Evaluation/monitoring Report No. 228

Carrickfergus Castle
(Battlements of Keep)
Co. Antrim

AE/11/74

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Site specific information

Site Address: Carrickfergus Castle, Carrickfergus, Co. Antrim

Town: Carrickfergus

SMR No. ANT 052:059

Protection: State Care

Grid Ref: J 4143 8725

Excavation Licence No: AE/11/74

Planning Ref: N/A

Date of excavation: 23 to 27 May 2011 and 13 to 17 June 2011

Archaeologist present: Dr Henry Welsh

Brief Summary:

Archaeological monitoring and recording of the excavation of three trenches (Trenches 1, 2 and 3) by power chisels, at the battlements of the Keep. Trench 1 located at the southern battlement and Trenches 2 and 3 at the western battlement. This work was undertaken in advance of repairs or replacement of the existing roof, with the aim of obtaining information about previous architectural features in this area.

Size of area opened:

Trench 1: 0.5m (north/south) by 0.5m (east/west)

Trench 2: 2.1m (north/south) by 1.6m (east/west)

Trench 3: 1.85m (north-east/south-west) by 0.3m (south-east/north-west)

Account of the monitoring/excavation

Introduction

Archaeological monitoring was undertaken on behalf of the Northern Ireland Environment Agency: Built Heritage (NIEA), from 23 to 27 May 2011 and 13 to 17 June 2011 at the battlements of the great tower, or Keep, of Carrickfergus Castle. The NIEA was anxious to obtain information about earlier architectural features at this level to assist with the planning of repair or replacement of the existing roof. Visual inspection of the battlements and the NIEA photographic archive revealed that there have been major modifications to the battlements during the twentieth century. The excavation had three specific aims; to establish the level of the original wall-walk, to investigate the function of one or more of the weepholes visible on the external face of the western wall of the Keep and to investigate a possible beam socket adjacent to the north-western squinch arch.

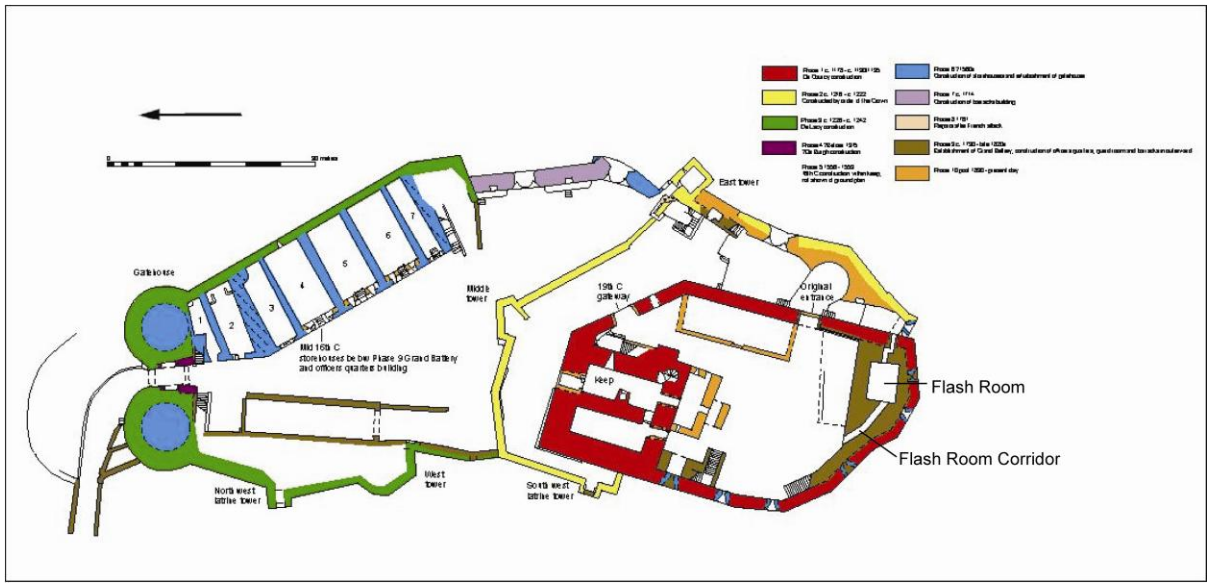

Figure 01: Ground floor plan of Carrickfergus Castle (after Ó Baoill 2008)

Carrickfergus Castle has been subject to much historical research and archaeological investigation and is possibly most comprehensively described by both Dr T. E. McNeill in *Carrickfergus Castle, County Antrim*, published by the Department of the Environment for Northern Ireland in 1981 and more recently by Ruairí Ó Baoill (2008) in *Carrickfergus, the Story of the Castle and Walled Town*, Belfast NIEA.

This excavation is one of several investigations that have taken place within the castle since 1991:

1. 1991: Excavation of a service trench from the north wall of the Keep to the Gatehouse (Brannon 1992).

2. 1993: Archaeological monitoring of the replacement of worn steps at the east wall of the Keep (Donnelly *et al.* 2005).

3. 2002: In advance of the proposed construction of a lift, archaeological excavation took place within the Inner Ward in a building believed to have been a nineteenth-century magazine, attached to the south wall of the Keep (Ó Néill and Logue 2002).

4. 2008: Archaeological monitoring of the replacement of service pipes to the north of the Gatehouse (McSparron 2008)

5. 2008: The mid-nineteenth-century Flash Room Corridor was the subject of an archaeological evaluation prior to the commencement of up-grading work (Welsh 2010).

6. 2010: Archaeological excavation took place on the roof of a range of vaulted storehouses to the south of the Gatehouse, known as the Grand Battery (Murray 2010).

7. 2011: Archaeological monitoring of a service trench across the Inner Ward to connect the Keep with the Flash Room Corridor (Welsh 2011).

Summary of results

The excavation met the three specific aims of the project. Trench 1 revealed that the level of the original wall-walk was roughly at the same level as the modern cobbled surface, at least in the area of the south wall-walk that was investigated. Further, the three courses of Cultra stonework in this area seem to be part of the original fabric of the Keep. In Trench 2, one of the many weepholes at battlement level was exposed and examined, revealing that it had originally extended throughout the thickness of the west wall of the Keep. However, the lack of a discernable fall in this feature throws doubt on its function as a conduit for rainwater. Some at least of these weepholes may instead have acted as beam slots, perhaps to support a wooden external battlement, but further investigation will be required to substantiate this. Also uncovered in Trench 2 were the remains of the chimney stack, also probably part of the original fabric of the Keep. Further investigation here will also be required to establish the relationship between this stack and the flues from the second and third floors, which it contained. Excavations in Trench 3 revealed that any evidence a possible beam socket adjacent to the north-western squinch arch has been obliterated by modern (and ultimately unsuccessful) attempts to repair the wall-walks and weatherproof the walls of the Keep.

The excavation

The great tower, or Keep, of Carrickfergus Castle, is thought to be one of the earliest structures on the castle site, along with the curtain walls of the Inner Ward. The 'Keep as built was not square: the two northern angles are very nearly right angles but the southern wall is decidedly off line. As a result the exterior walls are all slightly different lengths' (McNeill 1981, 22). The Keep is 25m in height, from ground level to the top of the corner turrets and at present has four floors. There is a blocked doorway in the south-east spiral staircase and a row of corbels along the inside of the east wall some 3m above the present third floor level, suggesting that there may have been another floor, or mezzanine at this level. The ground floor is currently accessed from the south wall of the Keep, while the first floor contains the main entrance, now accessed by stone steps at the east side. A modern steel staircase provides internal access from the first to the second and third floors. An original stone spiral staircase extends from the south-east corner of the Keep at ground floor up to the third floor, from where it also now provides the only means of access to the battlements. The head of this staircase is contained within the south-east corner turret. The remains of another original stone spiral staircase are visible in the south-west corner turret and this would originally have extended from the second floor to the battlements. At battlement level, the corner turrets at the south-east and south-west are supported on squinch arches. Another squinch arch is located at the north-west and traces of a fourth are visible at the north-east, suggesting that there were

originally four corner turrets. The battlements consist of four embrasures with wide merlons between, on each wall between the corner turrets.

Three trenches were excavated into the structural fabric of the battlements of the Keep in order to meet the specific aims of the NIEA and were designated Trenches 1, 2 and 3. The excavation was undertaken by electrically-powered chisel and a context record was created using the standard context recording method. Individual features and deposits were photographed. An overall plan of the battlements (scale 1:100) was completed and plan and section drawings (scale 1:10) of each trench were prepared throughout the course of the investigation.

Trench 1

A trench (Trench 1) was excavated at the surface of the existing wall-walk of the southern battlement, close to the south-eastern corner turret. This area had been selected for investigation as the wall-walk here is above a small area of Cultra limestone walling, presumed to be contemporary with the initial construction of the Keep. The trench was 0.5m north/south, 0.5m in east/west and 0.11m in maximum depth. At the upper surface of the trench, which formed part of the existing wall-walk, the stratigraphically latest deposit encountered consisted of a layer of lime mortar (context 101) that had been applied around a layer of rounded basalt cobbles (context 102), ranging in size from 0.2m in diameter by 0.1m in depth to 0.1m in diameter by 0.05m in depth, presumably to give the appearance that the surface of the wall-walk was much earlier than it actually was. This surface was found to slope gradually down towards the interior of the Keep, presumably to drain surface rainwater into the gully that is present around the edge of the current roof. The modern date for the existing wall-walk surface was confirmed when the lime mortar had been removed, as it was found that the cobbles had been placed in a bed of concrete, averaging 0.05m in thickness (context 103).

