

### 7.4.3.3. Bulwarks

#### 7.4.3.3.1 Introduction

The groups and sub-groups interpreted as part of the Phase 4 bulwarks.

Group	Sub-groups	Sub-groups	Group name
626			Bulwark
	604; 606	618; 706	Western part of bulwark, G626: bulwark, storm posts, livewell, repair
	712; 713; 595	637; (630); 714; 715; 661	Eastern part of bulwark, G626: 1 <sup>st</sup> building phase, 2 <sup>nd</sup> building phase, storm posts, deconstructed posts, (Usage – see sub-chapter 7.4.3.5.), cut and deposits south of bulwark, repairs

Table 43 Groups and sub-groups related to Phase 4 bulwarks

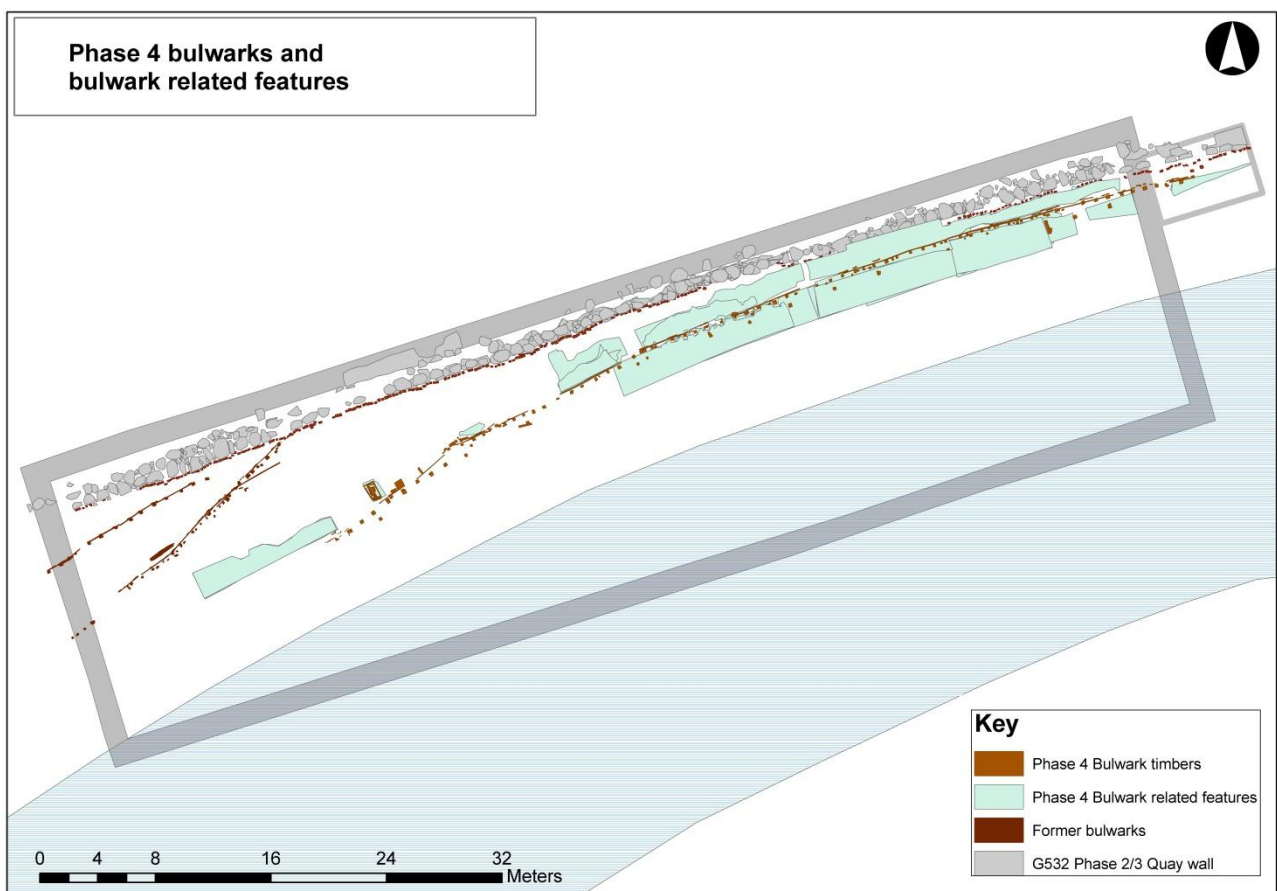


Fig. 218 Plan of all Phase 4 bulwark related structures and features

The Phase 4 harbour front consists of more than one bulwark building phase and has furthermore been split into more groups and sub-groups due to different excavation methodologies.

The westernmost exposed part of the Phase 4 bulwark was only partly excavated during the 2014 Main Excavation and was grouped as SG604, while the easternmost parts were documented in more detail and originally grouped as G626. Likewise the storm posts grouped as SG606 and SG595 were probably parts of the same overall storm post structure in the western and eastern end, respectively. Late in the

postexcavation process G626 was split into an earlier and a later construction phase, defined as sub-groups SG712 and SG713 respectively. The division into an earlier and a later building phase is based primarily on the later part being relatively well-preserved and evenly structured, while the earlier parts seem to have survived as single posts in between the later ones. Stratigraphical observations were not documented for all timber elements and other construction parts, but in the instances they were, the stratigraphy supports the division. Likewise, a series of dendrochronological samples from selected posts and other bulwark elements were analysed and support the division, though far from all posts are dated.

The exposed eastern part of the Phase 4 harbour front consists of an almost invisible first building phase, SG712 (including postholes from deconstructed posts, SG637), which had been almost entirely replaced by SG713, the later bulwark. A number of repairs of the later bulwark have been defined and sub-grouped individually.

When dealing with the bulwark structures, the biggest challenge was the continuous reuse and incorporation of timber built structures into later structures as well as the problems of observing the stratigraphical relationships between driven in posts and planks and the deposits into which they were driven.

### 7.4.3.3.2 The western bulwark group

#### *Bulwark and storm posts SG604 and SG606*

SG604 and SG606 constituted the western parts of a large bulwark structure consisting of a construction cut and backfill and a row of storm posts, bulwark posts, horizontal batten planks as well as vertical bulwark planking. The bulwark structure and related features extended out of the excavation area towards south and west and continued as SG712, SG713, SG595 (all likewise related to G626 Phase 4 bulwark) towards the east.

Due to many later truncations as well as limited excavation and recording conditions in this part of the Main Excavation, not all parts of the structure have been interpreted fully. It seems clear that the bulwark has undergone a number of repairs and strengthening, but the course of events cannot be clarified in detail on the basis of the documentation material.

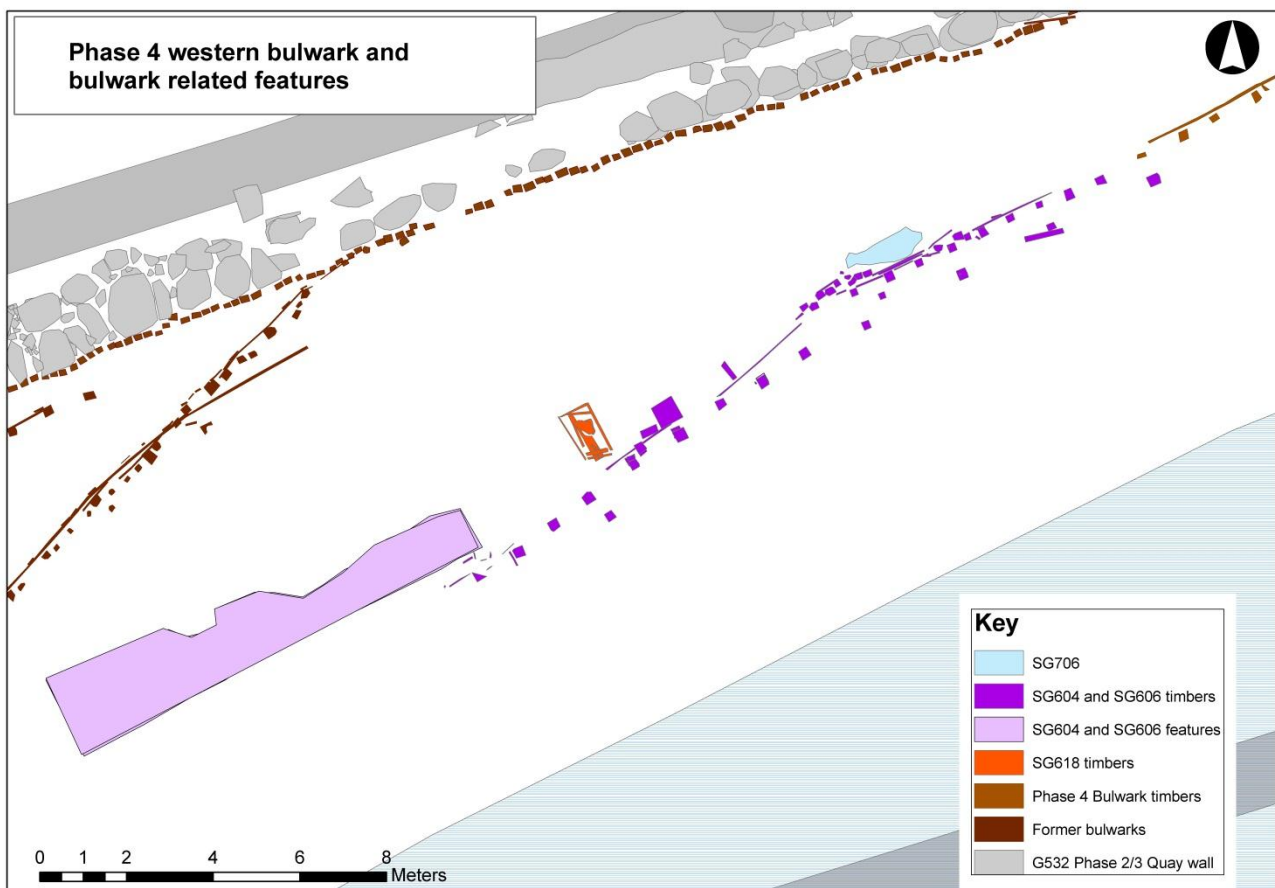


Fig. 219 Plan of Phase 4 western bulwark and related features

The southwestern end of the group SG604 consisted only of partly exposed construction cut SC44726 and backfill deposit SD36221, both extending into the unexcavated area in the SW corner of the Main Excavation trench. The presumed timber built bulwark structures south of these would have been placed beyond the southern limits of the excavation area. Moving further east, parts of the actual bulwarks were excavated within the Main Excavation trench.

The storm posts, SG606, consisted of 16 timber posts (ST47079 was used for several posts, ST26519, ST26773, ST26515, ST26511, ST53913, ST53905, ST53897 and ST36258) of which two were placed a little out of the row (ST47079 and ST53897), while two others were related to other, later structures, due to them being reused in-situ (ST34670, related to Phase 5 land tie, G615 and ST28739, related to Phase 5, "Fiskegangen", G583). The timbers interpreted as storm posts were in general stout posts with square cross sections, measuring approximately 0.26 m by 0.26 m. The posts all leaned slightly towards NNW. Where the storm posts' lengths were measured, these were found to be 2.83-3.02 m in length. The row of storm posts changed direction slightly, as in the western end the row was NE-SW-oriented with a deviation towards ENE-WSW, while further east the orientation was closer to ENE-WSW. This corresponds well with the change in orientation seen in the Phase 4 land ties north of the bulwark. Attached to a storm post near the eastern end of the row was a horizontal beam, ST36991. It is not clear, which purpose this served or if it was even an original part of the bulwark structure.

The bulwark posts were not preserved at the westernmost end – plausibly due to later constructions having removed them (G589 and G533, both Phase 6). Where the bulwark posts were preserved, they comprised a straight line of 10 evenly dispersed boxed heart timber cut posts with square cross sections (ST53917, ST53901, ST53893, ST53889, ST36270, ST36266, ST36262, ST23962 and ST23958, related to SG604, as well as ST34666, which was however related to a later structure, Phase 5 land tie G615, due to it being reused in-situ). The line of posts was orientated ENE-WSW and measured 7.3 m long.



Fig. 220 A section of the bulwark, showing storm posts ST53905 and ST53897 and bulwark posts ST53901, ST53893 and ST53889 with the later shoring/planking ST37030 in between. Behind this, batten plank ST37023 and additional bulwark posts ST36017, ST36022 and ST36027 are seen. Looking NNW. C03\_20140512\_10237

Behind the western end of this section of the bulwark, a 1.8 m long, uneven or bent line of eight closely set posts was recorded (ST53992, ST42524, ST42529, ST37094, ST36006, ST36017, ST36022 and ST36027). The posts were vertically set but differed from the other bulwark posts in cross section as most of them were rectangular and generally smaller than the more evenly dispersed posts. On the north side of ST42524, ST42529 and ST37094, five vertical planks (ST39755) appeared to be part of the structure. The fact that the eight posts were placed irregularly and so close to each other indicate that their purpose was to strengthen the bulwark and this is supported by the fact that the bulwark changed direction here. The posts are then evidence of a later repair. Further east, three other posts (ST42535, ST42542 and ST36274), which were placed within the evenly dispersed row of square bulwark posts, were likewise interpreted as repairs or strengthening. These should possibly be seen in connection with the establishment of a wooden drain pipe (G206, Phase 4), which appeared to have had its outflow in the bulwark line. The interpretations as repair posts are however problematic, as no repair cuts into the landfills on the north side of the bulwark were documented.



Fig. 221 Bulwark posts ST36270, ST36266 and ST36262 with batten planks ST36999 (the upper plank removed). In the foreground storm post ST36258 with attached beam ST36991. Looking NNW. C03\_20140512\_10223.

Near the western end of the row of storm posts were a number of vertical planks, interpreted as parts of the bulwark planking (ST47137, ST47160 and ST39740). These leaned heavily towards the southeast and may have been pushed outwards, when later structures were built above them, and were therefore not fully preserved in-situ. Further east, the vertical planks were supplemented by horizontal planks (ST27172 and ST37076), interpreted as the lower batten of the bulwark. Where the even line of square bulwark posts was seen, both horizontal batten planks (ST37023 and ST36999) and vertical planking (ST53926, ST37015

and ST36278) were preserved. It is however clear that only the lowest part of the bulwark structure is preserved and must have been heavily truncated by later constructions, e.g. the establishment of the Phase 6 quay wall.

The bulwark structure continued further ENE, but due to differences in excavation conditions it was here given other group numbers, SG712 ad SG713 (both related to G626, Phase 4 bulwark) with storm posts SG595.

### **Dating**

The structures SG604 and SG606 were not able to be dated either by dendrochronological analysis or by retrieved finds materials. However, due to the group's clear relation with the eastern bulwark groups SG712, SG713 and SG598 as well as with the land ties found north of the bulwark, it seems reasonable to place the structure within Phase 4. It is not clear if the excavated structure is actually the first version of the bulwark or a renewed version of it – or even fragments of both – but as there are indications of a long usage period, the first parts of the group may have been constructed already in the late 17<sup>th</sup> Century, with use and repairs continuing through the 17<sup>th</sup> Century and into the beginning of the 18<sup>th</sup> Century – including the construction of a livewell, SG618.

### *Livewell SG618*

The contexts related to SG618 were excavated during the 2014 Main Excavation and located in the south-western part of the Main Excavation trench. During the post excavation process it became clear that this structure would have been related to the western part of the Phase 4 bulwark, SG604/SG606. SG618 was located on the northern side of SG604, 0.35 m NW of bulwark post, ST26519.

The main part of SG618 was a rectangular, box-shaped timber structure consisting of a plank base, plank walls and a lid. The base was not surveyed, but seemed to comprise two large planks placed horizontally next to each other. Placed on top of the base planks was a set of plank walls on the western, northern and eastern side, ST35468. The planks of these walls were all made of oak and each approximately 0.4 m wide and 0.04-0.05 m thick and set on edge on top of each other in two courses. The western and eastern wall was placed against the two ends of the northern wall and kept in place with large nails. The surveyed top-levels of the plank walls were approximately OD – 0.50 m at the north end and – 0.65 m at the south end. The length of the whole structure (NNW-SSE) was 1.28 m and the width approximately 0.78 m. The depth of the plank walls was recorded as 0.8 m. Inside the box was a set of wooden strips (0.02 by 0.05 m in cross section and 0.78 m long) placed vertically, near the south end of the western and eastern walls respectively. The purpose of these was not completely clear but they may have kept either the lid (see below) in place or facilitated that the south side of the structure could be slid up and down to enable the box to be emptied for its contents. On the outside of the box six planks were described as keeping the box structure in place – two on each of the western, northern and eastern sides.



Fig. 222 SG618 seen towards NNW. Loose timber parts placed next to the box. C02\_20140513\_9378 (cropped)

The south side of the structure was constructed from planks of which the upper parts contained a large number of holes drilled into it. The holes were circular and approximately 0.03 m in diameter. This upper part of the structure was truncated by later activities and the plank fragments, ST36860, were found *ex situ* in the inner fill of the structure, SD36137, while the lower part, with no drilled holes, seemed to be intact but not surveyed. Though it is not completely clear how the box structure was related to the bulwark, SG604, it seems that the south side of the box is in alignment with the bulwark planking of SG604, which could indicate that the two structures are interrelated.

Found within the upper fill, SD36114, were timber fragments, ST36162, which were interpreted as parts of a lid of the structure. When put together these formed a large proportion of a plank lid with an almost circular hole in the middle.

Located on top of the base planks of the timber box, was a circular feature interpreted as the remains of a bark container (ST53930). No sample was taken of the

material for the container, and from the photos it appears to be made at least partly of thin wood rather than bark, but this cannot be ascertained.

The deposits located within the box were recorded as SD209627 being the lowest, placed on top of the plank base, except for where the bark container was placed. The 0.02 m thick deposit consisted of dark brown-black silt and organic material from which no finds were collected. Above SD209627 was SD36137, described as brown-grey silt and sand including stones and wood and from which a few finds were collected but not prioritized for registration. This deposit seemed to be part of the deconstruction of the box and thus not directly related to the use of the structure. Overlying SD36137 was another deconstruction deposit, SD36114, consisting of grey-brown silt and sand with a large proportion of stones and CBM. A series of soil samples were taken from the deposits, but were not prioritized for analysis due to the numbering and relations of the structure being unclear.

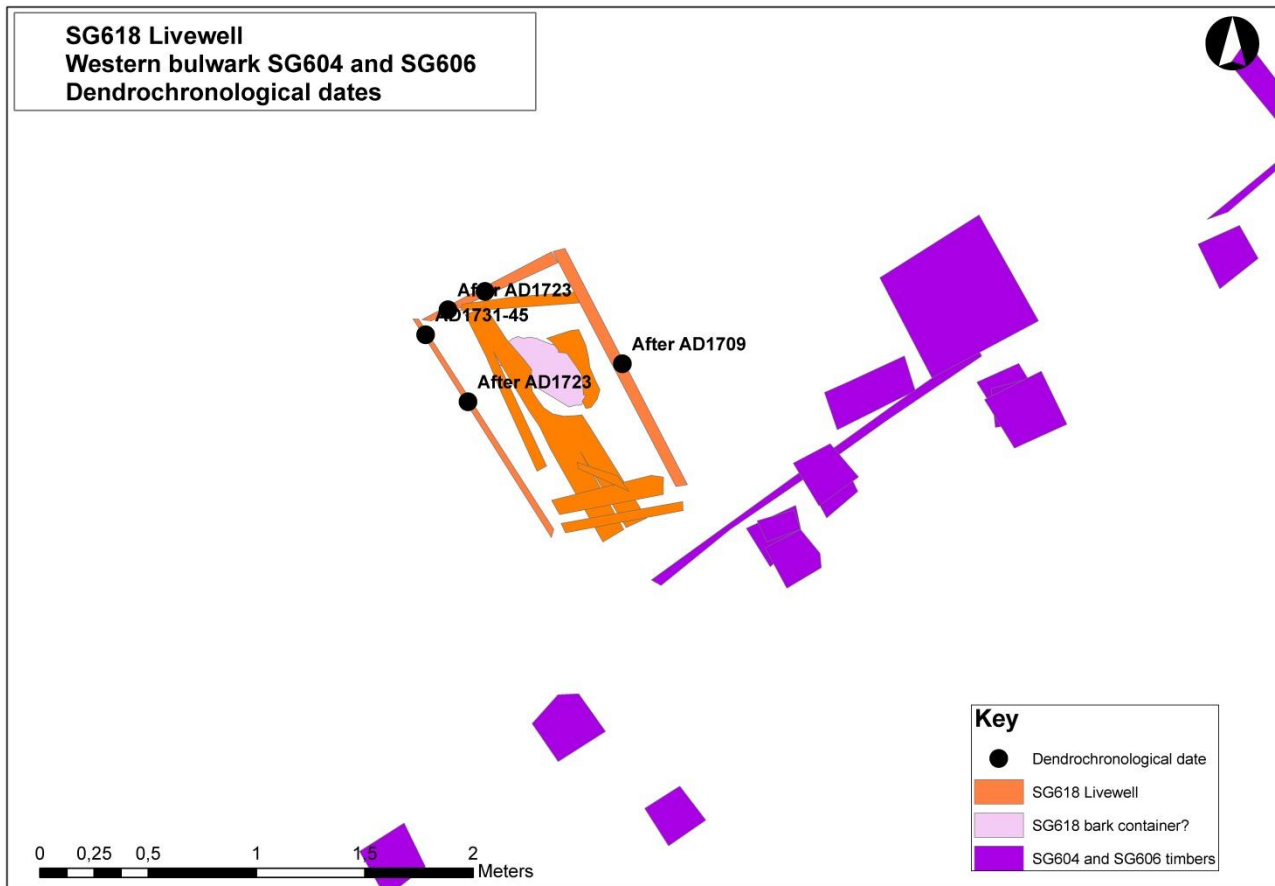


Fig. 223 Plan of SG618 livewell and relation to Phase 4 western bulwark, SG604 and SG606

Related to G618 was also a presumed construction cut. Only the southern edge seemed to be preserved as truncations made by later building activities had disturbed the rest of the cut, or at least it was not visible and thus the surveyed polygon seemed to have been based on assumptions. The cut was recorded as truncating deposit SD32429 of G598 (Phase 4, land reclamation), but as this deposit did not extend this far south, it is not clear how this could should be seen at all. From the post excavation assessment of the structure it seems more probable that this structure was built into the Phase 4 later bulwark, which is supported by the dendrochronological analysis of the timber elements.

