



Figure 82 Bridge beams (Subgroup 404) exposed under later structure Subgroup 405. Seen from southeast.

The most substantial part of this first bridge was composed of a series of wooden piles driven into the base of the moat cut (Group 334) and tenon jointed to crossbeams with support posts. The timbers used (Subgroup 404) were of oak, based on the elements examined. As mentioned above they were felled in the winters of AD 1370/1 and 1371/2, and came from the Lund region and south Sweden area (see Appendices 4 and 5). One of the stake piles was dated to after AD 1360, and also came from the Lund area.

As the trench was stepped for safety reasons, an area of only 7,5 m X 4 m was excavated at lower levels (see Figure 83), and consequently we cannot be certain of the true scale of the bridge. That said, given the stratigraphic position of Subgroup 404 at the base of the moat, the high quality of joints and fixings and the large scale of structural elements, particularly the piles, it is almost certain that Subgroup 404 represents a base for a bridge construction. How structural elements would have extended off the crossbeams is unclear, either having been removed during an unrecognised deconstruction phase of Subgroup 404 or occurring outside of the area visible during excavation.

Another section of this bridge (Subgroup 415) was located just west of gate foundation Group 111, sitting on a scarp on the eastern side of the moat. Measuring c. 4 m x 3 m, it was mainly made up of an incomplete framework of horizontal timbers, connected at the northern corner by being jointed into a substantial timber block. The structure had been truncated in the past to the southwest and southeast, and had likely decayed at a higher level, only surviving where it was wet enough. Subgroup 415 has been interpreted as the upper surviving element of the medieval wooden bridge (Subgroup 452), which would have led across the city moat and operated in conjunction with the city's western gate. This is based both on location, date and form.

Subgroup 415 consists of a post, tenon jointed into a northeast to southwest orientated beam and set within a beam slot. This structure was backfilled with dump material. Above this fill sat two beams oriented

northeast to southwest and northwest to southeast. These beams appear to intersect over the post although at this higher level it is heavily degraded. A final backfill covered the rest of the structure. It was a well built structure made of oak. Very little of this subgroup was seen during excavation for logistical reasons. It appeared to extend both to the southwest and southeast. The timbers were of oak, and were from Lund and Zealand. They dated to post AD 1361 and 1406 +/-7 (see Appendix 4). The slightly later date may relate to a repair of the structure. A small number of finds were recovered from the deposits in this subgroup, but were not diagnostic dating indicators, consisting of nails, flint flakes and slag.

The stratigraphic position of this subgroup would suggest that it was part, together with Subgroup 404 and Group 111, of the first phase of constructions within the moat. The orientation of Subgroup 415 was very similar to Subgroup 404, seen to the west, as were the construction materials and construction methods. A direct physical link between these structures could not be made during the excavation due to restrictions of access. Subgroup 415 also sat within a corner of Group 111, suggesting that these were related. Subgroup 415 is therefore best interpreted as the upper elements of the medieval bridge (Subgroup 452), of which Subgroup 404 represents the base elements.

As can be seen from its subgroups, structure Subgroup 452 appears to represent the remains of a wooden bridge which would have spanned the medieval city moat, linking the city gate with the area to the west, and presumably carrying traffic to and from the western road into Copenhagen. Dendrochronology samples were taken from bridge Subgroup 452, and produced dates from AD 1361, 1370/1, 1371/2 and 1406 (+/- 7) (Appendix 4). Collectively these point to a date of construction in about AD 1372, with the date of c. AD 1406 probably representing a phase of repair to the upper levels of the bridge. Subgroup 452 therefore represents the oldest known bridge at this location.

An interesting observation with regard to the dating of this first bridge, is that it was constructed shortly after the city (or at least the castle) was sacked by the Hanseatic League, and therefore could be seen as part of a reactionary strengthening of the town's defences. It is conceivable, or even likely, that the moat (in this location) and the western gate (Group 111) also date to this phase of construction. It is possible however that a somewhat smaller and shallower moat existed here before this time, but if so, no evidence for this was seen during the excavation at Rådhuspladsen in 2011 and 2012.

In time this bridge went out of use, or more precisely, was replaced. This seems to have occurred twice, and can be seen in Subgroups 453 and 454 (Phase 4), which both represent later versions of the bridge, and are grouped together with Subgroup 452 within the overall Group 451 (Bridge).

The Second Bridge

Group	Subgroups	Context types
451	453 (405, 407, 408, 442)	Timber platform, boulder foundation, brick and mortar structure.

Table 24 Second bridge related groups and subgroups

The second bridge phase (Subgroup 453) represented a large scale rebuild of the bridge, with almost none of the original bridge being used, except perhaps as a sort of platform upon which to commence construction. This second bridge saw the construction of a large platform of timber on the west side of the

moat (Subgroup 405), and potentially on the east also (this was not seen due to excavation constraints). On top of this platform a foundation of large uncut boulders was placed, and on this a more formal platform of brick and mortar laid. It is not clear how the upper portion of this bridge would have looked, it may have been of brick, stone or timber.



Figure 83 Bridge timbers (Subgroup 405) exposed crossing base of moat, boulder foundation Subgroup 407 seen in section. Seen from southeast.

Subgroup 453 spanned most of the width of the moat, immediately southwest of the gate (Group 111). It has been described in two Subgroups, 405 and 407. Subgroup 405 consisted of a range of timber structures. The largest of these comprised a large somewhat irregular platform of timbers on the western side of the moat, while other elements comprised timber uprights which defined the channel at the centre of the moat. These uprights also seemed to serve to define the area where the boulders and deposits of Subgroup 407 rested, and indeed the platform described above seemed to provide the boulders with a stable platform upon which they would rest. Consequently the purpose of Subgroup 405 was basically to provide a solid defined space for the boulder foundation (Subgroup 407). The main elements of the construction were northwest to southeast orientated beams overlain by a cross beam and two rows of tightly packed upright posts approximately 4,35 m apart. There were also a number of other upright posts. The timbers were of oak and beech (Appendix 5). Many of the timbers within this construction were re-used, one of which was originally shaped as a stake, or were made using lower quality soft timber. A very degraded section of upright wattling was also observed, and appeared to relate to the same phase of construction, perhaps acting as a retaining structure or mesh to hold back smaller material from slipping in to the water channel.

Subgroup 407, which comprised mainly of large boulders, seems to have acted as a foundation or platform in two parts for the placement of a new bridge (see Figure 83). Few traces of this actual structure survived, but within Subgroup 407 there were two possible mortar and brick foundation platforms (overall

dimensions 5,4 m x 1 m x 0,6 m deep, individual brick size: 0,27, W: 0,12, T: 0,08). These may represent the footings for either timber or masonry bridge piers which did not otherwise survive.

Due to the lack of formalised structure and the variety of different elements within this subgroup, interpretation is difficult. However, most of the timbers were physically overlain by a large stone deposit suggesting an association with this deposit. Upright timber piles were recorded which could be interpreted as a revetment for the boulders, preventing collapse into the central channel, and potentially constructed in conjunction with the wattling. The timber platform possibly acted as a bedding platform for the boulders, preventing subsidence into the natural clay and sand. It seems likely that Group 405 represented a phase of rebuilding - or more likely replacement - of bridge Group 452. In this case, the platform may either represent bedding for a scaffolding, or perhaps more likely a base for the large boulders placed on top. Collectively this platform and boulder placement could have been put down both to strengthen the bridge and to prevent the moat's edge from eroding (this occurred quite quickly during excavation as ground water bubbled up at this depth).

A number of timber samples were taken, and timbers from Subgroup 405 were dated by dendrochronology to c. AD 1436 and 1437/38, with one older timber from c. AD 1400 presumably having been reused (Appendix 4). This suggests that this bridge was constructed in about AD 1438 or soon after as a replacement of the original bridge (Subgroup 452) c. 66 years after the construction of the first (identified) bridge at Vesterport. With regard to this, it should be mentioned that there is a historical reference to King Christian I having improvements made to 'planks and bridges', in about AD 1455 (Nielsen, 1872 190, 191). It is possible that this second bridge could relate to these improvements.

As the elements described in Subgroups 405 and 407 were allowed to remain in situ when the final bridge (Subgroup 454) was constructed, we must assume that there was no particular fault in the bridge foundations at that time. The reason for upgrading the bridge a third time may instead be explained by the need for either a higher, more substantial or more ostentatious bridge than previously in existence. Some traces of the deconstruction of the upper part of the second bridge (Subgroup 442) were seen on the west side of the moat, and consisted of a dump of sandy stony soil with a large content of brick fragments. No finds or dateable material were recovered, but if interpreted correctly then this deposit probably dates to just before AD 1500, when the third bridge was constructed (see Phase 4).

The interpretation of Subgroup 453 suggests a large scale construction and re-modelling of the bridge structure over the moat. The moat was narrowed considerably in the area of the bridge (from c. 21.5m to 4.5m), thereby creating a narrow channel at the centre of the moat cut, Group 334. This re-modelling dictated the width of the moat under the bridge arch until it went out of use in the 17th century.

Rampart

Group	Subgroups	Context types
84		Clay deposits

Table 25 Rampart related groups and subgroups

Adjacent to the eastern corner of the medieval gate (Group 111) a series of six clay deposits were recorded, which have been interpreted as a remnant of the medieval rampart (Group 84). These extended in a southeasterly direction from the gate, though their extent was defined entirely by modern truncations, except where they abutted the gate. These deposits overlay some medieval street layers with dates in the 13th or 14th century. They also appeared to have been cut through for the placement of the foundation of the gate. This suggests that they must have been located here by the latter half of the 14th century, perhaps even at about the same time as the gate was being constructed. A number of ceramics of high medieval date were recovered from this group, in the form of Early Redware and Early Greyware. One sherd of Late Greyware was also retrieved, and may have been intrusive. Due to its truncated nature, little more can be said about this group. Environmental samples were taken, but due to the presumed re-deposited nature of the deposits, these have not been prioritized for processing.

Medieval City Gate (vesterport)

Group	Subgroups	Context types
111		Stone and brick structure, associated construction cuts.

Table 26 Medieval gate related groups and subgroups

A structure of mainly stone (Group 111) was located in the northwestern end of Area 1 and the northeastern end of Area 4. It was situated directly southwest of Vestergade, which was formerly the main street entering Copenhagen from the west. It comprised of a number of structural cuts, and stone constructions and bonding deposits placed within the cuts.

The cuts were made through some older archaeological deposits, and into the natural clay beneath, and formed a foundation cut for both the former western gate and a wall which projected outward from the western corner of the gate towards the moat and bridge to the southwest. In a sense these cuts really represent one continuous trench, separated by the excavation areas, and in some areas stepped during construction to follow the topography. The cut/cuts were filled by layers of stone and sometimes brick, laid in layers and bonded using clay in the deeper layers and compact stiff sand in the upper layers (the gate foundation was made up of 19 stone layers and nine bonding layers, the projecting wall was made up of two brick layers, five stone layers and two kinds of bonding material. Where bricks were laid they were bonded using mortar, and it is likely that this represented the interface between the foundation and the wall itself. The wall did not survive otherwise, having been demolished in the past, probably in the early to mid 1600s.



Figure 84 The outer foundation of gate Group 111 as it survived, truncated both lengthways (by wooden waterpipe) and to the southeast (left in photo)

The gate itself, based on the foundation remains seen, measured just under 9 m x 9 m, while the projecting wall extended ca. 5,1 m to the southwest of the gates western corner (see Figure 79). It is likely that a similar wall would have extended from the gates southern corner, but this area had been completely truncated so it was not possible to establish this. The main gate foundation was also badly preserved, having been truncated by numerous services down the years, even as early as the 1600s when a wooden waterpipe trench was dug through the foundation.

The projecting walls would have connected the gate structure to the bridge (Group 451 etc.) which spanned the city moat to the gates immediate southwest, possibly preventing the embankment from slumping on to the road. It seems most likely from the way the layers of stone were laid, that the gate and the projecting wall were built at the same time, although their construction varied slightly in form in some layers. Nonetheless, there was sufficient overlap of some layers to suggest contemporaneity.



Figure 85 The east corner of the foundation, mid-excavation. The foundation cut had clearly gone through several layers of archaeological material, as can be seen.

The overall plan of the foundation was an almost perfect square, and was aligned to face Vestergade. It also lined up with the various bridge remnants seen in Area 4, and so we can with confidence state that this foundation is that of the city's former western gate. At almost 9 m x 9m in plan, it was a sizeable structure, and with foundations that were almost 1.6 m deep, it is likely to have stood between c. 3 m and 5 m in height above ground (as an estimate). Given the well-built nature of the foundation, we can presume that the gate building itself was also a well built structure of brick and possibly stone. As stated above, the preservation of the foundation was only partial, as modern truncations and indeed post-medieval truncations (wooden waterpipe trenches) had removed a good deal of it (waterpipe Group 306 was one, and was dated using dendrochronology to AD 1666/67, see Phase 5). Nonetheless, there was enough remaining of the foundation to establish its size and depth, and the parts that remained survived in good condition.

Finds were rare, but included medieval ceramics (Early Redware and near-stoneware), copper alloy fragments (including possible coins and buttons) and a piece of glass. The pottery types seen are in line with a date in the 14th century, most likely up to AD 1375, but potentially a little later. The layers that the foundation were dug through were in some cases high medieval also, and based on finds may date to as late as the mid 14th century. This suggests a significant amount of activity going on in this location during the high medieval period, with various re-modellings of the area/restructuring of the public space. It is interesting to note that the wooden bridge elements seen deep in the moat date to c. AD 1371/2, so it can be suggested that a large program of construction including the gate, a moat and bridge was undertaken at about that time. It is interesting to note that the western gate (Vesterport) is first mentioned historically in Roskildebispens Jordebog from the 1370s (Frederiksen 1979: 27, Nielsen, 1872: 97).

Gate related deposits

Group	Subgroups	Context types
(113)	416	Deconstruction deposits
(80)	417	Deconstruction deposits

Table 27 Gate related groups and subgroups

A number of deconstruction deposits (Group 416) were recorded in association with the medieval gate, while dumps relating to the possible usage phase of the gate and associated road were also seen (Group 417). These included slag and other waste material, and are suggestive of the repeated cleaning/maintenance of the road surface during its lifetime. Both groups produced high medieval finds in the form of ceramics (Early Redware and Early Light Fired Rouen), and a handle fragment of German stoneware which may have been intrusive in this context.

Roads and surfaces

Group	Subgroups	Context types
(217)	435	Disturbed road layers

Table 28 Road and surface related groups and subgroups

Two possible road related deposits (Subgroup 435) were recorded at the north edge of Area 2B. While these may well relate to Group 217 (Phase 2), they were somewhat disturbed and truncated, and little more can be learned from these deposits. Their dating was unclear, with brick fragments a possible indicator of a late medieval or post-medieval date.

Other Late Medieval Activity

Introduction

Pits

Group	Subgroups	Context types
165	-	Pit cut and fills
202	-	Pit cut and fills
321	-	Pit cut and fill
360	-	Pit cut and fills

Table 29 Pit related groups and subgroups

Four pits have been dated to the late medieval period, though their dating is not completely secure. Located in Area 5, and directly under the outer gate foundation, one shallow pit (Group 321) was recorded. This pit may have been larger originally, but it seems to have been heavily truncated by the outer gate foundation cut. The fills were quite mottled, and in places appeared to be mixed with natural boulder clay, with slag pushed deep into natural in places suggesting the weight of the foundation pressing down on this feature. No conclusive dateable material was recovered, but it is thought that this pit may date to about the time of the construction of the outer gate or a little before, which would mean it was dug in the late 15th or possibly early 16th century. Its contents were inconclusive function-wise, though some slag fragments were seen that might indicate a metal-working related function.

A small pit (Group 165) in Area 2B has been dated to the late medieval period based on an AMS C14 date from an elderberry seed of cal AD 1425-1635 (2 Sigma, LuS 10670). The pit was located on the edge of the post-medieval moat in Area 2B (Group 165 was in fact cut by it), and it otherwise produced no dateable material. Fragments of cat and pig bone were identified (Appendix 1). The function of the pit unfortunately is rather unclear.

Located in the north-eastern corner of Area 2B, pit Group 202 was documented cutting into the natural clay geology. This pit measured 1,23 m x 1,12 m, though as it extended outside the trench, its full size is unknown. Its depth was 0,35 m. Its size and base were concave, and it is likely that originally the pit was circular in plan. It was filled with dark silty clay, which produced finds of animal bone (pig, sheep/goat and fish) and a single fragment of glazed stove tile, which has been identified as dating from between AD 1450 and 1525 (Appendix 18), placing the pit in Phase 3 (or possibly Phase 4). The original function of the pit is unclear; it may have been used as a cess or waste pit.

A possible pit or posthole (Group 360) consisted of a small sub-rectangular cut, located to the immediate west of the moat cut in Area 4. It did not appear to extend further to the southeast beyond where it was truncated by modern services. It cut through road surface Group 217 but appeared to be cut by the moat cut. If this is correct, it is further evidence to suggest that the road existed before the moat was constructed. It is unclear how to interpret this feature. It was possibly a pit or posthole. Its stratigraphic position indicates that it probably pre-dated the moat construction. It has therefore been postulated that this group could belong to an earlier fortification or pre-fortification structure. The dating of this subgroup, based on stratigraphic position, indicates a pre-1370 origin.

Overall conclusions for Phase 3, 1350 – 1500

Phase 3 at Rådhuspladsen saw some significant developments that suggest a major restructuring of the town's layout, and a new emphasis on fortification. The key development was the placing of the city moat and rampart along the edge of present day Vester Voldgade. Prior to this development in about AD 1372, there had clearly been significant activity going on west of where the moat would be placed (during Phase 1 and 2). This could suggest that the town boundary – if there was one – was located further west originally, enclosing that activity. Alternatively it may be that a less substantial boundary further east was adhered to loosely, with much activity going on outside it. Either way, in Phase 3 it seems that everyday activities were no longer going on in a significant way outside of the moat.

Phase 3 saw the establishment of a formidable new moat, and an associated rampart. A gate was also constructed, and initially a substantial wooden bridge over the moat, and later a bridge of stone and brick. This new emphasis on defence and a very formal edge to the city, may have come about as a result of the sack of Copenhagen castle by the Hanseatic League in AD 1370. While no records document what happened to the town during this attack, it is unlikely that it went unscathed. So along with rebuilding the castle, it is likely that a new emphasis was placed on the town itself being defensible. In the light of this evidence, it is worth considering that in the Roskilde bishop's land record (Roskildebispens Jordebog, RJ) from approximately AD 1377, Vestergade is mentioned as "the street by Vesterport" (Fabricius 2006: 51). It may be that when these references were made, the gate at least may have been a rather new structure.

Road layers have also been documented which may belong in Phase 3, but which originated in Phase 2 (e.g. Group 76). These represent the road west from the city, leading from the gate to the west. These layers may in some cases have been in use already in Phase 2 or even Phase 1 however, as it is difficult to date them with certainty as they may have been in continuous use for a long period of time. It appears that the earliest levels were cut by the moat, which would suggest that they predate the establishment of the moat in about AD 1372.

A limited number of pits and postholes attributed to Phase 3 provide further evidence of the activity going on in this part of Copenhagen in the period AD 1370 – 1500, and taken in tandem with the more significant structures outlined above, testify to the scale of town that was developing here in the late Middle Ages.

Phase 4 Expansion of Defences and Infrastructure – c. AD 1500 - 1600

The fourth recognised phase of activity at Rådhuspladsen corresponded approximately to the Late Medieval Period, and into the first part of the post-medieval period (between about AD 1500 and 1600), and saw further developments in the city's defences and infrastructure. It was a time when the infrastructure was upgraded in line with changes elsewhere in Europe, with an emphasis on the construction of sturdy brick and masonry structures, for both practical and presumably aesthetic reasons. The features found at Rådhuspladsen add new knowledge to our understanding of Copenhagen during this period, adding to our knowledge of everyday life in the post-medieval town as well as the city's organisation.

The early post-medieval remains seen at Rådhuspladsen were also heavily impacted by later activities in the area – both archaeological (such as the mill and millrace construction – Phase 5) and modern (service trenches, bunkers etc.). Nonetheless a good deal of the post-medieval material survived, enough to establish much of what was happening in this area at this time. The early post-medieval contexts themselves impacted on earlier archaeology too, particularly in the case of the outer moat which surely truncated medieval evidence.

The types of features excavated that can be dated to the early post-medieval period include new moat elements, moat revetments, a new bridge, a new outer city gate, a water-channel and sluice, and a number of pits. This phase primarily consists of large scale structures, mostly indicative of defence and communication. Some of the defence-related improvements were probably established at about the same time, as indeed indicated by the dendrochronological dates received. However, we also see a series of alterations occurring during this period, with the outer moat constructed twice in different ways and locations, suggesting a growing obsession with continually improving the urban defences.