Beneath this, extending to the south underneath the modern concrete and cobbles, was a layer consisting of mortared Cultra stone rubble (context 107) (plate 02). This layer was also found to slope down towards the interior of the Keep, with a gradient of 1:30, presumably to drain rainwater from surface of an earlier wall-walk surface (figures 04 and 05). This trench was deliberately located over a section of Cultra stonework and removal of the modern deposits of mortar, cobbles and concrete (contexts 101, 102 and 103) revealed that the three courses of Cultra stone (context 106) provided a facing to the rubble infill (context 107) located behind. The top of the uppermost course of Cultra stone was level with this surface and this course consisted of blocks that were thinner (0.05m) and broader (0.25m) than the blocks below (0.15m and 0.2m), suggesting these were deliberately chosen to form an edge, possibly to the original wall-walk. A small deposit of organic material (context 104), consisting of soil and plant material, was found at the eastern side of the trench, above the Cultra stonework (context 106) and below the bed of concrete (context 103). Its surface was interpreted as a horizontal discontinuity (context 108), representing a period of neglect in this part of the wall-walk before the modern mortared cobble surface was applied. Small deposits of lime mortar (context 105) were also found across the trench immediately below the bed of concrete (context 103). These are most likely from the original construction or later repairs to the south-west corner turret or adjacent battlements and analysis of this mortar (sample 4) may resolve this. Contexts 106 and 107 were not excavated, but samples of mortar and concrete were taken for further analysis (sample numbers 1, 2, 3 & 17). No artefacts were recovered from Trench 1.

Trench 2

Trench 2 was located immediately to the north of the mid-point of the western battlement and its long axis was aligned north/south. It was 2.1m north/south, 1.6m east/west and 1.5m in maximum depth. The stratigraphically latest deposit encountered was a layer of lime mortar (context 202) that had been applied around a layer of rounded basalt cobbles (context 201), ranging in size from 0.2m in diameter by 0.1m in depth to 0.1m in diameter by 0.05m in depth, again presumably to give the appearance that the surface of the wall-walk was much earlier than it actually was. The modern date for the existing wall-walk surface was confirmed when the lime mortar had been removed, as it was found that these had been placed in a bed of concrete (context 203), extending across the trench and averaging 0.02m in thickness. When this concrete was removed, two separate layers of mortared rubble were visible.

In the northern part of the trench was a layer (context 224) of light-brownish gravelly mortar, containing rounded and sub-rounded basalt stones, approximately 0.2m in diameter and 0.15m in thickness, as well as several voids. The layer was 0.6m in maximum depth, 0.85m north/south and 1m east/west. At the upper eastern edge of the wall-walk (figure 07), a single basalt block (context 229) was positioned layer in a crude attempt to replicate the courses of Cultra stone blocks to the north of the trench. The courses of Cultra stone (context 223) that were exposed during the excavation of this trench were also found to be embedded in the mortared stone layer (context 224). Also contained within this layer was a deposit of organic material (context 228), composed of soil and plant material. As this deposit was contained entirely within the mortared layer it was interpreted as being crudely placed there as a means of disposing of it. This deposit of mortared rubble itself was interpreted as being evidence of attempts made in the late 1950s and early 1960s to consolidate the wall-walk at this part of the battlements (Terence Reeves-Smyth pers. comm). If this is indeed the case, then the courses of Cultra stone at the western wall are not part of the original fabric of the Keep and instead represent the re-use of older stone blocks. When the mortared rubble layer (context 224) was removed at the western part of the trench, a compacted yellowish brown mortar surface, 0.03m in depth, was revealed (context 222), with a brighter yellowish brown layer (context 221) immediately below. The surfaces of these deposits slope towards the interior of the Keep and were interpreted as part of the original wall-walk of the battlements that had been exposed for some time, allowing the surface (context 222) to weather (plate 06). The yellowish brown mortar layer (context 221) was found to be around 0.3m in depth and contained several flat and rounded basalt stones, approximately 0.35m in diameter and 0.1m in thickness. Below context 221, a feature consisting of a row of similar stones was found, aligned east/west and extending across the trench (context 230). One of these stones was partially removed, revealing that these stones formed the lintels of a weephole below (context 232). This was found to be 0.35m in depth and 0.3m in width and extended through the west wall of the Keep, where it discharged directly to the open air (plate 08). It also extended 0.3m to the east, where it was blocked by rubble (plate 09). A layer of sediment (context 233), 0.05m in depth, was present throughout the base, but here was no discernable fall to indicate if the weephole was intended for drainage and the presence of the layer of sediment seemed to confirm that drainage action was poor. The weephole, the row of lintel stones (context 230) and the deposits of mortar above these (contexts 221 and 222) were all interpreted as being elements of the original fabric of the Keep. This part of the battlements had probably been damaged (context 235) during the construction of a brick vaulted roof, constructed around 1815 (discussed further below).

Along the eastern edge of the trench, two courses of angular basalt blocks (context 205) were present, along with associated mortar (context 213). Contained within this mortar was a small deposit of organic material (context 206), composed of soil and plant remains. This was interpreted as having been crudely incorporated into the mortar during construction works. The basalt blocks (context 205) formed part of what has previously been described as an 'offset' (McNeill 1981, 27), which is present at the south and west walls. Several of these blocks were removed, revealing the internal edge of the lead flashing (context 211) that is visible around the present roof gully. Also present here was a deposit of bitumen sealant (context 227). This was located in proximity to a puncture in the lead flashing and suggests an attempt to weatherproof this area soon after the lead flashing had been applied. It is clear that the basalt blocks (context 205) were positioned to secure the lead flashing and had to have been part of the present roof construction in 1929/1930.

At the southern part of the trench, a deposit of mortared rubble (context 204) was found immediately under the layer of concrete (context 203). This was 1.25m north/south, by 1.2m east/west and averaged 0.8m in depth. This was found to contain four layers of plastic damp-proof membrane (context 207), confirming the modern (1980s) nature of this deposit (plate 04). When this membrane and remaining deposit of mortared rubble (context 204) had been removed, the remains of a chimney stack (context 226) were exposed. Measurements taken of the west wall at second and third floor levels confirmed this to be the stack associated with extant fireplaces in the rooms now known as the Servery and Solar respectively. At the northern edge of the stack, a row of sub-angular weathered stone blocks, aligned east/west was uncovered, including two of Cultra stone. These were 0.15m in length, 0.15m in breadth and 0.15m in depth and were interpreted as being part of the northern external edge of the chimney stack. The mortared layer (context 222) and underlying deposit (context 221), discussed above, both abutted this edge to the north. Immediately to the south of this edge, a deposit of greyish-brown and pebble-rich mortar (context 218) was uncovered. This extended across the southern part of the trench and was 1.2m in length (north/south), 0.6m in width and 0.4m in depth. It contained rounded basalt cobbles and angular basalt fragments, 0.1m in length by 0.05m in width and 0.05m in depth and sloped sharply 0.3m to the south, where it met the remains of the northern edge of the chimney stack (context 226). Excavation into this deposit of mortared cobbles and rubble (context 218), revealed a square setting (0.5m in length by 0.5m in width and aligned north/south) of angular stones (context 214), averaging 0.2m in length, 0.15m in width and 0.1m in depth. These stones were placed in a bed of light grey mortar (context 215), which was itself placed on top of two slate slabs (context 212). These slate slabs were 0.3m square and 0.05m in thickness, were bedded in a light grey mortar (context 216) and formed a cap over the chimney flue from the second floor. There was no evidence of the chimney flue from the third floor and the assumption must be that the two flues merged at some point below the current roof level. Photographic evidence suggests that the stack was removed between 1900 and 1930 (plates 12 and 13), probably when the Keep was re-roofed in 1929-1930. To the south of the remains of the chimney stack, the rubble fill (context 218) continued until it met the northern edge of the large weephole centrally located in the west wall, but the exact relationship between these two features could not be identified without further excavation in this area. Similarly, there was no discernable western edge to the chimney stack in the trench and further excavation would be necessary in order to establish if the original chimney stack blocked access around the western wall-walk, or if a gap had existed to allow this. To the east of the remains of the chimney stack, a section of tarred felt 0.55m in length and 0.15m in width (context 210) was present immediately behind the lead flashing.

This must have pre-dated the installation of the lead flashing and probably represents an earlier attempt at weatherproofing the area around the chimney stack. Further excavation in this area would be required in order to establish the relationship between the architectural elements present. A further section of plastic damp-proof membrane (context 207) was also present here between the basalt blocks (context 205) and mortared rubble immediately behind (context 204), confirming recent (1980s) efforts to weatherproof the area around the remains of the chimney stack. No artefacts were recovered from Trench 2.

