Report on the Third Season of the Tre'r Ceiri Conservation Project May to October 1991

Part 1: Text

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Introduction.

Tre'r Ceiri, Llanaelhaearn (SH 373446), occupies the easternmost of the three peaks of yr Eifl, which rises to 485m OD. Although it is one of the best preserved stone-built hillforts in Britain, increasing concern about the deterioration of of the remains prompted Cyngor Dosbarth Dwyfor, in conjunction with Cadw: Welsh Historic Monuments and Gwynedd County Council, to embark in 1989 on a conservation programme to consolidate the site. The Gwynedd Archaeological Trust was commissioned to supervise archaeological aspects of the project and record works as they progressed.

The third season of the project began in May 1991, with a preliminary phase during which the condition of those areas due for conservation was recorded. The main works began on 10 June, continuing until 11 October.

Staff and Supervision.

Works were again conducted by W.H. Evans, W.O. Ellis and D. Ll. Jones, all of E & E Stone Masons, Penrhyndeudraeth, under the supervision of the writer. Monthly site meetings were attended by Mr. A Davies of Cyngor Dosbarth Dwyfor, Dr. M. Yates of Cadw, Mr. J. St. Paul of Gwynedd County Council and Mr. P. Fasham of the Gwynedd Archaeological Trust, at which the progress of the project was discussed and work programmes arranged.

Progress in the third season.

During the third season work continued on the north-west side of the main defensive wall (Fig 1). Approximately 120 metres of wall from Hut 80 towards the north postern was conserved, along with Huts 77, 80, 111, 112A, 37, 114, 38 and 115. Some further work was also carried out in the passageway of the north postern. Photographic recording of the main wall from Collapse I to Collapse L5 (see Fig 16) was completed, as was a complete resurvey of the wall from Hut 80 to the north postern. At the end of the season a survey was undertaken of the south-west entrance to the fort, in preparation for the 1992 season: a report on this has been prepared separately.

Recording methods.

As in previous seasons, a full written description was made of all works as they progressed, supplemented with photographs and, where appropriate, with drawings.

The problem of plotting accurately the position of each repaired stretch of wall on the existing plans of the site was discussed in the report on the 1990 season (Boyle 1991, 4). In the third season this problem was overcome with the aid of Total Station survey equipment. As in previous years, the baselines for drawings and the position of repaired stretches of wall were tied to temporary fixed points, either survey arrows or chalk marks on



Fig. 1. General Plan (after R.C.A.H.M. 1960) showing areas conserved during the second season.

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Fig. 2. The Ramparts: points of collapse (after Dallimore 1978).

secure rocks. These points were then surveyed in with the Total Station, for which a network of more permanent stations, marked by unobtrusive drill holes on boulders, was established. The instrument was also used to resurvey that part of the main wall conserved during the year (Fig 16). Points were taken at approximately one metre intervals along the top and bottom of both the inner and outer faces, resulting in a much more accurate plan than was previously available. The survey also plotted the surviving stretches of parapet for the first time.

Measured drawings were again made when photographs and written descriptions did not provide an adequate record. Huts 111, 112, 112A, 113, 37 and 114 were completely redrawn, but for nos. 77, 38 and 115 the 1980 Plowman Craven plan, with slight modifications, proved to be adequate.

About 1800 photographs were taken during the season. Black & white and colour print film was routinely used to record the walls before, during and after conservation, while colour slides were taken of points of particular interest.

A start had been made in 1990 on an overlapping sequence of 'before conservation' views of the main wall, working north-west from the north-west gateway, and reaching as far as Collapse I (see Figs 2 & 16). In 1991 this sequence was extended as far as Collapse L5. These photographs were taken with some care with the camera mounted on a tripod at a constant distance of 4 metres from the wall face. The camera was frequently below the level of the base of the wall, so a 28mm shift lens was used to correct the problem of converging vertical lines which would normally result from such a low viewpoint. The scales in these photographs were placed 2 metres apart (usually to within +/- 0.02m) so that in each frame the area between the scales occupied only about 40% of the negative, thus reducing distortion across the width of the frame to a minimum. The method is time consuming, but can be justified on two counts. In the first place the use of the shift lens allows the masons to work with photographs which 'look' correct, instead of the severely distorted images which had been used before. Secondly, as the distance between each pair of scales is recorded, their position can be plotted accurately and thus photographs of any point on the wall can be retrieved very easily.

Visitor Damage.

Treasure hunters continued to plague the site during 1991. Random checks were occasionally carried out on the huts in the central area of the fort, and freshly dug holes were encountered in 5 places. One hut, number 78, was attacked for the second year running, as described below. The summit cairn was also further damaged, when a hole was dug on its eastern edge. The most serious single act of vandalism, however, was a rectangular 'structure' built just outside Hut 61, built from stones pulled from the hut wall (Plate 1). It can only be hoped that the replacement of the noticeboard on the approach to the site in 1992 will go some way to alleviating this problem.

Details of Work Completed.

Details follow of all works completed during the third season. The huts are described first, followed by the main wall. Fig 16, at the back of the report, shows the location of each repair to the main wall.

Reference is occasionally made to earlier surveys of the site, and to save repitition these are best outlined here. The first of was compiled by Harold Hughes, in or around 1906, and is to be found (at a very small scale) in his report on the 1906 excavations (Hughes 1907). In 1956 the RCAHMW replanned the fort for the Caernarvonshire Inventory (RCAHMW 1960, fig 83). A third plan was produced in 1980 by Plowman Craven & Associates, based on aerial photographs. Two other studies of the site are also referred to: a detailed written description by W.E.Griffiths for the RCAHMW in 1946, and an assessment of the condition of the site by Keith Dallimore, produced in 1978 for the Welsh Office. Dallimore identified and described the most serious collapses to the main wall (Fig 2) and his numbering of these has been taken as the starting point for labelling the repairs carried out in the present project.

Hut 77 (Fig 3).

A large rectangular hut set against the fort wall, measuring 9.6m \times 3.1m internally with a probable entrance in the south-east side, 2 metres from the east corner (Fig 3).

The south-west wall stood up to 1.0m high and was generally in good condition (Plate 2), although there was a hole at the west corner, dug 0.4m below ground level. This hole exposed the facing of the fort wall, demonstrating that the hut had been built against it. The north-west wall was also up to 1 metre high, although it dipped to about 0.7m halfway along (Plate 3). Towards the north corner was a short stretch of loose, slumped walling (Plate 4), and against the base of the wall was a recently dug hole 0.4m in diameter and 0.4m deep.

The north-east wall of the hut was much collapsed, and only a short stretch of facing survived (behind and to the left of the right hand scale in Plate 5), while the south-east wall was mostly grassed over except at the south corner, where there was a short stretch of facing up to 1 metre high. A stone lying in front of this had clearly fallen from the wall face (Plate 6). At the entrance the wall was reduced to footings, but the line indicated on Fig 3 was fairly clear. A footpath ran along the outer edge of this wall.

The hatching on Fig 3 indicates the stretches conserved. The two holes in the hut floor were filled in, and the hole in the southeast wall was plugged with the fallen stone. Some work was necessary on the north-east wall to prevent further slippage, but this was limited to stabilising the remains by inserting a few



Fig 3. Hut 77 after 1980 Plowman Craven plan, with modifications.

pinning stones, and replacing one large slab (behind the right hand scale in Plate 5), which could not be stabilised because of its shape, with another, weathered, stone brought from the scree (Plate 7).

The north-west side required most attention. About halfway along the wall were two stretches of loose, slumped masonry. Most of the stones on the edge of the wall here appeared to have slipped from the core behind, and it is likely that the grassed-over 'humps' in front of the wall concealed the original facing stones. The loose masonry was cleared away and replaced with up to 0.4m of new facing. To avoid excavating the hut floor, some large stones were brought from areas of natural scree nearby. This work raised the height of the wall to about 0.85m (see Plate 8).

The most serious collapse on this side of the hut was towards the north corner, where a stretch 0.6m wide could not be stabilised. The stones to either side of this stretch were marked as a precaution (Plate 4), but were left untouched. The unstable masonry was then removed, to about 0.25m from the ground, and the wall was rebuilt to a height of 1.05m (Plate 9).

Plate 10 shows the north-west wall after conservation, with large heavy slabs placed along the top edge of the wall to prevent future collapse.

Hut 78 (Fig 1).

This hut was consolidated during the 1990 season. However, in October 1991 a hole was dug in the hut floor, presumably by treasure hunters. 0.8m from the south-west wall of the hut, and about halfway along that wall, it measured 0.7m x 0.6m and 0.6m deep. The hole was photographed and then backfilled.

Hut 80 (Fig 1).

