

Chapter 7: Results

7.0. Introduction to the Archaeology Results

7.0.1. Phases

In the post excavation phase it was decided that each of the main phases would begin with a major construction phase, and thus they would usually end with a deconstruction phase. Some of these phases, by pure chance linked with a major chronological period in Denmark's history, but that is more likely linked to important actions or rules that lead to the area changing.

Each phase was usually dated by absolute chronology, mainly dendrochronologically and the fantastic work undertaken by Aoife Daly, although relative dating by material culture typology helped date the earliest part of Phase 1 which had a broad start date in the early 1400s. Some of these dendrochronological dates even led to the reinterpretation of historical records as seen in the Phase 2 Valkendorf attributed stone harbour wall, which from the dates of bulwarks set directly south suggests that the wall had an earlier origin and may have been refurbished in 1583.

7.0.2. Stratigraphy, land reclamation and harbour activity

The whole area of Gammel Strand was created by land reclamation and the expansion of land southwards so stratigraphy was not only vertical, as per normal, but also horizontal. Within this project, 6 major periods of expansion southwards occurred, although the first phase may actually include 3 harbour phases. The process usually comprised the construction of a new harbour front, which led to backfilling and then land reclamation behind the new harbour barrier. Levelling would later occur on top of the former reclaimed land. Harbour activity south of the harbour front would feature dumping from urban areas and from boats and lead to deposits being created which would sometimes move southwards due to fluvial activity and the shape of the natural topography.

Cleaning of the harbour base would sometimes affect these harbour base areas, leading to truncations at the top of these deposits, mixing them, as seen through deposit assemblages. This was seen in many harbour deposits as they would start out purely relating to a certain phase but through dredging they would become truncated and later finds would be pushed into the earlier deposits. In some cases, new constructions in later phases would seal part of the deposit, keeping it originally in one period of time, but if the deposit continued southwards it would be affected by harbour activity, and thus continue in use over many phases. This was especially seen in some Phase 1 alluvial deposits, which through truncation, contained finds from Phases 1-3. This became the general activity in the harbour areas at Gammel Strand over the investigated 600 years of history.

This process of land reclamation out into areas of water ways is common in most urban areas (where water is present) and was an easier way of urban expansion where the other areas of town could not expand due to either a mixture of reasons such as physical boundaries set by natural topography or man made physical structures such as fortifications. Ownership of land outside urban areas would also have prevented

expansion. Harbour areas also had to expand or undertake urbanisation linked to the technological change in ships, depth of harbour base, type of harbour etc. All this will be discussed in detail in Chapters 8 and 9.

7.0.3. The various excavation trenches from 2012-2014

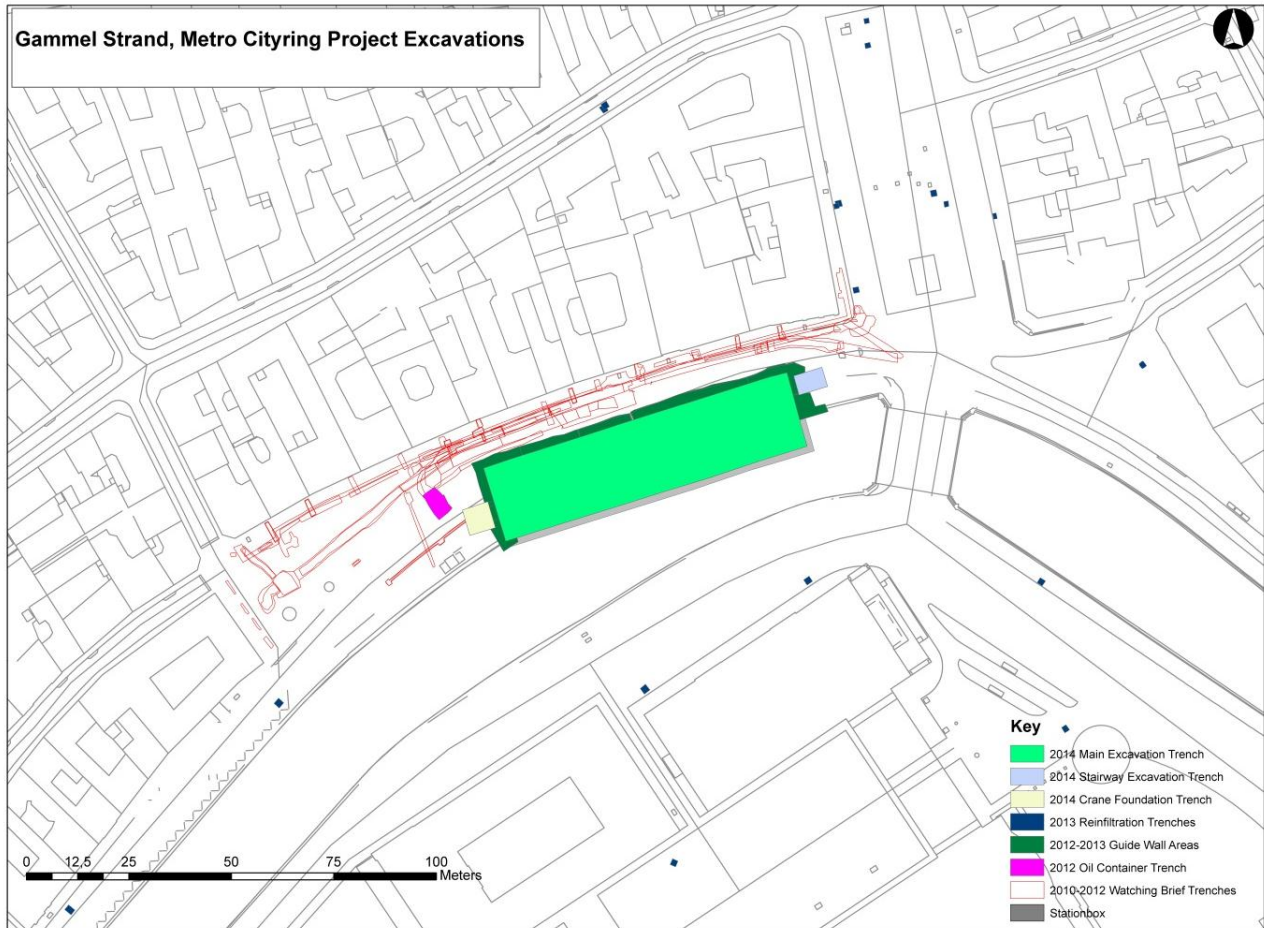


Fig. 18 Plan showing the Gammel Strand Metro Cityring excavation trenches, and their dates

7.0.3.1. Water supply trench 2012, Trench ZT9047

A trench measuring 19 m long and between 1 m and 1.85 m wide was excavated in May 2012 to provide new water pipes for cabins in 2012 for the Guide Wall excavation. This was undertaken in watching brief conditions, stopping to record and excavate archaeology in the process.

7.0.3.2. The Guide Wall excavation 2012-2013 (Trenches 1/ZT9164, 2a/ZT12420, 2b/ZT13818, 3/ZT13569, 4/ 5 east/ZT19856 and 5 west/ ZT19784)

The Guide Wall excavation was undertaken in 2012 with Trenches 1-4 as an excavation, with Trenches 5 west and 5 east as a watching brief. Due to health and safety and the tidal canal, the trench could only be excavated to 2 m deep from the modern surface. The trench was due to be only 2 m wide, but due to modern intrusions such as pipes and strong foundations of certain features, the width increased in certain areas. In various places where the excavation ceased at the 2 m depth, important structures were found, which were largely identified in the Main Excavation. Some of the features uncovered could not be fully identified, so have been given subjective identification. From undertaking the excavation the main wall of the station box could be constructed, and the Main Excavation could occur.



Fig. 19 Plan of the Guide Wall trenches

7.0.3.3. The Oil Container trench, Trench ZT19310. Excavated in 2012

The trench was excavated briefly at the end of areas 1-4 in the Guide Wall excavation. The 29.38 m² trench was excavated in watching brief conditions, which became a mini excavation after structures and features were found.

7.0.3.4. The Re-infiltration trenches. Excavated in 2012 & 2013

Sixteen re-infiltration trenches were excavated between 2012 and 2013. These were all watching briefs with one person following the excavations. The trenches were excavated to up to 2 m deep and between 1-2 m long and wide.

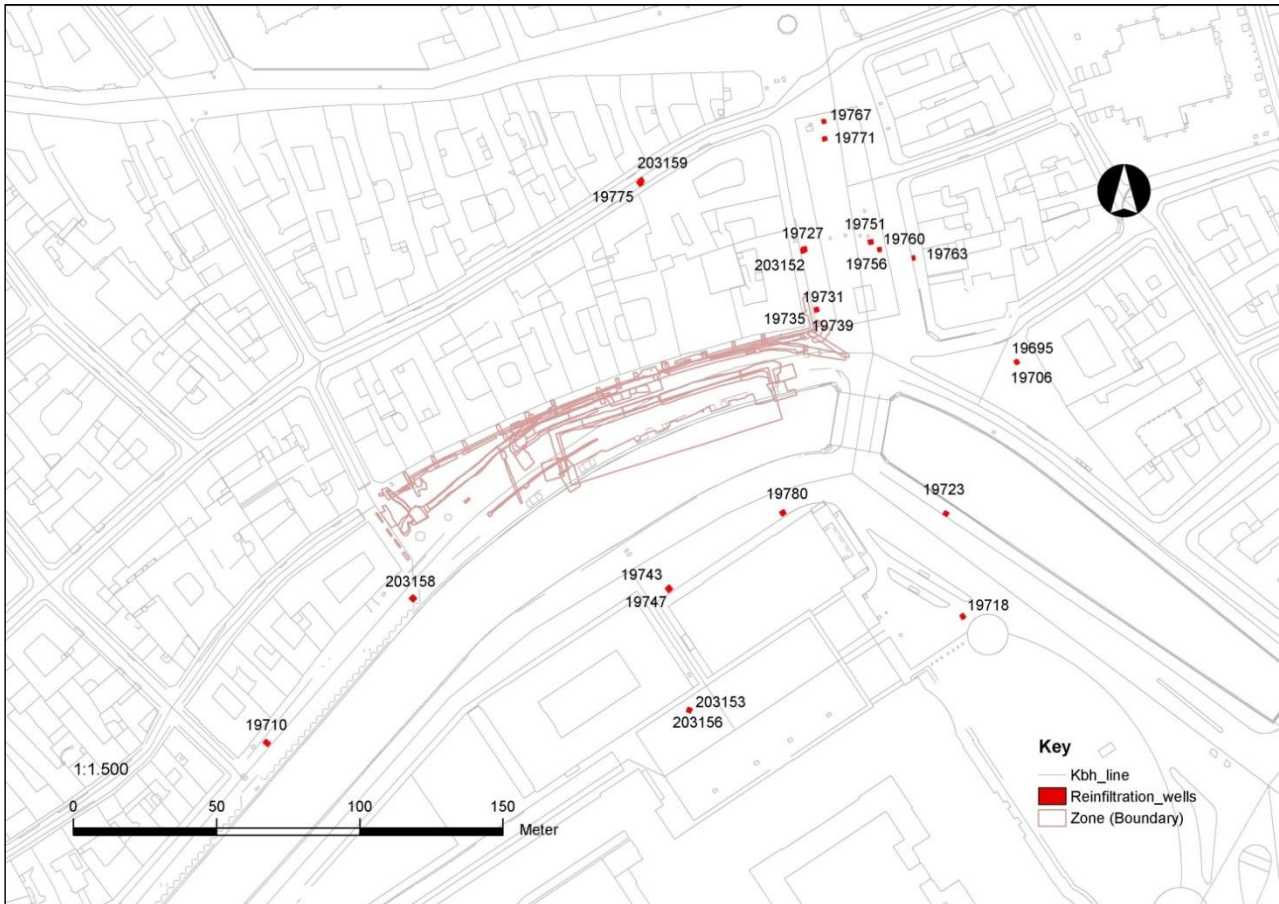


Fig. 20 Plan showing location of Re-infiltration trenches in relation the Metro Cityring Project area

7.0.3.5. The Main Excavation, Trench ZT20146. Excavated in 2014

The station box consisted of an area of 1458.39 m². As part of the trench actually continued into the canal, and with that harbour base area being polluted, only the land part of the trench could be excavated, measuring 729.74 m². The other area was viewed as a watching brief from the trench edges, recorded by photo documentation and notes. The trench measuring 80 m by 16 m by 9 m high was covered in a tent containing a remote winch system for removing big bags of soil.

The main entrance to the excavation area was through the SW side of the trench. It is for this reason that parts of this area were not excavated, as seen by gaps in the plan in this area.

7.0.3.6. The Stairway trench, ZT22798. Excavated in 2014

This trench was excavated in 2014 at the same time as the Main Excavation trench. The trench, measuring 35.25 m², was not covered, so experienced periods of heavy rain, and with flooding, was unworkable for small periods of time. It was excavated in full excavation style and used a winch system to remove big bags.

7.0.3.7. Crane base excavation, ZT213007. Excavated in 2014

This small trench located just outside of the south west area of the Guide Wall excavation and part of Trenches 4 and 5 west, was undertaken as a watching brief for the construction of a new base for a crane. The trench measured 6.75 m by 6.38 m and was excavated to a depth of 1 m. Only modern deposits were seen.

7.0.4. The excavation results

7.0.4.1. Archaeological physical remains

The excavation from 2012-2016 comprised 2490 stratigraphic objects split into 211 cuts, 1356 timber objects, 758 deposits and 135 stone brick structures. These stratigraphic objects were organized into 308 groups. The overall excavation results, combined with the 2010 watching brief results, consisted of 2829 stratigraphic objects and 500 groups.

Type of contexts	2010 Stratigraphic Objects	2012-16 Stratigraphic Objects	Overall amount of Stratigraphic Objects
Cuts SC	16	211	227
Timber structures ST	205	1356	1561
Deposits SD	65	758	823
Stone brick structures SS	53	135	188
Total	339	2460	2799
Groups G & Sub-groups SG	192	308	500

Table 6 Breakdown of the stratigraphic objects in 2010, 2012-2016 and overall quantity

7.0.4.2. Terminology of various groups within the results chapter

Before discussing the phasing and the linked Groups, a few deposits should be discussed that are present in the report.

Group 100/G100

This group represents the current ground surface that overlies the whole site. This may reflect either the modern road, landing bay or pedestrianized area.

Group 101

Group 101 represents the natural geology. The natural geology may be different in the excavation area, but if it is sterile and untouched by human activity it is given the same number.

Group 102

This is neither a deposit nor a context but represents the action for the Limit of Excavation. This was the stopping point where excavation ceased, especially on the Guide Wall excavation. As the limit was at the depth of 2 m, many structures, contexts, posts continued, whether it was driven or continued below this depth. It is nominally called a context due to the recording system.

Group 103

This is a machining action/process, grouped together, as G10,2 as an action rather than a deposit or a context. The number represents the process of machining, which differed in depth depending on the location within the excavation. Within this process later truncations or recent levelling layers were removed. This may explain why some modern truncations were removed and later destruction of the Bargeman Guild House was not fully seen.

7.0.4.3. The archaeological finds

During the excavation from 2012-2016 heavy prioritization of the **Bulk Finds** occurred due to the large quantity of finds. The finds that were not prioritised and registered for the report were added to the

archives for storage and future registration. The **Special Finds** were all registered as they may provide extra knowledge for the excavation.

In total the finds registered as Finds Units (**FU**) numbered 4861. From this number, the finds were prioritized, with the prioritized number registered as 15979 Finds Objects (**FO**) containing 62034 fragments. It is presumed that the overall total contains the non-prioritized finds. A selection of the finds and material types are included below.

Type of material	Number of Finds Objects	Number of fragments
Ceramic	3718	14340
Clay Pipe	2132	9199
CBM	393	1626
Glass	1215	6422
Metal	518	745
Textiles	41	67
Leather	380	1714
Total	15979	62034

Table 7 Number of Finds Objects and fragments of prioritised finds (2012-2016)

7.0.4.4. The natural science remains

A broad strategy of sampling was undertaken to complement the artefactual and physical archaeological evidence. As with the artefactual remains, the samples chosen for the report were prioritized, and are only a percentage of the samples undertaken on the excavation. The type and quantity of natural science sampling was linked to the discoveries, with some types planned before the excavation occurred, undertaken whilst the excavation was ongoing or organized as part of the post-excavation process.

Type of sample	Number of samples
Animal bones	623 (FU)
Dendrochronology	366
ICP Analysis	22
Macrofossil	60
Mollusc Analysis	63

Table 8 Number of samples prioritized for analysis (2012-2016)

7.1. Phase 1. The Late Medieval and Early Renaissance Harbour, 1400s-1560s

7.1.1. Summary

The importance of this historical phase became quite clear whilst the excavation was ongoing as it contained the remains of the earliest harbours found in Copenhagen to date, as well as well preserved artefactual and natural science evidence from the surrounding soils. Many bulwarks have been found in this region of the city before, but nothing that confirmed a substantial harbourside, from such an early date. Due to the organic nature of the soil, the finds were fairly well preserved. The ceramic sherds were particularly large and in some cases almost complete vessels. This evidence suggests that the refuse used to create the landfill came from the nearby area.