Structure SG618 is interpreted as a partly deconstructed livewell for storing fish. Though the construction sequence is not very clear, it seems probable that the box was built into the north side of the Phase 4 bulwark, when this was changed in the middle of the 18<sup>th</sup> Century. The structure was preserved from OD - 0.50 m to approximately -1.35 m and only the south side of the structure was equipped with holes for the water to pass through, supporting the interpretation that this was a “built-in” structure. The bark or wood container excavated at the base of the structure may have been a bucket or barrel used to hoist fish in or out of the livewell, using the circular hole in the lid or roof of the structure.

**Dating**

From G618 five samples from the timber box structure ST35468 were analysed by dendrochronology. Samples PD209291 and PD209293 had felling dates after AD 1709, while PD209290 and PD209360 were felled after AD 1723. PD209289 returned a more accurate felling date: AD 1731-45, corresponding with the



results of the felling dates for timbers used in the Phase 4B land ties as well as the later building phase, SG713 of the Phase 4 bulwark, G626.

The livewell structure was later truncated by the driving in of posts belonging with the timber and concrete structure, G589 (Phase 6, quayside), which was dated by dendrochronology to AD 1868. However, it is assumed that the structure went out of use before then, as the Phase 5 waterfront in this area was placed approximately 1.8 m further south than the Phase 4 bulwark, to which G618 seem to belong.

#### *Repair? SG706*

Repair group SG706 consisted of one cut, SC37620, which was recorded as an ENE-WSW oriented irregular shaped cut. The cut measured 1.88 m long by 0.6 m wide by 0.9 m deep. The southern edge of the surveyed cut ran along the northern side of the preserved parts of bulwark SG604, north of posts ST36022 and ST36027 and planking ST37015. The cut truncated the southern end of Phase 4A land tie, G608, and also possibly the southern end of the anchor beam belonging to Phase 4B land tie G705. The cut was filled by an unrecorded deposit consisting of dark clay and sand. Towards the bottom a number of larger stones were seen but not recorded. The feature itself was cut by the construction cut, SC22510, for Phase 5 land tie, G615.

Although not fully documented SG706 was similar to construction cut SC39183 further east, related to the later construction phase, SG713 of bulwark G626. This was likewise filled by stones, SS38692, near the base of the cut and seemed related to the reworking of the Phase 4 bulwark. Similarly SG706 may thus be a cut made for a set of new bulwark planks and may in fact be directly related to the section of vertical planks recorded as ST37015 (SG604). However, as no stratigraphical observations between SC37620 and ST37015 were recorded, this cannot be proven.

Repair group SG706 could not be dated, however, from stratigraphical observations it is clear that SG706 was made after the construction of Phase 4A land tie G608 and maybe also after the Phase 4B land tie G705, and before the construction of Phase 5 land tie, G615. With all probability this places SG706 somewhere in the middle of the 18<sup>th</sup> Century or the first two decades of the 19<sup>th</sup> Century.

### 7.4.3.3.3 The eastern bulwark group

The eastern part of the bulwark consisted of more than one construction phase. The earliest phase, SG712 was almost invisible and comprised the sub-group SG637 of deconstructed posts, along with a number of bulwark posts. The later construction phase, SG713, differed, and instead comprised a large construction/repair cut, 50 evenly dispersed bulwark posts as well as horizontal and vertical planking on the north side of the bulwark posts.

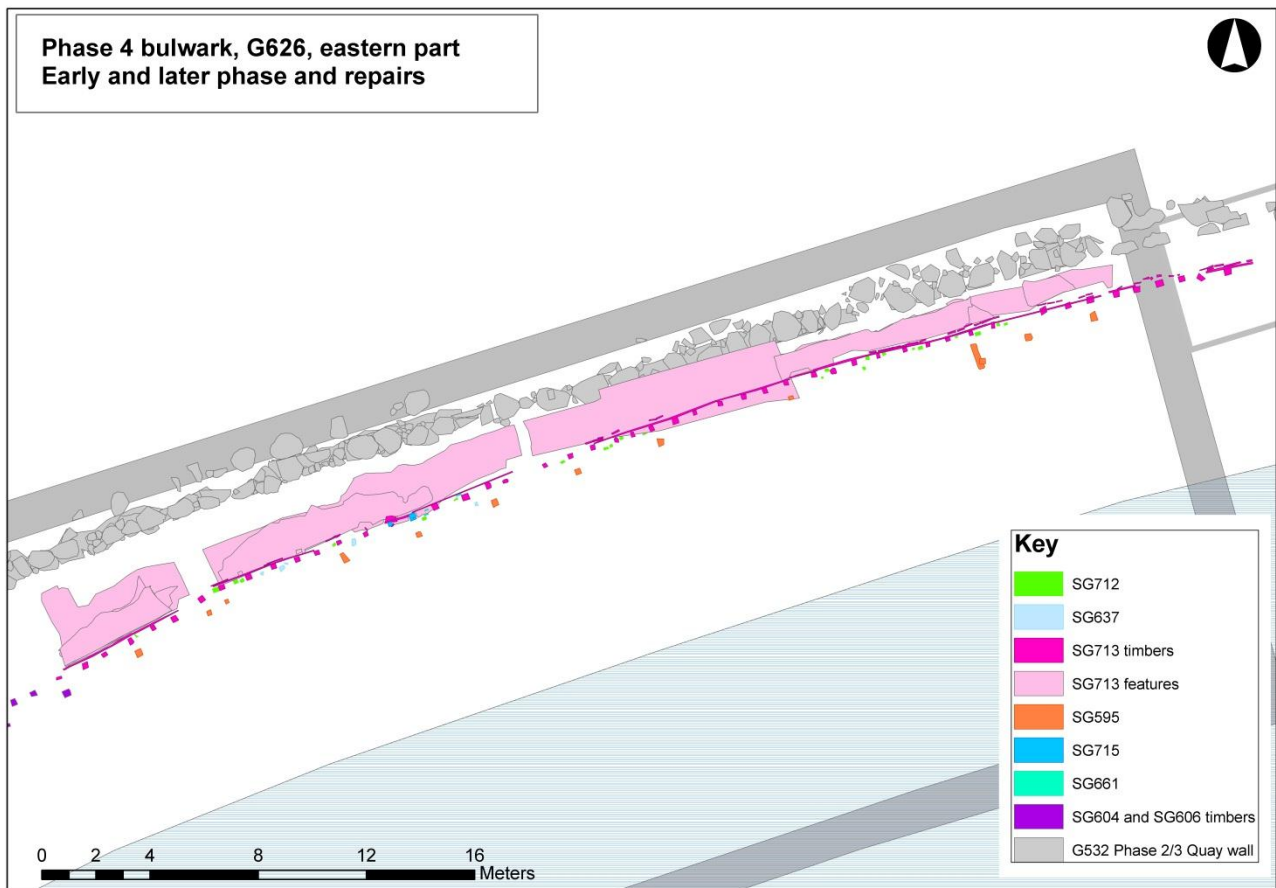


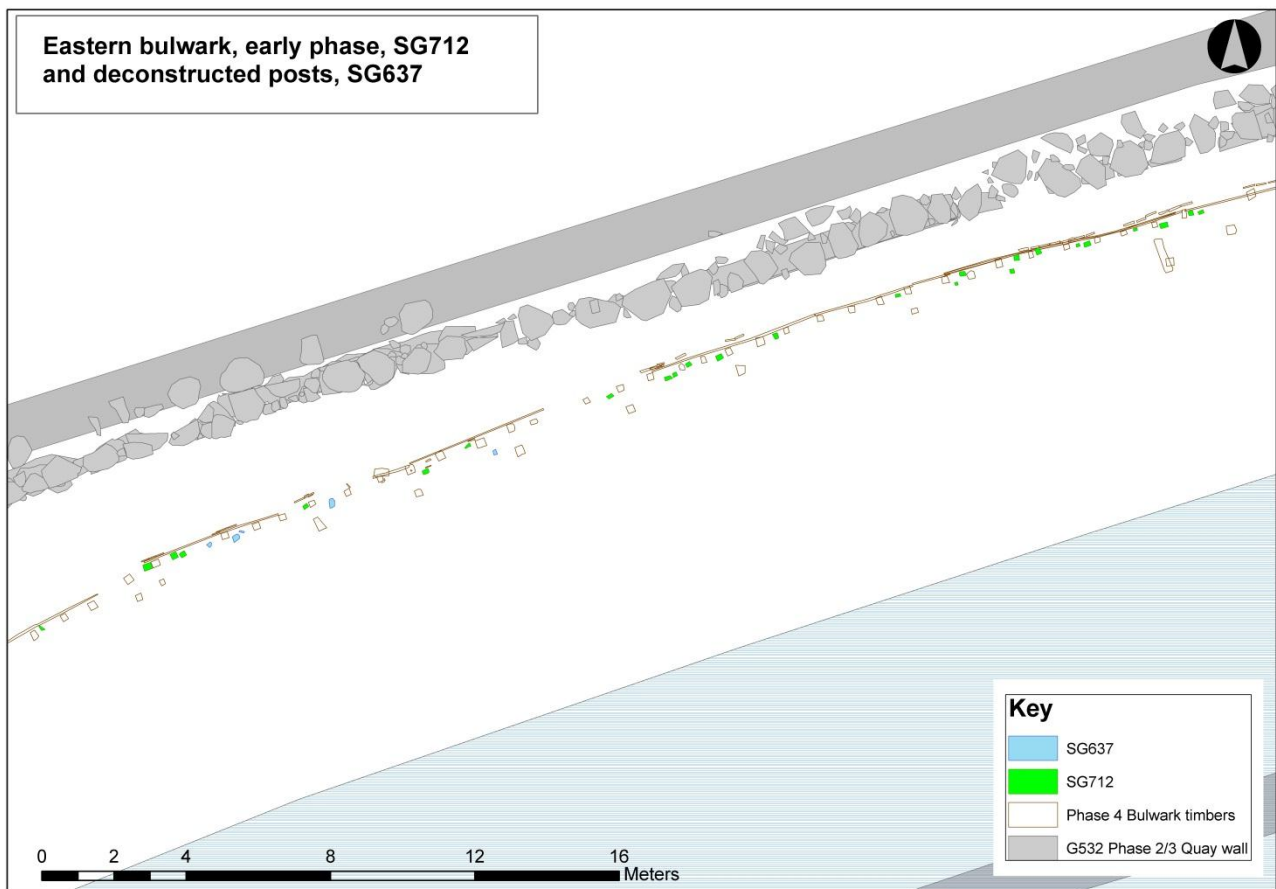
Fig. 224 Plan of Phase 4 bulwarks, G626, eastern parts. Early and later construction phases and repairs

The contexts related to SG712 and SG713 were placed in between each other and constituted a 50.4 m long section of a bulwark structure. The contexts were located in the middle of the Main Excavation trench, as a continuation of the exposed westernmost bulwark part, SG604/SG606, and continued until the middle of the Stairway trench, where the bulwark was truncated by the construction of the later Phase 5 bulwark. South of the bulwarks a row of storm posts were documented and grouped as SG595. It is not clear if any of these would have been related to the early bulwark phase, as the dendrochronological dates obtained from these all indicated connections with the later bulwark phase, SG713.

Related to the bulwarks was usage sub-group SG630, but this is dealt with in the usage sub-chapter (7.4.3.5) below.

*1<sup>st</sup> building phase SG712 and SG637*

The earliest features belonging to the Phase 4 harbour front was an almost entirely deconstructed bulwark, consisting of a row of five stake or postholes, sub-grouped as SG637, as well as 24 unevenly dispersed bulwark posts, included as SG712. Due to the difficulties in observing the stratigraphy regarding the driven in bulwark posts, it is not clear whether some of these posts were in fact later additions, rather than early bulwark features. From west to east the posts were ST46599, ST30102, ST52733, ST51366, ST30082, ST35625, ST27543, ST46215, ST45846, ST51388, ST51940, ST30835, ST30987, ST30999, ST53242, ST54544, ST54548, ST54556, ST54568, ST54564, ST54580, ST54588, ST54596, ST28045. The early bulwark was defined as those timbers which do not fit into the evenly defined, later bulwark, SG713. On the western side of ST45846 another post, ST45851, may also originally be part of this early bulwark structure, which however seem to have been later incorporated into the Phase 5, *Fiskegangen*, G583.



**Fig. 225 Plan of Phase 4 eastern bulwark, early building phase, SG712 and SG637**

The posts in SG712 were stout posts with square cross sections, made from boxed heart cut timbers. The posts were approximately 0.19-0.22 m in cross section. Some of the posts were recorded as soft and worn or having old breaks, but mostly the condition was good. Where the length of the posts was recorded, these were preserved at lengths ranging from 2.1 m to 4.3 m. The bottoms of the posts were tapered to facilitate the driving of the posts into the ground. In one instance, the taper measured 1.4 m long (ST35625), whereas the majority measured approximately 0.45 m long. From the species analysis carried out in connection with the dendrochronological analysis, the posts related to SG712 were from both pine and oak, but there was no visible pattern.

A series of dendrochronology dates from posts related to SG712 suggest a late 17<sup>th</sup> Century construction (PD209607 from ST35625: after AD 1674; PD209643 from ST54544: after AD 1690; PD210051 from ST54588: AD 1690 spring/summer). However, as only three of the 24 posts were dated by dendrochronology, there may be later posts among the non-sampled timbers related to SG712. A late 17<sup>th</sup> Century date for the construction of the early Phase 4 bulwark would match the proposed dates of the Phase 4A land ties.

*2<sup>nd</sup> building phase SG713, SG715 and SG661*

The majority of the structures and features related to the overall Phase 4 bulwark group, G626, derived from a later bulwark building phase, SG713. This consisted of three cuts, SC39183, SC34651 and SC38636, all interpreted as construction cuts for the bulwark, and quite possibly the same feature. The cuts truncated the Phase 4 land reclamation material to the north of the bulwark, supporting the view that there would have been an earlier bulwark structure, holding this land reclamation material back. The south edges of the cuts were not identified, which also supports the idea that this edge was made up by the former row of bulwark posts – identified as SG712. Within cut SC39183 at the westernmost end, was fill deposit SD39240.



**Fig. 226** Stone surface, SS38692 on the north side of the bulwark. Looking ENE. C03\_20140526\_10451

This deposit covered the base of the cut, and overlying it was stone structure, SS38692, interpreted as a work surface for the construction or repair of the bulwark. A trample layer, SD39071, was recorded between and on top of the stones. This consisted of dark, organic material mixed with grey sand and contained only few finds of animal bones and ceramics (not prioritized for registration).

From the bottom of the cut a row of 50 timber posts was driven into the underlying deposits (the stratigraphical relationships were not documented in all instances). The row of posts comprised (from west to east) ST31268, ST31276, ST28757, ST38076, ST31280, ST31284, ST30098, ST31528, (ST52729, which however was later incorporated into Phase 5 land tie/*Fiskegang*, G583), ST30070, ST30074, ST30078, ST30086, ST27572, ST54699 (which was later replaced by ST27565, SG715), ST27550, ST37375 (which was reused in Phase 5 land tie, G562), ST28086, ST28078, ST27535, ST46211, ST46206, ST51383, ST51935, ST51393, ST51398, ST30840, ST51403, ST51408, ST51923, ST30991, ST30995, ST53234, ST54540, ST54552, ST54572, ST54560, ST54576, ST54584, ST54592, ST20481, ST20399, ST20390, ST13642, ST13475, ST13469, ST13504, ST36286 and

ST36290. These posts were quite equal, stout posts made from boxed heart cut timbers with square cross sections. The bases of the posts were fashioned into four sided tapers to facilitate their driving into the ground. The posts were placed with a relatively even distance between them, 0.85 m to 0.95 m. As the stratigraphical relationships between the construction cuts and the bulwark posts are not clear, it cannot be assessed in all instances whether the posts were driven in before or after the cuts were made, but it

seems probable that the cut was made up against the former bulwark line, SG712. This would probably at this time have fallen into decay and was at least partly replaced by the posts in SG713.

Two posts, ST27565 and ST51316, were interpreted as replacements of other bulwark posts and sub-grouped as SG715. The posts were similar in dimensions to the bulwark posts related to SG713 and both posts appeared to be driven into the deposit, SD36034 (SG630 harbour usage). The posts were located 0.85 m apart and ST27565 was truncating the remains of another post, ST54699, more than indicating a replacement of this. On top of ST51316 was a wooden peg, which was recorded as ST30556. The peg, however, probably derived from when parts of the bulwark timbers were reused as elements in the later structure, G583 (Phase 5, *Fiskegang*). The post, ST51316 was dated by dendrochronology to AD 1754-69 (PD209619), which is quite similar to the dates obtained from the timbers in SG713.

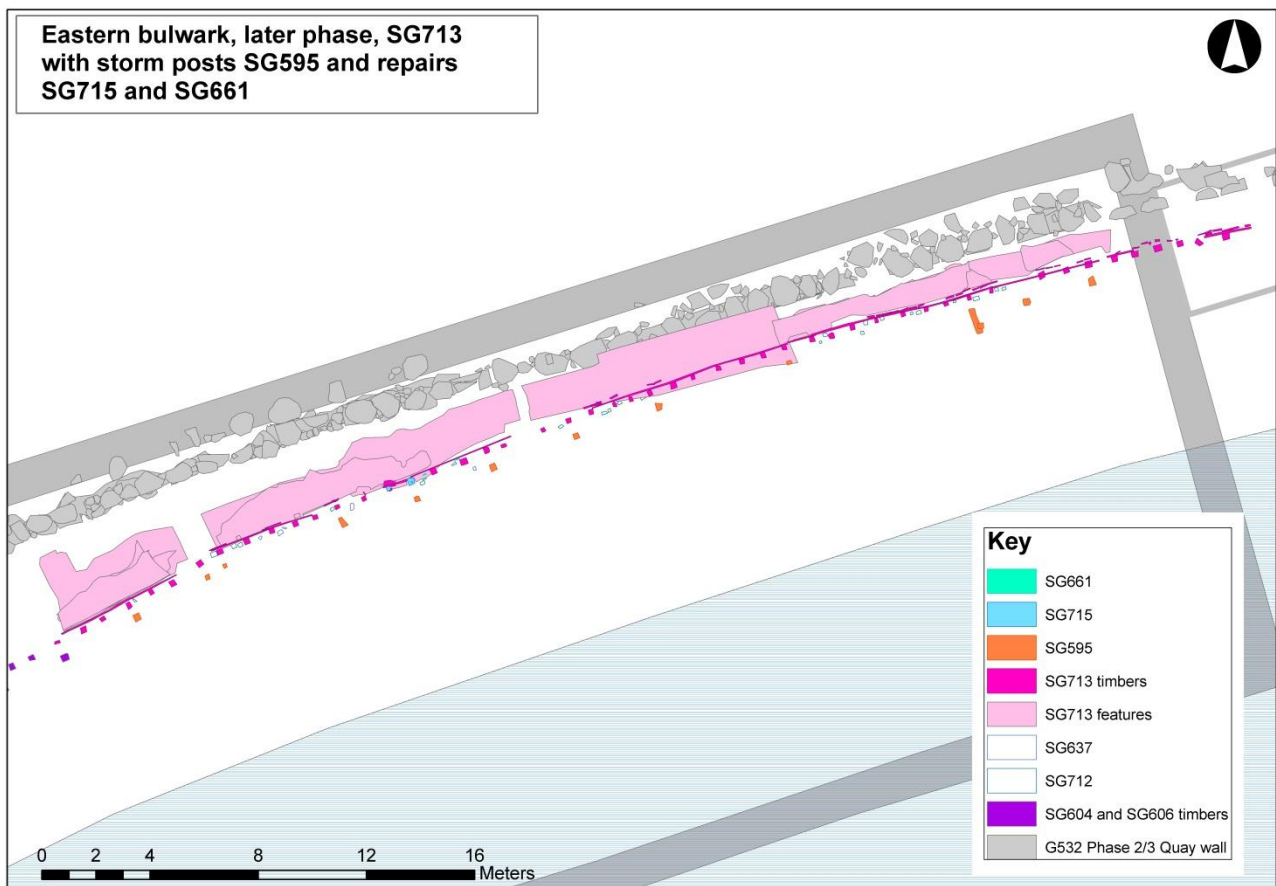


Fig. 227 Plan of Phase 4 eastern bulwark, later construction phase, SG713 with storm posts SG595 and repairs SG715 and SG661

On the northern side of the posts, sections of horizontal planking – batten – were seen. These comprised, from west to east, ST38048, ST52773, ST38539, ST37395, ST37391, ST54663 and ST36312. Only what seemed to be the lower parts of the batten were preserved as just one or two planks set on edge over each other were in-situ. The surveyed top-levels of the planks ranged from OD – 0.30 m to – 0.70 m, depending on later truncations. The planks measured 0.3 m to 0.35 m in width and were 0.05 m to 0.06 m thick. They differed in preserved length between 1.04 m and 5.02 m. Four wood samples from ST54663 were species analysed and were all oak.



**Fig. 228** The easternmost section of bulwark SG713, excavated in the Stairway trench/ZT22798. Looking NNE. C03\_20140723\_11702 (cropped)

Placed on the northern side of the horizontal batten planks, were vertical bulwark planks. These were not preserved all along the bulwark, but the planking placed on the northern side of horizontal plank ST52773 comprised ST210214, ST210215 and ST37339, sitting closely together, near bulwark posts, ST30102 and ST31528. Approximately 1.5 m further east, ST52737, ST210212 and ST210213 were likewise placed immediately north of ST52773, where bulwark post ST30070 was placed on the south side. Between the horizontal plank ST52773 and vertical plank ST52737 was ST37498, which was a smaller plank, interpreted as a wedge. Located 1.7 m further east, two vertical planks, ST210211 and ST52763 were placed north of bulwark posts ST30082 and ST30086, but with no horizontal plank present in between. A single, vertical plank, ST37515 was located on the north side of bulwark post ST27572, but as the plank was oriented differently than the other vertical planks, this may have been moved slightly out of its original position.

No vertical bulwark planks were seen north of the horizontal planks, ST38539, ST37395 and ST37391, but instead three vertical planks, ST37383, ST37387 and ST37379, were recorded on the south side of ST37391. These were sub-grouped as SG661, interpreted as a repair of the bulwark. It is not clear when this repair was made, as the planks were driven into the ground, leaving only little possibilities for making stratigraphical observations. However, the planks appeared to be driven into deposit SD35259 (SG630 harbour usage), interpreted as the second phase of silting up in front of the bulwark.