Trench 3

Trench 3 was located on the western battlement at the junction of the wall-walk and north-west squinch arch (plate 10). It was 1.6m in length, east-west, 0.4m in width, north-south and 0.7m in depth. The stratigraphically latest deposit encountered was a layer of bitumen (context 307) that had been incompletely applied over a deposit of mortared rubble (context 304), courses of Cultra stone (context 305) and basalt blocks (context 306). This was interpreted as a modern attempt to weatherproof this part of the western battlement. The bitumen sealant (context 307) was removed from the southern end of the trench and excavation commenced into the mortared rubble (context 304), following the line of the Cultra stone blocks. The aim was to identify any remains of the possible socket for a roof timber, but excavation here was terminated when it quickly became apparent that no such feature was present. A portion of the wall-walk above the trench was also removed and this was found to consist of a layer of lime mortar (context 302) that had been applied around a layer of rounded basalt cobbles (context 301), ranging in size from 0.2m in diameter by 0.1m in depth to 0.1m in diameter by 0.05m in depth, as in Trenches 1 and 2, again presumably to give the appearance that the surface of the wall-walk was much earlier than it actually was. The modern date for the existing wall-walk surface was confirmed when the lime mortar had been removed, as it was found that the cobbles had been placed in a bed of concrete (context 303). When this was removed, the deposit of mortared rubble (context 304) was uncovered (plate 11). No artefacts were recovered from Trench 3.

Other areas investigated

At the request of Paul Logue, Senior Inspector at the NIEA, mortar samples were taken from the undersides of the south-east, south-west and north-west squinch arches at battlement level of the Keep. A fragment of timber shuttering (context 1001) was recovered from the underside of the north-west squinch arch. Further mortar samples were taken from the chimney flues and interior of fireplaces at second and third floor levels of the Keep. It is hoped that further analysis of these mortar samples will assist with establishing phases of construction and modification. During this work, the interior faces of some of the stones used to rebuild the fireplaces on the second and third floors were found to be covered in barnacles. A sample of these (sample no. 32) was obtained for possible radiocarbon dating.

Discussion

This excavation at the battlements of the Keep provided a rare opportunity to see if in situ medieval architectural fabric and features survived in this area, one of the earliest parts of this Anglo-Norman castle complex. Several of the features identified during the excavation suggest that this is indeed the case and should provide some information as to phases of the construction and alteration of the upper floors of the Keep and of possible roof configurations;

1. Wall-walks

The wall-walks around the battlements of the Keep are currently all at a similar level and are angled inwards for surface rainwater to drain into the channels around the edge of the roof. The possible Anglo-Norman surface (context 224) uncovered in Trench 2 was also found to be angled inwards, probably for the same purpose.

Another feature of the wall-walk is the presence at the south and west of courses of Cultra stonework. It had been assumed that these were an original feature from the construction of the Keep, but the 2011 excavations have revealed that the existing courses of Cultra stone at the western battlement form part of modern attempts at reconstruction here. It would appear that the uppermost metre of the wall-walk has been so badly disturbed in recent years that little can be learned about the original fabric of this part of the Keep without its complete removal. Similar courses of Cultra stone are present at the southern wall-walk but excavations here (Trench 1) were not so conclusive. Modern mortar and concrete were present at the upper part of the trench, but below this a surface consisting of yellowish mortar and Cultra stone rubble seems to suggest an earlier date, which could possibly be confirmed by an analysis of the mortar samples taken. However, lead flashing and basalt blocks are present under these courses of stonework and the possibility remains that these are contemporary with the features at the western wall-walk.

The squinch arches present at the south-east, south-west and north-west, all appear to be original. All have evidence on the undersides of the timber shuttering that was used in their construction. A fragment of this timber shuttering was recovered from the north-west arch and a radiocarbon date from this could confirm its antiquity.

2. Weepholes

For the purposes of this discussion, all of the openings visible from the exterior of the Keep at battlement level have been categorised as weepholes. Many of these have been previously described:

> The history of this level is clearly not straightforward. In the north and west walls at the top of the fourth floor, below the present wall-walk level, there are what appear to be six blocked weepholes of Cultra stone (they have lintels and so are not blocked battlements)...In the south wall there is one at the same level at the west end, but at a slightly lower level, some 3 m above the heads of the large double windows on the third floor, are two others, one central and one at the west end. Half way between the windows and these possible weepholes several courses of the wall are largely composed of Cultra stone...A similar situation is to be found on the outer face of the east wall: a smaller, blocked weephole at the

> north end (like the six in the north wall) and a larger central hole above. (McNeill 1981, 42)

Investigations at the weephole in Trench 2 revealed that this feature originally extended through the entire depth of the western wall. It is not blocked, but open to the west, albeit obscured by vegetation. Its purpose for drainage seems doubtful due to the lack of internal slope, confirmed by the presence of 0.05m of sediment. This weephole is one of nine openings that are currently visible in the west wall of the Keep (plate 07). These are not all of uniform cross-section, some being larger than others. Discussions with staff at the castle who were involved with re-pointing the stonework of the Keep revealed that the most northerly of the weepholes in the west wall turns sharply to the south inside the thickness of the wall (Samuel Wilson pers. comm.). Further, not all of the openings are at the same level. The uppermost is associated with the 'offset' discussed above, which the excavation has shown to be of modern origin. The weephole exposed during the excavation appeared to be on the same level as only one other, as the three to the south appear to be at a slightly lower level and the two to the north are noticeably higher. It is difficult to see how these could all have functioned as drains from one roof. To add to the confusion, one further opening is visible about 1m below the exposed weephole and this seems to be associated with one of the large beam holes visible in the interior of the west wall, mentioned by McNeill below. It is likely that the uppermost four weepholes, one centrally placed in each wall of the Keep, are associated with a brick vaulted roof constructed in 1815 (discussed further below).

3. Evidence of roof structures

There is a fundamental difficulty with providing a roof within the battlemented walls of the Keep in that in order to be able to circumnavigate the battlements and maintain their defensive nature, the roof structure must be supported and attached to the inner parts of the walls. If good weatherproof seals and efficient means to remove rainwater are not achieved, the result will inevitably be perpetual problems from damp. McNeill describes how the roof may have been initially formed during the construction of the Keep in Period I (1178-1190):

> The internal span to be crossed is 11 m at its narrowest, requiring balks of timber some 12 m long, if straightforward joists or tie-beams were used...The windows in the north wall of the third floor and south wall of the second floor are markedly displaced off-centre. It is possible that the rooms, above the ground floor which has a stone spine wall, were divided by a north-south timber partition or arcade carried ultimately on the ground floor wall. This would obviate the need for such massive joists, anticipating the function of the inserted Tudor wall at each level. The problem of the roof is more complex. The actual roof itself was probably carried on the internal offset below wall-walk level. This offset is blocked by the springing of the squinches which support the angle turrets. These turrets also block the continuous line of the wall-walk around the Keep, which should surely have been kept free. The original roof seems to have shed water, to judge from the weepholes on all four walls, equally on all sides; that is, not to have gables. If the wall-walk was carried around the turrets, as the squinches seem to require, we must propose an octagonal roof structure. The angles of the five large beam holes in the west and east walls over the fourth level do not allow

> beams to run directly across from one to the other. They might however have been for beams running to the centre of the Keep, meeting on a central arcade as proposed above and supporting a central pillar for such an octagonal frame (McNeill 1981, 42).

The first re-roofing of the Keep appears to have taken place during Period V (1556-1559):

> The most obvious feature is the wall built dividing the first and second floors and that great arch over the third and fourth floors (Pl 14). The reason for this must at least in part have been to make the flooring and roofing of the building easier; the main joists must now have been 350 years old (*ibid*., 46).

The roof was again re-roofed in 1754-1755, this time in lead, replacing an earlier one of County Down slates (McNeill 1981, 15), presumably the one referred to above. It was these slates that were used to block the south-west spiral staircase, reportedly remaining there until their re-discovery in the mid-nineteenth century (Swanson, cited in McNeill 1981, 15). Work at the Keep, which involved modifications to the upper floors, has also been recorded in Period IX (1790-1830), when the Keep was converted for use as a barrack in 1793. This work 'involved the insertion of stairs against the south wall and probably the provision of a fourth floor at approximately the level of the original one; there was certainly one there in 1823' (McSkimin, cited in McNeill 1981, 49). In 1815, the Keep was again re-roofed. This time,

> the lead was taken off [and presumably the supporting timber framework] and replaced by two brick vaults, resting on the inserted arch dividing the third and fourth floors. These vaults together with six 600 gallon water tanks were removed in the winter of 1930-1; they had gone a long way towards breaking the arch (McNeill 1981, 16).

This is hardly surprising as the water alone would have weighed 16 tons and the fact that the roof lasted for a further 114 years seems almost miraculous. An undated architect's section drawing in the NIEA archive (apps.ehsni.gov.uk'ambit/Details.aspx?MonID=3869) shows this brick vaulted roof and drainage channels associated with it, which seem to correspond with the four uppermost large weepholes, centrally located at each wall of the Keep.

The present flat roof is reported to have been constructed in 1929-1930 (*ibid*., 17) and is supported on steel beams, which rest on the inner part of the east and west walls. This roof can be seen in an aerial photograph (Plate 13) and in a newspaper article dated 8 May 1931 (plate 14). Two courses of stone blocks have been inserted between these beams for support and it is possible that these beams rest on an earlier offset for roof supports. Above this, two similar features were uncovered during the 2011 excavation. The most obvious was the offset on which the present lead flashing was set, which was also secured with two courses of stonework. Behind this, in the area of the remains of the chimney stack, another earlier offset was uncovered, finished with a layer of tarred felt. Any of these offsets could be positioned on pre-existing supports for roof structures, but only further investigation may confirm this.

In addition to evidence for offsets, there are a number of stone corbels present around the walls of the third floor Solar and these may have acted as supports for roof timbers, but further survey or investigation will be required in order to identify relationships between these features. Similarly, a number of openings are visible in the same area, some referred to above as beam holes. If one or more roof structures were present internally, then there must have been some form of drainage

from around the edges. Further investigation will be required in order to identify the location of such features.