In 1946 Griffiths described this as a circular hut, 2.1m in internal diameter, its wall buried beneath turf apart from a stretch of inner face 0.75m high on the north. The entrance was on the east. Before conservation it appeared much as Griffiths saw it, though a sharp angle at the north, and very probably on the west, suggested it was square, 2.1m x 2.1m internally. The north-west wall was well defined, 0.6m thick and built against the fort wall, though only one course of facing was visible, except at the north corner, where it stood 0.3m high (Plate 11, left foreground). From the north corner the north-east wall stood 0.6m high for about 1.2m, the rest of this wall, and the whole of the south-west and south-east walls being totally turfed over, about 0.4m high and up to 1.5m thick. The entrance was on the south-east, perhaps 0.85m wide at its inner edge.

Only at the north corner was any work necessary. Here the upper part of the wall was loose, and likely to collapse at any moment. The upper 0.35m of the wall was dismantled and rebuilt. Stones were not marked before being removed, but only those taken from the wall, and those found lying immediately in front of it, were used. The large slab on the top of the wall was turned through 180° to lie more securely. The rebuilt wall measured 0.6m high, as before. The result is shown in Plate 12.

Huts 111, 112, 112A, 113, 37 & 114 (Figs 4 & 5).

This group of huts is depicted quite differently on each of the three surveys of the fort (see Fig 4). The visible remains are complicated, with walls in some places reduced to spreads of rubble, in others turfed over. A footpath now runs through these huts, and before the 1991 season the collapsed rubble in front of Collapse I, at the west corner of Hut 111, was used as an access over the fort wall. It was impossible to reconcile the various drawings of these huts, so a completely new plan was made before conservation work began. A simplified version of this is shown on Fig 5. Areas of stone are shown cross-hatched, and the footpaths are stippled. Otherwise the area was overgrown with heather and bilberry.

Hut 111 (Figs 4 & 5).

This hut was omitted from the RCAHMW plan, and was passed over by Dallimore. Hughes, however, did show it quite clearly, and it was



Fig 4. Huts 111, 112, 112A, 113, 37 & 114, as shown by Hughes, RCAHMW and Plowman Craven.



Fig 5. Huts 111, 112, 112A, 37 & 114, replanned 1991.

described by Griffiths as a sub-rectangular depression 4.6m x 1.8m, with walling visible on the north-west and the north-east, where an inner face stood 0.75m high. The Plowman Craven survey omits the hut altogether.

Before conservation the hut was fairly clear (Fig 5). The inner face of the north-east wall stood 0.7m high, and for about 2 metres from the north corner the north-west wall also stood up to 0.7m, although this had partially collapsed. The rest of this wall was defined by a sharp edge to a spread of small stones in front of the base of the fort wall, although no facing stones could be identified. Four large earthfast stones provided a convincing south-west end to the hut, while the south-east wall, although totally overgrown, stood 0.5m above the hut floor and 0.1m high above ground level outside the hut. A large edge set stone appeared to indicate the outer face at the east corner (see Plate 13 for a general view).

The interior of the hut was mostly grassed over, and there was a large hole at the north-east end. As this hole had exposed standing wall faces, it is likely that the present ground level over the rest of the hut is considerably higher than the original floor. A more recently dug hole, about 0.5m x 0.4m x 0.3m deep was recorded in June 1991 halfway along the north-west wall.

The only stretches of hut wall in need of attention were the tops of the north-east and north-west walls. The north-east wall required no more than the removal of small loose stones from the top of the wall, in place of which two heavy slabs were laid to strengthen the remaining original work.

Most of the remaining facing of the north-west wall, however, was found to be very unstable and already partly collapsed. This loose material was cleared away to the line indicated on Plate 14 and and a face about 2.1m long was rebuilt so that from a height of 0.7m high at the corner it tailed off as the ground level rose to the south-west. During conservation indications were observed of the top of a rough face continuing this line, but largely obscured by grassed-over rubble. These stones were not investigated further, but they would appear to confirm the impression that the original hut floor has been buried beneath tumbled stones. This suggests that beneath the present surface the hut may be well preserved. The loose stones removed from the north-west wall were not marked, but the same material was used to rebuild the wall face (Plate 15).

Hut 112 (Figs 4 & 5).

An irregular hut against the fort wall (Plate 16). Griffiths described it as an irregular depression about 0.75m below the general ground level, defined by its west wall and a short stretch of its east wall, both of which stood 0.6m high. It now appears much as Griffiths described it. The west wall is built of a mixture of large boulders and smaller laid masonry; the east and south walls are totally overgrown except for a 1.2m long stretch on the east, where laid masonry stands 0.7m high. A narrow gap at the south end, also noted by Griffiths, appears to be an entrance.

The north end of the hut is not clearly defined. What appears to be the base of a wall face, now much spread and reduced to ground level runs between the north ends of the east and west walls (Fig 5), but behind this is a 'dip' in the rubble against the fort wall, one side of this dip having a much ruined built face. It may be that the hut had a recess at this end, although it is equally likely that the north wall suggested on Fig 5 is no more than a spread of tumbled stones. The north end was the only part of the hut where the walls were not stable, but as there was not enough visible evidence to determine the true shape of the structure, it was thought best to record the remains and leave them untouched.

Hut 112A (Figs 4, 5 & 6).

Immediately south of Huts 112 and 113 Hughes planned the north wall and the south-west corner of a roughly square structure. Griffiths did not describe this at all, although the RCAHMW plan does show a short stretch of wall face at the south-west corner of Hughes' hut. During the 1991 season, enough traces of wall face were found to establish that a hut did exist here, and this has been numbered 112A.

Of the north wall, which is also the south wall of Hut 113, about 1.3m of the inner face survive, up to 0.3m high (two courses at the most). The north-west corner has been obliterated, and the north-east corner is obscured by vegetation and displaced stones. A short stretch of facing, up to 0.6m high and revetting rising ground, defines the line of the east wall, but the south-east corner and most of the south wall have collapsed completely. 1.75 m of the west wall survives, faced on both sides and up to 0.8m high. It is built mostly of laid slabs, with one large orthostat. This stretch has a squared off end which probably marks the south side of an entrance, but there is no trace of the north side of this entrance.

The most interesting feature of this hut is at the south-west corner (Plate 17). Here the south wall stands about 0.8m high, and the upper courses overhang the lower in what appears to be the remains of corbelling. In Fig 6 the uppermost stone had fallen (dotted line), but matted roots still preserved a shape into which a stone lying at the base of the wall fitted neatly. This stone is likely to have been squeezed forward by pressure from the footpath above and so the void it left may not indicate its original position, but the stones below it all lay either horizontally or tipped back away from the face, and all were fairly secure, so that it appeared unlikely that there had been significant movement of the face here. The remains appear to suggest corbelling - the clearest indication of such a building



Fig 6. Hut 112A. Profile of south wall.

technique on the site. Indeed, as far as the writer is aware, the only other recorded evidence for corbelling in Iron Age Gwynedd comes from the recent excavations at Graeanog homestead, Clynnog (Kelly 1990,107), where the adoption of the technique is seen as a response to a growing shortage of long timbers for roofing, an explanation which would seem reasonable at Tre'r Ceiri.

This hut was not scheduled for consolidation in 1991, and as it is not adjacent to the main wall it is excluded from the current Scheduled Monument Consent. However, there was a real danger that pressure from the footpath immediately above the overhang would cause futher damage, and so as an emergency measure a pier of flat slabs was constructed beneath the most vulnerable point to provide support until proper consolidation works are undertaken. No attempt was made to build this in the style of the original, and it now obscures the overhang, but it will not be difficult to dismantle it without damaging the original work when this hut is consolidated.

Hut 113 (Figs 4 & 5).

A subrectangular hut between Nos. 112A & 37. Hughes planned the

west end of this, as did the RCAHMW in 1956. There appears to have been some excavation here in 1939, the unpublished report noting that "The clearing at the south west corner [of Hut 37] revealed another hut, before completely hidden. Only part of it was uncovered, but it also appeared to have been reduced in size by a blocking wall" (Anon, n.d.). Griffiths described this as an irregular depression with a curving inner face on the west which emerged on the south as a wall of loose stones 1.4m thick. The 1956 RCAHMW plan agrees well with both Hughes and Griffiths, but suggests an east end by indicated a drop in ground level.

Replanning in 1991 enabled the shape of the hut to be more clearly defined. The west wall, up to 0.4m high, is of laid slabs except at the north-west corner where there are two large orthostats, one of which has been pulled out of position (shown 'blacked-in' on Fig 5). The south wall consists of a band of stones as described by Griffiths, but it can be traced further to the east where there are two large stones in heather-covered rising ground. The north wall is defined by the south corner of the outer face of Hut 37: its west half stands up to 0.3m high, but its east half consists of no more than a line of boulders which runs into overgrown rising ground. A north-east corner is suggested by one large stone, protruding from rising ground, set approximately at a right angle to the north wall. Thus defined the remains suggest a hut about 4.2m x 2.1m. There is no trace of an entrance.

