Van Straalen 1974, 50). The gates were the first elements of the town defence constructed in Bruges as well. Only when they were completed was the rest of the town walls constructed.

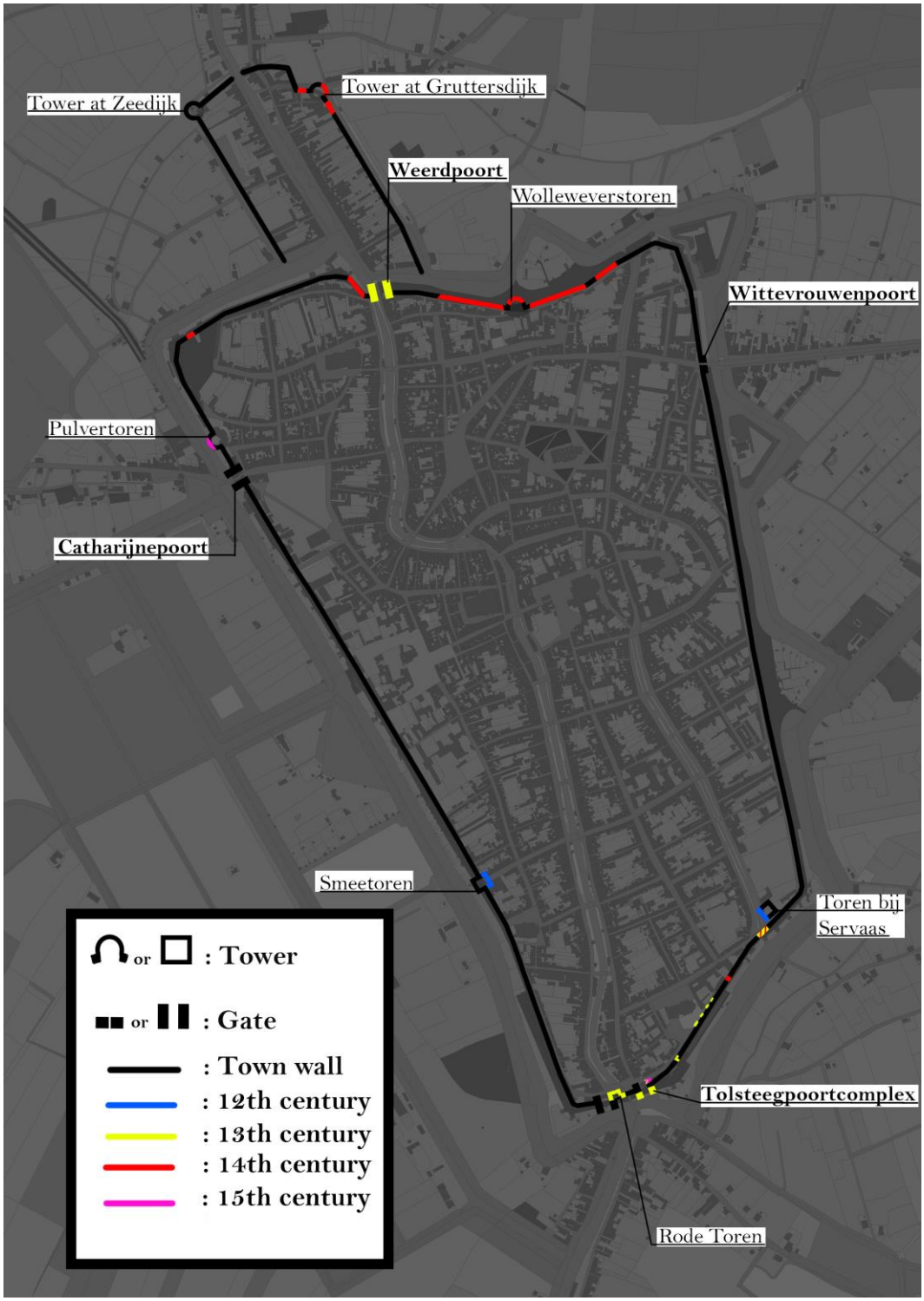


Figure 47, the excavated elements of the town defences dated according to their brick dimensions (see Table 3; Table 4; Table 5 and Table 6). The black town wall is a reconstruction based on all excavations which can be found in Appendix 3.

In contrast to the town gates the walls itself cannot be dated to one century (Table 5). While there are many stretches recovered dating to the 13th century (Appendix 1, ix. Manenburg 1948; vii. Servaasbolwerk 2003; xiii. Tolsteegpoort 1998; x. Wijde Doelen 1984), many can also be dated to the 14th century (Appendix 1, xxi. Nieuwe Kade 1982; vii. Servaasbolwerk 2003; iii. Van Asch van Wijckskade 1973-74; xix. Vredenburg Proefsleuven 2006; viii. Zochersplantsoen 2009). Interesting is the fact that all of the 13th century walls can be found in the southeast, no 13th century wall has been found in the north at all. This would suggest that the construction of the wall started in the south, near the Tolsteegpoortcomplex. Only in the 14th century were the walls in the north of Utrecht constructed. It was during this century as well that the Bemuurde Weerd was walled.

The retaining walls of the town moat have not been depicted on Figure 47 to prevent too much clutter on a small image. These can be found on Figure 48. The retaining walls of the moat can be dated back to the 13th (Appendix 1, xiv. Tolsteegsingel 1975) and 14th or 15th century (Appendix 1, xvii. Catharijnesingel 2013-14 and xviii. Catharijnesingel 1972). Once again the oldest walls are found in the south, near the Tolsteegpoortcomplex.

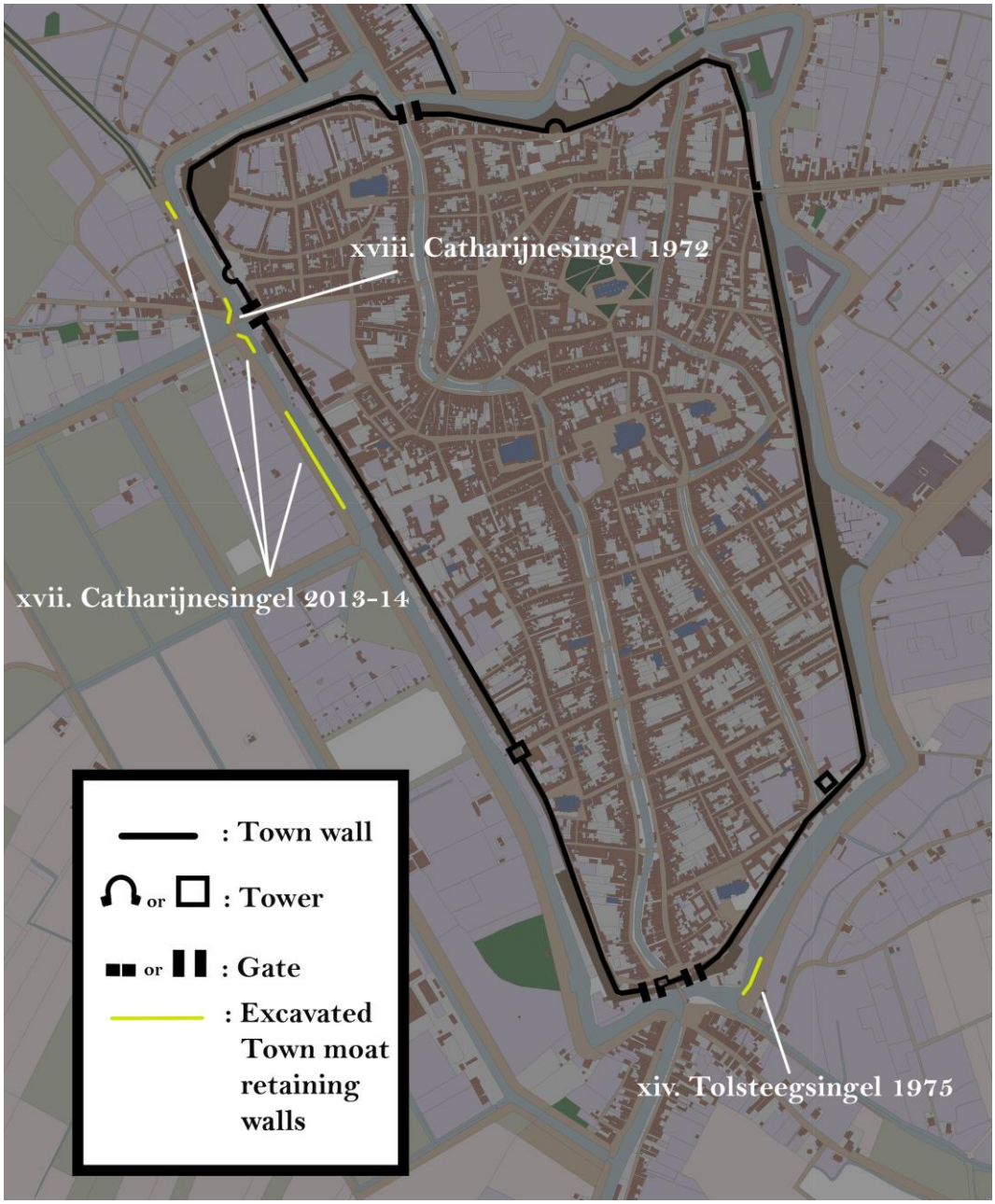


Figure 48, the location of the excavated retaining walls of the moat. The wall found at the Tolsteegsingel dates back to the 13th century and those found at the Catharijnesingel to the 14th and 15th century. For greater detail see Appendix 3, by author.

7.4 Summary

While there are some elements pointing to uniformity, the largest part of the evidence suggest otherwise. Thus, the town wall of Utrecht was a multi-phased structure, constructed over multiple centuries. Yet it originates from a plan to fortify Utrecht with town moats and an earthen wall that was implemented over a short period of time. The oldest parts

include the earthen rampart and the tufa towers dating back to the 12th century. In the 13th century the brick town defences were constructed. The oldest brick defences lie in the south near the Tolsteegpoort-complex and the first elements constructed out of brick were most likely the town gates (including the Rode Toren). Following their construction the town walls were built, starting in the southeast and following the circuit of the oldest earthen rampart to the north until they reached the already finished Weerdpoort. A special case is the Bemuurde Weerd, which was most likely built in one instance in the 14th century, as suggested by the uniformity of its foundations and brickwork and the historical sources. What follows is a phasing of the construction of the town walls of Utrecht.

Phase 1 – 12th century.

- The earthen wall and town moat are constructed.
- The oldest (tufa) defensive towers are built.
- Predecessors of the brick 13th century gates were constructed, but have not been recovered.

Phase 2 – 13th to 15th century.

- 13th century
    - The brick gates and Rode Toren are built.
    - The first stretches of town wall and retaining walls for the moat are built in the southeast near the Tolsteegpoort-complex.
- 14th century
    - The rest of the town wall and retaining walls for the moat have been constructed, surrounding the entirety of Utrecht.
    - Brick towers were incorporated into the town wall during its construction.
    - The Bemuurde Weerd was built.
- 15th century

- The last additions to the medieval town walls are made before the improvements of the 16th century to account for improved artillery.

8. Comparison between Utrecht and other towns

The town defences of Utrecht encompassed a large area from the start and were built mainly using brick. Only the oldest defences of the 12th century were erected using natural stone (e.g. tufa). In Utrecht the building of the brick town defences seems to have been a long process but was this the case with contemporary towns in the area? The similarities and differences, such as the surface enclosed in the town defences, the construction of the walls and whether it was a process or plan between the defences of Utrecht and other towns such as Den Bosch, Deventer, Zutphen and Antwerp shall be examined in this chapter. In the case of Den Bosch the 12th and 13th century shall be scrutinized with the following question in mind: how do the two defences compare in this early stage and what could explain the differences? Deventer presents us with another aspect to compare to Utrecht: its towers and general layout. Why could it be that the more advanced rounded towers in Deventer where constructed out of the generally earlier used tufa? What can we say about the development of the earthen walls in Deventer and how does it compare to those of Utrecht? In Cologne we take a look at the differences in development of town defences, are there any chronological discrepancies when comparing the development of the defences in Cologne to that of Utrecht? Finally we take a look at the town defences of Norwich to present the difference the available resources can make in the construction of the town defences.

8.1 Den Bosch

Located in Brabant in the southern part of the Netherlands Den Bosch lies only 50 kilometres south of Utrecht. Belonging to the same area this medieval town provides a beautiful example of the differences that arise between towns even though they lie so close together. Regretfully there is not enough information available for a comparison of the oldest defences

containing the earthen wall but an excellent comparison can be made with the first brick town wall of Den Bosch.