7.1.2. Introduction

This chapter will describe the archaeological remains and events that occurred within Phase 1 on Gammel Strand. From the excavations it was discovered that the area was largely devoid of human activity until the early 1400s at the beginning of the Late Medieval period. The earliest deposits encountered comprised naturally formed land that had built up slowly over thousands of years. Overlying the natural soils were a variety of deposits formed by a mixture of waste from boats and household rubbish dumped into the harbour from urban areas in the Late Medieval period. It was within these deposits that finds from the various Prehistoric periods, Viking period and Early and High Medieval periods were found, residual and mixed with these later deposits. The earliest Medieval activity from Gammel Strand is found within the 2010 watching brief excavations located north and west of the Main Excavation and Guide Wall excavation. In these trenches, bulwarks and posts were set within 1400s land reclamation deposits which were created to increase the urban area of Copenhagen and to provide a deeper harbour for the new larger and technologically advanced ships. Similar trends were seen in all urban maritime centres in Europe at this date.

Within the Guide Wall and Main Excavation trenches we see the development of this process of deepening the harbour approximately every 50 years and the creation of more new land behind the new harbour fronts. This expansion continued with the build up of alluvial soils encroaching southwards into the northern part of the Main Excavation trench. These deposits were only discovered in the Guide Wall trench with the use of an auger as they lay below the 2 m depth limit of that phase of excavation. Bulwarks were built into these groups of deposits which represent the harbourside of the late 1400s and early 1500s. One of the posts was from a tree felled in 1492 but it is believed to have been incorporated into the harbour in the early 1500s. Unfortunately due to truncation, the exact form of the harbour front bulwark from this phase cannot be completely verified, but it appears to have been a double frontage of oak planks and posts pushed into the soils, very similar to the form in the watching brief trenches.

Within the Main Excavation trench a new line of oak posts are then set into the harbour floor between 2-4 metres south of the Guide Wall trench harbour front. The posts were felled between the dates 1510-1532, and are thought to have been used in the harbour very soon afterwards. Around the harbour posts a new group of alluvial deposits built up overlying earlier Late Medieval harbour alluvial deposits, which themselves are a mixture of fluvial action with dumping of rubbish from the city.

Behind the various harbour fronts, new structures were built at the location of the modern Gammel Strand square. These structures were heavily truncated by later activities, but at least one of these buildings is thought to be a structure of some importance due to the wooden floor, cellars, foundations and associated finds. The phase ends with the deconstruction of the harbour posts in the Main Excavation trench, some were removed and some were cut and re-used in the new harbour wall. Outside of the Main Excavation trench, the upper levels of the structures were demolished and most of the materials were robbed out. The area was then levelled for the next phase in the area's use (Phase 2).

This sub-chapter will contain a summary of the main archaeological structures and deposits within the phase in chronological order, interspersed with appropriate plans and photographs of structures, finds and natural sciences. It will also include information of important structures and deposits from the 2010 Gammel Strand watching brief report. Although this information has already been included in the watching brief report, the information can now be linked with the other Gammel Strand excavation information and provide a more informative view of the harbour area within the Late Medieval and very early Renaissance periods.

Within the Phase 1 sub-chapter each group of activity will be discussed, including important information on natural science and finds. Because of the effects of dredging and fluvial activity within the harbour, contexts within the groups will be discussed in more detail as the processes really affect how some of the important contexts and groups are formed.

The phase consists of 18 groups and sub-groups and reevaluates many more from the 2010 excavations.

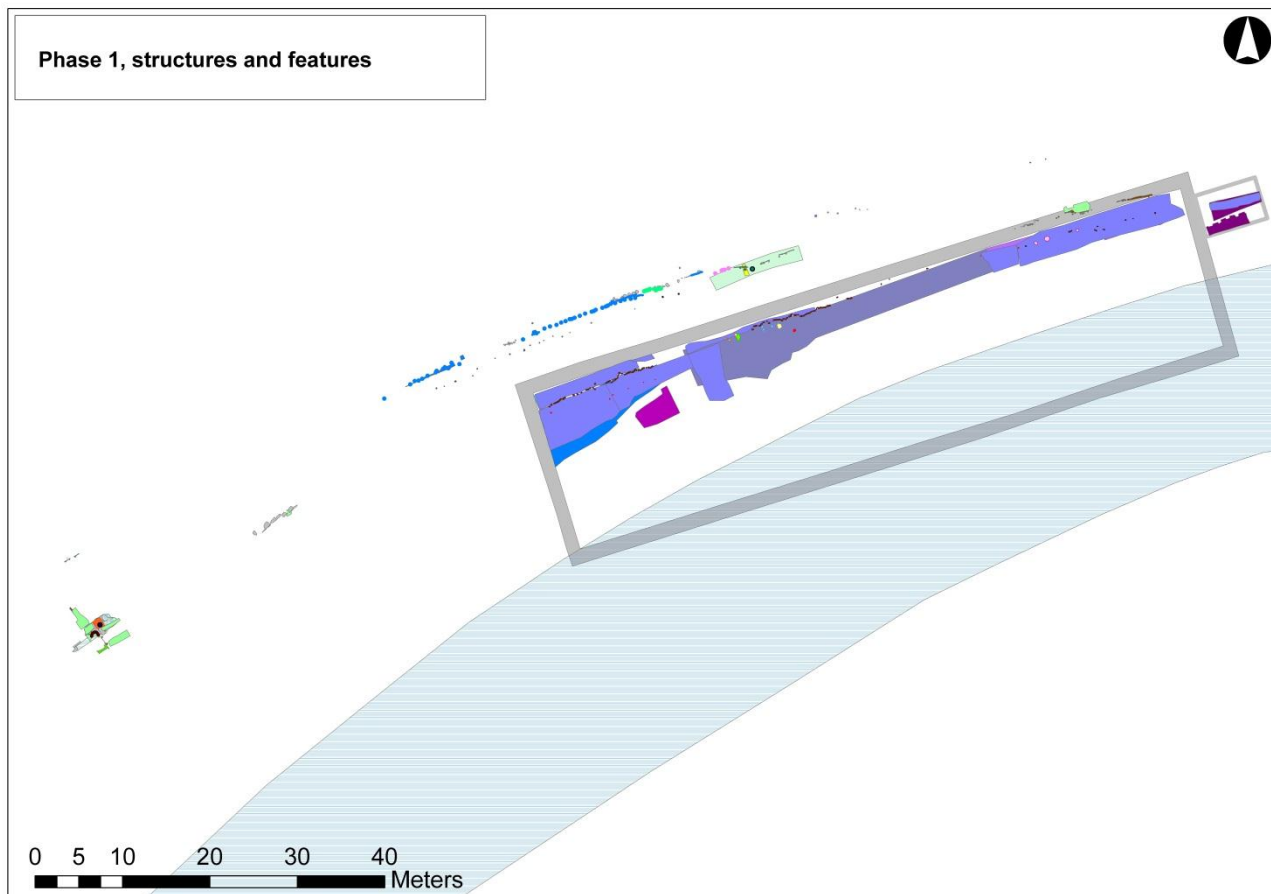


Fig. 21 Phase 1 overall plan of structures and features (see also A3 version in Appendix A)

7.1.2.1. Prehistoric period. Until AD 800

The earliest deposits uncovered at Gammel Strand were the natural sands G101, seen mainly in the Main Excavation trench. These sands were actually Holocene marine sediments deposited during or after the maximum Littorina transgressions of the coast in the mid-Holocene (Ruter 2014), but as seen from big bag sampling of this group, it was revealed as being affected by dredging and harbour activity so depending on the area within the Main Excavation, the deposits may have either Medieval, Post-medieval or Modern finds within. For more knowledge of the Prehistoric topography and soils, see Chapter 3.

7.1.2.2. Viking (800-1050), Early Medieval (1050-1200) and High Medieval periods (1200-1400)

As revealed in Chapter 3, within the Viking, Early and High Medieval periods, there were no obvious structures or deposits identified within the Gammel Strand project area from these periods. This activity occurs directly north, northeast and northwest of the project area, where various Re-in filtration trenches were excavated, but unfortunately they were not excavated deeply enough to uncover the earlier layers. These periods are only represented by residual finds within later deposits from Phases 1-6.

7.1.3. Gammel Strand watching brief 2010-11 – re-assessing the Medieval results

7.1.3.1. Introduction

The post excavation phase has allowed the authors the opportunity to reassess the findings from the 2010 excavations and place them within the overall historical and archaeological framework of the Gammel Strand area. With more finds and evidence from the Late Medieval and Renaissance periods recovered in the 2012 and 2014 excavations, the archaeology can now be properly compared with the earlier excavations. Remains were uncovered beneath the Gammel Strand square of structures that were of great importance to the economy of Medieval and Renaissance Copenhagen and Denmark. Historical records state that King Christoffer III of Bavaria ordered a *Vejerbod* (weighing booth) to be built in 1443 (Nielsen 1881, 152). Evidence of this *Vejerbod* has yet to be found, and instead, it may be another name for the *Vejerhus* which was present on Gammel Strand in the 1500s (Wolf 1654, 157) located between Kompagnistræde, Snaregade and a small alley that gave it access to the harbour (Nielsen 1872, nr. 297, 424-26). Fabricius also states that the Medieval Accisehus is also known to have existed around AD 1500 (Fabricius 2006, 61), so the area comprised public buildings within a private landscape.

7.1.3.2. Late Medieval Wharf

Group	Sub-groups	Group names
391		Late Medieval bulwark
	216	Bulwark
	249	Bulwark
	256	Wharf sequence
	262	Posts
284	281	Land reclamation (comprising SD200251 & SD 200252)
	317	Wharf sequence/bulwark
	330	Bulwark/posts
	356	Post
	357	Post
	378	Bulwark
	393	Possible storm posts

Table 9 Groups and sub-groups related to the Late Medieval wharf, 2010

Group 391, as seen in Fig. 22, is comprised of at least two phases of harbour bulwarks, and some separate unaligned post groups (SG262, SG356 & SG357). Together they appear to form the earliest harbour front discovered out of all the Gammel Strand excavations. These structures were originally observed and recorded in small watching brief trenches without the knowledge that was obtained in the later excavations at Gammel Strand in 2012 and 2014. It is only now that Group 391 can be placed within the phasing and dating for the whole Gammel Strand project. The structures were dated chronologically by location and depth, as well as from the artefacts from the surrounding deposits. Unfortunately it was not possible to undertake dendrochronological analysis on the various posts to verify dating. The chronology of the early excavations was based on vertical stratigraphy i.e. the lower contexts are older and also the theory that the more southern posts would be later due to the constant rebuilding of the harbourside.

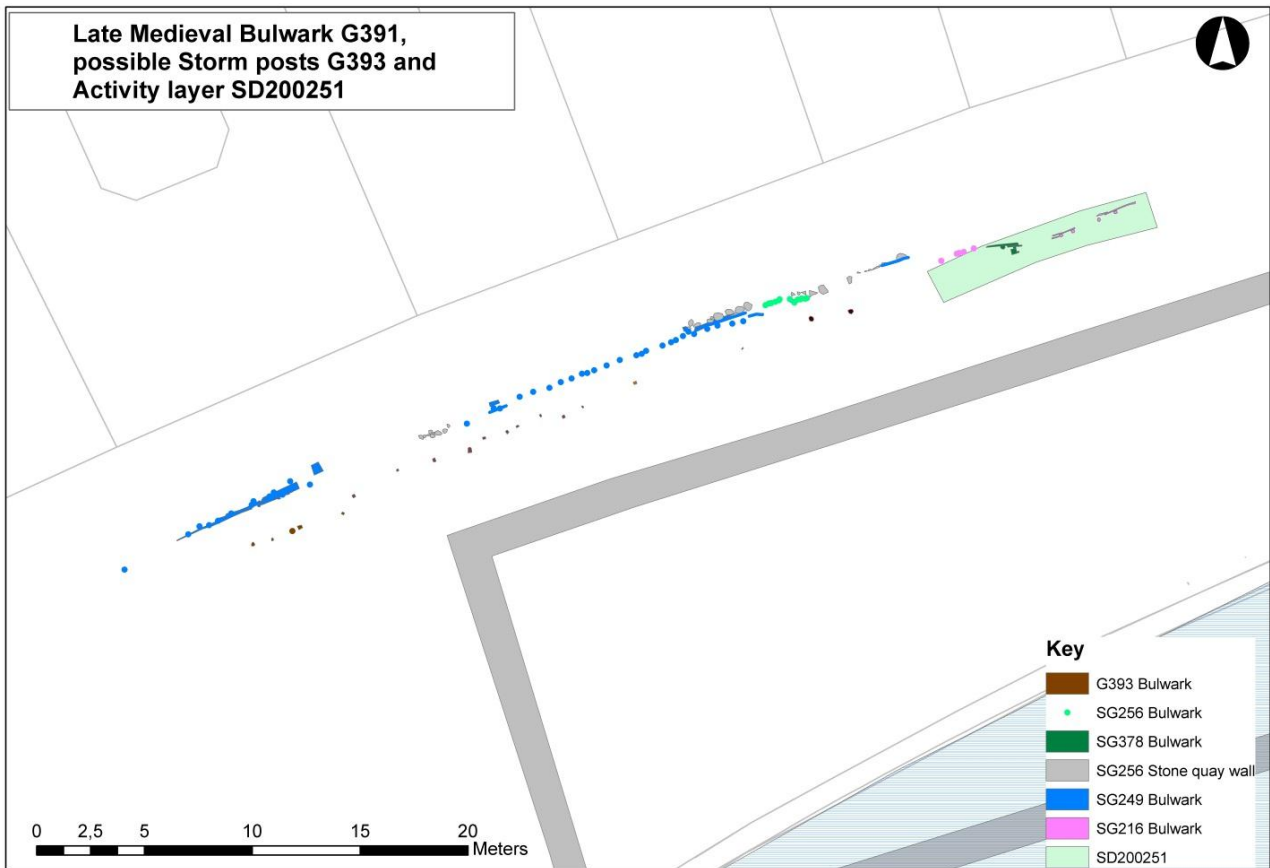


Fig. 22 Plan of the bulwarks uncovered in watching brief phase 2010

Wharf sub-group G262 was the most northern post sub-group seen at Gammel Strand, and the most northern posts of the whole bulwark group G391. They have been added to G391, due to the similarity of the posts, and style of feature, but probably represent an earlier bulwark phase. They represent 7 timber elements or posts in a vague linear setting or row and placed vertically. The posts measured between 0.1-0.2 m in diameter and were uncovered up to 0.3 m.

Post groups SG356 and SG357 were the next post sub-groups discovered. They were located southwest of SG262. Each sub-group comprised a single post only, measuring c. 0.2 m in diameter. The purpose of these posts could not be ascertained.

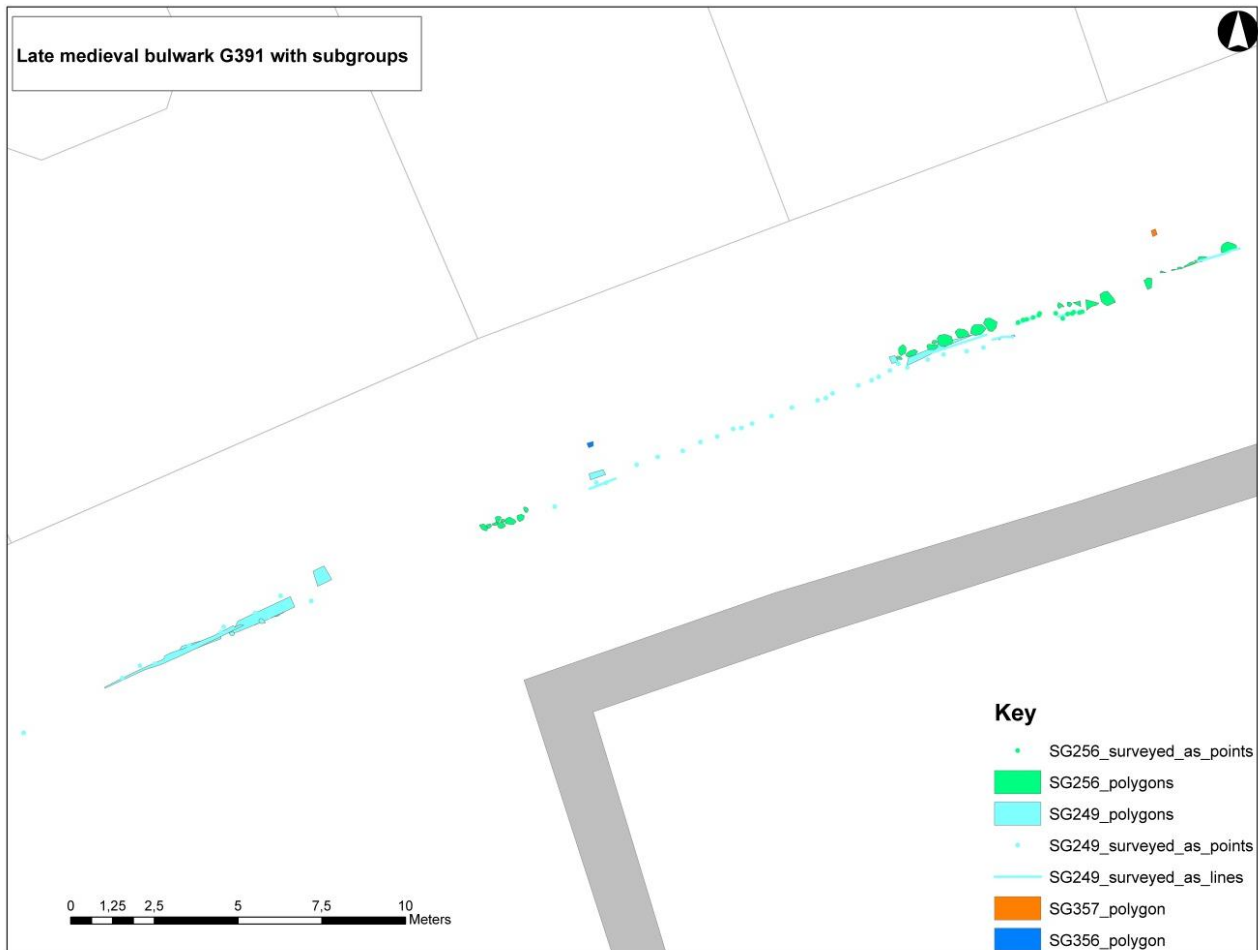


Fig. 23 Close up of bulwark groups SG249 and SG256 of bulwark G391

Bulwark groups SG249 and SG256 formed a bulwark located between 0.5 m and 1 m south of post groups SG356 and SG357 and 15 m southwest of SG262. Both these sub-groups together measured 31.8 m long in total. The various elements of the groups were recorded in different trenches, hence the different numbers. From post excavation analysis they seem to represent a harbour front consisting of a line of stones and harbour posts, SG256, with SG249, containing wooden posts and horizontal beams, located directly south and even abutting in places.