It was also observed during the 2011 excavation that the roof of the south-east corner turret was leaking.

4. Staircases

Access to the battlements is by two spiral staircases contained within the south-east and south-west corner turrets. The staircase to the south-east extends continuously from ground floor to battlement level. The staircase to the south-west extends from the third floor to battlement level, but the steps from the fourth floor to the battlements are currently missing. The steps in the south-east and south-west corner turrets are of Cultra stone throughout. The relationship between these staircases and the battlements has previously been described:

> The inner wall-lines appear to continue up from the fourth floor to an offset, varying in width from 15 to 30 cm, some 70 cm below the wall-walk. From this offset spring three squinches at the angles; the remains of the fourth at the north-east are clear. The south pair...now carry the inner angles of two small corner turrets which rise some 3.75 m above the wall-walk; the top 50 cm or so were rebuilt with hammer-dressed basalt in the 19th century. These turrets contain the heads of the two staircases. The east turret has a door facing the east wall-walk; the west turret has one facing the south walk. That there were two northern turrets originally is shown by the squinches at the angles and the wider, higher merlons at the corners. The battlements between the turrets had on each wall four embrasures, 1.15 m above the wall-walk and 60 cm wide with wide merlons between, now rather ruined but originally at least 2 m above the wall-walk (McNeill 1981, 27).

It would seem that the south-west and south-east spiral staircases were constructed as part of the original Keep, so it can therefore be assumed that as these discharge at the current wall-walk level, that this was also the original level of the wall-walk, at least in these areas. Excavations at Trench 2 have revealed what appears to be an original surface immediately to the north of the chimney stack, at a level 0.5m below the existing wall-walk, which gives rise two possibilities. First, this surface is only the remains of the original wall-walk, the upper 0.5m of which has been removed at some point in the past, or second, this is the original level of the wall-walk in this area and the original surface varied in height around the battlements.

In the south-east spiral staircase, a blocked doorway (plate 16) is visible at approximately 3.5m above current third floor level. It has been suggested (*ibid*.) that this may have been access to a fourth floor or a minstrel gallery running along the east wall and the presence of a row of stone corbels here seems to support this. Alternatively, this may have acted as access to an earlier roof structure, for maintenance. Excavation and further survey here may provide information as to its intended use.

5. Chimney flues

The arrangement of chimney flues and the remains of the associated chimney stack, which served the open fires at second-and third-floor levels, are also relevant to the roof structure. Examination of the interior surface of the flue from the second floor reveals a well-made circular flue, contained within the thickness of the western wall of the Keep. The flue is placed sufficiently far into the wall to allow space for the fireplace in the third floor directly above, suggesting that thought had been given to this in advance. These have also been described previously:

> In the interior at the centre of the west wall is a fireplace, 2.00 m wide; the jambs have heavy three-quarter roll mouldings, and the lintel is a single stone...The south wall has four windows. At the west end, high up in the wall to avoid the stairs of the first floor latrine, is a small window of dark red, thin brick. This is flat-headed on the outside, *c* 40cm wide and *c* 80 cm high. Possibly related to this, in level at least, is a blocked opening in the west wall, above the fireplace, some 2 m wide and apparently quite low. This may be a new fireplace for a floor above the present one...There is a central fireplace in the west wall, 2.00 m wide and spanned by a flat stone lintel (McNeill 1981, 25-26).

This lintel may be the one referred to as having been replaced during work in 1793 to convert the Keep into a barracks (*ibid*., 15), but it is not clear if an original stone canopy was removed at the same time. It is possible that the moulded stone features found during paving works in the inner ward and one found during the 2010 excavation (Welsh 2011) may have come from this fireplace. As there is only one flue present in the chimney stack at battlement level, the flues from second and third floors must merge at some point close to the present roof level. Further investigation of these flues would be required in order to better understand this relationship.

The remains of the chimney stack exposed during the excavation suggest that this formed part of the original structure of the Keep and as such would have been present during the many re-roofing episodes at battlement level. Also, its location on the western wall-walk meant that access around the battlements was restricted at this point. Further excavation in this area would be required to identify the western edge of the chimney stack and if a gap had been left by the builders between it and the inside edge of the western battlements, to allow access around the wall-walk. The removal of the basalt blocks at the eastern edge of the chimney stack revealed that the original eastern edge of the chimney stack had been lost in this area. Further investigation here may resolve this.

Recommendations for further work

This archaeological monitoring has shown that despite the many alterations that have taken place at the battlements since its original construction, there may still be significant undisturbed elements of the original fabric of the Keep. However, to reach and investigate these would require the removal of significant amounts of modern fill and the 2011 excavation has confirmed how time-consuming and expensive this would be.

Much of what we currently know about the history of the castle is based on the work of Tom McNeill, but the 1981 monograph does not take into account the more recent alterations and repairs that have taken place there. The information obtained from these and the small-scale excavations below has added to the corpus of information now available. It is recommended that the 1981 monograph be revised and up-dated in light of these recent developments. It is intended that the results of this excavation be published in an academic journal, such as the *Ulster Journal of Archaeology*.

The Keep of Carrickfergus Castle continues to reveal important information about its construction. Further investigation, such as unblocking the doorway in south-east spiral staircase, investigating the south-west staircase for any similar door and investigating the chimney flues to identify original configuration and subsequent alterations, should enable a better understanding of their function.

It is also recommended that a programme of post-excavation analysis of material recovered during the 2011 excavation be undertaken, in order to bring the project to completion. This material consists of mortar, timber and barnacle samples and analysis may assist with the identification of the phases of initial construction and subsequent alteration to the western and southern battlements of the Keep. While it is anticipated that many of the mortar samples will be of modern date, the inclusion of these into a mortar database for the castle must be a worthwhile objective. Costs have been estimated and are appended as a separate report.

Acknowledgements

Naomi Carver the Centre for Archaeological Fieldwork, Queen's University, Belfast, temporarily directed the excavation. Assistance was also provided by Janis Smith, Samuel Wilson and Rodney Horner, Northern Ireland Environment Agency staff at Carrickfergus Castle. June Welsh of the Ulster Archaeological Society assisted with preparation of the field drawings, which were later scanned and digitally prepared by Sapphire Mussen at the Centre for Archaeological Fieldwork, Queen's University, Belfast. Thanks also to Dr Philip Macdonald at the Centre for Archaeological Fieldwork, Queen's University, Belfast, for his helpful comments on the text.

Archive

Finds: all samples are currently archived at the Centre for Archaeological Fieldwork, Queen's University Belfast, but it is anticipated these will be returned to the Northern Ireland Environment Agency following any post-excavation analysis.

Photographs: digital images, held by the Centre for Archaeological Fieldwork, Queen's University Belfast.

Plans/Drawings: digital plans and section drawings, held by the Centre for Archaeological Fieldwork, Queen's University Belfast and included with this report.

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NIEA online archive [accessed 11 August 2011]: apps.ehsni.gov.uk'ambit/Details.aspx?MonID=3869.

Appendix 1: Context Lists

Trench 1

Context No.	Description
101	Lime mortar around C101
102	Layer of basalt cobbles (surface of existing wall-walk)
103	Concrete bed for C101
104	Organic deposit below C103
105	Mortar deposits immediately above Cultra stone blocks C106
106	Cultra stone blocks to interior of battlement wall-walk
107	Mortared rubble behind Cultra stone blocks C106
108	Horizontal discontinuity between mortared Cultra stonework and modern cobbles

Trench 2

Context No.	Description
201	Rounded and angular basalt cobbles (surface of existing wall-walk)
202	Lime mortar around C201
203	Concrete bed for C201
204	Rubble and mortar fill under C203 to south of trench
205	Angular basalt blocks (internal face of wall-walk)
206	Organic deposit adjacent to C205
207	Plastic damp-proof course
208	Grey mortar deposit above slate surface C212 [part of C218]
209	Gravel-rich light brown mortar deposit above slate surface C212 [part of C218]
210	Tarred felt strip under basalt blocks C205
211	Lead flashing under C205
212	Slate surface C212 (capping for chimney flue C231)
213	Mortar around basalt blocks C205
214	Sub-angular basalt stone setting securing slate capstones C212
215	Mortar deposit around C214
216	Mortar bed for C212
217	Sub-rounded basalt stones (in-fill of chimney stack C226)[part of C218]
218	Greyish-brown mortared rubble and stone
219	Sub-rounded basalt stone 'edge' of chimney stack [part of C226]
220	Pebble-rich mortar around C219 [part of C218]
221	Yellowish-brown mortar to north of chimney stack C226
222	Compacted lime-mortar 'surface' above C221
223	Cultra stone blocks to interior of existing wall-walk
224	Gravel-rich mortared rubble above C222
225	Plastic damp-proof course behind C205 [part of C207]
226	Chimney stack for flues from first and second floors [same as C231]
227	Bitumen sealant to west of lead flashing C211
228	Organic deposit within C224
229	Basalt block at upper inner edge of wall-walk
230	Row of basalt slabs (roof of weep-hole C232)
231	Chimney flue from first and second floor fire-places [part of C226]
232	Weep-hole
233	Sediment layer in weep-hole C232
234	Horizontal discontinuity, representing demolition of chimney stack C226
235	Cut into weephole C232, to construct brick vaulted arch roof