This hut is not due for consolidation until work begins on the footpaths across the fort: a path runs right through the centre of the hut, but apart from the south wall, the remains of which are loose and much spread, the surviving walls do not appear to need any treatment.

Hut 37 (Figs 4 & 5).

Hughes planned this hut as a sub-rectangular structure, and in 1906 it was excavated. Bones (including a jaw and a tibia of a horse), charcoal, pot-boilers, a stone rubber and a white pebble are listed as the finds (Hughes 1907, 40). The hut was reexcavated in 1939 by Hemp, Bersu and Gresham, who found evidence that it had originally been roughly circular, about 4.3m-4.6m in diameter, across which a blocking wall had been built to give it a rectangular shape. It has not so far been possible to trace the original records of this excavation, and the summary report is not easy to reconcile with the remains now visible:

'Heather and soil were cleared away over the area suspected of being a blocking and part of the original wall of the circular hut was discovered at the north end. Along the west side this was destroyed except for the large foundation stones. It may possibly have collapsed and been reused for the later blocking, or have been destroyed to make that blocking. The remaining portions of the earlier hut suggested that it had been almost circular, with a diameter varying between 14 and 15 feet, though it may have had a break in it ... on the south-east side.' (Anon, n.d.).

In 1946 Griffiths described the original hut as being 4.9m in diameter, with a well preserved wall on the north-west, but ruined elsewhere, although the inner face had been 'laid bare ' on the north-east (0.45m high) and on the east (0.9m high). The blocking wall was 0.75m high and similar in build to the original wall ('large stones laid in terraced fashion').

About 2.0m of the east wall is now visible, up to 0.6m high. The line of the south wall appears to be represented by the boulders which form the north wall of hut 113. It may be that these are the large foundation stones mentioned as defining the west wall of the hut in the 1939 report, and that there has been some confusion over the compass bearings: the wall around the west side of the hut certainly survives as more than a foundation. The south-east arc of the roundhouse wall cannot now be identified with any confidence. Fig 5 shows a number of flat slabs set into rising ground to the south-east of the modern footpath, but these would suggest a much larger hut than that described in either 1939 or 1946. An alternative line is suggested by a single flatfaced boulder in the centre of the footpath. This continues the arc suggested by the north-east wall, but would not line up with the remains of the south wall unless the surviving line of boulders there are seen as the *outer* face of the hut wall. Unfortunately no straight joint was visible in the south-east face of the blocking wall which might have indicated the line of the round hut wall.

The later rectangular hut is better-preserved. The south-west and north-west walls stand 0.9m-1.1m high, built of large laid slabs. The south-east wall (the 'blocking wall') stands up to 0.8m high at its north end, and again is built of laid slabs. Some 1.5m thick, its outer face stands up to 0.4m high. Towards the northeast end of this wall there is a blocked doorway. The north-east side of this is poorly defined, but it appears to have been 0.45m wide. The blocking consists of three huge slabs of rock. The north-east wall of the hut is in poor condition, consisting of a rough revetment 0.6m high, partly collapsed and overgrown. A gap 0.8m wide was identified by Griffiths as an entrance to Hut 114, but only the west side of this is clearly defined.

The remains of the earlier hut needed no consolidation: all remaining stones were firmly set. In the later hut, the southwest and south-east walls had partly collapsed, but in general the tumbled stones were stable: some were embedded in the turf, and probably supported the standing portions of the wall, others were moss covered or overgrown, indicating that they had not slipped recently (see Plates 18 & 19). Some of the smaller stones lying on top of the south-east wall were loose, but the main structure of the wall was secure, and the effort required to secure a few loose (and probably already displaced) stones, with the inevitable change in the appearance of the hut that this would cause, did not seem justified. The north-east end of the hut, although partly collapsed, was also overgrown and judged to be in no immediate danger of further deterioration.

Only on the north-west wall, therefore, were any repairs carried out (Plate 20). In the main this involved a minor rearrangement of the uppermost stones, with the addition of a few heavy slabs to keep the wall top secure. The only dismantling necessary was at one small area 2.3m from the west corner (Plate 21: scale is the right hand scale in Plate 20). Here Stone A was loose, as were the small stones immediately above it (these looked more like core material spilling forward into a gap in the wall than original facing stones). Stone A was reset more securely in its correct position, and three stones, chosen to fit the gap, were inserted above it. Above this , and as far as the north corner of the hut, large slabs were added to level the top edge of the hut wall and retain the stones farther back on the wall top (see Plate 22). Finally, 1.0m to the north-east of Stone A, a void in the wall face was filled with one stone (marked X on Plate 22). There were other voids in the face of the wall, but as the stones around them all appeared to be secure they were not filled. Plate 23 shows this wall after consolidation.

Hut 114 (Figs 4 & 5).

Hughes planned a small rectangular hut at this point, but identified facing only at its south-west end. In 1946 Griffiths described it as roughly square, with walls built of large boulders. The north-east wall was 'lost in a pile of large boulders'. The hut was discounted in the 1956 survey (margin note in copy of Griffiths' typescript in the National Monuments Record) and the space it occupies is depicted on that plan as part of Hut 37.

Before conservation (Plate 24, foreground, & Plate 25) the 'hut' appeared much as described by Griffiths. On the south-west a gap led into Hut 37; to the west of this a wall, 0.9m long, stood 0.8m high. The north-west wall, 0.6m thick and built against the fort wall, stood 0.8m high at the corner, built of rough laid stones. From the corner, walling could be traced for perhaps 2.4m, becoming increasingly rough, and at its north end consisiting of no more than a few stones piled on huge, apparently natural boulders. There was no trace of the north-east wall. Two huge slabs lay across the width of the 'hut', both angled down to the north-east at about 45°; these looked natural, but it is unlikely that the 'hut' ever extended beyond them. On the south-east side the ground rose sharply by 0.9m. Here there were traces of a rough revetment, largely collapsed.

Thus defined this structure measured 1.8m south-west to northeast by a maximum of 1.8m across the south-west end. The floor was very uneven, scattered with fallen stones and large boulders. It is difficult to imagine this as a dwelling of any kind, and it is perhaps best seen as an annexe to Hut 37. The south-west wall was stable, and no work could be done on the north-east end. The revetment on the south-east side was so badly ruined that its original character could not be made out. It was doubtful whether even the foundations remained, and so, as it was well away from any footpath, it was decided not to attempt any work here. Only on the north-west wall, therefore, was any work done (Plate 25). Some of the stones on top of the wall here were used to rebuild a small collapse of the main fort wall immediately above (Collapse J1), from where they had clearly fallen. The walling beneath these stones was loose, being composed mainly of small slabs, and to hold these in place a large slab on the top of the wall was pulled forward to the edge (arrowed on Plate 25).

Hut 38 (Figs 7, 8 & 9).

This hut was excavated in 1906, when it produced bones, charcoal, two sherds of 'black pottery' and fragments of what was interpreted as a 'leaf-shaped socketed lance-head' (Hughes 1907, 40). Griffiths described the hut in 1946 as a well-built circular hut 12 feet (3.66m) in diameter, and identified a possible entrance on the east, 'choked with fallen stones'. An entrance is shown in that position on the 1956 RCAHMW plan, as well as on Hughes' survey of ca. 1906 (Fig 7).



Fig 7. Huts 38 & 115, as planned by Hughes (1906) and RCAHMW (1956)

Fig 8, which shows the hut before conservation, is based on the 1980 Plowman Craven plan, amended during 1991. The hut was well defined, almost circular with a diameter of about 4.2m within walls 1.0m - 1.5m thick (Plate 26). The inner face of the wall stood to about 1.2m, although it was only 0.9m high on the southwest. Only on the north and north-east did any built outer face survive, and here it was no more than three courses high (Plate 27).



Fig 8. Huts 38 & 115. Amended version of 1980 Plowman Craven survey.

Apart from securing the uppermost stones of the inner face, repairs were necessary in four places: on the south, where the wall had collapsed into the hut; on the south-west, where the upper half of the wall was loose; on the north-east, where the upper courses had been lost; and at the 'entrance' on the east, which was choked with loose masonry. There were also two large holes in the hut floor, one on the north-east and one on the south-east, both against the wall. The north-east wall was tackled first. At the base of the wall was a large hole 2m x 1m and 0.6m deep. This extended 0.4m beneath the hut wall, and only one long slab prevented the collapse of the entire wall (Plate 28). Loose masonry in the void was cleared away and the void was packed with large stones. The hole in the hut floor was filled in with stones lying on the hut floor and 'spare' stones left over from repairs to other parts of the hut. The dip in the wall top above this hole, 1.3m wide, was filled with seven large slabs. One unstable stone (marked 'R' on Plate 28) was removed as it could not be properly secured.