This form of harbour front is one of the many forms in the Late Medieval period and has a resemblance to bolværk 7 from the Susåen excavations at Næstved (Hansen et al. 2005, 120-1) and is expected to date from the 1400s.

The harbour wall SG256 comprised 44 stones of differing size appearing to represent an actual harbour wall or packing behind a bulwark (see Fig. 23 and Fig.24). This was joined by SG249 which comprised a total of 50 posts (exposed up to 0.7 m with examples seen at 2.7 m long) and at least 5 horizontal planks (approximately 0.2 m long), a mixture of posts representing the harbour line with the posts (between 2-2.7 m long and planks 0.2 m wide) situated directly south and “protecting” the harbourside. The stones may represent the top of the wall, packing, or a path on top of the wall.



Fig. 24 A section of bulwark group SG256 looking south. Note the vertical posts, horizontal planks and variety of stone at front of photo. C07_20101026_0455

Exactly 1 m east of SG249 and SG256 was another bulwark, SG216 & SG378 which was on a different orientation and seems to jut out farther south than the other bulwark. It comprised three discontinuous fragments of a harbour front of posts and planks with individual posts set in-between. A close up of this area can be seen in in Fig 23 and Fig.24.

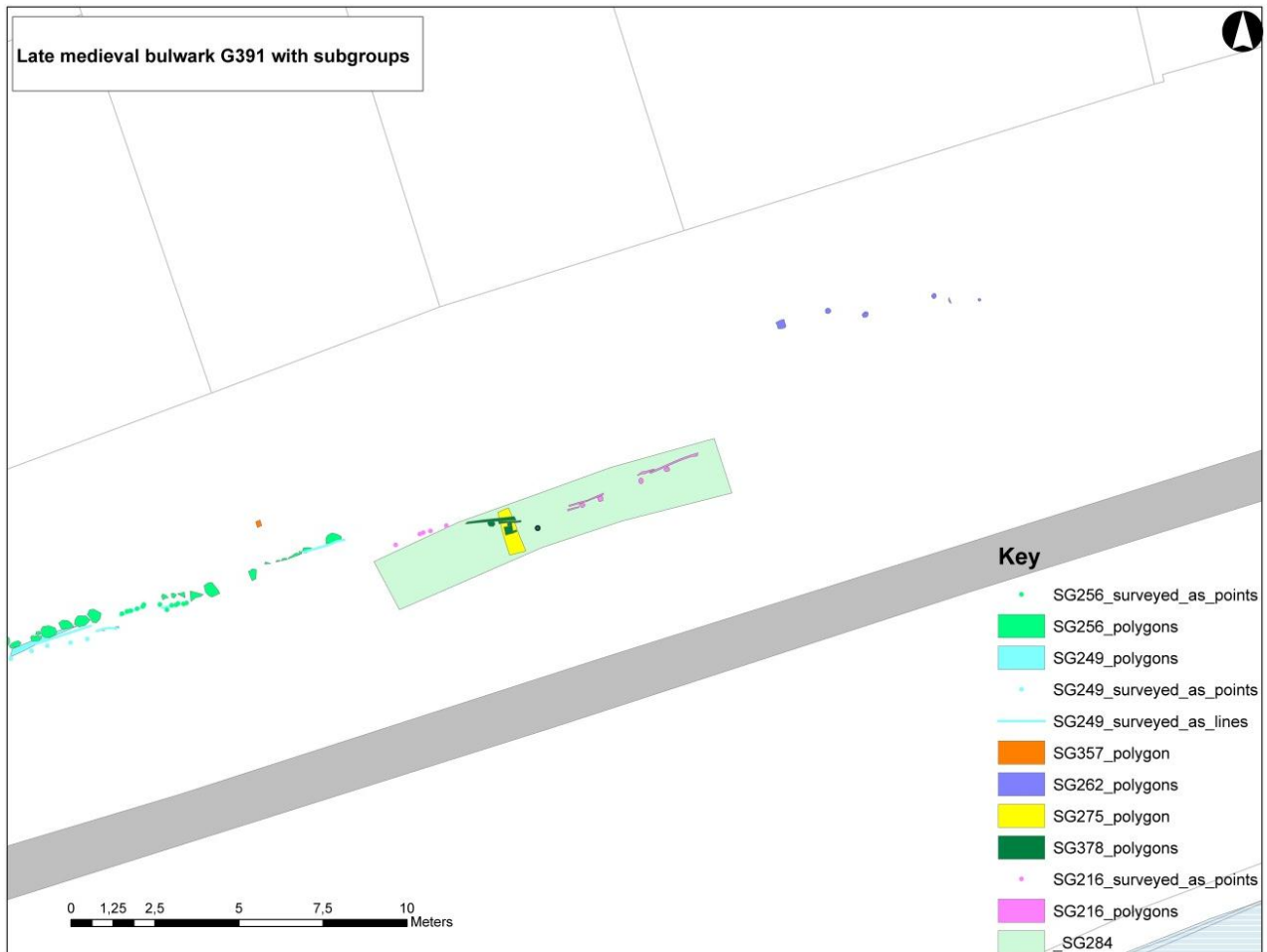


Fig. 25 Plan of Late Medieval bulwark group G391 with bulwark extensions SG378 and SG216 with deposits SD200251 and SG200252 within SG284

Surrounding the posts from SG216 & SG378 were deposits, SD200251 and SD200252, with the latter overlain by SD200251, as seen in Fig. 25. Due to the watching brief form of the archaeology work it was impossible to tell which came first, the structures or the deposits. The posts may have been inserted into the deposits or they may have formed around the posts as a mixture of harbour use or later construction. Both deposits were very rich in organic content with many organic finds preserved. The finds dated from the 13th to the early 16th Century, with the later ceramics found within SD200251. Amongst the finds assemblage were textiles, worked bone, worked wooden objects and metal objects. Although the posts could not be dated, it is believed they represent a Late Medieval period construction as seen from the Late Medieval finds.

Located 1 m south from SG249 was G393, (as also seen in Fig 23) which comprised a series of sub-groups containing 16 vertical posts extending over an area 11 m long, set in a line or row. No horizontal planks were located between the posts to clarify whether it functioned as a full bulwark or a line of storm posts, and the watching brief form of excavation prevented proper understanding of the structure as the trench was not wide enough, and thus unsafe to enter.

The location of the posts from G393 at 3.3 m north of the Guide Wall excavation, along with the depth of their discovery and typological style, possibly suggests they also belong to the Late Medieval phase. If they

were storm posts they would have had a dual purpose of protecting the harbourside from ships hitting it and being used to tie up boats when offloading goods. This is presumed for the later storm posts, as seen in the later Phase 3 period, built to protect the Phase 2 harbour. Post group G391 were either storm posts for harbour SG249 & SG256 or relate to the bulwarks SG216 and SG378, which were in a line directly east.

7.1.3.3. Late Medieval Bulwarks

Group	Sub-groups	Group name
394		Bulwark
	203	Bulwark
	322	Post

Table 10 Groups and sub-groups related to the Late Medieval Bulwarks

Located 38 metres west of bulwark G391 was bulwark group G394 comprising sub-groups SG203 and SG322. Post group SG322 comprised two posts grouped together 0.5 m north of sub-group SG203. The purpose of these posts was unknown. Sub-group SG203 was a harbour front comprising two horizontal planks set behind three posts. Unfortunately the large distance between the G391 harbour fronts prevented any linking of the harbour fronts. From location they were the most northerly in this western area, so presumably the oldest. These groups can be seen in Fig. 26

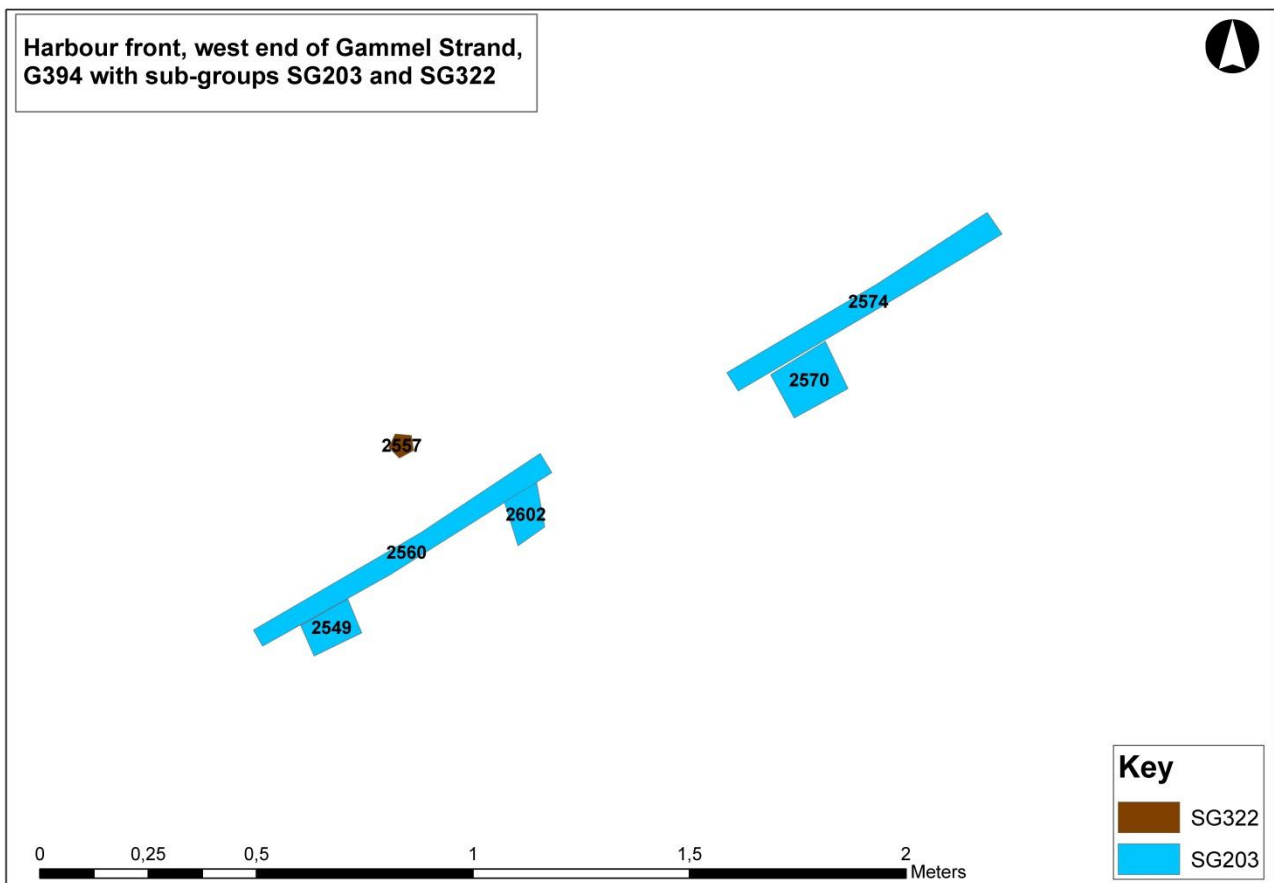


Fig. 26 Harbour front at the west end of Gammel Strand with G394 and SG203 and SG322

7.1.3.4. Late Medieval activity area

Group	Subgroups	Group name
266		Pit, sub-group natural ground
288		Wharf reclamation material
	283	Bulwark
	281	Pit
273		Building
319		Levelling group

Table 11 Groups and sub-groups related to the Late Medieval activity area

The groups in this small area represent the formation of the area into an urban setting, as shown in Fig. 27. It comprises a series of levelling groups, pits and bulwarks located 4 m south from bulwark group G394. The earliest activity noted within these groups was sub-group SG266, a group of natural sands appearing sterile, representing the beach area in the location. Due to the height of the deposit, it now appears to be a levelling layer of beach sand. These layers were truncated by pit group G281, a small sub-rounded pit measuring 0.4 by 0.2 m containing domestic rubbish of redwares, cow bones and various fish bones.

Nearby was sub-group SG283. The bulwark comprised a plank and 2 posts measuring 1.75 m long on a northwest southeast orientation. It is unsure whether it functioned as a wooden foundation or *fletværk* as Olesen & Bork-Pedersen (2012) suggest in their report as it resembles many other bulwarks uncovered in the excavation, but a wooden bulwark base would help prevent subsidence of building foundations into newly created land, perhaps to overlying building G389.

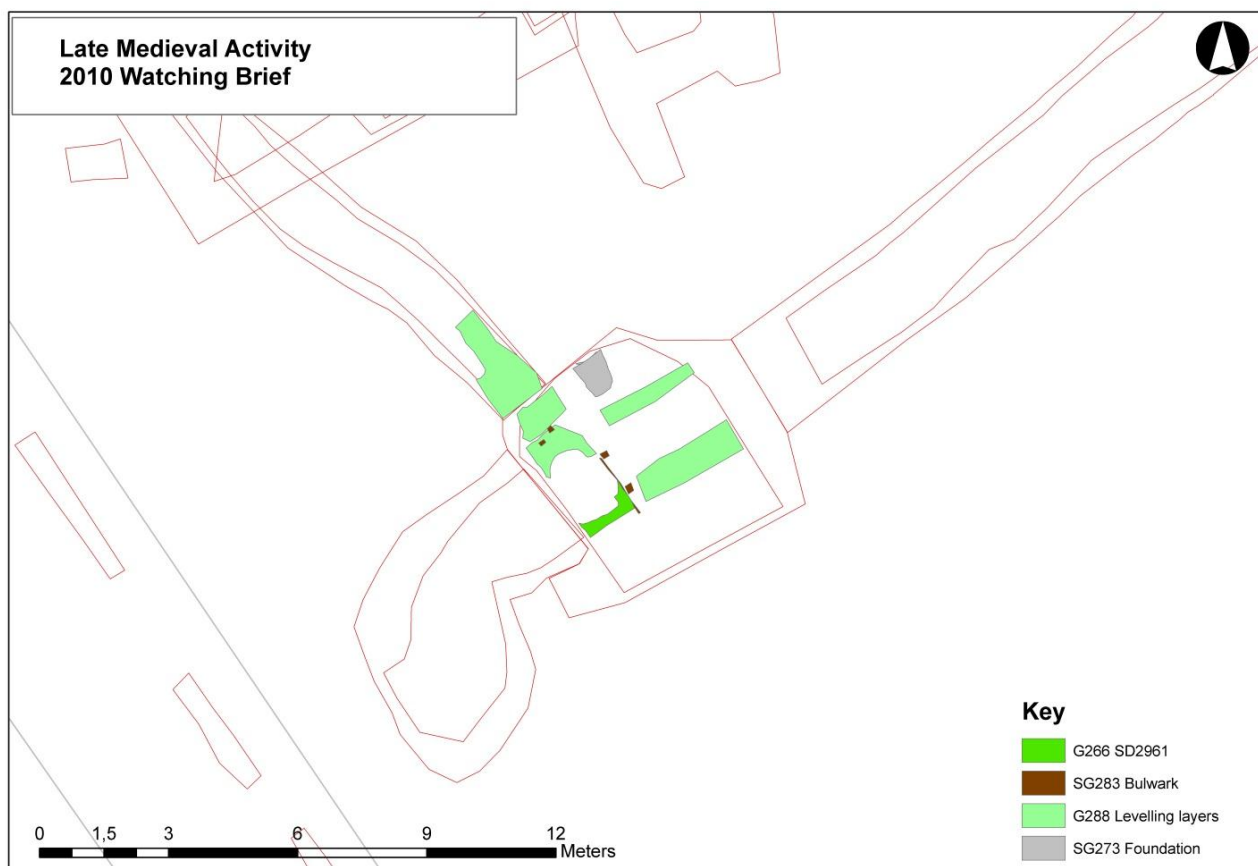


Fig. 27 Plan of land reclamation and Late Medieval activity at the western end of Gammel Strand

This bulwark group was believed by the excavators to have been overlain by levelling groups SG288, stratigraphically, but not physically, as relations between these features were destroyed by modern truncations. The group comprised 5 levelling deposits seen within various phases of trenching in 2010, so the perimetres do not always link, although they share the type of activity.