Figure 49, the trace of the 13th century town wall of Den Bosch (Janssen 1983, 65)

The brick town wall of Den Bosch dates back to the beginning of the 13th century and parts of the town moat to the late 12th century. The town defences of Den Bosch enclosed an area including the Markt (market) and its immediate surroundings (Janssen 1983, 65). This covers roughly 8.500m^2 or 0.85 ha (Figure 49). This is relatively small compared to the 143.1 ha of Utrecht. Most town defences of this era, such as those of

Hulst, Heusden, etc., are just as small as those of Den Bosch (Janse 1974, 98-103). It becomes clear that Utrecht is an exception to the rule.

The defences of Utrecht cover an area much larger than necessary for the inhabitants while the defences of Den Bosch were placed firmly around the inhabited space of the town. Even though these long walls seems unnecessary in the century of their construction, the passing of time and increasing of the town's population proves otherwise. While Utrecht never had to radically increase their by town defences encapsulated area (with an exception for the Bemuurde Weerd), Den Bosch had to build a completely new town wall already in the 14th century to encompass the ever growing town (Janssen 1983, 64).

Janssen argues that this trace was shaped by the rivers flowing around Den Bosch. These were utilized for parts of the town moat (Figure 50) (Janssen 1983, 64-66). Thus, in Den Bosch we see a similar scenario to Utrecht, using the natural river courses for the town moat, resulting in a town defence shaped by the landscape. One important distinction between the defences of Utrecht and Den Bosch in the 12th and 13th century is that those in Utrecht had an earthen wall whereas in Den Bosch the whole trace was already erected out of stone. Not only that, but the whole trace was built using remarkably similar bricks; all measuring around 27-29x12-14x7-8. On several spots tufa was incorporated into the wall as well. Janssen therefore argues that the oldest town defences of Den Bosch were made using one plan and in a relatively short time. The towers where horse-shoe shaped and uniform in appearance as well, they measured 10 by 6.8 metres and the foundation was 1.25 to 1.7 metres wide. These towers coincide with the rounded towers we find in Utrecht. The gates were constructed in stone as well, of which two have been recovered: the Leuvense Poort and the Orthenpoort. Most completely recovered was the Leuvense Poort. Built out of two horse-shoe shaped towers standing 3.8 metres apart this

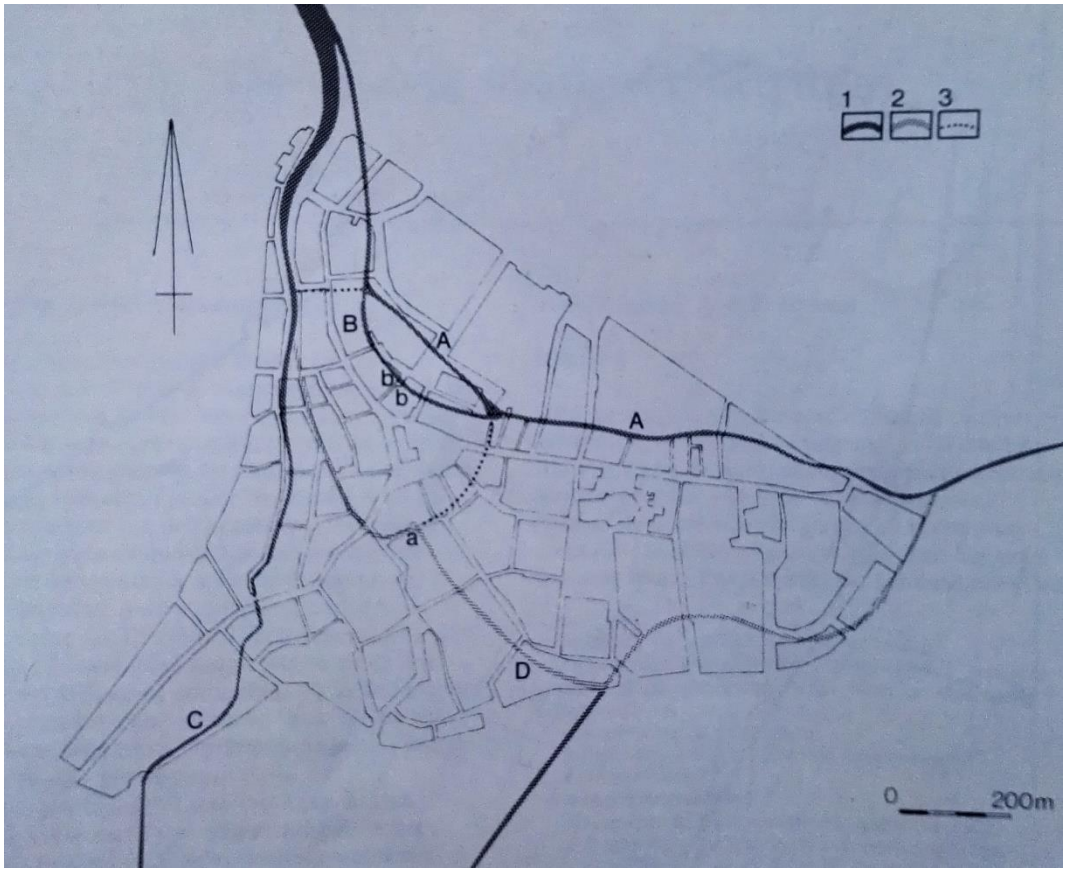


Figure 50, the town defences of Den Bosch, utilizing the rivers flowing through the area. The dotted lines indicate the town defences (Janssen 1983, 66).

gate had a simple plan yet was advanced with its rounded towers in comparison to the gate including Utrecht's Rode Torens, which had a square layout just like all the other towers of the oldest phase (12th to early 13th century). The town wall itself was built on the same construction of arches below ground to support the wall as seen in phase 2 in Utrecht (see chapter 6.2.2.1). The whole construction of the wall was remarkably similar to that of the walls of Utrecht in the second phase. It had a shield wall standing circa 1 metre strong, an arch construction behind it supporting a wall-walk (the arches stood 4 to 5 metres apart and were 1.35 centimetres wide). Interesting is the fact that the town wall was still standing in the walls of several houses demolished in 1957. It was registered that the town wall would have stood 7.5 high and had battlements on top (Janssen 1983, 67-68).

It has become apparent that there are several differences between the town defences of Den Bosch and Utrecht in the 12th and 13th century. The defences of Den Bosch were advanced compared to those of Utrecht in phase 1. With its defences constructed out of tufa and brick in its entirety and rounded towers the defences of Den Bosch were years ahead of those in Utrecht construction-wise. But even though Utrecht was late with its stone defences it seems that the defences in Utrecht kept in mind the bigger picture and predicted the ever expanding population and the need for living space between the walls. Where Den Bosch had to build a new trace of defences already in the 14th century, the trace of Utrecht remains largely the same up to this day.

8.2 Deventer

Further to the east on the shore of the IJssel a town can be found with a development in town defences very similar to Utrecht's: Deventer during the 9th to 13th century. Comparable to Utrecht, an earthen wall surrounded Deventer in that era. As is the case in Utrecht, it is assumed that the earthen wall follows the same trace as the first town wall which would result in an 1160 metres long rampart again much smaller than Utrecht's 4800-5400 metres. Several phases have been distinguished in the development of the earthen wall in Deventer. During the first phase dating to the 9th and 10th century the earthen wall stood 3 metres high, 11.6 metres wide and had an assumed flat top of 1 metre. This wall was surrounded by a ditch and presumably topped by a palisade. The improved wall of the second phase has been excavated measuring 6 metres high and 22.8 metres wide (Vermeulen 2010, 191-192). The ditch of the first phase was backfilled to extend the wall to the countryside and a new, 22.8 metres wide ditch was dug. On the town's side not much changed, which was likely due to the lack of open space. This second phase has been dated to the 11th century (possibly 1150 when King Henry III granted the fief of Deventer to the bishop of Utrecht) (Vermeulen 2010, 193-194). This second phase of the 11th century surpassed Utrecht's earthen wall by 3.5 metres in height (Utrecht's wall was 2.5 metres high, Deventers 6 metres). It seems that in Utrecht more effort

was put in the assumed trace (it being about eight times as long) than in the actual strength of the earthen wall. On several locations in Deventer, loose tufa has been found yet in contrast with Utrecht no definitive evidence has been found for its use in stone towers of the town defence during this period.

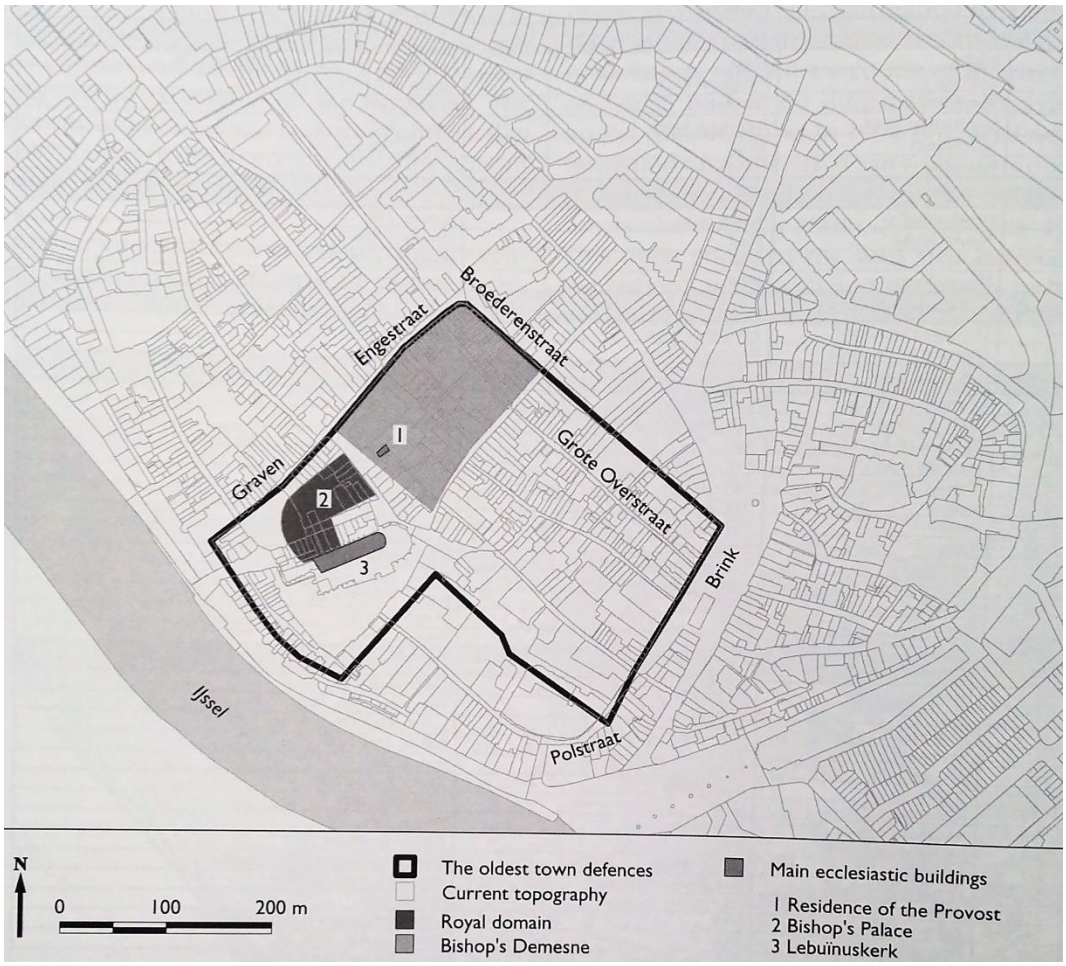


Figure 51, the town defences of Deventer in the third phase (12th to 14h century) (Vermeulen 2010, 190)

A third phase can be distinguished as well, starting at the end of the 12th century and lasting to the 14th, when the first brick town wall was built in Deventer. During this phase the earthen wall was widened again (Figure 51) and its trace was extended in the first quarter of the 13th century. On this extension a stone tower has been recovered. Tufa foundations and brickwork of a stone tower were recovered in 2007 at the Walstraat. The tower formed a semi-circle with a diameter of circa 6.5

metres. It is unclear whether the tower was connected to a stone wall or to a wooden palisade. The tower has been dated to the 13th century (Vermeulen 2010, 195-197). Contemporary to this tower is the Rode Toren in Utrecht. Vermeulen mentions that most of the recovered tower in Deventer consists tufa with a few small brick fragments.