Vertical planking ST30916 was surveyed as one structure, but comprised eight planks set in three small groups and truncated by later land tie G562 (Phase 5). The planks were, in general, 0.38 m wide and 0.06 m

thick and the length was recorded as 2.2 m (not measured individually). The bottom ends were sawn into a point to facilitate the driving of the planks into the ground, but it is not clear if the planks were driven into the bottom of the cut or the lowest backfill, SD38691 (see below).

Located 7.9 m ENE of the eastern part of ST30916 was ST53249, which comprised 13 vertically set planks, in two groups of seven and six planks respectively, covering a stretch of 5.07 m. The planks' dimensions varied between 0.17 m and 0.39 m in width and 0.03 m to 0.06 m in thickness. The preserved lengths ranged from 1.5 m to 1.95 m and the bottom ends were sawn into asymmetrical points. The planks seemed to be driven in to different depths. The gap between the two groups of planks coincided with the location of Phase 5 land tie, G632 and was probably removed when this land tie was constructed. The eastern part of ST53249 was probably truncated by the construction cut for later land ties, G580 (Phase 5) and G576 (Phase 6). From the wood species analysis it was determined that the planks in ST53249 were made from oak timber. On the eastern side of G580 was ST54608, which comprised three vertically set planks, recorded as 0.27 m wide and 0.05 m thick. Located 0.60 m ENE was another two planks ST54622. Due to difficult observation conditions, only a little was recorded about these, but they seem overall to be of the same function as the vertical bulwark planking west of this.

In the section of the bulwark extending into the Guide Wall Trench 3/ZT13569 and the Stairway trench/ZT22798, vertical bulwark planking was also recorded. Planking structure ST13814 consisted of seven vertically set planks, partly truncated by the stretcher beam belonging to Phase 6 land tie, G540. East of this, structure ST36320 seemed to be the continuation of the same vertical planking structure, consisting of another seven planks (though the westernmost is probably identical to the easternmost of ST13814). The planks were generally 0.30 m wide and 0.05 m thick. From the wood species analysis of two of the planks in ST13814 it was seen that the planks were made from oak timber.

Backfilling the construction cuts related to bulwark SG713 was a series of deposits. Deposit SD37793 in the westernmost end (above the trample layer on the stone surface SS39692) consisted of mottled and lensed,



Fig. 229 Ceramic money box, FO218082 collected from SD34660 (SG713). Museum of Copenhagen

grey-brown silty sand. From the deposit finds of animal bones CBM, ceramics, glass, metal, clay pipes and leather were collected, but only the clay pipes were fully registered. Among these was stem FO213330 with the name S. Ferslev. This clay pipe was produced in Christianshavn in the period 1755 to 1764 (Pedersen 2016b). Further east, deposit SD39307 was recorded at the base of the cut, SC34651. The deposit appeared to be naturally deposited – possibly by water, as it consisted of lensed sand and no finds were seen within it. It is possible that the sand washed into the construction cut for the repair of the bulwark during a heavy rainfall or built up over a longer period in the open cut. Overlying

SD39307 was backfill deposit SD34660. This was seen as a rapid backfill and included vast amounts of household waste comprising animal bone, CBM, ceramics (redwares, *fydepotte*, Majolica, Faience,

Westerwald stoneware and Chinese porcelain), clay pipes, glass and leather. A well preserved ceramic money box (FO218082) was among the finds.

At the eastern end of G713 were various backfills from construction/repair cut SC38636. These comprised of SD38691 near the base of the cut and the overlying deposits SD37528 and SD53452. Deposit SD38691 consisted of brown-grey clay and silt of medium compaction with inclusions of wood, shell, mortar, stones, bone and CBM. The finds material comprised animal bone, CBM, ceramics, clay pipes, glass, a bone comb (FO213517), leather and two copper alloy buttons (FO215344 and FO215345). The overlying deposit, SD37528 consisted of mottled brown-grey clay and sand with inclusions of CBM. This comprised frequent finds of ceramics (not prioritized for registration) as well as clay pipes, a bone button (FO215214) and a ceramic marble (FO213568). Overlying the eastern end of SD37528 was deposit SD53452, which primarily consisted of dark brown sand and silt with frequent inclusions of CBM and mortar. From this deposit finds



Fig. 230 Gold ring FO208936 retrieved from SD53452, SG713. Photo: Krister Kam Tayanin

of ceramics, clay pipe, glass and CBM were collected, and – most spectacularly – a gold ring with an emerald gem (FO208936). The finds materials in the backfills are probably either dug up from former contexts, when the construction cut was dug, and then re-deposited as backfills in the cut. Alternatively, the material was re-deposited from elsewhere as backfills and levelling, similar to what was seen with other levelling layers and the land reclamation fills.

### Interpretation and dating

Structure SG713 was interpreted as the later construction phase of the eastern part of the Phase 4 bulwark. The interpretation is based on stratigraphical observations as well as on the spatial layout of the bulwark structure as a whole. The observations are supported by a total of 24 results of dendrochronological analysis from timbers spread over the length of the bulwark. A section of the bulwark, G626 in the eastern end of the Main Excavation trench, was selected for more intensive dendrochronological analysis, in order to detect any repairs or reuses of the timbers. The results of the dendrochronological analysis were however very similar all through the structure and clearly link the construction of SG713 and Phase 4B land ties. This large building campaign was undertaken in the years around AD 1755. The possible repair, SG715, must have been undertaken shortly after, as the date obtained from one of the posts in this, is very similar to those of SG713.



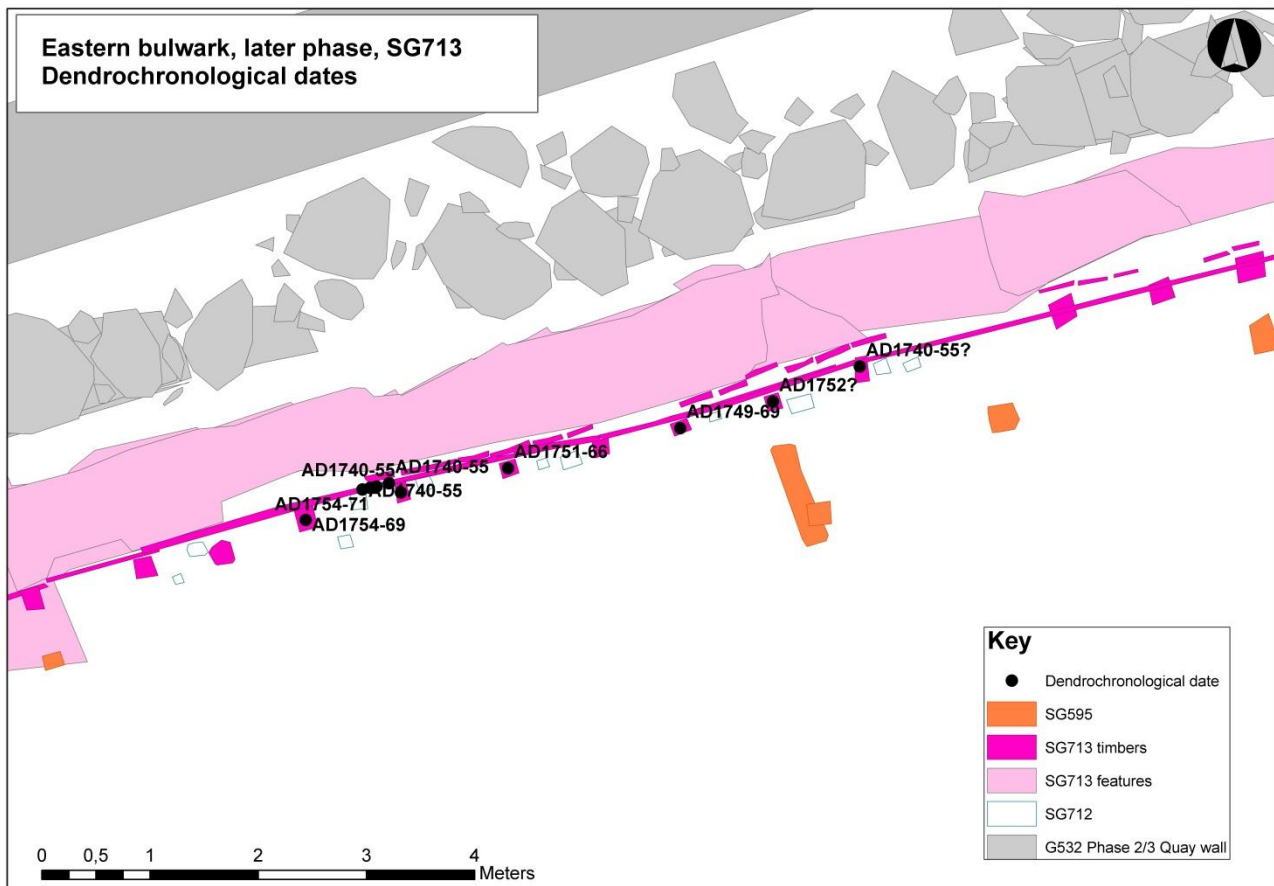


Fig. 231 Section of Phase 4 bulwark, later construction phase SG713 with dendrochronological dates

*Storm posts SG595*

Sub-group SG595 was a collection of storm posts that were excavated during the 2014 Main Excavation. At the western end of the structure, the area within the Main Excavation was not fully excavated and thus the grouping of the partly recorded timbers has been done on a limited basis. The interpretation is further complicated by the many instances of reuse of the timber structures, incorporating posts into later land ties, etc.

The westernmost end of SG595 was a continuation of the storm posts located west and situated with bulwark SG604/SG606. It appeared to consist of post ST28769, which was not fully excavated and related to G583 (Phase 5, *Fiskegangen*) only due to the location. It is not clear, whether this post was originally vertical or diagonally set, but the distance between this and the storm post west of it, ST28739 (belonging with the western bulwark, SG604/SG606, but also reused in G583) was approximately 3.0 m and the distance between the surveyed tops and the bulwark structure (bulwark posts ST31268 and ST38076, respectively), approximately 0.6 m, indicate that they could both be storm posts – maybe reused later in Phase 5 land tie G562 and/or in G583 (Phase 5, *Fiskegangen*). The posts formed the western end of an ENE-WSW line of posts.

Placed in alignment with these, and with similar distance to ST28769 and to the bulwark structure (bulwark post ST30098), was ST31233, described as slightly slanting, though not fully excavated. The top of the post was either truncated or made into a lap joint, possibly fitting structure G583 (Phase 5) on top of it. Placed

only 0.73 m ENE of ST31233 was ST31228, a diagonally set post, with square cross section, 0.18 m by 0.18 m. It was not clear why these two storm posts are placed so close to each other as this was not seen anywhere else in the structure. This post may originally have been fastened to the bulwark post ST31528.



Fig. 232 Parts of Phase 4 bulwark G626, partly exposed. Storm posts (G595) are seen as slanting towards the bulwark posts. Later structures related to G583 (Phase 5) with peg holes on top. Looking WSW. C03\_20140425\_9863

Located 4.5 m further ENE was the next storm post, ST30066, which was similar in shape and setting to the above mentioned and placed immediately SSE of bulwark post ST30086. Aligned on the same orientation were four storm posts, ST27555, ST28069, ST27521 and ST51414, which were placed evenly with gaps of 2.8-3.2 m between them. The posts were all diagonally set, leaning towards NNW and the bulwark structure G626, where they would have been connected to the bulwark posts ST51316, ST28086, ST46211 and ST51393. They were made of boxed heart cut timbers with square cross sections, preserved as 0.21 m by 0.21 m to 0.26 m by 0.26 m. The preserved length varied between 4.4 m and 5.2 m. Three of these timbers were analysed by dendrochronology. These were all oak timbers and were felled in AD 1753 winter (PD209603 from ST27555), after AD 1719 (PD211342 from ST28069) and after AD 1738 (PD212010 from ST27521).

Placed 5.03 m ENE of ST51414 was ST30983, which was measured 4.6 m long and 0.25 m by 0.25 m in cross section and likewise was diagonally set. This was analysed and determined as oak with a felling date AD 1754-69 (PD211095). Originally this would probably have been connected to bulwark post ST30991. From ST30983 there was a gap of 7 m before the next storm post, ST53170 (surveyed later again as ST38384). This was found to be in alignment and with the same characteristics as the above mentioned. Post

ST53170/ST38384 was placed just SSE of bulwark post ST54584. It is not clear if there would originally have been one or more storm posts placed between ST30983 and ST53170/ST38384, but this would have been expected. The construction of later land ties G624 and G632 (Phase 6 and Phase 5, resp.) may have resulted in storm posts being removed, though this seems to have been a difficult task.

A sample from ST53170/ST38384 was analysed by dendrochronology which was revealed to be oak felled in AD 1753/54 winter (PD209597). Only 2 m ENE of ST53170/ST38384 was ST53506, a storm post, which had later been incorporated into land tie G580 (Phase 5) as a support post. It had probably originally been connected to bulwark post, ST53483, which however was also incorporated into G580. At 2.53 m ENE of ST53506 was the easternmost preserved storm post, ST20394, which like the others was a heavy post leaning towards NNW. The top of the post was equipped with a tenon, which may originally have carried the beam (not preserved) connecting the storm post with the bulwark post, ST20390.

### **Interpretation**

SG595 is interpreted as 12 storm posts associated with the Phase 4 bulwark, G626. It seems plausible that the storm posts all belong to the later phase of the bulwark, SG713, as the storm posts are physically placed in close connection with bulwark posts related to this later construction phase, and this is furthermore supported by the dendrochronological dates obtained from the storm posts.

### **Dating**

From storm posts belonging with SG595 five samples were dated by dendrochronology. These placed the construction of the storm post structure in the mid 1750s, which corresponds to when the later phase of the bulwark G626 was established.

#### **7.4.3.3.4. Discussion**

The recorded structures and stratigraphy indicate that the harbour front at Gammel Strand from the 1690s consisted of a timber bulwark, functioning both as a means to keep the land reclamation fill in place as well as a quay for ships and barges to harbour at. It is not clear if this bulwark would have had storm posts attached at this time or not, as none of the excavated storm posts (G595) were dated to this early period.

Already in the middle of the 1750s, the quay was renewed with a similar style bulwark, consisting of stout bulwark posts as well as horizontal batten and vertical planks and a row of storm posts south of the bulwark itself. The former bulwark was however not completely removed and the preserved earlier bulwark posts may have served as support and strengthening of the later. A number of repairs can be seen, but it seems probable that there would have been more over time.

While the early bulwark construction phase is to be seen in close connection with the construction of the Phase 4A land ties, the later bulwark phase corresponds well with the construction of the Phase 4B land ties. The land ties and corresponding bulwarks would originally have been physically interlinked and the land ties would have tied the bulwarks to the dry land.

### 7.4.3.4. Levelling

#### 7.4.3.4.1 Introduction

The differences between deposits interpreted as levelling and land reclamation are in some cases minimal. However, levelling is defined as deposits created on already reclaimed land to increase the level before construction of buildings or open spaces or to even out a surface after a construction work or similar.

The majority of the groups consisting of levelling layers were excavated during the 2012 Guide Wall excavation and only two groups interpreted as Phase 4 levelling were excavated during the 2014 Main Excavation. The large number of groups related to Phase 4 levelling is explained by the methodology used for the grouping of contexts during the Guide Wall excavations. As these excavations were undertaken in a number of smaller trenches within set periods of time (usually resulting in trenches having to be closed before new were opened), the contexts were grouped only within the single trenches and hardly ever across trench limits. Thus, contexts which may originally have been part of the same deposition or line of events have not been grouped together, if they were found in different trenches.

#### 7.4.3.4.2. Groups interpreted as levelling

Group	Sub-groups	Group name
414		Levelling
416		Levelling
417		Levelling
421		Dumps
427		Levelling
429		Dumps
449		Levelling
450		Levelling
451		Levelling deposit
469		Levelling
488		Levelling
492		Dump deposit
506		Levelling
514		Dump
517		Dump
519		Dump
522		Dump
527		Levelling
683		Levelling
692		Levelling
716		Levelling

Table 44 Groups related to Phase 4 levelling

Within this report section, the levelling groups are described in less detail than the groups consisting of structures, and not by single groups but rather by what seems to have been originally part of the same. As a way of creating an overview, the levelling layers will be described from west to east, and where possible, from the oldest to the youngest groups.

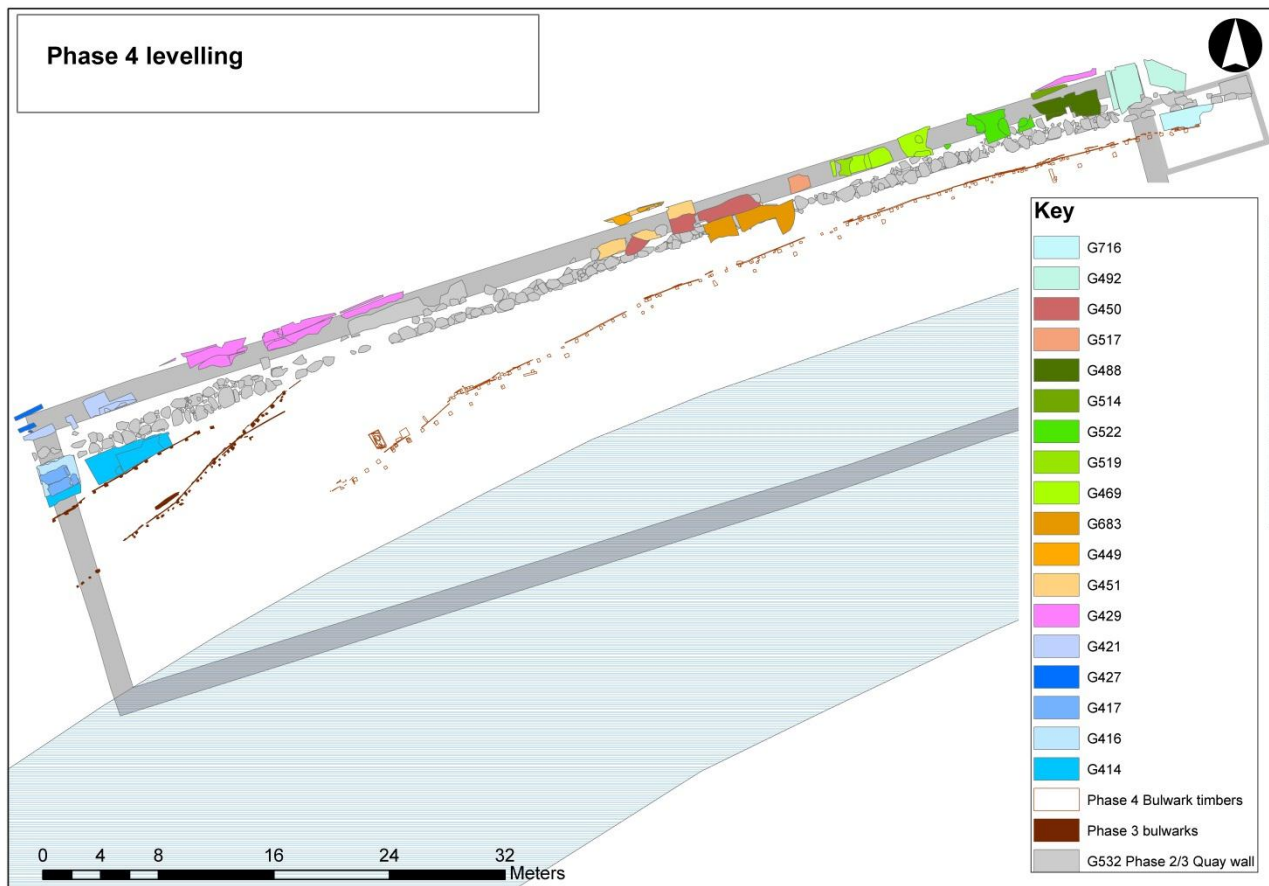


Fig. 233 Plan of all Phase 4 levelling groups (excluding G527 and G506 as these were placed further west)

*Levelling G527 and G506*

West of the Main Excavation area, two groups interpreted as levelling layers were excavated: In the service trench ZT9047, G527 comprising a single deposit of dark brown-grey sand, covered an area of approximately 3.2 m by 1.6 m. The deposit was overlain by the construction cut for a brick wall, related to the sub-group, SG226, which was interpreted in the report of the 2010-11 watching briefs as the northern wall of the eastern *Vejerhus* courtyard (Olesen & Bork-Pedersen 2012, 129). This was later re-interpreted as parts of the *Vragerbro* complex (see sub-chapter 7.4.3.6.).

In the Oil Container trench/ZT19393, approximately 5 m ESE of G527 was G506 consisting of a single levelling layer. This consisted of dark grey-brown, organic silt and covered an area of at least by 4.5 m by 3 m. It was recorded as being at least 0.5 m thick, but was not fully excavated due to the excavation depth limit of the area. The top of the layer was surveyed around level OD 0.40 m. Both these groups are interpreted as rather early Phase 4 levelling, due to their location in plan and level and the relation to the building structures. The finds materials retrieved from the levelling do not contradict this interpretation. These comprised of ceramics, including stoneware, late redwares and a single fragment of a faience dish.

*Levelling G414, G416, G417, G427 and dumps G421*

At the western end of the Main Excavation area, including the Guide Wall trenches, a large number of groups interpreted as early Phase 4 levelling were excavated.