Located nearby were various land reclamation or rather levelling deposits forming Group 288. The group was spread around an area measuring 5.93 m by 4.55 m and represented by 5 different deposits. The deposits were all rich in silt with either sand or clay in a mid grey brown matrix, portraying the different types of dumped soils. Only deposit SD7370 yielded an assemblage of Late Medieval wares with old Siegburg stoneware, late redware, early Cologne and Frechen stoneware with Late Medieval bottle sherds.

Levelling group G319 was created stratigraphically after G288. It comprised 3 deposits of silt and clay with inclusions of broken brick fragments, iron nails and a single Late Medieval sherd. The purpose of the group was to level the area for construction as shown by building SG273, and should be seen as just another series of levelling after G288. It was truncated for the building of structure SG273 (see Fig. 28 and Fig.29). Building SG273 or rather foundation SG273 was the earliest structure in the area. It was constructed on a northeast-southwest orientation in a flat construction cut and measured 0.9 by 0.8 m. The wall or foundation bed comprised a mixture of large granite stones, brick and pebbles with inclusions of charcoal and CBM etc. Unfortunately modern truncations and the trench perimeter prevented any more being seen. The purpose of this earlier structure is not known but was supplanted by later G389.



Fig. 28 Photo of Group 273, post excavation of trench, showing construction cut SC2136 and foundation SS2156 in the section (left side of photo). C07_20100629_0175

7.1.3.5. Late Medieval building structures

The 2010 excavations also revealed the remains of two stone structures, groups G389 (Fig. 29) and G390. Building group G389 was located beneath the modern day square, 15 m east of Nybrogade.2. Built as a lean-to, to the south of G389 was a Late Medieval booth G311 with cellar G244. Building group G390 was located below the central part of the modern Gammel Strand square, with the remains a lot more fragmentary (Olesen & Bork-Pedersen 2012, 138-146).

Group	Sub-groups	Group name
389		Vejerbod/Vejerhus walls, foundations
	223,244, 299,301 and	Late Medieval booth, cellar and walls. Built next to G389
390	290,291	Building, previously seen as the Accisehus

Table 12 Groups and sub-groups related to Late Medieval building structures

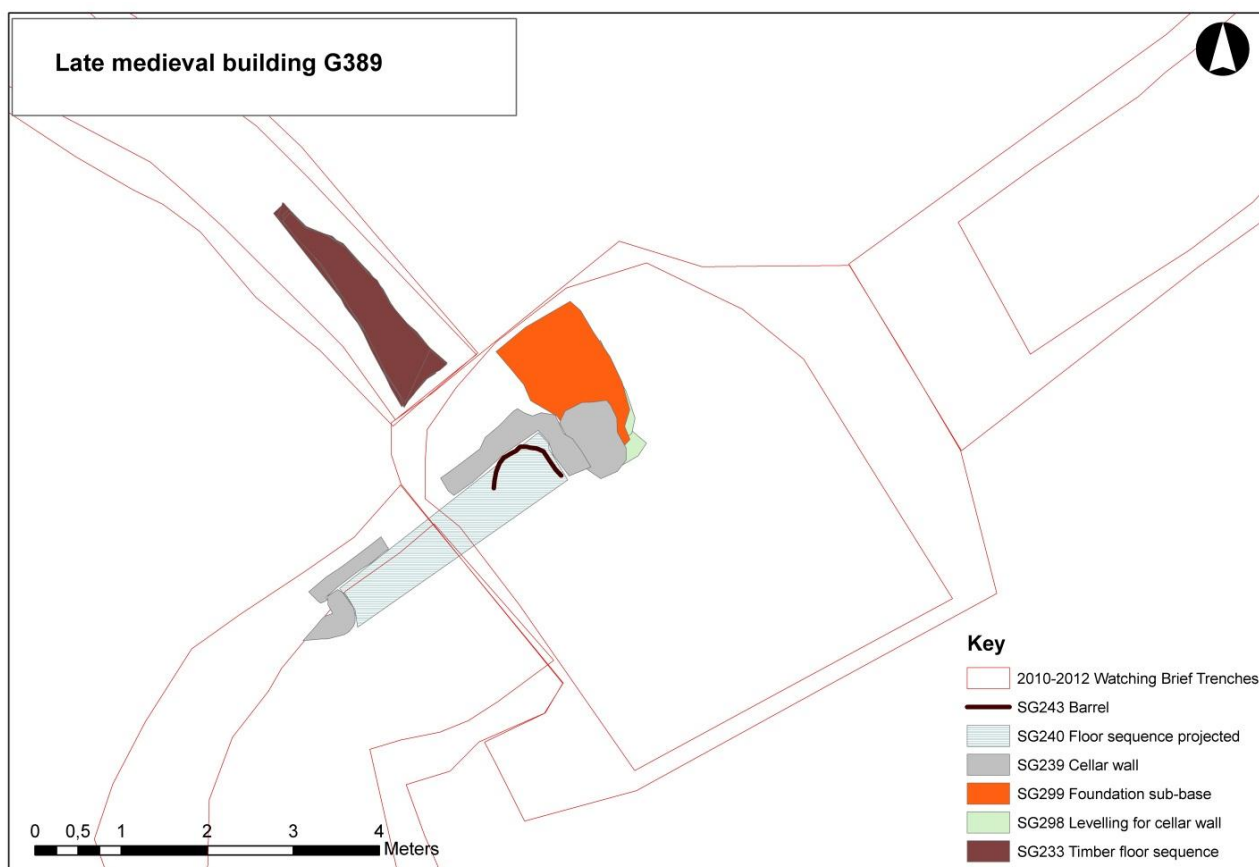


Fig. 29 Remains of building group G389.

7.1.3.5.1. Building group, G389

Building Group G389 recorded in 2010 comprised two buildings, whose perimeter extended out of the trench area, as seen in Fig. 29. The main building comprising a single room, SG301, and outbuilding SG311 which contained cellar SG244. The dimensions of this structure are not known. It consisted of the eastern wall of the structure, G299, which was constructed using various forms of broken *munkesten* brick on a NNW-SSE orientation. The wall was 1.15 m wide and 1.95 m long and was set within a construction cut, presumably into reclaimed land. The large width of the structure suggests it was loadbearing and could

comprise more floors. The wall also overlay another stone wall SG273, on the same orientation. It was built upon the levelling groups G288 and G319, depending on the area.



Fig. 30 Wall Group SG299 looking NNW. C07_20100705_0216

Set inside the eastern building wall SG299 to its west (Fig. 31) and northwest was wooden floor group G233. The floor contained many layers of wood, so it would have been relaid and replaced many times in its use. This is something only to be expected with having moist organic soil below the floor base affected by nearby flooding from tidal changes.



Fig. 31 Floor G233 within building G389. Looking NW. C07_20100628_0173

Directly south of this structure, structural remains were registered as outbuilding SG311 and cellar SG244. These structures, as seen in Fig. 33 were probably part of an outbuilding or extension. Unfortunately any relationship between cellar and SG301 was lost by truncations caused by later culvert G207, and later overlying buildings. The cellar walls were built within SG283, a set of bulwarks interpreted (3 posts and a

horizontal plank) as Dutch *fletværk*, overlain by small boulders and then wall SG239. Within the walls of the cellar was clay floor SG240 with barrel FO 60142 in the corner, added for drainage.

The finds retrieved from these areas were Late Medieval/very Early Post-medieval in date. The wall foundation group G299 comprised a single sherd of Siegburg stoneware dating from 1300-1500. More Siegburg stoneware, animal bone waste and ceramic building material were recovered from layers within the cellar floor and destruction layers. Of a particular high standard was FO 200592 a sherd from a Siegburg Schnelle (mug) decorated with the Tudor coat of arms and the year dated 1558-1625 (Fig.32). It is of interest because the sherd was retrieved from the drainage barrel in the basement. The believed 1560s-70s date of the vessel fits in with the perceived demolition date of the building in the late 1570s. The building was apparently in a poor state and the King requested its demolition and replacement with a new and better structure. This new building was built slightly to the east, with the surrounding yards perhaps overlying the former and recently destroyed Vejerhus building G389.



Fig. 32 FO 200592 Schnelle mug with coat of arms of Elizabeth 1st of England, 1560s. Museum of Copenhagen

As suggested by the Olesen & Bork-Pedersen report (2012, 149), the earlier structure SG389 represents a building of stature as seen by the thick walls and wooden floor, and may indeed represent the earlier *Vejerbod* or important building on site as was common in High and Late Medieval, Renaissance and modern harbours which comprised Weighing houses and customs houses near the harbourside (London, Bristol, Stockholm, Antwerp to list a few). The cellar of the structure is also of interest with the barrel being used for drainage. Even though the harbour walls suggest the area is watertight from the canal, the tide would flood the trenches every day which affected the 2012 Guide Wall excavation. Even though conditions and water levels are different now to 500 years ago, a

more porous wooden harbour bulwark would have led to more instability within the harbourside soil, and thus more flooding.

It is not known exactly when the building G389 was destroyed but the finds relate to use of the structure from the Late Medieval and the Early Renaissance, so it is presumed the building was destroyed at the end of Phase 1 or early Phase 2. As written in Chapter 3, the building may have continued into Phase 2 or 3 existing as a building entitled the hop farm, with a role of assessing the hop (Nielsen 1872, nr. 362, 486). It is still unsure whether this represented an area or farm in the former location of the old Weighing house/*Vejerhus* or the old building.



Fig. 33 Cellar SG244 from out-building G311 looking NNE. C07_20100702_0214

Of coincidence, Rosenkjær (1902) mentioned in his unpublished notes the discovery of a timber slipway leading into the canal, orientated N-S whilst observing building activity in the area in 1902. It is possible that he had observed parts of this structure, and with the shape of the structure within the trench, presumed it to be a slipway.

7.1.3.5.2. Building group G390

This group, described as the Accisehus in the 2010 report comprised the remains of a stone wall, stone foundation and levelling layer. The building remains were located 28 m west of the 2014 Main Excavation trench, as shown in Fig.34. The wall was orientated on a southwest-northeast direction, the same orientation as the Late Medieval structures in the Guide Wall and Main Excavation. The structure extended out of the trench area towards the north and the west. The wall was suggested by the excavators to be the north wall of the building. If this is correct, either the harbour front of the Late Medieval period was reclaimed further south than the area within the Main Excavation, or the structure was built partially

out into the sea. The wall is also on the same orientation as harbour wall G532 from Phase 2, so it may also be a Phase 2 structure. Unless full excavation occurs in the area surrounding this structure, the true purpose of G390 cannot be fully discerned. It is therefore placed as a Late Medieval Phase 1 building with the knowledge that it may also be part of Phase 2 wall G532.

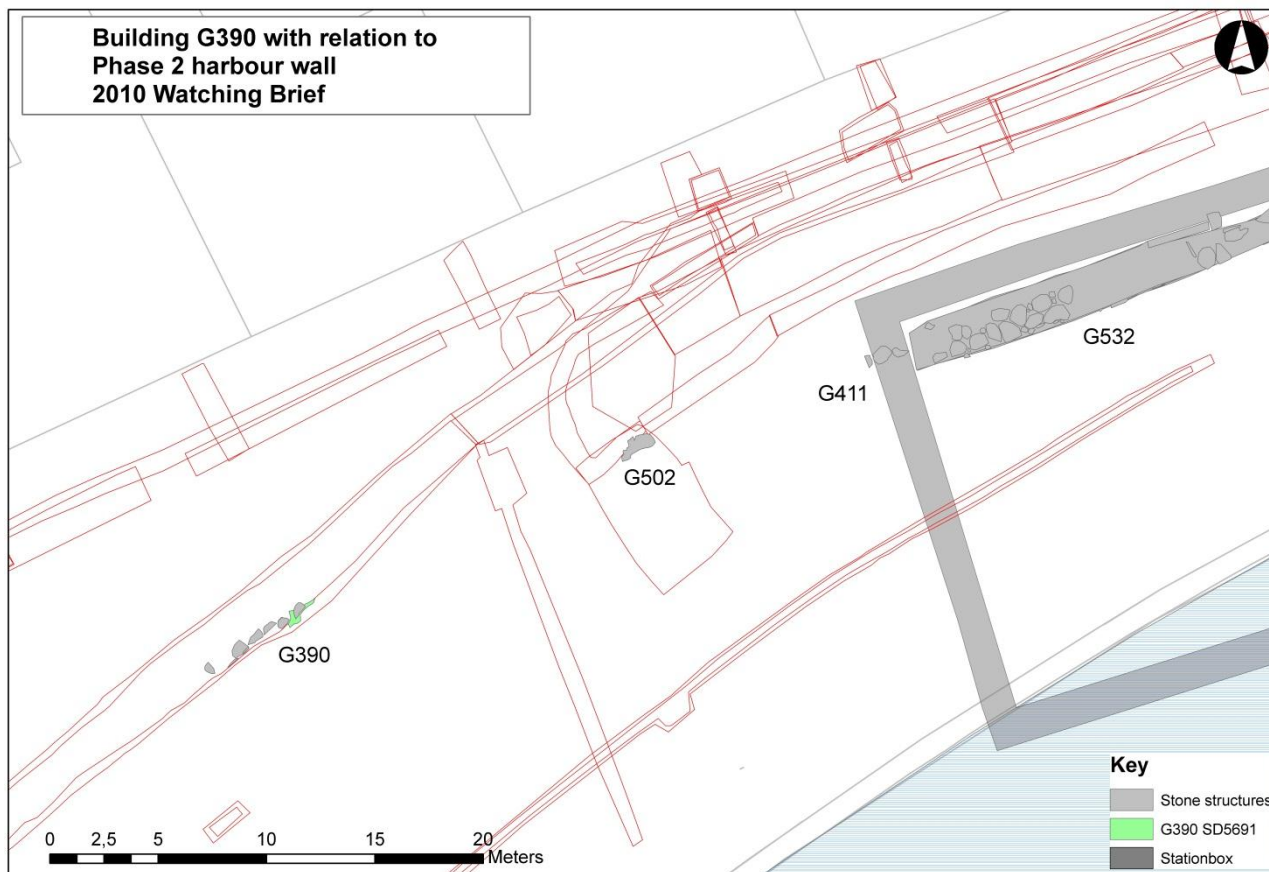


Fig. 34 Plan of building group G390 with relation to the Phase 2 harbour walls. Fig.XIII

7.1.4. Late Medieval alluvial/Harbour use deposits

Group	Sub-groups	Group name
647		Late Medieval harbour use group
678		Late Medieval harbour use group

Table 13 Groups related to the Late Medieval Alluvial/Harbour Use deposits

7.1.4.1. Introduction

The earliest deposits encountered on the Main Excavation were originally natural sand deposits later affected by human activity in the Medieval period. These deposits were found to the depth of 3.5 m below the modern surface, upon pure natural sand (G101). The sand itself was originally created in the early Holocene sands believed to be created 7000BP. For more evidence of the geological build up and creation of the soils in the area, please see Chapter 3.

Overlying the natural sand were groups G647 and G678 (see Fig 35), alluvial and activity groups comprising deposits ranging from light brown sand and silt to dark brown with components such as twigs, cess and leaves. These deposits were created before the harbour was built in the area by a mixture of dumping refuse and organic waste over the harbourside in the Late Medieval period (located just north of the excavation site), dumping rubbish from boats and by the action of fluvial activity at the harbour base. These deposits were originally pure Late Medieval deposits which were dated by finds. At the northern part of the Main Excavation trench they were “boxed in” or enclosed by the Phase 2 overlying stone harbour wall group G532 and wooden posts group G602. However the parts of the deposits that continued south of this

location were affected by later activity in the harbour such as dredging in the Early Renaissance period. This led to a truncation of the Late Medieval deposits and Renaissance finds from the late 1500s and 1600s were pushed into them

The area comprising groups G647 and G678 measured 85 m long (east-west) by (north-south) 6.11 m wide in the centre and 8.41 m at the western end of the Main Excavation trench. The deposits in the groups were generally thicker at the northern end of the site, reducing in thickness as they continued southwards. Deposits from G647 were mainly located in the central and eastern areas of the main trench and partly in the western area and Stairway trench. Group 678 was found in the Stairway trench and in the far western end of the Main Excavation beneath the bulwarks in Phases 2 and 3.