To the west of this dip, as far round as the west 'corner' only minor works were needed. Large stones were used to secure the top of the wall, and one small void just below the wall top was filled. This work occasionally involved the removal of small loose stones.

Rather more work was needed on the south-west side of the hut, where, for about 1.4m, the loose upper courses had begun to slip out of position (Plate 29). Five large stones were reset, and a further three stones were added. The five stones which were relaid are marked on Plate 29 (A - E), although as they were already displaced the stones themselves were not marked before work began. Plate 30 (to the right of the scale) shows this stretch of wall after conservation.



0 1m

Fig 9. Hut 38: elevation of blocked south-west doorway, after clearance of collapsed rubble.

To the south of this stretch the hut wall had collapsed completely, and further collapse immediately to the east of this, where the standing wall had pushed inwards, appeared likely (Plate 31). Eight facing stones were marked and then removed along with the collapsed masonry.

Beneath the rubble about 0.5m of the wall face survived, but more interesting was the discovery that there had been an entrance to the hut at this point (Plate 32 and Fig 9). This would appear to have been a more suitable position for a doorway than the east side of the hut, where the steeply rising ground outside the entrance identified by earlier surveyors would have caused problems with drainage. However, this south doorway had been blocked with large headers, some of them set on edge and wedged in place with what would appear to be a certain amount of care (Plate 33). Therefore, if this was the original entrance, it was certainly blocked before the hut was finally abandoned.

In rebuilding the wall most numbered stones were replaced approximately in their original positions. Between these stones and the entrance some 0.3m of facing was added so that the wall top graded down towards the edge of the doorway. 'Leftover' stones were than spread in front of the wall to bring ground level up to that across most of the rest of the hut (Plate 30). From the east edge of the doorway this repair measured 1.4m wide.

The final repair in this hut was to the supposed doorway on the east. Here there was a gap 0.9m wide, choked with rubble which spilled into the hut. It has been noted above that the rising ground outside the hut makes this an unlikely position for a door, but two possible corners could be identified (stones D, H & I and A, B & C on Plate 34). The rubble between these 'corners' was loose, and as a footpath ran across the top of the hut wall here consolidation was necessary to prevent further collapse. Eleven stones were marked before work began (A - K on Plate 34), although it proved necessary to remove only D, J and K on the north side of the gap. The rubble was then cleared away, but no further evidence of an entrance emerged. It may be that stones D, H & I and A, B & C merely gave the the impression of forming the inner corners of an entrance because they were all long headers stacked one on top of another. There was, however, not enough evidence to be certain on this point, so the question was left open by closing the gap with well-locked stones set to give the impression of a collapsed wall, with stones protruding down into the hut (Plate 35).

Hut 115 (Figs 7 & 8).

A rectangular hut, its north-west side set against the fort wall, Hut 115 measured 5.8m by up to 1.8m internally (Plate 36). Before conservation the north-west and south-east side walls generally stood to about 0.9m high. The two end walls were less well preserved, although enough large stones survived to define their lines. The hut was set in a hollow, so that the two end walls and the south-east side were built against rising ground; only on the south-east was an outer face traceable, and here it was only one course high. The entrance, 0.7m wide, was at the south end of the south-east wall.

At the east corner of the hut the south-east wall stopped about 1.0m short of the north-east wall. The latter continued beyond the point at which they might have joined as a line of edge set stones revetting a 1.0m rise in ground level. This revetment then turned to the south, and could be traced for a further 5.0m as a rough line of stones, some of them huge boulders against rising ground, perhaps defining a small enclosure (Plate 36 and Fig 8). It was not clear whether the south-east wall ever met the northeast wall, but the visible remains, although poorly defined and somewhat confused, appeared to suggest a small side chamber, about 1m by 1m at this corner of the hut (Plate 37), a feature which is suggested on Hughes' plan (Fig 7).

Most of the north-west wall (Plate 38) required no more work than the addition or rearrangement of large stones along its top edge. At its north-east end, however, the wall had totally collapsed for 1.5m from the corner. The collapsed rubble was cleared away and it emerged that the lower courses of the wall survived (Plate 39). Most of these stones were secure enough to be left undisturbed, but about 1.0m from the corner a large slab, set on edge, was too unstable to be left (marked 'R' on Plate 39: it had already slipped out of position and the stones above it had slumped forwards. The irregular shape of this slab made it impossible to replace it securely as an orthostat, so it was replaced flat. The wall was then rebuilt to a height of about 0.7m to match the masonry to either side.

The base of the north-east end wall, composed of huge slabs, was in stable condition, but on the wall top one large stone was turned over to enable it to lie more securely (arrowed on plate 40), while two edge set stones beside this, which had slipped from the wall top, were removed (marked 'R' on the plate). These were an awkward shape and could only have been secured in their original positions by adding courses on top of them, so they were replaced with one large stone from the hut floor in front of the wall ('S' on the plate).

Very little work was needed in the rest of the hut. Five stones were added to the south-east wall to secure the original masonry, and an unstable, rounded stone on top of the south-west wall was replaced with a large flat stone (sketched on Plate 41). Finally, rubble left over from the repair of the north corner was used to fill in holes at the west corner (Plate 41) and halfway along the north-west wall. Plate 42 shows this hut after conservation. Main Wall, H-I.

Collapse H5 (Figs 10 & 16)

This suggestion of a 'ramp' onto the wall top at this point was first made in 1939:

'About 30 yards south [of Hut 37] a point on the inside of the main rampart was examined. Here the inner face was not continuous, but had an overlap, one face being 3' 6" behind the other ... This may have been one of the points at which access to the top of the rampart was obtained' (Anon. 1939)

The RCAHMW followed this interpretation in 1956, and the feature is marked with an 'R' on their plan of the site (see Fig 1).

Before conservation this feature was still well defined, although much of the surviving masonry was unstable. As it provided easy access to the wall top it was used frequently by visitors, with the result that stones from the top of the wall had spilled down the surface of the ramp, and the wall faces on either side were loose and in danger of collapse. It was clear that some dismantling would be necessary, so all loose masonry was first marked (Plates 43 & 44).



Fig 10. Collapse H5 after removal of tumbled masonry.

During removal of the collapsed material, a watch was kept for any evidence that the two wall faces turned to meet each other, but no sign of such a turn emerged. Instead it appeared that the overlap extended further in both directions. Fig 10 shows H5 after clearance. Before conservation the face running up from the south-west (Face A) could be traced as far as Stone 10, but once the loose was removed, facing stones could be followed for another metre. The other face (Face B) had been visible up to stone 14, but during clearance large boulders were uncovered continuing its line for almost a metre before disappearing into the wall core (Plates 45 & 46).

There was thus strong evidence that the 'ramp' was indeed an original feature. One might speculate that the provision of easy access to the wall top would have been desirable at this point, as for some 35m to the south-west, and for 50 metres to the north-east, access would have been impossible due to the the huts ranged against the face of the wall.

The exact form of the original ramp must be to some extent a matter of conjecture, and two attempts were made at rebuilding it before a satisfactory effect was achieved. Plate 47 shows the second rebuild. At the end of Face A the wall was dismantled to the line shown on Plate 43. All but two of the marked stones were replaced close to their original positions: Stones A and B had no 'length', and were of such awkward shapes that they could not be reset securely. Other large headers were then used to grade this wall face down to ground level. The total width of the repaired stretch was 2.3m, its height dropping from 1.2m at the south-west end (0.5m being 'new') to 0.3m at the north-east (original work no higher than ground level).

Rather less work was needed on the south-west end of Face B, where, apart from already tumbled material, only Stones K and L (Plate 44) were removed. It has been noted above that during clearance this face was found to continue into the wall core. The surviving courses of this continuation were stable and provided a firm base for rebuilding. At the north-east end of the collapse the wall face was built up to 1.05m high, the height being graded down towards the south-west to the level of the top of the wall core. Between 0.35m and 0.55m of facing was added here.

On the surface of the ramp six large slabs were embedded in small core material. These were arranged in as irregular a pattern as possible in order to avoid the appearance of steps, but they will provide firm footholds for visitors as well as preventing any renewed spillage.

Collapse H6 (Fig 16)

A dip in the top of the outer face of the wall (see Plate 48). It measured 2.35m wide overall, but its western half needed little work: two stones were used to fill the small gap at the extreme west edge, and stones A, B & C were moved slightly to lie more securely. To the east of this was a 1.2m wide stretch where the wall dropped by up to 0.45m. Small core material, which had slipped into the gap, was first removed to provide a suitable surface for rebuilding and 0.45m of new masonry (approximately three courses) was added. Large heavy slabs were then placed along the whole length of this collapse, thus raising the maximum height of new masonry to 0.6m. Plate 49 shows the final result. Collapse H7 (Fig 16)

Immediately south-west of Collapse I, a stretch of the inner face about 5 metres wide had partly collapsed. The lower courses had pushed outwards while the upper half of the wall had slumped backwards towards the core, probably as the result of a collapse within the body of the wall.