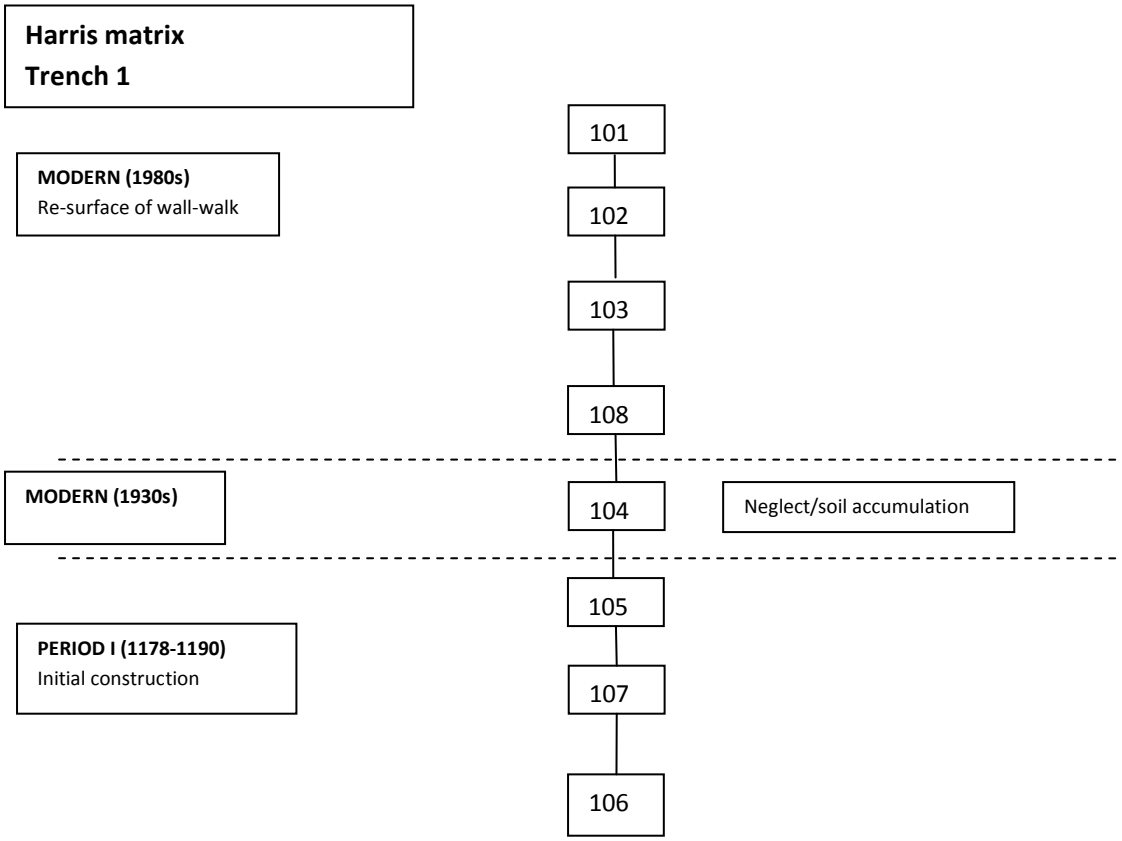
Trench 3

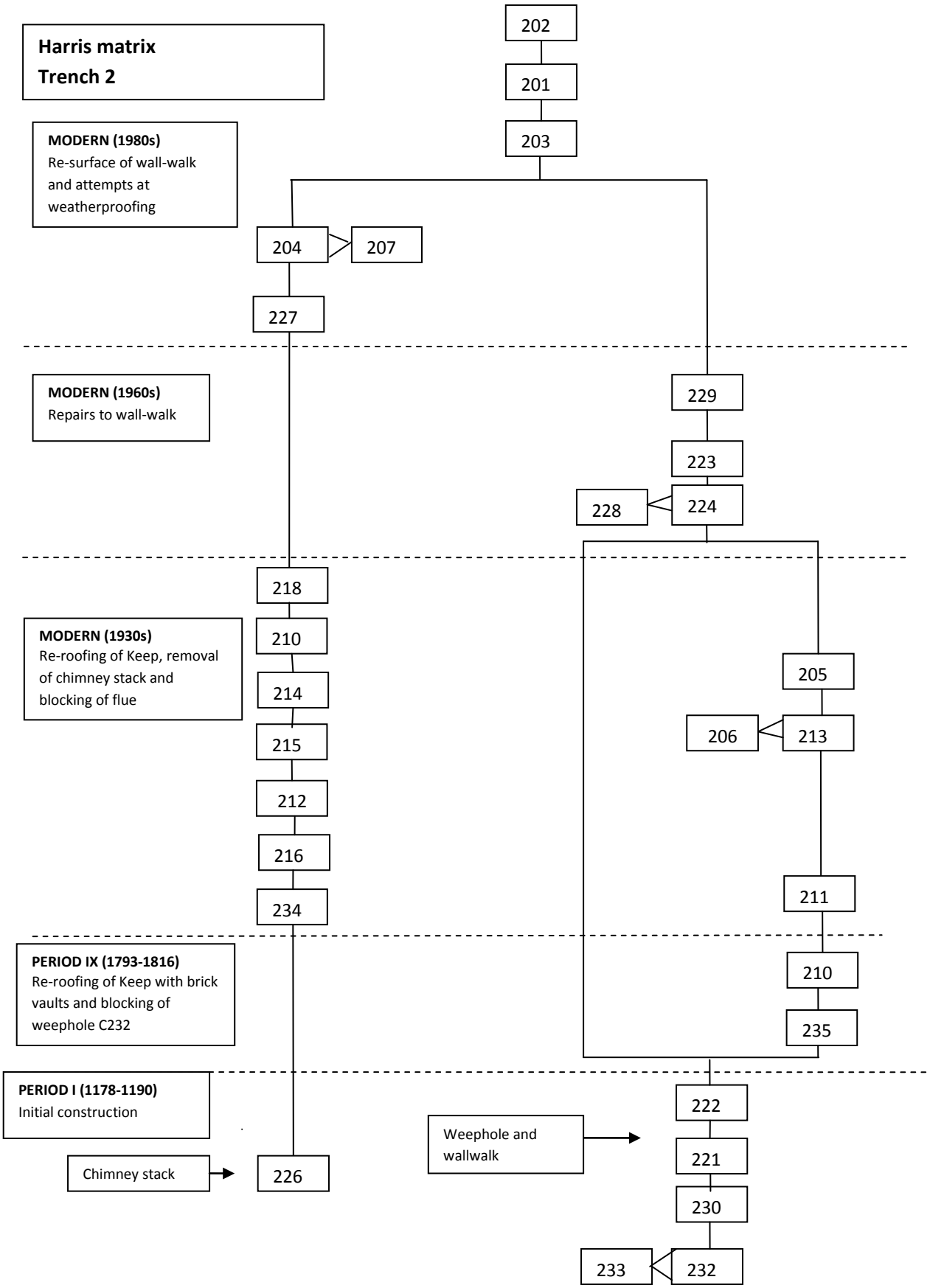
Context No.	Description
301	Rounded basalt cobbles (surface of existing wall-walk)
302	Lime mortar around C301
303	Concrete bed for C301
304	Rubble and mortar fill under C303
305	Cultra stone blocks to interior of wall-walk
306	Angular basaltic blocks to interior of wall-walk under C305
307	Deposit of bitumen sealant

Context numbers allocated to samples not within Trenches 1, 2 and 3

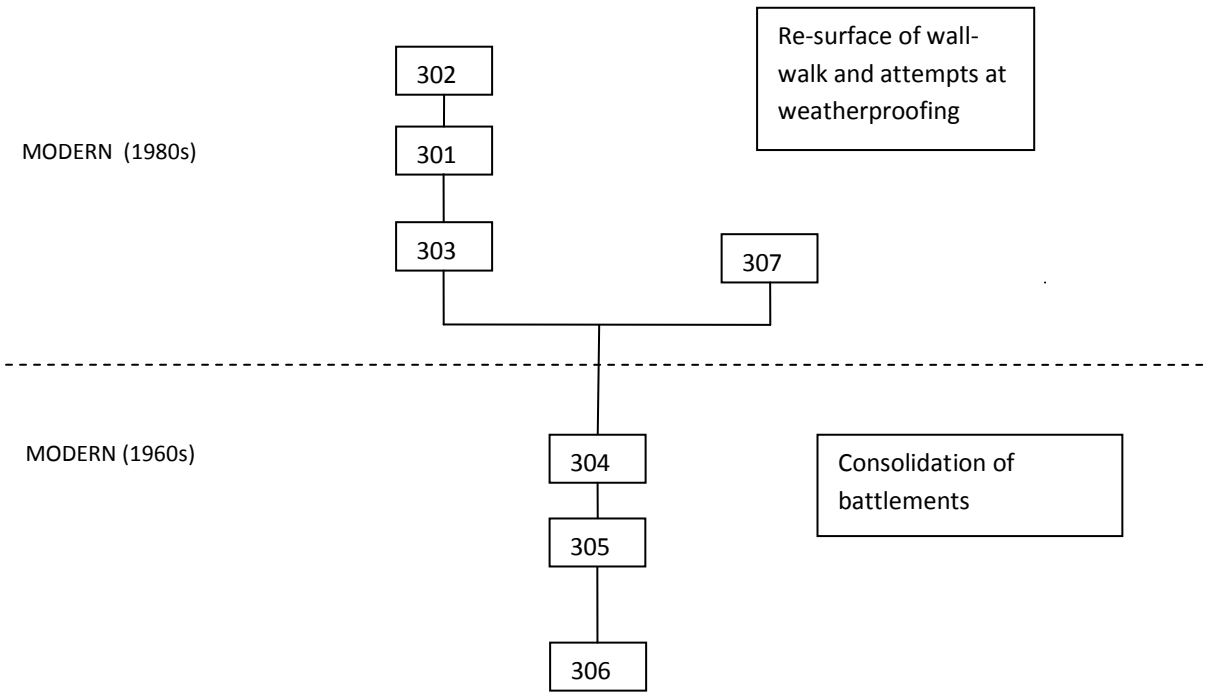
Context No.	Description
1001	Timber shuttering from voussoir of north-west squinch arch
1002	Underside of south-east squinch arch
1003	Underside of south-west squinch arch
1004	Underside of north-west squinch arch
1005	Chimney flue from second floor Servery fireplace C1006
1006	Fireplace at second floor Servery
1007	Chimney flue from third floor Solar Fireplace C1008
1008	Fireplace third floor Solar
1009	Barnacles from stonework of Servery fireplace