The first of these moat alterations saw a semi-circular moat constructed in front of Vesterport, creating an island that would have to be crossed before encountering the main moat and entering the city. This arrangement is known as a ravelin or a demi-lune (half-moon), and in this semi-circular shape was a 16th century phenomenon that originated in Italy (O'Connor, 2011 p. 252). These in turn were replaced by angular ravelins in the second half of the 16th century, and so too in Copenhagen (*ibid*). At some point in the latter years of the century the demi-lune was filled in, and a new outer gate was constructed on what was perhaps initially a ravelin (effectively an island), but soon became a bastion; this differentiation because the inner original line of the moat was effectively decommissioned in this area, being converted into a mill race, and hence the outer gate was no longer on an island. Bastions were first used in urban defense in Italy, specifically in Verona in the late 1520s (*ibid*, p. 249).

The bridge by Vesterport was rebuilt in about AD 1500 (based on dendrochronology, Appendix 4), with the construction of a stone and brick arched bridge. The nearby water channel and sluice seems to date from about the same time, and may have been part of a program of works to ensure a continuous supply of water to the moat. The wooden fence or revetment within the moat also dates to about this time (dendrochronology, Appendix 4), so it seems that an effort was being made to upgrade the area around Vesterport in about AD 1500.

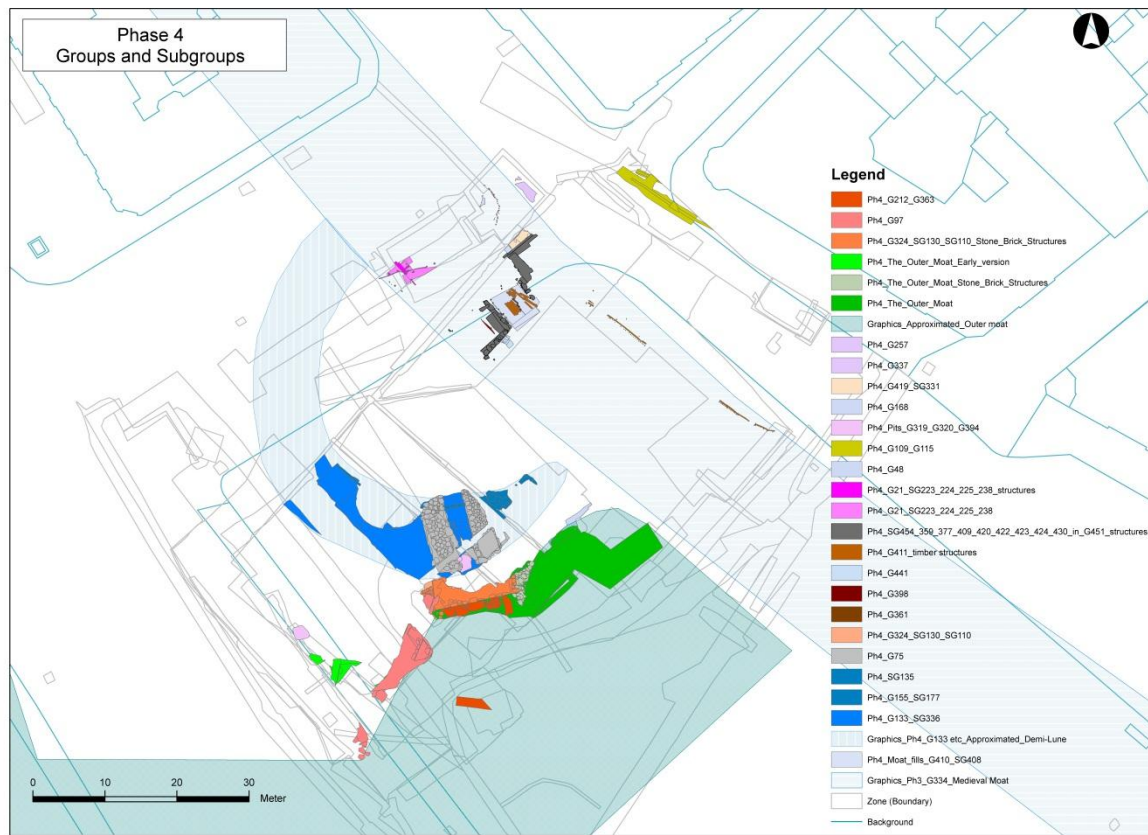


Figure 86 All groups and subgroups in Phase 4, including demi-lune, outer gate and outer moat

Overall then, Phase 4 saw the establishment of significant new urban defences in the Vesterport area. The possible reasons for this – apart from general defensive needs – may relate to a desire to keep up with current trends in urban defence, as well as an increased need for defence. These constructions would again have been organised centrally, perhaps by the king, or by his administration, requiring significant planning and organisation, and a large expenditure of labour, time and money.

The presentation of the features and finds from this phase will be divided into the different feature types as outlined above, beginning with the larger defensive-type features, such as the moat, gate, and bastion, which will be discussed together under the heading ‘Fortifications’. Thereafter the general infrastructural remains will be discussed under the heading ‘Infrastructure’, and any remaining features under the heading ‘Other Features’.

Fortifications

Introduction

In Phase 3 of the site (AD 1350 – 1500) the late medieval moat, gate and ramparts were already established. The 16th century (Phase 4) saw a series of successive alterations and additions to the city moat and rampart by Vesterport. These will be outlined in the following sections.

The Revetments

Group	Subgroups	Context types
456	198, 253, 268, 364	Wooden stakes, beams, stakehole.

Table 30 Revetment related groups and subgroups

A series of revetments (Group 456) were located along the sides of the medieval city moat, mainly along the inner face. They comprised almost entirely of wooden structures, of which most were angled wooden uprights in the form of stakes. Some horizontal beams were also seen. The timbers were all of oak (Appendix 5). The revetments measured 52 m in length (as exposed in three separate trenches) but extended beyond the area of excavation. The western part was located ca. 25 m southwest of the eastern part, on the opposite side of the moat, and was considerably less extensive (or survived less well).



Figure 87 Part of Subgroup 268 (mid-excavation)

Individually the posts were ca. 0,1 - 0,15 m in section, and up to 1 m in height (surviving), but the upper parts of all uprights had surely decayed as it was less waterlogged. Several dendrochronological samples were taken, and the dates returned suggest a main construction phase in or around AD 1500, but with an earlier phase, dating back to the 1400s. Also, repair work was carried out from time to time, well in to the 1500s (Appendix 4).

Group 456 has been interpreted as a revetment of the medieval moat. It is seen as having had a twofold function, perhaps acting both as a delineation of the moats edge, but also possibly acting as an additional barrier to movement/access. This group appears to date to c. AD 1500 predominantly, based on dendrochronological analysis. This suggests that this group was probably built at about the same time as the brick and masonry bridge in Area 4, and was part of the same phase of restructuring/improving the city defences.

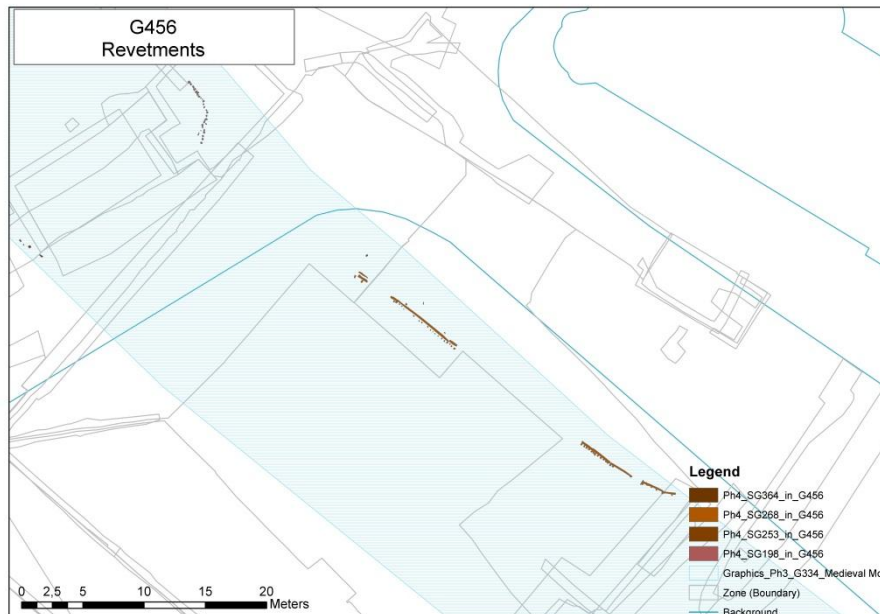


Figure 88 The revetments seen along the moats inner side

The most significant revetment structure (Subgroup 268) was located along the eastern (inner) edge of the city moat (Group 334). It was comprised of upright timber stakes (0,85 m – 1,05 m in length), stake holes, and beams (up to 5,38 m in length) (see Figure 88). The timber stakes were driven into the natural clay that the moat was cut into, while the horizontal planks lay alongside the stakes, generally behind (up slope) of the stakes. The structure ran northwest to southeast, following the alignment of the moat, and was basically horizontal, without any consistent slope over its 30+ meters (as exposed in Areas 3 and 4). It was placed lower in the moat than street level, but some meters above the moat base. It is perhaps likely that it was placed where it would have been above the normal water level of the moat.

The timbers used for the making of the stakes were, according to wood working expert Karl Magnus Melin, mostly reused, showing signs of having been used for other purposes prior to being shaped into stakes. This may suggest a practical approach to a piecemeal repair/ongoing reconstruction of the revetment. The timbers were generally in quite good condition, particularly the stakes whose moisture content was probably consistently high due to being embedded in the natural clay. All of the timbers had been sealed over by moat backfills, probably at the time that the construction of the mill began, perhaps in the early 1600s. A range of timber samples were taken, and these were used for obtaining dendrochronology dates. Of the 19 samples sent for analysis, 14 returned dates. These ranged over a period of over a century, but some date clusters were apparent. These were centered around c. AD 1421-60 (3 samples), c. AD 1502/3 (4 samples) and c. AD 1530 (4 samples). It is difficult to know what these dates mean, given that the timbers are likely to have been reused in most cases. Nonetheless, we can assume that they suggest a structure

which was being rebuilt in an ongoing way from perhaps the early to mid 1400s up to about AD 1530. Given that we know there was a moat in existence from c. AD 1372, this structure appears to have been part of a secondary phase of work on the city's defences, perhaps first constructed at about the time of the second bridge construction, and maintained for up to a century thereafter.

Subgroup 268 has been interpreted as a revetment of the moat. Given its relatively lightweight form (based on what has survived – we do not know how its upper elements might have looked), it may have acted more as protection against erosion than in any military sense, though perhaps it could also have acted as an obstacle to people climbing up the inner face of the moat, had they traversed its base.

Revetment Subgroup 198 was located just north of the inner edge of the bridges by Vesterport, on the inner edge of the late medieval city moat. It comprised entirely of wooden uprights, in the form of angled wooden stakes, driven into the natural clay that the moat was cut through. It was curvilinear in plan, following the moat's edge, but curving outwards towards its southern end, presumably to meet the bridge (though this connection was never seen, as it lay between Area 4 and Trench ZT 3064). The total length of the structure (as seen) was 5,6 m. The timbers were all narrowed to a point, in order to be driven into the hard clay, and survived to a height of 0,2 m. It is likely, as with the rest of Group 456, that these timbers were reused pieces, reworked into stakes. They were quite well preserved, due to the moist conditions deep in the moat.

Two samples were taken from the subgroup, from which just one dendro date could be gained. This pointed to a felling year of about AD1499 or after. This is broadly in line with the rest of Group 456, and again suggests that this set of structures were probably built at about the same time as the brick and masonry bridge. It is interesting to note, that at 3,64 m above sea level, Subgroup 198 was ca. 1 m higher than Subgroup 268. This may suggest that the moat stepped down by a similar amount in the environs of the bridge, being deeper/lower on the seaward side of the gate and bridge. As the moat base was never seen in the trench northwest of the bridge, we cannot be certain of this however.

Subgroup 253 was located in watching brief trench ZT 6326, and consisted of just 4 timber uprights (as exposed). It has been interpreted as a probable revetment. It was not dated, but is assumed to be from a similar time to the rest of Group 456. If so, it would have formed part of the wooden revetment that ran along the edge of the medieval city moat, in this case the outer edge. A single isolated stakehole (Subgroup 364) has been interpreted as a possible remnant of the revetment, located under (and truncated by) the mill building (Group 300). It is equally possible that it related in fact to the mill construction, and little more can be said about this isolated feature.

Moat fills

Group	Subgroups	Context types
410	-	Rubble and silt moat fills
(407)	408	Silting deposits
433	-	Probable moat fills

Table 31 Moat fill related groups and subgroups

Located in Area 4, beneath the arch of the third bridge and underlying the later structures related to the mill, a series of deposits (Group 410) were excavated which it is believed date to the usage phase of the third bridge (16th century). Subgroup 410 was composed of two mixed rubble and silt fills of the central channel of the moat. Its limits to the west were defined by the outer face of the arch and in the east by the opposite side of the arch. The CBM fragments have a worn appearance suggesting erosion by flowing water. A very large number of finds were recovered from the larger deposit, and these as an assemblage differed considerably from other moat fills. These deposits can be interpreted as a mixture of CBM dumping as well as in-situ silting. The high percentage of silt within the deposits suggests water-borne deposition. Finds within the largest deposit such as an armour chest plate, as well as fish hooks, knives etc, suggests a usage biographical stage rather than demolition or construction.

It seems most likely that these deposits should be seen as usage deposits associated with the bridge (Groups 377 and 422), though perhaps with some slightly later intrusive find material, washed in around the time of the construction of the mill race. Many of the finds probably relate to casually lost items, or small scale dumping in the moat. These deposits probably date to the 16th century, between the construction of the third bridge in about AD 1500 and the building of the mill race in about AD 1600. This takes into account stratigraphy, the find types and dendrochronological samples (related to other groups). This makes this a relatively rare example of a large definitively 16th century moat deposit from Rådhuspladsen. Some of the vast array of find types encountered in these deposits included: a decorated breast plate, stove tiles, rope parts, a coin, fishing hooks, keys, knives, pins, copper spoons, a wooden spoon, a bone needle, a stylus, pottery, glass, an awl, lead window came, a pewter brooch, shoes, and a lace chape.



Figures 89, 90 Pewter brooch FO 222386 (left) and breast plate FO 213736 (right)

Two heavily lensed silt deposits (Subgroup 408) were observed stratigraphically deeper than those described above, also in the area of the bridge, within the central channel of the moat. These deposits were bounded to the northeast and southwest by the bridge boulder foundations (Group 407). These deposits may be interpreted as in situ alluvial silting combined with a small degree of dumping within the central channel of the moat. They are likely to date to the use phase of either the second or third bridge by the inner gate, and so are either late 15th or early 16th century in date. No finds were recovered from these layers, so a more precise dating is not possible.

Located in the watching brief Z 6326, a number of deposits (Group 433) were seen, close to what is recognized as being the edge of the medieval moat; these were located just outside the brick wall which was built into the inner edge of the moat, and just outside the associated sluice gate. While very little can be said of these deposits, it seems probable that they represent pre-sluice fills or backfills of the medieval moat, deposits which were probably laid down in the early 16th century. There is also a possibility they relate to the demi-lune (see below).

The Semi-circular Moat (Demi-lune)

Group	Subgroups	Context types
133	135, 336	Moat cut, fill deposits, narrow ditch, stakes and stakeholes
155	177	Moat cut, fill deposits, narrow ditch and stakeholes
434	-	Organic moat fills

Possibly also includes Group 42 (large cut and fills in ZT 6326) and SG 57 (stakes in ZT 6326).

Table 32 Demi-lune related groups and subgroups

A large curvilinear cut feature (Group 133) was situated in the north-western part of Rådhuspladsen and excavated across several trenches (Area 2B, Area 2A, Area 5, ZT 77745 and possibly ZT 6326). The feature, which was also truncated in several areas, consisted of a large, semi-circular in plan, ditch-like cut, which in some places was approximately 10 m wide, but narrowed considerably in the south-eastern part. The depth was at least 1,8 m, with a base level of approximately 3,7 m above sea level. It had a total surviving length of c. 45 m. The base of the cut was generally flat, but rising in the south-eastern part. This feature has been interpreted as a semi-circular moat, defending an area in front of the city gate. This type of defence is known from the 16th century, and is known as a ‘demi-lune’ (half-moon).

Within the large ditch were a few deposits interpreted as primary fills. Into these was cut a narrow ditch or slot-trench in to which a row of stakes was set (Subgroup 135, 177). The area to the north and east of the stake fence was then partly filled up. During deconstruction, the ditch was later backfilled with several deposits containing cultural material. It is clear that that this feature was not nearly as deep as the main moat that defined the cities edge, but as an additional defence for the gate, perhaps it was not deemed necessary that it be very deep. Combined with an internal wall or bank (not seen), it might nonetheless have formed a formidable boundary. Only the southern part of the large feature was excavated as part of the main excavations, whereas the northern and western parts were recorded during watching briefs, which had an impact on the documentation level.

The finds from the fills consist primarily of slag, fragments of CBM, animal bones and sherds of medieval and early post-medieval ceramics (Baltic ware, Early Redware, German stonewares, Late Redware, and

stove tiles). Some musket balls were also recovered; perhaps evidence of some form of violent altercation by the western gate.

As outlined above, the groups G 133, G 155 and possibly G 42 have been interpreted as one large ditch – a type of moat, creating a small island outside the medieval western gate. It is not clear how or if the ditch was linked to the inner moat, running in front of the inner gate, as the areas where these would have met were either outside the excavated area or destroyed by later truncations. In the south-eastern preserved end of the ditch, it seemed to be narrowing and shallowing considerably, suggesting that it may have ended here and never connected with the inner moat at this end. It is not clear if the moat was originally water filled, but it seems reasonable to suggest that it was at least moist, based partly on the depth of the cut and the nature of the natural clay, and partly on the well preserved lower deposits with a high content of organic material.

The Subgroups 135 and 177 have been interpreted as one narrow ditch dug into the primary fills of the moat. In this ditch a row of vertically set timber stakes were driven in at a distance of 20-45 cm from each other (however, in Area 2A some stakes formed two parallel rows). This structure as a whole has been interpreted as a type of fence or revetment following the inner side of the moat cut at a distance of approximately 1,60 m. It was possibly placed here to secure the inner side of the moat from erosion or to create a more vertical inner side. Another set of six timber stakes in watching brief trench ZT 6326 (G 57) were possibly also part of this structure, though a narrow ditch was not seen in this area (the area was machine dug, so few details are available). If these were part of the same structure, then it would imply that the 'island' of the demi-lune had a diameter of ca. 33 m, with the external diameter of the moat being about 53 – 55 m. In 1865 a semi-circular row of boulders were seen in this area and a plan sketch was made. With certain reservations for the accuracy of the recordings, the row of boulders seem to follow the inner side of the semi-circular moat cut, or the narrow ditch with stakes, suggesting that there could have been a stone revetment or wall on the inside of the moat.

On the inner side of the timber fence, deposits with a large content of organic material – in Area 2A these were even seen in some places as rectangular peat blocks – were put into the gap between the inner edge of the moat cut and the fence. Why this was done is not clear, but it must have been important to create this vertical inner side of the small moat. It is not clear whether this was done as part of a remodelling of the moat during its usage phase, if the fence and peat block backfill were made as an early stage of the deconstruction of the feature – to control the backfill material, or indeed if they were part of the demi-lune construction from the outset.

The upper fills of the moat, including Subgroup 336, consisted of both re-deposited natural clays with hardly any cultural material in them and a larger number of layers with a high content of organic material and frequent finds. This suggests that the moat was backfilled with both material dug up from natural deposits as well as material taken from areas where household waste, building materials as well as industrial waste had been dumped before. The content of peat in the deposits may suggest that this would have been a marshy or bog-like area – and that the backfilling process may have been done over a longer period of time, as it was suggested that the peat had continued growing after it had been backfilled. The

possibility that the peat built up in situ must also be considered, in which case it could simply be that the ditch itself was waterlogged.

Located in watching brief Z 81650, two large deposits were seen (Group 434), measuring up to 0,8 m in depth. These were dark and organic in nature, and it was considered possible that they were either deposits over the medieval road, or perhaps fills within the demi-lune. The latter seems plausible given the location of these deposits, but as the precise course of the demi-lune at this end is not known, this remains a possibility rather than a certainty. It is equally possible that these deposits are too far east to lie within the demi-lune (Group 133).

Samples for environmental analyses were taken and some samples from lower fills were prioritized for analysis. Samples of timber stakes (mainly of oak, one of pine) were taken for dendrochronology, but as the wood was badly preserved, it was only possible to date a few of the stakes from the north-western part of the structure. This resulted in dates of AD 1525+/-7 and AD 1546+/-15, indicating that the stake structure was built in the first half of the 16th century (Appendix 4). A sample taken from the base fill produced some seeds of *Chenopodium* Sp. (Goosefoot) (Appendix 2), one of which produced an AMS C14 date of cal AD 1440 – 1635 (2 Sigma, LuS 10654) . While this is a broad date range, it ties in approximately with the dendrochronology dates, and is further evidence that this ditch was in use in the early to mid 1500s, if not before.