In the 14th century the inner brick town wall was built in Deventer. Regretfully not much research has been conducted into this wall and what has been researched was done so poorly according to Vermeulen. Therefore no comparisons can be made between the first brick defences of Utrecht and Deventer. However, there existed an outer wall in Deventer, standing 8 to 12 metres from the inner wall. These two town walls were standing concentric around the town, providing two walls to breach before the enemy would enter Deventer (Vermeulen 2010, 199). A stretch of wall and a wall tower still stand today in the Bokkingshang. This tower has a diameter of 11.5 metres and is 6 metres high with a rounded layout.

Three other towers have been excavated as well. These towers were made of red brick with a diameter ranging from 9.6 to 9.8 metres and 1.9 to 2.6 metres wide walls. Vermeulen explains that the inner town wall's towers would have stood higher than 6 metres in order to clear the low height of the existing tower and shoot over it. All of the excavated towers had an open gorge on the town side (Vermeulen 2010, 199). The town wall itself was constructed out of a shield wall of 1 metre wide and a 1 to 1.5 metre wide wall walk supported by arches. The brick and type of bonds used suggest that the towers and wall were built at the same time (Vermeulen 2010, 199-200). When we compare the defences of Deventer with Utrecht we find several interesting differences. First, the 13th century tower mentioned above stands in stark contrast with the 13th century Rode Toren of Utrecht. The Rode Toren was made up of brick in its entirety as opposed to the large sections of tufa in the 13th century tower in Deventer. Another distinctive difference is the shape of the towers.

Figure 52, one of the three excavated towers of the outer town wall of the 14th century (Vermeulen 2010, 201).

While the Rode Toren was a heavy set, square tower, the tower recovered at Deventer is rounded. This means that the tower in Deventer had a stronger structural integrity to withstand siege weapons and can be seen as the more advanced structure of the two (see chapter 2). The second difference is the existence of two contemporary town walls in Deventer forming the town defences. Only one has ever stood in Utrecht. The outer wall of Deventer itself differs from Utrecht's town wall in its marked uniformity. This would suggest that Deventer's outer wall was built as result of a careful planning executed over a short period of time, in contrast to the centuries it took the process in Utrecht. Perhaps the inner wall follows a similar pattern to that of Utrecht. Other than these differences the construction of the wall and towers seems similar to those in Utrecht. A shield wall of roughly 1 metre wide backed by a wall walk of the same width supported by arches can be seen in both towns. The towers of the 14th century outer wall of Deventer compare well to the towers of the second phase of Utrecht as well. Both are made of brick

with a rounded plan. A difference however is that the towers of Utrecht had a larger diameter: 11.54 metres in Utrecht versus 9.6-9.8 metres in Deventer and thinner walls: 1.87 centimetres versus 1.9-2.6 metres.

Compared to the wealth of information of the earthen town wall of Deventer it becomes clear that more detailed excavations of the earthen wall would benefit Utrecht. Using the excavated parts of the earthen wall a detailed description of the development of the earthen wall can be given for Deventer. Compared to what is known about Utrecht's earthen wall the wall of Deventer was taller by 3.5 metres and the wall of Utrecht encompassed a much larger area than the one in Deventer. There are marked differences between the towers constructed in the beginning of the 13th century as well. The Rode Toren, excavated in Utrecht was square, yet made of brick and the tower excavated in Deventer was rounded, yet mostly made of tufa. But while tufa was the predecessor to brick in the Netherlands and square towers are considered to be an older layout than rounded, this could be explained by the large brick production centres of Utrecht. Thus it would be possible for Utrecht to have access to large amounts of brick to construct towers when the square layout was still considered to be a feasible defensive structures, whereas in Deventer tufa was still the most accessible building material for large defensive structures.

8.3 Cologne

Finding its roots in a roman settlement just as Utrecht and being the seat of a bishop in the medieval period just as Utrecht, Cologne is a perfect candidate to compare the development of the town defences of Utrecht to. Cologne is located on the bank of the Rhine in the west of Germany. The medieval town defences of Cologne originate and incorporate large parts of the Roman *oppidum*. Until the year 1180 the town remained within the stone walls erected around the oppidum in the year 90 or 91. This 4 kilometres long stone wall encompassed an area of 96 ha and contained round towers on the corners made of stone. Only at the end of the 12th did these walls become too tight for the town. It was then that new defences had to be built to encompass the now 4.06 km^2

large town. The stone wall would have stood 10 kilometres long, yet almost everything was destroyed in the 19th century to expand the city (Trier 2010, 535-542). The moment Utrecht started to build their first earthen wall surrounding the town, measuring 4.8 kilometres, the people of Cologne started to build a stone wall more than twice that length. Moreover the construction of bulwarks to improve the town's defences of Cologne already started in the 14th century (Figure 53). Made of natural stone set in heavy walls (5 metres wide) these defences surpass the 14th century in all Dutch towns mentioned above in this century (Trier 2010, 545-547). Utrecht started the construction of their bulwarks as late as the 16th century. This confirms the historical sources that the need for defence in Cologne was an urgent issue (Trier 2010, 446). It also shows that Cologne was centuries ahead of Utrecht in the development of their town defences and reminds us of the enormous differences between areas in the general development of towns.

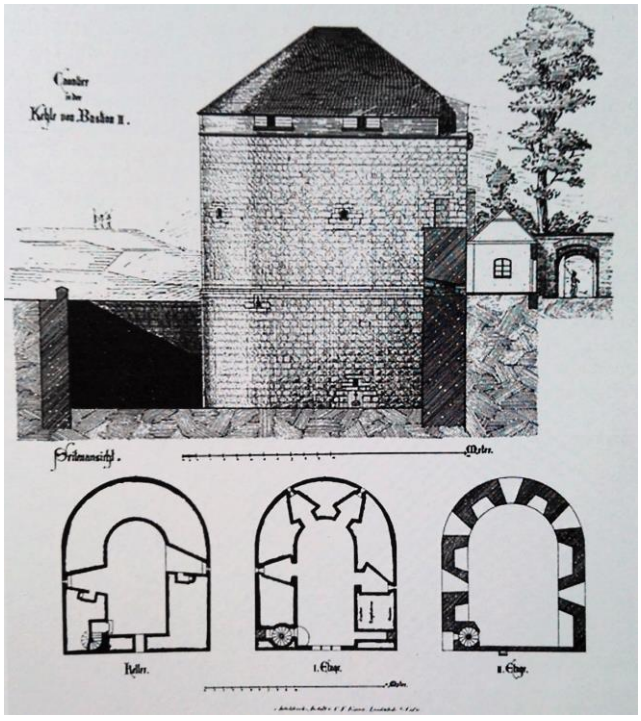


Figure 53, a 14th century bulwark from Cologne (Trier 2010, 545).

8.4 Norwich

After discussing several sites located on continental Europe would be appropriate to examine the differences to the British Isles. Norwich, located in the lowland river valley of the River Wensum, lies close to the North Sea in Great Britain, opposite of the Netherlands. The town of Norwich developed in a bend of the River Wensum, which would later be used as part of the town's defences. The first sign of fortifications dates back to the 10th century, when a ditch was dug and an earthen wall was constructed, once again assumed to have a palisade on top. Then in 1066 a royal castle was constructed and remained the primary defensive structure until the 13th century (Ayers 2010, 29).

The first medieval fortification that has been found is an earthwork protecting the western suburbs of the town. In 1290 the construction of the stone town wall began and would last until 1340 (Ayers 2010, 29). This town wall and the River Wensum would eventually encompass the whole town along a 6 kilometres long trace, which made it the longest urban defensive circuit anywhere in Britain. Along the river a timber fence was made to further improve its defensibility. All in all the circuit contained over 40 towers and 12 gates. Because the river flowed through the town boom towers were made. These towers, made almost entirely out of flint, stood on both banks of the river and were linked by a chain of Spanish iron to prevent unwanted passage (Ayes 2010, 30-34).

The town walls, towers and gates were made almost entirely constructed using flint, with the exception of several details. Arrow loops or the vaults of towers were often made out of brick and in several instances freestone was used. For example at the facing of a gate tower on Bishop Bridge. The height of the towers can still be seen at the Black Tower, which still stands over 13.5 metres high. The wall walk still stands at this location as well. The wall walk itself was supported by an arch construction inside which arrow loops were constructed. In several stretches of wall early gun loops were found as well.

Figure 54, cow tower of Norwich (Ayers 2010, 37).

The stretch of wall at Baker lane containing these gun loops has been dated to the 14th century. It was in 1398 to 1399 that the north-eastern part of the fortifications was strengthened. At the bend of the River Wensum the Cow Tower was built. A massive tower constructed out of

flint and mortar, faced with brick and limestone dressings. On top of this enormous tower stood a rooftop cannon. No more radical improvements were made to the town wall after the 14th century (Ayers 2010, 35-38).

When comparing the town defences of this British town to Utrecht several differences can be seen. First of all is the way in which the river was used in the town defences. In Utrecht the river became the town moat inside which the earthen wall and later the stone walls were build whereas in Norwich the river itself and a wooden fence became the total defence on large parts of the town defence's trace. This could partly be done because the lands to the east of Norwich were marshy and difficult to traverse (Ayers 2010, 37) but compared to the defences of Utrecht this seems flimsy at best. It seems that no threat came from that direction until 1398-1399 when the massive Cow Tower was built to fortify the defences (Figure 54). The 14th century stone wall was built over 50 years. Although one could speak of a plan to build the town wall in 1290, it became a long lasting process until 1340. This stone wall was constructed out of entirely different materials than the walls in Utrecht due to the natural resources readily available to the townsfolk of Norwich. The British Isles have natural stone aplenty compared to the Netherlands were this had to be imported from the Eiffel region. This resulted in the difference in building materials seen here. Flint was the main construction material instead of brick, although brick was also used in Norwich. However, the walls of Norwich themselves were constructed in similar fashion to Utrecht's, consisting out of a shield wall with a wall walk resting on an arch construction behind it. The towers however were different, especially the Cow Tower. The boom towers with their linking chain are a concept not known in Utrecht, where the influences of the rivers into the canals were protected by the more common iron fences. The enormous Cow Tower has dimensions far larger than any tower in Utrecht as well. It was in essence four towers built as one, creating one enormously wide tower with a roof that could support a cannon. No traces of anything similar were found in Utrecht until the construction of the bulwarks in the 16th century.

When comparing Norwich and Utrecht the differences between the areas of the Netherlands and Britain become clear. In the medieval period very different materials were used for the construction of the town defences and very different construction plans for towers were invented, but the way the landscape was used differs as well.

9. Conclusion

Through the course of this thesis many questions about the town defences of Utrecht have been answered and theories proven and disproven. The main question considered dissimilarities between the town defences as a process or plan in the form of the question: was the wall built according to a plan in one go or as a process over many years, perhaps in multiple phases? Answering this question brought us first to the reconstruction of the medieval town walls of Utrecht.

Using both archaeological and historical sources two phases have been reconstructed. Phase 1 ranged from the 12th century to the 13th century with the earliest possible year encountered being 1145 at the Smeetoren. This early phase encompassed the town moat, the earthen walls, several stretches of tufa walls and several square stone (tufa) towers. Two tufa towers have been recovered: the Smeetoren and the Toren bij Servaas. Acket and Wagenaars theories about the circuit of the first phase has been disproved by the excavations of the Smeetoren and Toren bij Servaas. The circuit followed the line of the brick town walls of phase 2, further south than the suggested line following the Smeestraat, Zuilenstraat and Schalkwijkstraat. The first defences encompassed an extremely large area compared to those of other towns in the Netherlands: 143.1 ha in Utrecht versus 0.85 ha in Den Bosch, 8.75 ha in Deventer. Even compared to the important town of Cologne we see that Utrecht's defences encompassed a much larger area: 96 ha in Cologne versus 143.1 in Utrecht.

Of phase 2, ranging from the 13th to 15th century more could be learned. The town defences encompassed a newly fortified the town moat with two retaining walls on each side, brick town walls with incorporated round towers and stone gates. Of these gates part of the layout of the east Tolsteegpoort and the Weerdpoort could be recovered, both resembling a rectangular gate with a front gate containing two towers, resembling Janse and Van Straalen's type C. Of all four gates a 3D reconstruction could be made using the historical (and in case of the Tolsteegpoort-

complex and Weerdpoort archaeological) sources. The circuit of the second phase of defences coincides largely with the images we see on historical maps such as those of Braun and Specht. Yet it also becomes clear that these maps show us a somewhat distorted version of the past simply because these maps were not as accurate as the maps of today. The trace remains within the modern day singel of Utrecht, following the bends in the waters with the exception of the 16th century bulwarks, added by Karel V. The construction of the wall of this second phase could also be properly reconstructed. The wall contained an 8 to 10 metres high and 0.9 m wide shield wall with an arch construction backing it on the town side. On this arch construction the wall walk stood and beneath it all ground saving arches supported the structure. The towers could be reconstructed to a certain extent as well. The towers of phase 2 where incorporated in the town wall, had a rounded layout and possible open backsides, as was discovered at the Zeedijk.