Appendix 2 Harris matrices




Harris matrix
Trench 2
MODERN (1980s)
Re-surface of wall-walk and attempts at weatherproofing
MODERN (1960s)
Repairs to wall-walk
MODERN (1930s)
Re-roofing of Keep, removal of chimney stack and blocking of flue
PERIOD IX (1793-1816)
Re-roofing of Keep with brick vaults and blocking of weephole C232
PERIOD I (1178-1190)
Initial construction
Chimney stack
Weephole and wallwalk
202
201
203
204
207
227
229
223
228
224
218
210
214
215
212
216
234
205
206
213
211
210
235
222
221
230
233
232
226

Harris matrix
Trench 3



Appendix 3: Harris Matrix – Concordance Table

Phase	Context	Trench 1	Trench 2	Trench 3
Modern (1980s)	Bitumen sealant		227	307
	Lime mortar	102	202	302
	Basalt cobbles	101	201	301
	Concrete bed for cobbles	103	203	303
	Mortared rubble levelling deposit		204	
Modern (1930s)	Cultra stone blocks	106		305
	Mortared rubble levelling deposit	107?	224	304
	Basalt blocks		205	306
	Lead Flashing		211	
Period I (1178-1190)	Wall-walk surface	107?	222	
	Weephole		232	
	Chimney stack		226	

Appendix 4: Field Drawing Register

Drawing No.	Scale	Type	Date	Description
1	1:10	Plan	23/5/11	Pre-excavation plan of Trench 1 C101/C102
2	1:10	Elevation	23/5/11	Pre-excavation east-facing elevation of Trench 3
3	1:10	Elevation	24/5/11	Pre-excavation east-facing elevation of Trench 2
4	1:10	Section	26/5/11	Post-excavation east-facing section of Trench 1
5	1:10	Section	26/5/11	Post-excavation north-facing section of Trench 3
6	1:10	Section	26/5/11	Post-excavation west-facing section of Trench 1
7	1:10	Plan	8/6/11	Mid-excavation plan of Trench 2
8	1:10	Section	13/6/11	Mid-excavation south-facing section of Trench 2
9	1:10	Plan	15/6/11	Post-excavation overlay plan of Trench 2
10	1:100	Plan	26/5/11	Plan of battlements showing excavation trenches

Appendix 5: Samples Record

Sample Number	Sample Material	Context	Number of bags
1	Stone and mortar	101/102	1
2	Concrete	103	1
3	Soil	104	1
4	Mortar	105	1
5	Timber	1001	1
6	Bitumen and mortar	301/302	1
7	Mortar	302/303	1
8	Mortar	304	1
9	Mortar	203	1
10	Mortar	220	1
11	Soil	206	1
12	Plastic Damp Proof Course	207	1
13	Concrete	208	1
14	Mortar	209	1
15	Mortar	213	1
16	Mortar	308	1
17	Mortar	107	1
18	Mortar	220	1
19	Mortar	221	1
20	Mortar	224	1
21	Plastic Damp Proof Course	225	1
22	Mortar	222	1
23	Bitumen	227	1
24	Mortar	1002	1
25	Mortar	1003	1
26	Mortar	1004	1
27	Mortar	1005	1
28	Mortar	1006	1
29	Mortar	1007	1
30	Mortar	1008	1
31	Mortar	216	1
32	Barnacles	1009	1

Appendix 6 Photographic Record

Ricoh Caplio 500 G wide, 8 Megapixel

(1) Referred to in the text

Reference	Details
RIMG0008	Pre-excavation view of Trench 1 at southern wall-walk, looking south
RIMG0065	Post-excavation view of Trench 1, looking south
RIMG0053	Pre-excavation view of Trench 2, looking west
RIMG0234	Trench 2, with slate flue cap C212, tarred felt offset C210 and deposit of mortared rubble C204, looking south
RIMG0357	Trench 2, view of lead flashing C211 and bitumen sealant C227, looking west
RIMG0363	Trench 2, possible wall-walk surface C222 and mortared rubble deposit C224, looking north
RIMG0093	West wall of Keep, weephole C232 and other weepholes, looking east
RIMG0409	View of interior of weephole C232, looking west
RIMG0100	View of interior of weephole C232, looking east
RIMG0033	Trench 3, pre-excavation view, looking west
RIMG0123	Trench 3, post-excavation view, looking south-west
NIEA	View of battlements and chimney stack *c*.1900
NIEA	Aerial view of Keep *c*.1960, St Joseph QV043
Belfast Telegraph	Repairs to battlements, *Belfast Telegraph* 8 May 1931
RIMG0173	View of south-west spiral staircase shaft
RIMG0220	Blocked doorway in south-east spiral staircase
RIMG0431(2)	View of second floor fireplace, looking west
RIMG0290	View of third floor fireplace, looking west
RIMG0282	View up chimney flue from second floor fireplace

(2) Supplementary

Reference	Details
DSCN7621	Trench 2, Modern fills containing damp-proof courses, looking north
DSCN7622	Trench 2, Modern fills containing damp-proof courses, looking west
DSCN7627	Trench 2, slate cap, looking north
DSCN7629	Trench 2, slate cap, looking west
DSCN7630	Trench 2, eastern edge of chimney stack, looking south
DSCN7632	Trench 2, damp-proof course behind basalt blocks
RIMG0239	North wall of Keep, looking south
RIMG0291	Third floor fireplace, view of lintel, looking north
DSCN7661	Trench 2, wall-walk old surface? Looking north
RIMG0205	Trench 2, eastern edge of chimney stack and tarred felt offset
RIMG0296	Third floor fireplace, view of lintel, looking south
RIMG0180	Current entrance to south-west spiral staircase
RIMG0402	Trench 2, overview of weephole and slate cap, looking east

RIMG0110	Trench 1, Post-excavation view, looking north
DSCN7664	Trench 2, old wall-walk surface, looking west
RIMG0068	Trench 1, surface of mortared Cultra stone rubble/surface
RIMG1015	Third floor fireplace, barnacle-covered stonework
RIMG0012	Battlements of Keep, looking south
RIMG0011	Battlements of Keep, looking east
RIMG0009	Battlements of Keep, looking west
RIMG0010	Battlements of Keep, looking north
RIMG0081	North-west squinch arch, looking north-west
RIMG0175	South-west spiral staircase, traces of stone steps
RIMG0294	Third floor fireplace, view up flue, looking west
RIMG0366	Trench 2, mortared stone rubble above surface

Figures

Period	Date	Period	Date
I	1177/1178-1190/1195	VI	1560s
II	1216-1224	VII	1700-1714
III	1226-1242	VIII	1761
IV	1328-1333	IX	1790-1830
V	1556-1559	X	1855-1889

Figure 02: Time periods suggested by McNeill (1981, 41-51)