Plate 50 shows this collapse before conservation. At first it was hoped that only the upper courses would have to be dismantled, but once these had been removed it was clear that the lower courses were also unstable. After the stones in the lower part of the wall had been numbered, therefore, much of the wall was dismantled as far as the basal course.

The basal course had pushed out from the line of the standing wall to either side, so in order to avoid a pronounced 'kink' in the wall face these stones were reset further back on what was thought to be a likely line for the original face. The wall was then built up to a height of 0.95m - 1.1m. Numbered stones were replaced as closely to their original positions as possible, and apart from the addition of some large heavy slabs brought from the scree outside the fort to weigh down the upper courses, only those stones removed from the wall, or lying immediately to hand, were used. Plate 51 shows H7 after conservation.

Collapse H8 (Fig 16)

About 1.8m north-east of the north-east edge of H6, the wall top rose sharply by some 0.4m, leaving three courses of masonry exposed and at risk of collapse (Plate 52). Stones were placed against these, this new masonry being graded down to the level of the wall top at the north-east edge of H6. One or two loose stones, probably slipped from the wall top behind, were removed as this was done. At most, 0.3m of masonry was added (Plate 53).

Collapse H9 (Fig 16)

Here the top of the outer face rose sharply by 0.35m, leaving three 'courses' of original masonry at risk of collapse, much as was the case with Collapse H8 (see Plate 54). 0.3m of new masonry was added against these, and further stones were added to grade the wall top down over a width of 0.75m. One stone was also inserted into a void beneath stone 'x' on Plate 54. Finally a large slab was added to the original work at the north-east edge of this stretch to keep it in place. Plate 55 shows H9 after conservation.

Collapse H10 (Fig 16)

A minor dip in the top of the outer face, 2.1m wide and up to 0.25m deep, as shown on Plate 56. No dismantling was necessary

here: the gap was filled with large headers as shown on Plate 57.

Void H11 (Fig 16)

A void at the base of the outer face of the wall. A stretch 1.2m wide and up to 0.5m high required support (Plate 58). This was pinned using the techniques described under H12 (below). Immediately north-east of this pinning stones were inserted between two thin slabs close to the base of the wall, as the lower stone was loose. The total length of H11, therefore, was 1.65m. Plate 59 shows the result.

Void H12 (Figs 11, 16)

Beneath the north-east edge of H8 was a small void at the base of the wall, around which loose masonry was in need of support (Plate 52). Stones were inserted into the void and pinned by placing large stones against them, angled down towards the wall base (see Fig 11). The work was then covered with large looselyplaced stones, forming a 'buttress' 0.6m high, 0.9m wide and extending up to 1.0m from the wall face (Plate 53).



Fig 11. Diagram showing buttressing technique, Void H12.

Void H13 (Fig 16)

A short distance south-west of Collapse I was a huge void at the base of the outer face (Plate 60). Two stones, presumably slipped from the face, lay immediately in front of the gap, and the removal of these revealed a hole up to 0.8m wide, 0.9m high and 0.8m deep (Plate 61). Around the hole the wall was supported by large headers wedged together, which might have remained in place indefinately, but as the small core behind these was loose, it seemed prudent to fill the void. The technique described above under Void H12 was used once more: the hole was packed with large stones laid as headers, and in front of these were set pinning stones angled down towards the base of the wall. These were then disguised by covering them with one massive slab and several smaller ones, resulting in a buttress 1.75m wide, reaching 0.7m from the wall face and rising 0.4m above the scree around it (Plate 62).

Collapse H14 (Fig 16)

Behind Hut 80 a minor repair was needed to the top edge of the inner face. The uppermost stones were loose along a 1.3m stretch of wall, and halfway along this there was a dip 0.25m wide and 0.25m deep, filled only with small loose stones (Plate 63).

The loose stones were removed and the dip filled with larger material. Seven heavy stones were then placed along the top edge of the wall.

Void H15 (Fig 16)

A void halfway up the inner face of the wall, 0.25m high and 0.4m wide (Plate 64) was filled with one large stone and several smaller ones (Plate 65).

Collapse H16 (Fig 16)

Loose material on top of the inner face here was removed and replaced more securely (Plate 66). Generally only one course was removed along a stretch 1.1m wide (the uppermost stones on the photo were farther back on top of the wall), and only one course of heavy stones was added. A small void immediately below the north-east edge of this stretch was filled with one pinning stone.

Collapse H17 (Fig 16)

Another minor repair was needed to the inner face immediately north-east of H16 (Plate 50). Five loose stones were removed from a 0.75m wide stretch of the wall top, and replaced with larger stones. At most 0.3m of new masonry was added.

Void H18 (Fig 16)

Beneath the south-west edge of H10 there was a pronounced bulge about halfway up the outer face of the wall. Beneath this bulge, about 0.6m above ground, was a void, outlined on Plate 56, with loose masonry immediately above it. A major collapse seemed likely, so the wall was supported by inserting two pinning stones into the void and buttressing the base of the wall with large stones. Again, the work was concealed by covering it with loosely placed slabs, resulting in a buttress 1.7m wide, reaching 0.5m from the wall face (Plate 57).

Collapse I (Fig 16)

This collapse, one of the largest on this side of the fort, was first recorded by Dallimore. The upper part of the wall on the outer face had been lost and fallen stones lay against the base of the wall so that it stood no more than 0.5m high at the centre of the collapse, compared with a height of over 2 metres to either side (Plate 67). The inner face had also collapsed, and here collapsed facing and core material had spilled out onto the east corner of Hut 111 (Plate 68). It was thus easy for walkers to cross over the wall at this point, and indeed there was a well worn path over the rubble against the inner face. Repairs were clearly necessary to prevent further loss of original masonry.

The Outer Face.

Before conservation began the uppermost in situ stones right across the collapse were all numbered. This was done as a precaution in case of an unexpected mishap: in the event only one of these stones, too irregular in shape to be incorporated securely in the wall, was removed. Small stones from the wall core which had spilled onto the edge of the wall were then cleared away to provide a solid base for rebuilding. At the base of the wall the pile of collapsed masonry was cleared and the lower courses examined to make sure that they were secure enough to support a reconstructed face. The wall was then rebuilt using stones from this pile. At the centre of the collapse 1.0m of new masonry was added, and as the pile beneath it was lowered by about 0.7m this resulted in a face 2.2m high above the scree (Plate 69). It should be noted, though, that the base of the wall was not reached during clearance, so the true height of the wall will be slightly greater. The repair measured 6.2m wide at the top of the wall.

The Inner Face.

The tumble in front of the collapse was first removed, revealing 0.45m of standing wall (Plate 70). Much of this, however, was in poor condition, and after the stones had been numbered the unstable stones were removed. At the north-east edge of the collapse this clearance extended down to the top of the basal course.

The face was then rebuilt to the height of the original work to either side (about 1.1m), up to 0.9m of new masonry being added. Numbered stones were replaced as near as possible to their original positions. The collapse measured 1.75m wide. Plate 71 shows this stretch after conservation. Main Wall I-J.

Collapse I1 (Fig 16)

Between Huts 111 and 112 the upper half of the inner face of the wall threatened to collapse. Plate 72 shows this stretch before conservation. Stones K, J and E were all on the point of falling out; had they done so, those above would have fallen too.

The wall was dismantled to the line shown on Plate 72, that is to 0.65m above the base of the wall. At the base of the cleared gap four new stones were added (next to K and below J), and a few 'new' stones were required towards the top of the wall; otherwise the original stones were replaced very much as before, the wall being built to a height of 1.55m. This stretch was 1.25m wide (see Plate 73).

Voids I2 (Fig 16)

Immediately adjacent to collapse I3 were two small voids in the upper half of the inner face of the wall, each 'framed' by loose stones (Plate 74). These were filled in, only one stone (marked XX on the plate) being disturbed - this was turned to lie as a header. The lower void measured 0.3m wide and 0.2m high, the upper void was up to 0.5m by 0.3m. See Plate 75 for an 'after conservation' view.

Collapse I3 (Fig 16)

Above and behind the west corner of Hut 37 was a stretch of the inner face which, like Collapse II, was in danger of collapsing. In Plate 74 stones K, M and N, halfway up the wall, and stones R, T and U, close to the wall base, were all loose, and there was a void between R and U exposing loose core material. As most of these stones were being squeezed out of the face it was not possible to support this stretch by pinning the loose stones, so a patch up to 1.2m wide and 1.1m high (reaching down to 0.3m above the base of the wall) was dismantled (Plate 76).