The dating of the construction of the demi-lune further relies on the stratigraphic relationship between the cut and the pits and wells which it was truncating, as well as finds material recovered from the fills of the ditch. The western end of the moat truncated a linear ditch (G 376), which was high medieval in date, so it is clear that the demi-lune post-dated the high medieval activity. Based on all this evidence, this group appears to date to the early post-medieval period, probably being constructed somewhere in the early 1500s, and almost certainly being in active use in AD 1531/2 (based on the dendrochronology evidence). Furthermore it is likely that it was deconstructed prior to the end of the 16th century, prior to the construction of the outer gate.

In this regard, it is worth considering a historical reference to money being spent in AD 1523 on a 'skansen outside Vesterport' (Nielsen, O. 1877; 50). Skansen translates as redoubt, an enclosed defended area, often outside a larger defended area. This is almost certainly referring to the area defined by this demi-lune, and could refer to some sort of improvements being carried out on it. A written source from the 1520s also mentions that some men were paid to build an earthwork outside Vesterport (Nielsen 1870, 334-37), presumably this same skansen mentioned above. A reference in 1530 to the ramparts being enlarged greatly, and being much wider and higher (Nielsen 1838-96), could suggest that the small original demi-lune's days were already numbered by this point, with bigger defences being developed.

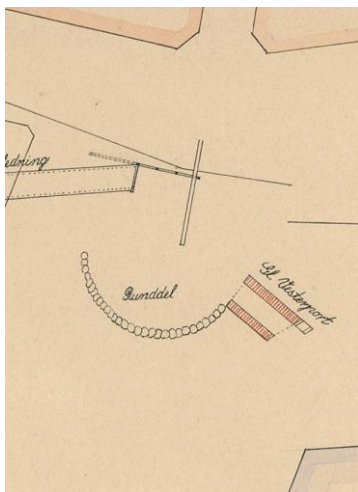


Figure 91 Plan of excavation from 1865 (Museum of Copenhagen archives)

In AD 1543 the roundel seems to have been rebuilt or extended, based on written records (Nielsen 1874: 271f). However the nature of this work is not described in detail. This may well be when the demi-lune described here was filled in, perhaps as it was too small, and a new version was built, with an outer gate added; the gate as we will see was constructed in the filled in demi-lune ditch.

To conclude, a small islet was created by the construction of the semi-circular, outer moat, right outside the western gate. This could be the same half-circular islet seen on the earliest map of Copenhagen from the 1590s (Museum of Copenhagen archaeological archive AA9 - see Figure 111), though both islet and the outer moat seem to be of larger dimensions on the map than was seen. Also, there seems to be a large outer gate on the islet, so it may be that the map is depicting the next phases of construction, when an outer gate was built, on a new larger demi-lune, which perhaps was shortly afterwards adjusted into being more bastion-like. The large boulder foundations (Group 75), interpreted as an outer gate building, cannot derive from the same phase as the semi-circular demi-lune moat, as the cut for the foundations was placed directly in, and therefore truncating and post-dating the moat backfills. An excavation carried out in 1865 (see Figure 91) in connection with the removal of Schack's Bastion encountered elements of both the outer gate and the edge of the demi-lune, though it seems that they incorrectly assumed that the two were related, whereas it now appears that the outer gate post-dates the demi-lune, even if only just. They recorded a semi-circular arrangement of large stones; if we take it that these correspond with the inner edge of the demi-lune ditch, then it would suggest that it may originally have had a wall running along the edge of the 'island'.

The Outer Moat, Outer Gate and Bastion

As seen above, it seems that by the late 1500s the demi-lune was backfilled, and a new larger version built with an outer gate added. This is what seems to be depicted on the earliest map of Copenhagen from the 1590s. The evidence for this enlarged outer moat as seen during excavations seems to suggest a more bastion-like arrangement however, similar to what is seen on the 1624 map of the city. It may be that in the intervening years the larger new demi-lune was reformed to be more angular, and turned into a by then more popular bastion-style defence.

The Outer Moat

Group	Subgroups	Context types
137	-	Stone revetment
141	138	Moat cut, moat fills, postholes
149		Revetment cut, fills
163	164	Moat cut, moat fills, ditch cut, ditch fills
351	352	Moat usage deposits
380	-	Moat cut, moat fills
401	-	Moat fills

Table 32 Outer moat related groups and subgroups

The outer moat that is presumed to have been first constructed in the mid or late 1500s was seen in Areas 2A, 2B and 5, and recorded in a number of groups. Some of these groups are essentially the equivalent of each other, but recorded in different trenches. The overall cut of the outer moat has been combined

together, and this has been placed within Group 141. Group 141 mainly represents the part of the early post-medieval outer moat that was seen in Area 2A, but also the overall cut of the outer moat from the 16th century across all trenches, and is thought to have been constructed in c. AD 1550 or so. Ceramic finds recovered included early medieval (Baltic ware), though a large amount of medieval pottery was also recovered (e.g. Late Greyware, stoneware), as well as some post-medieval pottery (Late Redware) raising the possibility of a late medieval construction date. However, the existence of the demi-lune, which appears to date to after AD 1500 and must predate this outer moat (which was surely an up-scaling and improvement) suggests that a 16th century date is likely. This outer moat seems to have been partially filled in as early as ca. AD 1600, particularly to the east of the outer gate, and this may have been due to ongoing changes made to the defences in the time of Christian IV. The outer moat in front of the outer gate and to the west remained open longer, probably until the youngest moat was built in about AD 1670.

The construction cut for this outer moat was made into the natural clay, and was steep sided, with a maximum recorded depth of 4 m. It may have been deeper, but the base of the moat was never conclusively seen, due to the placement of the excavation area. Based on what was seen however, we can suggest that it would have presented a formidable obstacle to movement.



Figure 92 The outer moat (Group 141) as seen in Area 2B

In Area 5, a potential primary cut for this outer moat was seen (Group 380). This consisted of a relatively gently sloping cut into natural clay, with three distinct fills. The angle and position of this cut (only seen in the corner of the area) suggests that it would have run behind the bastion wall (Group 97) as seen west of the gate (see below), and so cannot be contemporary, but instead must predate that version of the bastion. This may have been a fairly short-lived version of the outer moat, filled up – at least along its inner edge – to allow for the construction of the bastion (Group 97). This could correspond to the more rounded early version of the bastion.

The moat's deepest fills are likely to have silted up in situ, but most of its fills appear to have been dumped in, and may have comprised of the adjacent rampart, quickly backfilled in to the moat. This might explain

the high clay content, which was quite different from the backfills of the inner moat (Group 200), which were far more organic, and with a higher concentration of finds material. Nonetheless a significant amount of finds were also retrieved from Group 141, though many of them were only seen during off-site sieving in post-excavation stage. These included a range of late medieval and early post-medieval finds, including cloth seals, a crossbow bolt, an iron arrowhead, roof tiles and window glass, copper and iron pins, stove tiles, a whetstone, a thimble, 5 knives, glass beads, bone beads, horseshoes, a bone needle, bone handle, 2 coins, shoe fragments, and ceramics (including Baltic Ware, Early Redware, Late Greyware, stoneware, Late Redware and Jydepot). A badge of copper alloy depicting a rooster may well have been lost from a military uniform. Unlike in Group 200, many of these finds represent the kinds of objects that might be casually lost in or near a moat, or on the rampart nearby.

A set of three postholes (Subgroup 138) were identified, which had been cut into one of the deposits in Subgroup 141. These were sealed over by another deposit within Subgroup 141. The related posts may have only stood for a brief time based on this evidence, and it is possible that they relate in some way to a phase of organized backfilling of the outer moat, perhaps placed to control the placement of soil. They ran in a northeast to southwest direction, which is roughly parallel to the outer moat's edge, and they were located c. 3,6 m away from the edge of the moat. No dateable finds were found within this group. It was observed during excavation that the outer moat just east of the outer gate had been filled up a number of times, and the edge of the backfilled area re-shaped deliberately, in order to be the 'end' of the moat in this direction. At the same time the moat in front of the outer gate was maintained as an open moat at this time. It can only be assumed that these changes represent planned redesigns of the shape of the moat and embankments, as part of improvements of the city defences.

A series of deposits and stone structures were seen to the east of the gate, whose main function seems to have been the revetment of the outer moat. The revetment (Group 137) consisted of a series of large uncut boulders, in 7 rough rows or courses, each a little 'behind' the row below, and hence sloping back toward the moat cut to the northwest. It is assumed this was done both as a defensive reinforcement (which may have continued up higher originally), but also perhaps to prevent erosion.

The deposits included in this group are likely to have acted as bonding material, in the form of clay, though some may simply represent silting up around the revetment. They stratigraphically underlay the outer gate facade, but may have been contemporary with the original outer gate, as it seems that the facade seen during excavation may not have been an original part of the structure. The revetment extended over a distance of ca. 7,5 m, in a slight dog-leg shape, to the immediate east of the outer gate. Further to the northeast no such revetment was seen, so it may be that the moat was only revetted in this way in the environs of the gate. An alternative could be that the revetment to the east was removed to be reused, at the time when this area was filled in. Unfortunately this cannot be proven.



Figure 93 The upper course of the stone revetment Group 137, seen from the edge of the gate façade

A large probable cut and its fills (Group 149), presumed to be for the placement of the revetment (Group 137) was also recorded east of the gate façade. This cut, which was either dug into the base of the moat or perhaps dug at the same time, correlates very well with the area in which the revetment was placed, and may in effect be a foundation cut for the revetment. Its fills produced a considerable amount of finds, which were in line with a date in the 16th century.

All of the visible outer moat remains in Area 2B and watching brief Z 81681 were recorded as Group 163. This group consisted of a cut, (part of the overall cut), and 8 fills. There was a high degree of variation within the fills, some were composed of mixed organic material and re-deposited natural, some had a high degree of plant (water reed) mixed with silty clay, while some were composed of a mixture of cultural material and re-deposited natural.

The outer moat cut in this area took a sharp turn, some 16 m northeast of the outer gate, from running southwest-northeast to northwest-southeast. This indicates that the new outer moat did not link up with the pre-existing inner moat, but instead ran more or less parallel with it. Therefore the 16th century fortification modifications can be shown to have effectively pushed the city moat out to the southwest, though it would appear that for a time the inner moat was still open, before being converted into a millrace. This is supported by map evidence from the early 17th century, particularly the Swedish spy map of 1624 (See Figure 96–below). Very little extra space within the city walls would have been created through these modifications. It is more likely that the changes were aimed at employing newer defensive technologies, which themselves required more space. The angled turn in the moat, is also indicative of the angled bastions which became popular in the late 16th and 17th centuries.

Finds from Group 163 included precisely the same range of pottery types as Group 141, as well as a whetstone, 2 knives, floor tiles, stove tiles, a bone die, copper pins, a musket ball and a leather shoe sole. It

is therefore consistent with the finds assemblage in Group 141, which Group 163 is effectively the equivalent of, but recorded in a different trench. Consequently, the date range is the same.

A small ditch (Group 164) was documented, which ran in a northwest to southeast direction and into the outer moat cut Group 163. The ditch was 0,55 m deep, and just 2 m of its length was seen, as it was truncated by the construction cut of a 1940s bomb shelter. A sherd of Early Redware was recovered from the ditch, as well as a stove tile fragment, so an early post-medieval date is also quite likely. It is presumed that the ditch was placed to flow into the moat, and it was most likely some kind of drainage feature flowing from the area inside the bastion.

A series of moat usage fills (Group 351), were seen in front of the outer gate façade in Area 5, the lowest of which was a rubble deposit which it has been suggested could have been used in the construction of the gate façade. Other fills varied from sand to silt to peat, and generally it is thought that these deposits built up during the moats usage period, rather than being dumped in later. One deposit appeared to have been made up of deliberately placed rectangular peat or turf sods, and it is thought that this must have related to an act of deliberate landscaping, presumably with the aim of concealing the base of the gate and the bridge pillars. Why this would have been desirable is unclear, but it may have related to consolidating a new phase of landscaping, to help prevent it from eroding. Finds from this group included Late Redware sherds, roof slates, nails, shoe fragments and a small fragment of a sandstone statue. This was in the form of two life-size human fingers that appeared to be holding something, perhaps a book. It is very possible that this find is a small element of a statue that stood on the front of the gate, which was certainly decorated and embellished. How it came to lie in the moat is unclear, but it has been noted that it was blackened, possibly from fire.



Figure 94 Some landscaping evident in clay placed next to the corner of the outer gate façade

One small possible pit (Subgroup 352) was seen cut into the sod layer, and was filled with an organic deposit containing a large amount of beach bark pieces. A possibility is that this feature related somehow to the overlying scaffolding structure Group 361, and possibly dates to the time of its placement.

A deeper set of moat fills seen in front of the gate were recorded as Subgroup 401. These are interpreted as the first fills of the moat after the construction of the gate façade, or perhaps even just before. The lowest of these is a rubble fill and probably dates from the construction of the façade, while the upper fill consists of a layer of blue clay with CBM and is probably the result of alluvial deposition, some re-deposition, and some dumping associated with the construction of the facade or the pillars. No finds were recovered from this group.

The Outer Gate

The outer gate that is presumed to have been first constructed in the mid or late 1500s was seen in Areas 2A and 5, and recorded in a number of groups. Some of these groups are essentially the equivalent of each other, but recorded in a different trench. The outer gate is a difficult structure to date precisely based on the archaeological evidence, with few finds demonstrably associated with it, no timbers that could be dated, or suitable material for C14 dating. It is however almost certain to post-date the demi-lune (ca. 1500-1530s, see above), and it appears to be depicted on the earliest map of the city from the 1590s. Hence we can suggest that it was probably constructed sometime between about AD 1530 and 1590. As mentioned earlier, in AD 1543 the roundel or demi-lune seems to have been rebuilt or extended, based on written records (Nielsen, 1874: 271f). This could also suggest a possible date for the construction of the outer gate. Finally, in AD 1583 Christopher Valkendorff, King Frederik II's "rentemester" (Minister of Finance) according to the written sources established "a vault in Vesterport between the two gates ..." (Nielsen 1870, p. 542). This reference appears to prove that by AD 1583 at the latest, there was an outer gate in place.

Outer gate – main structure

Group	Subgroups	Context types
75	-	Boulder foundations
136		Deconstruction of gate
439		Deconstruction of gate

Table 33 Outer gate related groups and subgroups

The outer gates as seen during excavation consisted of two main elements, the façade (see below) and the foundations of the sidewalls (no rear wall was seen, due to modern truncation). The sidewall foundations (Group 75) consisted of two parallel structures, constructed of very large uncut boulders.



Figure 95 The remains of the foundations of the outer gate side walls, as seen facing southeast

The large, natural boulders seemed in most instances to have been placed carefully along the edges of the construction cuts, like kerb stones, and up to four courses of these were preserved. In a few instances smaller wedge stones were documented under or between the larger kerb stones. The inside of each foundation was filled up more randomly by natural boulders of various sizes, and among these were also a few carved pieces of limestone. Traces of mortar and red brick dust were noted on several of the stones in the foundation, indicating that they were reused. The western foundation as it survived measured 10,4 m x 3,1 m, while the eastern foundation measured 10,6 x 3,5 m. The preserved depth of the foundations was max. 1,6 m from the top of the uppermost preserved stones to the base of the construction cut. The dimensions were heavily affected by modern truncations on the north, south and east side as well as on the top of the structure. The gap between the two foundation parts was 2,75 m wide.

Between the foundation stones were layers of both very organic and clayey soil, which would have served as a type of bonding material within the foundations (mortar was not used in the foundations). The finds related to this group all derived from these deposits and given the character of the soil and the finds, it must be cultural material taken from elsewhere and re-deposited here (see below).

Overall the structure is interpreted as the foundation for the outer western gate building. The building was partly documented (as a rather stylised sketch) in 1865 when the large Schacks Bastion overlying the structure was demolished and hence this gate was exposed (see Figure 91), and it was partly excavated again in connection with rearrangements of Rådhuspladsen and the construction of air raid shelters in 1931 and 1944. In 1865 the structure seems to have been preserved to a maximum height of approximately 3,5 m, including boulder built walls on top of the foundations and a paved surface between the eastern and western walls. During the excavations in 2011-2012, nothing was left of these structures above former ground level. The interpretation as a gate foundation was initially based on written sources and maps (earliest map of Copenhagen ca. AD 1590 and the Swedish "spy map" from AD 1624), and the

interpretation seems certain, based on the size, character and location as well as orientation of the structure and its connection to what is believed to be a gate facade (G 324).



Figure 96 Detail of the western gate area from the Swedish Spy Map of 1624

The exact dating of the construction of this gate is not clear, and unfortunately there is not much archaeological material to help clarify this matter, as the dateable finds seem to have been re-deposited, and are both medieval (bone combs, medieval pottery) and post-medieval in date. The youngest finds located between the foundation stones are Late Redware, stoneware and a single Jydepot sherd, which indicate a first deposition date between 1550 and 1650 AD. Therefore the date of the construction of the foundations is likely to be late 16th or early 17th century. It is uncertain how long the gate was in use, but as stated above, it was likely to have been constructed sometime between 1530 and 1590, and was used at most up until 1670, but possibly only up to 1624 when the Swedish spy map could be depicting a different gate (see above).

These foundations are related to Group 324, which is interpreted as the facade for the gate - however, as the two structures did not have a stratigraphic relationship, it is unclear if the facade was built at the same time as the gate building itself, and indeed it seems possible that the façade was a later addition (see below) . The upper levels of this structure, where this large foundation became a wall, were no longer extant, but were seen in the 1931 excavation, when it was described as having been of stone and brick (Museum of Copenhagen archives, AA12).

From what was seen during the excavation in 2011/2012, it would appear that two large foundation trenches were dug for these walls, trenches which cut through the peaty backfill of the demi-lune ditch (Group 133), and also through some of the medieval wells (Groups 132, 134 and 333). No foundation cut was seen for these structures initially, and only conclusively recorded near the base where the natural underlying clay was cut through. This was because the peat which had been cut through higher up had

presumably slumped up against the foundations over time, making it impossible to recognise a construction cut.

Also, a series of deposits were documented at a stratigraphically high level, which appeared to represent elements of the deconstruction phase of the outer gate (Groups 136 and 439). As such these may in fact date to significantly later than the use phase of the gate. They could date to the late 1600s when the new gate was constructed, but as much of this area was simply buried in a bastion at that time the gate may have remained largely intact into the late 19th century when the defences were removed entirely. As part of this process, an excavation was conducted in 1865 where this gate was partially documented at its higher levels (See Figure 91). It may even be that these upper deconstruction layers date to this early archaeological excavation. The finds encountered included a range of objects, many of which were considered to be modern in date, particularly glass and ceramic fragments, making this scenario quite likely.

The outer gate façade

Group	Subgroups	Context types
324	139, 110	Gate façade, brick buttresses
361	-	Wooden scaffolding

Table 34 Outer gate façade related groups and subgroups

The main façade and outward facing wall of the outer gate (Group 324) was constructed of both stone and brick. The lowest part was set in a construction cut that was dug to about the same level as the moat cut, and had a depth below contemporary ground level of at least 4 m. The bottom section was faced entirely of cut stone, up to a height of about 3 m. These were very substantial stones, rounded at the back, but with flat squared fronts, and lay in five main courses (only three survived at the western end). Behind these were more randomly shaped stones as well as brickwork, and the entire structure was bonded together with mortar which was still extremely solid during excavation. The construction cut for the façade stepped upwards to the rear (north-northwest), meaning that the wall was deepest at the front. Underneath the cut-stone base, a single course of un-bonded irregular rocks had been placed as the primary foundation layer for the structure; these were lodged in clay, which may have been placed deliberately for this purpose.

On top of the cut stone section of the wall a brick superstructure was built. This survived to a height of 2,25 m, and though badly truncated by the construction cut for a bomb shelter, it survived well enough to document where and at what height the opening of the gateway was. Thus we could see that the base of the gateway was at a height of ca. 4,3 m above the base of the wall foundation, and had an internal width of between 6 m and 7 m. The gate façade had overall external dimensions across the front of 11,9 m, and a width from front to back of 4,4 m. When one takes into account the deepest layer of foundation and the buttress additions to the eastern end, then the dimensions increase up to 13,3 m in length across the front, and 5,1 m in width.



Figure 97 The outer gate façade (Group 324)

The foundation cut for the outer gate façade was separate from the construction cut for the side walls of the gate building. This suggests that they may not have been built at the same time, and indeed it is believed that the outer gate was renovated and given a new front during the reign of Christian IV. This may suggest that the original gateway was built between c. AD 1530 and AD 1590, with the façade being entirely rebuilt sometime around AD 1618/19.

A series of white limestone blocks used as part of the side foundation of the western corner of the gate may perhaps have been part of the original gate façade, though of course this is speculative. It is also clear in plan that the façade and the side walls of the gate structure are not quite at right angles to each other, which again may suggest that the façade was not original, but instead added to a pre-existing structure, whose original front may have been at a more conventional angle to the rest of the structure. The results of an excavation here in 1931 suggested that the gate façade was placed on the outside of an earlier façade (Jensen 1938: 212f) and it was thought that the changes might have been related to Christian IV's redecoration of the gate house beginning in AD 1618-19, described in written sources (Lassen 1855, Jensen 1938: 221). In this case, the façade might belong more in the next phase than this one, but this is not certain.