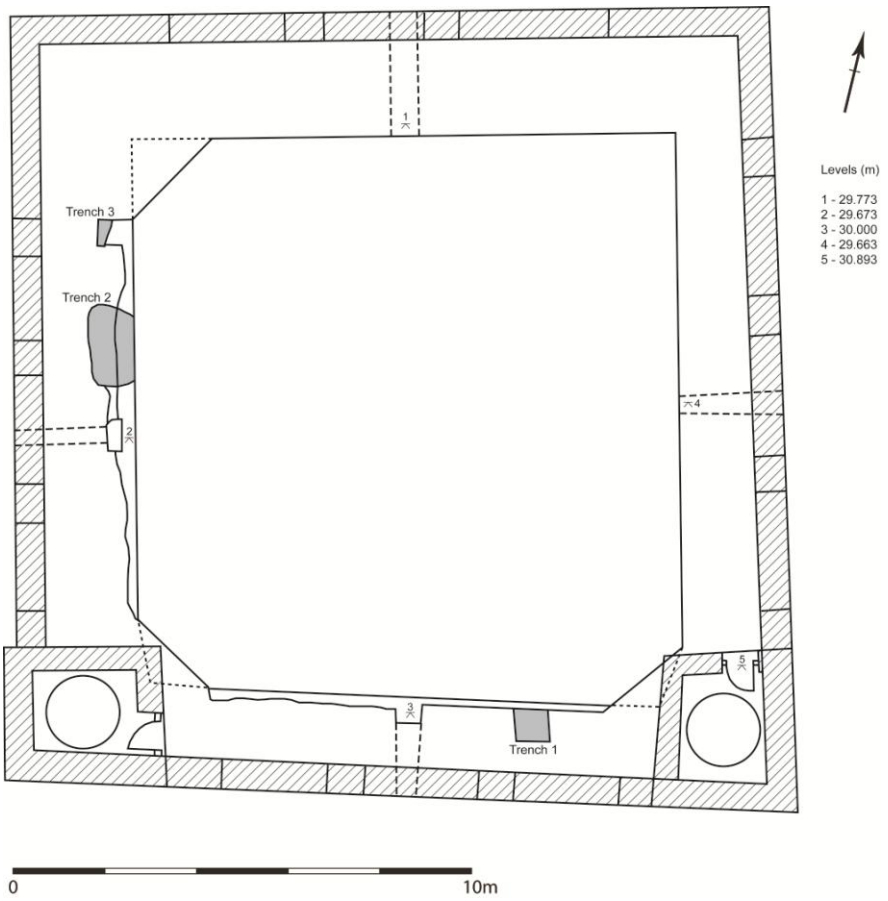


Figure 03: Plan of battlements, showing excavation trenches

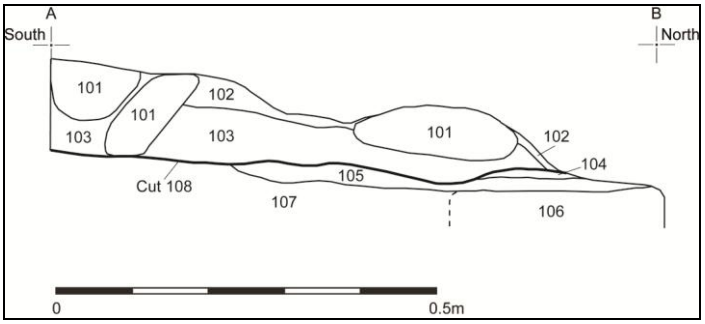


Figure 04: Trench 1 east-facing section

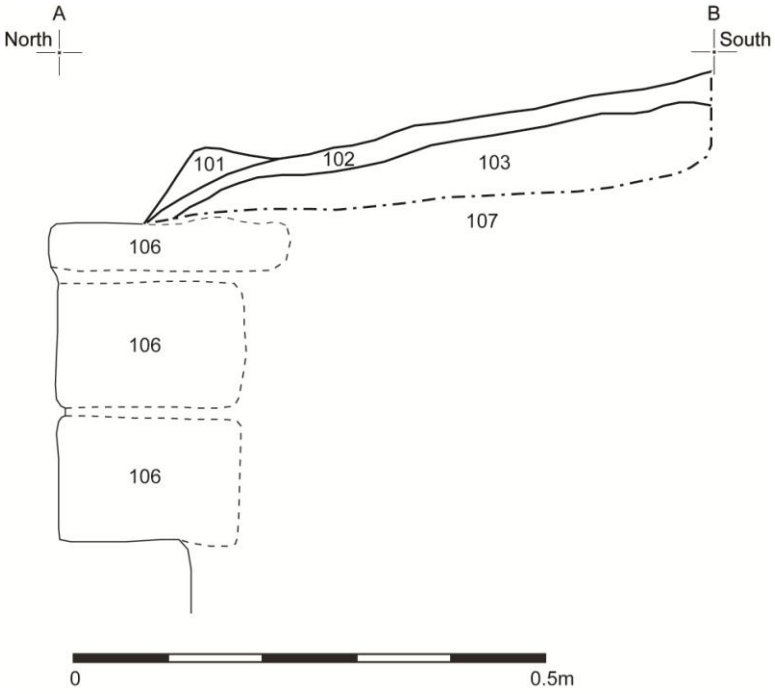


Figure 05: Trench 1 west-facing section

Figure 06: Trench 2: Plan

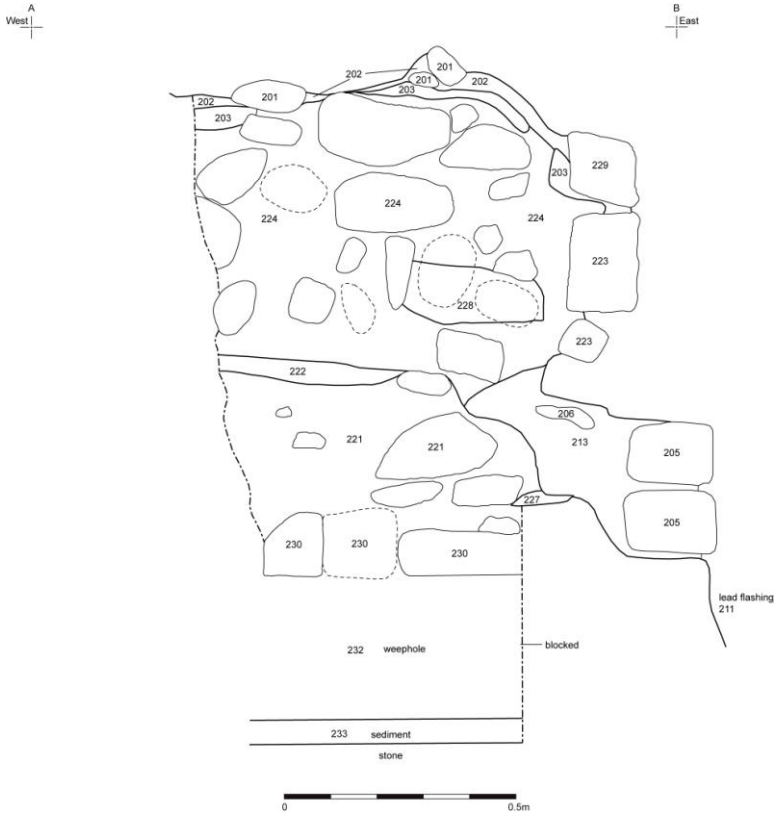


Figure 07: Trench 2 south-facing section

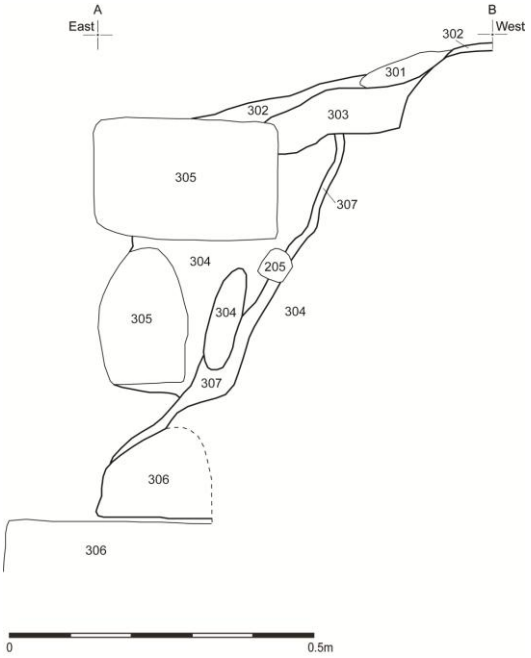


Figure 08: Trench 3 north-facing section

Plates

Plate 01: Pre-excavation view of Trench 1 at southern wall-walk, looking south [scale 2m]

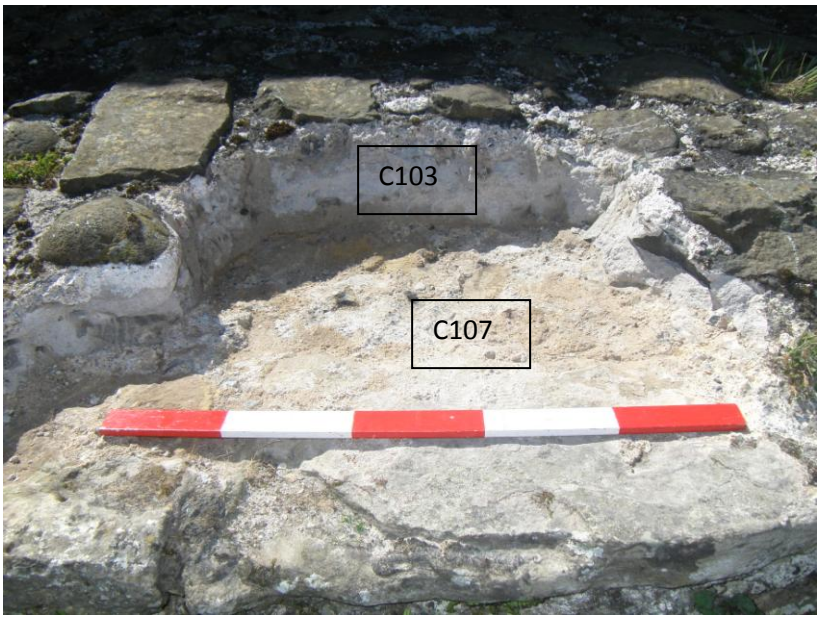


Plate 02: Post-excavation view of Trench 1, looking south [scale 0.5m]

Plate 03: Pre-excavation view of Trench 2, looking west [scale 1m]