When rebuilding the wall, most of the numbered stones were replaced in, or at least close to, their original positions. Only two, stones I and U, were not used in the face, and only two or three 'new' stones were used, apart from the large heavy slabs which were used, as always, to hold down the top edge of the wall. Plate 75 shows I3 after conservation.

Collapse I4 (Fig 16)

Immediately north-east of Collapse I, there was an overlap in the line of the upper courses of the wall, where the wall top running from the north-east curved behind that running from the southwest by up to 0.55m, and stood some 0.3m above it. The uppermost stones of the 'lower' face were loose and at risk of collapse. Six stones were marked before work began (Plate 77), though only four, A, B, C and D, were moved.

Stone A was straightened and laid flat. B, C and D were replaced on top of it in much the same positions as before, though at a more secure angle. Two extra stones were added, one above F, the other above and behind C and D, to add weight. In all a stretch 1.0m wide and 0.3m high was removed and replaced (Plate 78).

Voids I5 (Fig 16)

To the south-west of Voids I2 were two more voids which needed pinning (Plate 79). The first was 0.5m - 0.75m above ground and 0.65m wide. It was filled with six stones. The other was 0.35m - 0.45m above the first and 0.25m high. this was filled with three small stones (Plate 75).

Collapse J (Fig 16)

Dallimore identified a minor collapse here, 3.0m wide. Before conservation there was a dip in the outer face about 0.8m deep, with a pile of stones at the foot of the wall, some of them unweathered, suggesting that they had fallen recently. At the centre of the collapse the wall stood only about 0.6m above these fallen stones (Plate 80).

Repairing this collapse was a straightforward task. No dismantling was necessary, although as usual some small core material which had slipped onto the edge of the wall had to be cleared away. The stones at the foot of the wall were large and heavy enough to fill the gap securely. At the centre of this stretch 0.8m of masonry was added, while the pile of stones at its foot was reduced by about 0.5m, leaving a wall face about 1.9m high. The repair measured 2.85m wide (Plate 81).

Main Wall J-K.

Collapse J1 (Fig 16)

Directly above Hut 114, the inner face of the fort wall had slumped and partly collapsed. Plate 82 shows this stretch before consolidation. Stones A, B, C, D and H and the stones above these were all loose, especially H and D which were at risk of being squeezed out altogether.

The wall was dismantled to the line shown on Plate 82: the stones beneath G and H had to be removed to provide a firm base on which to rebuild. When rebuilding, numbered stones were replaced as close as possible to their original positions, although as the priority was to build a secure face in the style of the original, it was not possible to replace them at precisely the same angle as before (Plate 84). Up to 0.6m of masonry was rebuilt, taking the wall to a height of 1.4m. This collapse measured 2.15m in width.

Collapse J2 (Fig 16)

A minor dip in the inner face of the wall, immediately to the north-east of collapse J1. Facing stones at the top of the wall had been lost, allowing core material to spill into the gap (Plate 83). The loose material was cleared out, four stones were used to fill the gap, and an additional large slab was added on top to keep these in place (Plate 84, to right of scale). The dip was about 0.5m wide and 0.22m deep. Including the slab on top, 0.36m of masonry was added.

Collapse J3 (Fig 16)

Behind Hut 38 there was a sudden break in the line of the inner face of the wall. Where the face met the outer face of the west wall of the hut it stopped abruptly, continuing towards the north east from a point 0.7m farther back. It may be that the original wall face was dismantled when Hut 38 was built. In any case the true line of the top edge of the wall was not clear, the continuation to the north was rather vague and only 0.3m-0.4m above the top of the hut wall.

Collapse J3 was at the 'butt end' of the wall where it met the hut (Plate 85). Stones A, B and C were all very loose, stone C being in danger of falling, taking the other two with it. Stones F (which was set further back than the other stones) and G (which lay on the wall top behind A and B) both prevented stones being laid into the wall core, so these were removed along with A, B C and D. E was left undisturbed. Several attempts were made to rebuild this stretch using the original stones, but apart from D they all lacked the length necessary for stability, so other stones were used to rebuild the face (though stone A was replaced on the wall top, in its original position). The new work is 0.8m wide (at the top of the wall) and 0.45m high, beginning 0.5m above ground (see Plates 86 & 87).

Collapse J4 (Fig 16)

A minor collapse and general 'raggedness' to the upper courses of the inner face of the wall behind Huts 115 & 116, about 4.2m long overall (Plates 88 & 89). Most of the uppermost 'course' had been lost, leaving slipped core material on the wall edge.

The repairs to this stretch can be described as three sections. Firstly, for 1.95m from the west end a single line of large stones was all that was needed to secure the wall top. No dismantling was necessary, and only one change was made to the existing masonry: one stone (arrowed on Plate 88) was pushed back to the line of the face and laid horizontally. Secondly, from 1.95m to 2.65m from the west end, the base of the wall, the outer face and the remains of the parapet all began to rise steeply. Up to two 'courses' of stones (0.3m) were needed here to retain the loose core behind. The final stretch, 1.55m long, did require some dismantling (Plate 89), as stone G was being squeezed out and stones B, C, D, I and those above them were all loose. After numbering the larger stones, the wall was taken down to the line indicated on Plate 89. Stones B, C and D were not moved, as it proved possible to secure them by using different stones immediately above them. Stones G, H and E were replaced much as before, stone A was put back upside down and F was placed beside A. The rebuilt patch was 0.35m high, taking the wall height to about 0.75m. Plate 90 shows this stretch after conservation, with the new positions of the numbered stones.

Void J5 (Fig 16)

A small void 0.15m above the base of the outer face of the wall, immediately below Collapse J8 (Plate 91). 0.3m wide and 0.15m high, it was filled with one long stone, wedged in with a smaller stone (Plate 92).

Void J6 (Fig 16)

At the base of the wall here was a small void , above which a large slab appeared to have pushed out from the wall face by about 0.2m (Plate 93). The slab seemed to be stable, but any further slip would have caused the masonry above it to collapse backwards into the void, thus bringing down the entire wall. It was thought prudent, therefore, to construct a small buttress beneath the slab, built of large heavy stones angled down towards the base of the wall. This will prevent further movement of he wall. Overall, the buttress measures 0.45m wide, 0.3m high and protrudes 0.5m from the wall face.

Void J7 (Fig 16)

About 1.5m north east of J6 was another void at the base of the wall, 0.35m wide and 0.5m high (Plate 93). This was packed tightly with long stones laid horizontally. No buttress was needed here.

Collapse J8 (Fig 16)

This dip in the wall top measured 2.45m wide, and generally 0.35m deep (Plate 91). It was filled with seventeen large stones, laid in three or four 'courses', taken from the scree at the base of the wall (Plate 92). No dismantling or disturbance of original work was necessary.

<u>Collapse K (Figs 12, 13 & 16)</u>

This collapse, first noted by Dallimore, was one of the largest on the north-west side of the fort. The outer face had collapsed totally (Plate 94), while on the inner face the upper courses, at least, were ruined (Plate 95). This break lay on the most direct route between Yr Eifl and the summit of Tre'r Ceiri, and not surprisingly it was frequently used by walkers as a route over the fort wall. Rebuilding the wall was therefore essential to prevent the collapse widening further.

The Outer Face.

Before conservation the wall appeared to have collapsed completely for a distance of about 4 metres. To either side of this the upper courses had also fallen, the gap measuring about 10m overall. A large pile of scree spread downhill from the wall face. At the west edge the wall stood 2.6m high (Plate 96, centre of frame) but dropped away sharply. As it did so, the facing bulged considerably (Plate 97 and Fig 13), and it was clear before work began that some masonry would have to be dismantled. Eighty-eight facing stones were therefore numbered, although most of these were marked purely as a precaution against an accident. The facing on the east side of the gap appeared to be more stable (Plate 98), but once again much of the surviving masonry was numbered before work began.



Fig 12. Collapse K, outer face, after clearance of rubble.

The tumbled masonry was cleared away, and it emerged that some of the lower courses survived (Plates 99 & 100). At the east end of the collapse up to 0.5m of wall survived; generally, though, only about half this height remained. Almost all of these stones tipped forward, some at an angle of 45° or more, and together they described a pronounced arc which protruded about 0.7m forward of a line between the basal courses of the standing wall to either side of the collapse (Fig 12). This would appear to suggest that the spill had been caused by a collapse within the wall core, which had pushed the face outwards before bringing it down.

The remains of the lower courses were dismantled after numbering and, as far as possible, replaced in their correct positions relative to one another. Beneath these only one or two stones close to the west edge of the gap remained to suggest the original line of the wall, so a 'likely' line was followed to join up with the wall to either side.