Through the construction of the walls, its foundations and its brickwork it was possible to determine whether the town walls of Utrecht were constructed in one go or as a process over a longer period of time. Especially through the study of the brick dimensions it has become possible to place different excavated remains of the town walls in a specific century resulting in a clear overview of the developments of the brick town walls in phase 2, following the earthen and tufa defences of phase 1. First the earthen wall, town moat and tufa towers were constructed in the 12th century. Afterwards in the 13th century the brick gates, Rode Toren and first stretches of brick town walls and retaining walls for the moat were built in the southwest of town, near the East Tolsteegpoort. Then in the 14th century the brick town walls were completed, including rounded towers incorporated into the walls. The suburb the Bemuurde Weerd was also constructed in this century. Finally in the 15th century the last additions (the Pulvertoren) are made before the renovation of the town walls and construction of the bulwarks in the 16th century to account for the improved artillery.

Comparing the town defences of Utrecht with other medieval defences of Den Bosch, Deventer, Cologne and Norwich provided a broader perspective in which to take a critical view at the defences. Many differences could be seen such as in the building materials used in Norwich: flint rather than brick, the early development of bulwarks in Cologne in the 14th century, the uniform structure of Den Bosch's town defences and the generally smaller area encompassed by the town walls of all the other towns compared to Utrecht. While there are many differences, similarities could be seen as well, such as the rounded or horse-shoe shaped plan of the towers in Deventer and Den Bosch. The development from earthen walls to brick town walls from the 12th to the 14th century can be seen in Deventer and Den Bosch as well.

All in all a detailed overview has been made of the defences of Utrecht, its walls, towers and gates, its similarities and discrepancies with other cities. We can now say that the defences of Utrecht, its town moat, town walls, towers and gates were not constructed in one go. They were in fact part of a long lasting process to fortify the town, creating an enormous and multiple phased structure.

Abstract

In this paper data has been gathered from excavation of the last century dealing with the town defences of Utrecht. Using this data and other historical sources a reconstruction has been made of the medieval town defences of Utrecht. Central stands the question whether the construction of the town defences was a plan or process and how this enormous endeavour was realized. First the general history and background of Utrecht are discussed, followed by the reconstruction of the town defences. Then the town defences are divided into different phases. Finally a comparison between the town defences of Utrecht and different other towns in both the Netherlands and abroad will be made.

Bibliography

Acket, M.N., 1946. De burcht van Trecht en de wording van de stad Utrecht, *MOU* 1946, 68-72.

Ayer, B., 2010. Norwich, the fortifications of medieval and early modern Norwich, in C. Kimminus-Schneider, M. Schneider and D. Zwick (eds.), *Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII: Die Befestigungen*, Verlag Schmidt-Römhild, Lubeck, 29-46.

Bakker, A.M., 2004. Lepelenburg/Bruntenhof in D. Kok and R. Kok (eds). *Archeologische Kroniek , Provincie Utrecht 2002-2003*. Utrecht: PlantijnCasperie, 165.

Bakker, A.M., 2006. *Archeologisch proefonderzoek in het Stationsgebied (2006), Op zoek naar middeleeuwse bewoningssporen, de stadsmuur en restanten van kasteel Vredenburg*, Intern Rapport Gemeente Utrecht.

Berkel, A.A. and Vlerk van der 1983, 1983. Nieuwe Kade, in T.J. Hoekstra (ed), *Bouwhistorische Archeologische Kroniek 1982.* Utrecht, 95-101.

Braun and Hogenberg, 1572. *Civitates orbis terrarium I*, Braun and Hogenberg, Keulen.

Calkoen, C.G., 1896, *Venieuwing der Stadsverdediging*. Utrecht.

Calkoen, C.G., 1903. *Aanteekeningen omtrent de verdedigingswerken en de verdedigingsmiddelen der stad Utrecht. Van 1122 tot 1795.* Utrecht.

Creightown, O.H. and R.A. Higham, 2005. *Medieval Town Walls, An archaeology and social history of urban defence*. Gloucestershire: Tempus publishing.

Dinter, M., in preparation. *Late Holocene lowland fluvial archives and geoarchaeology: Utrecht's case study of Rhine river abandonment under Roman and Medieval settlement*, in K.M. Cohen *et al.* (eds.), Quaternary Science Reviews.

Groot de, H.L., 1981. Jan Meijenstraat e.o., in T.J. Hoekstra (ed). *Archeologische & Bouwhistorische Kroniek 1978-79-80*. Utrecht: BroeseKemink, 44-50.

Groot de, H.L., 1984a. Keizersgracht, in T.J. Hoekstra (ed). *Archeologische & Bouwhistorische Kroniek 1984*. Utrecht: BroeseKemink, 102.

Groot de, H.L., 1984b. Wijde Doelen, in T.J. Hoekstra (ed). *Archeologische & Bouwhistorische Kroniek 1984*. Utrecht: BroeseKemink, 186.

Groot de, H.L., 1986. Twijnstraat, in T.J. Hoekstra (ed). *Archeologische en bouwhistorische Kroniek van de Gemeente Utrecht 1985*. Utrecht: Broese Kemink, 225-227.

Groot de, H.L., 2000a. Lepelenburg, in D. Kok and K. van den Graaf (eds). *Archeologische Kroniek, Provincie Utrecht 1998-1999*, Utrecht: PlantijnCasparie Utrecht, 114-117.

Groot de, H.L., 2000b. Van Strijdhamer tot Bisschopsstaf, in A. Pietersma (ed). *Geschiedenis van Utrecht*. Stichting Matrijs, Utrecht, 10-43.

Groot de, H.L., 2004. Weerdsingel-Nieuwekade, in D. Kok and R. Kok (eds). *Archeologische Kroniek, Provincie Utrecht 2002-2003*, Utrecht: PlantijnCasparie Utrecht, 172-176.

Groot de, H.L. and Tj. Pot, 1989. Nieuwe Kade, in L.R.P. Ozinga (ed). *Archeologische en Bouwhistorische Kroniek van de Gemeente Utrecht 1988*. Utrecht: BroeseKemink, 132-134.

Hundertmark, H. and H. Wynia, 2000. Tolsteegpoort, in K. van der Graaf and D. Kok (eds), *Archeologische Kroniek, Provincie Utrecht 1998-1999*. Utrecht: PlantijnCasparie Utrecht, 142-144.

Hartog den, C.M.W., 2016a. *Tolsteegpoort, Archeologische waarneming nabij de Tolsteegbrug te Utrecht*, Intern Rapport Gemeente Utrecht.

Hartog den, C.M.W., 2016b. *De Sint Servaasabdij*, Intern Rapport Gemeente Utrecht.

Hoekstra, T.J. 1977. Lepelenburg, *Oud Maandblad Utrecht* 50(12), 138-142.

Hoekstra, T.J., 1979a. Tolsteegsingel, in T.J. Hoekstra (ed). *Archeologische Kroniek van de Gemeente Utrecht 1974-1975*. Utrecht, 30-31.

Hoekstra, T.J., 1979b. Van Asch van Wijckskade, in T.J. Hoekstra (ed). *Archeologische Kroniek van de Gemeente Utrecht 1974-1975*. Utrecht, 8-10.

Hoekstra, T.J., 1979c. Lange Smeestraat, in T.J. Hoekstra (ed). *Archeologische Kroniek van de Gemeente Utrecht 1974-1975*. Utrecht, 18-19.

Hoekstra, T.J., 1980. Van Asch van Wijcksstraat, in T.J. Hoekstra (ed). *Archeologische Kroniek van de Gemeente Utrecht 1976-1977*. Utrecht, 5-8.

Hoekstra, T.J., 1986. Van Asch van Wijckskade, in T.J. Hoekstra (ed). *Archeologische en Bouwhistorische Kroniek van de Gemeente Utrecht 1985*. Utrecht: BroeseKemink, 119-120.

Hoven van Genderen van den, A.J., 2000. Op het toppunt van de macht, in A. Pietersma (ed). *Geschiedenis van Utrecht*. Stichting Matrijs, Utrecht, 113-189.

Jansen, H. and Th. Van Straalen, 1974. *Middeleeuwse Stadswallen en Stadspoorten in de Lage Landen*, Europese Bibliotheek, Zaltbommel.

Janssen, H.L., 1983. De oudste stadsommuring, in H.L. Janssen, *Van Bos tot Stad*. 's-Hertogenbosch: Dienst van gemeentewerken.

Kamp van der, J.S., 2015. *Evaluatierapport archeologisch onderzoek parkeergarage De Vredenburg, Utrecht (2014)*, Intern Rapport Gemeente Utrecht.

Kemme, A.W.A., 2013. *Utrecht, Vredenburgknoop. Archeologische Begeleidingen*, Intern Rapport BAAC.

Kylstra, E.M., 1981. Gruttersdijk, in T.J. Hoekstra (ed). *Archeologische Kroniek, Gemeente Utrecht 1978-79-80*, Utrecht, 37-38.

Kylstra, E.M., 1981. Nieuwe Kade, in T.J. Hoekstra (ed). *Archeologische Kroniek, Gemeente Utrecht 1978-79-80*, Utrecht, 56-57.

Monde van der, N., 1845. *Geschied en oudheidkundige beschrijving van de pleinen, straten, stegen, waterleidingen, wedden, putten en pompen der Stad Utrecht II*, Europese Bibliotheek, Baarn.

Orsel, E. D., 2007. *Rijswijkers in Leiden. Algemeen overzicht van bakstenen en metselwerk in Leiden en signalering van zestiende-en zeventiende-eeuwse kenmerken*, Leiden.

Schaik van, A.H.M., 2000. Een nieuwe heer en een andere leer, in A. Pietersma (ed). *Geschiedenis van Utrecht*. Stichting Matrijs, Utrecht, 191-249.

Temminck Groll, C.L., 1995. Bijlhouwersstraat, stadsmuur bij het bastion Sterrenburg, in M.H. Stafleu (ed). *Archeologische en Bouwhistorische kroniek van de Gemeente Utrecht 1926-1972*. Utrecht: Stichting Publicaties Oud Utrecht, 45-47.

Trier, M., 2010. *Köln,* Die Kölner Stadtbefestigung im Mittelalter und in der frühen Neuzeit, in C. Kimminus-Schneider, M. Schneider and D. Zwick (eds.), *Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII: Die Befestigungen*, Verlag Schmidt-Römhild, Lubeck, 518-552.

Vermeulen, B., 2010. From rampart to Hoornwerk: Deventer's defences (882-1873), in C. Kimminus-Schneider, M. Schneider and D. Zwick (eds.), *Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII: Die Befestigungen*, Verlag Schmidt-Römhild, Lubeck, 187-217.

Vlerk van der, L.C., 1983. *Utrecht ommuurd, De stedelijke verdedigingswerken van Utrecht*. Utrecht: Kwadraat, Vianen.

Vliet van, K., 2000a. De stad van de bisschop, in A. Pietersma (ed). *Geschiedenis van Utrecht*. Stichting Matrijs, Utrecht, 45-71.

Vliet van, K., 2000b. De stad van de burgers, in A. Pietersma (ed). *Geschiedenis van Utrecht*. Stichting Matrijs, Utrecht, 72-111.

Wagenaar, T., 1971. Enige hypothesen van dr. G.C. Labouchère over het middeleeuwse Utrecht, *JOU* 1971, 13-32.

Manuscripts[4]

Berends, D., 1980. *Utrecht Baksteenformaten*, manuscript, department of Heritage Utrecht.

Temminck Grol, C.L., 1963. *Middel Eeuws Stenen Huis in Utrecht*, dissertation, department of Heritage Utrecht.

[4] These documents were acquired by F. Kipp, construction historian at the department of Heritage in Utrecht. If one wishes to take a closer look at these documents, feel free to get in touch with the author.