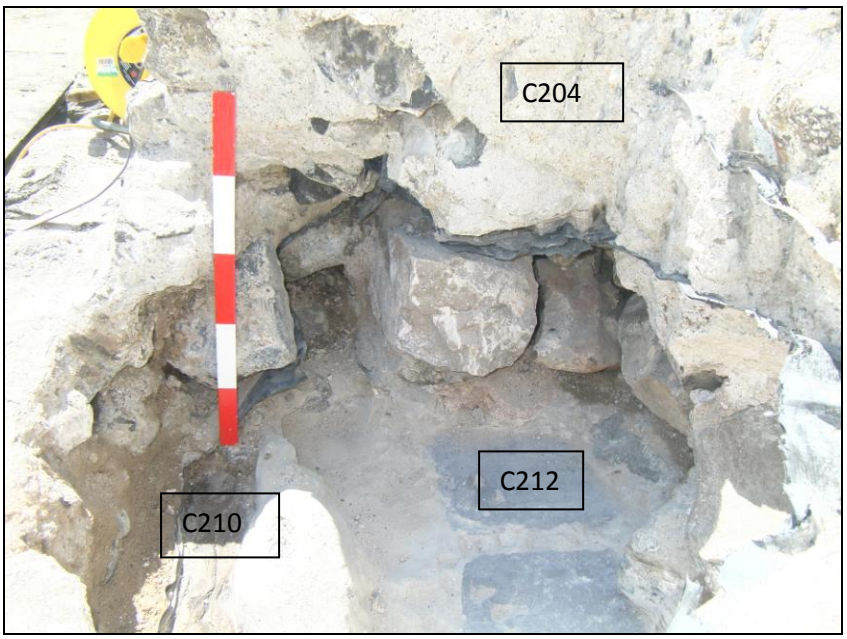


Plate 04: Trench 2, with slate flue cap C212, tarred felt offset C210 and deposit of mortared rubble C204, looking south [scale 0.5m]

Plate 05: Trench 2, view of lead flashing C211 and bitumen sealant C227, looking west [scale 0.5m]

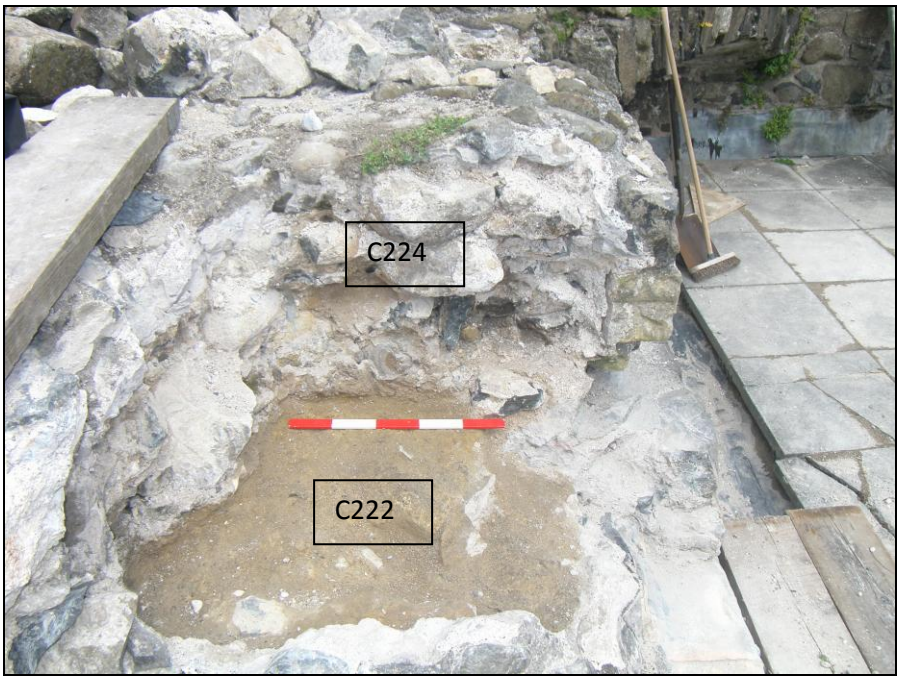


Plate 06: Trench 2, possible wall-walk surface C222 and mortared rubble deposit C224, looking north [scale 0.5m]

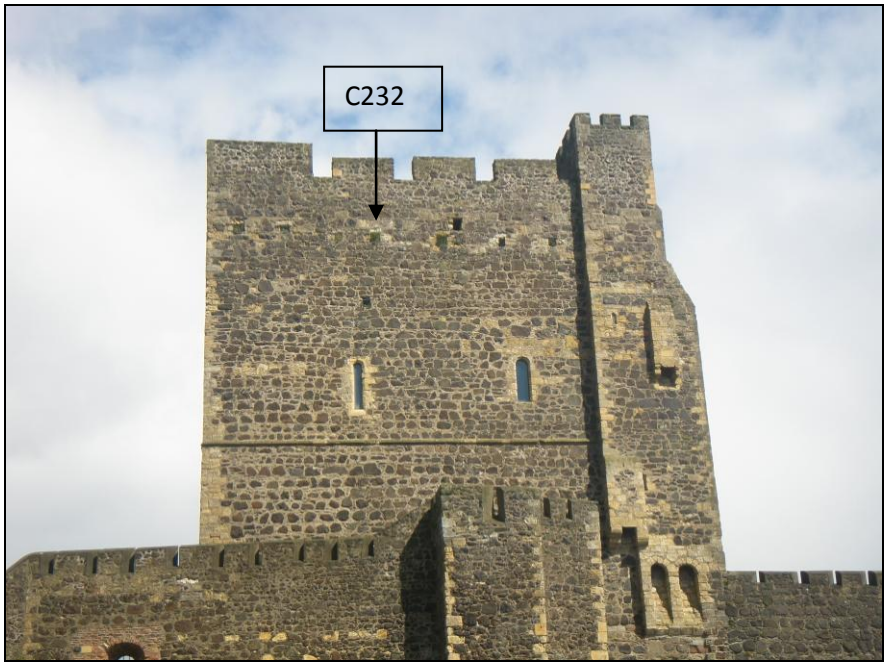


Plate 07: West wall of Keep, weephole C232 and other weepholes, looking east

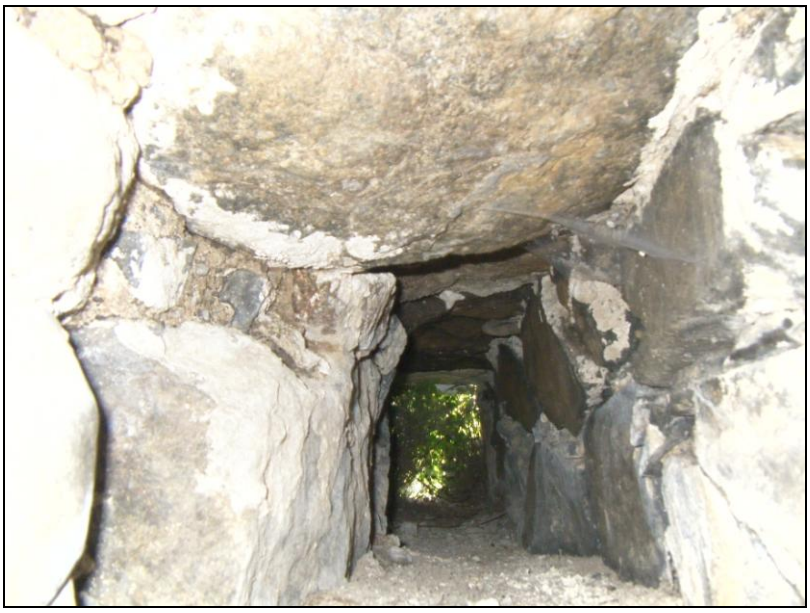


Plate 08: View of interior of weephole C232, looking west

Plate 09: View of interior of weephole C232, looking east

Plate 10: Trench 3, pre-excavation view, looking west [scale 0.5m]

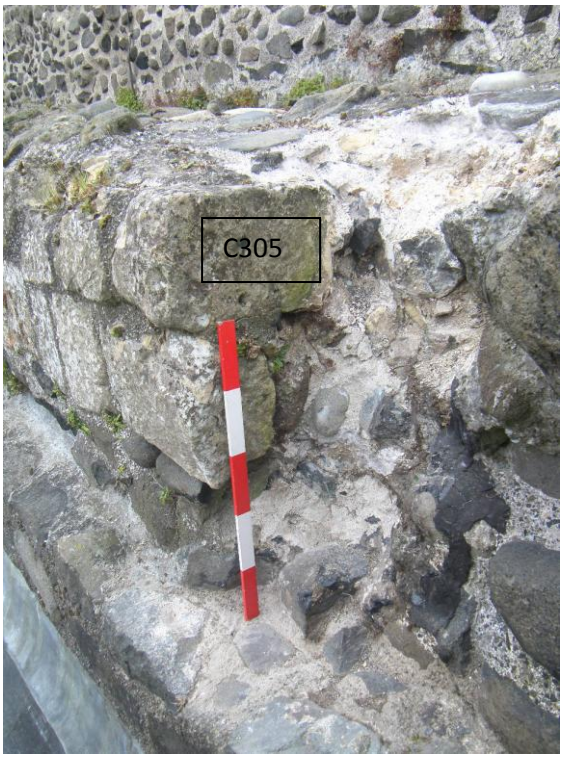


Plate 11: Trench 3, post-excavation view, looking south-west [scale 0.5m]

Plate 12: View of battlements and chimney stack *c*.1900, *NIEA*

Plate 13: Aerial view of Keep *c*.1960, St Joseph QV043, *NIEA*

Plate 14: Repairs to battlements, *Belfast Telegraph* 8 May 1931

Plate 15: View of south-west spiral staircase shaft

Plate 16: Blocked doorway in south-east spiral staircase

Plate 17: View of second floor fireplace, looking west

Plate 18: View of third floor fireplace, looking west

Plate 19: View up chimney flue from second floor fireplace