Fig. 35 Plan of G647 & G648. Alluvial and activity layers in Phase 1

7.1.4.2. Groups relating to alluvial and earlier activity

Group G647 comprised a mixture of alluvial deposits made up of both sand and silt. The deposits were located at an average depth of -2 m OD. The group measured 76 m long by 6.4 m wide by 0.3 m deep and comprised deposits SD37646, SD37913, SD40761, SD55596 and SD54707. All deposits were rich in finds material whilst also containing a large quantity of natural science remains such as oyster and mussel shells. The presence of these seashells suggests these layers may have been open to the harbour activity for a very long time. It was seen by the archaeologists that the Phase 1 deposits that were later enclosed beneath the Phase 2 wall consisted of Medieval finds only. When the deposits continued southwards they became more mixed with finds from the Later Renaissance period. This may suggest many things. It is possible that dredging has mixed Renaissance deposits in with the Medieval deposits or that the formation of the

deposits occurred in similar conditions over centuries and therefore it was difficult to see an actual change while excavating. This was only really visible in the post excavation phase when washing of the finds led the understanding of the situation.



Fig. 36 Plan of G647 and G678 and their individual deposits

The earliest deposit encountered was SD37913, measuring 3.93 m by 2.13 m and overlaying natural sand G101. The deposit was encountered in the central area of the Main Excavation trench. The light grey sand rich deposit appeared to be a natural deposit on excavation but big bag sampling revealed fragments of stove tile, glass and animal bone. That was probably due to the high mobility of the sandy layers due to the fine particles moving in tidal waters which meant that finds would be slowly buried and therefore incorporated into the surrounding deposit. The deposit cannot be seen in Fig 36 as it completely underlies SD37646 of G647.

Overlying SD37913 was alluvial layer SD37646. This deposit continued into the northern edge of the Main Excavation trench, westwards into the baulk, spreading out to the east and southwards. It most likely continued north of the station box, through the original Guide Wall trench, but this was not seen. The light brown yellow silt and clay deposit was 0.3 m thick at the very north of the site, decreasing gently in thickness as it continued southwards. It was lensed with medium compaction and comprised many oyster shells and scallop shells. The deposit measured 36 m by 6.4 m. At its northern end it contained a large quantity of near complete Siegburg stonewares, German reduced fired greywares and Copenhagen lead glazed redwares, mainly from the Late Medieval period, with some High Medieval wares. A bone needle, FO212440, for making or preparing nets was also retrieved, portraying the maritime nature of the area.

South of the area later boxed in by the Phase 2 harbour wall G532 it was noticed the finds became mixed between periods. Medieval Siegburg stoneware and redware was still recovered but large quantities of Renaissance pottery were also retrieved. Foreign wares such as Westerwald stoneware, Weser and Niedersachsen wares from modern central Germany and Majolica, faience and light and redwares from the Netherlands were present. Imported glass was also seen with various sherds of *Römerglas* and *Pasglas* from Germany and various fragments that could be from either the Netherlands or Germany. The sherds were all very large in size and not very worn. This possibly suggests that the rubbish came from the nearby area or it represents rubbish disposal that was not the result of multiple deposition. It also shows that this waste was not collected from roads as trampling by foot, animal or vehicle would have left most **Bulk Finds** appearing small in size.

Along with waste, household goods were also retrieved, with candleholders FO212787 and FO212788 representing the new Late Medieval household and combs FO213512 and FO213522 and amber bead FO 215200.

Deposit SD 40761 was located at the centre and eastern areas of the Main Excavation trench. The trench at 22 m long by 5.2 m wide comprised a sand rich deposit with stone inclusions that appeared a pure natural deposit to the excavators. Big bag sampling however revealed, particularly in the southern part, the presence of drinking vessels and window glass with Medieval and Renaissance ceramic sherds. As this area was noticed to be the area most affected by dredging, the contamination of later pottery was as expected.



Fig. 37 Pre conservation photo- Late Medieval style Copper alloy buckle FO 212829, from deposit 55596, Group 647. Museum of Copenhagen

Deposits SD55596 and SD47977 were very similar alluvial activity layers located at opposite ends of the site, at the far west of the Main Excavation and in the Stairway trench. The deposits ranged from beige to grey to white lensed sands and were heavily lensed, greatly affected by dredging. Within SD55596 were two metal finds of note; coin FO 212505 was an interesting coin as it is believed to be a copy dating to 1563 (Märcher, M. pers. comm.) from the reign of Fredrik II (1559-1588). The 1 mark coin retained the reverse design containing the 3 lions but appeared to be two pieces of metal pushed together. The small copper alloy buckle FO212829 is a Late Medieval style belt buckle. SD47977 contained no finds, and it is not known if later dredging removed them. The location near the Højbro

(High Bridge) is in an area of great building activity over the last 500 years, and may have been affected by those activities.

In total from G647, 99 Medieval ceramic sherds were retrieved, mainly located within SD37646 and SD40761. The majority were from SD37646 where 97 Medieval sherds were found. Only two were from

layer SD40761 which were collected via sieving. From the group assemblage, one Baltic ware sherd represented the Early Medieval period (1050-1250), 39 sherds could be attributed to the High Medieval period (1250-1400) and one to the Late Medieval period (1400-1550) so residual evidence was clearly visible within the redeposited soil layers. A total of 58 Medieval sherds could not be split between internal Medieval periods. The pottery was sourced between 56% from Scandinavia, heavily centred on Denmark, and represented by early redware, Baltic ware and grey ware. A total of 40% has been imported from Germany in the form of German unsourced Nearly stoneware, unsourced, Nearly stoneware from Siegburg kilns and Nearly stoneware Langerwehe type and Siegburg stoneware, Medieval type. Only 3% of sherds have come from the Netherlands and Flemish area, represented by 3 sherds. No Post-medieval sherds were found in the areas that would be later covered by G532, the Renaissance harbour wall, but due to the majority of this large deposit residing outside this area in the harbour, dredging and other activities truncating and impacting this region is seen from the results. (For more in depth analysis read Kristensen 2016a, 8-10).



Fig. 38 Nearly stoneware jug from Siegburg, c. 1250-1400, FO218598 found in SD37646, G647. Museum of Copenhagen.

The later Phase 2 truncation of these layers is represented by the presence of 171 clay pipe fragments (in the form of Dutch and English pipes and bowls) and 377 Post-medieval ceramics (in the form of later Siegburg stoneware, Cologne/Frechen stoneware, Dutch Majolica) from the later 1500s up to the mid 1600s. This large number provides good evidence of harbour activity and the effects it has on earlier deposits. For more knowledge of the Post-medieval pottery and the clay pipes see the Post-medieval pottery report by Kristensen (2016b) and clay pipe report by Pedersen (2016b).

Alluvial group G678 (as seen in Fig. 36) was located in two locations; location 1 was seen in the western area of the Main Excavation trench comprising deposits SD55781 and SD44520 and measured 12 m by 8 m by 0.5 m thick. Location 2 in the eastern area of the main trench comprised deposit SD57770 measuring 6 m by 1.1 m by 0.2 m thick. The deposits were located between 3.5-4 m below the modern surface in the eastern part of the trench and approximately 3.4 m below the surface at the western end of the trench, on average at 1.55 m OD.

As with group G647, the group comprised older layers possibly formed in the Holocene period and affected by human interaction in the Later Medieval period, and truncated in the Renaissance period. Deposit SD55781 was heavily lensed with bands of light brown silt and light grey sand. The deposit was believed to be the same as SD37646 located on the north eastside of the baulk and SD44520 located to the south. Unlike SD37646, the deposit was relatively clean in terms of inclusions and finds. It was formed directly over natural sand G101, and measured 12.4 m by 1.66 m wide by 0.5 m thick. The lensing of the deposit suggests a gradual accumulation of silt and sand at the base of a harbour or channel while the sterility of the deposit suggests any harbour structure was some distance to the N. The deposit thinned out to the south, but it was unclear if this was due to a limit of the deposition or later erosion or dredging of the channel post construction of the Phase 2 harbour wall G532. Dating of this deposit was very difficult due to the lack of finds material.



Fig. 39 East facing section showing the western stratigraphy of Phases 1, 2 and 3. Deposit SD55781 is located on the bottom right, Deposit SD44520 shown in the central area at the base. C03_20140715_11608

Deposit SD44520 on the other hand was heavily lensed comprising more organic material such as twigs and leaves as well as ceramics, leather, bone and textiles. Like SD55781 and SD37646, deposit SD44520 was very similar in make-up. It comprised inclusions consisting of twigs, leaves and pebbles which may have been moved around the harbour by fluvial activity. Sample PM212930 was analysed from the deposit, with results suggesting species prominent from brackish water conditions. These results complement the evidence seen by the archaeologists. Dating of the deposit was very difficult due to the lack of finds material, but stratigraphy suggests a Late Medieval date.

Deposit SD57770 was found overlying alluvial deposit SD47977 in the Stairway trench. The alluvial deposit consisted of dark grey coarse gravel and sand measuring 0.2 m thick. The deposit was devoid of finds, and again may have been affected by dredging.

The deposits in Group G678 contained very little ceramic evidence, perhaps suggesting better cleaning of the harbour in the Phase 1 period, or differential deposition of rubbish deposits into the harbour. This area was covered over by later phase activities so they stopped being open to the harbour by Phase 2. The small ceramic evidence consisted of some early redwares.

7.1.5. The 1500s Late Medieval harbour front

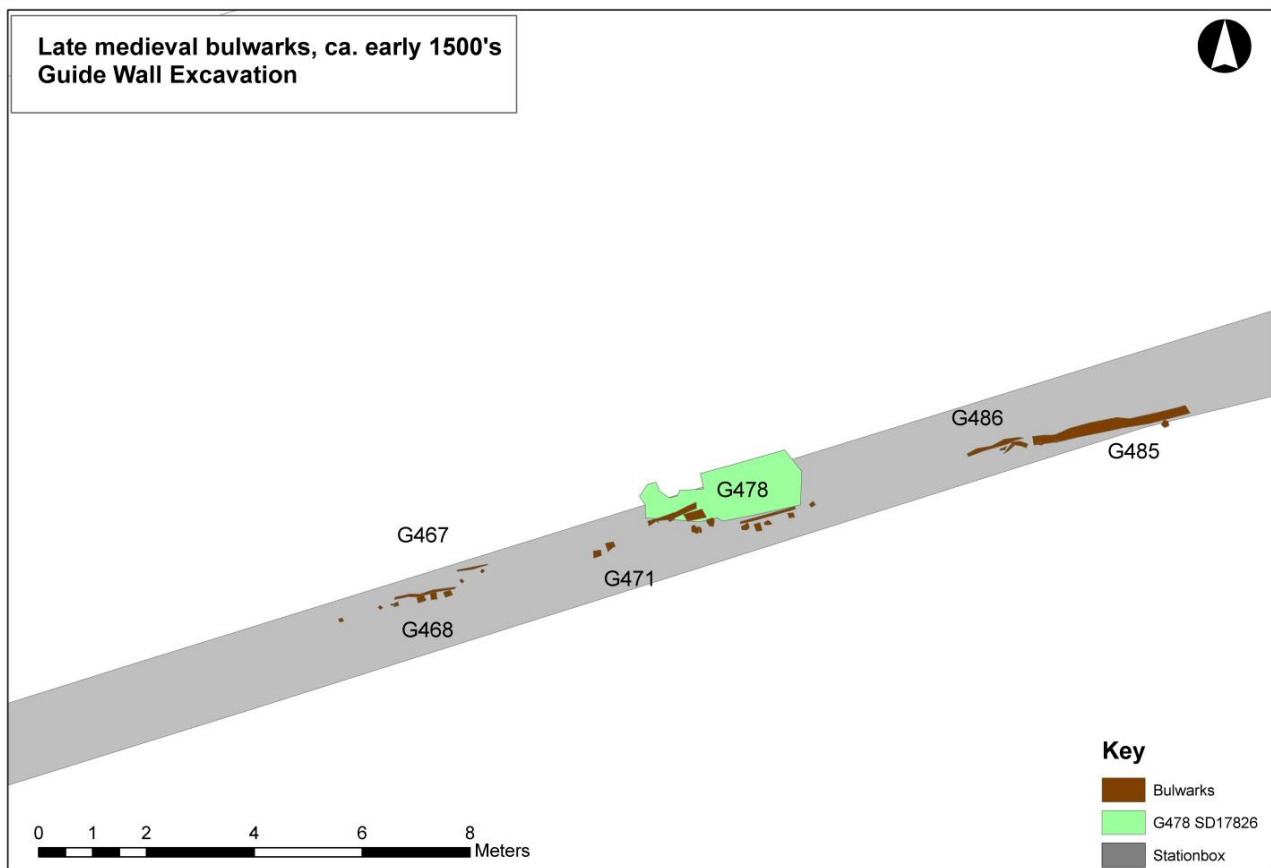


Fig. 40 Plan of the Late Medieval bulwarks from the Guide Wall trench excavated in 2012.

7.1.5.1. Introduction

The Late Medieval harbour was only found in the northeastern part of the 2012 Guide Wall excavation, in trench areas 2B and 3. The harbour remains that were uncovered were a discontinuous line of bulwarks

comprising vertical posts and horizontal planks. The groups were spread over an area 16 m long and 1 m wide. The posts were located just south of the horizontal planks, and were pushed into the ground first, with the planks then placed behind. The bulwarks were mostly undated due to bad preservation as only one post could be dated by dendrochronology. This post was found to date after AD1508, and cut in AD 1492. The harbour would have been more extensive but factors such as the inability to dig below the health and safety depth of 2 m below the surface in the trench coupled with later truncation prevented the excavators from uncovering more parts of the previous harbour.

Modern truncations greatly affected preservation in the Guide Wall trench. From the western end to the central area a large truncation had occurred by the construction of a service pipe laid in the 1900s (and reported by Smidt from the Nationalmuseet in 1902). This had destroyed an area measuring 70 m long by 1.5 m wide by 1.5 m deep on a southeast-northwest orientation.

The form of the Late Medieval bulwarks resembles Medieval harbours found all over northern Europe, with the closest example being Næstved bulwark no.7 (Hansen et al. 2005, 120-1) from the Late Medieval period. The Late Medieval bulwark style was found to comprise horizontal beams/planking held in position by posts vertically set in front. On Gammel Strand these posts were driven into the limit of excavation, so the stratigraphy below is not known, but it is expected that they would be pushed into the sand as seen in all the later bulwarks. The bulwarks had a dual purpose. They were built primarily as a harbour front but due to the land reclamation process that occurred in the creation of the harbour front, they also functioned as a barrier to hold back the newly created land. It is possible that due to the pressure and force of holding the new land in position, the bulwarks may have had two lines of posts and planks, and due to the wood rotting, were replaced every 30-50 years, as seen on the Gammel Strand excavations.

The posts and beams were fashioned from oak, and as seen with other posts and planks of this phase, they were brought from either Sjælland in Denmark or from Skåne from southern Sweden, which in this period was part of Denmark. The provenance of wood in this period differs to later phases where pine and spruce were imported from Norway and Lower North Germany or from the eastern Baltic region. The posts from this phase were also soft; they began to rot from exposure to the air and changes in surrounding conditions from when they were uncovered.

7.1.5.2. Groups belonging to the 1500s harbour front

Group	Sub-groups	Group name
467		Bulwark
471		Bulwark
478		Bulwark
485		Bulwark
486		Bulwark

Table 14 Groups related to the 1500s harbour front

7.1.5.2.1. Bulwark Group G467

Bulwark group G467 was located in the Guide Wall excavation within Trench 2B at the heights of 0.15-0.5 m OD. The group comprised 8 vertical posts set behind a horizontal beam/plank in an area measuring 2.27 m by 0.37 m by 0.3 m. The plank was further split into 2 fragments. Posts ST14222, ST14235, ST17066, ST17071, ST17168, ST17172, ST17176, and ST17180 all continued into G102, the limit of excavation. No cuts were seen as the soil was placed around the posts in later periods as part of land reclamation. The

dimensions of the posts are related to only two posts ST14235 and ST14222 as they were the only posts pulled out of the ground. They measured 2.9 m long by 0.3 m. Posts ST17168, ST17172, ST17176 and ST17189 were found to support plank ST17308 which was horizontally laid in two fragments on a NE/SW angle, approximately 1.15 m and 0.6 m long.

Plank structure ST17038 comprised two horizontal planks. The southern plank was physically linked to the posts to form a linear structure. The other plank within the group was situated 0.2 m north. We do not know if the two lines of planks represent a double bulwark harbour front or perhaps two different bulwarks, but this could not be discerned from excavation perimetres within the Guide Wall trench. Dendrochronological samples were taken for dating from ST14222 (PD18839) and ST14235 (PD203004). Dendrochronology states that post ST14222 grew from AD 1369-1492 but it was probably placed in the ground after 1508. No finds were recovered. Post ST 14235 had a similar date range from 1350-1479 with an interpretative date of after 1495. These dates fit the presumed date of the structure of the early 1500s.