List of figures

Cover page, the Weerdpoort depicted by D. Verrijk in 1755, bouwgeschiedenisutrecht.nl visited on 28-.3-2017.....cover page

Figure 1, model of the two phases in the general development of town defences...... 13

Figure 2, layout of the early and late defences, by author...... 14

Figure 3, development of town gates. From left to right: (a) oldest to (b) middle to (c) youngest (c) plans. The dotted lines represent the path into the town, by author after the description of gates in Janse and Van Straalen 1974, 27-34)...... 16

Figure 4, the plan of a square and round tower (N.B. the general plan, not to scale, by author. 20

Figure 5, the area surrounding Utrecht (De Groot 2000b, 11)...... 25

Figure 6, habitation zones of Utrecht around the year 1000 (Van Vliet 2000, 55)...... 26

Figure 7, habitation zones of Utrecht around the year 1150 (Van Vliet 2000, 81)...... 27

Figure 8, street layout of Utrecht around 1300 on a background of the modern day street pattern. In yellow the streets formed around 1300 and in dark grey streets that were likely to exist around 1300 (Van den Hoven van Genderen 2000, 140). 27

Figure 9, still standing stretch of medieval town wall on the Nobeldwarsstraat. Here we see the arch construction on the town side. The shield wall has been stripped off in the 19th century and a supportive wall has been constructed on the town side closing off the arches...... 29

Figure 10, masonry connections; 1: Noords Verband, 2: Vlaams verband, 3: Staand verband, 4: Kruisverband (Orsel 2007, 15). 34

Figure 11, cadastre of Utrecht originating from 1832 (hisgis.nl)..... 39

Figure 12, the different theories about the course of the circuit of the first defences. Included are the excavated remains and archaeological observations. Note that the theory of Van der Vlerk includes the circuit of Acket and Wagenaar with the exception of the southern wall. By author. 41

Figure 13, the brick retaining wall standing over 2 metres high at the excavation on the Nieuwe Kade, after De Groot 1989, 132. 45
Figure 14, schematic representation of the earthen wall's mass causing the brick retaining wall to lean away from the earthen wall. By author. 46
Figure 15, profile in which the earthen wall at the Jan Meijenstraat can be seen (left). After De Groot 1981, 49. 46
Figure 16, measurements of the Smeetoren from 1864, before the demolishment. Here we see that the Smeetoren was 22 metres high, had a square layout and walls ranging from 0.8 to 2 metres wide at the time (Opmeting Smeetoren 1864, UD-SM01). 49
Figure 17, 3d reconstruction of the Smeetoren around 1200 by D. Claessen. 50
Figure 18, field drawing of the excavation of the tufa wall of the Servaastoren. The top grey feature is the tufa wall. After original field drawing (UD-SER002) 51
Figure 19, the development of the north-western area of Utrecht. From the 11th to the 12th century the river slowly retreated north. In black the 11th century dyke, white the shoring equipment dated to 1050-1125 and in purple the 12th century levee, by author. 54
Figure 20, the foundation stone of the Smeetoren. This stone found at the excavation in 1973 is a 15th century replacement for the original foundation stone. It states the date of construction: 1145. The translation of the original Latin is: 'In the year of our Lord 1145, the seventh year of King Koenraad and the sixth of bishop Hartbert, this structure has been erected by sheriff Alfer' (After Van Vliet 2000, 78). 55
Figure 21, map of Utrecht, showing the situation at the end of the 16th century (Braun and Hogenberg, 1572). 59
Figure 22, map of Utrecht, showing the situation around the end of the 17th century (Specht 1695). 66
Figure 23, the excavations of the Tolsteegpoort-complex. On the background the cadastre of Utrecht, making it possible to pinpoint the exact location of the medieval gate, by author. 68

Figure 24, circuit of the town wall between the 13th and 15th century. Based on excavated remains of the town wall on a background of the cadastre of Utrecht in 1832 from HISGIS. In yellow the excavated remains. Keep in mind that this is a rough indication of the elements excavated: e.g. from the Smeetoren, not everything was recovered. For greater detail see Appendix 3. By author. 69
Figure 25, a 17th century drawing of the town wall and towers. Here we can see that the walls were higher than 4-5 metres. Taking the average length of 1.70m, we can stack the man depicted next to the river in order to find the height of the town walls. The height of the wall equals 5.5 men. 5.5x1.7m= 9.35m. Taking into account the inaccuracy of the drawing the length of the town walls still stands roughly between 8 to 10 metres. After H. Saftleven 1642. 72
Figure 26, region Abraham Bloemaert, early 17th century. In the background we see the Bijlhouwerstoren, on the right of the tower the connecting town wall, (Unknown, first quarter of the 17th century). 73
Figure 27, measurement of the Bijlhouwerstoren in 1872, note that the windows are located at 6.5 and 7 metres high (UD-BIJ001). 74
Figure 28, a reconstruction of the old 14th century town wall (below) containing a tower and the new 16th century (above) town wall. Both are constructed out of a shield wall (solid) and an arch construction on the town's side, by F. Kipp (UD-CM003) 76
Figure 29, possible reconstructions of the town wall based on excavation results and historical drawings, by author. 77
Figure 30, the excavated town wall at Wijde Doelen 1984. Two pieces of the wall have separately been recovered. The L-shaped element is the town wall with its adjoining abutment. After original excavation drawing Wijde Doelen 1984, UD-WD001 77
Figure 31, the town wall including its towers and gates shortly after 1500 based on the map of Jacob van Deventer (1560) (Van den Hoven van Genderen 2000, 129). 80
Figure 32, locations of the towers and gates of Phase 2. 82

Figure 33, reconstruction of 16th century Toren het Paard, the successor of the Brouwerstoren. 83
Figure 34, the excavated part of the Pulvertoren (in green) and a reconstruction of how it would have fit in the full tower (blue lines), by author (based on original field drawings). 84
Figure 35, the Wantsnijderstoren (blue outline) and town walls (green) excavated at Vredenburgknoop 2011-13, by author (based on original field drawings). 85
Figure 36, layout of the four gates. 1. Weerdpoort, 2. Tolsteegpoorten, 3. Wittevrouwenpoort and 4. Catharijnepoort, based on historical construction plans (Van der Vlerk 1983, 56). 87
Figure 37, ground plan of the Tolsteegpoort-complex drawn by Rombout Keldermans in 1529-1531 (Van der Vlerk 1983, 63) 89
Figure 38, 3D reconstruction of the Tolsteegpoort west (left) and east (right), based on historical drawings and excavations, by D. Claessen. 89
Figure 39, ground plan of the recovered Weerdpoort. 90
Figure 40, reconstruction of the east part of the main gate building of the Weerdpoort in the pavement. The small square stones represent the plan of the gate. 91
Figure 41, the reconstructed front towers of the Weerdpoort with an added window to look inside. 91
Figure 42, 3D reconstruction of the Weerdpoort, based on historical drawings and excavations, by D. Claessen. 92
Figure 43, 3d reconstructions of the Wittevrouwenpoort (top) and Catharijnepoort (bottom) by D. Claessen, based on historical drawings. 93
Figure 44, exerpt from the excavation drawings of Manenburg 1948, showing two of the five buttresses, UD-MAN01 97
Figure 45, the location of the excavated buttresses of phase 2. For greater detail, see Appendix 3, by author. 98
Figure 46, the excavation at the Nieuwe Kade 1982. Shown are the 13th/14th century town wall and buttresses, by author based on original field drawing Nieuwe Kade 1982. 99

Figure 47, the excavated elements of the town defences dated according to their brick dimensions (see Table 3; Table 4; Table 5 and Table 6). The black town wall is a reconstruction based on all excavations which can be found in Appendix 3. 101
Figure 48, the location of the excavated retaining walls of the moat. The wall found at the Tolsteegsingel dates back to the 13th century and those found at the Catharijnesingel to the 14th and 15th century. For greater detail see Appendix 3, by author. 103
Figure 49, the trace of the 13th century town wall of Den Bosch (Janssen 1983, 65) 108
Figure 50, the town defences of Den Bosch, utilizing the rivers flowing through the area. The dotted lines indicate the town defences (Janssen 1983, 66). 110
Figure 51, the town defences of Deventer in the third phase (12th to 14h century) (Vermeulen 2010, 190) 112
Figure 52, one of the three excavated towers of the outer town wall of the 14th century (Vermeulen 2010, 201). 114
Figure 53, a 14th century bulwark from Cologne (Trier 2010, 545). 116
Figure 54, cow tower of Norwich (Ayers 2010, 37). 118

List of tables

Table 1, development of brick in Utrecht after Temminck Grol 1963 and Berends 1980. Dimensions in centimetres. 33
Table 2, core data of the excavations listed in Appendix 1, concerning the first phase of the defences of Utrecht. Their location can be found on Figure 12 or Appendix 3 in greater detail. Brick sizes are in centimetres. 38
Table 3, the gates of phase 2. The core data of the excavations listed in Appendix 1, concerning the gates of the second phase of the defences of Utrecht. Their location can be found in Appendix 3 in greater detail. Brick sizes are in centimetres. 61
Table 4, the towers of phase 2. The core data of the excavations listed in Appendix 1, concerning the towers of the second phase of the defences of Utrecht. Their location can be found in Appendix 3 in greater detail. Brick sizes are in centimetres. 62
Table 5, the town walls of phase 2, the core data of the excavations listed in Appendix 1, concerning the town walls of the second phase of the defences of Utrecht. Their location can be found in Appendix 3 in greater detail. Brick sizes are in centimetres and all bricks found were whole. ... 63
Table 6, the retaining walls of the moat of phase 2, the core data of the excavations listed in Appendix 1, concerning the retaining walls of the moat of the second phase of the defences of Utrecht. Their location can be found in Appendix 3 in greater detail. Brick sizes are in centimetres. 65
Table 7, locations of excavations of the town defences. 163
Table 8, locations of elements of the town defences. 164

List of Appendices

Appendix 1: Waarnemingen.....92

Appendix 2: Map locations.....108

Appendix 3: Maps, phase 1 and phase 2.....111

Appendices

What follows is the list of appendices, which contains a list of the observations about the town defences made by archaeologists over the last century under the heading 'waarnemingen' and the two detailed maps depicting the locations of these observations and excavations.

Appendix 1. Waarnemingen

Hier volgt de lijst met alle waarnemingen van de stadsverdediging gemaakt voor archeologen in Utrecht gedurende de laatste eeuw. Gesorteerd op de nummering die te vinden is op de kaart.

i. Jan Meijenstraat, 1979

Op deze locatie is tijdens een groot onderzoek een aantal belangrijke waarnemingen gedaan. Tot aan de 13e eeuw stroomde een rivier tot aan de Waterstraat. Enkele meters ten noorden van de Waterstraat zijn resten gevonden van een dijklichaam welk de stad beschermde van de rivier. Het dijklichaam bestond uit klei op een bed van slieten (afgehouwen boomstammen). De slieten lagen direct op de natuurlijke afzettingen op gemiddeld 50 cm +NAP. Aan de hand van aardewerkvondsten onder de slieten en tegen de dijk aan is deze gedateerd in de 11e eeuw. Hiervoor werd ook een shoeiiing aangetroffen aan de rivierzijde. Tegen deze schoeiing werden veel zand afgezet door de rivier en hierdoor verlandde het gebied zich naar het noorden. Verder naar het noorden zijn nog verschillende jongere schoeiingen aangetroffen (daterend tussen de 1050 en 1125, aan de hand van aardewerk). Dit verlandingsproces ging door tot het eind van de 12e eeuw toen de locatie van de moderne singel werd bereikt en een oeverwal onstond op de locatie van de Oranjestraat (De Groot 1981, 44-47). Voor de 13e eeuw is er dus geen sprake van een stadsverdediging naast de dijk en de rivier zelf.

Op de Jan Meijenstraat (ten noorden van de Waterstraat) is een aarden wal aangetroffen die tot de oudste stadsverdediging hoorde en is gedateerd in de 13e eeuw. De wal stond vroeger waarschijnlijk 2.5 meter hoog. Tijdens de opgraving werd alleen het topje van de wal niet teruggevonden in het profiel. Naast de verdedigingsfunctie is het mogelijk dat deze wal ook als dijk diende voor de rivier.

Behalve de aarden wal is ook de oude stadsmuur gevonden, daterend uit de 14e eeuw met het baksteenformaat van 30x15x7 centimeter. Dit muurwerk werd aan de plattelandszijde gevonden, ten noorden van de

aarden wal. De funderingsaanleg was 1.9 meter breed en op hoger niveau bestond de muur uit een schildmuur van 85 centimeter dik met aan de stadszijde een spaarboogconstructie met een afstand van 4.5 meter tussen de boogaanzettingen (De Groot 1981, 47-50).

Tot slot zijn nog grote delen van de 16e eeuwse verdediging gevonden waaronder een deel stadsmuur en grote delen van bastion Morgenster (De Groot 1981, 49-50).

ii. Noord-oostelijk deel van de stad, 1974

Tijdens deze grootschalige verbouwingen zijn er 3 torens aangetroffen, een deel van de Weerdpoort en meerdere delen van de stadsmuur daterend tussen de 13e en 15e eeuw. Vermoedelijk gaat het hier om toren de Beer, de Lauwerstoren en een kleinere niet bij naam bekende toren (UD-NOD01 1974, veldaantekening).