The façade which was seen during excavation was an extremely durable structure, with an internal structure of criss-crossed brick courses and stone which would probably have made it capable of withstanding quite serious bombardments.



Figure 98 Close up of the outer gate façade

If as is thought this façade was a new addition to an existing gate structure, probably brought about by Christian IV, then unfortunately due to modern truncations the connection was lost. It seems likely that at the superstructure level at least, the structures would have been keyed into each other in some way to maintain a structurally coherent gate building. This gates' use after the façade was constructed is somewhat unclear.

On the Swedish spy map of AD 1624, the gate depicted does not appear to be in the correct position to be this outer gate. In fact the bridge and gate on this map do not appear to correspond very well with anything seen archaeologically at Rådhuspladsen. On the other hand, a dam and bastion shown are likely to be those that we saw elements of during excavation (see below). Whether the illustrator of the map made some errors in this area, or whether another bridge and gate remain to be found (perhaps to the southeast of our excavation area) we cannot be certain.

At some point following the construction of the main façade (Group 324), further additions were made to its eastern end (Subgroups 139, 110). These took the form of a number of brick built buttresses or supports. Precisely why they were built is unclear – perhaps they were deemed structurally necessary, or alternatively they formed the base for some form of cosmetic add-on to the structure.

The largest part (Subgroup 139) measured c. 2,5 m in length, by 1,7 m in maximum width, and abutted the gate buildings eastern end. No such structure was seen at the western end (though it might have been removed in the interim), but instead the western sidewall stepped in behind the façade, by a distance of 1,35 m, meaning that there was a slight corner behind this end of the façade (and that the façade was wider than, and projected beyond, the actual building behind it) (see Figure 99). This corner was then partially built up with a layer of mostly mortar, and then with a layer of white limestone blocks (see above).



Figure 99 The façade seen from the side (note how it projects beyond the side wall on the near side)

In fact the physical evidence seen during the Rådhuspladsen excavation is much more similar to what was depicted at Nørreport in AD 1624 (see Figure 6). Again this can mean an error by the illustrator (Heinrich Thome, engineer), or alternatively that the outer Vesterport had at one time looked like what is drawn at Nørreport, and hence we saw remains of this, but that it had been changed by AD 1624, and these changes were more difficult to see in the archaeological record.

If we trust the map, and take into account the evidence seen on site, it could suggest that the outer gate was taken out of use by AD 1624, with a new gate being built closer to Frederiksberggade. In fact the gate shown on this map seems to directly overlie the medieval moat (by then a mill-race), which raises the possibility that the mill building (otherwise not shown on the map) also acted as a gatehouse for a time. Unfortunately, the picture is somewhat unclear.

A further structure related to the outer gate façade included the remains of probable wooden scaffolding (Subgroup 361). This timber structure was placed just in front of the outer gate, and lay at a slight angle to it, deep down near the base of the wall/foundation. It consisted of 8 timber posts in a line, parallel to a long timber beam that lay horizontally and measured 5,8 m in length. It seems likely that it represents an element of scaffolding from one of the phases of construction associated with the gate or its façade. A sample from this structure was sent for dendrochronological dating, but was not suitable and no date was retrieved.

The deposit that lay around the horizontal beam produced a small number of finds of late post-medieval redware. This may suggest that the scaffolding could date to as late as when the outer gate was deconstructed, perhaps as late as the 1670s. However, given how liquid the deposits were deep in the moat, there is always a risk that some find material sank down from a higher level, which makes the dating of this deposit uncertain.

The Bastion

Group	Subgroups	Context types
97	-	Stone, brick and mortar wall, possible dam
314	-	Probable disturbed element of bastion

Table 35 Bastion related groups and subgroups

Historical sources suggest that in AD 1618-19 changes were made to the roundel. In the process of rebuilding the fortification based on Dutch and Italian models, the rounded island was transformed into a sharp-edged bastion, physically connected to the rampart in the semi-circular fortification. The bastion was known as Vesterport’s bastion (Jensen 1938, p. 219, Dahl 1996: 125ff). Traces of the bastion were scarce during the 2011-12 excavation, but to the west of the outer gate some evidence was seen. This consisted of a section of cut stone wall (Group 97) that projected out from the west corner of the outer gate façade at an angle, and slightly further west – on the other side of a deep modern truncation – a substantial piece of walling built up against the natural clay subsoil (to its north), with the moat backfills to its south. The stone facing of this was mostly removed, leaving mortar and bricks behind, but it was clear from the very large stone sockets that there had been a stone outer face to the structure originally, up to a height of at least 3 m, and from there up it was brick faced.



Figure 100 The robbed-out face of the bastion

This is very similar to the facing of the outer gate itself, the only difference being that the gate had a vertical face, while this wall had been built leaning slightly backwards against the natural clay behind. This may suggest that both structures were built at the same time, though of course one could have been built to mimic the other. The fact that the stone facing of the outer gate was not removed as with the bastion wall, may suggest that in some way the gate remained in use longer than the bastion wall of Group 97. Why this would be the case however, is unclear.

This structure differed substantially from the stone revetment on the eastern side of the outer gate, as that was comprised only of loose, un-mortared and uncut boulders, while this stretch of wall was mortared and would have had a cut-stone finish. For that reason it is considered extremely likely that it represents a surviving element of the late 16th or early 17th century bastion wall. The reason for the removal of the cut-stone facing of this wall is likely to be its re-use in another structure, probably the late 17th century bastion.

Ignoring the modern truncations, this section of bastion wall measured either c. 23,5 m in length, or about 16 m in length. The reason for this difference is that part of Group 97 was interpreted as a dam when it was first recorded on site (the outer, western section), but if this assumption is incorrect, then it could in fact be part of the bastion wall also. This outer part was in poorer condition, with more material having been robbed from it, so it is difficult to be certain of its original function.



Figure 101 Western element of bastion/dam

The Swedish Spy Map of 1624 depicts a dam projecting off of the western end of the bastion's southern side, and it is possible that this is the structure encountered on site at the west end of the bastion wall. Unfortunately, we cannot be certain. The section closest to the gate was built leaning up against the natural geological clay, while this furthest west part seemed to have more organic moat-like fills behind it. It is perhaps unlikely that such material would be used to fill in the space behind a bastion wall, as its softness would be poor support in the case of a bombardment. This supports the idea that this western structure may in fact have been part of a dam. Conversely, the structure was noted to stand in a structural cut, made into the natural clay, and the construction was also inclined to the north. It seem unlikely that a dam would be built leaning against nothing but water, but if this structure was built up against solid material (even infill), then it would be similar to the rest of the bastion wall. Consequently it is most likely that it was in fact part of the bastion, meaning that it was at least 23 m in length along this side.

Four boulders (Group 314) located between the gate façade and the parallel gate foundations were initially thought to be a further element of the bastion. However, it was concluded following excavation that these had more than likely been disturbed during the construction of the air-raid shelter, as a result of which their archaeological significance is uncertain, with their original location being uncertain.

Infrastructure

Introduction

In Phase 3 of the site (AD 1350 – 1500) the late medieval moat was already established, and a bridge was in place which appears to have been replaced at least once. The 16th century saw a further rebuild of the bridge over the moat, and the construction of a sluice that fed water into the moat just north of the bridge by vesterport. Some wooden waterpipes were also seen. These developments will be outlined in the following sections.

The Third Bridge

Group	Subgroups	Context types
398	-	Timber structures
411	-	Timber structures
(451)	454: 359, 377, 409, 420, 422, 423, 424, 430	Structural cuts, stone and brick walls, arch, dump deposits
441	-	Bridge buttresses

Table 36 Third bridge related groups and subgroups

The final bridge over the medieval moat outside the original (inner) Vesterport consisted of a brick-built bridge resting on masonry stone foundations. Dendrochronological evidence from associated timber structures suggests strongly that this bridge was constructed in about 1500 AD. It measured about 17 m in length, and 7 m in width.



Figure 102 The brick and stone bridge (Subgroup 454) seen from the east

This third and final bridge at this location (Subgroup 454) was recorded in a number of structural parts, which were each given their own subgroup numbers. The bridge was located in Area 4, and spanned the moat in a southwest-northeast direction. It was a replacement of the earlier high medieval bridge (Subgroup 453) and indeed appears to have been built reusing its foundations. Consequently, the foundations and dimensions of the central channel were already defined by these earlier foundations (Group 407) from the previous bridge.

The main elements of the bridge (Subgroups 377 and 422) consisted of a number of structures and associated structural cuts separated by the central channel. On the western side a northwest to southeast orientated wall

was keyed into a northeast to southwest aligned wall at the southern end. No joint was visible between these two walls suggesting a contemporary construction.

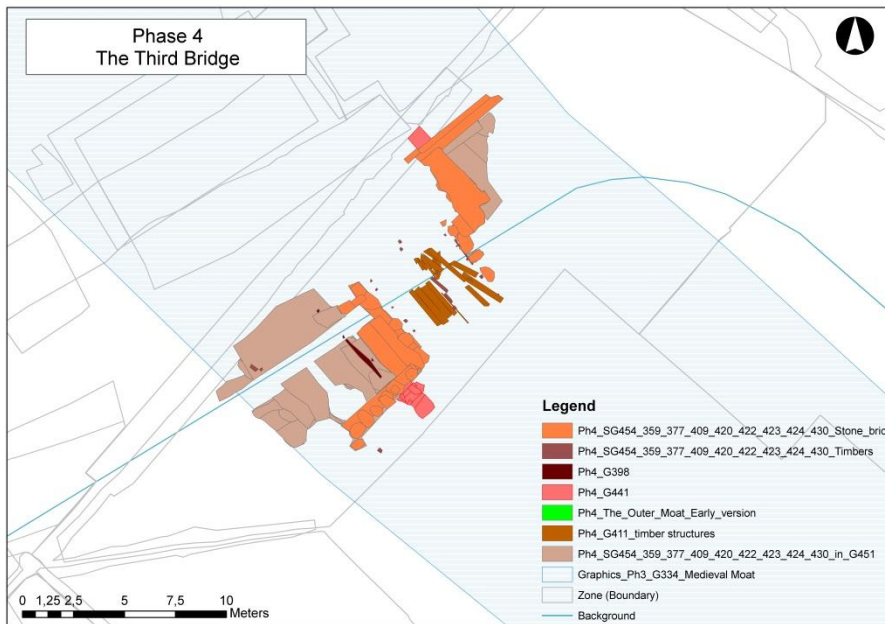


Figure 103 The third bridge over the moat

On the eastern side the relationship between the northeast to southwest wall and the northwest to southeast aligned wall was truncated by a 1940's bomb shelter cut. A contemporary date for these two walls must therefore be assumed but cannot be proven. Another wall (removed by the bunker) was recorded during the 1940's excavations that

would have created a three-sided structure. This construction can therefore be seen as a large rectangular structure measuring approximately 5,5 m X 7,5 m, with walls on three sides and the medieval moat cut on the fourth. On the eastern side of the moat a similar structure existed as on the western side, except on the fourth un-walled side where the medieval gate Group 111 would have formed the north-eastern extent. Again not all of this side of the bridge survived, with the southern side having been robbed out at some point in the past. The base or ends of a brick arch (Subgroup 422) were seen on both sides of the bridge, and were clearly built at the same time as the main bridge walls (Subgroup 377). The top of the arch had been deconstructed and removed in the past, possibly as late as when the final defences were constructed in AD 1670, or even when those were removed in the late 19th century.

Figure 104 The western side of the bridge arch, with foundation boulders visible and part of Subgroup 409 (timber uprights)

Buttresses or bridge supports appear to have been added on to the side of the bridge at some point after its initial construction (Group 441), in order to support the main structure. Two of these survived, one on either side of the bridge, though there



were surely four originally (the other two were likely demolished around the time of the construction of the underground toilet and the L-shaped bunker in the 1940s). They were also constructed of brick. They were both 0,8 m in width, and projected 1,7 m out from the bridge.

Two deposits containing frequent CBM (Subgroup 420) were located on the western side of Group 422. These deposits were interpreted as a discrete series of dumps, possibly associated with the construction phase of the bridge. They may also have derived from the deconstruction of the previous bridge.

These deposits can possibly be viewed as part of Group 359. Although the composition of material in Group 359 is different, it is likely that they are part of the same deposition process. Based on stratigraphic position and location a provisional date of 16th century can be suggested.

It is clear that these structures formed part of a bridge structure post-dating Group 407. The northwest to southeast orientated walls are likely to be bridge piers although the type of bridge extending off these piers is unclear. There might have been an early version with a wooden span structure between, but what was seen on site was the base of a brick arch. A series of dumped deposits (Group 359 and Subgroup 421) appear to have been placed in around the bridge walls (Group 377) during the construction phase, presumably as infill which would give the structure more stability. These produced a number of ceramic finds of various dates, from medieval to late medieval to one post-medieval sherd.

A north-west facing wall re-facing (Subgroup 423) was placed along the northwest edge of the brick bridge. It was built with stretcher coursing and had a possible associated construction cut. The cut would have been made through the original bridge side wall (Group 377). It is also possible that this brickwork was simply added on to the existing wall, without a new construction cut, or indeed that the 'cut' really represents an episode of collapse in the original wall.



Group 423 can be interpreted as a possible re-facing of wall Group 377. The motivation for this re-facing is open to conjecture. It is possible that the original wall was damaged or degraded in some way. It does suggest however that Group 423 was visible and therefore Group 419 must have been deposited at a later date. It is unclear during which phase this modification took place as many of the structures in this area had multiple phases of re-use and modification, but it most likely belongs in Phase 4. It is either made during modifications to Group 377 or Group 422. Based on stratigraphic relations Group 423 can be seen as post-dating Group 377 but pre-dating Groups 424 and 419. A dating of 16th century seems reasonable.

Figure 105 Possible re-faced bridge sidewall
Subgroup 423

A further minor bridge element was seen immediately west of Subgroup 423. Subgroup 424 consisted of a small extension of the walls in Group 423. It appeared to have been built up against something, and could actually be a continuation of the re-facing discussed above, but expanded into an actual buttress or pillar, presumably to support Group 423 from collapsing. Based on stratigraphic position these walls must post-date Group 423 (though perhaps only just). A date in the 16th century is likely.

Some timber structures were also noted in the environs of the bridge walls (Groups 398, 409, 411 and 430) which are likely to have acted as scaffolding or similar construction-phase related structures. Subgroup 398 was located in Area 4, on the western edge of the moat, and immediately west of the late medieval masonry bridge (Subgroup 377). It consisted of three slightly angled timber uprights in a row, running parallel to the moat and bridge, and one horizontal beam, which though degraded, had probably originally been attached to the uprights.

Initially it was thought that these might have acted as part of a wooden bridge, but the greater likelihood appears to be that they were part of scaffolding erected during the construction of the final masonry bridge. This is also based on the fact that another double row of posts (Subgroup 409, see below) was uncovered on the inside of the bridge arch deep down, and pressed up against the inner faces of the arch base. These were of a similar age to Subgroup 398, and were also thought to be part of construction scaffolding.

The timbers of Subgroup 398 were relatively dry, being high up on the edge of the moat, but fortunately well enough preserved that a dendro date could be obtained from one upright and a horizontal beam (both of oak – Appendix 4). The upright returned a date of 1498 (+/-14), while the horizontal returned a date of 1480 (+/- 20) (Appendix 4). Taken in conjunction with the dates from Subgroup 409, the dating evidence points to a construction date for the scaffolding and bridge (Subgroup 454) of c. AD 1500. No finds were retrieved from this subgroup. Further timbers (Subgroup 430) were located higher on the west side of the moat, and probably are related to Subgroup 398. These timbers were dryer, and no dendro dating was possible.

Further probable scaffolding timbers (Subgroup 409) were also located in Area 4, in the middle of the moat, at a depth of c. 4 m below street level. This subgroup was composed of a number of upright stakes and a single plank aligned along the central channel of the moat (see Figure 103, above). Several vertical and diagonal timbers were also placed within this group based on stratigraphic position and northwest to southeast orientation. A number of dendrochronological samples were taken from this subgroup. Of these, two produced early felling dates of AD 1442 and 1460, but the remaining four produced dates clustered around AD 1495 to 1500, again suggesting a construction date of very close to AD 1500. The older pieces are likely to have been reused.

Under the arch of the bridge, Group 411 consisted of a number of timbers, aligned roughly northwest to southeast, in varying degrees of structural coherence. The east and west sides were divided by a laterally laid plank. The east side had little structural coherence being just an irregularly arranged pile of planks. The western side however was arranged into an irregular surface with the planks lying flat. One silt deposit had

built up over the timbers. Dating of this group is based on three dendro dates, and points to a date between about AD 1555 and 1571 (Appendix 4).

Taking into account the early date for this structure, it may be that it represents some kind of structure associated with work carried out on the bridge arch, perhaps some repairs carried out in the mid to late 1500s. It was initially thought to be an early version of the mill race, but as there was no evidence for a mill prior to AD 1605, it means this group is more likely to relate to the bridge in some way.

Dating of bridge Subgroup 377 is based on the dendro dating of the various timber structures, (a total of 7 samples returned dates) in which case a construction date of c. AD 1500 seems most likely. The brick types used would not be at odds with this dating. This bridge appears to have been in use for over a century, but sometime after the mill was constructed in the early 1600s, this bridge probably ceased to be used for access to the city. It may have continued in use in connection with the mill until c. AD 1670, by which time the mill too went out of use. In this final phase of its usage, the bridge would have housed the final stretch of the mill headrace, and indeed many additional structures including a dam were built within the bridge arch. It may even be that the location of the bridge influenced the choice of location for the mill. What is less clear, is whether or not the top of the arch remained standing in these years, but it seems likely that it did, perhaps buried in the late 1600s, and then torn down in the late 1800s when Rådhuspladsen was made into a square for the first time.

This bridge (Subgroup 454) appears to be the third and final phase of bridge building within the inner moat at Rådhuspladsen. The first phase (Subgroup 452) happened in about AD 1372, the second phase (Subgroup 453) in about AD 1443, and this phase in about AD 1500. This would suggest that the first two bridges (most likely of timber, and timber and masonry respectively) lasted about 70 years and c. 55 years respectively, and this version at least a century. This bridge should be seen together with Subgroup 453 and 452, and collectively they form Group 451, which represents all phases of the bridge in the inner moat. The reason for improving the bridge in about AD 1500 could have been a need for structural improvements of the previous bridge, or to make a stronger bridge. However it is equally likely that it may have been rebuilt for purely aesthetic reasons, as an arched brick bridge may have been considered more fitting at the city's western entrance.

The timber-lined sluice and gateway

Group	Subgroups	Context types
21	223, 224, 225, 238	Wooden structures, brick wall, silt deposits

Table 37 Timber-lined sluice related groups and subgroups

Located some 11 m to the northwest of the bridge (Subgroup 377), and by the west edge of the medieval/early post-medieval moat, a sluice or water-channel and its fills (Group 21) was documented in watching brief ZT6326. The main sluice structure (Subgroup 225) measured ca. 8 m in length (exposed) and ran in a southwest-northeast direction. It was assumed during excavation that its function was to channel water into the city moat, perhaps in order to maintain the water level, or to supply water to the mill. However dendrochronology has shown that this structure predates the mill, and during post-excavation, thanks to the dating of various other structures, a new possibility has emerged, which will be outlined

below. As well as (and in connection with) the sluice, a wall (Subgroup 223) and gate (Subgroup 224) were also recorded, which it would appear served to regulate or control the flow of water into the moat from the sluice. This combined structure consisted of a brick-built wall (1,8 m high, 2,2 m long and 0,5 m wide) of munkesten type bricks (large generally medieval form) running parallel to the moats edge (just inside the moat's edge), and a timber framed 'doorway' that presumably had a closing mechanism and door when in use. A series of mainly silted deposits (Group 21) were also documented within the sluice.



Figure 106 Group 21, sluice wall (SG 223), gate (SG 224) and revetment (SG 225) seen from southeast

A number of wood samples were taken from the timber structures that made up parts of this sluice, and revealed the structure to be made of oak and pine (Appendix 4). Dendrochronology dates retrieved from these suggest that the sluice and gate date to ca. AD 1537, with repairs going on until about AD 1560 (Appendix 4). Finds retrieved included sherds of Late Redware, a stylus and a roof tile, which are not in conflict with the dendro dates. A series of propping posts that support the wall and gate structure on the city side, date to about AD 1560, and are likely to be later additions to the main structure (Appendix 4).