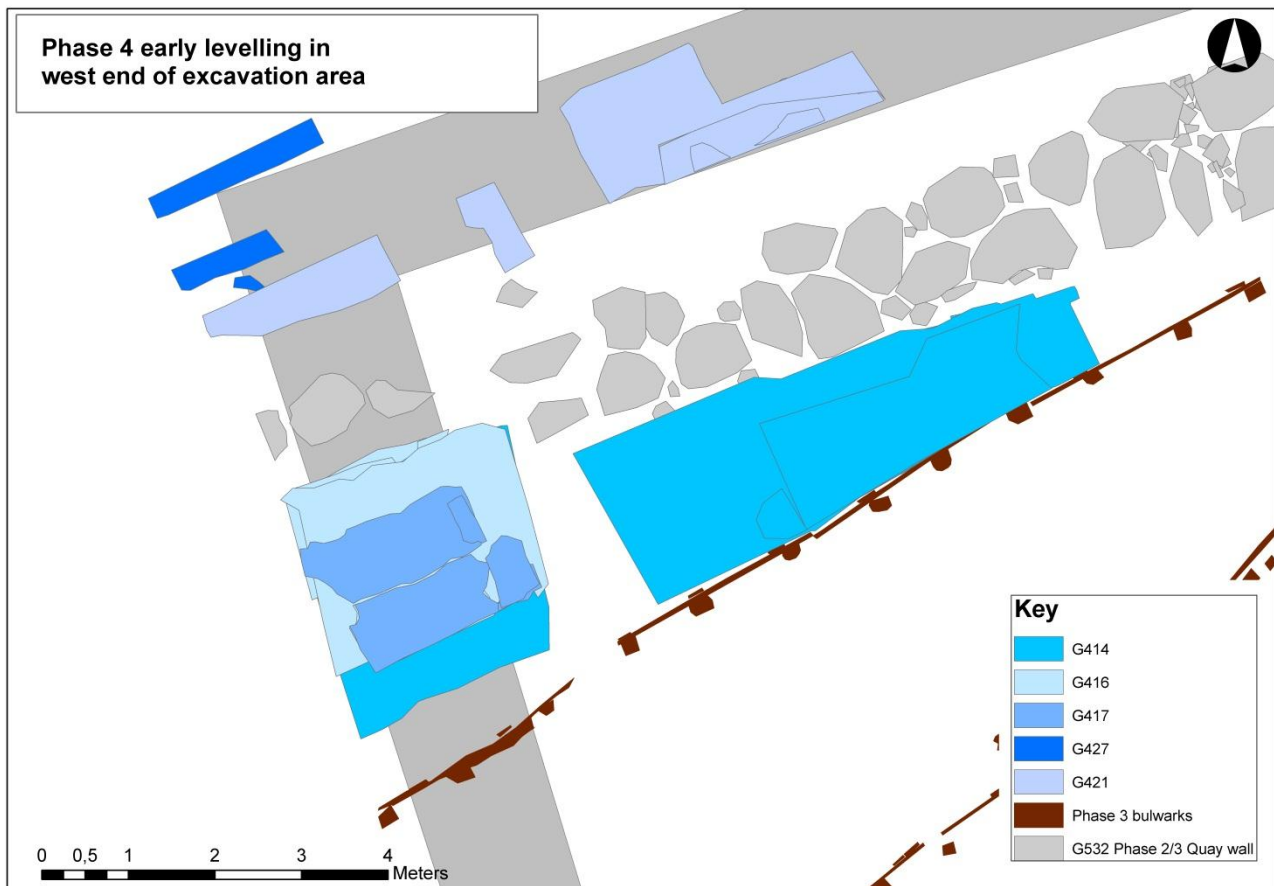


Fig. 234 Plan of Phase 4 early levelling groups G414, G416, G417, G421 and G427

One of the earliest groups was G414, consisting of three very different deposits of which one (SD12895) was excavated in the Guide Wall Trench 1/ZT9164 while the two others (SD41737 and SD55839) were excavated in the Main Excavation trench, to the immediate east. The western deposit was recorded at a slightly higher level than the two deposits in the Main trench. The surveyed top-levels ranged from OD – 0.37 m to + 0.02 m for the eastern deposits and OD + 0.19-0.41 m for the western deposit. However, the three deposits may derive from the same event of levelling, as the western deposit was not fully excavated downwards, due to the excavation depth limit, and thus may have continued downwards – whereas the area where the eastern deposits were found was more heavily disturbed by later building activities.

The western deposit SD12896 consisted of brown-grey sand and clay and overlay the part of the Renaissance quay wall, SG412, and the bulwark in front of it, SG415 (related to G532 and G602, Phase 2-3). Of the two eastern deposits, the lower consisted primarily of building rubble comprising *Munkesten*-type bricks (Danish Medieval and Renaissance style) and the upper deposit consisted mostly of organic material comprising a large finds material assemblage. The eastern deposits appeared stopped to the north by the Phase 2 bulwark. It is not clear what limited the western deposit towards south, but the two eastern deposits seemed contained by the bulwark structure, G674 (Phase 3, bulwark/land reclamation fence). This could indicate that the deposits were related to the land reclamation of Phase 3, but the stratigraphical relationship with a wooden drain or water pipe, G413, suggests that the levelling layers were later than this. The wooden pipe was dated by dendrochronology to AD 1686 spring/summer (PD211101 from

ST41678), and the levelling – if the stratigraphical observations are correct – is thus contemporary with or later than this.

The finds material from the group was collected from the two larger deposits and was very varied, comprising ceramics, clay pipes, glass, leather, animal bone.

The ceramics from the upper, eastern deposit, SD55389, were fully registered and analysed. The material comprised redwares from the Netherlands, German earthenware from the Weser area and Rhineland stoneware, *gydepotter*, a sherd of a possible Spanish/Portuguese olive jar and unsourced earthenware of which several could be of local production. Most of the collection seemed produced in the 17<sup>th</sup> Century (Kristensen 2016b). A single Medieval sherd belonged to an early redware jug, probably locally made in the period AD 1200-1450 (Kristensen 2016a). While the ceramics from the western deposit, SD12895, were only superficially registered, one special find of German stoneware (FO218800) was identified: This comprised two sherds from a white/light grey stoneware jug with impressed decoration showing in an arcade setting the French King's coat of arms with three lilies and a profile portrait of a woman dressed in Renaissance dress and headgear. Such richly decorated types of baluster-formed jugs were produced in Westerwald in the first decades of the 17<sup>th</sup> Century but examples from Siegburg are also known. Due to the very light fabric, this may be a Siegburg jug (Kristensen 2016b).

The two large deposits, SD12895 and SD55839, also contained a large collection of animal bones. These comprised primarily fish of salt water and fresh water species, cattle, pig, sheep/goat, domesticated birds as well as fewer elements of roe deer, fallow deer, rat, hare and seal. It was concluded that "the collection as a whole is waste from a normal household consumption pattern. There is, however, an element of possible higher status included in the collection, with access to higher end species, although this may represent processing and not actual household" (Bangsgaard et al 2016).

An environmental sample from the upper, eastern deposit (SD55839, PM214697) was analysed for macrobotanical remains, and the results suggested that the remains included a "quite well developed weed flora as well as from meadows while seeds/fruits from grown/collected plants were almost absent, except fruits from hops (*Humulus lupulus*) that were most frequently noted in just this sample" (Ranheden 2016). From the western deposit, SD12895, a series of macrofossils (PM12960) were identified in 2013 by Mette-Marie Hald, comprising the same material as found in SD55839, but also a wider variety of grown plants, including cereals.

Overlying the western deposit of G414 in Trench 1/ZT9164 were four deposits related to G416, covering an area of approximately 2.4 m by 2.7 m in plan and 0.35 m in depth. The top-levels of the upper deposit, SD11401, ranged between OD 0.37 m and 0.46 m. Group G416 was interpreted as a series of deposits used for levelling of the area prior to or in the process of developing the area for buildings. The material used for the levelling consisted both of building debris – from deconstruction of the former Renaissance quay wall – and soils containing vast amounts of household waste, probably taken from open spaces where the waste had built up around the city. The finds material included a wide variety of household and building waste products including animal bone, CBM, ceramics (not fully registered), clay pipes, glass, iron nails, slag, a bone comb, a copper alloy knife blade and fragments of a lead window came.

Located above the southern parts of G416 were four deposits related to G417. These were all excavated in the Guide Wall Trench 1/ZT9164 and covered an area of approximately 2.3 m by 1.6 m and 0.27 m deep. The group G417 was interpreted as a series of levelling layers deposited to raise and even the ground level in the area, where the western building (G710, Phase 4) was erected. The material used for the levelling was a combination of building debris, household waste and sand containing shell fragments. It is not clear what separated G417 from underlying G416 as this too was interpreted as levelling deposits. The dating of G417 is based on the stratigraphical relationship with underlying G416. G416 was probably deposited in the late 17<sup>th</sup> or early 18<sup>th</sup> Century and it seems plausible also that G417 was deposited at this time as parts of the same levelling process. The surveyed top-levels of the deposits related to G417 were up to OD 0.65 m.

North of G414, G416 and G417 were additionally two groups interpreted as levelling prior to the establishment of buildings in the area: G421 and G427. Both groups were heavily truncated by the two modern service pipe truncations running ENE-WSW through this northern part of the excavation area.

Group G427 was located in the north-western corner of the Guide Wall Trench 1/ZT9164 and comprised of three deposits with top-levels surveyed between OD 0.56 m and 0.69 m. The deposits related to G427 were exposed over an area of 8 m by 2 m and were approximately 0.3 m thick in total. Group G427 was interpreted as levelling layers, possibly laid out in the process of increasing and levelling the ground level prior to the development of the area with buildings and rebuilds of these. Due to the excavation conditions it is not fully clear if these three deposits are in fact parts of the same overall deposition or if they are the remains of several events. The dating of G427 relied on stratigraphical observations of the relationship with the structures in the area. Based on this, G427 was probably deposited during the late 17<sup>th</sup> or early 18<sup>th</sup> Century. This was not contradicted by the finds material consisting of glass (few fragments of window glass and pas glass), ceramics (not fully registered), clay pipes, iron nails as well as animal and fish bone.

South of G427 and partly overlying this was a series of five deposits grouped as G421. The exposed parts of the deposits covered an area measuring approximately 4 m by 0.8 m. The interpretation of G421 is problematic as the deposits' stratigraphical relations with other contexts were not all recorded. The rather different deposits were interpreted as a mixture of construction cut backfill and ground levelling for the buildings in this part of the excavation area.

#### *Dumps G429*

The contexts related to G429 were all excavated and recorded during the 2012 Guide Wall excavation. The majority of the contexts were located in the eastern part of Trench 1/ZT9164, extending a little into the westernmost part of Trench 2A/ZT12420, but one context (SD14281) was recorded in the northern part of Trench 3/ZT13569.

Group G429 was interpreted as a series of 11 deposits dumped on top of the former road surface, G430 (Phase 2, but probably in use in Phase 3). Seen as one, the deposits related to G429 stretched over 66 m (ENE-WSW), but possibly extended out of the excavation area over into the Main Excavation, leaving 18 m of deposits exposed in the western end and 4.5 m in the eastern end. Where the deposits were not truncated by the modern gas pipe truncation, the surveyed top-levels ranged between OD 0.65 m and 0.85 m. Most of the deposits related to G429 consisted of sand in varying colours and textures and the finds materials indicate that most of the levelling material was taken from areas left with household debris. Given that some of the deposits were described as consisting of a darker, more organic material near the



road surface, these may include both some of the use phase of the road and the later deconstruction of the same road surface. It is not clear what necessitated the levelling on top of the road, but maybe the whole harbour area needed ground rising as part of the developing of the harbour area.

An accurate dating of G429 is slightly problematic. Stratigraphically, the deposits were later than the road surface belonging with Phase 2. Some of the deposits in G429 were truncated by the construction cuts for Phase 4 drain pipes (G235 and G315) and others were truncated by a possible Phase 4 pit (G431) and a possible Phase 6 pit (G433). The dateable finds materials, e.g. clay pipes and ceramics, indicate that the layers were deposited in the late 17<sup>th</sup> or 18<sup>th</sup> Century. Based on this, it seems probable that the contexts related to G429 were deposited in the early part of Phase 4, late 17<sup>th</sup> Century or the early 18<sup>th</sup> Century.

From two of the deposits related to G429, SD11309 and SD14281 samples were analysed for macro-botanical content. The sample from SD11309 (PM214846) yielded a fairly good spectrum of taxa from foremost wet/fresh meadow plants which may support the suggestion that part of this material could derive from horse dung, as suggested by the excavator, while the sample from SD14281 (PM214889) showed a high diversity in weeds (Ranheden 2016).

From two deposits in G429, SD10244 and SD11309, the faunal remains were analysed together. The animal and fish bones were collected both from big bag wet sieving and fine sieving, but the majority was hand collected. The material comprised 10,732 fragments of which 3,078 could be identified to species or nearest taxon. The collection of mammal and bird remains consisted mainly of domesticated or probable domesticated species, but the collection from G429 also included multiple wild species although most of these were only represented by one or two fragments, roe deer being the exception with five elements. Generally the distribution of fragments from all the main domesticated species appeared to represent the entire body and as such indicated the presence of complete carcasses and not just choice cuts. But it is worth noting that the most common elements in this collection were those most closely associated with meats from the trunk and upper limbs. Overall, the species, mammals and birds, the elemental distribution and the type and location of cut and chop marks suggested that the collection as a whole is waste from household consumption. It is, however, worth noting that a single cut-mark was also found on a rat bone, but the location on the calvarium suggests skinning activity, not consumption. There were no clear indications of processing of the fish like e.g. stockfish, but cut marks on elements from the gadids clearly indicated that they were consumed. Pike and salmonids were in the late Medieval period very expensive delicacies and thus only eaten by the upper class. Very large fish like the huge cod is also an indicator for the high status household. Combined with the presence of the wild species of hare and deer the collection from group G429 clearly includes an element of higher status, where some had access to higher end species, although this may represent processing and not actual household consumption (Bangsgaard et al 2016).

#### *Levelling G451, G449 and G683*

Contexts belonging to G451 and G449 were all excavated during the 2012 Guide Wall excavation and located at the western end of Trench 2B/ZT13818. Group G451 was the older of the two groups and interpreted as a series of levelling deposits, consisting mainly of silts and sand. The deposits were laid out to increase the ground level and to even out the ground in this area after the demolition of the Renaissance quay wall. The dating of G451 relied mainly on the stratigraphical observations made in the area. The deposits were laid out over the deconstruction layers related to the Renaissance quay wall, and possibly

also over posts, G447, which are related to Phase 4, though not fully dateable. The levelling layers were truncated themselves by construction cuts belonging with both the early and the later Phase 4 land ties (Phase 4A and B). This probably places the levelling in the late 17<sup>th</sup> Century, which was not contradicted by the collected finds materials.

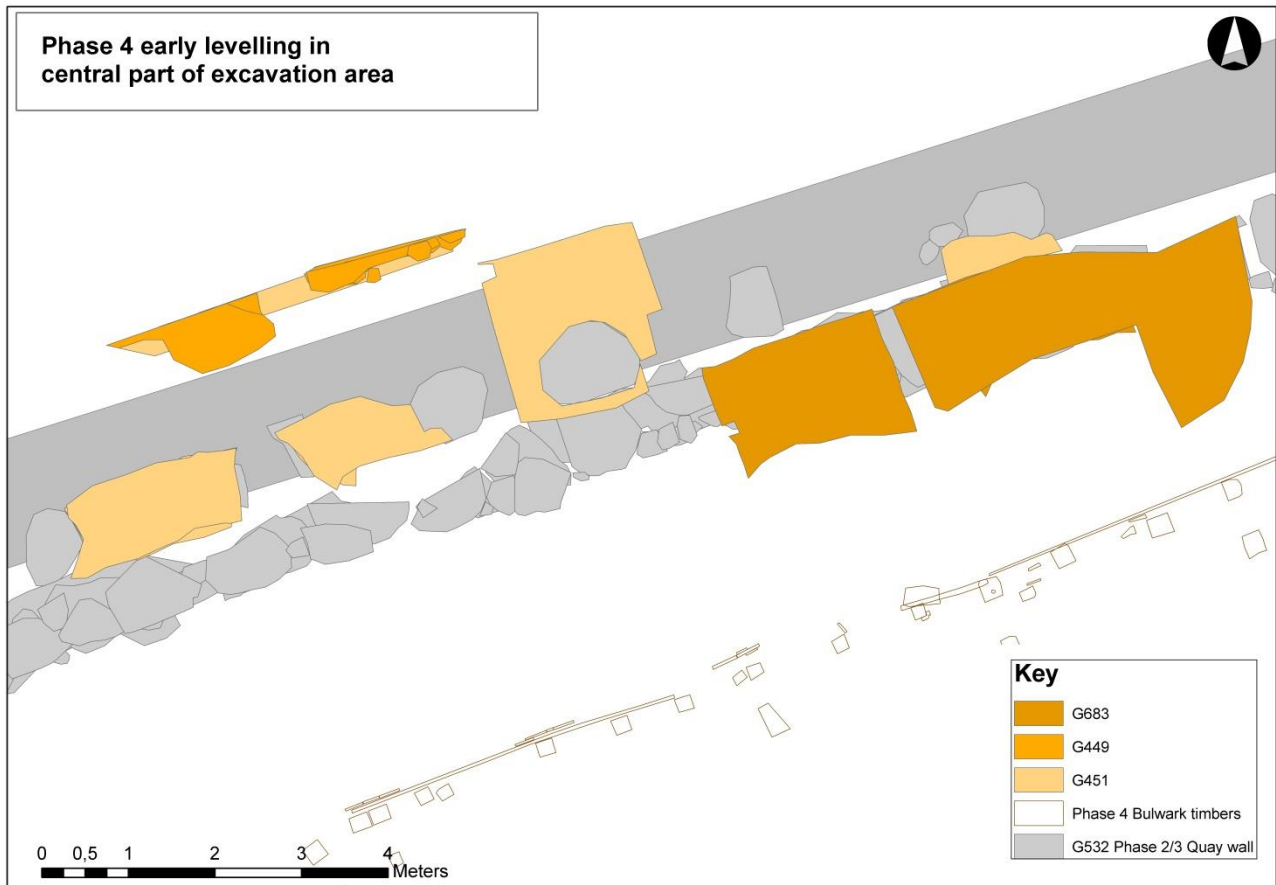


Fig. 235 Phase 4 early levelling G451, G449 and G683

Located on top of the northern parts of G451 were deposits related to G449. Group G449 was interpreted as a series of deposits, which can probably also be related to the levelling of the area. The material for the levelling differed slightly from other levelling materials in that organic material was preserved, which may indicate that this was redeposited from a more moist environment. Based on stratigraphy, G449 was deposited after the construction of land tie G444 and drain G445, but before the repair, G448 was made. This places the deposition in the 18<sup>th</sup> Century. The dateable finds materials were slightly older, but may have been old when discarded or the material was redeposited from an older deposition.

Group G683 was excavated during the 2014 Main Excavation. The deposits related to G683 were all located just east of the middle of the Main Excavation trench, immediately south of the levelling layers related to G450, G449, G451 and G517.

The deposits related to G683 were interpreted as levelling layers. Based on the stratigraphical observations, the deposits seem to be laid out sometime after the establishment of the first phase of Phase 4 land ties as the layers covered G460, but were truncated by the Phase 4B land ties, G530 and G453. G683 was

comparable in terms of stratigraphy, levels and composition to G451, excavated in the Guide Wall trench north-west of G683.

*Levelling and dumps G469, G519, G522, G51 and, G488*

These groups were all excavated during the 2012 Guide Wall excavations and located along the north side of the excavation area. Most of the deposits probably extended further north, beyond the limit of the excavation trenches. In total the levelling layers in this area covered a 19 m long area (ENE-WSW), which was approximately 2.4 m wide.

The deposits related to G469 were interpreted as levelling layers in total covering an area of 7.0 (ENE-WSW) by 1.9 m. Two large boulders can be seen as either parts of the Renaissance quay wall or as loose stones included in the levelling layers. It is not completely clear what the levelling was laid out for, but the stratigraphical observations indicate that the layers were deposited in the same process as or prior to the construction of the Phase 4A land ties. The dating of G469 relies on the observed stratigraphical relations to the more accurately dated timber structures in the area. Based on this, the levelling layers were probably deposited during the late 17<sup>th</sup> Century.

The single deposit related to G519 was excavated in the same area as G469 in Trench 2B/ZT13818, but at a slightly higher level. This deposit was a very mottled, mixed layer, described as yellow-grey silty sand containing lumps and chunks of CBM and occasional small chunks of bluish clay. It is not clear how the deposit related to G519 was stratigraphically related to the deposit to the east and west of it in G469. From the surveyed top levels it seems however reasonable that G519 was located at a stratigraphical higher level than G469. The deposit belonging with G519 was recorded as truncated by the construction cut, SC18117 for the Phase 4B land tie, G463. Group G519 was interpreted as a levelling layer. It was possibly associated with the construction of the Phase 4 drain, G464 – or at least deposited after this was established – and before the Phase 4B land ties were put in. If the interpretation based on the stratigraphical information is correct, G519 was probably deposited in the first half of the 18<sup>th</sup> Century.

Group G522 comprised a single deposit as well as three large stones. Group G522 was interpreted as a levelling layer and possibly a stone from the deconstructed Renaissance quay wall. The levelling layer appears to have been deposited after the construction of Phase 4 drain pipe, G211, but before the land tie repair, G466 was put in. If the interpretation is correct, G522 was probably deposited during the first decades of the 18<sup>th</sup> Century. The felling date for the drain pipe, G211 was not established, but must be after the establishment of the Phase 4A land ties in the late 17<sup>th</sup> Century. The levelling was earlier than the land tie repair, G466, which seems to have occurred in the 1720s.