1m

Fig 13. Collapse K, outer face (west side). Section through wall face.

Fig 13 shows the exposed section through the wall face on the west side of the gap, with the bulge mentioned above. To prevent wholesale collapse of the wall, work on this bulge was not started until several courses had been constructed across the gap. Only fifteen of the numbered stones had to be removed: these were replaced in roughly the correct order but pushed back to line up with the facing stones below. At the east end of the collapse there proved to be more loose and unstable facing stones than had first been thought, and the wall was taken down to the line indicated on Plate 101. In all, fifteen numbered stones were reset.

One final stage before the upper courses of the face were rebuilt was the construction of an extra 'face' within the core, about 5.0m long and 1.0m back from the true face (Plate 102). This was built to relieve pressure on the true wall face and thus reduce the risk of another collapse. The wall was then rebuilt, 2.45m high at the centre, but to match the standing wall on either side it was taken up to 2.6m at the west edge and 2.2m at the east edge (Plate 102). In all this repair was 9.3m wide, of which 4.45m was rebuilt from ground level.

The Inner Face.

On the inner face tumble again obscured the lower part of the wall, so that it was not known, before conservation, whether the face had collapsed completely (Plate 95). The standing wall to either side of the collapse had a pronounced batter, its top being about 0.6m back from the base. This is likely to have been the result of slumping, presumably caused by the collapse of the outer face.

Before work began, in situ masonry on either side of the collapse was marked: it was clear that the upper stones at least were unstable and would have to be reset. Once the tumble was peeled away, it was clear that much of the wall face survived, to a height of 0.8m, although all but the lowest two or three courses had slumped back towards the core. It was immediately apparent that some of the freshly uncovered stones would need to be dismantled, and these were numbered as shown on Plate 104.

The wall was then taken down to the line indicated on Plate 104. Some of the stones below this line had slumped back from the wall face (particularly below stones BE and BF), but these were extremely long slabs (up to about 1 metre), they appeared to be secure, and resetting them would have involved removing a substantial part of the standing wall; they were therefore left undisturbed and the voids between them were filled with long headers.

As the wall was rebuilt, stones were laid to match the batter in the facing to either side of the collapse, the angle of the face being brought closer to vertical towards the top. The wall was rebuilt to a height of 1.8m, of which up to 1.0m was 'new' (Plate 105). Measured along the top of the wall, the total width of this repair was 3.9m. Main Wall K-L.

Collapse K1 (Fig 16)

A 3.3m wide stretch of the inner face which had largely collapsed. Plate 106 shows K1 before conservation. At each end the collapse extended almost to the base of the wall; between these gaps most of the wall survived, though many stones were loose, and before work began it was not clear how many of these would need to be reset.

Twenty seven stones were numbered before conservation, although in the event most of the central section proved to be sufficiently secure, and only E, H, I, J, R and U were removed. Apart from Most of these were replaced as before, although R was laid upside down, I was 'lost' during rebuilding, and U, which had no depth, and lying on top of the wall served no useful purpose, was not replaced. Otherwise a wall face was rebuilt using stones from the pile lying immediately below the gap. As these stones were lifted, more of the lower courses of the wall were revealed. However, no attempt was made to excavate the pile of stones to locate the original basal course: only those stones needed to raise K1 to the height of the wall to either side of it were used: it seemed most improbable that the whole of this pile was composed of tumbled stones and to have removed more would have been to risk destabilising the rebuilt wall.

Plate 107 shows K1 after rebuilding. At the right hand edge of the collapse 0.75m was added, otherwise the wall was built up by 0.25m - 0.4m, resulting in a face 0.9m - 1.1m high, increasing towards the left (south-west) end as the ground dropped away.

Collapse K2 (Figs 14 & 16)

A minor collapse on the inner face, west of Hut 70 (Plate 108). The surviving wall to either side presented a ragged, irregular face of large blocks. These stones appeared to be stable, but as a precaution they were numbered before consolidation began. Plate 109 shows K2 after clearance, as does Fig 14.

The original line of the wall was not entirely clear. Two 'courses' of masonry (about 0.5m high) survived behind the rubble. The lower of these suggested a rough concave curve to the wall, but the upper 'course' consisted of a line of three roughly flat faced slabs which formed a sharp angle with the standing masonry to the west. There was insufficient evidence to establish which of these two lines was the more correct, and so as a comprimise a line between the two, retaining the angle but smoothing it out slightly, was followed (shown dotted on Fig 14). None of the numbered stones were disturbed during conservation.

Plate 110 shows K2 after rebuilding. 0.5m of masonry was added to the wall, bringing it to 1.0m high. As always the uppermost course was constructed of large heavy stones.

Collapse K3 (Figs 14 & 16)

Immediately east of K2 was another stretch, 2.5m wide, where the inner face had collapsed (Plate 111). Stones had spilled forwards from the wall top, and a surviving stretch of parapet immediately above the collapse was at risk. At the east edge the upper courses of the standing wall had slumped backwards towards the core. Some of these were clearly unstable, and so before work began they, and the stones around them, were numbered.



Fig 14. Collapse K2 and Collapse K3, after removal of tumble.

The tumbled stones were cleared away, showing that of the basal courses only three stones survived: one set on edge, one large block and a long header on top of this, all at the east edge of the collapse (Plate 112 and Fig 14). To the west of these were a number of long headers, all angled sharply downwards and lying on loose core material. These may have been slumped facing stones, but it is also possible that they formed part of the original core.

At the west side of the gap the wall was cleared right to the base of the wall, where a flat 'bed' was prepared prior to rebuilding. At the same time a void behind the standing masonry at the edge of the collapse, presumably the result of the facing stones slipping forwards, was packed with small stones. At the east edge of the collapse, three of the numbered stones had to be reset: the edge of stone G (Plate 111) was lifted and stone F placed beneath it, while stone H was straightened. Stone E appeared to have slipped forward, bringing the stones above with it, but as it was stable no attempt was made to push it back.

When rebuilding the face, a slightly concave line was taken between the standing wall to either side (dotted on Fig 14). This enabled the large block at the east end of the collapse to be incorporated as part of the face. It may appear from the plan that a convex face is suggested by the line of the masonry to either side, but these stones appeared to have slipped forward, and were not in situ. The wall was rebuilt to a height of 1.3m - 1.4m (Plate 113).

Collapse K4 (Fig 16)

Between Collapse K1 and Collapse K2, for about 7.5m, the upper courses of the inner face of the wall were loose and partly collapsed (Plate 114). Consolidation was necessary here not only to prevent further deterioration of the wall face, but also to retain the stones on the wall top behind.

Eighteen larger stones were numbered before work began, eleven of which were dismantled. Most of these were already displaced, and so no particular attempt was made to do more than replace them in the general area from which they came. Rather more attention, though, was paid to ensuring that no more stones were removed than was absolutely necessary to ensure stability.

The amount of dismantling/rebuilding required varied greatly along the wall, but roughly 0.3m - 0.5m was added, including heavy slabs along the upper edge. This brought the total height of the wall to 1.0m - 1.2m, high enough to secure the wall top behind (Plate 115).

Void K5 (Fig 16)

A void at the base of the outer face of the wall, 0.7m wide and up to 0.4m high. This was bridged by one thin slab, 0.75m long, which had snapped in the middle (Plate 116, the crack is immediately left of the scale). The void extended only about 0.25m into the wall, but loose core material was exposed and some of the small stones on which the bridging slab rested were also loose. The void was therefore filled in and a buttress built to support the broken slab.

The technique used was the same as that employed on other voids at the base of the wall. Four or five stones filled the void, angled down into the core, and these were disguised by placing loose slabs over them. This buttress extended 0.5m from the face, and stood 0.5m high.

Void K6 (Fig 16)

Above K5, halfway up the wall face, was a small void, 0.1m x 0.1m (Plate 116). The stone next to this was loose, and to prevent more stones working loose a long narrow stone was pushed into the void.

Void K7 (Fig 16)

Directly beneath the east edge of Collapse K9, close to the base

of the wall, was a group of three small stones, all loose (Plate 117). These were removed, leaving a void 0.3m wide and 0.2m high, which was packed with one large and two small stones to give the wall better support.

Void K8 (Fig 16)

A void at the base of the outer face of the wall, about 0.25m wide and 0.35m high, extending 0.35m into the wall (position indicated on Plate 118, although the scree in front obscures most of the void). Above the void the wall was supported by one slab, apparently laid as a stretcher. Long stones were packed in beneath this to give it additional support, and these were disguised by placing weathered stones loosely in front of them.

Collapse K9 (Fig 16)

A dip in the outer face , above Void K7 (Plate 117), measuring 1.45m wide. No dismantling was necessary here, though some stones which had slipped into the dip from the wall top were cleared out. At the centre of the gap 0.55m of masonry was added, raising the height of the wall to 1.4m (Plate 119).