It was thought during excavation that this sluice might have related to a watermill, functioning as a millrace. However, although a considerable amount of mill-related structures were later found in Area 3 and Area 4, none of them dated as far back as this sluice, which makes this theory unlikely. It is now apparent that this structure dates to roughly the same time as the demi-lune described above (Groups 133, 155 etc.), and its base is at a very similar height above sea level. An examination of the available evidence could suggest that the 'sluice' was in fact connected to the demi-lune moat. This moat was much shallower than the main city moat, and so it stands to reason that without some kind of control, the water in it would simply flow down into the main moat, and the demi-lune moat would dry out. Consequently it could make sense that these structures (223, 224 and 225) represent such a control point, and served to regulate the water level in the demi-lune moat, keeping it full, but allowing for its emptying if so desired. As the area between these features was not part of the excavation, it was not possible to confirm this theory, but it seems a likely explanation for the structures. One further possibility that should be considered, is that this

sluice represents the structure reputed to have been built at the behest of Valkendorf in AD 1583 (Nielsen, 1870, p. 542), between the two gates by Vesterport. However, if that is the case, the timbers used must have been recycled, as they generally predate AD 1580 by some decades.

Revetment structure

Group	Subgroups	Context types
48	-	Timber structure, various deposits

Table 38 Revetment related groups and subgroups

Seen deep in the moat in watching brief trench Z 3064, was a linear timber structure (Group 48) of somewhat uncertain function, extending beyond the trench at both ends. This group comprised of a linear cut made into the natural clay at the base/side of the moat – possibly also cutting through some of the primary moat fills. The cut and associated structure were oriented NNE-SSW. Along the inner edge of the cut were driven three fairly substantial timber posts, and placed behind them (between them and the cut) were two planks on edge, one on top of the other. The impression was of a small wooden revetment, but it could also represent a drain or similar construction. However, it was possible that the structure might have been taller originally.

As the construction was seen only in the corner of the trench, its true function was not possible to establish. Based on its depth, it was thought likely that it underlay and predated the nearby millrace, and so was likely to be pre-1600. One of the sherds of pottery found in the backfill around the posts was seen to be Late Redware, post-dating AD 1550. This suggested that this construction was made somewhere between about AD 1550 and 1600. One dendro date was returned from a piece of oak from this group however, and suggested a date of winter AD 1691/92 (Appendix 4). If this is accurate, then it suggests that this structure post-dates the millrace, and indeed the backfilling of the millrace. For this to be the case, this structure would have to be in the base of a very deep cut through moat/millrace backfills, a cut which was not seen in the watching brief trench (and a scenario that seems unlikely). Nonetheless the possibility must be kept in mind.

The material found to the west side of this structure – which was probably the primary fill of the sluice or drain that this structure was part of – was extremely organic in nature, with a strong smell of horse manure and containing much straw. This may suggest that this group represents a drain from a stable area, leading waste down into the moat, though this interpretation is far from certain – particularly if the structure dates to AD 1691 (and hence would belong in Phase 6).

The Outer Bridge

Group	Subgroups	Context types
212	152	Brick pillar/pier, brick rubble
363	-	Brick pillars, foundation cuts, stone foundations

Table 39 Outer bridge related groups and subgroups

With an outer gate and outer moat constructed sometime between AD 1543 and 1583, it stands to reason that an outer bridge would also have been necessary from that time. Various bridge elements were seen in

this area, and while dating these is difficult, it seems logical that they should date to about the same time as the outer gate and moat.



Figure 107 Bridge pillar Group 212 seen from southeast

One element seen in Watching Brief Area Z 114012 comprised of a free-standing brick pillar (Group 212), which is thought to have been one of the supports or piers for the outer bridge. This was slightly out of alignment with the entrance to the outer gate. Such a kink in alignment may have been intentional and could have acted as a defensive measure to slow down an attack or charge on the outer gate. This pier or pillar measured 5 m in length, but was truncated at its eastern end, so it would have been longer originally. It measured 1,25 m in width, and survived 17 brick courses in height (ca. 1,6 m). It sat upon a foundation of limestone blocks, which were only seen in plan, hence their depth is unknown.

The top of this structure was found at a depth of c. 2 m above sea level, or > 3 m below present ground level. It can be seen then, that the moat base in this area was at least 5 m below ground level. Moat fills were noted around this structure, and seemed to have built up in situ after the placement of the pillar. Some brick rubble was also seen, particularly higher up, and is likely to represent part of the upper pillar which was demolished and fell in to the moat, perhaps in about AD 1670.

Further possible evidence for a second such pillar was seen c. 4 m to the southeast, in the form of brick rubble (Group 152). Due to safety concerns, this structure could not be examined closely and hence few details are known of its form, but it is possible that it was the rubble remains of a second bridge pier. Evidence for this outer bridge was also found directly adjacent to the façade of the outer gate in Area 5, in the form of two brick pillars and their associated foundations and construction cuts (Group 363)



These pillars were built butting directly up against the gate façade (though not connected physically). The eastern-most pillar survived to a height of 2,7 m, and sat on foundations ca. 0,85 m in depth. The western pillar on the other hand had been almost completely removed, and only survived to a height of 0,3 m, with only a few courses of brickwork remaining. It sat on a foundation 0,65 m deep. In both foundations, cut granite stones very similar to those used to build the outer gates foundations were used (though less formally laid). The pillars were built at a slight angle to the gate façade, and projected 1,28 m from the façade (eastern pillar) and 0,6 m from the façade (western pillar). It would appear that the reason for the pillars being angled was to begin the process of angling the bridge away from the façade, a process which was continued and further accentuated with the pillar Group 212 further out in the moat. Unfortunately as the pillars had in all cases had their uppermost parts demolished, it is unclear what form the span of the bridge would have had.

Figure 108 Bridge pillars Group 363 seen from west

Wooden waterpipes

Group	Subgroups	Context types
109	-	Cut, deposits, wooden structure
115	-	Cut, deposits, wooden structure

Table 40 Wooden waterpipe related groups and subgroups

Located along the east side of Area 1, and running in a NW-SE direction for a distance of 15,6 m (as seen), a wooden waterpipe was documented (Group 109). This group comprised of a large linear trench, cut through both archaeological layers and the underlying natural geology. This trench also appeared to turn NE at one point, presumably to go down Vestergade. A wooden waterpipe was found in the base of this trench, though it was not observed to turn down Vestergade, but instead continued straight. Due to its depth, and time constraints, few details are available. It was noted as having a diameter of 0,3 m. It was possible to take a sample of this pipe, and dendrochronology has revealed it to be a very early example, the pine tree having been felled in AD 1589/90 (Appendix 4). This makes it the oldest dated pipe from the excavation at Rådhuspladsen. It is noteworthy that the only artefact recovered from the backfill of this pipe trench was a sherd of a high medieval Early Redware jug.

Another waterpipe was later discovered running parallel to and very close beside the pipe mentioned above. It was in fact c. 1,1 m east of the pipe in Group 109. This pipe, Group 115, was extremely deep

below ground surface, in a cut that went deep into the natural clay. As it was backfilled with this clay also, this trench was very difficult to identify. The pipe was documented as being 0,33 m in diameter. A typical lead joint was also identified. This pipe appears to be one of those detailed on a map from AD 1757, and if so it must predate this year. On that map of waterpipe placement, several water pipes are shown in this area, suggesting it was a major entry point for water into the city. No date was retrieved from this pipe, but based on its proximity to Group 109, and given that they are parallel to one another, it is suggested that it may have a similar date, and hence it has been placed in Phase 4.

Other Features

Pits

Group	Subgroups	Context types
319	-	Pit cut and fill
320	-	Pit cut and fills
394	-	Pit cut and fill

Table 41 Pit related groups and subgroups

A large pit (Group 394) was excavated in the western edge of Area 5. The pit had one discernible fill. It was irregular in plan, almost square but with rounded corners. The preserved dimensions were 2 x 2 m and the depth was measured to 0,7m. The sides and the base of the cut were irregular.

During excavation it was suggested that this could originally have been a clay extraction pit, based on the fact that the pit was cut into compact natural clay. The irregularity of the sides and base supports this interpretation, though the almost straight sides and rounded corners of the pit seen in plan might suggest otherwise. The pit was filled by a dark clayey fill with small lenses of organic material. Finds included a bone comb, some slag, animal bones, ceramic and a fragment of a stove tile. The scarcity of finds was interpreted by the excavators as an indication that this was not originally dug to be a waste disposal pit. However, garbage disposal could have been a secondary function. The finds recovered (for example a glazed stove tile fragment) indicate that this pit was slightly later than the other pits nearby, and so probably belongs in Phase 4.

A heavily truncated pit (Group 320) (0,75 m x 0,65 m x 0,37 m deep) was documented in Area 5. This was possibly a waste pit as it contained domestic waste and some smithing waste. It may have been open for a while to allow a naturally accumulated slump of material to form between waste fills. The pit was cut into and through re-deposited natural clay, and was truncated by the foundation for the gate, suggesting it predated it. Finds and stratigraphy suggest a 16th century date, perhaps just preceding the construction of the outer gate.

A quite large pit (Group 319) (2,5 m x 1,8 m x 0,35 m deep) was excavated beneath the foundations of the outer gate, in the same area as the pit Group 320. It was not a very deep pit, but may have been truncated by the gate foundation cut. Its fills were perhaps indicative of waste dumping. While finds were few, the pottery seen is probably 16th century, so this pit probably just predates the construction of the outer gate, and perhaps was actually dug around the same time as the gate foundations were being excavated.

Ditch

Group	Subgroups	Context types
168	-	Ditch cut and fills

Table 42 Gitch related groups

A linear ditch (Group 168) was excavated in Area 2B. This was running parallel to, and inside the 16th century moat that ran southwest – northeast across this trench. While its backfills contained 17th century material, it is considered likely that the ditch itself is 16th century in date.



The function of this ditch is somewhat uncertain. If as is thought it co-existed with the adjacent moat, then it makes sense neither as a boundary nor as a drainage feature. Unfortunately as it was seen in a confined area, no evidence was found to further explain its function.

Figure 109 Ditch Group 168 seen from west (post-excavation)

Rampart erosion deposits

Group	Subgroups	Context types
419	331	Dump layers, posthole

Table 43 Rampart erosion related groups and subgroups

A number of deposits (Group 419) were documented in Area 4, immediately adjacent to the outside of the brick wall of the bridge (Group 423). These were probably a mix of natural accumulation, dumping, and up-cast from moat clean out. These dump layers, deposited north of the bridge were nearly all of a silty organic nature. Their form suggested that they were laid down by water. They may have derived from dredging or clean outs of the central moat channel – or perhaps more likely in wash-off from the rampart. The bridge was constructed in about AD 1500, so these deposits surely post-date AD 1500, and are likely to predate AD 1600.

Within this group was a possible posthole (Subgroup 331). As this was cut through, and sealed by, deposits from Group 419 it suggests that the deposition of this group may have occurred in a series of dumps over a period of time, but also that this (somewhat tenuous) posthole is likely to have a broadly similar date to Group 419; sometime in the 16th century. It might have related to work carried out on the bridge, as a part of scaffolding or similar, though this is far from certain.

Stakeholes

Group	Subgroups	Context types
337	-	Stakeholes

Table 44 Stakehole related groups and subgroups

Two stakeholes (Group 337) were excavated underneath the cut for the foundation of the western wall of the outer city gate. However, due to the similarity with the surrounding deposits it is possible that they were pushed through the pit layers (Group 319) above and were not seen, in which case they may relate to either the pit function or the construction of the gate. As they were isolated, little can be said regarding their function, but it can be assumed that they predate the outer gate, and hence are likely to date to the 16th century.

Surfaces

Group	Subgroups	Context types
257	-	Surface, usage deposits

Table 45 Surface related groups and subgroups

A number of deposits found in section in Watching Brief Trench Z 3064 have been interpreted as probably representing a work surface and associated cultural accumulation built up in situ (Group 257). One of these deposits comprised of a layer containing charred seeds which could relate to cereal drying, though they may have been dumped here as part of the overlying levelling Group 226.



Figure 110 Group 257 deposits seen in profile from east

The dating of this group is uncertain, and based mainly on ceramics. These could point to the surface itself potentially being late medieval or transitional in date, with perhaps medieval layers lying immediately underneath. The layers above however, certainly contained post-medieval ceramics. Taken as a group, this suggests a working surface laid down towards the end of the medieval period, and continuing in use into the post-medieval period (after AD 1500). It is also possible that (some at least of) the deposits in Group 257 could belong in Phase 5.

These layers occurred just west of the medieval gate, in an area that we would expect to be just inside the moat that was in use well in to the 1500s or even up to AD 1600. This may suggest that this area was located just between the medieval moat and embankment, as it certainly cannot have been inside the embankment. This may be evidence for a small area existing outside the medieval rampart, but still within the moat, a sort of liminal space or no-mans-land in a sense, neither in the city nor outside the city. The surface could suggest a pathway followed this middle-ground, but the cultural build up layers suggest it was not simply a pathway, but also a working surface of some kind. The presence of a possible iron-working feature deeper down, of likely medieval date, is also interesting, suggesting that this kind of work might be carried out near to, but outside of the gate, yet in a sense not outside the city territory entirely.

Overall conclusions for Phase 4, AD 1500 – 1600

Phase 4 at Rådhuspladsen saw a series of alterations to the defences and infrastructure at the western edge of the city, changes which reflect the advancement of Copenhagen's western boundary from a medieval form to a more 'modern' or post-medieval form. The first of these changes saw the construction of a stone based and brick-arched bridge over the city moat, replacing the previous version thought to be of brick and timber. This occurred around the year AD 1500, and seems to coincide approximately with the placement of a wooden revetment or fence-line along the inner (and in places outer) edge of the moat, either as a structural or defensive addition to the moat.

Following on from these changes, a small semi-circular outer moat or demi-lune was constructed outside the western gate in order to add an extra layer of defence to the approach to Copenhagen from the west. This appears to have been constructed in about AD 1530, based on dendrochronological dates, and would only be in use for a few decades at most. A timber-revetted structure that was initially thought to relate to a mill race, is now seen as likely to be the northern terminus of this demi-lune, and has been dated to c. AD 1537 based on dendro dating of some of its elements.



Figure 111 The oldest map of Copenhagen from c. AD 1590, western gate area to the left (Lorenzen 1930, kort I)

It seems that it was realised quite quickly that this demi-lune was either ineffective, or simply not in keeping with wider trends in urban defences of the 16th century. Hence it seems to have been filled in by about the middle of the century or soon after, in tandem with the establishment of a much larger outer

moat that was placed somewhat further out (its inner edge was between 4 m and 15 m further out than the demi-lune's outer edge where observed). This is likely to have had a large rampart along its inner edge, though this did not survive. It is possible that initially this moat also had a roughly semi-circular shape in plan, or was at least curved, and it seems likely that this is the construction depicted on the first map of Copenhagen from about AD 1590 (Figure 111). In tandem with the construction of this new outer moat, an outer gate was also constructed. This faced to the south-southeast, approximately at a right-angle to the inner gate, in itself a defensive layout. It was also seen that this gate was later redesigned, with a new façade added. This may have been as late as AD 1618, when Christian IV was supposed to have had the front of the gate rebuilt (Lassen 1855, Jensen 1938: 221).

A new outer bridge was also constructed, in order to span the outer moat and link the outer gate to the area outside the town. This appears to have been built on a series of vertical brick pillars or bridge piers. Finally, to the immediate west of the outer gate and abutting it, a substantial stone, brick and mortar wall was seen, built not vertically but leaning slightly inwards, and running in a southwest to northeast direction. Surviving to a maximum height of c. 4 m, this appeared to have been a part of the first bastion or ravelin built in this area, and implies another reworking of the area outside the original western gate. It seems that the outer gate was reworked in to this new more angular outer defence system, which is likely to have been built after AD 1590, but before AD 1624 when the Swedish spy map was drawn and appears to depict this angular bastion structure. It is thus possible that this structure might belong in Phase 5 rather than Phase 4, but this is uncertain.

Throughout the period of these changes, the original inner moat seems to have remained open and in use as a moat, hence technically the 'bastion' was in fact a ravelin during these years (as it was detached from the main defences, standing outside them), but this too would change early in the 1600s. Finally, the first wooden waterpipes documented at Rådhuspladsen occur in Phase 4, suggesting that by c. AD 1590 the process of supplying piped water to this part of the city had already begun.

Phase 5 Decommissioning of the medieval defences and associated constructions, and the mill by Vesterport. –AD 1600 – ca. 1670

The fifth recognised phase of activity at Rådhuspladsen corresponded approximately to the middle part of the Post-Medieval Period (between c. AD 1600 – c.1670), and saw progressive developments related to the city's defences and infrastructure, many of which were initiated by Christian IV. It was a time when the medieval defence line – in this area at least – seems to have been abandoned, and reused instead as a part of the city's non-defence related infrastructure. The features found at Rådhuspladsen from this period add considerable new knowledge to our understanding of Copenhagen at this time. In particular the excavation adds to our knowledge of the timing and form of some of the changes to the city's western boundary zone. It also gives us considerable information regarding the everyday life of the townspeople, through their material culture. Furthermore evidence has been unearthed that tells us something about the city's wider organisation.

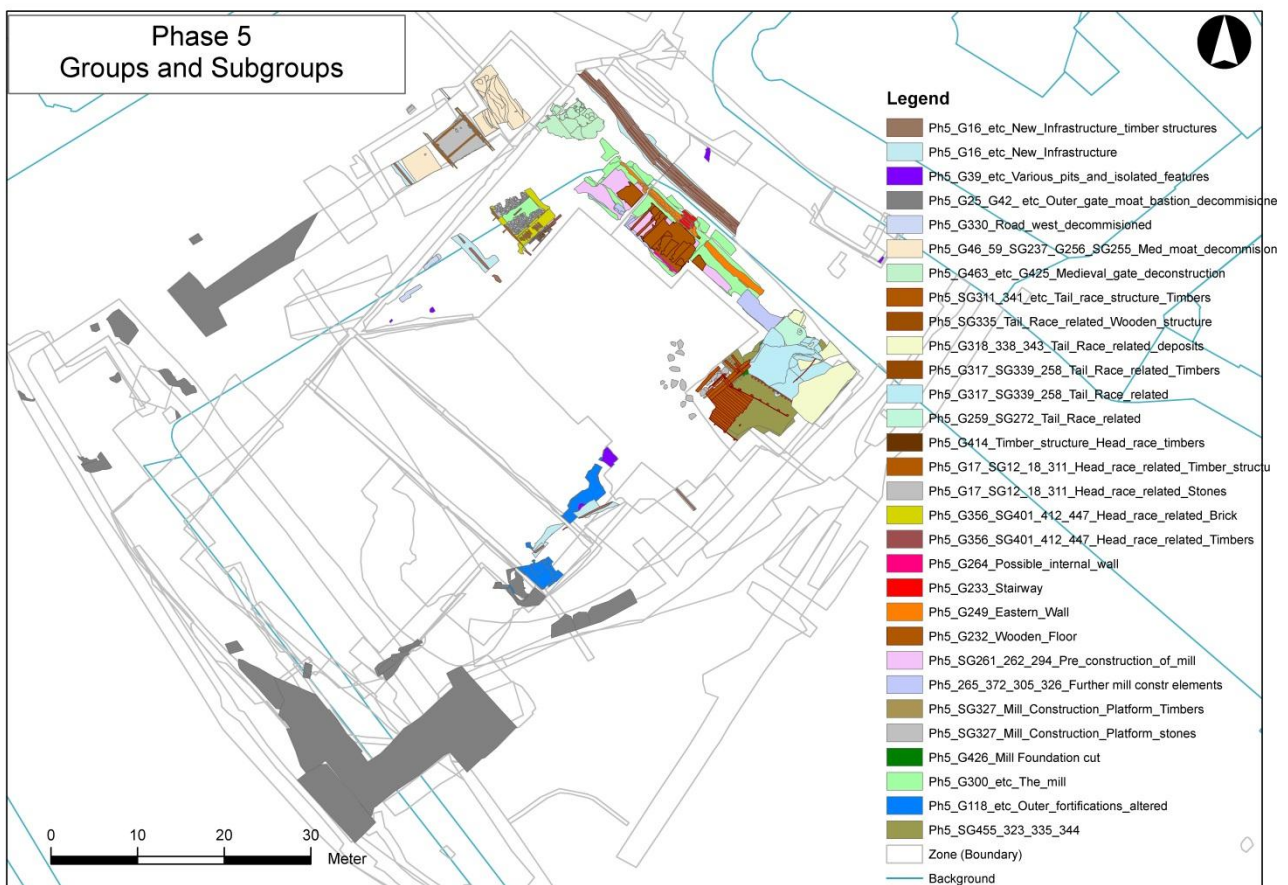


Figure 112 Phase 5 Groups and Subgroups

These post-medieval remains seen at Rådhuspladsen were heavily impacted by later activities in the area – both archaeological (the placement of the final bastion and moat) and modern (service trenches, bunkers, an underground toilet etc.). Nonetheless a good deal of the relevant material survived, and together with what we know of some previous excavations in the area, we can establish a much of what happened in the area at this time. The post-medieval contexts themselves impacted on earlier archaeology too, particularly in the case of the medieval moat which was reused in a completely new way during these years.

This phase primarily consists of large scale structures mostly indicative of industry and infrastructural developments, as well as some defence-related work. Many of the structures built in this phase were probably established in a relatively short time, as part of a major phase of construction, something that is also indicated by the dendrochronological dates received. The types of features excavated that can be dated to the period AD 1600 – 1670 include for example several mill and mill-race related structures, possibly a new façade for the outer city gate, , and a great deal of in-filling of deeper features in the area in order to facilitate the re-construction of the entire western boundary area.