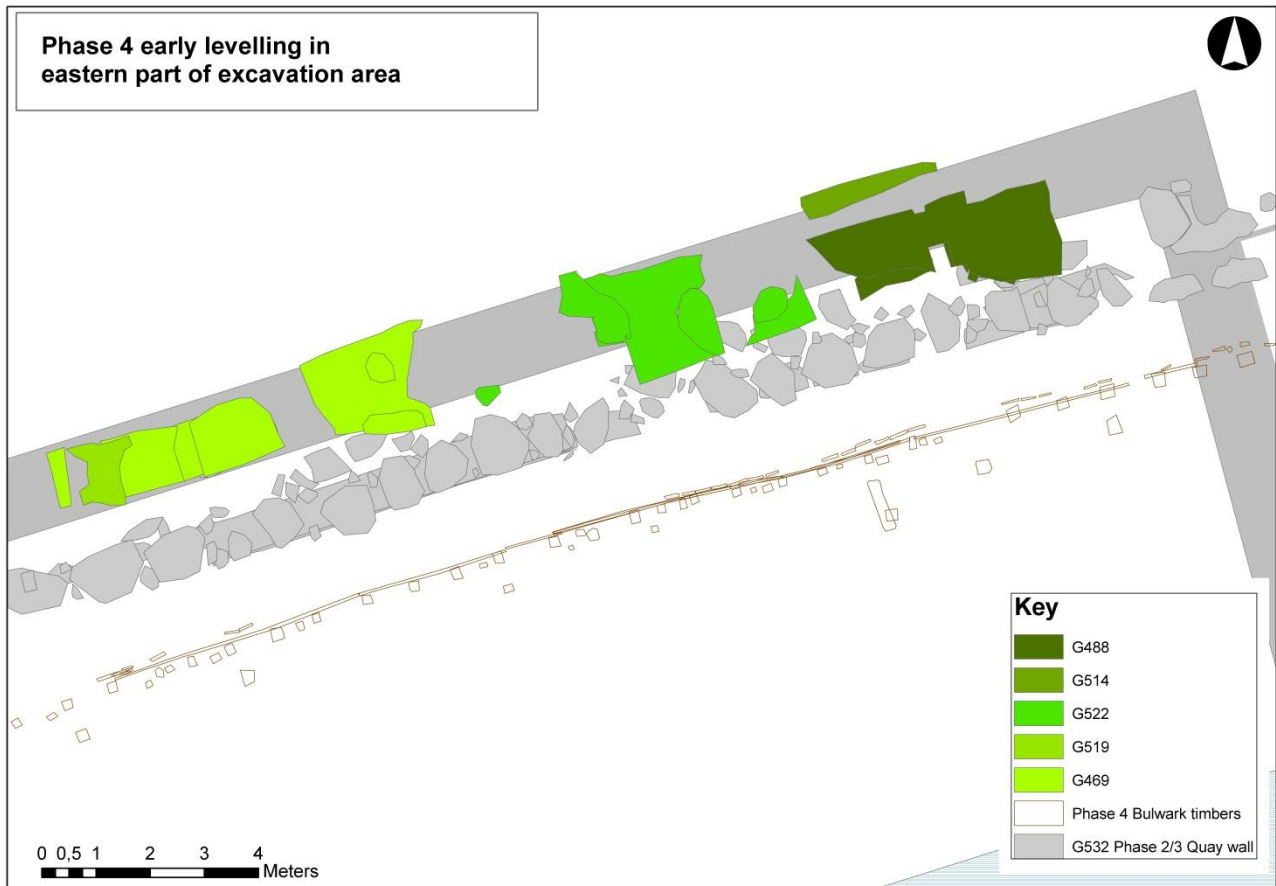


Fig. 236 Plan of Phase 4 early levelling in the eastern part of the excavation area, G469, G519, G522, G514 and G488

Another group consisting of only one deposit was G514, located in Trench 3/ZT13569 in the eastern end of the excavation area, immediately north of the contexts belonging with G488. G514 was interpreted as a levelling layer. It seemed to be stratigraphically younger than the land tie, G484, and may be seen in connection with the establishment of the Phase 4A land ties in general. Based on the stratigraphical observations, G514 was deposited after – but maybe just shortly after – the establishment of the Phase 4A land tie, G484. This was constructed during the late 17<sup>th</sup> Century or early 18<sup>th</sup> Century and G514 may thus be contemporary with this.

Group G488 comprised three deposits and two possible timber structures, the latter of which could not be interpreted purposefully. The group was interpreted as a series of levelling layers laid out prior to the establishment of the Phase 4A land tie, G484 – either as land reclamation or as levelling of the claimed land. The dating of G488 was not clear. Stratigraphy suggested that the group was younger than the G485 and G486 bulwarks (Phase 1), but older than the Phase 4A land tie, G484. This may place the levelling in the late 17<sup>th</sup> Century or before.

#### *Dump G517*

The single deposit related to G517 was excavated and recorded during the 2012 Guide Wall excavation. It was located in Trench 2B/ZT13818 near the middle of the excavation area, between levelling groups G450 and G469. The interpretation of G517 was slightly problematic due to the complexity of the stratigraphical observations. If the deposit related to G517 was really deposited above one of the timbers related to the

land tie repair, G455, but at the same time was truncated by a construction cut also related to G455, it seems most probable that G517 was actually part of this repair. It is possible that the deposit related to G517 was a levelling layer laid out in connection with the establishment of the land tie repair, G455. If this interpretation is correct, the dating of G517 could be the same as G455. With caution, G455 is dated to the AD 1730s to 1750s.

#### *Levelling G450 and dump deposit G492*

The contexts related to the two groups, G450 and G492, were excavated during the 2012 Guide Wall excavations and located in the western end of Trench2B/ZT13818 and in Trench 3/ZT13569 in the easternmost end of the excavation area respectively. The distance between the two groups was 25.4 m in which no levelling layers dated to the same later part of Phase 4 were excavated.

The four deposits related to G450 covered an area of approximately 9.8 m(ENE-WSW) by 1.3 m. The northern limits of the contexts were made from the truncation caused by the modern gas pipe construction cut, SM18399. Group G450 was interpreted as a series of sandy levelling layers deposited as a way of evening out the ground – possibly after or during the process of inserting the Phase 4B land ties as indicated by stratigraphy. From this it was seen that the levelling layers of G450 post-date the construction of land ties, G530 and G531 (both Phase 4B land ties), as well as the Phase 4 drain pipe, G452. However, another drain pipe, G446 was overlying one of the deposits belonging with G450. None of the drains were dated by dendrochronology, but it seems reasonable to place G450 in time just after the construction of the Phase 4B land ties, which seems in general to have occurred in the middle of the 18<sup>th</sup> Century.

Group G492 comprised three deposits (possibly only two, as two were very similar), which have been interpreted as a large levelling deposit and a smaller dump of oyster shells, probably also serving as levelling material. The deposits were overlying the Phase 4B land tie, G494, and could have derived from a levelling episode connected to the establishment of the Phase 4B land ties in general or be slightly later. From stratigraphy, G492 could be dated to the period between the construction of Phase 4B land tie, G494 (which probably was made in the middle of the 18<sup>th</sup> Century), and the construction of the Phase 4 drain, G315. This group had a dendrochronological sample with a felling date after AD 1775. It thus seems probable that G492 was deposited in the second half of the 18<sup>th</sup> Century. This is supported by the finds of a Silesian goblet (FO202848), made in the period AD 1710-1780 and the industrial creamware (FO204363) produced from AD 1750.

#### *Levelling G716*

Group G716 comprised only one deposit, SD57670, located in the easternmost end of the excavation in the Stairway trench/ZT22798. Deposit SD57670 was formerly related to G620 (Phase 4 land reclamation). However, due to its far distance from the rest of G620 (in the western end of the Main Excavation trench) as well as its stratigraphical relationship with the later Phase 4 bulwark, SG713, it was regrouped as a levelling group on its own.

SD57670 consisted of a mottled layer of dark grey-brown sand and silt and comprised small pieces of red and yellow bricks. The deposit was recorded as 3.09 m long (ENE-WSW), 1.35 m wide and 0.37 m deep. From SD57670 fragments of clay pipe, green glazed floor tile and ornamented stove tiles were collected and registered. Ceramics and animal bone from SD57670 were not prioritized for registration.

The deposit was interpreted as a levelling layer deposited after the construction of the later Phase 4 bulwark, SG713. It is possible that SD57670 is the backfill of an un-recorded construction or repair cut on the north side of the bulwark (similar to other cuts related to SG713), but this cannot be said with certainty. Regardless, it seems to be a levelling layer, deposited just after the construction of the bulwark planking in this eastern section of SG713. This would have occurred in the 1750s. The dateable finds materials, the stove tiles, are a bit earlier than this (1575-1675), but would have had a usage period before being discarded and may furthermore derive from redeposited soil.

#### 7.4.3.4.3 Discussion

The groups interpreted as levelling comprise a wide variety of deposits. Most deposits were recorded as consisting mainly of sand with varying elements of silts and clay. Others consisted of building debris, including large proportions of rubble and mortar, while a few deposits seemed to be more local dumps of e.g. oyster shells or materials with a high organic content. The finds materials from both the sand rich and the more organic deposits indicate that the material used for the levelling was collected from areas where household waste was dumped *en masse*. The finds are dominated by ceramics, clay pipes and glass and a large collection of animal bone.

From the zoological analysis of the animal bone from G414 and G429 it was concluded that the analysed deposits in both groups represented what is considered normal household debris but also including elements of higher status households.

The macro-botanical analysis of deposits from the same two groups supported some of the results made from the archaeological observations and the zoological analysis. From G414 the macrofossils from two deposits consisted mainly of plants from dry or fresh meadows as well as a series of grown plants in combination with fragments of charcoal and un-charred wood. This could well correspond to areas of open spaces in the city, where weeds and meadow plants would have grown, while household waste built up as a result of the ill-functional, though highly regulated garbage disposal system in the late 17<sup>th</sup> Century.

From G429 two deposits were analysed for their macro-botanical content. The result from one of them supported the excavator's interpretation of a deposit containing a large proportion of horse dung, while the other contained a broad spectrum of plant remains including weeds, meadow species and collected or grown plants, corresponding to what would be expected if the levelling was taken from an open area or street where household waste was dumped.

In conclusion, the levelling layers in Phase 4 comprised a combination of building waste from demolished structures and large amounts of household waste, probably collected from streets and open areas where garbage had built up over a relatively short time.

### 7.4.3.5. Usage

Group	Sub-groups	Group name
698		Alluvial/use
	630	Harbour usage

Table 45 Groups and sub-groups related to Phase 4 harbour usage



Fig. 237 Plan of groups interpreted as harbour usage

#### 7.4.3.5.1 Introduction

The usage of the harbour is seen both in the building activities located near the harbour front (see below), but also in terms of garbage and activity traces dumped into the water in front of the bulwark as well as dredging activities affecting these dumped deposits.

During the post excavation process two large groups have been interpreted as linked to the usage of the harbour. Contexts related to the groups G698 and SG630 were excavated at the eastern end of the excavation trench, where also the Phase 4 bulwark was preserved. Some areas south of the Phase 4 bulwark were excavated by machine only, and the usage deposits were not extended into these areas, even though they were probably present. At the western end of the excavation area, the Phase 4 bulwark was not identified (as it would have been located beyond the southern limits of the excavation), and thus the usage layers related to this, could not be excavated.

Group G698 comprised deposits that were probably formed naturally, but have been affected by dredging through the 17<sup>th</sup> and 18<sup>th</sup> Centuries, whereas the contexts related to SG630 were formed during this period as well as being affected by dredging.

#### 7.4.3.5.2. Groups interpreted as harbour usage

##### *Alluvial/use G698*

Deposits related to G698 were excavated during the 2014 Main Excavation. The three larger deposits (SD37142, SD54690 and SD54707) were all excavated in the eastern part of the Main Excavation trench, while SD47644, SD47662 and SD47690 were seen in section only, during the watching briefs undertaken in July 2014 in the southwestern part of the excavation area.

Of the three deposits recorded in a section, south of the western part of the Phase 4 bulwark SG604/SG606, SD47662 was the lowest. This deposit consisted of grey, silty sand with occasional inclusions of pebbles, stones, bone, bark, CBM and mortar. The surveyed top-levels of the deposit ranged from OD – 2.43 m at the southern end to – 1.74 m at the northern end. Below the deposit was another, however unrecorded, deposit. Deposit SD47662 was interpreted as a result of natural deposition (alluvial) with some dumped elements of building debris. From stratigraphical observations, the layer seemed to have accumulated after the storm posts, SG606, belonging with the southwestern part of the Phase 4 bulwarks, SG604, had been driven into the ground in front of the bulwark. Above SD47662 was another sand deposit, SD47644, which was lighter in colour than SD47662 and with moderate inclusions of CBM and frequent pebbles. From SD47644 a copper alloy button was collected (FO215347) as the only find. Overlying SD47644 was a lensed sand deposit, SD47690, which was likewise interpreted as an alluvial deposit accumulated over time, while the Phase 4 harbour front was in use.



Fig. 238 Copper alloy jetton (FO212549) found in SD54707 (G698). Coat of arms with three French lillies. "HANS WEIDINGER RECH P". Museum of Copenhagen

Further east in the Main Excavation trench, SD54707 was a greyish-white layer of more or less sterile sand. The surveyed top levels ranged from OD – 3.19 m to – 2.77 m. The layer was interpreted as a geological layer, but as it contained a few finds, among other things a well preserved copper alloy jetton (FO212549, from the late 17<sup>th</sup> or early 18<sup>th</sup> Century) as well as a few sherds of glass and a small fragments of faience, it had probably been subjected to dredging and was therefore included amongst the deposits related to the harbour usage.

Above SD54707 was a large deposit, SD37142, which consisted of grey-brown loose sand with occasional shells as well as large stones and boulders. It was lensed with more organic material, containing hazelnuts. The recorded dimensions of SD37142 were 10.2 m in length (ENE-WSW) and 1.86 m in width. The depth was approximately 0.6 m. From SD37142 was collected a wide selection of finds materials, especially



animal bones (not prioritized for registration), clay pipes, glass, CBM, leather and a few metal artefacts. Four sherds of a Westerwald stoneware mug decorated with Judith and head of Holofernes (FO217847) were dated to the period 1600-1650. The dateable clay pipes range in production date from 1640-60 to



Fig. 239 FO217847, Westerwald stoneware mug collected from SD37142 (G698).  
Museum of Copenhagen

1730-50, indicating that this deposit had also been subjected to dredging over time. Likewise the glass finds comprise items of very varying production dates between the early 17<sup>th</sup> Century and the 19<sup>th</sup> Century.

From SD37142 a sample was analysed for macrofossils. This contained botanical material of weeds (primarily fat hen, *Chenopodium Album*), wet/fresh meadow (primarily sedges, *Carex*) as well as a few other species, of which some were probably grown, among others, hazelnut

(*Coryllus avelana*) and buckwheat (*Fagopyrum sp.*) (Ranheden 2016). The collection did not seem to point towards a specific type of environment.

In the eastern end of the Main Excavation trench, SD54690 was a deposit located on the south side of the Phase 4 bulwark line. It consisted of sand in horizontal layers, but all seemed to be naturally deposited material. In terms of finds the layer was almost completely sterile, except for a single clay pipe fragment. The deposit was interpreted as a naturally deposited layer with a slight influence of human activities, possibly by dredging in the harbour.

### Interpretation

Group G698 consisted of six deposits (SD37142, SD54690, SD54707, SD47644, SD47662 and SD47690) of which three were excavated during the Main Excavation, while three other were seen and documented from a section only. The deposits were all located very close to the natural sea bed and are interpreted as being partly naturally deposited (as in the natural sea bed itself) but also at least partly subjected to dredging. SD37142 is furthermore interpreted as a result of both natural deposition and dumping of waste. The dredging and dumping has possibly been undertaken as parts of the activities linked to the usage of the harbour during the late 17<sup>th</sup> and early 18<sup>th</sup> Centuries, corresponding to the finds materials recovered from the layers. The majority of the bulwark timbers related to the Phase 4 bulwarks, G626, as well as the deconstructed bulwark posts (SG637) seem driven directly into SD37142 which is the uppermost of the deposits, indicating that this deposit would have been here before the insertion of the bulwark. However, these observations may be somewhat general and there may be exceptions to this in G626 as there seems to have been two overall building phases (SG712 and SG713) as well as some repairs in G626. Furthermore, it is possible that especially SD37142 was partly built up while the first bulwark phase, SG712, was in place.

## Dating

The natural sand layers are of geological age, but the human influence must have occurred during the late 17<sup>th</sup> Century and early 18<sup>th</sup> Century. This is supported by the finds material among other things a copper alloy jeton (FO212549), dated by the maker, Hans Weidinger, who was a Nürnberg meister from AD 1670 to 1727.

### Harbour usage SG630

Sub-group SG630 was excavated during the 2014 Main Excavation. The contexts related to SG630 were excavated in the eastern end of the Main Excavation trench, south of the bulwark structure, G626.

The lowest deposit to be encountered was SD35535, which was recorded as being deposited directly on top of natural sand layer, SD54690 (G698) at the eastern end of the Main Excavation trench. Deposit SD35535 consisted of light grey sand with inclusions of stones. A broad range of finds materials was related to the deposit, containing animal bones, CBM, ceramics, clay pipes, glass, iron, leather and three corroded copper alloy coins (not yet back from conservation). The deposit was recorded as a minimum of 6.7 m long (ENE-WSW) by 2 m wide and 0.3 m deep and was formed by the washing up of sand against the south side of the timbers of the bulwark, G626. The chronological spread of the clay pipes' production dates, however, also indicates that dredging has affected the layer. Only a few macro fossils were found during the environmental analysis (PM213911), and the amount and variation of the weeds in the sample from SD35535 was unusually low. There was a clear but scattered presence of widgeon grass (*Ruppia maritima*) and horned pondweed (*Zannichellia palustris*) indicating a marine influence on the material. Solitary finds from hemp (*Cannabis sativa*), hulls of buckwheat (*Fagopyrum sp.*), cherry (*Prunus avium/cerasus*), dewberry (*Rubus caesius*), raspberry (*Rubus idaeus*), stone bramble (*Rubus saxatilis*) and grape (*Vitis vinifera*) were obvious remains from collected plant materials (Ranheden 2016).



Fig. 240 FO213225, clay pipe produced in Stubbekøbing, retrieved from SD35240 (SG630). Museum of Copenhagen

Above SD35535 was a very finds rich deposit, SD35240, which consisted of very dense, very uniform, dark golden brown, fine-grained silts. The deposit extended over a minimum of 19 m by 2.2 m, but was seen to continue out of the trench towards south. The layer did not extend all the way up to the G626 bulwark in all places, and varied notably in depth, suggesting that it had settled into the sand below it. SD35240 comprised vast amounts of animal bone, especially sawn distal ends of cattle metatarsals.

The ceramics from this deposit were mainly produced in the period AD 1625-1775 and consisted of a broad range of fabrics, including stoneware, late redwares, Chinese porcelain etc. The clay pipe material was likewise very varied both in terms of production dates and provenance, as Scottish and Danish clay pipe fragments were among the collected items (Pedersen 2016b). Also the glass material was extensive and comprised window glass, bottles and different types of drinking glasses. From the environmental analysis it appeared that this deposit also contained relatively few macrofossils, but hazelnuts (*Corylus avellana*) and buckwheat (*Fagopyrum sp.*) were relatively well represented (Ranheden 2016).

Above SD35240 were two deposits, SD35227 and SD36034. Deposit SD35227 was a relatively small deposit of dark sand, deposited against the south facing side of the bulwark, near the eastern end of the trench. Larger and located to the west was SD36034. Deposit SD36034 consisted of an approximately 0.2 m thick layer of loose, white sand, which was lensed with grey-brown silt. The full extent of the deposit was not completely recorded, due to the excavation conditions, where parts of the site was left unexcavated for a long time, to ensure safety in the trench and later machined out without the possibility of observing the different layers. Where the deposit's top-levels were surveyed, they ranged from OD – 0.73 m in the north side to – 2.13 m in the south side of the deposit, indicating a considerable sloping of the deposit.



Fig. 241 FO213531 Eau de Cologne-bottle from SD36034, SG630. Museum of Copenhagen

The finds material from SD36034 was extensive and comprised large amounts of Post-medieval ceramics, glass and clay pipes as well as a few metal and leather artefacts. Among the glass finds was an almost intact Eau de Cologne bottle (FO213531), which can be dated to AD 1775-1850.

From SD36034 one sample (PM213536) was analysed for macrofossil content. In this, seeds/fruits from weeds and wet/fresh meadows were present while plant remains from dry/fresh meadows were very sparse. Grown/collected remains were foremost hulls from buckwheat (*Fagopyrum esculentum*) and more solitary appearance of coriander (*Coriandrum savitum*), hazelnutshells (*Corylus avelana*), wild strawberry (*Fragaria vesca*), hops (*Humulus lupulus*), cherry (*Prunus avium/cerasus*), dewberry (*Rubus caesius*) and grape (*Vitis vinifera*) could point out signs of household remains (Ranheden 2016).

The animal bones from SD35240 and SD36034 was retrieved via hand collection, big bag sieving and fine sieving and were analysed together. The collected material from the two deposits comprised more than 18 kg of zoological material, with fish bones constituting the largest number of fragments. 23 different fish species (dominated by garfish, plaice/flounder/dab and herring) were identified along with seven species of mammals (dominated by cattle) and three species of domesticated birds. The distribution of species along with the general location and type of cut marks (see Bangsgaard et al 2016) suggest that the majority of the assemblage from the two deposits represents the waste from household consumption. The collection did, however, also include an overrepresentation of two elements from cattle, namely the mandibles and metapodiums. The pattern suggests that these two elements made their way into the collection as separate items or products. Furthermore, the mandibles also stand out as very uniform in age distribution and the human treatment of them. The latter refer a near identical pattern of chop-marks and fragmentation to the majority of the mandibles. Although the exact reasons behind the phenomenon is not clear, it suggests industrial or production usage of these remains and they likely represent something beyond the household consumption, which otherwise characterises the remaining collection from group SG630. The metapodiums had also received a uniform treatment as the majority were sawn into three pieces, namely the proximal and distal epiphyses, which were found in the excavation, whereas the shafts are absent. This pattern clearly suggests an industrial or production usage of the remains, where the missing shafts likely were used as the raw material for some form of production. The probable end product could perhaps be the bone combs that are known from this period and also were found as a finished product in the excavations (Bangsgaard et al 2016).

Where stratigraphy (with regards to timber structures and so-called push-lines) could be carefully examined, it was observed that SD36034 overlay a wide range of the timber structures belonging with bulwark G626 and storm posts SG595, indicating that SD36034 built up after these timbers had been driven into the ground. This was interpreted as a first episode of silting up of the area in front of the bulwark.



Fig. 242 FO213541, complete glass bottle collected from SD35259 (SG630). Museum of Copenhagen

Following this first episode of silting up was SD35259, which consisted of alternate layers of white sand and greyish silt. Deposit SD35259 contained large amounts of cattle mandibles, glass and clay pipes. From the surveyed top levels, ranging between OD – 0.51 m and – 2.09 m, the deposit seemed to be sloping heavily downwards from north to south.

The macro-botanical material from SD35259 was analysed (PM213912). This sample was not particularly rich in plant materials of any ecological or functional group, but the sample contained ample remains from buckwheat (*Fagopyrum cf. esculentum*). Hulls from buckwheat were noted in quite a lot of samples from Gammel Strand but this sample was extremely rich in that respect. The main part of the organic material between 2 mm and 4 mm consisted of hulls from buckwheat (Ranheden 2016).

SD34718 was excavated in the easternmost end of the trench (east of SD36034 and SD35259) but was seen as the same as these two deposits, where a differentiation could not be made between them. However, SD34718 was recorded as consisting of darker material, containing large amounts of organic material. The finds materials were dominated by ceramics (late redwares, *fydepotter*, Dutch redware, German light fired fabrics, stoneware and also Chinese porcelain and a few sherds of industrial wares), glass (window glass, bottles, *Röhmer glass*, *pasglas* and other drinking glasses) and clay pipes (among others fragments of a Jonah pipe, FO215801). Other finds consisted of three Prehistoric flint flakes, a stone stylus (FO218097) and a copper alloy pin.