Fig. 41 Bulwark Group 467 in foreground. Stone harbour wall 532 from Phase 2 in centre, with Phase 4 land tie at the top of the photo. Photo facing southeast. C19_20120924_3933

7.1.5.2.2. Bulwark Group G471

Located 1.3 m east of G467 was G471. The group comprised 2 posts ST16984 and ST166989, set in a line, and orientated similarly to the posts in Group G647. Both posts were located at 0.2 m OD and measured 0.18 m in diameter, and were pushed into the limit of excavation G102. Apart from their diameter, only 0.2 m of the post was seen due to the excavation limit.

7.1.5.2.3. Bulwark Group G478

Located 3 m east of Group G467 was bulwark Group G478. The group comprised three wooden posts (ST16865, ST17792 and ST17846), three wooden planks (ST17820, ST18132 and ST18136) and a land reclamation deposit (SD17836), located at height 0.25 m OD. The posts measured between 0.88 m and 1.02 m long by 0.13-0.2 m in diameter with the plank measuring around 1 m by 0.1 m wide.

As with Group G467 the posts and planks were split between two lines. This may relate to either a double harbour front style of bulwarks or two different phases of bulwarks. The southern line of bulwark comprised plank ST17820 and posts ST16865 and ST17792. The northern part comprised planks ST18132 and ST18136 and post timber ST17846. It was discovered that deposit SD17836 partially overlay the horizontal planks and post ST17826. It was excavated to the depth of 0.2 m revealing the majority of the deposit. It has been presumed by the excavator to be land reclamation, dumped to backfill the area behind the new bulwark. The finds within the deposit suggest a 16th Century date with *Pasglas* (FO205072) and redware present.



Fig. 42 Bulwark remains ST 17792 of Group 478. Looking south. C19_20120927_3989

7.1.5.2.4. Bulwark Group G485

The structure comprises a timber beam horizontally laid, with 3 posts vertically in the ground holding it in position. The structure measured 2.9 m by 0.15 m by 0.15 m. The posts were sunk into the edge of excavation 102. The structural design suggests a bulwark, with the purpose of holding back or securing the reclaimed land. It either links with the sea wall phase or predates it. As the beam and posts were just at the limit of allowed excavation they could only be removed and surveyed instead of being fully excavated and exposed.

7.1.5.2.5. Bulwark Group G486

Bulwark group G486 measured 1.2 m by 0.25 m by 0.15 m. The posts measure 0.2 m by 0.18 m by 0.1 m and 0.11 m by 0.24 m by 0.4 m. The bulwark was located at the average height of 0.15 m OD. The structure comprised a timber beam horizontally laid, with 3 posts vertically in the ground holding the beam in position. The posts were sunk into limit of excavation G102, and the beam lay behind them, to the north.

The structural design suggests a bulwark, with the purpose of it to either hold back or secure the reclaimed land or to act as a harbour front. As the beam and posts were at the limit of allowed excavation they could only be removed and surveyed without being fully excavated. The group may be linked to bulwark G485, or be part of the same structure.

7.1.6. Land reclamation

7.1.6.1. Introduction

The land reclamation groups correspond to the Late Medieval harbour phase uncovered in the Guide Wall excavation. They are believed to be the remains of land reclamation behind the Late Medieval harbour comprising groups G467, G471, G478, G485 and G486. The land reclamation activity consisted of one group encountered at 2 m below the surface, G515, and one group comprising a deposit found by auguring, G529.

Group	Sub-groups	Group name
515		Land reclamation group
529		Land reclamation auger group

Table 15 Groups related to Phase 1 land reclamation

7.1.6.2. Groups belonging to land reclamation

7.1.6.2.1. Land reclamation group G515

Land reclamation group G515 was located near G529 and comprised two deposits in an area measuring 7.05 m by 2 m. It was located at the height of 0.23 m OD. Deposit SD16993 measured 2.3 m by 1.55 m and SD16214 measured 1.95 m by 1.55 m. Both deposits were exposed up to 0.2 m and were found to consist of two grey brown sand and silt deposits with inclusions of charcoal, wood, bone and CBM. They contained finds of ceramics, iron, animal bone, ceramic building material and later pushed in clay pipes (2 stems).

7.1.6.2.2. Land reclamation group G529

Group G529 consisted of a single deposit, SD16580, retrieved using an auger. The augering was undertaken to find the natural sand below the 2 m limit end of excavation. Although the deposit contained no artefactual remains, organic deposits were discovered up to 0.7 m below the limit of excavation, with natural sand G101 found 1 m below that surface. The organic layer consisted of faeces and other organic substances, with inclusions of hair and wood. The layer was interpreted as a dump deposit, possibly from a former latrine. Although it contained no finds, from the depth it is presumed to be Late Medieval.

7.1.7. The 1530s harbour and harbour use

7.1.7.1. Introduction

The second major phase of activity in the Main Excavation trench occurred after the alluvial usage layers were formed, and after the Late Medieval harbour phase in the Guide Wall excavation trench.

All structures and deposits in this construction part/activity of the phase were uncovered near the lowest points of the trenches. They were either deposits that overlay or were wooden posts that pushed through the alluvial deposits from groups G647 and G678. The post groups are linked with the surrounding usage layers of the Late Medieval harbour, G667, which formed around the posts and posthole group SG668, representing destruction of the posts.

Group	Subgroups	Group name
656		Late Medieval harbour group
667		Late Medieval harbour use group
	668	Postholes, former bulwark posts

Table 16 Groups and sub-groups related to the 1530s harbour

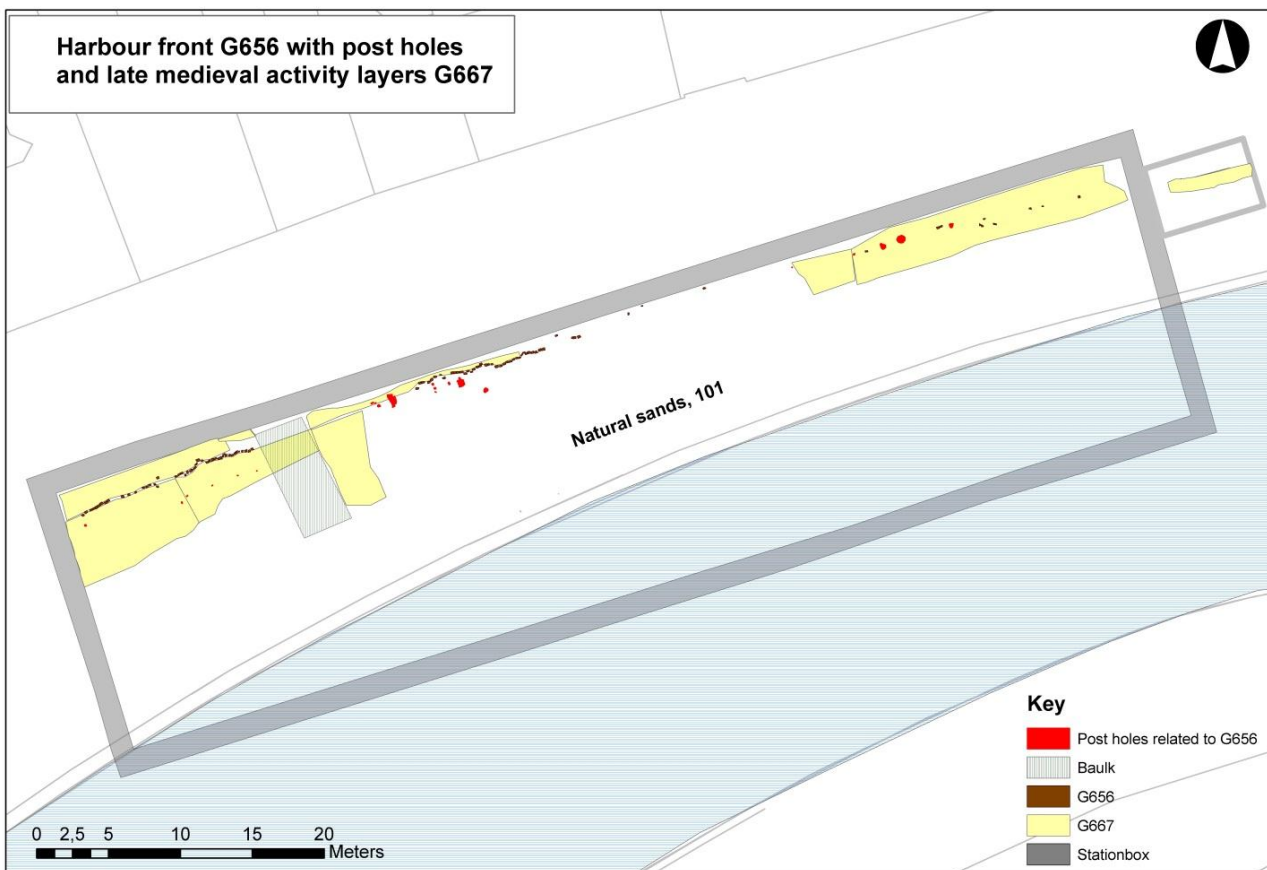


Fig. 43 Plan of the Late Medieval harbour, c.1530s. Gammel Strand Main Excavation.

7.1.7.2. Groups belonging to the 1530s harbour and harbour use

7.1.7.2.1. Bulwark G656

The posts or fence line measured circa 75 m long and were located between -0.38 m to -1.27 m OD, depending on the length of the post. Each post measured between 1 m and 2.2 m long with a diameter measuring between 0.16 m and 0.12 m. There are more of the posts located at the north western and central part of the Main Excavation trench; they are less frequent at the eastern part of the trench (see Fig 43). It was possible to follow the orientation and location of this post line from stakeholes and postholes created when the harbour was demolished in the 1570s with the creation of the Phase 2 harbour.



Fig. 44 Oak posts from a Late Medieval bulwark in the Main Excavation, central area. Part of Group 656. Note the truncated top of the posts with the c. 1580s stone harbour above, concreted into the Guide Wall. Photo looking NE. C02_20140623_10013

The group consisted of a discontinuous line of posts (ST56381, ST44396, ST44400, ST44082, ST44412, ST44550, ST215922, ST44558 and ST44751) that were pushed into the ground to the depth of 0.2 m. The majority of the posts contained tool markings, the result of production. The posts themselves were rectangular box shaped, halved in cross section with a sharpened end. They were, on average, worn, with visible old breaks. Some had evidence of makers' marks with evidence of incised lines or cuts found. One end was shaped and sharpened to be pushed into the dirty sand deposits SD40761, SD37646 and SD55781. The other end was usually flattened and squared with occasional evidence of fraying resulting from later truncation or weathering within the water; although there were instances where some posts were cut off at the top.



Fig. 45 Working photo showing post ST544550 with carpenters mark. C02_20140612_9723

One post ST44550 (see Fig. 45) contained what is believed to be a carpenter's mark which may represent the letters A and W. The carving was located on what was believed to be the north western face, although the placement of the decorated side within the harbour was probably by chance, and not on purpose. The other terminus of the post contained visible cut marks, perhaps suggesting that it was sawn and re-used in a different format as a base for Early Renaissance stone harbour group G532. The other ends of the post, the "top" end appears to have been truncated in antiquity. As they were found directly beneath stone harbour wall group G532 from Phase 2, it is presumed that they were cut in antiquity, and became part of the foundations for the new harbour wall. Other remains of the posts were found in the form of postholes and stakeholes. These are located on the same line and orientation AS Group G656, and provide an extra glimpse of the Late Medieval harbour. All of these posts and beams were of oak, with the provenance either from Hålland, Skåne or Sjælland, as seen from comparative provenance work (Daly 2016, 7).

The posts date to the Late Medieval period from dendrochronological dates. A total of 21 samples of these posts were analysed. The results suggest that the majority of the posts were either felled in the winter of 1531/2 or winter of 1532/3, with a few with only an after date of 1500. They appear to have been in use until the late 1560s when stone wall G532 was built directly above. Because the uppermost parts of the timber posts were removed in antiquity, it is not known if group G656 represent the earlier bulwark itself or the posts placed in front of the bulwark. It appears that at some point, the upper part of the post was removed, and they may have been re-used for another function, as wooden piling for the 1580s stone harbour wall. Not all the posts were reused. In some places no post is found only a posthole and backfill. Does this represent a different construction methodology or pure chance?

Also linked to this line of posts were stakehole line group G673. This group was only discovered through later postholes in the destruction phase of this harbourside. They appeared to be a line of storm posts which are thought to act as protection of the harbour front whilst providing posts for ships to be tied to.

7.1.7.2.2. Late Medieval alluvial/harbour use deposits G667

The Late Medieval alluvial deposits (SD40492, SD42912, SD42357, SD55778, SD55779, SD57774, SD55780, SC57790, SD43320, SD57711, SD57748 and SD54997) surrounding post group G656 were a collection of usage deposits and activity deposits from the Late Medieval harbour phase (see Fig.43). They are found located around the posts, north of the posts and south of the posts at approximately 4 m below the modern surface. They make up sub-group SG677. All the deposits were similar in make-up and inclusions, and as they were exposed to the water and the daily tides, they were heavily lensed with sand. As with the earliest Late Medieval deposits, they were heavily affected by later activity in the harbour with later phase finds pushed into the earlier deposits. Although this process can also be argued as long use of the deposit. Although the various deposits were very similar, they have been given separate numbers as they are truncated by activities from their dis-use to modern times.



Fig. 46 Photo of fence line 656, western area of site, looking north. The posts were pushed through the lower Group 687, with the upper sub-group G667 forming around it. C03_20140630_11289

The alluvial/harbour use group G667 was a discontinuous sub-group of deposits that continued across the Main Excavation trench and Stairway trench, near the base. The sub-group measured 86 m long, up to 8 m wide from north to south and up to 0.5 m thick. They were formed around the post group G656 as seen in the western and eastern parts of the Main Excavation trench. In the Stairway trench they were found to the

south of the Renaissance wall. They may have continued north under the wall but it was not possible to excavate in that area so this cannot be substantiated.

In the central area of the Main Excavation trench these types of deposits were not found as the Late Medieval alluvial group G647 in the form of deposits SD37646 and SD40492 continued in use. The deposits are fairly organic ranging from light brown to dark brown in colour, but still rich in sand. They differed to the deposits within underlying groups 647 and 678 which generally contained more sand. The deposits were also highly lensed reflecting the fluvial activity and long time of use in the harbourside.

The group finds assemblage comprised pottery, glass, animal bone, leather shoes, metal special finds and ceramic building material. As in groups G647 and G678, they are purely Late Medieval at the north of the trench, but become mixed with Post-medieval finds by various activities the more south they continue.



Fig. 47 profile containing sand G101 (at bottom of photo), overlain by SD55781 of Group G678, below SD55780 and SD55779 of sub-group 667 levels at western area of Main Excavation. Note that construction cut SC57441 of Phase 2 Group wall G532 truncated the upper part of bulwark G656. C03_20140624_11176

Both contexts SD55778 and SD55779 (Fig 43) were situated in the far west of the site. The alluvial layers, although rich in organic material contained no finds. Overlying these deposits was SD55780. This rich organic layer comprised many finds representing urban waste with redware and Siegburg stoneware along with many fragments of leather and animal bone. A copper alloy jetton was also recovered; FO212509, unfortunately no markings were seen on either of the faces. The large amount of straw and dung in the deposit suggests the presence of waste from perhaps stables rather than roadsides as the finds were not so trampled.



Fig. 48 Deposit SD42912 of sub-group SG667, central area of Main Excavation. The deposit overlies SD37646 of Group G647, a less organic and more sand rich deposit. C03_20140623_11124

The deposits were pure Late Medieval and very organic in their matrix. They became more mixed the more south they continued due to harbour activity. Context SD42912 (Fig. 48) comprised red brown silt and clay with the remains of straw and dung from the city. Amongst the large assemblage of finds, the deposit contained a leather and metal scabbard FO213529 (Fig. 49), a large gilded copper alloy cooking pot FO211681 (Fig. 50), and many fragments of leather shoes, late redware and Siegburg stoneware Medieval pottery.



Fig. 49 Photo of FO213528, Scabbard fashioned from leather and copper alloy. Found in SD42912, G667. Museum of Copenhagen

Sample PM213115 revealed evidence of weeds common from water meadows with no traces of cultivated plants. It is probable that the deposit comprised a mixture of rural soil combined with urban rubbish and manure, and lack of evidence for brackish weeds suggests it was hastily dumped and covered over quickly as no species common in the environment were allowed to grow within the soil. Sample PM212501 revealed the same lack of brackish water evidence from the analysis, but more remains from the urban setting with finds such as

hazelnut shells, wild strawberry, hops and single seeds from flax and grape. Sample PM212519 differed to the other two samples from the deposit as it contained rare quantities of fruits from the genera *Ruppia* and *Zannichellia* indicating an influence from brackish water and small quantities of grown/collected plants though, as shown by the solitary observations of hazelnut shells and seeds from flax as well as a single charred seed from barley (Ranreden 2016, 31). The difference within the soil deposit with the macrofossil evidence shows that various soil dumps into the harbour were not from the same location, some represent the harbour base, some household waste, and some remains from gardens or roads which show evidence of how these harbour deposits were created.