It appears that in the years just after AD 1600 it was decided to rely entirely on the new outer moat, and at that time the inner moat was transformed into a substantial mill race, constructed in parts of timber, and in parts of brick. A large mill was built, also largely within the former moat, immediately to the south of the bridge that was built in about AD 1500. It seems that the bridge was probably retained, though it may have been buried under the new rampart/bastion. Certainly it seems that north of the bridge, the mill race was placed underground, where it ran under the city defences before it seems to have connected into the newer moat (based on the AD 1624 Swedish spy map) , from where it presumably drew water. This mill appears to have been in use for about 60 years, before it was decided to alter the western boundary yet again. Consequently by the end of Phase 5 the mill had been demolished, and some of its structural material removed for use elsewhere. Both its' footprint and the millrace were completely filled in with urban refuse which seems to have been taken from around the city, making way for a final vast phase of reconstruction of the city's western defence.

The construction of the mill and associated works would have been organised centrally, probably by the king, or by his administration, requiring significant planning and organisation, and a large expenditure of labour, time and money. Christian IV, king from AD 1596 to 1648, was known for his large-scale construction projects, including significant re-workings of the urban defences, and the erection of such buildings as Rundetårn (Round Tower observatory), Børsen (the stock exchange) and Holmens Kirke, that still stand today. He also commissioned the construction of the entire Christianshavn suburb; so the works by Vesterport were relatively small by comparison.

The presentation of the features and finds from this phase will be divided into the different feature types as outlined above, beginning with the larger infrastructural type features, such as the mill and mill-race, which will be discussed together under the heading 'Land-use Change'. Thereafter the later evidence such as the filling up of the mill and mill-race/moat will be discussed under the heading 'Deconstruction as Construction', and all remaining features under the heading 'Other features in Phase 5'.

Land-use Change

Introduction

In Phase 5 of the site (c. AD 1600 – 1670) a series of successive alterations were made to the inner city moat by Vesterport and in its environs, including its decommissioning – first as a moat, and then as a millrace. These alterations will be outlined in the following sections.

The inner moat partially backfilled

Group	Subgroups	Context types
(300)	455 (323, 335, 344)	Moat backfills and alluvial deposits, stakeholes, wooden structure (dam)

Table 46 Inner moat backfills related groups and subgroups

A series of deposits and structures (Subgroup 455) were recorded within the deeper part of the former medieval moat, which have been interpreted as pre-mill backfills, some at least which may have been placed deliberately to prepare for the construction of the mill. Some of these have been interpreted as being alluvial in nature (Subgroup 344), and hence may have built up naturally within the moat. The first mentioned group of deposits were located within Areas 3 and 4, to the northwest (and upstream) of the former mills location (and under the arch of the former third bridge), and were also located along the moats eastern edge, presumably under the former moat building. The deposits stretched across an area of some 25 m (northwest-southeast) x 11 m (northeast-southwest). A large amount of this material would have been removed by the placement of the underground toilet building in the 1940s.

A number of samples were taken for finds and environmental information. From the analysis it was seen that several weed species were seen in these layers; nettle, buttercup and goosefoot. A wide range of finds material was retrieved, including ceramics (Late Redware, faience, Early Redware, Early Greyware, Baltic ware, stoneware and Jydepot) metal finds (a padlock, musket balls, and possible chain mail fragments), flint and bone. The ceramic assemblage suggests that the layers are quite mixed, with a mixture of material of different ages being deposited, which would support the idea of a deliberate dump of material brought in from other locations.

These deposits (Subroup 455) have been interpreted as representing a series of dumps into the moat, prior to the construction phase of the mill. In fact it is presumed that the deposits were dumped here in order to raise and level the moat base to enable construction to take place. This would suggest that the layers were deposited by about AD 1600. The finds assemblage is in line with this dating.

The more alluvial type deposits (Group 344) were located in the southern half of Area 3, within the medieval city moat, and spread over an area measuring some 12,5 m x 15 m. They consisted primarily of silted deposits and some associated structures, including two stakeholes (Subgroup 323) and a wooden dam structure (Subgroup 335). The deposits spanned across the base of the moat. It is likely they were largely truncated by the toilet building to the north, though some of these layers may have survived underneath. If so, this may be seen in the final phase of work at RHP when the area within the station walls is excavated under the station roof. The stakeholes are both isolated, and very little can be inferred about their function.

Analysis of the ceramics found in this Group show that there is a wide range of pottery dates represented, from high medieval through to about AD 1600. These are mixed within the same layers in most cases, showing that the layers are relatively late, and that the material has been either churned up in situ (due to water action) or originated in different places. There is one exception. The stratigraphically deepest layer contained a few high medieval sherds, and no later material, showing that this layer could potentially be an in situ medieval layer without later contamination. This group dates to about AD 1600, based on a dendro date returned for Subgroup 335, and on the finds assemblage – though as has been noted, the deepest layer may in fact be medieval. Given the general date range, this subgroup has been related to Subgroup 455, as it only predates the mill construction by a short time.

A wooden dam-like structure (Subgroup 335) was located on the eastern edge of the moat within Area 3, running down the side of the moat towards its centre. It was in reasonable to soft condition; good enough to allow a sample to be taken for dendro analysis. It consisted of a single plank of pine and two stakes (Appendix 4). It was orientated in a north-east to south-west alignment with the plank resting at approximately 20 degrees on the stakes.

Subgroup 335 has been interpreted as a possible dam structure. Its precise purpose is unclear, but it may have acted as some form of water control, presumably in connection with the mill which seems to have been constructed at about the same time. One possibility may be that it was placed here to keep water out during the construction phase of the mill building – hence it would only have been built as a temporary structure, and would just predate the mill. While there appears to have been various attempts at water management or erosion prevention, this was the only structure of its type and orientation found during excavation. Dendrochronological dating of one sample from this group has returned a date of AD 1605 (Appendix 4). This shows that it is broadly contemporary with the first phase of mill construction.

The outer fortifications altered (the Christian IV era)

Group	Subgroups	Context types
118		Moat fills, re-cut
119		Moat fills, re-cut, timber structures
128		Moat fills, re-cut
129		Moat fills, re-cut
162		Cut and dump deposits
349		Cut and fill
350		Cut and fill
353		Cut and fill

Table 47 Outer fortification related groups and subgroups

Located in Area 2A to the east of the outer gate, a cut and a series of deposits (Group 118) were interpreted as a reworking of the moat in the region of the outer gate.



Figure 113 Group 118 seen from above

It appears that originally the moat was designed to run past the gate to the east for some distance before heading towards the sea. At some point, much of this area was filled in, and a new 'edge' was created much closer to the gate, where the moat turned southeast toward the sea. This new edge was moved and readjusted a number of times (see below). This reworking seems likely to have coincided with some renovations to the gate facade. It is considered most likely that this 'cut' or edge was formed during the reign of Christian IV, possibly about AD 1600 or soon after, when the king had a lot of renovations done to the fortifications. This reworking of the moat in this area seemed to have a few phases, possibly as the builders were not happy with the first versions. This is the fourth (and final) such re-working as identified on site. As well as some alluvial deposits that formed naturally in this moat, some deposits have been included in this group which may relate more to the backfilling of this area in the 1660s, when this moat was decommissioned. This is not certain, however.

Located in the same part of Area 2A, a cut and a series of deposits (Group 119) have also been interpreted as a reworking of the moat in the region of the outer gate. As with the group above, this is likely to date to about AD 1600 or soon after. This was the third recognised phase of reworking of the moat and rampart.



Figure 114 Group 119 seen from north

As well as some alluvial deposits that formed naturally in this moat, timbers or timber sockets have been included in this group which may relate to the strengthening of this rebuilt moat edge. These large timbers had lain horizontally, and it is likely they were placed here to stabilise the deposits that had been used to fill up the moat to the east of this new edge. This cut has been interpreted as coinciding with the addition to the outer gate of a yellow brick buttress (Group 110) at its east corner.

Located slightly further east, a further cut and its backfills (Group 129) predated both the re-workings outlined above, and testify to the frequency that this area of the fortifications was altered and reshaped. A large amount of Late Redware ceramic sherds were found associated with this phase of the moat.

Located in almost the same place and with a similar layout to Group 129, another cut and its backfills (Group 128) were recognised as the first re-working of the moat in this area. As this is the first re-shaping, it must have been at this time that the majority of the moat east of this cut was filled in; in fact it is the edge of this backfill that in reality forms this 'cut'. The reshaping is also thought to likely be related to Christian IV's improvements of the fortifications. Hence, all four re-workings (Groups 118, 119, 129 and 128) are thought to have been carried out in a relatively short period of time, perhaps within a couple of decades or less, presumably from AD 1596 and onwards, when Christian IV took effective control of the state. The backfills of this 'cut' are in a sense likely to date to the formation of the next cut (Group 129), and so on. A few ceramic sherds were recovered from these deposits, mainly post-medieval Late Redware, but these do not help to date the deposits more precisely. Overall Groups 129 and 128 are most similar, while the change to Groups 118 and 119 was more pronounced.

Located just northwest of the outer moats innermost area in Phase 2B, a cut and a series of dumped deposits (Group 162) were documented, which appeared to post-date the backfilling of this part of the moat (in about AD 1600). How long after is uncertain, but the aim appears to have been to level out the wider area. Finds recovered were dominated by Late Redware sherds, and it must be assumed that these deposits were laid down sometime in the 17th century, quite possibly during the large scale preparations for the construction of the youngest fortifications to the west in the 1660s.

Three further phases of more minor remodelling of the moat close to the outer gate were observed (Groups 349, 350 and 353). It is not entirely clear what the purpose of this work was, it may simply have been a final attempt to renew the area around the outer gate prior to its decommissioning.



Figures 115 and 116 Two plans of the western gate area as drawn between AD 1647 and 1649 (Lorenzen, 1930 map XII and XIII)

Two maps from AD 1647-49 (Figures 115 and 116) depict planned changes to the fortifications around Vesterport. Based on what was seen at Rådhuspladsen, most of these changes were never made in the area of the western gate. However, the maps are useful in that, based on what was seen at Rådhuspladsen, they seem to depict quite accurately how the outer gate area looked at that time. It can be seen that the area in front of the outer gate appears to be dry at this stage, and it may be that it was prone to silting up and was an ongoing problem. This could explain the repeated re-workings seen during excavation in the area of the southeast corner of the outer gate, the various changes outlined above.

The mill

Group	Subgroups	Context types
300	263, 265, 295, 296, 305, 365, 366, 372, 455	The overall mill structure – main subgroups listed

Table 48 Mill related groups and subgroups

Placed within the former moat in Areas 3 and 4, various contexts were identified which have been interpreted as representing the remains of a mill, previously seen in the 1940s during the ground-works for the underground toilet, and also known from historical references. The mill (Group 300) was made up of several Subgroups as well as individual contexts. The 18 Subgroups formed a range of different elements of the mill building, such as construction levelling layers, structural timber elements, brick and stone structural elements, usage deposits, deconstruction elements, and deconstruction deposits including rubble. The remaining contexts were mainly construction cuts. Overall the structure measured 25,6 m in length (northwest-southeast) and 5,75 m in width (northeast-southwest), though the original measurements of the structure are likely to have been ca. 26,5 m x ca. 20 m wide (the entire western side of the building had been removed by the construction of the underground toilet building).

Several different cuts, all of which are made into the natural clay, formed various parts of the construction cut for the mill building. One main cut for the building was identified, comprising a large horizontal scarp cut into the natural clay to receive the majority of the mill construction. A separate cut was seen which acted as the foundation cut for the eastern wall of the mill, and ran along the eastern edge of the main cut. In effect these could be seen as one cut, or a cut within a cut, but it is likely that the overall excavation was made first, and then the wall foundation cut was made within it. Another foundation cut was seen for the northern wall of the mill. A pair of cuts were identified either side of the brick stair case (see below), and appear to have been for the placement of two large foundation stones, presumably to carry the weight of the side walls of the stairs.

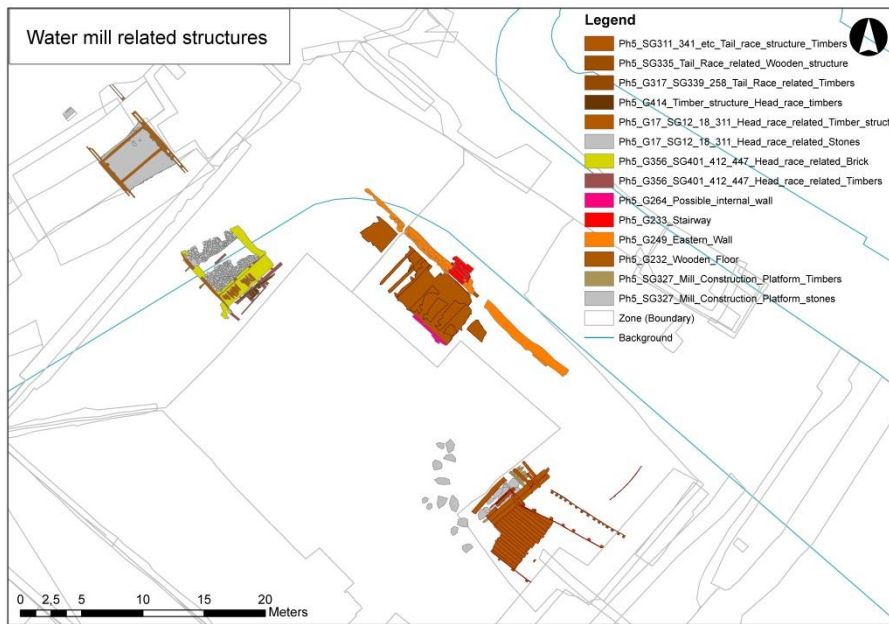


Figure 117 Plan of mill-related structures

Four shallow cuts made into the natural clay on the eastern upper edge of the main structural cut were very regular in form, and may represent a shallow foundation for a higher level of the mill's eastern wall. A narrow linear cut running along the base of the overall construction cut represented a shallow drain beneath the floor of the mill.



Figure 118 The northern end of the main mill cut post-exavation, seen from south

It was filled by an accumulation of material formed during the use phase of the building. Two cuts that formed parts of one structural foundation at the northeast corner of the mill building, based on their having a slightly different angle than the main mill wall, are likely to have been part of an extension to the main building, added on to its northeast corner. Located within the main construction cut for the mill, a wash of natural clay-like material may have accumulated either when the construction cut lay open during the construction phase or deconstruction phase of the mill.

The mill building (based on finds recovered and historical information) was probably built in the early years of the 17th century. Indeed thanks to the results of dendrochronological dating of several timber samples, it would appear that the mill was first constructed in about AD 1606 or 1607 (Appendix 4). While it is possible that an earlier mill may have stood on the same location, perhaps dating back to the 1500s, no evidence for this was recovered. It seems clear based on the available evidence (both artefactual and historical) that the building was deconstructed in the late 1660s or thereabouts. This deconstruction was done quite thoroughly, with much of the useful structural material fully removed. Regrettably, much of the surviving mill elements were removed in the 1940s, during an excavation for the placement of the underground toilet building. While there was an archaeological presence for the work, very little documentation was carried out, hence we really do not know the details of what was seen at this time, though a mill is mentioned.

It seems likely that the building remains seen in Area 3 and 4 were a basement, with steps leading down from street level. The presence of pieces of mill-stone supports the view that the building was a water-mill. The finds recovered from the main mill area are in line with a use period from about the late 1500s to the late 1600s, and as well as some mill stone fragments include coins and tokens, iron tools, a large assemblage of stove tiles, ceramics, glass and various other metal and organic objects.

Samples were taken from some deposits for environmental analysis, and dendrochronological samples were taken of various different elements of the mill building. These will be discussed in the following sections.

Main Construction elements of the mill building (Subgroup 296)

The main structural elements of the mill (Subgroups 232, 233, 249, 264, 327, 426) have been combined together for stratigraphical and organisational purposes as Subgroup 296, though these are part of Group 300 (Mill). These consist of the western wooden wall of the mill, the eastern brick and stone wall of the mill, the wooden floor of the mill, and the stairs leading into the mill. They will be discussed under separate headings below.

Foundation Cut

Group	Subgroups	Context types
(300)	296 (426)	Construction cut

Table 49 Foundation cut groups and subgroups

A linear construction cut (Group 426) was located at the south end of the toilet building cut, in Area 3. This cut was more or less at right angles to the eastern wall of the mill, and was c. 7 m in length. Its base was cut into natural, and had two of the massive mill-related timbers resting on it, and following its edge. Hence, on reaching the base of this cut it became clear that it was a construction related cut for the placement of the large timbers at the south end of the mill. Its lowest fill (a sticky grey clay) was also construction related, though it is possible that the secondary fill represents material that fell in during the deconstruction of the mill. This cut almost coincides with Group 250, but that is seen as a deconstruction related cut. It stands to reason however that the deconstruction of the mill wall would effectively overlap the construction of the same wall, and indeed it was difficult to tell where one cut ended and the next began.

Mill Construction Platform

Group	Subgroups	Context types
(300)	296 (327)	Stone and timber structure (platform)

Table 50 Mill construction platform related groups and subgroups

Subgroup 327 consisted of two courses of boulders which were bounded on their upper extent by two beams lying north-east to south-west and north-west to south-east. These would originally have been joined together, possibly with a peg. These beams were covered by steeply angled planks which appear to have been partly driven into moat silts below. These two visible sides of this structure form a rough right angle. The angled planks were then held in place by two cross beams.



Figure 119 The southern edge of the mill construction platform Group 327, seen from southeast

As relatively little of this structure was seen during excavation interpretation is difficult. It was initially thought likely that this group represented the construction of a 'ravelin' within the moat. However, dendro dating has challenged this view, as the timbers are relatively late. Therefore it is now thought that this structure represents a construction platform, placed here to form a solid base upon which to erect the mill building. As the structure placed on top (of a quite similar age) was somewhat different in form, it may be that an initial plan for the mill was altered during construction, and this structure is a remnant of the original design, reused as a foundation platform.

Dendrochronological analysis was carried out on 5 samples from this subgroup. The dates received varied from AD 1604/05 up to 1609+/-15. Two dates from AD 1606 may suggest the actual date of the structure, or perhaps it may have been constructed shortly after this, in AD 1607 or 1608 for example. The timbers were felled in either Østlandet in south-east Norway or Bohuslän in west Sweden, or nearby provinces (Appendix 4).

The wooden floor

Group	Subgroups	Context types
300	296 (232)	Wooden structure (floor)

Table 51 Mill floor related groups and subgroups

A wooden floor (Subgroup 232) was located within the mill building, along the eastern edge of the former city moat, and south of the former inner western gate. It comprised mainly of timber elements, joists and floor boards, as well as some deposits considered to be directly associated with the floor. It measured over 13 m in length, and some 4,4 m in width, but was somewhat irregular in shape. It can be presumed that originally the floor would have been rectangular, and considerably larger, but both due to modern and historical truncations as well as decay, only part of it survived.



Figure 120 Wooden floor Subgroup 232 in situ, with stairs Subgroup 233 beyond, seen from southwest

The timber floor had been constructed directly onto a flat scarp (see above) that had been cut into the side of the moat, and also resting on material piled into the lower part of the moat to form a continuous level platform. The joists were laid on this platform (running SW-NE), and then the planked floor was nailed on top, with the floor boards running NW-SE. It was made predominantly of pine, which had been felled in Småland in Sweden. On site observations made after the floor was removed suggest that it was not the original floor of the building, but a later replacement.

The joists, perhaps because they were laid directly on the damp clay, were quite well preserved, while the floor boards were quite soft, and had been compressed over time to a only a few millimetres in thickness. In one area a timber upright had been built into the inner face of the wall of the mill, that approximately lined up with one of the floor beams. This may suggest that the floor was physically connected into the fabric of the building at certain points. This connection did not survive though, as the floor had been ripped up next to the wall, at the time that the wall was robbed following destruction.

As a result of the differential preservation levels, it was mainly the joists that were sampled for dendrochronological analysis. A range of find material was recovered from Subgroup 232, including nails, a

coin, a token, a buckle, a stove tile, a thimble, a metal mount, a lead came, and some mortar fragments. The coin was a silver Christian IV 1 skilling from 1621, while the token was dated to 1588 (Appendix 22). These dates correlate quite well with the dendrochronology dates (see below).

This subgroup would have functioned as part of the floor of the mill itself. It dated to c. AD 1632. This is based on the dendro samples taken. In total 6 samples were analysed. 5 of these were dateable, and returned dates of between AD 1613 +/- 20 and 1632 +/-3 (Appendix 4). This floor is perhaps evidence for one of the final renovations carried out on the building, as we can assume from the dendro results that this was not the original mill floor, but a replacement made in c. AD 1632. There is some evidence that a structure predating the wooden floor was present on the same spot due to the presence of building rubble and structural cuts beneath the floor. These probably relate to an earlier floor within the same mill building.