Fig. 243 FO218097, stone stylus collected from SD34718 (SG630). Museum of Copenhagen

Covering over the eastern half of SD34718 was deposit, SD53344. SD53344 consisted of light grey sand and was recorded as deposited up against the bulwark, G626. The surveyed top levels were ranging from OD – 0.35 m on the north side and sloping downwards to approximately – 2.30 m along the south side of the exposed part of the deposit. In general the deposit was approximately 0.4 m thick. The deposit contained many types of finds materials including leather, ceramics, glass, clay pipes, metals etc., but only the clay pipes have been

registered along with a metal spoon bowl (FO217975), four corroded coins (not yet conserved, FO212526) and a glass seal that seems to be a fake London glass seal made in the Eastern Baltic area (FO214809).



Fig. 244 Glass seal FO214809 from SD53344 (SG630). Photo: G. Haggrén

From SD53344 an environmental sample (PM212964) was analysed for its macro-botanical content. The contents of the sample were relatively sparse, but an interesting feature was the “crumb structure” that seemed to characterize the soil. Crumb structure is a name given to a phenomenon created by worms. A visible product from this is a mixture of minerogenic and organic substance, partly as a complex of clay and humus (it could be considered dung from worms). The soil looks “grainy” and is hardly (or not at all) dissolved during the flotation process. The phenomenon is interesting as it suggests that the soil has been biologically active and the intrinsic question is if this happened after the soil was deposited, or if it rather suggests this material to have an at least partly natural soil source (Ranheden 2016).

East of SD34718 and SD53344, a small deposit, SD53336 was first seen in section, when a survey slot was excavated through the area (C32810), and the deposit was later extended to the east and west. This consisted of light grey and white sand with few inclusions. The finds materials collected comprised animal bone, ceramics, glass and metal (none registered) as well as clay pipes.

### Interpretation

Sub-group SG630 belongs to the Phase 4 bulwark, G626, and the deposits related to SG630 are interpreted as remains of the usage of the harbour front – a combination of dumping of garbage and other activity remains into the harbour as well as dredging activities. The finds materials recorded from the deposits indicate that primarily household waste was dumped into the waters in front of the bulwark.

The deposits related to this group consisted either of light coloured sands or darker silts with a high organic content, indicating different deposition events. The white and light grey sandy deposits may be either sand washed out with the numerous drain pipes (e.g. G445, G638, G452, G459 etc.) leading from the buildings on the northern side of the current Gammel Strand square or sand dropped by accident by the sand barges delivering sand for the *sand-kister* (sand containers) from which people could buy sand for keeping their wooden floors clean. There seem to have been two *sand-kister* near Gammel Strand – one on the eastern side of Stormbroen (southwest of Gammel Strand) and one on the eastern side of Højbro (northeast of the excavation area). The silt and organic deposit may on the other hand be related to the more direct dumping of waste into the water – this comprising both stable waste and probably slaughter house debris – which has settled into the water over time. Generally the waste seems dumped directly from the edge of the bulwark, as the deposits were found at a high level near the bulwark and then sloped downwards towards the south, where also dredging would have possibly both mixed the layers considerably as well as removing some of the bulk of material.

Two timber posts were related to this sub-group, as they seemed to be later additions or replacements of other bulwark posts of G626, based on stratigraphical observations. However, the dendrochronological

date obtained from one of them was similar to the rest of the G626 bulwark. It is possible that the bulwark posts were taken out and put back in connection with the establishment of drain pipe G452.

### Dating

The deposits related to SG630 seem to have accumulated during the second half of the 18<sup>th</sup> Century and the early 19<sup>th</sup> Century, as they built up on the outside of the Phase 4 bulwark, G626. This is not contradicted by the dateable finds.

#### 7.4.3.5.3. Discussions

In G698 the deposits are mainly naturally accumulated sand layers, which may have been slightly affected by the dredging of the area through time. Elements of dumped materials were seen, in that inclusions of building material such as CBM, stones and mortar were documented within the layers – but in nowhere comparable measures to what was seen in the land reclamation and levelling deposits. Finds materials were scarce but included household material as well as personal items (ceramics, glass, clay pipes, button, jetton, stylus etc.), which were retrieved mainly by sieving of big bags of the deposits. From the macro-botanical analysis, material pointing towards brackish waters as well as wet/fresh meadow plants was seen, but the conclusions on where the material would have derived from were not clear.

From SG630 finds and inclusions were more numerous from these also much more diverse deposits, consisting of light sand as well as sand with large amounts of darker silts and organic materials in them.



Fig. 245 Copper alloy button FO212837 from SD34718 (SG630). Museum of Copenhagen

SG630 was interpreted by the excavator as representing two different phases of silting up in front of the early and later Phase 4 bulwark, but the layers may also have been affected by dredging. Clearly waste was dumped into the harbour from the harbourside and possibly also from ships and barges. The dumped waste included clay pipes, glass of many different types, and a broad spectrum of ceramics as well as more **Special Finds** such as buttons, styli and coins. Building debris was also located. Most of the finds were collected by sieving, rather than hand collection, supporting the idea

that this material was not dumped *en masse*, but rather as casual losses or household waste being dumped a little at a time.

From SG630 a series of five macro-botanical samples were prioritized for analysis. From these, the scarceness of the human influence is clear in comparison to the amounts of plant material from the samples taken from land reclamation and levelling layers throughout the excavation. The zoological analysis of two of the deposits in SG630 revealed mostly material related to household waste, but also fragments of bone which could derive from production related activities.

### 7.4.3.6. Buildings (This sub-chapter is primarily written by Rachel C. Morgan)

#### 7.4.3.6.1. Introduction

There were two discernible structures excavated in the Guide Wall and Main Excavation trenches, which lay in the northwest corner of the excavations. Both buildings had been subject to periods of rebuilding or alteration, and between them demonstrated various methods of construction ranging from fully laid masonry walls to timber pile foundations. The easternmost building was a northwest-southeast oriented structure, G707, identified as probably being the Bargemen's Guild House ('*Pramlaugets hus*'). To the west of this and abutting it was G537, a building of poorer quality construction which was identified as probably being the '*Vragerbro*'. This structure may initially have been a yard to the west of the Guild House building which was enclosed by a wall to the north, which at a later stage was further enclosed by the addition of a southern wall and the partial rebuilding of the northern wall to create a small structure (see G537 below). For further documentary and cartographic sources referring to these buildings see Chapter 3. There is a suggestion that building G707 could have been re-built in 1822-3 by A. H. Seith who was reported to have been given permission to build a two storey structure on the plot (Villads Christensen 1912, 52). However, this cannot be substantiated, and while there is archaeological evidence for a limited amount of alteration to the chimney structure, there is none which would support the theory of a complete re-build.



Fig. 246 Detail of a 1840 daguerrotype of Gammel Strand by T. Neubourg showing building G707, identified as the probable Bargemen's Guild House, viewed from the southeast. Another structure partially seen to the rear of the Guild house could be identified as G537, the probable *Vragerbro*.

**7.4.3.6.2. Groups interpreted as parts of buildings**

As the groups in this sub-chapter each consist of many sub-groups, a table is inserted for each of the building groups below. Some of the more complex groups have more levels of sub-groups related to them for the sake of overview over the single building phases.

Group	Sub-groups	Group name
707	426; 675; 680; 685; 686; 687; 688; 690; 693; 696	Eastern building
537	709; 710; 711; 409; 410; 418; 419; 420; 422; 424	Western building
539	500; 501	Vragerbro structure

Table 46 Groups and sub-groups related to Phase 4 buildings

*Eastern building G707 (probable Bargemen’s Guild House or ‘Pramlaugets hus’)*

Group	Sub-group	Sub-group	Context Type
707			Eastern building
	426		Wall
	675		Wall
	680		Southern extension to G707
	688	685; 686; 687; 690; 696	Chimney base
	693		Wall

Table 47 Groups and sub-groups related to the eastern building, G707

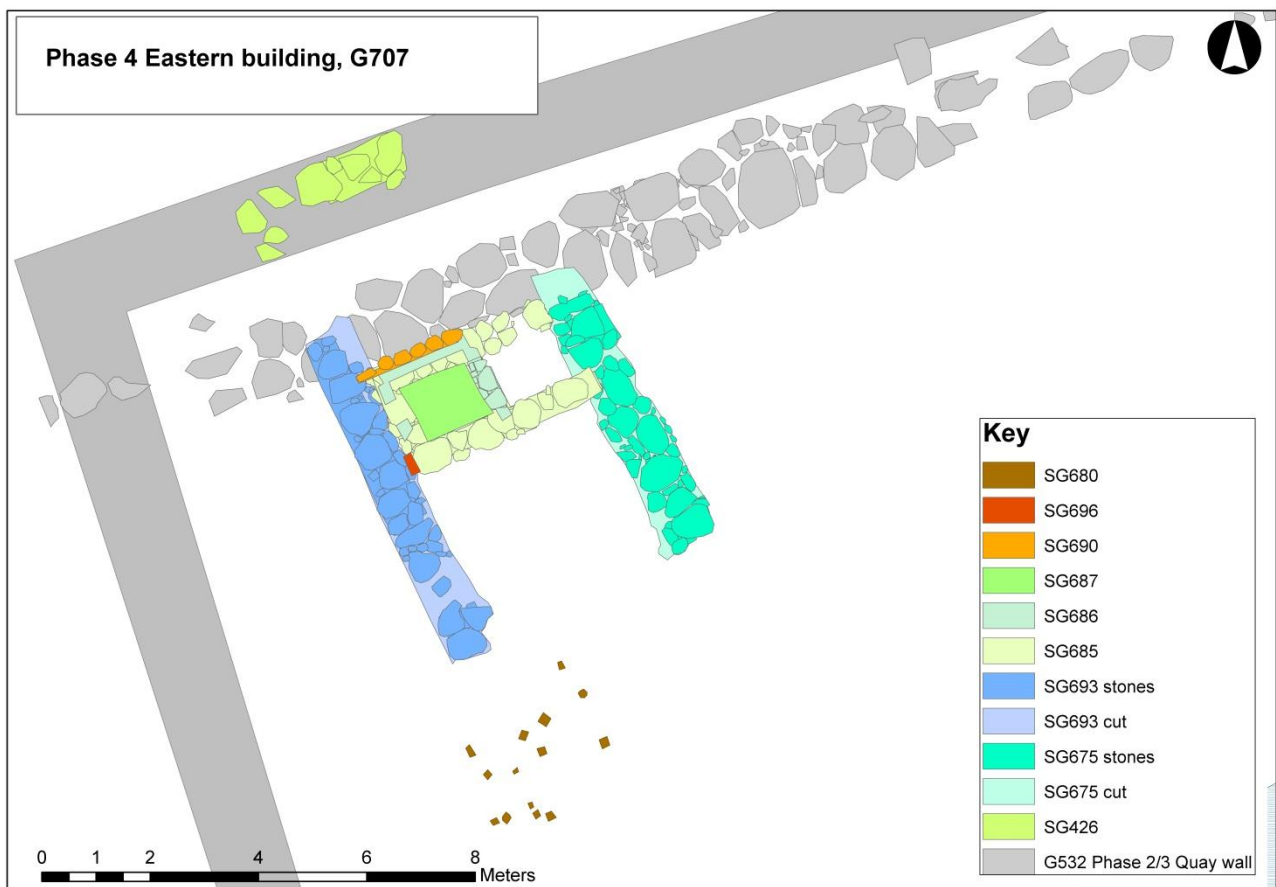


Fig. 247 Plan of foundation walls SG426, SG675 and SG693 of the probable Bargemen’s Guild House G707 with central chimney SG688



The first building to be constructed within this area of Gammel Strand was a brick walled structure with stone foundations aligned NNW-SSE, which would have orientated its southern wall parallel with the alignment of Phase 4 of the harbour. The extant remains of the external walls consisted of the lower stone foundations of the north (SG426), west (SG693) and east (SG675) walls; the southern wall having been truncated away during Phase 5 of the harbour development (see Chapter 7.5). The remaining wall foundations were all partially truncated by modern interventions which destroyed the relationships between the north wall and the east and west walls. The northeast corner was excavated in 2008 (Bork-Pedersen 2008) where the brickwork at the lower limit of excavation initially identified as a floor, is now thought to have been the top of the robbed out walls. The overall dimensions of the structure were 9.45 m NNW-SSE by 5.35 m ENE-WSW, with an interior width of 3.98 m. The walls survived to a total height of 0.62 m at 0.42 m OD. The southern wall of the building was missing, so the total dimensions of the structure are unknown, however the inventories of the building undertaken in 1811 and 1822 stated its relative dimensions as two bays wide by five long (see Chapter 3 above). By extrapolating from the known width of the remains, the internal length of the structure would appear to be approximately 10 m, and the external dimension approximately 11.6 m.



**Fig. 248** The robbed out remains of building G707, with the remains of the chimney base SG688 to the centre of the picture, and the remains of wall SG409 belonging to the probable Vragbro building G537 to the left. Looking NE.  
C03\_20140226\_8277

Each exterior wall (SG693, SG675 and SG426) had a foundation of large, sub-rounded and sub-angular granite boulders which were set into a construction cut. The eastern and northern walls, SG675 and SG426 respectively, contained mixed construction backfill over the boulders to stabilise them, with broken red pan tiles placed along the side of the cut as packing infill. The backfill of the eastern wall contained a mixture of finds derived from construction and domestic sources, including ceramics, leather and clay pipes. Of the three collected clay pipe fragments, two were stems with broad dates of AD 1600-1800, while one bowl

dated to AD 1640-60 which could either provide a construction date for the wall, or more likely be derived from the material through which the wall was constructed and have been re-deposited here. Over the stone foundation layers were the remains of brick walls constructed of yellow Flensburg brick, regularly laid, but in no discernible bond as the remaining brickwork consisted of only three courses. These walls had been robbed out by SG697 (Phase 5, demolition) to the present level, below the remains of the central brick feature SG688 and the western building G537, which is indicative that the exterior walls were probably constructed of higher quality material.

The brick structure, SG688, situated centrally within the external walls of G707 was interpreted as the base for a chimney, which had undergone alterations or repairs during its lifetime. The initial construction phase of the structure, SG685, was oriented in a ENE-WSW “U-shape” with the opening to the ENE, and was constructed of three elements; the main brick wall SS21939, above a wider brick step foundation SS25660, over stone foundation SS32145. The overall dimensions of this structure measured 3.9 m ENE-WSW by 2.3 m NNW-SSE, and survived to a total height of 0.65 m at 0.84 m OD.



**Fig. 249** The initial construction phase SG685 of the chimney feature SG688. Wall SG675 can be seen in the foreground, and buttress SG690 to the right. Looking WSW. C02\_20140311\_8486 (cropped)

The entire chimney structure abutted the NNW-SSE oriented wall groups SG693 and SG675 to the west and east respectively. The foundation stones of the chimney, SS32145, were unshaped, granite, glacial erratic boulders which varied in size from approximately 0.1 m to 0.35 m in diameter. The boulders formed foundations SS32145, which measured approximately 0.66 m in width and appeared to have been placed in a shallow construction cut, however this was not recorded. Some yellow-grey mortar was present among the stones, but this appears to have been part of the infill and not to have formed a bonding material. The stone foundation supported a stepped brick foundation, SS25660, which was a maximum of 0.62 m wide. This consisted of two courses of yellow Flensburg brick, regularly laid but not in an identified bond, mortared together with a light grey slaked lime mortar. The extant main wall, SS21939, over the stepped foundation consisted of seven courses of

brick which were laid in rows of headers with one row of stretchers. The bricks were yellow to pink Flensburg type although they were slightly thicker than normal, measuring 0.22 m by 0.11 m by 0.04 m. The south and west walls were c. 0.36 m wide, but the northern wall was broader, at 0.48 m. A vertical fissure between the west and south walls showed the structure had been subjected to quite heavy settling which resulted in the undulation of the southwest corner especially, and may have necessitated some of the repairs.

The episodes of repair or alteration to the chimney foundations were separate from each other and could have occurred simultaneously as one phase of repair, none of which could be securely dated. The insertion



Fig. 251 The 'stub' wall SG686. The upper course can clearly be seen to be bonded into SS21939 to the left of the picture. Looking WSW. C02\_20140303\_8355

of a small stub wall SG686 into the open 'U' of the walls consisted of a short stone and brick foundation, SS24164, supporting a brick stub wall, SS23609, which was underneath a broken U-shaped brick wall, SS22775. The foundation comprised light yellow coloured Flensburg brick and four sub-rectangular stones, the most northerly of which was a reused flagstone of Öland limestone, which rested at an angle, unlike the other flat stones, probably due to settling. The stub wall was

perpendicular to and connected with both the north and south walls of the chimney base SG685, which had previously been U-shaped, and thereby closed the 'U'. The brick stub wall, SS23609, was 1.02 m long and consisted of two courses of Flensburg bricks, the upper course of which was bonded into the upper course of wall SS21939 in SG685. The bonding between these two walls could have occurred through the partial removal of SS21939, or the upper course of that wall could also be part of this addition. Over the foundation was a U-shaped brick addition, SS22775, which overlay the east, north and western walls of the chimney base. It was again constructed from two courses of yellow Flensburg bricks bonded with an unfinished grey mortar. This is suggestive that the structure was taken down to the level at which this

context began, and the structure was then re-built from here. The interior space delineated by the chimney base was filled by a foundation for a floor, SG687, which comprised dark grey-brown clay sand and contained a low concentration of mixed inclusions, e.g. ceramics, floor tile, glass, iron, bone and slag, which were indicative of general waste, none of which provided specific dates, along with a high concentration of building waste such as mortar



Fig. 250 The buttress SG690 to the chimney SG688. Looking SSE. C02\_20140303\_8352

and ceramic building material.

The chimney was buttressed along its northern side by SG690 which consisted of foundation wall, SS26126, a single course of rounded boulders which supported five courses of yellow Flensburg bricks, SS25054, laid in a stretcher pattern and which were not bonded to wall SS21939. This repair may have been contemporary with some of the other additions to the chimney, such as studwall SG696, or floor foundation SG687.



Fig. 252 The short 'stud' wall, SG696, seen here abutting the chimney base SG685 to the right and the robbed out remains of the exterior wall SG693 to the left. Looking NNW. C03\_20140311\_8681

Between the chimney and the exterior wall SG693 to the west was a small stud wall SG696. This consisted of a single column of yellow Flensburg bricks, four courses high which would have abutted both SS21939 and the large wall SG693 to the west which was subsequently robbed out. This small wall could have been placed to seal the gap between the two walls in order to make a usable basement space in the room to the south of the chimney.

The eastern and western exterior walls, SG675 and SG693 respectively, were robbed out by group G697 (Phase 5), as can be seen from their lower extant height than the chimney SG688 which lay between them. The backfill into the robber cut was only recorded for the eastern wall and consisted of brick and stone rubble, the broken remains of the robbed out material, alongside some fragments of domestic waste such as ceramics, animal bone and clay pipe, the latter of which had a broad date range from 1600-1800. These walls were probably demolished to a lower level than the other elements of the structure due to their construction from superior quality material which was then removed for re-use. All other structural elements appeared to have been deconstructed down to ground level.

To the south of the main structure was a collection of timber posts (SG680) which have been interpreted as possibly part of this building. The area covered by these posts measured approximately 2.6 m northeast-southwest by 2.65 m northwest-southeast. The average total depth of the posts was ca. 0.2 m and their heights OD varied between – 0.2 m and + 0.5 m.

These fourteen posts do not form a coherent arrangement, and none of them returned dendrochronology dates for comparison. Due to excavation conditions (the area was machined out) no stratigraphy was recorded for the posts, making sequencing or dating practically impossible. These posts tentatively have been identified as being the foundation for an extension from the southern wall of building group G707 out into the harbour which was identified in the daguerreotype from 1840. They could otherwise belong to various unidentified harbourside structures or features in the area such as mooring posts.

The building G707 can probably be identified as the Bargemen's Guild House (*'Pramlaugets hus'*) which was known to have been built in the area. The 1840 daguerreotype of Gammel Strand shows a building in this location with the entrance in the eastern wall and a central chimney towards the rear (west) of the building

(see Fig.246). The buildings along Gammel Strand were known to have been demolished in 1857, which securely dates the robbing group G697 (Phase 5, see Chapter 7.5).



The results of the excavations corroborate part of the assessments and valuations of the building undertaken in the early 19<sup>th</sup> Century (see Chapter 3), which confirmed the external walls were fully laid, and there was a chimney in the basement. That the basement rooms were utilised as more than storage space was inferred by the presence of the wall infill SG696, however the stone or brick floors mentioned in the inventories must have been robbed out prior to demolition, and the two stoves which were said to have been located in the basements would not have left archaeological traces. Comparisons between the two extant images of this building i.e. the painting by A. Juul in c. 1820, and the daguerreotype from 1840 show that the building underwent minor alterations in the intervening years: the square upper window in the side annex appears to have been replaced by a smaller circular one, and dormer windows had been added to the end roof hips.