Hiernaast zijn op meerdere locaties grote delen van de 16e eeuwse stadswal aangetroffen.

iii. Van Asch van Wijckskade, 1973-74

Aangetroffen zijn hier de fundamenten van de Wolleweverstoren (na 1528 de Leeuw genaamd) welk in 1828 is afgebroken. De wanddikte van het teruggevonden fundament van deze toren werd gemeten op 210 cm met een buitendiameter van 12 meter. De 17e eeuwse buitenschil bestond uit bakstenen van 24x12x5 cm en de muur daarbinnen (evenals de fundering) uit kloostermoppen met afmetingen van 28x14x7. Alsmede is de aanzet van de toren de Beer aangetroffen, daterend uit 1536. Dit was het jaar waarin op bevel van de graaf Van Hoogstraten, stadhouder van o.a. Utrecht, de Utrechtste stadsmuur werd verlaagd en de nieuwe torens werden gebouwd, waaronder toren de Beer. Hier waren veel reparaties te zien, zowel Middeleeuws als 17e/18e eeuws. Naast de twee torens is ook een groot stuk stadsmuur gevonden met bakstenen van het formaat 28-30x14-15x6,5-7 cm en met meerdere riooluitlaten waarvan er één dateerd uit de bouwtijd van de muur (de meest westelijke) een tweede (de middelste) uit 1545 (weer gesloten in 1579) en als derde de oostelijke na

1579 (Hoekstra 1979b, 8-10; UD-AWK01 1973-74, veldtekening; Van der Monde 1845, 235-236).

iv. Van Asch van Wijckskade, 1976

Een stuk bastenen muur is gevonden, behorend tot de stadsmuur. Het baksteenformaat van de muur was: 28x15x6 centimeter met een 10 lagen maat van 76 centimer. Helaas is de precieze locatie van dit stuk muur verloren gegaan (Hoekstra 1980, 5-7). Hiernaast zijn ook drie steunberen aangetroffen, daterend uit de 14e/15e eeuw. Veldtekeningen van de steunberen zijn gevonden, de stadsmuur werd hierop echter niet aangegeven (UD-AWK02 1976, veldaantekeningen).

v. Lepelenburg, 1998

In juli werd in 1998 de bovenkant van de stadsmuur op twee plaatsen aangetroffen bij Lepelenburg, helaas kon de onderzijde niet worden bereikt i.v.m. grondwater. Hoogstwaarschijnlijk is ook een deel van de Maliepoort aangetroffen. Het gaat hier om een muurwerk met twee verschillende baksteenformaten liggend bovenop de aangetroffen stadsmuur. Het bovenste deel bestond uit stenen met het formaat: 26x12.5-13x5-6 met een 10 lagen maat van 65-66 centimeter. Het onderste deel bestond uit gestapelde lagen met hergebruikte stenen, dit alles had een 10 lagen maat van 90-91 centimeter (Groot de 2000a, 114-117 en UD-LEP02 1998, veldtekeningen).

vi. Lepelenburg, 1972

Een deel van de stadsmuur werd hier aangetroffen, welk een overkluisde riooldoorgang van 1,05 meter hoog bevatte. De aanlegbreedte van de muur was 3 meter en ten noorden van de riooldoorgang zelfs 4,2 meter (Hoekstra 1977, 142). Er zijn hiervan geen gegevens over de steenformaten. Qua tracé ligt de muur op de lijn van de eerste fase (1122-1482). Rekening moet er wel mee worden gehouden dat het fragment gerepareerd of vernieuwd kan zijn waardoor een latere datering mogelijk is.

vii. Servaasbolwerk, 2003

Verschillende delen muurwerk zijn in nauwe relatie met elkaar

aangetroffen. De ondergrond van de putten bestond uit zware zavel op ongeveer 1.50 m +NAP en daaronder zand (0.8-0.9 m +NAP). Het oudste muurwerk was circa 1,9 meter breed en 95 centimeter diep. De funderingen lagen op 42 cm –NAP. De onderste vijf lagen van de muur vertoonden een afgewerkte kant aan de zuidoost zijde, wat overeenkomt met de plattelandszijde van de muur. De baksteenformaten (32x17x9 centimeter) leverden een datering op in de 13e eeuw. Waaruit de conclusie is getrokken dat dit de oudste stadsmuur is.

Koud tegen de oudste muur stond een tweede muur, welk 0,6 meter breed was, 2 meter lang en circa 45 centimeter diep. De fundering lag op 44 cm –NAP. Deze muur werd geplaatst in de 14e eeuw. Verbonden met deze muur werd nog een stuk 14e eeuws muurwerk aangetroffen. Vermoedelijk behoorden deze muren ook tot de oude stadsmuur.

Verder is er nog een dichtgemetselde grondboog gevonden welk uit de 15e/16e eeuw afkomstig is gezien de baksteenformaten. Dit alles werd overdekt door muurwerk uit de 16e eeuw. Deze muur was gefundeerd op een puinlaag. Dit 16e eeuwse muurwerk kan worden geïnterpreteerd als een deel van de toren op het St. Servaashek welk stamt uit de 16e eeuw en op historische kaarten precies op deze locatie te zien is (Braun en Hogenberg 1590, Stadsplattegrond van Utrecht; Den Hartog 2016, 18-25).

Tot slot zijn er tufstenen funderingen aangevonden van een toren. Deze fundering werd aangetroffen bij de Servaasabdij wat betekent dat dit hoogstwaarschijnlijk de 'Toren bij Servaas' is. Het spoor was 9 meter lang en maximaal 1.25 meter breed. Een deel van het tufsteen was volledig verdwenen maar in het noorden was de fundering nog intact. De fundering lag tussen de 1.49 en 1.58 meter +NAP bovenop het zavelpakket (Den Hartog 2016, 19).

viii. Zochersplantsoen, 2009

Een klein deel van de middeleeuwse stadsmuur is aangetroffen waarvan 2 zijden zijn afgebroken en één nette rechte wand is gezien. Het baksteenformaat is 28x15x9 met een 10 lagen maat van 91 centimeter en

kan dus worden gedateerd in de 14e eeuw (UD-ZOP 2009, veldaantekeningen).

ix. Manenburg, 1948

Op deze locatie zijn in 1948 vijf steunberen aangetroffen met een steenformaat van 32x15x8 centimeter. Dit duidt op een datering uit de 13e eeuw en de steunberen behoren dus tot de eerste stadsmuur. Zij zijn allen ongeveer 1 meter breed, de lengte is niet te zien doordat ze de grens van de put doorsnijden. (UD-MAN01 1948, veldtekening).

x. Wijde Doelen, 1984

De oude én nieuwe stadsmuur zijn hier aangetroffen. De oude muur dateert uit de laat 13e, begin 14e eeuw, heeft een 90 centimeter dikke schildmuur en was vermoedelijk gebouwd op spaarbogen. Het baksteenformaat was: 32x15x7-8 centimeter en 8 lagen = 70 centimeter. Ook is hier een steunbeer van aangetroffen van 90 centimeter dik aan de stadszijde. De nieuwe stadsmuur dateert uit de tijd van het bastion Manenburg, dus ongeveer 1554 en lag 9 meter ten zuiden van de oude muur. Hiervan was het baksteenformaat 25x12x5 centimeter met een 10 lagen maat van 60 centimeter (De Groot 1984b, 186). Verder is er ook nog de begrenzing van een keienstraatje gevonden dat aan de stadszijde liep van de oude stadsmuur. Deze straat werd al vermeld in de schutmeestersrekeningen van 1510, maar vermoedelijk is het hier aangetroffen straatwerk de reparatie van de weg in 1543 welk besloten werd door de Raad na de aanleg van de nieuwe muur (De Groot 1984b, 186; UD-WDO01 1984, veldtekening).

xi. Wijde Doelen, 1948

De oostmuur van de Tolsteegpoort uit de 13e eeuw werd aangetroffen (steenformaat: 30x15x7 cm) en ook twee losse muurresten waarvan een vroeg 13e eeuws (32x15x7,5 cm) en degene die daar koud op is gezet 15e eeuws (30x14x6 cm) (UD-WDO02 1948, veldaantekening).

xii. Twijnstraat 1985

In 1926 zijn grote delen van de oostelijke Tolsteegpoort en de tolsteegbarrière aangetroffen, waarvan aangenomen wordt dat deze

afkomstig is uit het eind van de 14e eeuw en werd gesloopt in het midden van de 16e eeuw (Hoekstra 1986, 225-227). Twee torens, de verbindende muur en een zijmuur zijn gevonden. Het baksteenformaat van de toren was 30x15x7 cm. Ook zijn een aantal stenen kanonskogels in de toren aangetroffen (UD-TWS04 1985, veldaantekeningen). Hiernaast is een stuk ten westen van de torens ook een deel van het 16e eeuwse poortcomplex aangetroffen. De eerste twee muren van het bruggewelf en een kelder van het poortgebouw zijn gevonden (UD-TWS03 1926, veldaantekeningen).

xiii. Tolsteegpoort, 1998

De 13e eeuwse stadsmuur werd hier aangetroffen samen met de westelijke van de beide Rodetoren-poorten (aan weerszijden van de Tolsteegbrug en de voorlopers van de Tolsteegpoorten waarin zij later werden geïncorporeerd). Een 13e eeuwse massieve toren (dé Rodetoren) werd gevonden. Het baksteenformaat van de toren bedroeg: 31-32.5x15-15.5x8,5 centimeter met een 10 lagen maat van 106 centimeter. Het stuk stadsmuur was jonger (te zien aan het feit dat hij om de toren was heengebouwd) dan de toren, maar gezien het metselwerk stamt hij eveneens uit de 13e eeuw. Hiervan was het baksteenformaat 32x15.5-16x8.5 centimeter met een 10 lagen maat van 92 centimeter. Daarnaast is ten zuid-westen ook nog een stuk stadsmuur aangetroffen met het baksteenformaat 31-32x15-16x8 centimeter met een 10 lagenmaat van 88 centimeter. Ook zijn er nog twee muurstukken die vermoedelijk tot de 13e eeuwse Tolsteegpoort hebben behoord gevonden. Tot slot werd een keienstraatje aangetroffen binnen de muren wat in verband stond met de verdedigingswerken en daarom ook in de 13e/14e eeuw is gedateerd (Hundertmark en Wynia 2000, 142-144; UD-TOL04 1998, veldaantekeningen Hundertmark, H., Rooijen, C. en Wynia, H.).

xiv. Tolsteegsingel, 1975

Hier is de middeleeuwse singelmuur aangetroffen, welk de buitenkant van de stadsbuitengracht begrensde. De eerste vermelding hiervan is gevonden uit documenten van de grondruil tussen de stad en de St.

Servaasabdij in 1348. De vlijlaag is gevonden en de waterzijde van de muur was in tras gemetseld (Hoekstra 1979a, 30-31). Het steenformaat was: 32-34x16-17x8 centimeter en duidt op de 13e eeuw (UD-TSS01 1975, veldaantekening).

xv. Lange Smeestraat, 1973

Een tufstenen fundament is hier gevonden welk mogelijk deel is van de Smeetoren (voor het eerst vermeld in de historische bronnen 1154), welk behoorde tot de oudste torens van de verdediging, nog van de periode van vóór de stadsmuur. Het fundament was 2,6 meter breed en de aanlegdiepte was 0,90 m+NAP Bovenop lagen bakstenen van het formaat 32x16x7,5 welk dateren uit de 13e eeuw. Tot slot is er een funderingsteengevonden waarop de het jaartal 1145 stond, wat wordt geïnterpreteerd als de datum van constructie (Hoekstra 1979c, 18-19; Van der Vlerk 1983, 137).

xvi. Vredenburgknoop, 2011-13

Gedurende dit lang lopende begeleidingsproject zijn een aantal belangrijke waarnemingen gedaan. Delen van de Catharijnepoort zijn gezien, evenals delen van de stadsmuur, een ronddeel en de noordwesttoren van kasteel Vredenburg.

Van de Catharijnepoort zijn vijf delen muurwerk gevonden. Het oudste muurwerk was noordwest-zuidoost georiënteerd en liep in het noordwesten verder buiten de sleuf. De resten waren 2,20 m breed en er zijn twee versnijdingen vastgesteld. De muur was gemetseld met rode bakstenen (26x13x5,5) met veel tras, waardoor het slechts mogelijk was van één baksteen formaten te nemen. De bovenkant bevond zich op 3,20 m +NAP, het diepst gemeten punt op versnijding twee lag op 2,59 m +NAP.