Deposit SD43320 was similar in soil matrix to SD42912 and SD55780 north of the G656 bulwark and SD54497 to the east on the other side of the baulk, but was separated due to physical breaks between the deposits. It was interpreted as an accumulated deposit (also with some dumping) but with a high degree of



Fig. 50 Cooking pot FO211681, pre-conservation. Retrieved from SD42912, G667. Museum of Copenhagen.

organic material either washing in from an unknown harbourside or deriving from an accumulation of rotting vegetation at the base of the channel. This process suggests low erosion and clean out rate. As there are no sandy lenses within the deposit it is unlikely to be a wash off type of deposit and is more likely to be a slow build up of sludge. As SD43320 was covered over with deposits in early Phase 2 the context was spared constant harbour activity and contamination with later sherds of ceramics.

Sample PM212517 from the deposit revealed some of the soil had been dumped from an earlier meadow type location as it revealed a fair quantity of plant species. This sample probably reflects the dumped material rather than the perceived accumulation in the harbour.

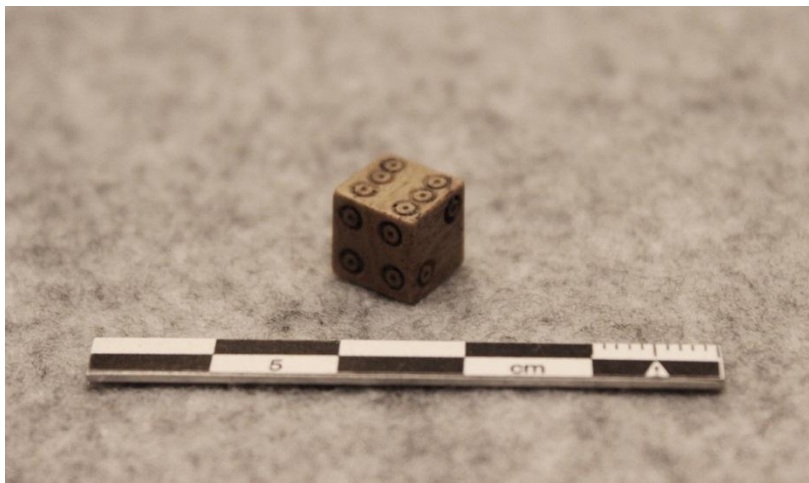


Fig. 51 FO218291. Medieval cubic bone die, with irregular numbering as opposite sides do not equal 7. Ring and dot number decoration. SD54997, G667. Museum of Copenhagen

Both SD54997 and SD40492 were affected by this harbour action. Deposit SD54997, measuring 14 m by 5 m by 0.45 m thick overlay part of SD34746 and was greatly affected by dredging in Phase 2 (1580-1620). The large finds assemblage was very mixed with the pottery date range spread over 150 years. The broad type series comprised many forms imported from the Baltic region including crudely decorated Nearly stoneware from Langerwehe (Fig. 52). The deposit contained a mixture of Medieval glass vessel types and a

fairly large sample of Late Medieval shoes representing fashion within the period.

The deposit was a mixture of harbour use and activity and was fairly organic with manure, silt and with some harbour sand. Within sample PM213535 was evidence not only of the urban environment with meadows, weeds and nuts but also sand and weeds common to brackish conditions which conformed to the archaeologist's viewpoint when excavating the deposit. This differed in comparison to PM212518, which instead was poor in plant remains from weeds and meadow species but comprised a large spectrum of grown/collected plants. This sample contained more household remains with fruits (small nuts) from wild strawberry and more solitary notations of hemp, buckwheat, prunes, cherry, grape and a single charred seed from barley (*Hordeum vulgare*) (Ranheden 2016, 30). This may point to the distinct different dumps within the harbour that show the formulation of SD54997.

The deposit was at the harbour base for Phases 1-3 so comprised a very large collection of Renaissance pottery, glass and clay pipe representing later dredging activity in the harbour. The large collection of Medieval pottery and shoes reflects the Phase 1 origin of the deposit. For the knowledge of the sheer quantity of finds relating to SD54997, see the individual finds reports in the appendix.



Fig. 52 Near stoneware from Langerwehe? Sherds from richly decorated jug dating from. 1300-1500 (FO218540). Found in SD57997, Group G667. Museum of Copenhagen

At 23 m by 3 m by 0.3 m SD40492 was the largest deposit in the group (see Fig.54), a working photo of a section). It was located at the eastern end of the excavation overlying SD44178 from G678. As found with deposit SD44178, it started as a Medieval layer created around the harbour posts G656, and capped by the Phase 2 wall G532 and post G602. South of those features were many Renaissance finds dating up to the mid 17th Century. As with SD54997, clay pipes dating to Phases 2 and 3 were found (73 clay pipe fragments) which is evidence for later dredging. From PM212497 it was discovered that the context comprised only a



Fig. 53 Fruits of coriander (*Coriandrum sativum*) found in PM212497, SD40492, G667. Photo by H. Ranheden.

few plant remains from weeds and meadow species. Instead, seeds and fruits from some used plants were more frequent, such as coriander, wild strawberry, cherries and grape, suggesting the presence of household waste discarded into the harbour.



Fig. 54 section containing SD40492 at central left and bottom right of photo. Facing NE. C02_20140624_10044 (cropped)

The earliest activity seen in the Stairway trench was posthole SC57790. This posthole was cut into alluvial deposit SD57770 from G678. It was sub-rounded in shape measuring 0.14 m in diameter. The posthole was backfilled with a mid grey sand and silt deposit (SD57794), devoid of finds. It was presumed that this represented a short-lived former timber post in the harbour that quickly backfilled when G667 was being formed.

Overlying the posthole backfill was alluvial deposit SD57748. The light white sand deposit measured 6 m by 0.9 m by 0.1 m thick and comprised few finds. The retrieval of a fragment of clay pipe from within the deposit may have been a result of harbour activity or it could have been pressed into the deposit. It was presumed that this deposit continued north under the Phase 2 wall, but because of health and safety, the wall could not be removed, and thus the deposit could not be seen.

The final deposit of this group SD57711 was a dark red brown organic and clay layer. The deposit overlay a sand rich deposit SD57748. As with SD57748, the true extent was not found due to the perimeters of the excavation. Analysis of the sample PM213538 revealed the deposit was made up of a mixture of material from both the urban environment and the brackish conditions of the harbour. It was discovered that this deposit was greatly affected by harbour activities from later phases as Late Renaissance clay pipes, glass, ceramic and stove tiles were discovered. Harbour activity was expected as the 1570s post group G602 and the wall group G532 were built into the deposit.

It is from this group that the majority of the Medieval sherds were retrieved, totalling 438 sherds weighing 16805 g, with the largest quantities within SD40492 (159 sherds) and SD54997 (191 sherds) representing a very important collection for Gammel Strand and Copenhagen. The sherds represent forms used in daily life with no obvious status evidence. The fairly large collection of drinking vessels represent the prominent beer drinking culture now becoming more visible.



Fig. 55 A rare Siegburg stoneware bowl sherd dating from 1300-1550 (FO218629) (Main Excavation, Group 667, SD40492. Museum of Copenhagen

The group assemblage was split between one Baltic ware fragment from the Early Medieval period (1050-1250), 114 sherds from the High Medieval period, two sherds from the Late Medieval period and 321 sherds dated broadly to the Medieval period. A total of only 1.37% of the Medieval sherds originated from the Dutch/Flemish area in the form of 6 sherds. A larger quantity, 40.64% of the group assemblage with 178 sherds, was from the Rhineland area of the Holy Roman Empire. Nearly stoneware types made in Siegburg, Langerwehe and unsourced kilns represented 35 sherds, and one sherd of Proto stoneware from Siegburg. The largest quantity of German types was early stoneware vessels fired in Siegburg stoneware where 114 sherds were manufactured. A total of 29 stoneware sherds were unsourced German kilns.

As expected, ceramics from Scandinavian kilns represented the largest Medieval assemblage at 56% with 246 sherds. Early redwares which were probably made in Copenhagen or the regions of *Skåne* and *Sjælland* represented 99 sherds. The larger amount was from late greywares (some of which might have been fired in Germany) which were mostly unglazed. Of interest were two sherds from the same vessel of Grafit ware originating from either North East Germany or northwest Poland, as physical evidence for trade from this area is rare.



Fig. 56 Sherds from a burnished jug with high neck, possibly Grafit ware c. 1400 (FO218647) (Main Excavation, Group 667, SD40492. Museum of Copenhagen)

The large amount of Medieval pottery was still dwarfed by the amount of Post-medieval pottery, which numbered 977 sherds. These sherds date up to the 1650s, generally with earthenwares including Majolica and faience from the Netherlands, *Jydepotte* from Jutland and stonewares from Germany. As these sherds relate to Phase 2 truncation, they will not be mentioned further in this chapter. The same is to be said for glass from the Netherlands and Germany which was also part of the Phase 2 cultural package. Along with the intrusions of Post-medieval glass and pottery, 100 clay pipes were also retrieved and they represent a later intrusion pushed into the earlier Medieval deposit.

7.1.8. Deconstruction of the Late Medieval harbour & end of Phase 1

7.1.8.1. Introduction

The destruction of the Phase 1 harbour is represented by various postholes and stakeholes which were probably part of harbour front G656 harbourside system. They functioned as either the former bulwark posts or storm posts and will be separated and discussed between the two types in two sub-sections in this section. These postholes were found in-between and around the remaining posts of G656 at heights between -1.7 m to -2.2 m OD.

7.1.8.2. Groups belonging to the deconstruction of Phase 1 harbour

7.1.8.2.1. Postholes, relating to bulwark G656

All the posts were located near the northern part of the Main Excavation trench, and were located along the western, central and eastern areas. Postholes Groups G655 and G659 were in the central western part of the harbour, with postholes groups G671 and G672 in the central eastern side or later covered over by Phase 2 harbour wall G532. The posts were between 0.16 m and 0.4 m in diameter and sub-rounded in style. The backfill of these deposits was found to resemble the surrounding soil.

Group	Subgroups	Group name
655		Postholes, formerly part of G656
659		Postholes, formerly part of G656
660		Postholes, formerly part of G656
671		Postholes, formerly part of G656
672		Postholes, formerly part of G656

Table 17 Groups of postholes related to bulwark G656

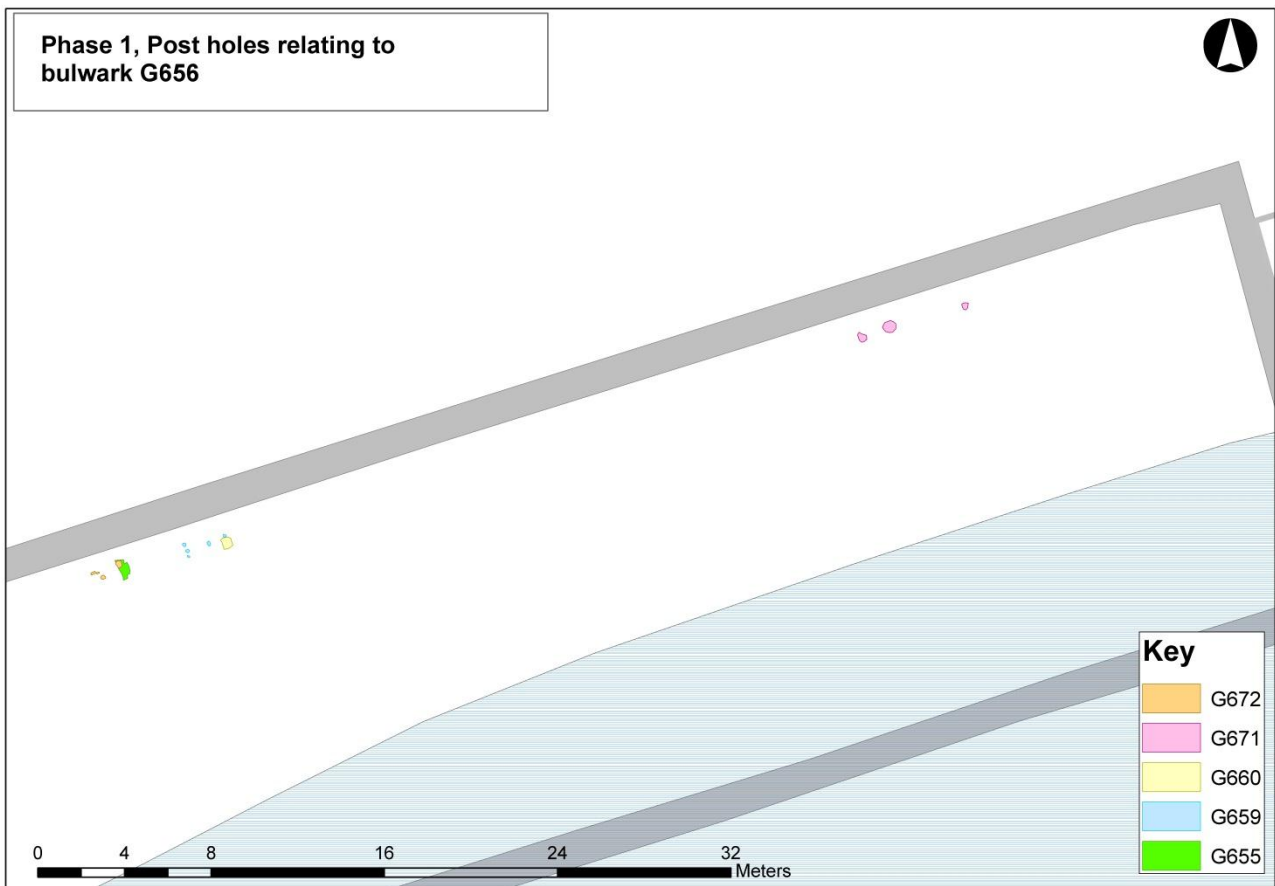


Fig. 57 Plan of postholes relating to bulwark G656

Posthole G655

Posthole G655 comprised a single cut and fill. It was located in the central western area at -1.72 m OD in the Main Excavation trench.

The posthole comprised cut SC44622 and backfill deposit SD44637. The cut measured 0.7 m by 0.27 m by 0.05 m thick, with a flat base and sloping sides; somewhat suggesting it was an impression from a stone. The backfill deposit was light white and grey sand, suggesting slightly dirtied natural sand.

It appears that the posthole may have been either a hole for a large stone, or a post. If it was for a stone, it may have been linked to the Phase 2 wall G532 overlying it. It seems peculiar that the wall here is so low and why there is so little soil build up within Phase 1 in this very small area on site.

Posthole G659

Posthole group G659 was spread over an area measuring 1.2 m by 0.71 m and at -2.24 m OD. It was located 1 m east of G672 the central western part of the Main Excavation trench. The group comprised five postholes and fills, all of the same shape and filled by dark brown silt soils. No finds were seen in the deposits.

Postholes SC45237, SC45255, SC45282, SC45256 and SC45268 all consisted of concave sides with tapered blunt bases measuring between 0.1-0.2 m in diameter with depths of 0.04 m-0.14 m. They were backfilled by SD45244, SD54255, SD45294, SD45267 and SD45281, which were all uniform in nature, and originated from the surrounding deposits, probably a mixture of SD37646 and SD54997 collapsing into the holes after the posts were removed.

Posthole G660

Posthole group G660, comprised a single posthole, located at -2.22 m OD. It was located at the central eastern part of the Main Excavation, and was linked to G656.

Cut SC45295 was irregular in shape, with an irregular base. It measured 0.47 m by 0.48 m by 0.13 m deep. It truncated the natural sand G101 and SD37646 from G647, and was backfilled by SD45321, a dark brown organic layer resembling nearby SD54997 and SD42912. No finds were recovered.

Posthole G671

Posthole group G671 comprised three postholes located in the central eastern area of the Main Excavation trench. All three postholes comprising backfill deposits that reveal the organic rich brackish nature of the environment at the base of the harbour mixed with the surrounding sand. They were located at the average height of 1.9 m OD, with an average depth of 0.25 m.

The farthest west of the three postholes was SC211266. The posthole was sub-rounded at 0.35 m in diameter with a 0.18 m depth. Filling the posthole was SD44686, a mixture of natural sand and mid yellow organic silt deposit, containing bone and a fragment of wood. The soil was reminiscent of the surrounding deposit SD40492.

The largest posthole was SC211267, sub-rounded, with a concave base, and measuring 0.66 m by 0.55 m by 0.25 m deep. The deposit comprised a mixture of natural sand and organic rich mid yellow brown silt deposit, which resembled the deposit surrounding the bulwark G656 in the area, SD40492 from G667. Within the deposit was a single redware sherd and fragment of bone.

The eastern most posthole was SC211268. The sub-rounded posthole measured 0.5 m by 0.45 m by 0.26 m thick, and was filled by SD40761, a mid yellow brown deposit with areas of natural sand. The backfill resembled SD44697 and SD44698 and surrounding deposit SD44092.

The groups of postholes are in an area directly beneath the later Phase 2 harbour wall G532. It appears that when this wall was built, three posts from the former bulwark G656 were removed, leading to an enlarged posthole, and backfilled by the surrounding harbour base deposit, SD40492 and natural sand from the harbour. This would have occurred probably in the mid 1560s.