The stairway

Group	Subgroups	Context types
300	296 (233)	Brick and stone structure (stairs)

Table 52 Stairway related groups and subgroups

A structure of brick and stone (Subgroup 233) was situated along the northeastern edge of the mill building, in Area 3. It comprised of a set of 5 steps, which lead from ground level down into the mills interior, to where the wooden floor was situated. It appears that this staircase was built directly onto the edge/cut of the main mill building.



The steps were constructed of brick, and were partially built into the fabric of the mills brick wall. Each flat surface (or stair tread) was overlain with a deposit of mortar c. 3cm thick, and this in turn had a timber tread placed on top, to form a walking surface. The overall dimensions of the steps were 2,1 m wide x 1,6 m long, with an overall height of c. 1 m. The brick stairs were integrated into the eastern brick wall of the mill, and as such must have been constructed at the same time, and is therefore integral to the building. The bricks it was constructed of correspond with the Renaissance form used from AD 1550 until 1898. The brickwork of the staircase was generally in good condition, and was still well bonded, particularly deeper within the structure. The wooden treads however were very soft. Consequently they were not sampled.

Figure 121 Brick and timber stairs Group 233, seen from south

While the upper level of the stairs was truncated when the mill was deconstructed, it does tell us where one of the mills entrances was, and that it lead down into the mill, a feature that seems to have been common in watermills from this era.

Eastern wall

Group	Subgroups	Context types
300	296 (249)	Construction cut, stone and brick structure (wall), deconstruction deposits

Table 53 Eastern mill wall related groups and subgroups

The main east wall of the mill (Group 249) was situated running NW-SE along the edge of the main construction cut, in areas 3 and 4. It comprised of a number of structural elements, a linear construction cut, some stone, brick, timber and mortar structural elements, and some possible deconstruction or packing material (mainly brick fragments). It was linear in form, measuring c. 22,5 m in length and maximum 0,77 m in width, with a maximum height of c. 0,7 m.



Figure 122 The remains of wall Group 249 being documented, seen from west

It comprised the partial remains of a wall of brick and stone. The base course or foundation was constructed of large uncut stones, with some crushed brick and stone packing. Above this the wall had been constructed of brick, but this survived only in isolated patches. In some areas only the construction cut and some rubble deposits remained. In one location a very decomposed timber upright was found built into the wall fabric (see above), with a horizontal timber piece resting beneath. This horizontal had originally extended out of the wall at floor level, but this part had rotted away. It may have functioned as a means of structurally tying the wall and floor structures together. Clearly the majority of the wall did not survive; this appears to have been both due to an initial phase of deconstruction, as well as a later phase of robbing of material.

Finds consisted of some nails and a scrap of leather within the packing material while two samples of brick were taken for identification, from the wall itself, and from the area of the wall beneath the staircase. This

structure (Group 249) has been interpreted as the northeastern wall of the mill building, part of the wall that stood in the lower part of the mill below street level. This is based on both form and location. The brick and timber stairs (Subgroup 233) was built into or integrated with this wall, and would in effect have lead through it. Its very partial nature reflects a deliberate act of deconstruction when the mill had gone out of use.

Possible internal wall

Group	Subgroups	Context types
300	296 (264)	Wooden structure (wall)

Table 54 Internal wall related groups and subgroups

Another wall (Subgroup 264) was located along the southwestern edge of the wooden floor (Subgroup 232) in Phase 3. It comprised of two related timber structures, a horizontal beam, and two uprights. It was linear in shape, measuring 3,7m long x 0,24 m wide and c. 0,3 m high. The horizontal beam was quite substantial, and had two large mortices cut into its upper side, to receive the tenons at the base of the two upright. The horizontal was somewhat soft, but in reasonable condition overall. Three of the horizontal beams that made up the wooden floor rested on the edge of this horizontal also. The uprights were in poorer condition, and were quite friable. They only survived to a maximum height of c. 0,2 m. It is not clear if this was solely due to rot, or if they had been deliberately broken/cut off in the past. There were no finds recovered from this subgroup, while one wood sample was taken. This was sent to a dendro specialist for dating, but failed to produce a date.

This structure (Subgroup 264) has been interpreted as the base of a wall, with the base timber acting as the sill plate/beam. What is less clear is whether it was an internal wall or an external wall, as the entire structure was truncated immediately to its west at the time when the underground toilet building was constructed, and consequently we cannot say whether the building continued to the southwest or not. Furthermore, as so little of this wall survived, it is unclear if it was a timber-framed wall with brick panels, or if it was made solely of timber (perhaps more likely). This wall is likely to date to the early 17th century. This is based on its association with the other elements of the mill structure.

Pre-construction of the mill

Group	Subgroups	Context types
300	295 (261, 262, 294)	Wooden stakes, levelling deposits

Table 55 Mill pre-construction related groups and subgroups

Some pre-construction preparations for the mill building (Subgroup 295) consisted of a levelling layer as a foundation for the wooden floor, and three stakes which were interpreted as being connected to the construction process. These were located within the area of the mill building in Areas 3 and 4, at a level below that of the wooden floor (Subgroup 232). They comprised of a number of horizontally laid deposits of CBM-rich soil (Subgroup 294), and three wooden stakes (Subgroups 261 and 262).

The deposits (294) were very find-rich, and contained large amounts of CBM, particularly brick fragments. In general this Subgroup was quite find-rich. It contained ceramics (Late Redware, late grey ware, stoneware and Jydepotte), glass (both drinking and window fragments), iron nails, slag, CBM (including

bricks, floor tiles and many stove tiles), window came, coins (where dateable, from between AD 1440 and 1513), glass linen smoother fragment, mill stone fragments, whetstone fragments, an iron knife with bone handle, and a cannonball. Overall, the finds seem to be consistent with a date in the 16th or early 17th century.

Subgroup 294 has been interpreted as a series of homogenous deposits, which appear to have been laid down as a foundation or levelling layer for the construction of the wooden floor (Subgroup 232), which it underlay directly. The frequent inclusions of CBM, window came and other building materials, may suggest that this deposit is made up of the remains of a demolished building, perhaps an earlier part of the mill itself. This subgroup dates to the 16th or early 17th century. This is based on finds recovered, as well as stratigraphy. If we presume that it related directly to the construction of the wooden floor that was recorded on site, then it dates to c. AD 1632. Of course it may have already been laid down for an older phase of the floor, in which case its precise dating is less clear.

The function of the stakes and stakeholes (Subgroups 261 and 262) remains uncertain, apart from suggesting that they may have related to the construction phase of the mill floor in some way. The former (Subgroup 261) was located in the area of the mill building in Phase 3, at a level deeper than the floor. It consisted of a pair of stakeholes 2 m apart, one filled with a deposit, and one with the decayed remains of a stake in situ. Both were small and shallow (at just 0,1 m). They were driven into the backfilled moat beneath the floor, as opposed to into the natural clay. No finds were recovered, and no samples were taken. These stakeholes have been interpreted as construction related stakeholes, though as just two were identified, the interpretation is tenuous. It is presumed that they were associated with the mill construction, and consequently they are part of Group 300.

Another stakehole (Subgroup 262) was located in the area of the mill building in Phase 3, also deeper than the floor. It consisted of a stakehole filled with a deposit of decayed wood. It was small and shallow. It was driven into a levelling layer beneath the floor, and was directly under the timber floor. Again we can suggest that it may have been related to the construction phase of the mill floor in some way, perhaps in conjunction with Subgroup 261, and as part of Group 300.

Further mill construction elements

Group	Subgroups	Context types
300	265, 372, 305, 326	Construction cuts, fills, construction deposits, backfills

Table 56 Mill construction elements related groups and subgroups

Some linear cut features (Subgroup 265) were located within the area of the mill building, beneath the wooden floor. A number of similar shaped and sized cuts were recorded running in a row aligned NW-SE, roughly perpendicular to the cut of the moat and also perpendicular to the brick mill wall. These may have held timbers as part of an earlier construction than the wooden floor above, or indeed connected to the working elements of the mill in some way, perhaps containing horizontal wooden beams that would have extended out into the moat or mill pit. Individual cuts measured typically 1,1 m x 0,45 m, and were 0,2 - 0,3 m deep.



Figure 123 Linear cuts Subgroup 265, seen from southwest

No timbers remained in situ, and the fill of the cuts is likely to have accumulated here when the beams were removed – presumably when the mill was demolished, or when the final floor was built. Finds recovered included a possible chisel, some nails, a stove tile and a piece of slag. These features may represent some evidence for the structural make up of the working section of the mill.

A series of three small shallow cuts (Subgroup 372) were located in the northern area of the mill floor, on a northwest to southeast orientation. They were filled with an organic deposit and sealed by a small demolition layer. The three cuts were all contained within a shallow depression or cut made into the natural clay beneath the mill floor. These can be interpreted as a series of shallow postholes or post pads and demolition material associated with it. One fill contained a high degree of organic material, possibly derived from a partially decayed post. The postholes appeared to be too small for structural timbers, unless simply to act as footing recesses for stabilizing some kind of props or uprights associated with internal elements of the mill building. Some Late Redware ceramics were recovered from this Subgroup.

Two substantial deposits (Subgroup 305) were placed in the moat cut in Area 3, which appear to have been deliberately placed here prior to the construction of the mill floor. In preparation of the area for the construction of the mill, part of the slope of the moat-side was dug away to create a level scarp, and the natural clay acquired in doing so was then used to fill up the lower part of the moat adjacent, to continue the flat platform of the scarp outwards and hence enlarge the space for the mill floor. Consequently these deposits are largely sterile in nature, with few finds recovered. The finds that were retrieved included an iron bucket handle, animal bone and some sherds of Late Redware and stoneware.

This group is likely to date to the early 17th century, or perhaps late 16th century. This is based on the available information regarding the mill by Vesterport, as well as the dendro dates obtained from the various mill related structures.

Located at the southeastern corner of the mill building in Area 3, a large cut (5,5 m x 2,75 m) and seven deposits were recorded (Subgroup 326). The cut appears to represent the construction of some sort of structure.



Figure 124 Construction Subgroup 326, seen from northwest. Post-excavation.

Due to a high level of truncation the full extent and the purpose of the structure are unclear, however, it does align with the 'mill' building to the NW. The southern edge of the cut also appears to align with a short section of wall which was recorded in-situ further to the west. The cut was difficult to see during excavation due to the truncation of the toilet building, and the similarity of the deposits either side of the cut. The precise extent of the southeastern corner of this cut is unknown due to truncation by a large pit (Group 222).

A mortar deposit lined parts of the southern edge of the cut, and may be evidence for a former wall set within this cut. Further mortar deposits spread across most of the base of the cut, and have been interpreted as a possible floor or floor foundation layer, though it could perhaps have been demolition residue.

The fills gave little indication as to the purpose of this structure, though it seems likely that it would have been part of the 'mill' building somehow. The upper fills were late 17th century in date based on finds (e.g. Late Redware pottery, window glass, CBM, wooden loom part) and were very similar to all the other general waste backfills used to fill the moat and the void left by the mill building to the north. This gives a presumed demolition date for the structure in the late 17th century. If this was part of the mill building, then this area seems to have been slightly deeper/lower than the rest of the building. This might have been for structural or functional reasons.

Various posts, postholes and stakeholes

Group	Subgroups	Context types
300	263, 323, 365, 366,	Postholes, stakeholes, fills

Table 57 Various post and stakehole related subgroups

A single posthole and its fill (Subgroup 263) was located adjacent to the stairs in the mill building. It may have related somehow to the workings of the mill mechanism, or simply have held some structural element, perhaps during the construction phase of the mill. No finds were recovered, and no samples were taken.

Two possible postholes (Subgroup 366) were seen in the base of the construction cut for the northwestern wall of the mill in Area 4, and were probably contemporary with it. These may have been dug to take upright timbers within the wall though no obvious pattern formed.

A single posthole (Subgroup 365) was seen which appeared to pre-date the mill building, but could possibly have been associated with its construction. It was located northeast of the northwest corner of the mill and appeared to have been truncated by the mills' foundation cut. Finds consisted of two sherds of Late Redware and Late Greyware ceramics.

A small stakehole (Subgroup 323) was located within the south end of Area 3, on the eastern edge of the base of the moat. It consists of a single isolated stake or posthole and its associated fill. As this subgroup consists of a single isolated feature, interpretation is difficult. It can be viewed as possibly being part of revetment Group 344.

The mill race

Located both northwest and south east of the mill itself, substantial parts of the mill race – or head race and tail race, were found during excavations in Areas 3 and 4. The head race is the part upstream of the mill wheel – at Rådhuspladsen this was the part to the northwest of the mill; while the tail race is the part downstream or after the mill wheel – at Rådhuspladsen this was the part southeast of the mill. The various parts of these structures will be outlined in the following sections.

The overall mill race (head race and tail race together) has been grouped together as Group 17, which has several Subgroups (12, 18, 311, 340, 341) and related groups such as 356. Group 17 includes both the wood and brick built head race that lead the water into the mill from the northwest, and also the timber built tail race that the water flowed through once it departed the mill, exiting in a south-easterly direction towards the harbour. Its various elements will be discussed here in their separate subgroups.

The head race

Group	Subgroups	Context types
17	12, 18, 311	Timber structures, stone structures, brick structures, clay and organic deposits

Table 58 Head race related groups and subgroups

The main head race structure was itself largely described within Group 17, as well as Group 356. This structure was first seen in a watching brief trench Z 6326 just northwest of Area 4, and later in Area 4 itself. It was found to be rather different in each of these areas, though it should be said that it was not fully excavated in the watching brief trench. It would ultimately be seen that the headrace had a number of phases, which did not operate at the same time, but rather superseded each other. Due to the complexity of the structure, it will be described as it was excavated, with the later phase being described first.



Figure 125 Mill head race Group 17, seen in Trench Z 6326 from southeast

In Z 6326 the head race was seen as a large wooden structure c. 5 m in width and 1,25 m high, with a base of stones set in clay (See Figure 125). The overall length of this structure as seen across the trenches was c. 39 m. The walls of this structure were composed of squared timber uprights, sandwiched between two planked faces, the inside one of which was waterproofed with felted textile along its joints. Between the two planked leaves or faces of the walls sand was packed, presumably to add to the structures water-tightness. The base was comprised of large timber cross-beams at regular intervals, with the spaces in between packed with large stones set into sticky clay. This arrangement was probably both waterproof and very unlikely to come apart.

Each wall was about 35 cm in width, and the space between the two walls was 4,25 m. The walls survived to a height of 1,25 m, though it seems likely that they were originally taller. The base of the head race was c. 2,25 m below present ground level, and at a height of 4,22 m above sea level. The section seen in Z 6326 was filled up mainly with lensed sand to a depth of c. 0,7 m, sand which was clearly water deposited. Some more organic layers were found over this (Subgroup 12), and produced a number of 17th century finds, including leather, wood and ceramics, as well as a Swedish coin from AD 1630. These upper layers likely date to when the mill and hence mill race were abandoned/decommissioned in the 1670s or so.

About 3 m to the northwest a small trench was opened as part of the contractors work, and here a further section of the mill head race was seen, though in this location it was in the form of a brick vault of red bricks (Subgroup 18). Today this passes under the street, but when it was constructed originally, it may have been passing under the city rampart, hence the need to be built in brick instead of wood. As the trench was very small, very little more can be said about this part of the structure. It could be seen that its southern end had been bricked off at some point with a wall of yellow bricks, presumably after the mill went out of use.

Approximately 6 m southeast of Z 6326, the head race (Group 17) was seen again in Area 4. Here the excavation was to go to full depth, so a more thorough examination of the structure was possible. The upper part of the head race was found to be very similar to what was seen previously, with a wood-walled

structure with a base of stones set in clay. In this area the structure was placed inside the former arch of the brick bridge described in Phase 4, so that the water for the mill ran through the bridge on its way to the mill. It is possible that the top of the arch was already removed by this time, but it is not a certainty.



Figure 126a Upper part of mill head race Group 17 seen in Area 4, seen from northwest. Note concrete service truncation.

The dam and earlier sluice structure

Group	Subgroups	Context types
356	406, 412, 447	Brick and timber structures, various deposits, foundations
413		Dump deposits
414		Timber structure

Table 59 Dam and earlier sluice related groups and subgroups

At its south-eastern end a further element to the structure was seen, in the form of a brick-built wall that ran across the width of the head race, with timber planking placed on top. The top of this wall was barely higher than the base of the head race however, at 4,42 m above sea level, so it was apparent that it may have related to an earlier version of the head race.

It appeared though that once the water crossed over the top of this wall it then dropped down vertically, presumably on its way to the former mill wheel, and so the drop was presumably required to speed up the water to create more force when it went through or over the mill wheel. It would have fallen to a height of c. 2,6 m above sea level to the southeast of the dam, or a fall of c. 1,8 m. It also seemed that some of the water may have been diverted through narrow slots in the wall just beneath the timber planking, again presumably for reasons related to the mill wheel (see image below).



Figure 126b Brick wall, capped in timber, and slot for water (Group 17), all placed within the bridge arch. Seen from southeast

Upon removing the stone and clay base of the structure, it was discovered that under the wooden side walls there were yellow-brick built walls continuing downwards, of a construction-type similar to the wall crossing the head race, and indeed these three walls appeared to have been built as one. It was not clear why the side walls were necessary, as they were placed directly against the brick and stone walls of the bridge wall. Either it was to guarantee the water-tightness of the channel, or to maintain the width of the head race, perhaps to maintain the pressure or speed of the water flow. At this point it was realised that we were seeing an earlier phase of the head race, and so each of the brick walls above and the other elements of the structure that would be seen were recorded as a separate group, Group 356.

This structure (Group 356) consisted of a large number of construction elements including rubble levelling and foundation layers, brick walls and wooden structures as well as some silt deposits possibly relating to its usage phase and some demolition deposits directly related to the Group. These latter layers included several dumped layers of material which were placed within this structure to fill it up to the level of the stone and clay floor (Group 17), and in doing so deliberately decommissioning Group 356. The structure (356) was constructed on rubble levelling or foundation layers. On top of these foundations the brick walls were constructed. The parallel side walls were constructed against the exposed faces of the bridge as outlined above, on a northeast to southwest orientation, and the cross-wall ran at 90 degrees to the side walls, linking the two and forming a dam in the head race.

Down the centre of this defined area between the walls, ran a narrow timber-built sluice, measuring c. 0,9 m in width and c. 0,6 m in height, and which passed through the dam. This sluice was constructed of pointed wooden uprights that were driven into the ground, with horizontal timbers connecting them in pairs. The remainder of the structure had been removed, but its original form could be seen where it passed through the brick cross-wall or dam. Here it was more intact, and it had heavy wooden planks lining its base and sides, and also the top of the sluice, so that it was completely boxed in originally. Rubble

material topped with sticky clay had been deliberately filled in around the sluice, between it and the head race walls, up to the height of the top of the sluice, and then sloping upwards slightly upwards to where it met the brick head race walls (see photo below).



Figure 127 The lower sluice element of the head race exposed within the bridge arch. Seen from NW

When the sluice was intact it would have been possible to close it off, allowing the water in the upper larger part of the head race to fill up to the top of the dam, where it would then spill over the top of the wall, and enter the mill from a height.

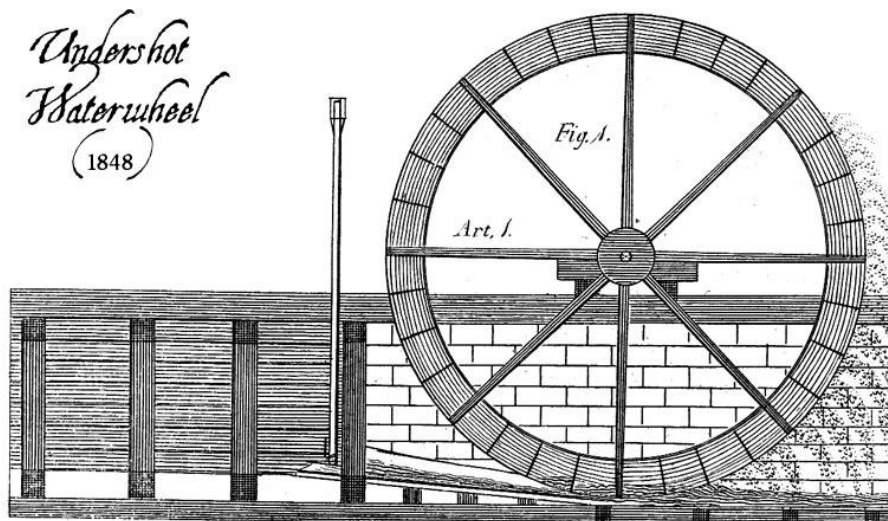


Figure 128 A depiction of an undershot millwheel from 1848 (http://www.engr.psu.edu/mtah/essays/threetypes_waterwheels.htm)

On opening the sluice, the water built up in the upper area would presumably be forced through the sluice with some force in a smaller jet, in order to power an undershot mill wheel. It seems that this system was not satisfactory however, and so at some point the narrow sluice was largely dismantled as we have seen.