Iets ten noordoosten van dit stuk is een deel van een muur gevonden met verschillende formaten bakstenen (25,2x12,1x5,0 en ..x11,5x5,4 en ..x13,6x6,7) en gevoegd met kalkmortel. Aan de noordzijde waren er twee versnijdingen, de zuidzijde had er geen. Het fragment muur was aan de oost en westzijde verstoord door kabels en leidingen en er was ook een

kabelgoot in de lengterichting van de muur uitgehakt. Het is niet duidelijk hoe het precies in de Catharijnepoort moet hebben gepast. Er is een ander fragment muur aan de oostzijde van de sleuf gevonden dat volgens de tekening van 1969 tot dezelfde structuur zou hebben behoord.

De oost- en westmuur waar het gewelf op gemetseld was zijn in respectievelijk de oost- en westwand van sleuf 8 gevonden. Het lijkt erop dat ook de noordzijde van het gewelf is aangetroffen. Aan de oostzijde van de sleuf was nog een deel van het gewelf zelf bewaard gebleven waarvan de noordzijde afwerkt was. Aan de westzijde was een deel van het gewelf over het oudste muurwerk gemetseld. Het gewelf was gemetseld met rode bakstenen (22x11,4x4) waarbij tras als voegmateriaal is gebruikt.

80 meter ten noordwesten van de Catharijnepoort is muurwerk gevonden dat tot een ronddeel in de stadsmuur behoorde, een toren. Het betrof de ronding van de neus van het rondeel waarin zich een ingebouwde latrine bevond. Waarschijnlijk gaat het hier om een kruittoren wat als kruitmagazijn werd gebruikt, een andere naam hiervoor is een Pulvertoren. De bakstenen hadden formaten van 31x12x5,5 cm en een 10-lagenmaat van 70 cm. het muurwerk is aangetroffen op circa 0 m +NAP en de onderkant bevond zich op circa 0,75 m -NAP.

Ten zuiden van de Catharijnepoort werden er fragmenten van de noordwesttoren van kasteel Vredenburg aangetroffen. De funderingen zijn gemetseld met breukstenen die in wildverband zijn gelegd. De formaten van de stenen waren 29,2 x 12,8-14,2 x 5,9-6,7 cm, de vijf-lagenmaat was 37,3 cm en het voegmateriaal bestond uit kalkmortel. Het hoogste punt waarop het muurwerk is aangetroffen was 0,74 m +NAP, de onderkant van de funderingen is op een aantal plekken gemeten en lag tussen 1,75 en 1,80 m –NAP. Binnen de aangetroffen muurresten kunnen twee fases onderscheiden worden op basis van de gebruikte bakstenen. Eén blok muurwerk heeft vrij forse bakstenen, tenminste voor zover er baksteen formaten genomen konden worden. Er is een ruime hoeveelheid tras als voegmateriaal voor het muurwerk gebruikt waardoor het moeilijk was goede baksteenformaten te nemen en uiteindelijk

konden alleen dikten (6,8 tot 8,2 cm) genomen worden. Het was ook niet mogelijk te bepalen of het om breukstenen ging of niet, hoewel het daar wel de schijn van had. Deze formaten wijken sterk af van de baksteenformaten die voor fase 2 van het muurwerk zijn gebruikt (24,2-25,6 x 11,2-12,1 x 4,7-5,2). Fase 2 behelst de twee wanden aan beide zijden van de zojuist genoemde opening in het muurwerk. Aan de noordelijk zijde van de opening is het muurwerk van fase 2 koud tegen dat van fase 1 gezet. Aan de zuidzijde van de opening is ook een wand van een baksteenlengte dik tegen een ander blok muurwerk gezet, maar de baksteenformaten lijken erop te wijzen, dat deze twee stukken muurwerk min of meer gelijktijdig zijn gebouwd. De Catharijnepoort is meerdere malen verbouwd gedurende het bestaan en hier lijken aanwijzingen te zijn gevonden voor zo'n verbouwing. Om welke verbouwing het gaat is op basis van dit in omvang beperkt stuk muurwerk niet goed te bepalen (Kemme 2013, 5-28).

De gevonden stadsmuur ligt een paar honderd meter ten zuidoosten van de resten van kasteel Vredenburg. Het muurwerk was ongeveer 1,5 meter breed en lag over een lengte van zo'n 50 meter met moderne versnijdingen er in.

xvii. Catharijnesingel 2013-14

Grote delen van de singelmuur (plattelandszijde) zijn waargenomen. Over het gehele onderzoeksgebied was de kademuur relatief veel nog intact, zeker in het zuidelijke gedeelte waar hij nog zo goed als compleet onder de grond lag. De singelmuur was gemetseld in wild verband met rode bakstenen en zachte kalkmortel. De bakstenen zijn primair gebruikt en hebben een baksteenformaat van 28-30x13-14x6,5-8 centimer. Op basis van de gebruikte bakstenen en opbouw van de muur dateert de oudste fase van de muur waarschijnlijk uit de eerste helft van de 14^{e} eeuw. De muur lijkt koud op een klei- of zandlaag te zijn gemetseld. Er zijn nergens funderingspalen of onderliggend hout aangetroffen. De middeleeuwse singelmuur is aan de bovenkant ongeveer één meter breed.

Hiertegenaan is een klampmuur geplaats welk dateerd uit de 17e of 18e eeuw (Verduin and Leijnse 2016, 11-15).

xviii. Catharijnesingel, 1972

Fragmenten van de singelmuur zijn hier op twee plaatsen aangetroffen. Daterend uit de 14e/15e eeuw. Het steenformaat van deze middeleeuwse muur was: 29-30x14-15x6,5-7 met een 10 lagen maat van 80 centimeter (UD-CAT01 1972, veldrapportage). Een vermelding van dit stuk kademuur wordt gemaakt in de schutmeestersrekeningen, volgens de rekeningen is de muur in 1348 aangelegd (Hoekstra 1977, 138).

xix. Vredenburg proefsleuven, 2006

Gedurende dit proefsleuvenonderzoek kwam de noordelijke stadsmuur tevoorschijn. De aanlegdiepte kon niet worden bereikt. De bovenkant van de muur is 1.20 m breed en bevond zich op 0.45 m +NAP. Het huidige maaiveld ligt hier op ca. 2,10 m +NAP. De stadsmuur is opgebouwd uit een groot formaat bakstenen (29,5x16x7 centimeter) en heeft een klamp van ongeveer 0.32 meter breed aan de grachtzijde van een iets kleiner formaat bakstenen (27x12x5,5 centimeter). Dit duidt erop dat er herstelwerk heeft plaatsgevonden. Aan de voet heeft de muur een breedte van 1,90 m. Daaronder bevindt zich nog drie versnijdingen waarmee de muur op een diepte van 0.40 m -NAP een totale breedte van 2,20 m heeft. Het is aannemelijk dat aan de grachtzijde de breedte op dieper niveau nog meer zal toenemen. Aan de walzijde zijn geen versnijdingen waargenomen en de muur staat hier ook recht overeind. De aanlegdiepte kon niet worden bereikt (Bakker 2006, 13-14).

xx. Weerdsingel-Nieuwe Kade, 2001

Hier zijn de funderingen van de 16e eeuwse toren het Paard aangetroffen, samen met aan beide zijde de aansluitende stadsmuur. De toren bestond uit een aantal lagen: een buitenste 17e eeuwse schil van zo'n 15 centimeter dik (vechtsteen 23x10,5x45, 10-lagen: 60,8 centimeter), een muur bestaande uit 16e eeuwse kloostermoppen van ongeveer 24 centimeter (27,5x14x7, 10-lagen: 80 centimeter) gemetseld met tras en kalkmortel. En een kern gemaakt uit veel hergebruikt 13e eeuws

materiaal (27x16,5x6,5, 10-lagen: 92 centimeter) wat vermoedelijk van de Brouwerstoren was welk de voorloper was van toren het paard. Tot slot werd er trasachtige mortel met veel houtskool gevonden. De aansluitende muur komt oorspronkelijk uit de 13e eeuw (Groot de 2004, 172-176; UD-NK01 2001, veldtekening).

xxi. Nieuwe Kade, 1982

Grote delen van de stadsmuur zijn gevonden rond het bastion Morgenster. Het gaat hierbij om grote stukken middeleeuwse muren van de 14e eeuw én stukken die in het begin 16e eeuw zijn vernieuwd (Kroniek 1982, 95). De 14e eeuwse stadsmuur is gevonden ten zuid-oosten van bastion Morgenster. De muur bestond uit een schildmuur met aan stadszijde een weergang op bogen. De schildmuur varieerde in dikte van 0,8 tot 0,9 meter en de steenformaten bedroegen: 33-33,5x15-16x7-7.5 centimeter. Dit duidt op een aanleg in de laat 13e of vroeg 14e eeuw. Er is ten zuiden van een knik in de muur een wijziging in de aanleg waargenomen; de muur is hier een halve steen breder en vervolgt zijn weg in een iets andere richting. Dit kan op een pauze in de bouw duiden of een reparatie. Aan de stadszijde van de schildmuur werden pijlers aangetroffen waarop bogen hebben gerust. Zij lagen ongeveer 3,20 meter uit elkaar en hadden een formaat van 1-1,2 meter lang en 1 meter breed. Deze onderste rij bogen lag waarschijnlijk bijna onder de grond waarbij de tweede rij daarbovenop lag met daarboven de weergang (Berkel en Van der Vlerk 1983, 95-98).

Het stuk muur ten westen van het bastion was een zware muur met bijbehorende trekberen. Het aangetroffen fundament was 2,1 meter dik en uit moppen opgebouwd. Een verklaring voor de trekberen van de muur was het feit dat de muur was aangeaard aan stadszijde. De trekberen voorkwamen dat de muur de gracht inviel. Deze trekberen behoorden niet tot het originele fundament en waren pas later ingezet. De muur had het steenformaat: 29,5-30x13x6,5-7 centimeter, wat wijst op een aanleg in de Middeleeuwen, in de laat 15e-vroeg 16e eeuw. Het lijkt erop dat de middeleeuwse muur was afgebroken en opnieuw opgebouwd

in verzwaarde versie met aarde en trekberen. De bogen werden gevuld met baksteen zoals te zien was op de hoek van de Nieuwe Kade en de St. Jacobsstraat. Hier werd de ruimte tussen de pijlers van de oude muur opgevuld kleine bakstenen (Berkel en Van der Vlerk 1982, 95-101).

xxii. Zeedijk, 2016

Op deze locatie werd nog net op tijd voor deze scriptie de noordwest toren en een deel van de stadsmuur gevonden van de Bemuurde Weerd. Het betreft een hoefijzervormige toren waarvan de funderingen ongeveer 1.20 meter dik waren en gemaakt van rode bakstenen. Een boogaanzet werd gevonden in de opening van de hoefijzervorm. Ook de aansluitende stadsmuur was gemaakt van rode bakstenen en was 90 centimetres dik. Beide waren gefundeerd op zware zavel (uiterst ziltige klei). De onderkant van de fundering van de toren lag op 0.49 meter -NAP en was gefundeerd op verticaal staande houten palen (UD-ZEE06).

xxiii. Keizersgracht, 1984

Wederom is er een stuk van de muur van de Bemuurde Weerd gevonden, ditmaal aangelegd op hout, met een aanlegbreedte van ongeveer 1m, uit bakstenen met het formaat 30x15x6 centimeter met onderaan trasachtig cement tussen de stenen (Groot de 1984a, 102).

xxiv. Lauwerecht, 1987

De noordelijke muur van de Bemuurde Weerd is hier aangetroffen. De gracht die hieromheenliep is ook teruggevonden en was ongeveer 4 meter breed (UD-LAU01 1987, veldaantekening).

xxv. Gruttersdijk, 1980

De verdedigingsmuur (oostelijk deel) van de bemuurde weerd is hier aangetroffen samen met de noord-oostelijke toren (ronddeel Simpoel). Beide zijn 90cm breed en uit baksteen opgetrokken. Een vermelding is te vinden in de schutmeestersrekeningen en wijst naar het jaar 1510, maar dit is niet zeker. De toren was vermoedelijk hoefijzervormig en had een baksteenformaat van 29-30x14,5x6-6,5, wat ook gold voor de aangetroffen muur (Kyltra 1981, 37-38).

xxvi. Nieuwe Kade, 1988

De aarden stadswal behorende tot de eerste stadsverdediging met keermuur die waarschijnlijk bij de eerste verdediging hoorde is hier aangetroffen (baksteenformaat: 30x14x7). De keermuur dateerd uit de 13e eeuw (De Groot en Pot 1989, 132-134).