**Fig. 253 Part of the post foundation SG680. The posts do not form a coherent structure, but were thought to relate to an ancillary structure on the southern side of building G707. Looking N. C03\_20140415\_9601**



**Fig. 254 Painting by A. Juul, c. 1820. Source: Væggen/Museum of Copenhagen**

Western building G537 (probably the buildings surrounding Vragerbro)

Group	Sub-group	Sub-group	Context type
537			Building
	709		Building construction (1 <sup>st</sup> phase)
		420	Wall – 1 <sup>st</sup> construction phase
		(223)	(Culvert – 1 <sup>st</sup> construction phase)
		(423)	(Culvert – 1 <sup>st</sup> construction phase)
	710		Building construction (2 <sup>nd</sup> phase)
		409	Wall – 2 <sup>nd</sup> construction phase
		410	Foundation wall – 2 <sup>nd</sup> construction phase
		418	Wall repair – 2 <sup>nd</sup> construction phase
		(689)	(Drain – 2 <sup>nd</sup> construction phase)
		(708)	(Drain – 2 <sup>nd</sup> construction phase)
	711		Building construction (3 <sup>rd</sup> phase)
		419	Buttress – 3 <sup>rd</sup> construction phase
		422	Buttress – 3 <sup>rd</sup> construction phase

Table 48 Groups and sub-groups related to the Western building G537

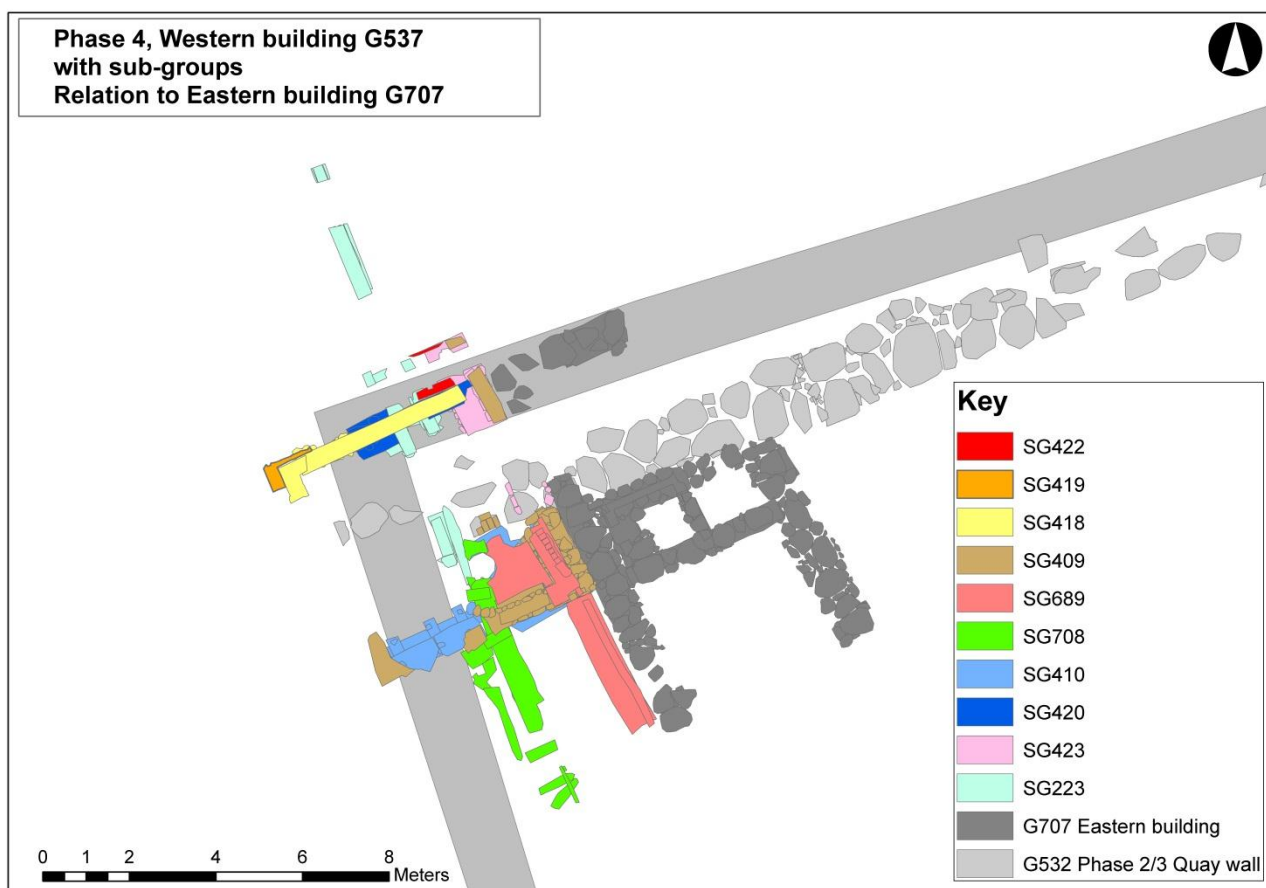


Fig. 255 Plan of Western building G537 with sub-groups and relation to Eastern building G707

The building to the west of G707, the probable Bargemen’s Guild House (*‘Pramlaugets hus’*), has been identified as probably the buildings limiting the *Vragerbro*; an area where goods underwent quality control. Due to the differences in construction methods, materials and discernible phases, this structure appeared to have undergone three distinct phases of construction and subsequent alteration. This began with SG709,

the construction of a northern wall (SG420), oriented northeast-southwest, which overlay two perpendicular brick culverts, SG223 and SG423. It was followed by SG710, the construction of another wall on the same alignment further south, SG410/SG409 with a drain, SG708 a continuation of SG223, integral to the structure, and the partial deconstruction of wall SG420 and a new wall SG418, built above. The final phase consisted of a series of small buttresses, SG419 and SG422, to support the northern part of the building.

It would appear from Gedde's 1757 'Snarens kvarter' map that a structure existed at that time in the northeast corner created by the north-south and east-west buildings in the area. However, there was no mention of the *Vragerbro* on this map, just the *Vejerhus* and *Pramlaugets hus*. In the *Københavnske Jævnførelsesregistre* (Copenhagen plot correspondence registers), the *Vragerbro* is not mentioned in 1756, but seems to be present in both 1689 (in Snarens Kvarter, plot nr. 1) and 1806 (in Strand Kvarter, plot nr. 57). The dendrochronology dates retrieved from the foundation timbers (see below) post date the map thereby indicating that this structure was re-built.



Fig. 256 detail from Gedde's 1757 'Snarens kvarter' map showing the layout of the buildings in the area. The structure in the corner between the north-south and east-west buildings can easily be seen.

The 1<sup>st</sup> phase of the western building SG709 was composed of three structural elements; NNW-SSE oriented culverts SG223 and SG423, and wall SG420 which spanned them perpendicularly.

*1<sup>st</sup> building phase SG709, northwWall and culverts*

The structures and features related to SG710 were primarily excavated during the 2012 Guide Wall excavation and located in the northwestern part of Guide Wall Trench 1/ZT9164. A few additional parts were excavated in the northwestern corner of the Main Excavation trench in 2014.



**Fig. 257 Plan of the two brick arched culverts SG223 and SG423 with wall SG420 overlying**

The wall SG420 was aligned ENE-WSW and extended for 3 m over the two brick arched culverts SG223 and SG423, to a total depth of 0.91 m from 1.185 m OD. A shallow construction cut SC203106 to the west of culvert SG223 contained seven sub-angular and sub-rounded field stones, SS12015, in a drystone construction with no bonding material. The construction cut was backfilled with sandy material SD11621 which contained occasional domestic waste as ceramics and glass. The glass dated from between 1550-1675, however, the artefactual evidence was derived from construction backfill and so was re-deposited from the layers through which the construction trench was excavated rather than dating the construction of the feature itself. The stone foundation supported a brick wall, SS11686 of yellow Flensburg bricks in a block bond, mortared together with light grey sandy mortar, of which nine courses remained. The wall extended over the brick arches of culverts SG223 and SG423, and was probably built contemporaneously with them although they were not bonded together. This wall could represent either part of a building or be the northern wall of a yard space. The southern wall (SG409/SG410 – see below) was constructed using different materials and methods from this wall, which could support the theory of an enclosed yard which



was later incorporated into a building, unless the southern wall was entirely rebuilt later using different methods.



**Fig. 258** A working photo showing the recording of wall SG420 with overlying rebuild SG418, viewed from the northwest. The two culverts SG223 and SG423 can be seen in the top left of the photograph. Looking SE. C03\_\_20120718\_4967

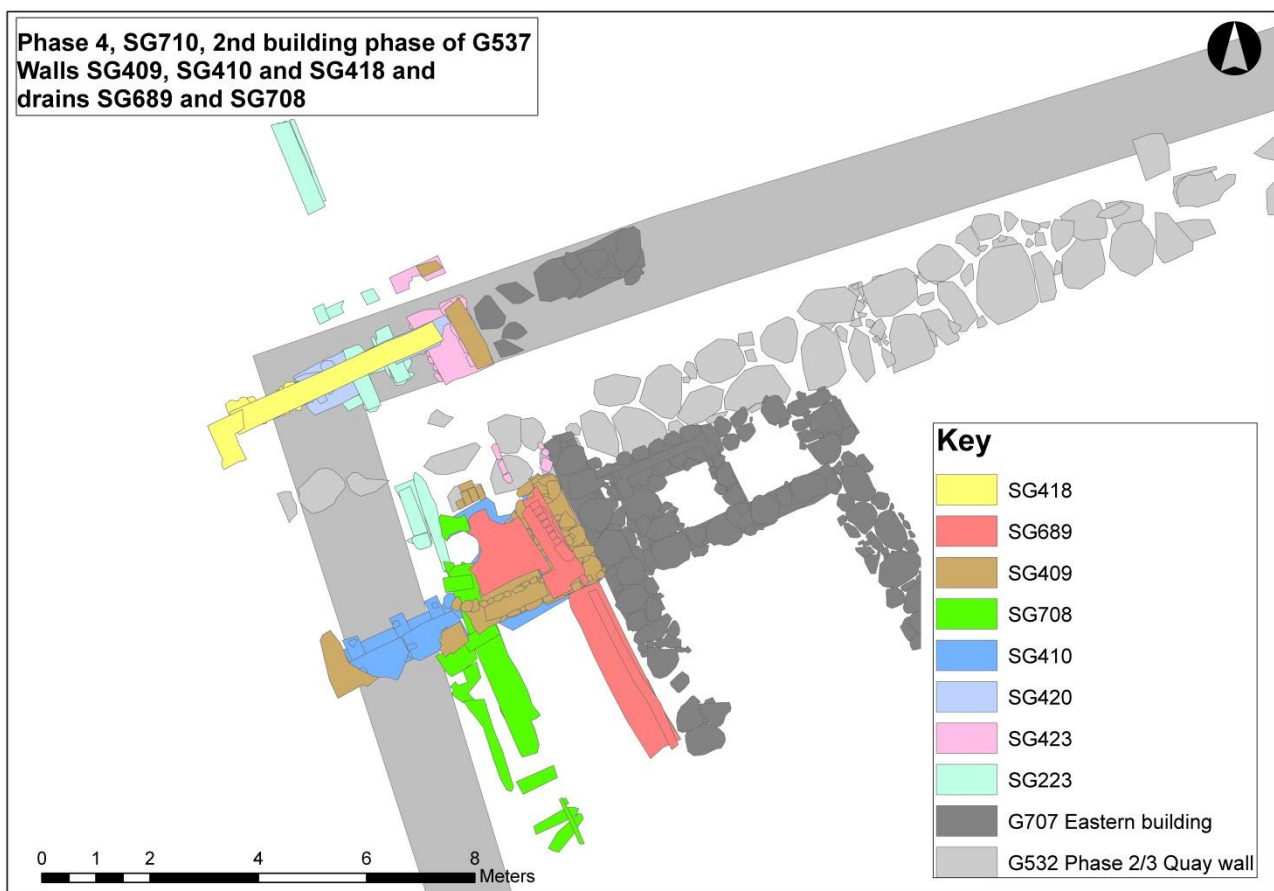
The two culvert structures, SG223 and SG423, are described further in the service pipe sub-chapter (7.4.3.7.).

*2<sup>nd</sup> building phase SG710, South Wall, Drains and North Wall Rebuild*

Parts of this sub-group were excavated during the 2012 Guide Wall excavations, in Trench 1/ZT9164, while the easternmost parts were excavated in the Main Excavation in 2014.

The southern wall was built in three separate sequences to create an overall integral structure. This began with the construction of a stone and timber foundation, SG410, in order to create a stable base in the unstable, newly reclaimed land. A drain, SG708, was then constructed through the middle of the foundation to form a continuation of the northwest-southeast drain G223 to the northwest (see further about the drains in Chapter 7.4.3.7). Lastly, the stone and brick wall, SG409, was built above to form the southern boundary of either an enclosure or a building.

The northern wall was rebuilt, SG418.



**Fig. 259 Plan of SG710, the 2nd phase of construction of the western building G537 seen in relation to the earlier elements**

The initial foundation of the south wall, SG410, consisted of an L-shaped timber and stone structure which measured 4.93 m running ENE-WSW, turning NNW for 1.55 m at its eastern extent. The foundation was constructed from seven pairs of 2 m long, vertical, square posts (fourteen in total - ST12379 and ST44452) driven into the underlying levelling layers belonging with G414. These pairs of posts supported one short horizontal beam (ST12334 and ST39781) per pair, to which they were fixed by wooden pegs. Three of the posts were dated through dendrochronology to the winter of AD 1778 (PD211999, PD212003 and

PD212004 from ST44452), and one of the beams to AD 1776[?] (PD12294 from ST12175). These beams in turn supported four perpendicular horizontal beams (ST12175 and ST34967), although foundation stones SS39795 were placed between beams ST39781 and ST34967 in the corner of the structure to provide added stability here.

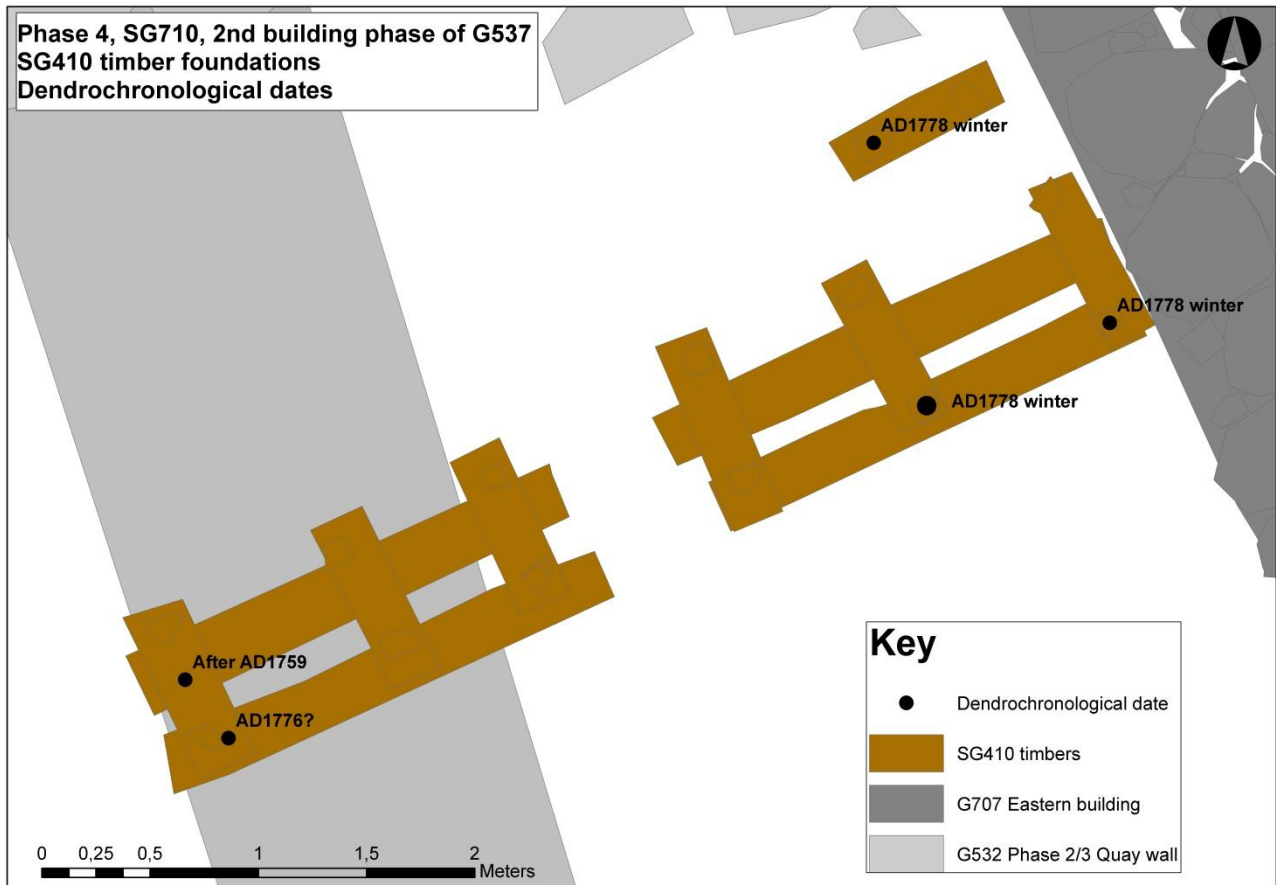


Fig. 260 Plan of the timbers from SG410 which returned dendrochronological dates



Fig. 261 Timber foundations SG410 in the Main Excavation. Looking south. C02\_20140507\_9194 (cropped)

Around the various structural elements, SD12247 and SD37153 were construction backfills, containing mixed materials with secondarily deposited finds and inclusions, as these fills were likely to have derived from the immediate surrounding area. A clay pipe bowl FO215161, found within SD37153 dated from AD 1630-1650, and another, FO215164 with a crowned SH stamp within the same deposit, dated to AD 1710-1730 (Pedersen

2016b). Both pipes were imported from the Netherlands, but were likely to have derived as secondary deposition from the surrounding layers and so cannot provide a date for the construction.



Fig. 262 Foundations SG410 in the Guide Wall trench, Looking south. C03\_20120723\_5067 (cropped)

Two large, squared boulders, SS9369, were supported on the western end of the timber structure and formed a stable, level foundation for the overlying brick wall, SG409. Two further large, shaped granite boulders, SS33632 and SS33651, were supported by these timber foundations to the east in the Main Excavation; however these have been included as part of the overlying brick wall SG409 due to the stratigraphic position of the drain SG708 which ran through the middle of the structure.

This illustrates the integral nature of the drain structure with the wall. See further about drain structure G708 in the service pipe sub-chapter (7.4.7.3).



Fig. 263 Plan showing the extent of the brick walls and possible area of brick flooring in SG409

The upper structure of wall SG409 was constructed of stones and bricks SS35002 set between beams ST34967 in SG410 in the southeast corner of the wall to provide stability. Above these timbers were large, rectangular boulders, SS33632 and SS33651, along the western and northern foundations respectively. The corner of the structure between the two was then filled with rounded stones SS33678 as a drystone structure and a primary wall footing. SS50560, of red brick was built over the foundation stones. This in turn carried six courses of red Danish Modern brick wall, SS24616, laid in a stretcher bond, measuring 2.35 m by 2.15 m and 0.6 m high from a height OD of 0.81 m, and which would have been mortared to the wall SG693, before the latter was robbed out.



Fig. 264 the remains of wall SS9386 in SG409 over foundations SG410 in the Guide Wall trench. Looking west.  
C03\_\_20120718\_4994

Part of wall SS24616 was cut away to insert drain SG689 (see further about SG689 in the service pipe sub-chapter 7.4.7.3.). A small section of five flat-laid bricks placed NW of the rest of the structure were also surveyed as part of SS24616. However these did not form part of the wall structure and could alternatively represent the remains of a floor. Wall SS9386 consisted of five courses of red brick seen in the western edge of the Guide Wall trench and which probably formed the continuation of the brick wall SS24616, and may show a short northern return for this wall. Wall SS12104 was a northern section of brick wall which was built over the eastern side of culvert SG423. This was recorded as being built of yellow bricks; however the photographs show red bricks in the upper courses which could indicate a contemporary build with wall SS24616 to the south, with which this wall aligned.



Fig. 265 The upper courses of SG409 viewed from the west. The top of drain SG689 can be seen to the top of the photograph, and drain SG708 to the bottom. The remains of the possible brick floor can be seen to the left. C03\_20140317\_8825 (cropped)



Fig. 266 SS12104 of SG409 along the east side of culvert SG423. Looking SW. The red bricks in the upper courses of the wall are clearly seen. C03\_280612\_4658 (cropped)

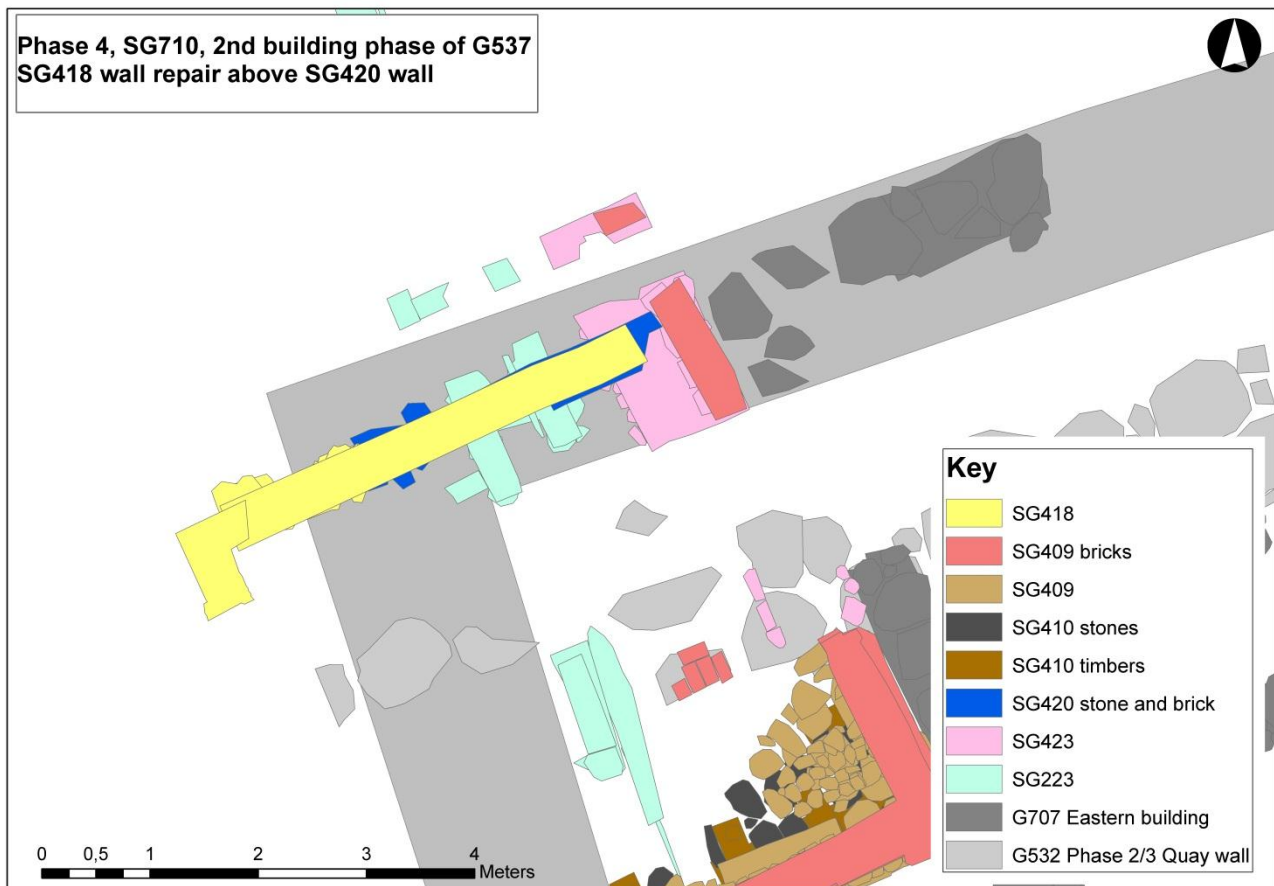


Fig. 267 Plan of the relation between the wall repair SG418 and wall SG420 beneath

The rebuild of the northern wall SG418 may also be contemporary with the construction of the southern wall SG409, despite the difference in construction techniques, which however is probably due to the presence of the earlier northern wall SG420 beneath SG418. The rebuild included the partial destruction of SG420 on a diagonal line, probably to extend the wall further to the west and provide a secure foundation and bonding between the old and new structures. The extended foundations did not have the same timber post and plank construction as SG410 to the south, presumably because the ground was more stable this much further north of the harbourside. Instead, a single layer of rounded stones and a section of brickwork laid face down, SS11423, were used as a foundation for the brickwork above. Over the foundation, the brickwork plinth footing SS11360 was one course thick, projecting slightly northwards of the Main brick wall above. At its western end, this plinth was laid in a double row of headers slightly off-set from each other and which extended to five bricks. At the eastern half of the plinth, it was constructed of broken bricks and did not form a coherent bond. The whole plinth was laid on a thick bed of mortar c. 0.15 m deep and was bonded together with the same. The main wall, SS9085, built on the plinth was L-shaped, extending 4.59 m northeast-southwest, before turning southeast for 0.85 m at its western end, and survived to a total height of 0.73 m from a height OD of 1.23 m. Eight courses of yellow bricks remained in-situ mostly in header courses but poorly built with few overlapping joints to provide strength and stability. Some of the bricks showed signs of being reused with heat effected faces bearing traces of soot, again indicating the poorer build quality of this structure.