The opening in the dam was blocked with two upright planks, and the head race back-filled up to the level of the top of the dam, with the addition of the new stone and timber head race base. It is worth noting that the height difference between water flowing over the dam or flowing through the sluice was quite significant, at 2,4 m.

Several elements of the head race structures were dated using dendrochronology. Based on three samples that could be dated, it is apparent that the lower sluice structure must have a construction date no earlier than AD 1620, and probably not much later than AD 1630. The upper larger and stratigraphically later head race, had timbers with possible date ranges from AD 1624 to 1693, but taken as a group, they appear to point to a construction date as late as AD 1664 or just after. This suggests a relatively short life-span for the earlier sluice-based head race of just 30 to 44 years. It also suggests that there was a significant attempt to improve the mills effectiveness almost immediately before it went out of use, which suggests either that the plan to upgrade the city's defences was conceived and implemented quite rapidly, or simply that those who ran the mill were not aware of these plans and were allowed to waste time and money upgrading a mill that would be dismantled within about 4 to 10 years.

Immediately southeast of the dam structure a number of structural elements were seen, though these were very partial due to the close proximity of the toilet building construction cut. In the narrow space (c. 1 m) between the dam and the truncation, several timber elements were documented, which appeared to have been leading water from the dam onwards at a lower level and presumably in to the mill.



Figure 129 Timbers seen at the southeast side of the dam, leading towards the mill wheel

Some of these were substantial structural pieces with large mortices to take tenoned uprights, some of which also survived. It is possible, perhaps likely, that these timbers were in fact parts of the actual mill itself, and were in fact located just at the edge of the mill building, potentially very close to where the wheel would have been mounted. A number of dates were retrieved from these timbers, ranging from AD 1612 up to as late as (potentially) AD 1688 (Appendix 4). Taken *en masse* however, it would appear that the structures in question were first constructed between about AD 1605 and 1610, with various repairs carried out intermittently up to about AD 1660; another of words, throughout the working life of the mill.



Figure 130 The lowest timber elements southeast of the dam (Subgroups 412 and 356)

Some further timber structures (Subgroup 412) were seen on this side of the dam, which seemed to have linked with the timber sluice, and had again been truncated by the toilet building construction cut. These formed a further narrow sluice, some repairs and associated structural timbers, and are clearly part of the same water-management system as Subgroup 356. One date was retrieved from this structure, and that was from AD 1531, but it is likely that this piece was a reused element of an older structure and as such this date is considered unlikely to be an indicator of the true age of this structure (Appendix 4).

A brick structure (Subgroup 447) was located at the southeast of Area 4, at the junction of the head race and the mill, and abutting the late medieval bridge. It was comprised of an irregularly shaped pillar or buttress of bricks, that was built around the corner of the late medieval bridge. It is considered most likely that it related to the millrace, which entered the mill having passed through the bridge at this location. Whether it was mainly part of the wall of the head race, or in some way a support for the bridge arch, is somewhat unclear. It may be that it functioned as both simultaneously.

The structure survived quite well, but was somewhat crumbly and loose at the 'front' nearest where the mill would have been. No finds were retrieved, and no samples taken. The structure likely dates to the early 17th century, as with most of the mill-related structures. It has been related to the mill head race.

A layer of silting in the form a sandy clay deposit (Subgroup 406) was observed southeast of the dam and within that part of the sluice that was within the dam wall (southeast of the timbers that blocked the sluice). This layer must have built up after the sluice was blocked up, probably caused by fine sediments washing through cracks between and around the planks that blocked the sluice. Hence it probably formed between AD 1664 (when the upper head race was constructed) and AD 1668 when the mill appears to have been closed down. It produced just one find, a fragment of stove tile, and can be seen as evidence for the abandonment of the lower timber sluice construction.

A possible late phase of the water channel (Subgroup 414) was recorded southeast of the dam. This seemed to be placed over deconstruction backfill Subgroup 413. Group 414 was composed of several planks roughly laid horizontally over beams and posts which belonged to the earlier water channel Group 356. It has been interpreted as a crudely constructed water channel post dating Group 356, though it is possible that it could also represent a collapsed upper element of the main structure (Group 356).

It is unclear which groups are associated with this structure. It is possibly related to a phase of activity associated with Group 356 but post-dating the use of the water channel through the sluice in the dam. However it might also be related to the later water channel Group 17. It is very likely that Group 414 relates to Group 413. This comprised of a series of dumped deposits, overlying Group 356, and underlying Group 414. It has been interpreted as either representing the deconstruction of the original channel (Group 356) or as the foundation deposit for Group 414. It may be that it should be seen as both simultaneously. Both Groups 413 and 414 are likely to date to the mid to late 1600s, perhaps between AD 1650 and 1665.

Two points should be made regarding the head race structure. It was quite clear during excavation that the upper head race and the lower sluice did not and could not have operated at the same time. The lower sluice had clearly been dismantled and filled in, along with the walled head race channel above it, prior to the construction of the upper head race; in fact this backfill formed the foundation for the base of the later headrace. It is also worth mentioning that the entire structure, or at the least the upper later version, was placed in a cut made into moat backfills, implying that the moat, in this area at least, was filled up prior to AD 1664, and possibly prior to AD 1630 (the latter date would be considerably earlier than further southeast, downstream of the mill).

Tail Race related structures

Group	Subgroups	Context types
259	272	Cut and deposits, timber structure (post)
317	339, 258	Timber structures, posthole, deposits
318		Deposits (surface)
338		Deposits (surface)
343		Deposit
(344)	335	Wooden structure (dam)

Table 60 Tail race related groups and subgroups

A structure understood to be a revetment (Group 317) was located along the eastern side of the former medieval moat in the southern half of Area 3. It comprised of a stout timber structure of large upright posts (about 15 degrees off vertical) and horizontal planks, a construction cut for its placement, and a series of deposits which were upslope of or behind the revetment, both dumped into the construction cut, and overlying it.

The group extended beyond the trench to the southeast, and was truncated to the northwest by the toilet building construction. It was nearly 11 m in length as exposed, and including the deposits it measured c. 6 m in width. The upright posts themselves were quite massive, measuring c. 25 cm x 25 cm in section, and on removal were seen to be c. 4 m in height (as they survived). They had been driven into the ground, deep into the natural clay, and were placed quite close together (c. 0,28 cm apart). This combined with the thick sturdy planks placed behind it, suggests that the structure was built for strength.

One posthole-like cut (Subgroup 339) was recorded around one of the large uprights, but given the depth of the posts, this cannot have had anything to do with the placement of the post. It may be that it formed naturally through water action.



Figure 131 Revetment Group 317 (left), seen from northwest (see also Figure 133)

The revetment structure overlay the early alluvial fills of the moat (Group 344). The north-eastern side of these posts were clad with overlapping horizontal planks. This was followed by the placement of a series of dumps and backfills, such as Subgroup 258 and Group 343 (see below), an external surface construction stratigraphically post-dating the construction of Group 317 but most likely sharing a contemporary phase of use. Finds from these deposits included ceramics, iron, glass, horseshoe, whetstone, barrel hoops/staves, slag, clay pipes, knives, a cannonball, and a possible millstone fragment. The finds assemblage is consistent with a date of the late 16th/17th century.

Of 3 dendro samples taken unfortunately just one, from the planking, returned a date. This was to AD 1616/17 (Appendix 4). The planking may of course have been replaced more often than the upright posts, so it may be that the overall structure is somewhat older than this date suggests. It is perhaps likely that it dates to about the same time as the original mill, to c. AD 1606. It is not clear if this structure for a time formed the actual edge of the tail race along its eastern side, or if perhaps it was built to allow for the construction of the lighter canal/tail race structure (Group 341) to its west, retaining the clay and soil dumps of material which had been dumped in to the moats eastern side, to narrow down from a moat to a mill race. In this scenario, it was built to form a safe construction area for the actual mill race.

A large deposit of sterile sandy clay (Group 343) was located in the east side of Area 3, and seems to have been placed here around the same time as the revetment (Group 317) was constructed. It may be that the revetment was placed here to retain this material, though some of it later washed out beyond the revetment. This deposit (and one associated post) is likely to have been placed here as part of the narrowing of the former moat, in order to transform it into a mill tail race. As this material was quite sterile, it may originally have formed part of the medieval rampart inside the moat, which would have been taken

down as part of the rebuilding associated with the construction of the mill and mill race, and the placing of the new moat further out than these various structures.

A metalled surface or walkway (Group 338) located in the south-eastern corner of Area 3, was presumably laid for access to the tail race from street level. This group consists of a shallow cut into which a mixture of stone and CBM was deposited. Modern truncation destroyed the central part of this surface, while to the north it was truncated by Group 258 (see below).

Another walkway or external surface (Subgroup 258) was located along the east side of the former medieval city moat, south of the mill, in the southern part of Area 3. It extended beyond the trench to the southwest, and it seems likely that it would have lead gradually up the side of the moat/tail race to street level. This surface was bound on its western side by the revetment structure Group 317. It measured 10,5 m (exposed) by 7,8 m.



Figure 132 External surface Group 258, seen from west

This subgroup represents a walkway down into the tail race associated with the mill. It truncated an earlier walkway Group 338 to the east, and could therefore represent a re-modelling of the access to the millrace, although the purpose of this re-modelling is unclear. It appeared to end at the revetment Group 317, which during the use of Subgroup 258 possibly formed the edge of the mill race. It may be that it was first used as an access to the edge of the revetment during the construction of the mill race and mill, though it appears to have been used for some time after this also.

Finds from the backfills in this group (Late Redware, Jydepot, stoneware, late light fired, knives, flint flakes, clay pipes, glass, stove tile, thimble, buckle, musket ball, Christian IV coin) indicate an early 17th century date, which would be contemporary with the construction of the mill. Finds from the surface itself suggest an early to mid-17th century date, and suggest that this walkway was in use potentially up until the mid-17th century, from c. AD 1600.

A further pathway or walkway (Subgroup 318) was seen at the eastern edge of Area 3, just to the north of Subgroups 338 and 258. This was very partial, having been truncated to a high degree. It was cut into the natural clay, and had a metallised surface comprised of pebbles. Finds from its backfills were similar to the other pathways (above), Late Redware and clay pipe fragments were most common, and suggest a date after AD 1650. It is likely that this feature is related to (or perhaps part of) Group 338 or Subgroup 258.

A possible water-channel or walkway (Group 259) consisted of a U-shaped cut initially heading northwest to southeast then turning to a northeast to southwest direction at its southern end. It is thought likely that this feature was a drain or water channel related to the tail race of the mill, or perhaps the mill itself. Another interpretation could be that the cut is related to drainage off the ramparts, but this is less likely. The dating of this group is unclear, but based on stratigraphy it is probably 16th or 17th century. The deconstruction phase of this group appears to be contemporary with the closing down of this area in the mid-17th Century.

A timber post (Subgroup 272) has been viewed as part of this group. It has been interpreted as a large timber post construction, though its function is unclear. Its position on the edge of Group 259 suggests a connection with this group, though it is not a certainty. The substantial post was tapered at the end, and seems to have been driven in to the natural clay on the edge of the water channel Group 259.

A wooden dam-like structure (Subgroup 335) was located downstream of the mill, on the eastern edge of the moat within Area 3, running down the side of the moat towards its centre, and measuring 3,85 m in length, and c. 0,5 m in height. It was in reasonable to soft condition, solid enough to allow a sample to be taken for dendro analysis. It consisted of a just single plank and two stakes. It was orientated in a northeast to southwest alignment with the plank resting at approximately 20 degrees on the stakes.

This structure has been interpreted as a possible dam. While there appears to have been various attempts at water management or erosion prevention, this is the only structure of its type and orientation remaining in the former moat. Its precise purpose is unclear, but it may have acted as some form of lightly-built water control/dam structure, presumably in connection with the mill which seems to have been constructed at about the same time (though it occurs downstream of the mill, but c. 1 m higher above sea level than the water as it exited the mill. Alternatively, it might have functioned as a border to a path or similar. The stratigraphic position of this subgroup, overlying alluvial Group 344, is comparable with the revetment Group 317. They can be interpreted as broadly contemporary structures.

Dendrochronological dating of one piece of this group returned a date of c. AD 1605 (Appendix 4). This shows that it is contemporary with the first known phase of mill construction, and so probably relates to the same phase of construction in some way.

The Tail Race Structure

Group	Subgroups	Context types
17	311, 341 (312, 313)	Wooden structures, construction cut, deposits, postholes

Table 61 The main tail race groups and subgroups

The main construction elements of the tail race (Subgroup 341) comprised of a wooden floor and walls that defined the tail race, the construction space into which it was built, and some sturdy timber structural

elements that lead into the tail race from the mill itself. It also included some construction deposits, of stone, brick and rubble, placed to raise the level for the end of the mill/start of the tail race. The structure was well built, and had survived in excellent condition. The tail race was c. 5,3 m in width, and was seen to be at least 8,5 m in length. The wooden floor of the tail race only extended about 4,6 m however, but it may be that originally the floor too extended further to the southeast, and had at some point been removed.

Whether the tail race would have been timber-lined all the way to the harbour, or whether it would simply have opened out into the former moat further to the southeast, remains a matter for speculation. 17th century mapping suggests a quite straight-sided and well-defined channel running from the western gate to enter the sea at Gammel Strand, running almost parallel to and just inside the newer city ramparts. This may suggest that the tail race was timber-lined all the way to the sea. The same mapping (See Figure 96) shows no mill race to the northwest of the gate, suggesting that it was underground in this area. Neither is the mill building drawn however, suggesting that the map makers were selective in what they chose to show.



Figure 133 Mill tail race Subgroup 341, seen from southeast (note revetment Group 317 to the right)

Regarding the structure of the tail race, a cut was observed into the moat silts, within which a line of posts were driven in, floor beams fitted around the posts; and a fill laid between the floor beams. Horizontal planks were then nailed to the posts forming a sidewall; floor planks were nailed to the floor beams; and three phases of backfill were placed behind the (northeast) side planks. The tail race was built with a step down into it from the mill, presumably to channel the water away from the wheel as rapidly as possible to keep the mill working freely. On the upper side of the step were two enormous horizontal beams of beech wood, that measured c. 6,5 m in length, and were each c. 0,4 m in width. These extended metres beyond the tail race to the northeast, and it is likely that they mark the division between the mill itself and the tail race. They were placed on top of the massive boulder and timber foundation platform (Subgroup 327), seen as the first stage of the mills construction. Dendrochronology dates received for these two timbers

suggest a date of between AD 1584 and 1612, with a date just after AD 1600 likely (Appendix 4). This is again evidence to support a date of construction for the mill of about AD 1600 – 1610.



Figure 134 Mill tail race Subgroup 341, seen from northwest

The tail race consisted of a series of separate construction events including levelling layers and primary construction cuts and their associated backfills, which cut silts (Group 342) that had built up after the placement of the large revetment (Group 317). Within these cuts the wooden structure was built. It was constructed in the order: floor beams, floor, side posts and finally plank walls. Some elements of the tail race were constructed overlying the mill base (Subgroup 327), including a brick platform and a southwest – northeast oriented timber and brick wall. Some of these may have belonged to the mill itself, but it is difficult to be certain. Also associated with the tail race were some timbers whose function was not completely apparent and three postholes (one along either wall of the tail race – Subgroups 312 and 313, and one in the tail race, Subgroup 311) which presumably once held posts related to the main structure, and suggest ongoing repair and replacement while the mill race was in use.

A number of timbers from the tailrace were submitted for dendro dating, and along with the two mentioned above, a further eight samples produced dates. These were from the floor and walls of the tailrace, and were all of pine. They ranged in date from AD 1591-1621 to AD 1610-1630 (Appendix 4). Taken as a group, they suggest a construction date in the early 1600s, with new elements added (repairs presumably) in about AD 1620 and again in AD 1627. There is no evidence for any further repair work after AD 1627, despite the fact that the mill appears to have been used for another 40 years or so. It may simply be that it was well maintained, and that the timber was in good condition (it was still in quite good condition in 2012). The timber was sourced in West Sweden or Southeast Norway, as well as Southwest Sweden, Gotland and Sodermanland, again in Sweden (Appendix 4). This suggests that timber was being imported to Copenhagen from a wide catchment area in these years.

Deconstruction of the tail race

Group	Subgroups	Context types
17	340	Dump deposits

Table 62 Tail race deconstruction related groups and subgroups

The deconstruction of the water channel/tail race (or more accurately decommissioning, as it was not dismantled) was documented in the form of a series of substantial deposits (Subgroup 340) in and over the tail race. The main layer consisted of rubble and CBM which was recorded as 'water rolled', which may suggest that the tail race was partially backfilled for a time while water was still flowing through it. The two upper layers also contained CBM, but these layers could also be said to belong to the general backfilling of the moat (Group 200), as they were similar in form. Some timber posts have been assigned to this group as they were first recorded underneath the upper layer, but their stratigraphy was not clear and they may have related to Subgroup 341. Their purpose is unknown, but they do show an alignment either side of the north-eastern tail race wall, so they may have related to this feature.

This infilling most likely dates to the late 17th century based on finds, stratigraphic position and written sources documenting the deconstruction of the fortifications and related structures in this area from about AD 1668, including the mill and related structures. These deposits were clearly placed here as a deliberate act of decommissioning and filling up the tail race, with the apparent aim of levelling the area, which would now become part of the interior of the cityscape.

Deconstruction as Construction

Introduction

In Phase 5 of the site (c. AD 1600 – 1670) a series of actions were carried out to deconstruct various structures, in order to facilitate new construction work. The evidence for this activity will be outlined in the following sections.

Defences and Mill Decommissioned

Towards the end of Phase 5 of the site (c. AD 1660 – c.1670) the process of changing the city's defences began once again, with the decommissioning of the Christian IV era moat and bastions, and all of the mill-related structures – in order to facilitate the construction of a new and more modern set of larger bastions. The evidence for the deconstruction work will be discussed below.

Medieval gate deconstruction

Group	Subgroups	Context types
463	354, 357, 379, 402, 440	Dump deposits
425		Pit cut, rubble fill

Table 63 Medieval gate deconstruction related groups and subgroups

A series of 9 deposits (Subgroup 354) located in the environs of the inner gate (mainly between the walls), are thought to have related to the deconstruction of the medieval Vesterport gate. The deposits were mostly of sandy clay, with some CBM, mortar and some charcoal. Another stratigraphically later deposit of

similar material (Subgroup 440) in the same location, may represent a somewhat disturbed layer of similar deconstruction remains.

A shallow pit filled with rubble and stones (Subgroup 402) was also recorded adjacent to the former inner gate. It has been interpreted as part of the deconstruction of the gate. This group consisted of a sub-rectangular cut and its associated fill. The fill was composed of a mixture of clay, stone and CBM. It was orientated northeast to southwest. It can probably be interpreted as a deconstruction related pit. Due to its location, immediately southeast of gate Group 111, it is likely that it was associated with the deconstruction of gate Group 111.

A further series of deposits of sand, stones and bricks (Subgroup 357) was found mainly within the remains of the construction cut for the wall that lead from the west corner of the inner gate towards the bridge. These deposits of mostly construction material appear to have been disturbed, and consequently are likely to represent elements of the former wall that stood here, demolished and partially dumped back into the foundation cut. Hence it is also understood that a robber cut is likely to have been used, to rob the more useful elements of the wall for reuse. This disturbed material overlay the more intact remains of deeper elements of the wall (see Group 111 etc). A single isolated posthole (Subgroup 379) may also relate to this deconstruction activity, perhaps as part of scaffolding.

These subgroups have been grouped together as medieval gate deconstruction (Group 463). It is not clear when exactly this work was carried out, but it is likely to have been in the 17th century at some point. In the Swedish spy map of AD 1620 the inner gate is not depicted, though in the oldest map of the city from AD 1590 it is, but whether this is simply an omission in AD 1620, or whether it was already demolished is difficult to be sure. Certainly it does not survive beyond AD 1670 or so when the mill etc. is demolished to make way for the new ramparts. In fact we know this for certain, as the foundations of the inner gate are truncated in a substantial way by the placement of some wooden waterpipes, which have been dendro dated to the winter of AD 1666/67. Consequently we can narrow down the placement of these demolition deposits to somewhere between c. AD 1600 and 1667.

A large irregular shaped pit and its associated fill (Group 425), which was predominantly composed of brick rubble, was also documented near the inner gate remains. It overlay Group 354 (see above). Due to the large amounts of CBM within its fill, it seems likely that this group was associated with a deconstruction event. Although it overlay the main Vesterport deconstruction Group 354, it was thought to represent a secondary deconstruction or alternatively a slightly later stage of demolition of gate Group 111. A date range of 17th century is also likely for this activity.

Medieval moat decommissioned

Group	Subgroups	Context types
46		Deposits (moat backfills)
59	237	Deposits (moat backfills), post
256	255	Deposits (moat backfills), posthole

Table 64 Medieval moat decommissioning related groups and subgroups

The medieval moat, established no later than AD 1371/2, remained in use as a moat for some time, changing little it would appear, up until about AD 1600 or just after. Other changes occurred of course, the