Posthole G672

Posthole group G672 was spread over an area measuring 1.11 m by 0.5 m and were located at -1.7 m OD at the western part of the central area of the Main Excavation. It comprised four holes that have been labelled cuts but instead represent the pulling out of 4 posts that were previously driven into the ground. The deposits of these holes differ and represent backfill from the natural sand G101 seen as white sand and silt which is then mixed with red brown silt from surrounding areas. It is believed that the posts were inserted from the early 1500s, and removed in the 1560s.

SC43733 was recorded differently on site and a collection of 3 postholes was recorded with a single number subdivided by letters A, B and C.:

SC43733 A was sub-circular measuring 0.38 m long by 0.30 m wide by 0.28 m deep. It comprised a flat base, filled by SD43750, light white sand with some redware sherds.

SC43733 B was sub-square measuring 0.25 m by 0.20 m and 0.52 m deep. It had a flat base with vertical sides which was slightly angled South-North and filled by SD43800, a light grey white sand.

SC43733 C was sub-rectangular measuring 0.20 m by 0.13 m with a depth of 0.47 m. It was flat based with vertical sides and filled by SD43791, a brown sand and silt with inclusions of wood chips.

SC44512 was sub rectangular in shape, with straight sides and a tapered blunt base. It measured 0.12 m by 0.06 m and 0.3 m deep. It was backfilled with SD44579, a white sand and silt.

7.1.8.2.2. Postholes relating to storm posts

Group	Subgroups	Group name
645		Postholes, former storm post
673		Postholes, former storm post

Table 18 Groups of postholes related to storm posts

Posthole Groups G645 and G673 were differently located to the other groups. They were located south of the other Phase 1 posthole groups and harbour front G656 within the Main Excavation trench. They were backfilled with soil and finds from deposits very similar to the surrounding and overlying phase 1 deposits with some sand and weeds from the harbour. This was revealed from sample PM214836 taken from the backfill deposit SD43731. Group G645 was found in the centre of the trench at -2.16 m OD with Group G673 seen as a line of posts south of G656 at -1.73 m OD. Their location may suggest that they were storm posts to the former harbourside of G656 and postholes G655, G659, G660 and G672. It is unsure why some posts from G656 remained in one piece and in position, while some were cut and kept in place whilst others were removed and backfilled with surrounding soil.

Posthole G645

Posthole G645 comprises a single cut and fill of a posthole and was located in the central western part of the Main Excavation in the north of the trench. The location of this post, in comparison to the bulwark G656 and the other postholes relating to G656 suggest it may have been a storm post or a post from which boats were tied to whilst unloading.

The cut for posthole SC42315 was 0.32 m in diameter and 0.36 m deep, straight sided with a tapered base. It has been registered as a posthole, but resembled the activity of driving a post into the harbour. It was filled by SD42331, which resembled the overlying SD54997, dark brown organic silt. The deposit was sampled (PM214850), with the result suggesting an anaerobic environment at the base of the harbour. There was little evidence of the surrounding urban vegetation from the city, suggesting it was a slow deposition, rather than being created by a rapid dump from the city.

This group could represent many things. It could represent deconstruction of a post from either Phase 1 group G901, or one of the storm posts from Phase 2 group 900. It comprises fill very similar to deposit SD54997.

Posthole G673

Group G673 was a line of six possible storm posts at the far western end of the Main Excavation. They were not seen when excavating SD43320 from G667 but found when uncovering SD44520 from G678. The backfill consisted of deposit SD43320, which had been pushed in, and some natural sand G101. These fills occurred when the posts were pushed into the sand, dragging the surrounding soil in with them. Medieval pottery was found within this backfill. The posts were located at -1.73 m OD and spread over an area measuring 12.26 m². As with G646, the posts in group G673 were found south of bulwark G656 so may have fulfilled the same role.

The group comprises six stake or postholes which could be contemporary with the Late Medieval Phase 1. The cut numbers are SC43717, SC43722, SC43727, SC56945, SC56951 and SC212017. Cut SC43717 was straight with a tapered base measuring 0.07 m in diameter and was 0.25 m deep, it was cut into the natural sand. It was backfilled by SD43721 which resembled the surrounding natural sand. Posthole SC43722 mirrored SC43717 in shape and form at 0.08 m diameter and 0.26 m deep. It was backfilled by light white and grey silt and sand deposit SD43726. No finds were recovered, but PM214861 revealed more evidence of the environment and diet. The sample revealed very little evidence of the surrounding urban setting as both weeds and meadow species were seen. Instead, fruits from both *Ruppia* and *Zannichellia* reveal the brackish water influence to the material. The discovery of single notations of a fruit from wild strawberry and a seed from flax suggests the presence of grown or collected species from the surrounding area.

Posthole SC43727 was 0.3 m deep with a tapered base and 0.07 m wide. It is presumed it had been pushed through SD44502. It was backfilled with SD43331 a mid grey brown silt with inclusions of bone and CBM.

Cut SC56945 measured 0.3 m deep and 0.14 m in diameter, also with straight sides and tapered base. It contained SD56949 which was light grey silt and sand with charcoal, wood and bone. The deposit was sampled, with the results from PM214856 representing an organic rich anaerobic environment, which is commonly seen at the base of harbours. There was little evidence of urban vegetation, again suggesting it was a deposit gradually building up at the base, rather than an urban dump into the harbour.

Stake or posthole SC56945 was straight sided with a tapered base. It was filled by SD56955, a mid grey silt deposit with inclusions of stones and pebbles. The final post or stakehole of the group was SC212017, which was 0.15 m in diameter and 0.9 m deep, and pushed through SD43320. The cut was backfilled by SD212018, a mid red brown silt and clay with inclusions of charcoal and twigs.

It is presumed that these posts relate to G656, but there is little artefactual evidence to prove this and instead the stratigraphy is being relied upon. The similar surrounding soil and backfill deposits from the groups made identification hard. The width of these posts suggests they would not be a substantial line of storm posts unless they were connected together, by some horizontal planking. Unfortunately, with no evidence of the posts remaining, not much can be said.

7.1.9 Phase 1 conclusion

The archaeology from Phase 1 has provided new information on the Late Medieval harbourside and the surrounding area. From the natural sciences, structural remains and deposits we have information on how the area was created, used and how it looked. From the artefacts we have information on what was imported, consisting of finds that were related to fashion, religions, crafts, wealth, personal identity and trade whilst providing absolute and relative dating from the period. The finds from Phase 1 were varied. Some were of great quality, and represent an assemblage of the nearby wealthy elite. The ceramics and glass were imported from Bohemia, central Germany and the east Netherlands representing people who were able to afford more luxurious imports. Others are evidence of daily life for the perceived normal Copenhageners.

When writing about the harbourside, it should be noted that the Late Medieval harbour front phase is in reality just another intermediary harbour phase in Copenhagen's long harbour history. From c. 1200 AD and the start of the High Medieval period in Copenhagen, a new style of harbour was constructed to fit the needs of the new style of sea vessel. The change from flat bottomed vessels to caravels and cogs led to the need for deeper harbours with harbour fronts which the vessels could be tied to/or rested against. There was also a change from a barter economy into a monetary economy. The monetary economy was used with customs houses and Weighing houses that controlled the trade system. These changes provide a backdrop to the area of Gammel Strand in the 1400s.

With reference to the method statement and the project earlier aims and objectives, no physical structures were found pre dating the late 1400s, and the earliest features found within the trench were alluvial layers formed by slow accumulation at the base of the harbour. The Early and High Medieval harbours are yet to be uncovered and exist north of the excavation area. Rare remains of Early Medieval and High Medieval finds are found in very small numbers (*Pingsdorf* ware and early grey wares representing the ceramics and a large rim fragment from a ribbed beaker with applied glass threads (*Fadenrippenbecher*) (FO202612) retrieved from Phase 4 SD11091, G401. Although these objects relate to the Phase 1 period, they were all residual in later deposits in later phases, which portray the occasional mixing of deposits and secondary deposition.

7.1.9.1. Harbour construction

This phase also seems to have two phases of harbour construction, which differs with later phases. The earliest harbour front dates from the late 1400s/early 1500s which unfortunately was only visible in the northeastern part of the Guide Wall excavation. Unlike the bulwark G656 Main Excavation, the earliest harbour fronts could only be uncovered for approximately 0.2 m at the base of the trench, and not fully seen. The location of the Phase 1 posts in the Main Excavation trench up to 3 m south of the bulwarks has led to the belief that they represent different harbour fronts, as the distance between them is much greater than the distance between posts in other phases. Construction of the new metro station box has removed any link between the two harbour fronts which may have provided the answer.

7.1.9.2. The Buildings

The two buildings G389 and G390 uncovered from the 2010 watching brief have been attributed in the past to the *Vejerhus* and *Accisehus* which have been recorded in documentation from the Late Medieval period

as being present on the harbourside. Neither of these two structures, or rather three due to the small wall G273 found beneath G389, can be conclusively attributed to either the *Accisehus* or *Vejerhus*. What we can say is that G389 represents a wealthy structure on the harbour front.

Structure G273 represents a wall on a different orientation to G389 and the finds in the area suggests it was part of a Late Medieval structure. The size of G389 i.e. the width of the load-bearing foundations suggest that this could have been a two storey building. The scale of the structure, the wooden floors, basement, finds and imported luxury goods suggests that the inhabitant had the ability to furnish the building to a degree of wealth in the Late Medieval period which could signify an important person or official living in the area.

Structure G390 interpreted as the *Accisehus* comprised only of large boulder foundations which suggests the base of a wealthy structure. No overlying remains of the structure were found, so it has been removed in antiquity. The size of the boulders suggests it could support a large wall. No other information can be attributed to the wall though.

The harbour went out of use in the 1560s with the construction of the new harbourside directly above. Part of the bulwarks were removed and are seen as postholes whilst some were cut at 1 m from the base of the post and became part of the new harbour. By this time the Late Medieval harbour had served its use, and was to be replaced by something more important and better built.

7.1.9.3. The harbour base issue

The Late Medieval alluvial deposits chart the gradual movement southwards of the harbour, which is seen in the northern and central parts of the Main Excavation trench. These deposits were a real mixture of both sand from the base, and silt and rubbish from the city. The closer the deposits were to the town, the richer they were in quantity of finds. The problem with these deposits was that they became more mixed the further south they went. The depth of the harbour needs to be maintained to enable easy passage for ships, this is achieved by dredging. This process was ongoing to the south of the harbour front so deposits that formed in these areas would get contaminated with later artefacts pushed into the deposits. The greater the weight of the find, the more likely it would sink in. These deposits were more secure when situated north of the harbour front or, as with the Phase 2 wall group G532, “boxed in” by later constructions. It is from these areas that we can use dendrochronology to provide secure dates from the period. It was deemed that we should treat all these earlier alluvial and harbour use deposits as starting in the Late Medieval period, and therefore part of Phase 1. It was also important/deemed necessary to include the Post-medieval finds because the upper parts of the deposits have been affected by dredging, which has reduced them in size and mixed them with finds from Phase 2, whilst still retaining the original period of build-up.

7.1.9.4. Conclusions from finds and natural sciences

Phase 1 ceramics

Even though the Medieval pottery assemblage from Gammel Strand was quite small, it is considered as large for Copenhagen due to the general lack of ceramics from this period. As Kristensen writes (2016a, 17) the assemblage comprised a total of 537 Medieval ceramic sherds from the prioritized groups linked to Phase 1. The date range of the ceramics extends across the entire Medieval period but the majority are

from c. 1200-1450. Only one sherd of Baltic ware is datable to the earliest part of the Medieval period (c. 950-1250) (FO218593). The Late Medieval period is also only represented by a few sherds e.g. Dutch redware, although many of the Medieval sherds could not be split between High Medieval and Late Medieval and it is presumed they had a long phase of use between 1250 and 1500.

In general, the Medieval ceramic assemblage from Phase 1 dates from 1400-1560s, with a few High Medieval and Early Medieval sherds. The majority of the imported ceramics came from Germany, in particular the Rhineland area. The locally made wares were mainly redwares from *Skåne*, *Sjælland* and perhaps from kiln sites yet to be discovered in Copenhagen. The form types from this period are mainly pots, jugs and drinking vessels with a solitary Siegburg bowl fragment. The truncation of these deposits is represented by the Post-medieval ceramics which represent nearly three times the amount of Medieval sherds at 1,355 ceramic sherds. These sherds mainly dated from the late 16th and throughout the 17th Centuries. The Early Post-medieval sherds mainly came from Jutland (*Jydepotte*) but German and Dutch imports are also very common amongst some locally produced ceramics (Kristensen 2016b, 20).

Phase 1 glass

The glass artefacts tell a similar story to the ceramics but in smaller quantities, probably due to its fragility. There were only about a dozen Medieval glass finds which is 4.5% of the total prioritized glass assemblage. Six of these belong to the Bohemian tradition dating to the 14th and 15th Centuries whilst the others represented styles made in Western Germany in the late 15th and early 16th Centuries. The majority recovered from Phase 1 dates from the late 1500s and early to mid 1600s in the form of *Röemer glass*, *Pasglas*, beakers as well as normal bottles. These finds are evidence of the dredging of the Late Medieval deposits in the harbour and represent material used in Phase 2 and 3.

Phase 1 clay pipe problems

A total of 273 pipe fragments were recovered from alluvial groups G647 and G667. These finds were later intrusions due to the effect of dredging in the harbour from Phases 2 and 3. As they do not physically date to the Phase 1 period dates, they do not warrant further discussion. Clay pipes were imported into Denmark in the early 1600s (Phase 2 on Gammel Strand) and thus represent a later intrusion.

Phase 1 molluscs

The mollusc remains are also mainly common in the Danish landscape, many of which inhabit the brackish Baltic waters expected in the harbour and surrounding areas. The most common species were cockles, mussels and periwinkle. Oysters were sparse, but some had been brought in for consumption. Of particular note was the soft shell clam which indicates a sandy base to the harbour. The Zoologisk Museum states that the species is invasive in Danish waters as it is naturally occurring in America. It was first described in Europe in the 15th Century. With the later Phase 2 contamination of some harbour alluvial deposits, especially SD54997, it is believed that this may represent a Phase 2 intrusion into Phase 1 deposits.

Phase 1 fish bones

The natural science remains, with the exception of the dendrochronology analysis, revealed evidence mainly related to the environment and diet. The animal and fish bone comprised a total number of 8799 fragments equalling 10,940 grams of fish, bird and mammal bones from the two groups in this phase, SG647 and SG656. The Zoologisk Museum identified a minimum of 57 species comprising at least 15 species of molluscs, 23 species of fish, 8 species of birds and 11 species of mammals. All of the identified

species are common in Denmark today. The fish and mollusc remains represented 71% of the Phase 1 assemblage, with herring, as expected, dominating the period remains (47% of the fish species). The fish were mainly from saltwater areas, and after herring, Gadids (whiting, cod etc.) were the second most popular types representing 35% of the assemblage, followed by flatfish. Freshwater fish comprised pike, trout and salmon, but their number was small. Of interest were the findings of true sardine (European pilchard) and lump sucker fish, which had not been found in Copenhagen in this period before.

Phase 1 animal and bird bones

The animal bones comprised a larger quantity of domestic animals in comparison to wild species, with pig, cattle, sheep and goat well represented. Birds were also present, with hen remains accounting for 57% of the bird remains and goose at 37%. The animal and bird species were very indicative of an urban diet and represent what was to be expected in Copenhagen in this period.

Phase 1 macrofossil remains

Of the 11 samples undertaken in Phase, there is a real mixture within the assemblage. Some samples represent the dietary evidence of the city, some the urban landscape and some the brackish water environment. What is of interest is that samples reveal evidence of different dumps within each alluvial harbour deposits. This was especially seen within deposit SD54997, where PM212518 comprised a large spectrum of grown or collected plants, which was not seen in the same quantity in PM213535, which instead comprised more evidence of brackish waters with some weeds representing the surrounding landscape.

Ranheden (2016, 17) writes that in Phase 1 there is a number of species that did not occur in the other phases. Such notations are weeds and meadow species such as: *Agrostemma githago* (corncockle), *Chenopodium hybridum* (goosefoot), *Scleranthus* sp. (knotweed), *Veronica* sp. (speedwell), *Potentilla anserina*, (goosewort) *Rumex acetosa* (common sorrel), *Cerastium fontanum* (mouse-ear chickweed), *Potentilla argentea* (silvery cinquefoil) and *Ranunculus auricomus* (Greenland buttercup).

He states that these are weeds and meadow species which are lacking in samples from later phases and may give a hint of a diminishing rural landscape aspect as well as a decreasing emphasis on an extensive land use economy. This is supported by other remains such as *Daphnia* sp. (water fleas, which are small planktonic crustaceans, not plants), *Hottonia palustris* (water violet) and *Potamogeton* sp. (pondweeds). These findings are related to harbour use and alluvial deposits. The provenance of these plants and seeds points to a Northern European setting, which is largely supported by the artefactual evidence from Phase 1. Only some Fig remains point to imports from the Mediterranean.