Collapse K10 (Fig 16)

Where Hut 70 joined the fort wall the top of the inner face was loose and in danger of collapse. The unstable stretch was 4.15m wide overall (Plate 120).

It was the west end of K10 which gave most concern. Here the top of the wall bulged forwards, and several stones were squeezing out (from A to J on Plate 120). To the east of these, the uppermost stones needed resetting, but east of Stone T all that was required was the addition of a course of heavy slabs. Stones were again numbered before removal, and of the thirteen that were taken down, eight were reset almost exactly as before. After consolidation (Plate 121) the height of the wall measured 1.25m at the west end of the collapse (0.25m of this being added/rebuilt masonry), but as the gronud level rose towards the east it was only about 1.0m high at the east end (*ca.* 0.2m added).

Collapse K11 (Fig 16)

A minor dip, 1.75m wide, and about 0.25m deep, at the top of the outer face (Plate 122). This was filled with eight heavy stones. One stone, possibly part of the original facing, lacked the length necessary to ensure a stable edge to the wall, and was therefore removed.

Collapse K12 (Fig 16)

The top of the outer face rose sharply here (Plate 123), and it was clear that without some protection the stones at the top edge of this rise would be easily dislodged. Four heavy stones were therefore added to 'smooth out' the sharpness of the rise, and one slab lying on the wall top was moved forward to the edge (arrowed on Plate 123). The new masonry measured 1.2m wide and up to 0.25m high.

Collapse K13 (Fig 16)

Another minor dip at the top of the outer face (Plate 124) was filled with nine stones. No dismantling of *in situ* masonry was required. The dip was 1.2m wide and up to 0.25m of masonry was added, taking the wall up to 1.9m high.

Collapse K14 (Fig 16)

0.4m east of K13 was another dip in the wall top, this one 3.1m wide (Plate 125). Only one stone had to be removed before the dip was filled: a long stone laid along the wall edge which was relaid as a header. 0.3m - 0.4m of masonry was added, raising the wall top to 1.7m above the scree (Plate 126).

Collapse L (Fig 16).

This small collapse on the outer face was first recorded by Dallimore, who measured it at 2.0m wide. In 1991 it measured 3.3m wide at the top of the wall, narrowing to 1.5m. At its centre the wall dropped by about 1.2m to the top of a pile of fallen stones, but it was not clear before conservation whether the wall face survived behind this rubble (Plate 127). Some of the stones to either side were loose, and these were marked before clearance began. On the west side one large slab, (stone A on Plate 128) had slipped forwards by 0.2m and those above it (already removed in Plate 128) had slumped backwards. The stones on the east side side appeared more secure, but were marked as a precaution.

When the collapse had been cleared from the face of the wall (Plate 128), it emerged that most of the lower courses survived. Stone A was easily pushed back into line after the loose masonry above it was removed: this involved the removal of only one marked stone. On the east side of the collapse the wall was adequately supported by one huge header (stone AB), and only one slab, stone O near the top of the wall, had to be moved: this was pulled forward to the front edge of stone Q immediately beneath it.

The wall was rebuilt using the stones lying immediately below it (Plate 129). Stone B, the only marked stone to be removed, was replaced very close to its original position. At the centre of

the collapse, 1.3m of masonry was added, taking the height to about 1.9m, although 'leftover' stones from the pile of rubble were placed against the base of the wall at the centre of this stretch, making the height above the scree 1.55m.

Main Wall L-M.

Collapse L1 (Fig 16)

A minor dip in the outer face immediately east of Collapse L, 2.15m wide (Plate 130). Removal of *in situ* facing stones was not necessary, with two exceptions, marked X1 and X2 on the plate, both of which had tilted backwards. The front of X1 was pushed downwards, and the left hand side of X2 (as viewed on Plate 130) was lowered, so that both these stones presented flat upper surfaces for rebuilding. Up to 0.6m of masonry was added (measured from the base of X1) taking the wall height to 2.1m at the centre of this stretch (Plate 131).

Collapse L2 (Fig 16)

L2 was another dip, and general raggedness, at the top of the outer face of the wall, 4.05m wide (Plate 132). Towards the west half of the gap the wall stood only 0.7m high above the scree and tumble at its foot.

No *in situ* masonry needed to be disturbed to secure this stretch: the only stones that were removed were clearly displaced, and most of these had probably slipped forwards from the core. Clearance extended down to the line marked on Plate 132.

At the west end of the collapse up to 0.55m of masonry was added, using the stones piled beneath it. This pile was reduced in height by 0.35m, so that after consolidation the wall stood about 1.6m high. Further to the east, fewer stones were required on the wall top, 0.2m - 0.5m being added here (Plate 133).

Beneath the east end of this stretch, low down in the face was a void, 0.4m wide, 0.2m high and 0.5m deep (Plate 132, to right of left hand scale). Packing this void was considered, but as the stones above it were very long headers, and none of them seemed at risk of slipping, it was decided that this hole could be left as it was.

Collapse L3 (Fig 16)

This was another dip in the outer face, 2.75m wide (Plate 134). Generally only the uppermost stones were moved or replaced, and no more than 0.35m of new work added, but towards the east end of this stretch was a gap 1.1m wide where the wall had to be cleared to 0.85m above ground. Up to 0.5m of masonry was inserted

here, bringing the wall height to 1.35m. None of the stones which were removed appeared to be in their original positions, so none were marked before dismantling. Plate 135 shows this stretch after conservation.

Collapse L4 (Fig 16)

Where the north wall of Hut 70 abutted the inner face of the fort wall, the latter stood only 0.55m high for about 2.5m, before rising, raggedly, to 1.25m high (Plate 136). This stretch of wall was built chiefly of huge slabs, on top of which lay many loose smaller stones. Apart from the loose material on top, the wall was stable, but some work was necessary to support the sharp rise to the east.

The loose stones were cleared away first. Two of these were marked (A and B on Plate 136), although there was some doubt as to whether these were part of the original wall face or had slipped from the wall top behind. Four large slabs, secured with some smaller material, were then placed against the rise in the wall face. The new masonry measured 1.9m wide, and was 0.25m high at the west end, grading up to 0.8m high at the east. Plate 137 shows L4 after conservation. Stone A was moved down and slightly to the right, stone B was replaced in its original position, though in the plate it is concealed behind two new stones (immediately behind the scale).

Collapse L5 (Fig 16)

This was another minor collapse of the outer face of the wall, to the east of Collapse L3. Before conservation the wall was only 0.45m high above the fallen stones at its foot. This collapse thus provided an easy and much used access over the wall for visitors (Plate 138).

No dismantling of in situ masonry was necessary during consolidation. At the centre of the gap 0.4m was added, using the stones lying immediately below. This resulted in the ground level being reduced by about 0.35m so that the wall stood 1.2m high after conservation. This is still not an unsurmountable barrier to walkers, and some consideration was given to increasing further the height of this stretch. However, the top of the wall here slopes down to the inner face, so that raising the outer face would have been impossible without raising the entire wall top. Nor was it possible to reduce the level of the scree beneath the outer face by more than 0.35m, as this would have exposed the natural scree on which the wall was founded, thus weakening the face. Although the wall here is lower than anywhere else on this side of the fort, it is possible that it never stood any higher, and that the steep scree-covered slope in front of it was regarded as an adequate defence by the original builders. Plate 139 shows this stretch after conservation.

The North Postern (Figs 15, 16).

The repair to the lintel from the north postern was was not completed in time for it to be replaced during the third season. This will be a priority in 1992. In 1991 a minor repair was made to the east side of the passageway.

Fig 15 shows the elevation of this side of the passage (see also Plate 140). Much of this was rebuilt in 1989/90, and the bottom of the new masonry is indicated by stones marked 'x'. Some pinning stones had been inserted into a void at the base of the surviving stretch of original work, but these were not absolutely firm and there was a worry that they might eventually work loose and fall out.

Before removing the suspect pinning stones, a scaffold cage was constructed within the passage. Tied to this were 4 220mm diameter steel pins, inserted into gaps between stones above the pinning, in order to support the wall while works were carried out. The cage was designed by Mr. John Wyn Wlliams of the County Council Planning Dept.

Stones marked 'R' on Fig 15 were then pulled out, leaving a void 0.4m deep, 0.5m high and about 0.5m wide. Before work began it had been intended that some of the wall core would be removed to accommodate long pinning stones, but the core turned out to be well packed and secure: indeed it was probably doing much of the work of holding the wall up.

Three large stones were used to fill the void, with some small rubble used as packing. These were carefully selected from the scree outside the fort wall to provide the best possible fit, although one had to be trimmed slightly. The result is illustrated on Plate 141.





Fig 15. North postern. Elevation of east wall of passageway.

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