Fig. 268 The rebuild SG418 over wall SG420: the deconstruction of SG420 on the diagonal can clearly be seen, viewed from the south. The poorer quality of the overlying brickwork is evident when contrasted against the earlier wall. C03\_20120717\_4941



*The 3<sup>rd</sup> building phase SG711, buttressing*

The final phase of the western extension consisted of two episodes of brick wall constructions which buttressed the previously poorly constructed northern wall SG418. SG419 was an L-shaped brick wall which measured 1.28 m long by 0.67 m wide and was 0.37 m high, with the top of the structure at 1.38 m OD, constructed in *mobber* style and was fully laid, butted up against and extending around the exterior of the northwest corner of wall SG418. The other buttress, SG422, comprised two fragments of wall; SS12240 and SS12350. Both walls were aligned northeast-southwest, with SS12350 lying 0.75 m to the south of SS12240. Wall SS12350 bridged the two brick culverts; extending from the western wall of culvert SG423 to the eastern wall of culvert SG223, and measured 0.9 m long by 0.2 m thick. It survived to a height of 0.5 m, with the top of the structure being at 1.25 m OD. It also abutted and ran alongside wall SG418. Wall SS12240 abutted the western side of wall SG409 at its northernmost extent (at the northern limit of excavation). These walls were crudely built, consisting of whole and fragmentary bricks of varying shape and size, so the material was likely to have been reused. The extent of the building to the north is unknown, and so the short wall SS12240 could represent the reinforcement of an unknown structure or wall further north. There was a short section of wall recorded just north of the buttress, which was originally interpreted as probably modern, but due to its location and construction from yellow bricks, this could be interpreted as a continuation of culvert SG423. However, there is no photograph of it with which to compare the structures.

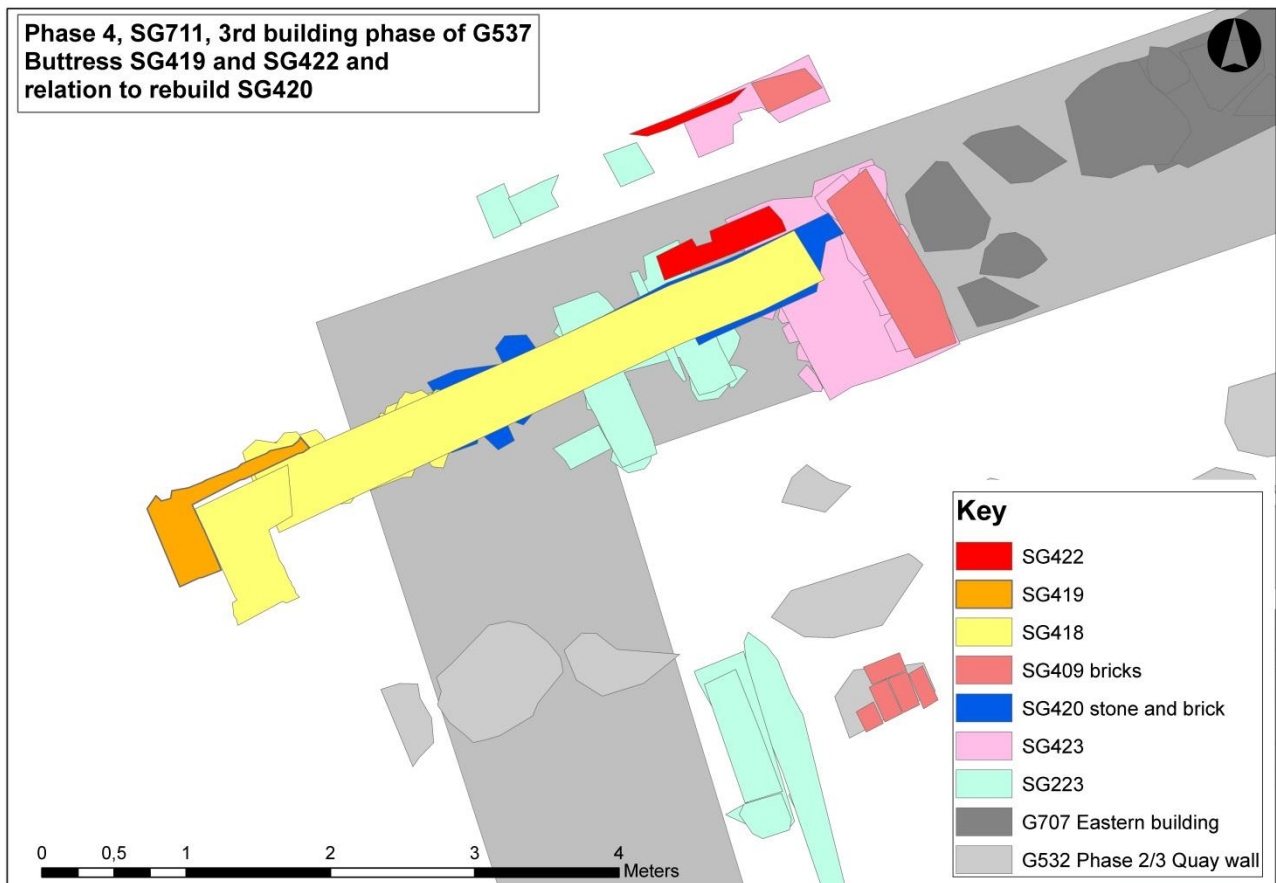


Fig. 269 Plan of the buttress sub-groups SG419 and SG422 in relation to the rebuild SG418

Wall G424

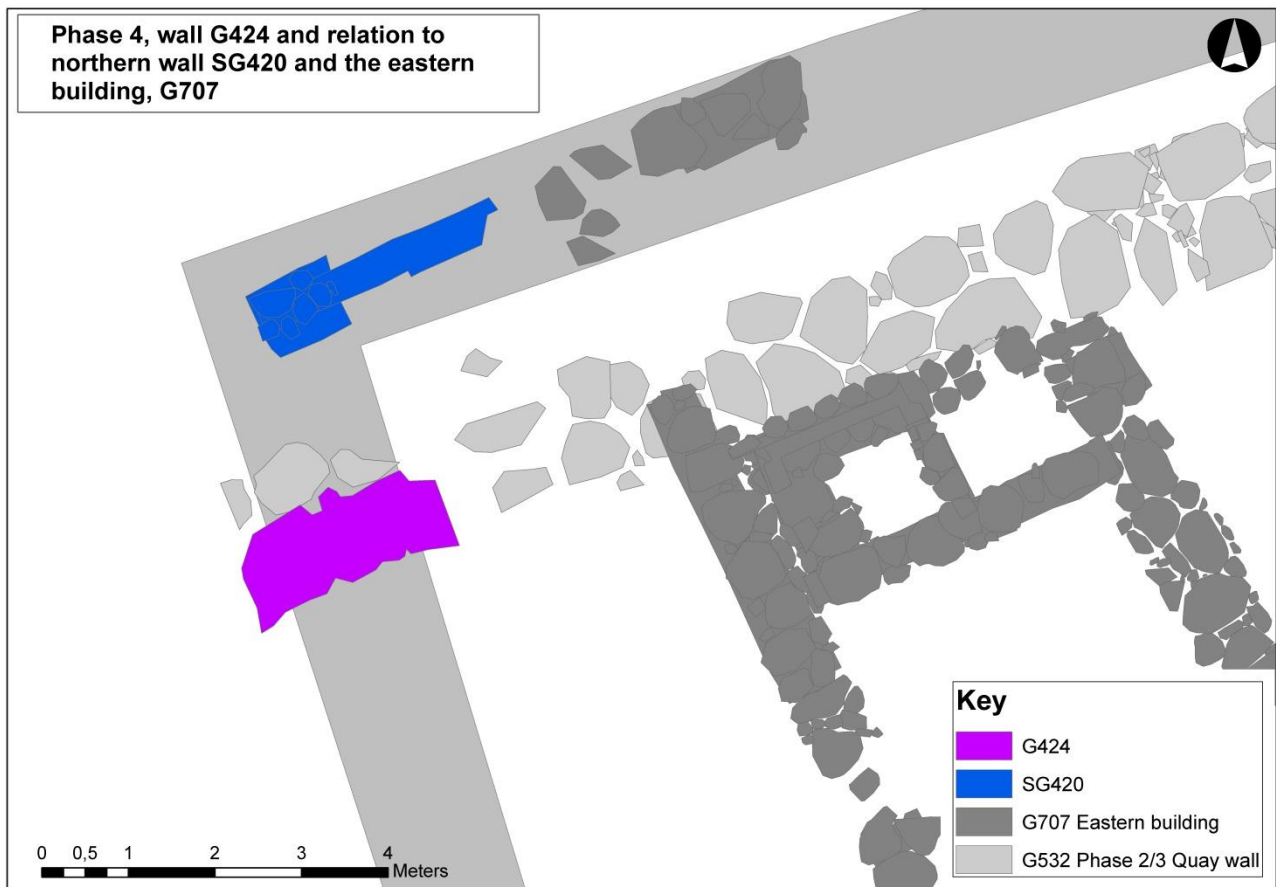


Fig. 270 Plan of the small foundation wall G424 in relation to the northern wall SG420 and the probable Bargemen’s Guild House G707.



Fig. 271 Wall G424. Looking WSW. C03\_20120718\_4972 (cropped)

Wall G424 consisted of a short section of stone wall foundation which measured 2.5 m by 0.7 m and 0.2 m high. The top of the structure was at 0.44 m OD. It was built above the remains of the old harbour wall G532, and ran perpendicular to the building group G707, on the same alignment with SG420 to the north. It was constructed of natural sub-angular stones, SS11242, c. 0.3 m in diameter, laid in two parallel rows and in-filled with fragments of broken brick. The relationship to the culvert SG223 was unclear, and it could be that the wall was truncated by the culvert. This section of wall did not directly relate to any of the other structures in the area, and while the construction method was similar to SG420 to the north the larger size of materials used is indicative of a different phase of construction. This wall could have been the first instance of the creation of an enclosed ‘booth’ in the area, with wall SG420 having formed its northern boundary, or it could have formed an internal wall between walls SG420 and SG410/409.

That G424 had been deconstructed down to a lower height than either of these two structures could be suggestive that the wall actually represented an earlier structure which was later demolished when building G537 was raised. Thus, it is not clear to which building this belonged.

*Western building G539*

Group	Sub-group	Context Type
539		Building
	251	Wall
	500	Wall
	501	Wall

Table 49 Groups and sub-groups related to the western building G539

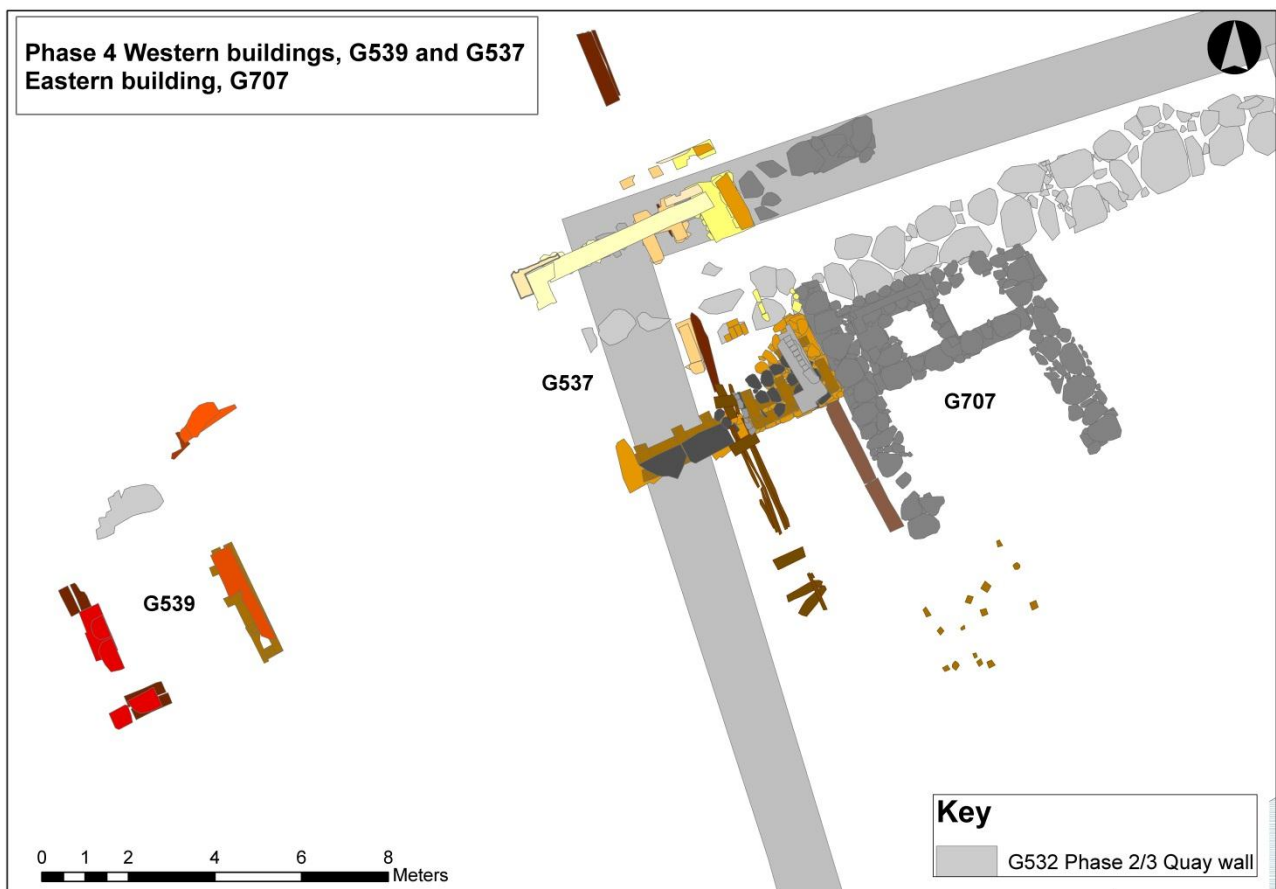


Fig. 272 Plan of the further western building group G539 in relation to the western building group G537 and eastern building G707

Located west of the Guide Wall trenches and Main Excavation were the partial remains of a building found during a watching brief for the Oil separator trench/ZT19393. The building was most likely the western extent of the probable *Vragerbro*. This structure consisted of two parallel northwest-southeast oriented walls, SG500 and SG501, which lay 2.85 m apart, a fragmentary northeast-southwest oriented wall SG501, and SG251, a short section of red brick wall on a timber foundation. The eastern wall, SG500 measured 2.96 m by 0.76 m and was extant to 0.7 m from a top height of 0.82 m OD. The southern and western walls, SG501, measured 3.47 m northwest-southeast by 1.45 m northeast-southwest, and were 0.59 m wide with an extant height of 0.6 m from a top height of 0.86 m OD. There were no artefacts associated with these



Fig. 274 The separate elements of SG501 and the modern disturbance. Working shot, looking west. C19\_IMG\_4334 (cropped)

differed, however, between SG500 and SG501, which could indicate a different phase of construction between the two walls. SG501 had large stones, SS19500 and SS19541, c. 0.35 m high, faced to their eastern sides, over the longitudinal beams, ST19485 and ST19554, to support the brickwork, SS19348 and SS19546, above, but SG500 had a single layer of smaller, natural stones, SS19509, c. 0.2 m thick, covered with a thick layer of mortar to provide a level surface on which to construct the brickwork, SS19504. SG500



Fig. 273 Wall SG500. Looking east. Despite the different preservation levels between this and SG501 (see Fig. 274 above), the contrasting use of stone in the foundation is evident. C19\_IMG\_4350 (cropped)

SG501 was precisely aligned with SG410/409 in G537, and the construction methods were identical, both of which aspects could point to a contemporary construction of these features.

features. All of these walls demonstrated the same basic type of construction method with long foundation beams which supported stone foundations, above which were constructed brick walls. The bricks were laid in a cross bond and a maximum of five courses of remained due to disturbance caused by modern services.

The nature of the stone foundation construction

also had short transverse beams, ST19533, ST19654, ST19658, and ST19663, below the longitudinal beams ST19522, two of which were supported at their western ends on vertical posts ST19687 and ST19691, beneath. A dendrochronology sample taken from ST19658 returned no date. These lower timber elements were not seen in SG501, probably due to being below the limit of excavation in this area.

The southern wall of

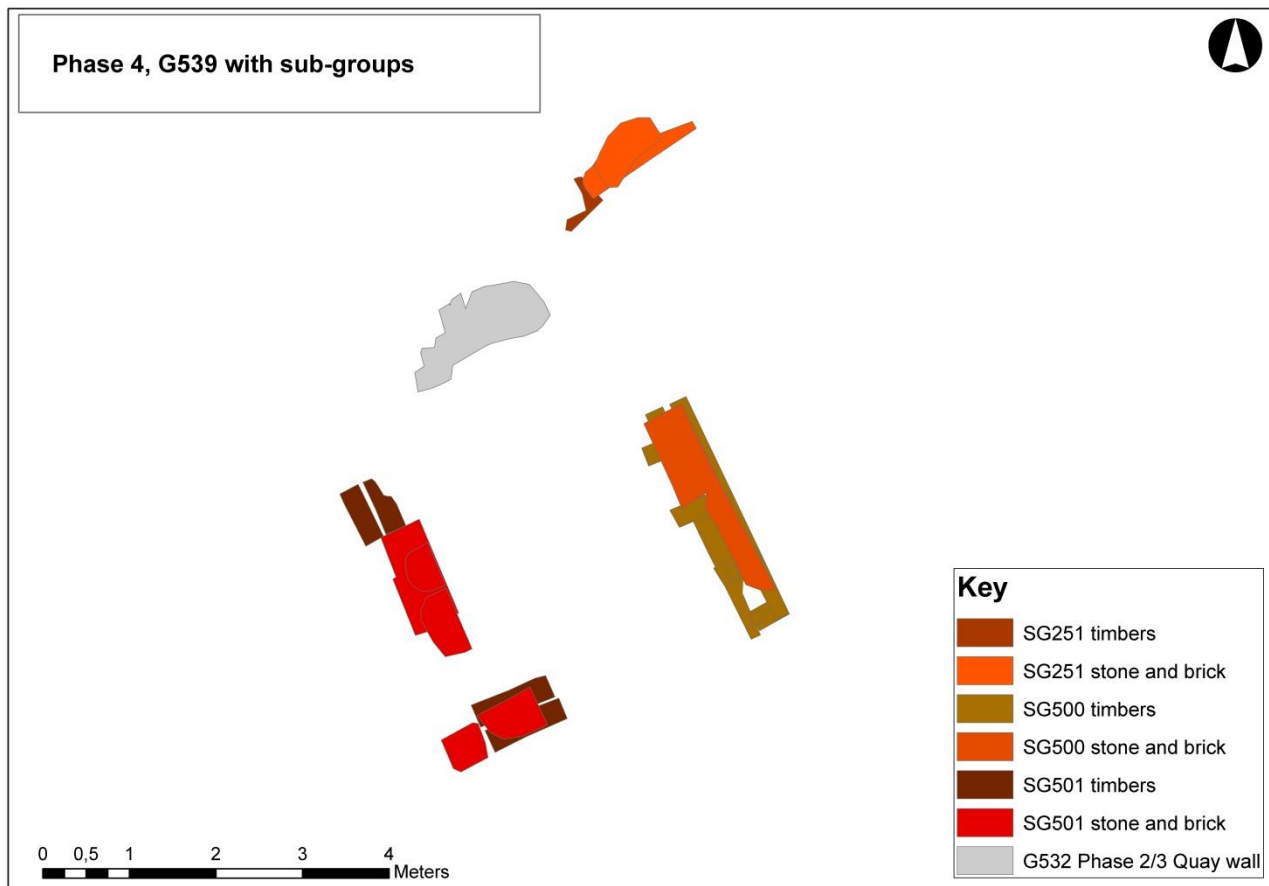


Fig. 275 Plan of G539 with sub-groups SG500, SG501 and SG251

The northern wall SG251 was fragmentary, and only a very short extent remained, measuring 1.53 m by 0.57 m by 0.5 m high from a height of 1.2 m OD. It consisted of brickwork constructed on a timber foundation. The number of courses and the brick bond was unrecorded due to the damage to the extant brickwork. The orientation of the structure was also not recorded thereby making any interpretation and association with other features difficult.