Vermeldingen

Hieronder volgen aangetroffen stukken van de stadsverdediging welk niet konden worden geplaatst in de kaart door een gebrek aan gegevens. Het gaat hierbij deels om gegevens die kwijt zijn geraakt bij de verhuizing van het gemeente van Utrecht en deels om oude opgravingsgegevens die in de tussenliggende jaren verloren zijn gegaan. Ook staan hier vermeldingen die uitsluitend te maken hebben met de stadsverdediging ná de 15e eeuw. Dit valt buiten het tijdsbestek van het onderzoek.

Van Asch van Wijckskade, 1985

Een schuine steunbeer werd aangetroffen, vermoedelijk is het een gerepareerde steunbeer van de stadsmuur. Het baksteenformaat bedroeg: 28-29x14x6,5 centimeter, een datering in de 15e eeuw is dus niet onwaarschijnlijk (Hoekstra 1986, 119-120).

Agnietenstraat, 1972

Aangetroffen zijn drie poeren van de 16e eeuwse stadsmuur. Van poer 1 zijn helaas geen gegevens bewaard gebleven maar van 2 en 3 wel. Poer 2: steenformaat = 21x10-10,5x4-4,5 met een 10 lagen maat van 55 centimeter. Hiervan waren de onderste 11 lagen gestapeld en alles daarboven gemetseld. De dikte van de poer was ongeveer 250 centimeter. Poer 3: steenformaat = 22-23x11-12x4,5 met een 10 lagen maat van 54 centimeter. Hier waren de onderste 13 lagen gestapeld en de bovenste 13 gemetseld. De dikte van de poer was ongeveer 240 centimer (UD-AGN01 1972, Veldtekeningen).

Bijlhouwersbrug, 1948

Hier is 16e eeuws muurwerk van het bruggewelf van de Tolsteegbrug (van voor de vernieuwing van 1534) aangetroffen met het steenformaat: 27x13,5x5,5. Samen met muurwerk dat waarschijnlijk deel uit maakt

van de vernieuwing met het steenformaat 25x12x5. Dit laatste muurwerk dichtte de gewelven van de Bijlhouwersbrug ter versterking van de verdediging van de stad (UD-BIJ01 1948, veldtekening).

Bijlhouwersstraat, 1971

De stadsmuur werd aangetroffen tussen het bolwerk Sterrenburg en de Tolsteegpoort. Het muurwerk was opgebouwd uit een tweelaagse steunboogconstructie met schildmuur (Temminck Groll 1995, 44-47). Dit deel van de stadsmuur is vermoedelijk gebouwd in 1554-1557 ter vervanging van de Middeleeuwse muur (Calkoen 1896, 15).

Lepelenburg/Bruntenhof, 2002

De 16e eeuwse stadswal is hier doorsneden en de daarbij behorende keermuur is aangetroffen. Het baksteenformaat hiervan bedroeg: 30x15x6,5 centimeter (Bakker 2004, 165).

Schalkwijkstraat, 2002

De 16e eeuwse stadswal werd hier aangetroffen in de profielen, evenals de keermuur van de wal. Van de keermuur restte nog zeven lagen bakstenen met het formaat: 30x15x6,5. Deze bakstenen waren afgedekt met een natuurstenen vensterlatei waarin nog een dookgat aanwezig was (UD-SWS02 2002, veldaantekeningen).

Sterrenburg, 1997

Een stuk muurwerk van het bastion Sterrenburg is gevonden, waarschijnlijk de keermuur voor de aarde rondom de ingang. Het is in de 16e eeuw gedateerd aan de hand van een 10 lagen maat van 70 centimeter en het had een kleine reparatie uit de 17e eeuw. Verder was het muurwerk 1,80 meter breed (UD-STB02 1997, veldaantekeningen).

Tolsteegbrug politiebureau, 2003

Op deze locatie werden resten van de 16e eeuwse stadsmuur inclusief zes steunberen aangetroffen. De muur was tot op grote diepte gesloopt en als fundering gebruikt voor de binnenplaatsmuur van het politiebureau. De steunberen (3,20 bij 1,20 meter) waren tot op grotere hoogte zichtbaar (2,87m+NAP). Zij stonden loodrecht op de muur met een interval van 3,20 meter en hadden een baksteenformaat van 26,5x12,5x6. Gemetseld

in tras zijn zij waargenomen tot op een diepte van 0,0 NAP. Tijdens graafwerkzaamheden in 1958 zijn in de Bijlhouwerstraat resten van dezelfde muur gevonden (Temminck Groll 1995, 45-47) Hieruit blijkt dat de muur aan beide zijden van de voormalige Tolsteegpoort qua structuur en afmetingen veel overeenkomsten vertoont (UD-TOL01 2003, veldaantekeningen).

Tolsteegbrug, 2016

De keermuur van de 16e eeuwse wal is aangetroffen tijdens dit onderzoek. Het betrof een vaak uitkragend stuk muurwerk dat tot minstens 1,65 meter onder straatniveau doorging. De muur was gemetseld met naar tras neigende zeer goed hechtende kalkmortel. Een aantal verschillende baksteenformaten zijn gemeten: 27,5-28x12,5x6; 29,5x14,5x7,5; ?x14x6; -x14x6; ?x13x5; ?x13x5. Als 10 lagen maat is gemeten 85 cm over zowel het opgaande muurwerk als de uitkragende lagen. Voor alleen het opgaande werk dat nog uit 5 lagen bestond is 44,5 cm gemeten (UD-TOL03 2016, veldaantekeningen).

Tolsteegpoort, 2014

Op twee plekken zijn hier in 2014 delen van de stadsverdediging aangetroffen. Het noordelijke fragment bestaat uit felrode baksteen met een baksteenformaat van 30x14-16x6-7 cm en maakt deel uit van de noordelijke of binnenste muur. Het betreft metselwerk in een onregelmatig verband, wat voor het inwendige van een walmuur niet opmerkelijk is. Het steenformaat is kenmerkend voor de veertiende eeuw en is ter plaatse secundair gebruikt in het midden van de zestiende eeuw. Voor zover was vast te stellen is aan de noordzijde de bakstenen fundering van de binnenmuur vrij recht en afgestreken met een kalkspecie.

Een tiental meter zuidelijker zijn twee fragmenten blootgelegd van een tweede muur met - onder het nodige voorbehoud - een dikte van 3,7 meter en metselwerk zonder duidelijk vast te stellen structuur. Het middelste fragment (afb. 9, B op afb. 3.2) was vrij ruw gemetseld met gebruikmaking van relatief veel slecht gebakken baksteen en veel

kalkspecie. Aan de zuidzijde wordt deze muur afgesloten door een licht hellende bakstenen keermuur met in hardsteen uitgevoerde, constructieve onderdelen. Deze onderdelen bestaan uit een hardstenen lijst opgebouwd van boven naar beneden: een 8 cm brede lijst - waarvan het bovenste deel recht en vervolgens een hol-bolprofiel - en daaronder een 40 cm hoge bolle lijst die is afgewerkt met een frijnslag.

Van de 16e eeuwse Tolsteegpoort zijn twee dekplaten vrijgelegd: aan de buitenzijde een blok met een maat (bovenzijde) van 50 x 102 cm en aansluitend aan de noordzijde een blok van 47,5 x 102 cm. Beide blokken natuursteen van de lijst sluiten op elkaar aan met een brede kalkvoeg (1 cm).

Onder de bolle hardstenen lijst sluit een muur aan van bakstenen met een formaat van 23,5 x 10,5 x 4 centimeter, met een 10-lagenmaat van 49 centimeter. De muur 'onder' de poort heeft aan de grachtzijde een lichte afschuining. Hierbij moet worden opgemerkt dat de gehele zuidelijke zestiende-eeuwse bakstenen bekleding van de buitenzijde van de stadswal - gezien de tekening van Jan de Beijer van de Tolsteegpoort uit 1744 - een overeenkomstige afschuining bezat. Het aangetroffen natuursteenwerk betreft het zuidoostelijke deel van de hardstenen lijst waarop de basementen van de beide oostelijke pilasters aan de veldzijde van 16e eeuwse Tolsteegpoort rusten. De detaillering is hetzelfde als het aanzicht van de buitenzijde poort die zijn afgebeeld op twee opmetingen van kort voor de sloop (Hartog 2016, 5-10; UD-TOL04 2014, veldaantekeningen).

<u>Vredenburg entreegebouw, 2014</u>

Van het kasteel Vredenburg (de bouw begon in 1529) werd in 2014 de zuidwesttoren opgegraven. De noordelijke fundering en keldermuur werden aangetroffen. Het muurwerk had afmetingen van 10,85 bij 7,70 meter. De bovenkant lag op 0,96 m+NAP en de onderkant tussen de 2,08m- en 2,20m-NAP. Restanten van de zuidmuur van de zuidwesttoren hadden een afmeting van 7,9 bij 13,3 meter. Het muurwerk bevond zich op een hoogte van 1,87 m+NAP (1,9 meter onder het maaiveld) en de

onderkant lag op 2,15 m-NAP. Dit levert een hoogte van 4,02 meter op. Ten zuiden van de toren trof men delen van de stadsmuur aan welk aansloot op de zuidwesttoren. De fundering van deze muur was 4,85 meter breed en het opgaande werk 3,5 meter. De stadsbuitengracht en het grachtenstelsel rondom kasteel Vredenburg waren verbonden door de in de zuidmuur van de zuidwesttoren aangetroffen watergang (Van der Kamp 2015, 16-19).

Wittevrouwenkade, 1986.

Muur van toren de Hond aangetroffen, daterend uit 1537 (UD-WVK01 1968, veldaantekening). Deze toren was opgegraven zonder archeologische begeleiding. Het is te danken aan het bezoek van de heer F. Kipp dat er überhaupt nog een tekening van de situatie is.

Appendix 2. Map locations

Below two tables present all the locations of excavations and elements of the town defences shown on the maps of Appendix 3 and d.

Table 7, locations of excavations of the town defences.

Indicator	Excavation
i.	Jan Meijenstraat 1979
ii.	NO deel van de stad 1974
iii.	Van Asch van Wijckskade 1973-74
iv.	Van Asch van Wijckskade 1976
v.	Lepelenburg 1998
vi.	Lepelenburg 1972
vii.	Servaasbolwerk 2003
viii.	Zochersplantsoen 2009
ix.	Manenburg 1948
x.	Wijde Doelen 1984
xi.	Wijde Doelen 1948
xii.	Twijnstraat 1985
xiii.	Tolsteegpoort 1998
xiv.	Tolsteegsingel 1975
xv.	Lange Smeestraat 1973
xvi.	Vredenburgknoop 20011-13
xvii.	Catharijnesingel 2013-14
xviii.	Catharijnesingel 1972
xix.	Vredenburg proefsleuven 2006
xx.	Weerdsingel/Nieuwe Kade 2001
xxi.	Nieuwe Kade 1982
xxii.	Zeedijk 2016
xxiii.	Keizersgracht 1984
xxiv.	Lauwerecht 1987
xxv.	Gruttersdijk 1980
xxiv.	Nieuwe Kade 1988

Table 8, locations of elements of the town defences.

Indicator	Possible historical name
1.	Weerdpoort
2.	Louwerstoren
3.	Wolleweverstoren
4.	Wolleweverstoren
5.	Plompetoren
6.	Boterliedentoren
7.	Wittevrouwenpoort
8.	Oudschoenmakerstoren
9.	Schoenmakerstoren
10.	Hactentoren
11.	'Toren achter Lepelenburg'
12.	'Toren achter Lepelenburg'
13.	Oudekleerkoperstoren
14.	Steenbikkerstoren
15.	Toren achter St. Servaasabdij
16.	Bontwerkerstoren
17.	Riemsnijderstoren
18.	Oostelijke Tolsteegpoort en Rode Toren
19.	Westelijke Tolsteegpoort en Rode Toren
20.	Bijlhouwerstoren
21.	?
22.	Smeetoren
23.	Kleine Smeetoren
24.	Zadelaarstoren
25.	Wantsnijderstoren
26.	?
27.	Snijderstoren
28.	Catharijnepoort
29.	Kruittoren
30.	Bakkerstoren

31.	Bollaartstoren
32.	Vleeshouwerstoren-Brouwerstoren (later het Paard)
33.	Viskoperstoren
34.	Ronddeel Simpoel

Appendix 3. Maps, phase 1 and phase 2

On the two following pages the layout and excavated elements of the town defences of Utrecht are shown. The first map contains the town defences of the first phase (the 12th to beginning of the 13th century) and the last map that of the second phase (13th to 15th century).